SERVICE MANUAL

PRICE $2.00
40
SERIAL NUMBERS
BEGINNING 10001

The Fisher®
40

Two- and Four-Channel Stereo
Home Music Center

WORLD LEADER IN HIGH QUALITY STEREO

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CAUTION: **This precision high-fidelity instrument should be serviced only by qualified personnel, trained in the repair of transistor equipment and printed circuitry.**

Many of these items are included only as a reminder — they are normal procedures for experienced technicians. Shortcuts may be taken, but these often cause additional damage to transistors, circuit components, or printed circuit boards.

SOLDERING: A well-tinned, hot, clean soldering iron tip will make soldering easier, without causing damage to the printed circuit board or the components mounted on it. Regular use of a sponge cleaner will maintain a clean soldering surface. The heat available at the tip, (not the wattage of the iron) is important. Some 50-watt irons reach temperatures of 1,000° F, while others will hardly melt solder. Small-diameter tips should be used for single solder connections, pyramid and chisel tips for large areas.

Always disconnect the AC power cord from the line when soldering. Turning the power switch OFF is not sufficient. Power-line leakage paths, through the heating elements of the iron, may destroy transistors.

PARTS REMOVAL: If a part is not being returned for in-warranty factory replacement, it may be cut in half (with diagonal cutting pliers) to make removal easier. Multiple terminal parts, such as IF transformers, or electrolytic capacitors, should be removed using special de-soldering tips made especially for this purpose. Removing solder from terminals, reduces the possibility of breaking the printed circuit board when the part is removed.

ACCIDENTAL SHORTS: A clean working area, free of metal particles, screws, etc., is an important preventive in avoiding servicing problems: Screws, removed from the chassis during servicing, should be stored in a box until needed. While a set is operating, it takes only an instant for a base-to-collector short to destroy a transistor (and others direct-coupled to it). In the time it takes for a dropped screw, washer, or screwdriver, to contact a pair of terminals (or terminal and chassis), a transistor can be ruined.

SOLID-STATE DEVICES: Integrated Circuits contain the equivalent of many circuit parts, including transistors, diodes, resistors, and capacitors. The preferred troubleshooting procedure requires isolating the trouble to one stage using AC signal tracing methods. Once the suspected stage is located the DC voltages at the input and output leads are measured to give an accurate indication of the operating conditions of the IC. DO NOT use an ohmmeter, to check continuity with the IC mounted on the printed circuit board. Forward biasing the internal junctions within the IC may burn out the transistors. Do not replace a defective IC until all external resistors, capacitors, and transformers are checked first, to prevent the replacement IC from failing immediately due to a defect in the connecting components. Solder and unsolder each lead separately using a pliers or other heat sink on the lead to prevent damage from excessive heat. Check that the leads are connected to the correct locations on the printed circuit board before turning the set on.

Whenever possible, a transistor tester should be used to determine the condition of a transistor or diode. Ohmmeter checks do not provide conclusive data, and many even destroy the junction(s) within the device.

Never attempt to repair a transistor power amplifier module until the power supply filter-capacitors are fully discharged.

If an output or driver transistor becomes defective (opens or shorts), always check ALL direct-coupled transistors and diodes in that channel. In addition, check the bias pot., and other parts in the bias network, before installing replacement transistors. All output and driver transistors in one channel may be destroyed if the bias network is defective. After parts replacement, check bias for specified idling current.

In some applications, replacement of transistors must be made from the same beta group as the original type. The beta group is indicated by a colored marking on the transistor. Include this information when ordering replacements.

When mounting a replacement power transistor, be sure the bottom of the flange, mica insulator, and the surface of the heat sink, are free of foreign matter. Dust and grit will prevent flat contact, reducing heat transfer to the heat sink. Metallic particles can puncture the insulator, cause a short, and destroy the transistor.

Silicone grease must be used between the transistor and the mica insulator and between the mica and the heat sink for best heat transfer. Use Dow-Corning DC-3, or an equivalent compound made for power transistor heat conduction.

Use care when making connections to speakers and output terminals. To reduce the possibility of shorts, lugs should be used on the exposed ends, or stranded wire should be tinned to prevent frayed wire ends. Current in the speakers and output circuitry is quite high — poor contacts, or small wire, can cause significant power losses. For wire lengths greater than 30 feet, 16 AWG, or heavier, should be used.

VOLTAGE MEASUREMENTS: All voltages are measured with the line voltage adjusted to 120 volts. All measured voltages are ± 20%. DC voltages are measured to chassis with a VTVM, with no signal input unless otherwise noted. AC signal voltages are measured under the conditions specified on the schematic.

ALIGNMENT PROCEDURES: DO NOT attempt realignment unless the required test equipment is available, and the alignment procedure is thoroughly understood.

TEST EQUIPMENT

The following equipment is required to completely test and adjust the 40 Home Music Center

- Line Voltage Autotransformer or Voltage Regulator
- DC Vacuum Tube Voltohmmeter
- Accurately Calibrated AC Vacuum Tube Voltmeter
- Oscilloscope (Flat to 100 kHz Minimum)
- Low-Distortion Audio (Sine Wave) Generator
- Harmonic Distortion Analyzer
- 2 –Load Resistors, 4-Ohms, 100 Watt (Minimum Rating)
- AM-FM Signal Generator
- 10.7 MHz Sweep Generator (Fisher 3024*)
- Multiplex Generator with RF output (Fisher 1536*)
- 455 kHz Sweep Generator (Fisher 3025*)
- Test Cartridges – 2 and 4 Channel
- Soldering iron with Small Tip, Fully Insulated from AC Line
- Suction Desoldering Tool

* with Power Supply (Fisher 1561)

PLEASE READ CAREFULLY: The parts lists on this and following pages do not include shipping charges. Please include the serial number of the Fisher equipment for which the part(s) are intended. Send your order to:

PARTS DEPARTMENT, FISHER RADIO, 11-40 45th Road, Long Island City, N. Y. 11101.

MAIN CHASSIS

Symbol	Description	Part No.	Sug. Ret.
--	AC Outlet	JK20665	.65
--	Adhesive Pad (for Meter)	EM51293	.30
--	Antenna, Dipole (FM)	LA51319-1	1.45
--	Cartridge, Phono (Pickering V15/AT2)	GT21352	20.25
--	Channel Rubber	A670-137	.40
--	Connector, Changer (4 Terminal)	J50375-4	.45
--	Cover, AM Antenna	EM4058-156	.35
--	Cover, Top	AA4058-127	2.40
--	Dial Drum Assembly (Tuner)	AS2287-23400011	.85
--	Dial Glass, Screened	AS4058-108	.60
--	Dial Pointer Assembly	AS20506	2.90
--	Door (Tape Cartridge Insert)	AD51367	1.15
--	Dress Panel Assembly	AS4058-137	28.00
--	Foot, Molded	A51A147	.45
--	Fuse Holder	X51B080	1.35
--	Grommet, Rubber	A1059-119	.35
--	Jack, FM Detector Out	J50465	.40
--	Jack, Phones, Ext Recorder Out	JK20627-5	1.10
--	Jack Strip, Input Output (12 jacks)	JK20691	3.00
--	Knob:		
	Pushbutton	EK20021-3	.50
	Volume	EK20040	.60
	Tuning	EK20035	.50
	Mode/Ext Mon, Selector	EK20036	.50
	Dual Outer – Balance, Bass, Treble	EK20037	.50
	Dual Inner – Balance, Bass, Treble	EK20038	.70
--	Lamp, 28V, 40mA (for Lamp Assembly)	LM21436-3	.60
--	Lamp Assembly (4 lamps)	AS21433-1	8.65
--	Lamp Assembly (6 lamps)	AS21431-2	12.00
--	Lamp Assembly, Dial Glass	AS21410-5	1.05
--	Lamp Assembly, Dial Pointer	AS21413-2	1.05
--	Lamp Assembly, Stereobeacon, Meter	AS21419-3	3.85
--	Lens, Cartridge, Receiver Mode (Red)	EA21425-4	.25
--	Line Cord	W50023-1	1.25
--	Motor Board Assembly	AS4058-138	5.00
--	Nameplate '40'	NP22641-1	.75
--	Nameplate Turntable (BSR)	N20A267	.40
--	Panel, Left Side (Walnut)	KE4058-109-1	6.30
--	Panel, Right Side (Walnut)	KE4058-109-2	6.30
--	PCB AM-FM Tuner	PB2287-1	104.50
--	PCB Control-Preamplifier	PB2247-1	82.30
--	PCB 2+2 Channel Decoder	PB2289-2	7.25
--	PCB Volume Control	PB2284-1	12.30
--	PCB Power Amplifier	PB2291-1	45.70
--	PCB Power Supply	PB2245-1	23.45
--	*PCB Power Supply	PB2245-2	23.85
--	Retainer, Dial Glass	AB4058-125	.40
--	Retainer, Lamp Assembly	AN4058-149	.65
--	Retainer Wire (Meter)	AN4058-147	.35
--	Rod, Hinge (Tape Cartridge Insert door)	AN51350	.55
--	Rubber Strip (Dial Glass)	EM51290	.40
--	Speed Clip (Tape Cartridge Insert Door)	HH21750	.50
--	Spring, Dial Drum	AN2287-11403381	.35
--	*Switch, Voltage Selector	SR51304-1	1.65
--	Terminal Board, Antenna	ET51394	1.15
--	Terminal Board, Speakers	ET51340-1	5.10
--	Torsion Spring (Tape Cartridge Insert Door)	AN51351	.30
--	Tuning Shaft Assembly	AS20719	2.25
C50	Ceramic, 1 pF, ±0.25 pF, 500V	C51188-1	.35
C283	Ceramic, 3900 pF, 10%, 500V	C51B189-17	.40
F1	Fuse, 3.2A, 125V, Slo-Blo	FL51313-6	.65
*F1	Fuse, 1.6A, 250V, Slo-Blo	F51B247-17	.60
*F1	Fuse, 3.5A, 250V, Slo-Blo	F51B247-21	.60
L9	Antenna Ferrite (AM)	LA2287-114-1	2.65
L10	Choke, RF, 3.3 uH	LC21814-2	.55
M1	Meter, Indicating	MC21613	7.10
R61	Composition, 270, 10%, ½W	RC20BF271K	.30
R62	Composition, 330K, 10%, ½W	RC20BF334K	.30
S1, 2, 3, 4, 5	Switch, Power, Speakers, Muting Off, Loudness (5-switch Assembly)	SP50200-52-1	6.65
S6, S7	Switch, 2 ƒ 2 Decoder (2-switch Assembly)	SP50200-55	3.20
S8, S9	Switch, Repeat-Consec, Change (2-switch Assembly)	SP50200-51	2.65
T1	Transformer, Power	TD4058-115	19.20
*T1	Transformer, Power	TD4058-215	29.55

*Used in Export Units Only

MECHANICAL DISASSEMBLY

CHASSIS ACCESS

For access to the chassis for servicing, remove motorboard and top cover (if necessary) as follows:

REMOVING MOTORBOARD

(1) Unplug AC power cord.
(2) Unscrew two large shipping screws near left-rear and right-front corners of the turntable baseplate so that they are fully out. This will lock the turntable to motorboard.
(3) Remove four screws (two on each side) holding the motorboard to chassis. Remove two screws from top of dress panel in front of motorboard.
(4) Lift motorboard at rear and disconnect motor connector and audio cables from underside of turntable. Remove motorboard from top of chassis.
(5) Reverse procedure to reinstall motorboard. Red plug designates the right channel.

REMOVING TOP COVER AND CARTRIDGE PLAYER

Access to the cartridge player, 2+2 decoder, or right section of control-preamplifier board is as follows:
(1) Remove motorboard.
(2) Remove two screws securing the top cover at the rear of chassis. Remove the screw from top of dress panel above cartridge player.
(3) For access to right section of control-preamplifier board, remove four screws holding cartridge player brackets and slide player towards rear of chassis. Label and disconnect leads at cartridge player to remove player from chassis.
(4) Reverse procedure to reinstall cartridge player.

REMOVING DRESS PANEL

(1) Unplug AC power cord.
(2) Gently pull VOLUME, BALANCE, BASS, TREBLE, MODE/EXT TAPE MONITOR, SELECTOR and TUNING knobs from their shafts.
(3) Remove motorboard and top panel. Remove four screws from bottom of dress panel and remove dress panel.
(4) Reverse procedure for reassembly.

REPLACING DIAL AND METER LAMPS AND METER

The dial glass assembly must be removed for access to dial lamps, dial pointer assembly (and lamp), meter and STEREO-BEACON lamps, and tuning meter.
(1) Remove dress panel.
(2) Remove four screws securing dial glass assembly to supporting bracket on front panel assembly.
(3) Label and disconnect lamp and meter wires to permit the dial glass assembly to swing forward for access or to be removed.
(4) To replace dial lamps, snap out defective lamp assembly from the rear of dial glass bracket and insert a new one.
(5) To replace dial pointer assembly or dial pointer lamp, label and disconnect lamp leads, carefully disengage pointer assembly and pull it free of bracket. Snap out lamp housing and remove. Check pointer adjustment after reassembly. Refer to DIAL STRINGING procedure.
(6) To replace STEREOBEACON or meter lamps, the lampholder assembly must be replaced as a unit. Label and disconnect lampholder leads, pull up lampholder retaining spring, and remove lampholder. Install a new lampholder and insert retaining spring to hold it against rear of meter.
(7) To replace tuning meter, label and disconnect meter leads, remove lampholder assembly from rear of meter, and gently pry meter from back of panel. Scrape residual adhesive from panel. Transfer meter leads to new meter. Align meter face over panel cutout and press firmly to back of panel. Reinstall lampholder at rear of meter. Check meter calibration after reassembly. Refer to TUNER ALIGNMENT.
(8) Replace dial glass assembly in reverse order.

REPLACING DIAL GLASS

(1) Remove dress panel.
(2) Remove left and right dial glass retainers and remove dial glass.

REPLACING RECEIVER MODE OR CARTRIDGE LAMPS

Four lamps are contained in the RECEIVER MODE lamp assembly. Similarly, six lamps are contained in the CARTRIDGE lamp assembly. Both must be replaced as complete units.
(1) Remove motorboard, top cover, and dress panel.
(2) Label and disconnect leads from control-preamplifier board (MODE lamps) or cartridge player.
(3) Remove lampholder from its retainer. Install a new lampholder and reconnect wiring.
(4) Reassemble dress panel, top cover, and motorboard.

REMOVING PC BOARDS AND SWITCH ASSEMBLIES

Remove the motorboard and top cover for access to boards. To remove boards, disconnect leads and remove screws securing the board to its mounts. Label all wires for reference. Points to note are as follows:
The power amplifier heat sinks are secured to the rear skirt of the chassis with five screws. These must be removed to remove the board. When removing the tuner board, access to the dial drum is required. Remove the screw securing the plate on which the AM antenna is mounted for access. Remove the dial cord. Refer to DIAL STRINGING procedure to replace the dial cord.

CONTROL-PREAMPLIFIER

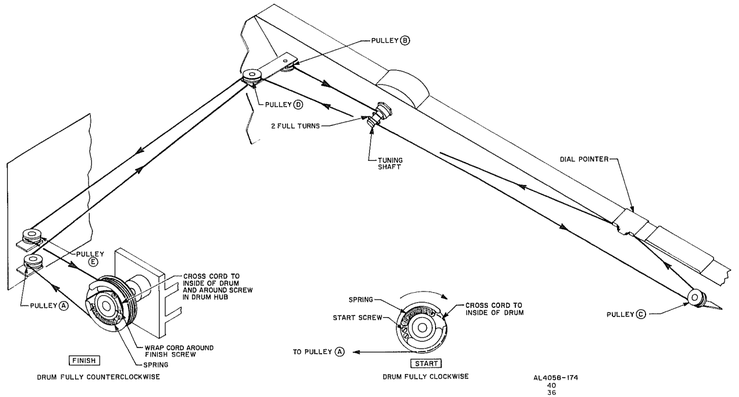
The control-preamplifier requires additional procedures for its removal as follows:
(1) Remove the motorboard and top cover.
(2) Remove four screws holding cartridge player brackets and move cartridge player towards the rear of chassis. The player can be secured in this position by inserting a mounting screw in one of the holes provided in the chassis.
(3) Label and disconnect the wires from pins 50 and 51 on power supply board, and pins 28, 56, and DD from control-preamplifier board. These are the wires interconnecting the terminal board at rear of front panel assembly.
(4) Remove RECEIVER MODE and CARTRIDGE lamp assemblies from their holders.
(5) Tape dial cord to pulleys at tuner and at rear of panel of assembly. This will keep dial cord in place during removal of panel assembly (otherwise dial cord will have to be restrung).
(6) Remove four screws securing front panel assembly to chassis, and carefully place it on top of chassis.
(7) Label all wiring to control-preamplifier and disconnect.
(8) Remove two screws holding 2+2DECODER and CARTRIDGE PROGRAM CONTROL switches to the front chassis skirt. Push switch assemblies through the cutout and place them aside clear of control-preamplifier.
(9) Remove four screws securing the bracket which mounts front panel controls to front chassis skirt.
(10) Place unit on its side and remove five screws that secure front chassis skirt to chassis (bottom plate). Pull chassis skirt forward to clear control shafts.
(11) Remove screws securing control-preamplifier board to its mounts. Carefully lift it clear of the chassis.
(12) Replace in reverse order. Refer to DIAL STRINGING procedure if necessary.

PUSHBUTTON SWITCH ASSEMBLIES AND VOLUME BOARD

For access to or removal of pushbutton switch assemblies or volume board, follow steps (1) through (6) of control-preamplifier removal. Label wires for reference and disconnect them. Two screws secure the assemblies to the front chassis skirt. Replace in reverse order.

DIAL STRINGING

(1) Remove motorboard and top cover. Refer to disassembly procedures.
(2) Remove dial pointer from old dial cord.
(3) Remove AM loop antenna mounting plate for access to the dial drum.
(4) Rotate tuning capacitor drum fully clockwise. Loosen machine screws in drum and remove old dial cord.
(5) Tie new dial cord to end of spring. Fasten spring to START screw. See illustration.
(6) Cross the cord to inside of drum, then run cord through slot in rim and wrap ½ turn clockwise around drum. Guide cord around pulleys 'A' and 'B' and wrap 2 full turns (counterclockwise viewed from back) around tuning shaft.
(7) Guide cord under pulley 'C' and around pulleys 'D' and 'E.' Rotate drum fully counterclockwise allowing cord to wind on drum.
(8) Run cord over drum and around the other side into the rim slot. Cross cord to inside of drum and around screw on drum hub, then wrap cord around FINISH screw.
(9) Pull cord taut and tighten screw. Turn tuning shaft clockwise and counterclockwise several times to distribute tensioning.
(10) Place pointer on rail and slip cord over tabs. Turn tuning shaft fully counterclockwise, slide pointer to (0) mark on logging scale, and cement to cord.
(11) Check dial calibration. Refer to TUNER ALIGNMENT.
(12) Reinstall antenna mounting plate, top cover, and motorboard.

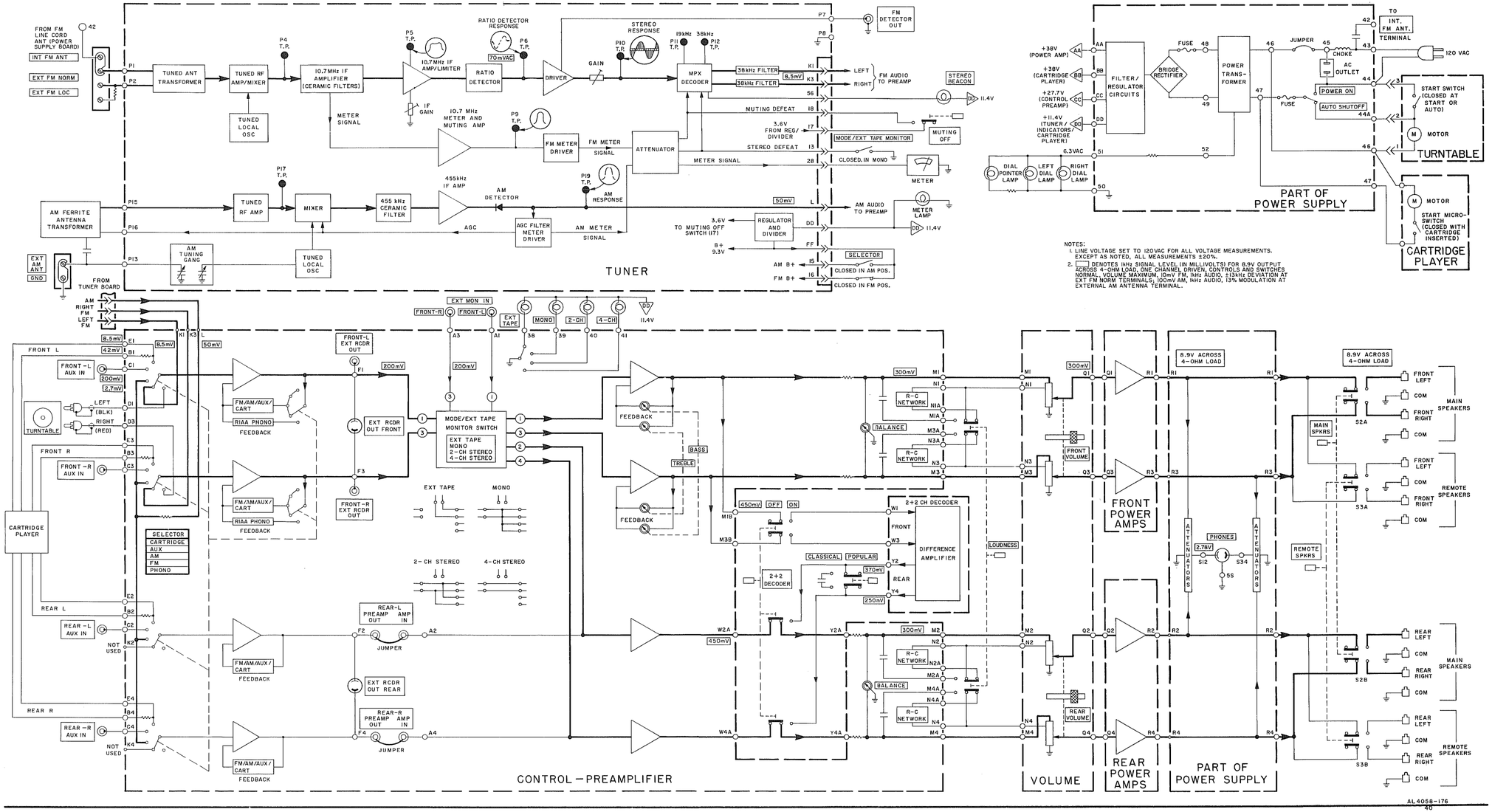


HARMONIC DISTORTION TEST

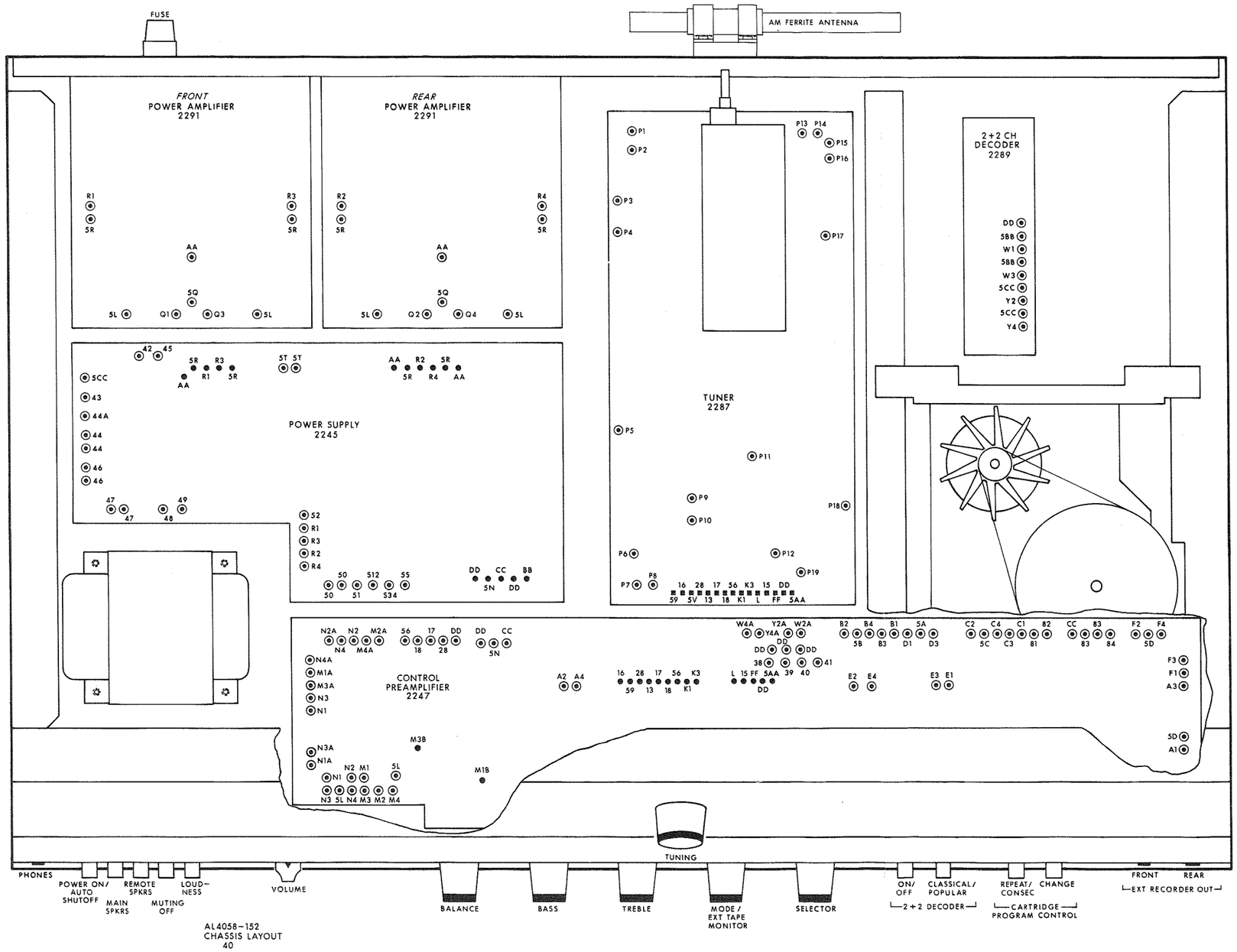
CAUTION:

(A) Test one channel at a time.
(B) Limit tests to 10 minutes.
(C) Use a load with a minimum power rating of 100 watts.

Unplug AC power cord and release all pushbuttons, Slide FRONT and REAR VOLUME controls to MIN. Set BASS, TREBLE and BALANCE to their center positions. Set MODE/EXT TAPE MONITOR to 4-CH STEREO, SELECTOR to AUX, and depress MAIN SPKRS pushbutton.
(1) Connect a low-distortion sine wave generator to the FRONT L AUX IN jack. Set generator frequency to 1kHz, and the output level to minimum.
(2) Connect a 4-ohm load resistor between MAIN SPKRS FRONT L and COMmon terminals. Connect a harmonic distortion analyzer across the load.
(3) Connect AC power cord and depress POWER ON pushbutton. Slide FRONT VOLUME to MAX.
(4) Increase generator output for 20 watts RMS (8.9V across 4-ohm load). HD meter should indicate 1% or less.
(5) Repeat preceding steps for FRONT R, REAR L, and REAR R channels.



NOTES:
1. LINE VOLTAGE SET TO 120VAC FOR ALL VOLTAGE MEASUREMENTS. EXCEPT AS NOTED, ALL MEASUREMENTS ±20%.
2. ☐ DENOTES 1kHz SIGNAL LEVEL (IN MILLIVOLTS) FOR 8.9V OUTPUT ACROSS 4-OHM LOAD, ONE CHANNEL DRIVEN, CONTROLS AND SWITCHES NORMAL, VOLUME MAXIMUM, 10mV FM, 1kHz AUDIO, ±13kHz DEVIATION AT EXT FM NORM TERMINALS; 100mV AM, 1kHz AUDIO, 13% MODULATION AT EXTERNAL AM ANTENNA TERMINAL.



AL4058-152
CHASSIS LAYOUT
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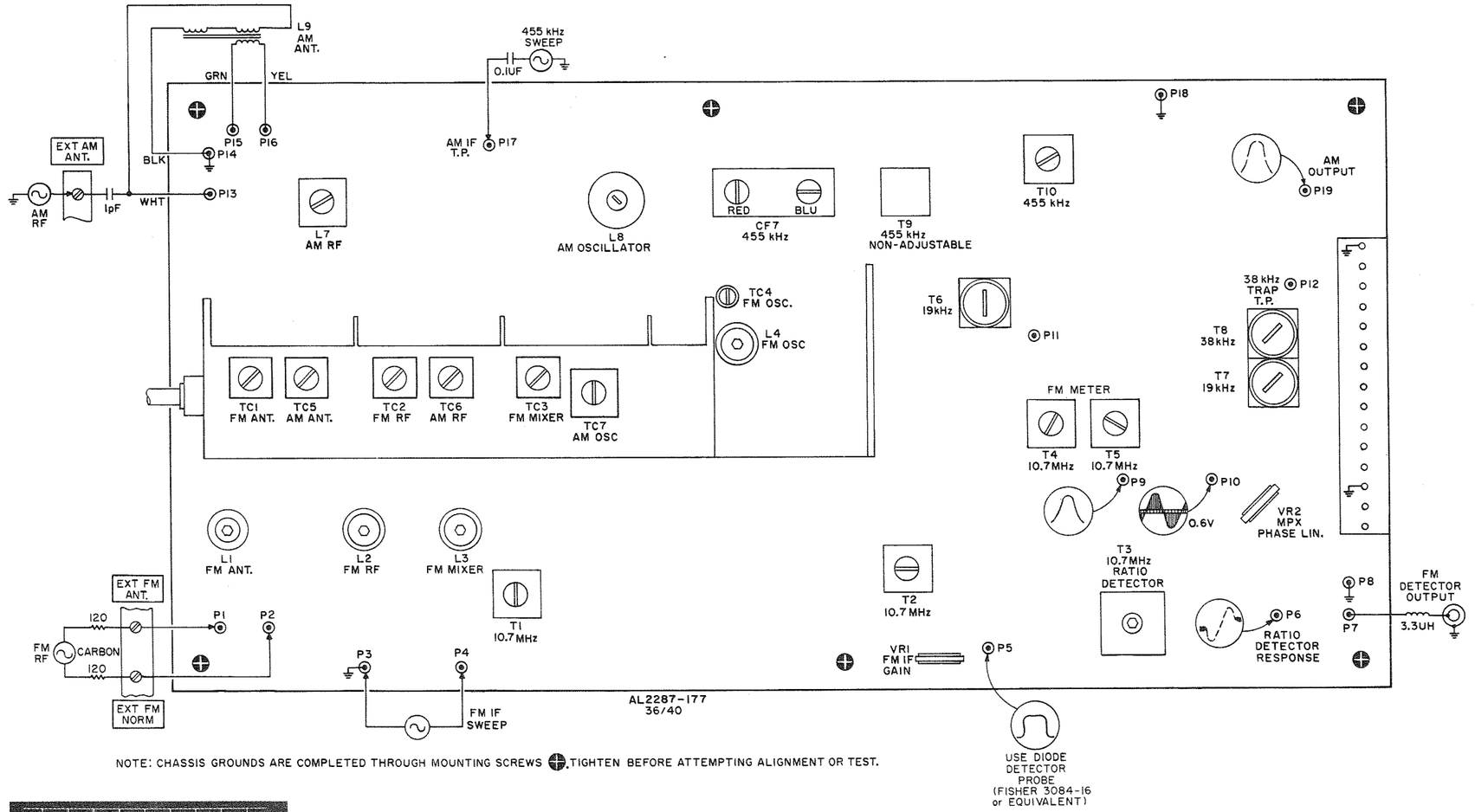
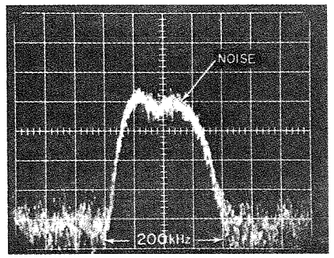
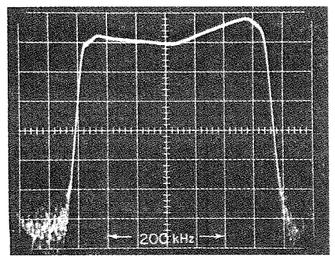


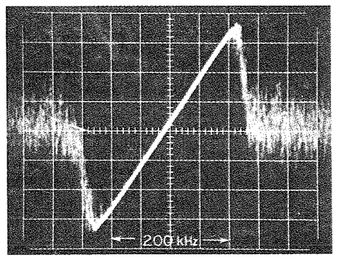
NOTE: CHASSIS GROUNDS ARE COMPLETED THROUGH MOUNTING SCREWS ⊕. TIGHTEN BEFORE ATTEMPTING ALIGNMENT OR TEST.



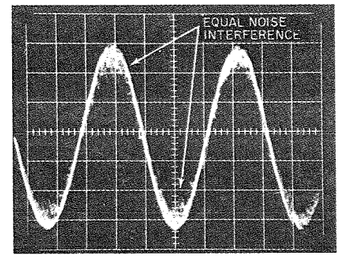
FM IF : A



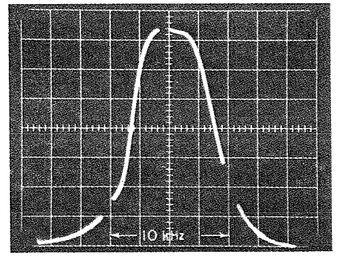
FM IF LIMITED



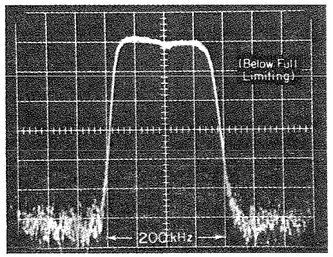
FM DETECTOR



SYMMETRICAL TUNING



AM IF



FM IF : B

TUNER ALIGNMENT

FM ALIGNMENT – SELECTOR to FM, MODE/EXT TAPE MONITOR to MONO, MUTING OFF depressed, FRONT and REAR VOLUME to 0.

Maintain generator output as low as possible for suitable indication.

	GENERATOR	DIAL SETTING	INDICATOR	PROCEDURE
	Note: FM IF circuits utilize non-tunable ceramic filters which establish the IF bandpass. To insure symmetrical tuning and selectivity, the IF's must be aligned precisely to the center of the IF bandpass, rather than to 10.7 MHz as in conventional LC circuits.			
1. IF	Connect 10.7MHz sweep to pin P4, gnd to P3. Markers are not required.	Position of non-interference	Scope vert input to pin P5, gnd to P3. Use diode detector probe.*	Adjust FM IF GAIN VR1, T1 and T2 for max gain and best symmetry. Keep signal low enough for noise on response as shown in FM IF, RESPONSE A.
2.	Increase output for signal just below full limiting.	Position of non-interference	Scope vert input to pin P5, gnd to P3. Use diode detector probe.*	If necessary readjust T1 and T2 for good symmetry. SEE FM IF, RESPONSE B.
3. DETECTOR	10.7 MHz sweep to P4, gnd to P3. Adjust for S-curve display.	Position of non-interference	Scope vert input to pin P6 through 100K resistor, gnd to P8.	Adjust T3 bottom and top slugs for max gain and best symmetry. SEE FM DETECTOR RESPONSE. Note: Minimum THD and Maximum Meter alignment must be performed as part of Detector alignment.
	NOTE: 120-ohm composition resistors in series with each lead from RF generator match 50-ohm output to 300-ohm input impedances. Generator output voltage is reduced to one-half at antenna terminals. Signal voltages are generator output levels, not antenna voltages.			
4. METER	Sweep generator as connected in step 2. FM generator to FM ANTenna terminals through 120-ohm resistors. Turn modulation off. Slowly increase output and vary frequency for marker at center of IF response curve. Turn off sweep and adjust FM generator output for panel meter reading of approx 3.	Position of non-interference	Front panel meter	Adjust T4 and T5 for max deflection. Reduce generator output to keep meter at approx 3.
5. FRONT END		Tuning knob fully CCW.		Center dial pointer on 0 and cement.
6.	FM generator to FM ANTenna terminals through 120-ohm resistors. Set to 90 MHz. Adjust output for approx 3 on meter.	Center of 90 MHz calibration mark on dial.	Front panel meter	Adjust L4, L3, L2, L1 for max deflection. Reduce generator output to keep meter at approx 3.
7.	Set to 106 MHz	Center of 106 MHz calibration mark on dial.	Front panel meter	Adjust TC4, TC3, TC2, TC1 for max deflection. Reduce generator output to keep meter at approx 3. Repeat steps 6 and 7 for max signal and accurate dial calibration.
8. MAX METER	Set to position of non-interference near 98 MHz. Modulate with 400 Hz, ±75 kHz deviation. Vary frequency to peak meter reading. Keep output at approx 3.5.	Tune to generator.	Scope vert input to FRONT-L EXT RCDR OUT jack.	Reduce generator output for noise visible on sine wave. Readjust generator frequency to center noise on positive and negative half cycles. SEE SYMMETRICAL TUNING RESPONSE.
9.	Set generator for CW output at 2 mV.	Tune to generator.	Front panel meter	Meter deflection should be between 4 and 5. (No adjustment.) Note: Do not change generator or receiver tuning; proceed with Min THD adjustment.
10. MINIMUM THD	Modulate with 400 Hz, ±75 kHz deviation.		AC VTVM and HD analyzer to FRONT-L RCDR OUT jack.	Adjust T3 top and bottom for max output and minimum distortion. Output should be from 0.8 to 1.8 VRMS; distortion should be below 0.8%.
11. MUTING	Position of non-interference near 98 MHz. Modulate with 400 Hz, ±22.5 (or 25) kHz deviation. Set output at 2 mV.	Tune to generator	AC VTVM and scope vert input to FRONT-L RCDR OUT jack.	Release MUTING OFF pushbutton. Panel meter should be between 4 and 5. Reduce generator output until audio signal disappears on scope trace; generator output should be less than 45 mV. Increase generator output to 60 uV, audio should reappear. Depress MUTING OFF pushbutton.
12. 19 kHz PILOT	FM generator with composite multiplex signal at EXTERNAL MODULATION input. Modulate with 19 kHz pilot (10%), 400 Hz audio (90%), left channel only. Set for 42.5 kHz deviation and 2 mV output.	Tune to generator	Scope vert AC input to pin P11.	Set MODE/EXT TAPE MONITOR to 4-CH STEREO. Adjust T6 and T7 for max amplitude.
13. 38 kHz TRAP, STEREO-BEACON	FM generator with composite multiplex signal at EXTERNAL MODULATION input. Modulate with 19 kHz pilot (10%), 400 Hz audio (90%), left channel only. Set for 42.5 kHz deviation and 2 mV output.	Tune to generator	Scope vert input to P12.	Adjust T8 for max amplitude. STEREOBEACON lamp should be on.
14. SEPARATION	FM generator with composite multiplex signal at EXTERNAL MODULATION input. Modulate with 19 kHz pilot (10%), 400 Hz audio (90%), left channel only. Set for 42.5 kHz deviation and 2 mV output.	Tune to generator	AC VTVM to FRONT-L RCDR OUT jack, another to FRONT-R RCDR OUT jack.	Readjust T6 for max on left channel. Adjust T8 and VR2 (MPX PHASE LINEARITY) for best separation. Modulate right channel only. If necessary, readjust T8 and VR2 for best separation.

AM ALIGNMENT – SELECTOR to AM, MODE/EXT TAPE MONITOR to MONO, FRONT and REAR VOLUME to 0.

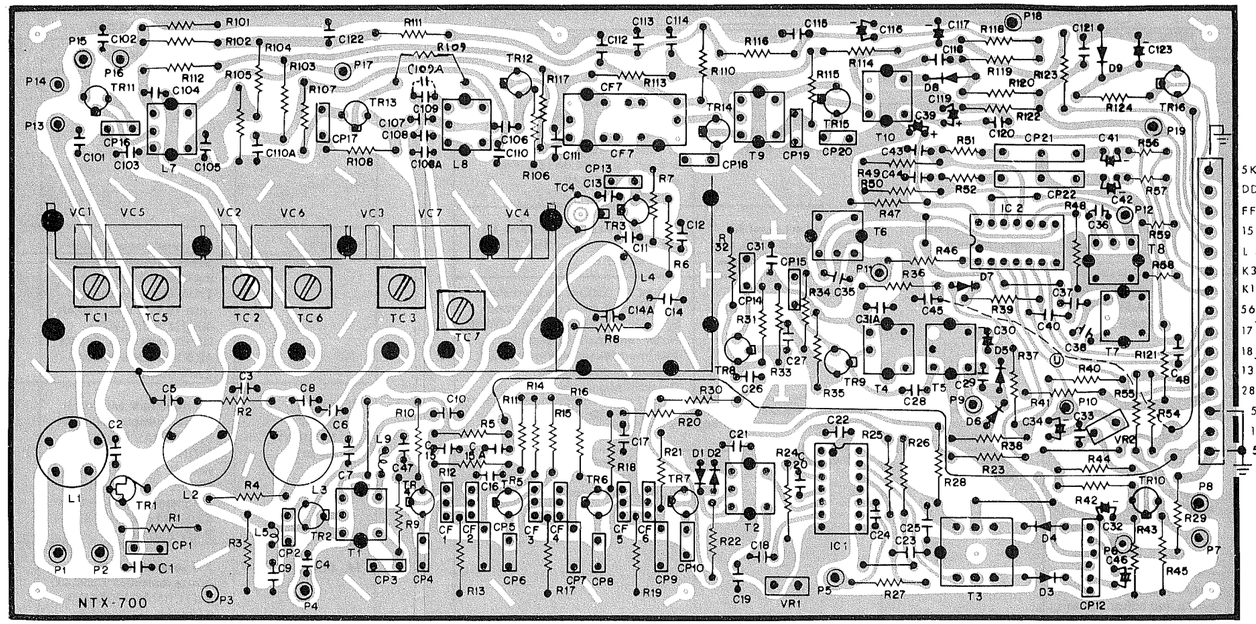
Maintain generator output as low as possible for suitable indication.

	GENERATOR	DIAL SETTING	INDICATOR	PROCEDURE
1. IF	455 kHz sweep generator to pin P17, gnd to P14. Use 0.1 uF capacitor in series with generator lead.	Position of non-interference.	Scope to pin P19, gnd to P18. Use low capacitance probe.	Adjust both T10 and CF7 for max gain and best symmetry. Maximum response can be ±2.5 kHz from IF center frequency (455 kHz). See AM IF RESPONSE.
2. FRONT END	AM generator to EXT AM ANT and GND terminals. Open GND link. Set to 600 kHz. Modulate with 400 Hz, 30% modulation.	Center of 600 kHz calibration mark on dial.	Front panel meter.	Adjust L7 and L8 for max deflection. Reduce generator output to keep panel meter at approx 3.
3.	Set to 1400 kHz	Center of 1400 kHz calibration mark on dial.	Front panel meter.	Adjust TC7, TC5, TC6 for max gain. Keep meter at approx 3. Repeat steps 2 and 3.

AM-FM TUNER PB2287-1

Symbol	Description	Part No.	Sug. Ret.
C1, C108A	Ceramic, 10pF, ±0.5pF, 50V, N330	CK2287-42333017	.40
C2	Ceramic, 27pF, ±0.5pF, 50V	CK2287-42333033	.40
C3	Ceramic, 8pF, ±0.5pF, 50V	CK2287-42333015	.40
C4, C10	Ceramic, 1pF, ±0.25pF, 50V	CK2287-42331001	.35
C5, 8, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 29, 31, 31A, 45	Ceramic, 0.01uF, +80-20%, 25V	CK2287-42103004	.35
C6	Ceramic, 12pF, 5%, 50V	CK2287-42333025	.40
C7	Ceramic, 5pF, ±0.5pF, 50V	CK2287-42333012	.40
C9, 47	Ceramic, 100pF, 5%, 50V	CK2287-42333047	.40
C11	Ceramic, 12pF, 10%, 50V, NPO	CK2287-42332046	.40
C12	Ceramic, 20pF, 5%, 50V, NPO	CK2287-42332028	.40
C13	Ceramic, 10pF, 1%, 50V	CK2287-42336021	.40
C14, 14A	Ceramic, 1000pF, +80-20%, 25V	CK2287-42103001	.35
C28	Ceramic, 10pF, ±0.5pF, 50V or 12pF, ±pF, 50V	CK2287-42333017 CK2287-42333025	.40 .40
C30, 34, 39, 41, 42, 46, 116, 119	Electrolytic, 2.2uF, 16V	CE2287-43001054	.50
C32	Electrolytic, 10uF, 16V	CE2287-43001057	.50
C33, 36	Polyethylene, 2200pF, ±10%, 50V	CP2287-42749217	.45
C35, 38	Polyethylene, 0.01uF, 10%, 50V	CP2287-42749225	.45
C37	Mylar, 0.047uF, 20%, 50V	CY2287-42701023	.50
C40, 48	Ceramic, 0.1uF, +80-20%, 12.5V	CK2287-42104005	.50
C43, 44	Mylar, 6800pF, 10%, 50V	CY2287-42701118	.40
C102, 104, 105, 110, 110A, 111, 112, 113, 114, 115, 120, 121, 122	Ceramic, 0.01uF, +80-20%, 25V	CK2287-42103004	.35
C106, 107	Mylar, 4700pF, 10%, 50V	CY2287-42701117	.40
C108	Ceramic, 18pF, 10%, 50V, N1500	CK2287-42930009	.50
C109	Polyethylene, 430pF, 5%, 50V or 390pF, 5%, 50V	CP2287-42749316 CP2287-42749315	.45 .45
C109A	Ceramic, 18pF, 5%, 50V	CK2287-42333029	.40
	or 27pF, 5%, 50V	CK2287-42333033	.40
	or 39pF, 5%, 50V	CK2287-42333037	.40
	or 56pF, 5%, 50V	CK2287-42033041	.40
	or 68pF, 5%, 50V	CK2287-42033043	.40
	or 82pF, 5%, 50V	CK2287-42033045	.40
C117	Electrolytic, 10uF, 16V	CE2287-43001057	.50
C118	Ceramic, 2200pF, +80-20%, 25V	CK2287-42103002	.35

Symbol	Description	Part No.	Sug. Ret.
C123	Electrolytic, 100uF, 16V	CE2287-43001061	.70
CF1, 2, 3, 4, 5, 6	Ceramic Filter, 10.7MHz	ZK2287-61136001	1.35
CF7	Ceramic Filter, 455kHz	ZK2287-61131001	2.95
CP1	Printed Circuit	EP2287-39050003	.45
CP2, 10	Printed Circuit	EP2287-39050019	.45
CP3	Printed Circuit	EP2287-39050024	.45
CP4, 6, 16, 18, 20	Printed Circuit	EP2287-39050015	.45
CP5, 7, 9	Printed Circuit	EP2287-39051001	.80
CP8, 14	Printed Circuit	EP2287-39050012	.45
CP12	Printed Circuit	EP2287-39053001	1.30
CP13	Printed Circuit	EP2287-39050027	.45
CP15	Printed Circuit	EP2287-39050011	.45
CP17	Printed Circuit	EP2287-39050029	.40
CP19	Printed Circuit	EP2287-39050030	.40
CP21, 22	Printed Circuit	EP2287-39052001	1.30
D1, 2, 5, 6, 7, 8	Diode SD-46	TR2287-36002003	.55
D3, 4	Diode SD-46(1)	TR2287-36002004	.65
D9	Zener, Diode, RD11AM	TR2287-36003026	1.70
IC1	Integrated Circuit LA1201	TR2287-79905696	6.15
IC2	Integrated Circuit MC1305P	TR2287-37001004	13.15
L1	FM Antenna Coil	LC2287-60723001	2.05
L2, 3	FM RF, Mixer Coil	LC2287-60724001	1.30
L4	FM Osc Coil	LC2287-60782001	1.30
L5, 9	RF Choke, 2.2uH	LC2287-61052009	.55
L7	AM RF Coil	LC2287-60700010	1.00
L8	AM Osc Coil	LC2287-60779001	1.00
R1, 38, 101	220K	RF25DC224J	.30
R2, 44	470	RF25DC471J	.30
R3, 32	6.8K	RF25DC682J	.30
R4, 54	12K	RF25DC123J	.30
R5, 36, 46	220	RF25DC221J	.30
R6, 42, 102, 111, 115	22K	RF25DC223J	.30
R7, 33, 123	1.2K	RF25DC122J	.30
R8	56	RF25DC560J	.30
R9, 22, 103, 108, 121	1K	RF25DC102J	.30
R10, 37, 107	33K	RF25DC333J	.30
R11, 20, 23	33	RF25DC330J	.30
R12, 15, 18, 48, 124	330	RF25DC331J	.30
R13, 17, 19, 113	820	RF25DC821J	.30
R14, 16, 104, 116, 119	56K	RF25DC563J	.30
R21	8.2K	RF25DC822J	.30
R24	18K	RF25DC183J	.30
R25, 26, 27	1.5K	RF25DC152J	.30
R28, 114	560	RF25DC561J	.30
R29, 47, 55, 122	4.7K	RF25DC472J	.30



AL2287-111

(U) DENOTES WIRING ON UNDERSIDE OF BOARD

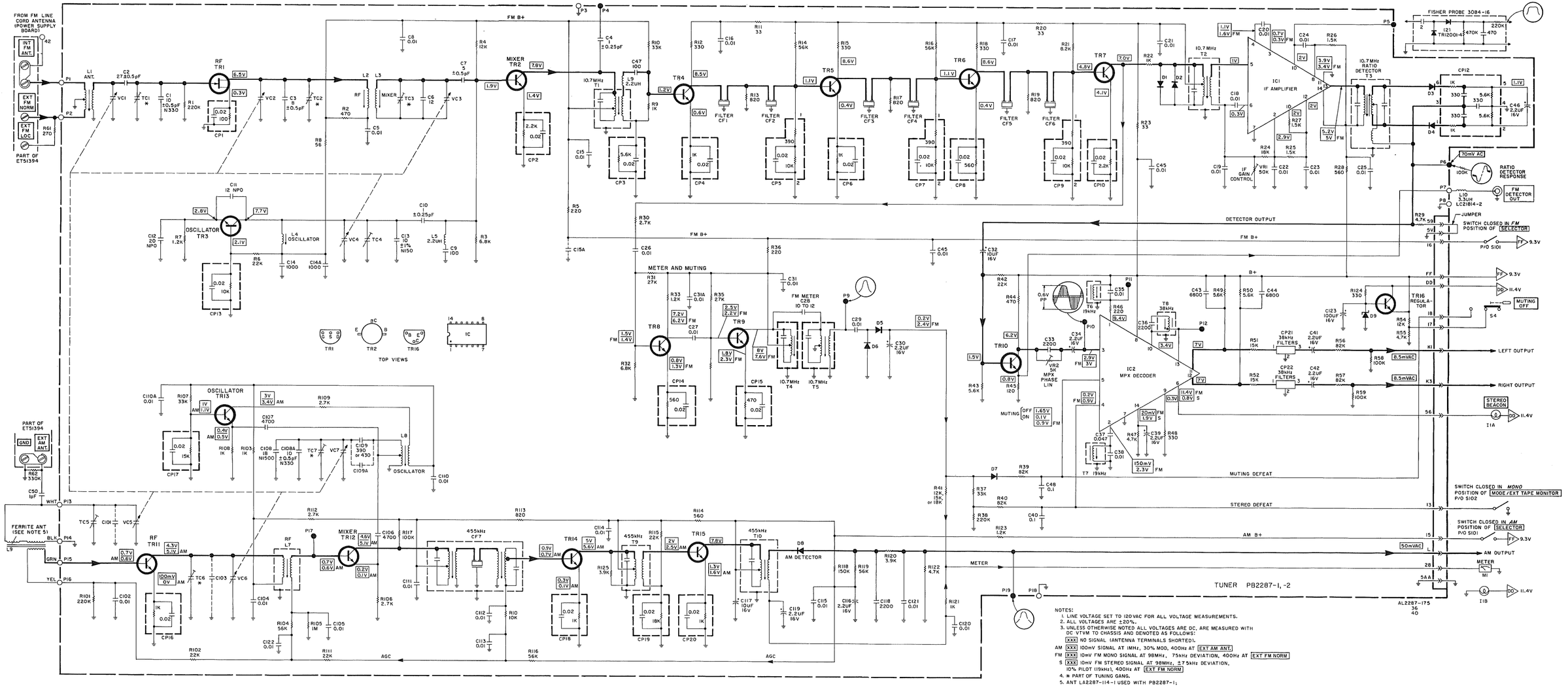
Symbol	Description	Part No.	Sug. Ret.
R30	2.7K or	RF25DC272J	.30
	2.2K or	RF25DC222J	.30
	3.3K or	RF25DC332J	.30
	3.9K or	RF25DC392J	.30
	4.7K	RF25DC472J	.30
R31, 35	27K	RF25DC273J	.30
R34	15K	RF25DC153J	.30
R39, 40	82K	RF25DC823J	.30
R41	15K or	RF25DC153J	.30
	12K or	RF25DC123J	.30
	18K	RF25DC183J	.30
R43, 49, 50	5.6K	RF25DC562J	.30
R45	120	RF25DC121J	.30
R51, 52	15K	RF25DC153J	.30
R56, 57	82K	RF25DC823J	.30
R58, 59, 117	100K	RF25DC104J	.30
R105	1M	RF25DC105J	.30
R106, 109, 112	2.7K	RF25DC272J	.30
R110	10K	RF25DC103J	.30
R118	150K	RF25DC154J	.30
R120, 125	3.9K	RF25DC392J	.30
T1, 2, 5	IF Trans, 10.7MHz	ZZ2287-60828102	1.25
T3	Ratio Det, 10.7MHz	ZZ2287-60830001	2.15
T4	IF Trans, 10.7MHz	ZZ2287-60828002	1.25
T6, 7	Coil, 19kHz	LC2287-61905003	1.80
T8	Coil, 38kHz	LC2287-61905004	1.80

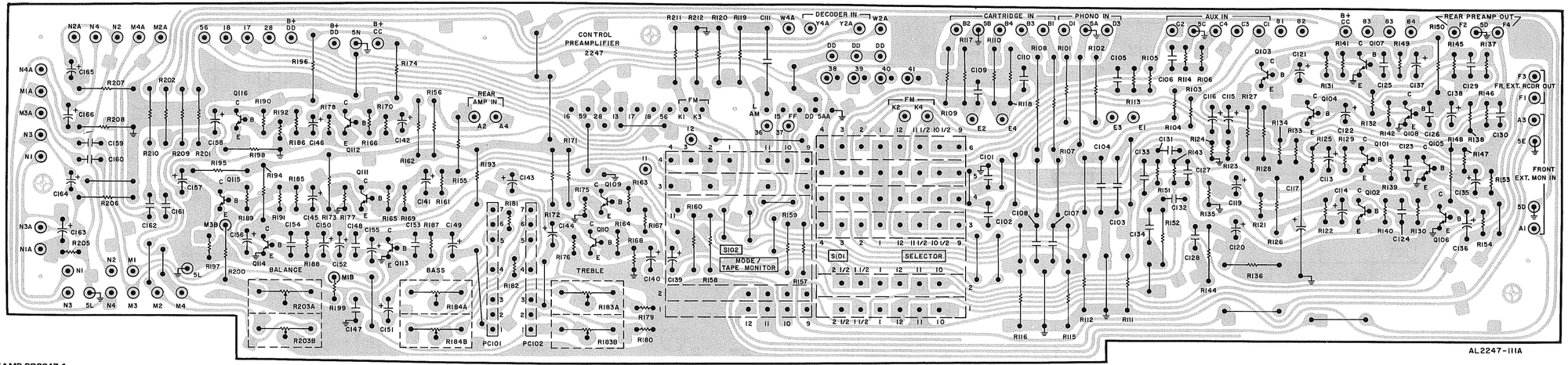
Symbol	Description	Part No.	Sug. Ret.
T9	IF Trans, 455kHz	LC2287-60812001	1.15
T10	IF Trans, 455kHz	LC2287-60802010	1.05
TC1, 2, 3, 5, 6, 7	Trimmer (Part of Tuning Gang Assembly)		
TC4	Trimmer	CT2287-44316001	.85
TR1	FET 2SK19	TR2287-35120325	4.40
TR2, 3	Transistor 2SC921K	TR2287-35046011	1.55
TR4, 5, 6, 8, 9, 11, 12, 14	Transistor 2SC920Q	TR2287-35048617	1.10
TR7, 10, 13, 15	Transistor 2SC920R	TR2287-35048618	1.10
TR16	Transistor 2SC815K	TR2287-35045311	1.50
VC1, 2, 3, 4, 5, 6, 7	Tuning Gang Assembly	CV2287-44019001	19.05
VR1	Variable Resistor, 50K	RV2287-41950006	.80
VR2	Variable Resistor, 5K	RV2287-41950005	.80
	Connector, 15-pin, male	HH20685-15	1.20
--	Insulator, Shield Plate B	EM2287-18600491	.40
	Shield Plate A (Component Side)	AM2287-18501521	.65
	Shield Plate B (Underside)	AM2287-18501841	.75

MISCELLANEOUS

Symbol	Description	Part No.	Sug. Ret.
C50	Ceramic, 1pF, ±0.25pF, 500V, P100	C51188-1	.35
I1A,B	Lampholder (Sterebeacon, Meter)	LM21420-3	2.00
L9	AM Antenna	LA2287-114-1	2.60
L10	RF Choke, 3.3uH	LC21814-2	.55
M1	Meter, Indicating	MC21613	7.10
R61	Composition, 270, 10%, ½W	RC20BF271K	.30
R62	Composition, 330K, 10%, ½W	RC20BF334K	.30
S4	Muting Off Switch (Part of 5 Switch assembly)	SP50200-52-1	6.10
S101	Selector Switch	SR2247-115	16.40
S102	Mode/Ext. Tape Monitor Switch	SR2247-116	9.20
--	Jack, FM Detector Out	J50465	.40
--	Terminal Board, Antenna	ET51394	1.15

Note: Unless otherwise specified, all resistors are Carbon Film in ohms, 10%, ¼W. K = Kilohms, M = Megohms


TUNER PB2287-1, -2
TOP VIEWS
TR1
TR2
TR6
IC
METER AND MUTING
OSCILLATOR TR3
RF TR1
MIXER TR2
TR4
TR5
TR6
TR7
IF AMPLIFIER IC1
MPX DECODER IC2
TR8
TR9
TR10
TR11
TR12
TR13
TR14
TR15
TR16 REGULATOR
AM DETECTOR
FM METER
RATIO DETECTOR RESPONSE
FISHER PROBE 3084-16
FM B+
AM B+
DETECTOR OUTPUT
LEFT OUTPUT
RIGHT OUTPUT
MUTING DEFEAT
STEREO DEFEAT
METER
AGC
FM DETECTOR OUT
MUTING OFF
STEREO BEACON
SWITCH CLOSED IN FM POSITION OF SELECTOR
SWITCH CLOSED IN AM POSITION OF SELECTOR
SWITCH CLOSED IN MONO POSITION OF MODE/EXT TAPE MONITOR
P/O SI01
P/O SI02
AL2287-175
NOTES:
1. LINE VOLTAGE SET TO 120VAC FOR ALL VOLTAGE MEASUREMENTS.
2. ALL VOLTAGES ARE ±20%.
3. UNLESS OTHERWISE NOTED ALL VOLTAGES ARE DC, ARE MEASURED WITH DC VTVM TO CHASSIS AND DENOTED AS FOLLOWS:
XXX NO SIGNAL (ANTENNA TERMINALS SHORTED).
AM XXX 100mV SIGNAL AT 1MHz, 30% MOD, 400Hz AT EXT AM ANT.
FM XXX 10mV FM MONO SIGNAL AT 98MHz, 75kHz DEVIATION, 400Hz AT EXT FM NORM
S XXX 10mV FM STEREO SIGNAL AT 98MHz, ±7.5kHz DEVIATION, 10% PILOT (19kHz), 400Hz AT EXT FM NORM
4. * PART OF TUNING GANG.
5. ANT LA2287-114-1 USED WITH PB2287-1;
ANT LA2287-116-1 USED WITH PB2287-2.



CONTROL-PREAMP PB2247-1

Symbol	Description	Part No.	Sug. Ret.
C101, 102	Ceramic, 470pF, 10%, 500V	C50B651-13	.35
C103, 104, 107, 108	Ceramic, 330pF, 10%, 500V	C51B189-1	.35
C105, 106, 109, 110	Ceramic, 330pF, 10%, 500V	C50B651-1	.30
C111	Mylar, 0.047uF, 10%, 250V	C50B574-5	.50
C113, 114, 115, 116	Tantalum, 0.68uF, 20%, 35V	CL22306-2	.75
C117	Electrolytic, 220uF, 6.3V	CE22324-4	.70
C119, 120, 121, 122	Electrolytic, 10uF, 63V	CE22326-4	.35
C123, 124, 125, 126	Ceramic, 5pF, 5%, 500V, NPO	C50B652-21	.35
C127, 128, 129, 130	Ceramic, 120pF, 10%, 500V	C50B651-16	.30
C131, 132	Ceramic, 5000pF, 20%, 500V	C50B567-2	.30
C133, 134	Ceramic, 1500pF, 10%, 1000V	C50B576-4	.45
C135, 136, 137, 138, 157, 158	Tantalum, 2.7uF, 20%, 35V	CL22305-4	.45
C139, 140, 141, 142	Tantalum, 0.33uF, 20%, 35V	CL22305-9	.80
C143, 144, 145, 146, 151, 152	Tantalum, 1uF, 20%, 35V	CL22305-3	.80
C147, 148	Ceramic, 820pF, 10%, 500V	C50B651-6	.30
C149, 150, 155, 156	Tantalum, 4uF, 20%, 35V	C22305-14	.90
C153, 154	Ceramic, 47pF, 10%, 500V, N330	C50B652-19	.30
C159, 160, 161, 162	Ceramic, 680pF, 10%, 500V	C50B651-2	.30
C163, 164, 165, 166	Mylar, 0.22uF, 10%, 250V	C50B575-2	.60
PC101, 102	Encapsulated Tone Control Network	PC50B187-57	1.60
Q101, 102 103, 104	Transistor	TR02020-2	.55
Q105, 106, 107, 108, 109, 110, 111, 112	Transistor	TR01037 or TR01015	1.00 .95
Q113, 114, 115, 116	Transistor	TRBC147B	.60

Symbol	Description	Part No.	Sug. Ret.
R101, 102	1.5K	R33DC152J	.30
R103, 104, 105, 106, 134	100K	R33DC104J	.30
R107, 108, 109, 110, 119, 167, 168, 161, 162, 185, 186	27K	R33DC273J	.30
R111, 112, 113, 114, 120, 171, 172, 173, 174, 195, 196	5.6K	R33DC562J	.30
R115, 116, 117, 118	6.8K	R33DC682J	.30
R121, 122, 129, 130, 131, 132	82K	R33DC823J	.30
R123, 124, 125, 126, 127, 128	120K	R33DC124J	.30
R133, 147, 148, 199, 200, 201, 202, 209, 210	10K	R33DC103J	.30
R135, 136, 137, 138, 177, 178, 197, 198	820	R33DC821J	.30
R139, 140, 153, 164, 179, 180	1M	R33DC105J	.30
R141, 142	560K	R33DC564J	.30
R143, 144, 145, 146	18K	R33DC183J	.30
R149, 150, 193, 194	4.7K	R33DC472J	.30
R151, 152, 159, 160	56K	R33DC563J	.30
R155, 156, 157, 158	22K	R33DC223J	.30

Symbol	Description	Part No.	Sug. Ret.
R163, 164	270K	R33DC274J	.30
R165, 166, 189, 190	180K	R33DC184J	.30
R169, 170, 191, 192	39K	R33DC393J	.30
R175, 176	120	R33DC121J	.30
R181, 182	330K	R33DC334J	.30
R183A, B, 184A, B	Potentiometer, Dual-Bass, Treble, 200K	RP50160-283	3.00
R187, 188	1.2M	R33DC125J	.30
R203A, B	Potentiometer, Dual-Balance	RP50160-284	2.80
R205, 206, 207, 208	2.7K	R33DC272J	.30
S101	Selector Switch	SR2247-115	16.40
S102	Mode/Ext Tape Monitor Switch	SR2247-116	9.20
	Connector, 15-pin, female	H1120683-15	.65

2+2 CH DECODER PB2289-2

Symbol	Description	Part No.	Sug. Ret.
C271, 272	Mylar, 0.01uF, 5%, 100V	C50B574-1	.45
C273	Ceramic, 5000pF, 20%, 500V	C50B567-2	.30
C275, 276	Ceramic, 180pF, 10%, 500V	C50B651-14	.50
C277, 278 279, 280	Sintered Alum., 0.33uF, 20% 25V	CS22340-3	.50
C281, 282	Sintered Alum., 4.7uF, 20% 25V	CS22340-6	.70
C283	Electrolytic, 100uF, 25V	CE22326-1A	.40
Q271, 272, 273, 274	Transistor BC239C	TR01014	.50
R271, 272	Composition, 180K, 5%, 1/4W	RC07BF184J	.30
R273, 274	Composition, 12K, 5%, 1/8W	R12DC123J	.30
R275, 276	Composition, 8.2K, 5%, 1/4W	RC07BF822J	.30
R277, 278	Composition, 5.6K, 5%, 1/8W	R12DC562J	.30
R279, 280	Composition, 820, 5%, 1/4W	RC07BF821J	.30
R281	Composition, 3.3K, 5%, 1/4W	RC07BF332J	.30
R283, 284	Composition, 100K, 5%, 1/4W	RC07BF104J	.30
R285, 286	Composition, 3.9M, 5%, 1/4W	RC07BF395J	.30
R287, 288	Composition, 4.7K, 5%, 1/4W	RC07BF472J	.30
R289, 290	Composition, 680, 5%, 1/4W	RC07BF681J	.30
R291	Composition, 2.2K, 5%, 1/4W	RC07BF222J	.30

VOLUME PB2284-1

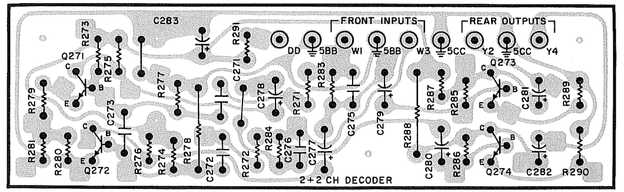
Symbol	Description	Part No.	Sug. Ret.
R298A, B, 299A, B	Potentiometer, Dual Slide, 50K	RP50160-278	5.75

MISCELLANEOUS

Symbol	Description	Part No.	Sug. Ret.
	Jack, Ext Recorder Out Front, Rear	JK20627-5	1.10
	Jack Strip, Input-Output	JK20691	3.00
	Jumper, Input-Output	AS836-120	.10
	Lamp Assembly, Receiver Mode (4 lamp)	AS21432-1	7.55
C284	Ceramic, 3800pF, 10%, 500V	C51B189-17	.40
S4, S5	Switch, Muting Off, Loudness (Part of 5 switch assembly)	SP50200-52-1	6.65
S6, S7	Switch, 2+2 Decoder (2 switch assembly)	SP50200-65	3.20

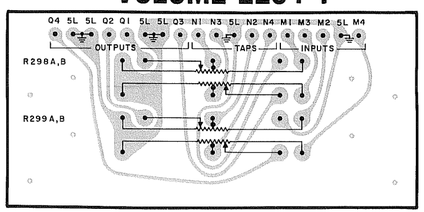
NOTE: Unless otherwise specified, all resistors are Carbon Film in ohms, 5%, 1/3 Watt. K = Kilohms, M = Megohms

2+2 DECODER 2289-2

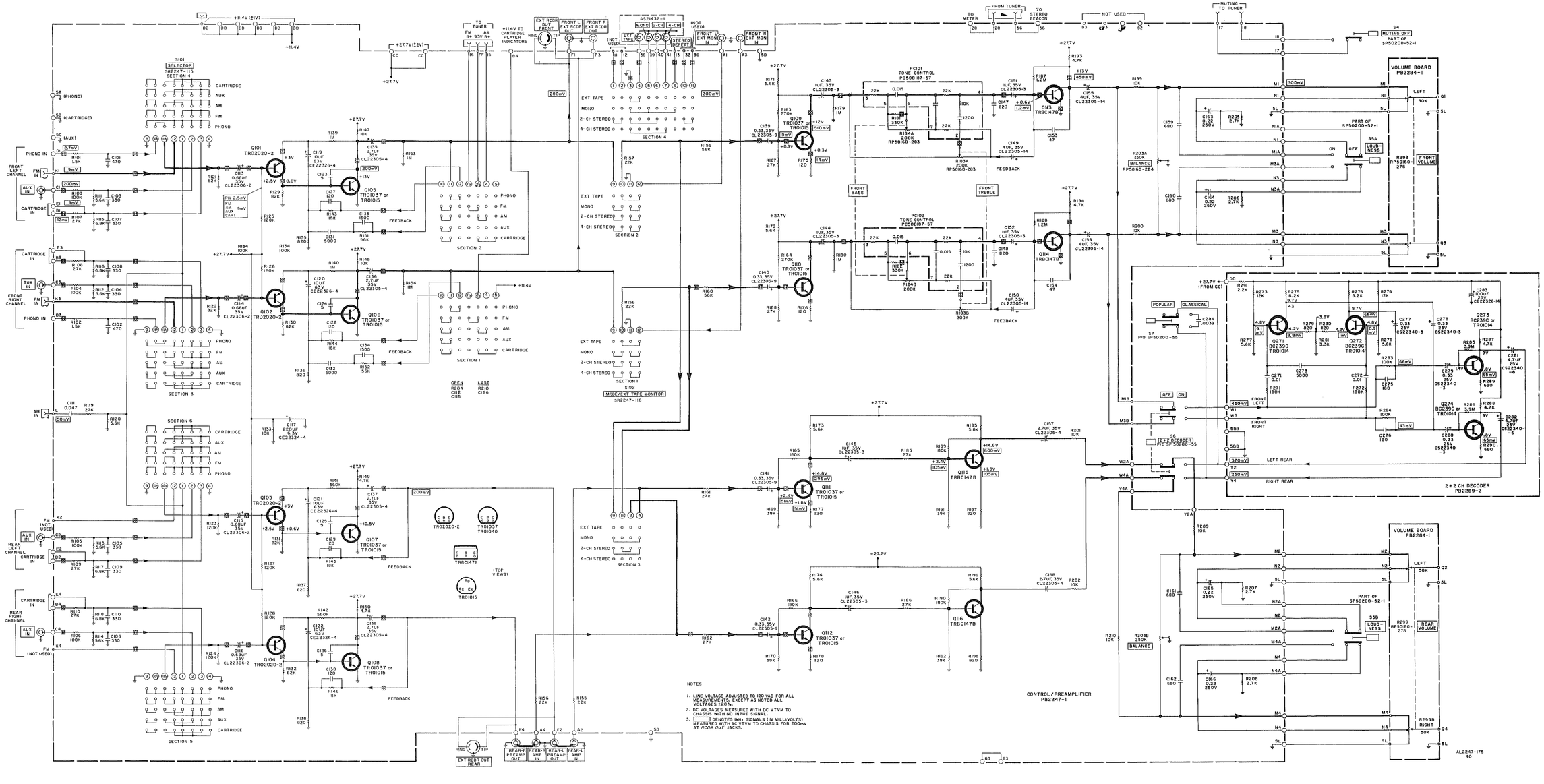


AL2289-III

VOLUME 2284-1



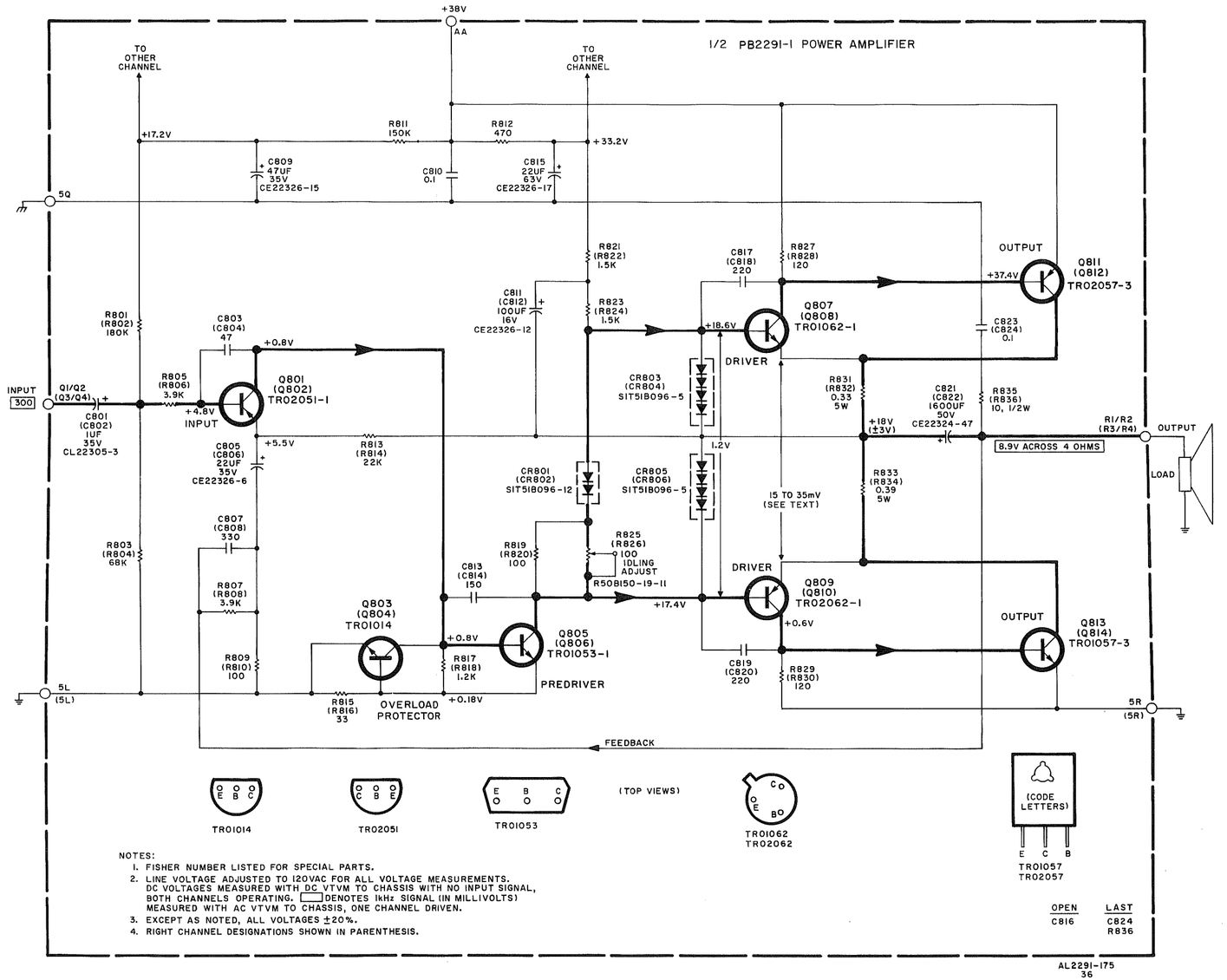
AL2284-III

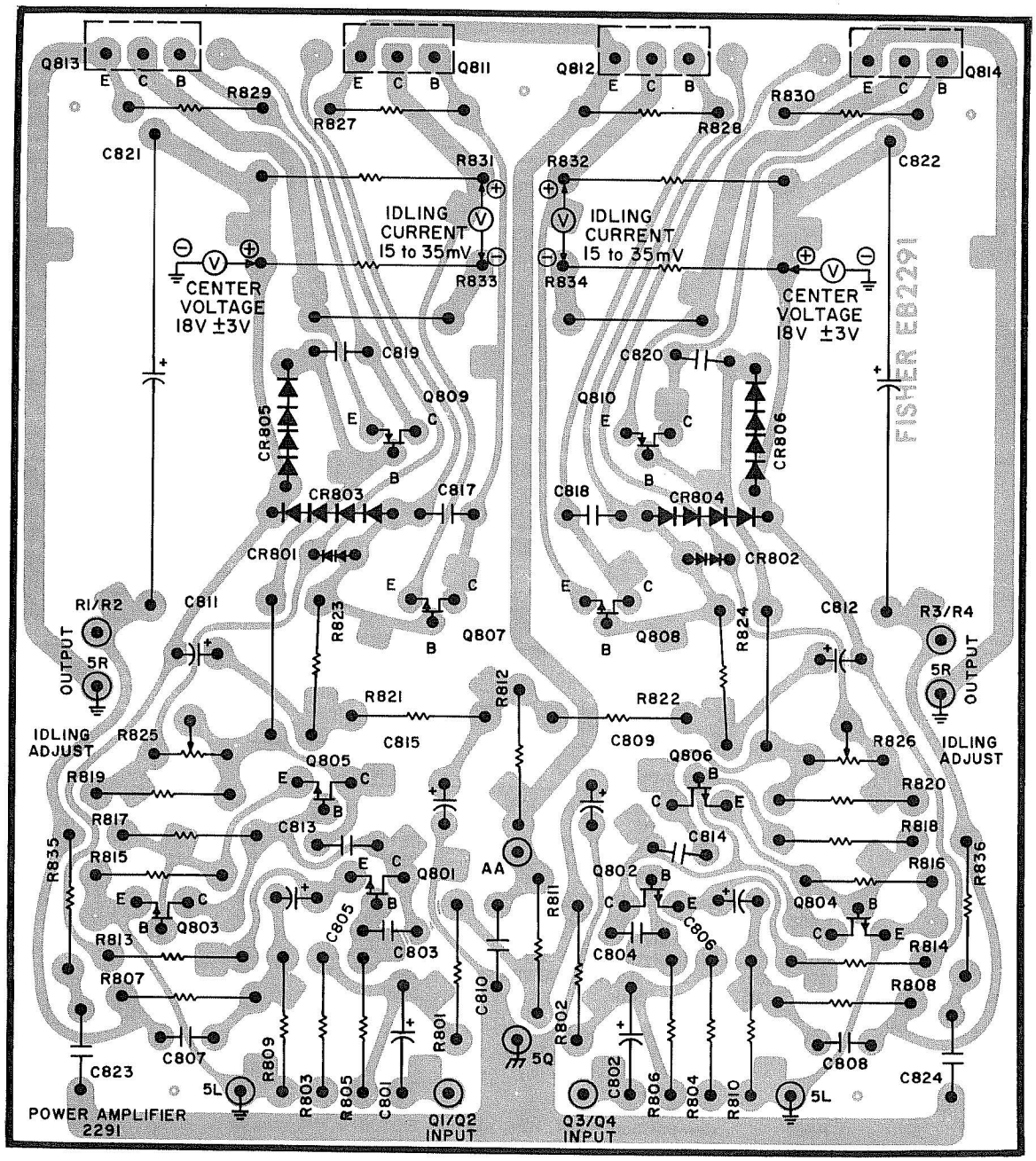

SELECTOR SR2247-115 SECTION 4
CARTRIDGE
AUX
AM
FM
PHONO
FRONT LEFT CHANNEL
FRONT RIGHT CHANNEL
REAR LEFT CHANNEL
REAR RIGHT CHANNEL
PHONO IN
CARTRIDGE IN
AUX IN
FM IN
AM IN
FM (NOT USED)
SECTION 1
SECTION 2
SECTION 3
SECTION 4
SECTION 5
SECTION 6
Q101 TRO2020-2
Q102 TRO2020-2
Q103 TRO2020-2
Q104 TRO2020-2
Q105 TRO1037 or TRO1015
Q106 TRO1037 or TRO1015
Q107 TRO1037 or TRO1015
Q108 TRO1037 or TRO1015
Q109 TRO1037 or TRO1015
Q110 TRO1037 or TRO1015
Q111 TRO1037 or TRO1015
Q112 TRO1037 or TRO1015
Q113 TRBC1478
Q114 TRBC1478
Q115 TRBC1478
Q116 TRBC1478
PC101 TONE CONTROL PCS08187-57
PC102 TONE CONTROL PCS08187-57
FEEDBACK
FRONT BASS
FRONT TREBLE
VOLUME BOARD PB2284-1
FRONT VOLUME
REAR VOLUME
BALANCE
LOUDNESS
MUTING OFF
MUTING TO TUNER
FROM TUNER
TO METER
TO STEREO BEACON
NOT USED
2+2 CH DECODER PB2289-2
POPULAR
CLASSICAL
FRONT LEFT
FRONT RIGHT
REAR LEFT
REAR RIGHT
EXT TAPE
MONO
2-CH STEREO
4-CH STEREO
MODE/EXT TAPE MONITOR SN2247-116
EXT RCDR OUT FRONT
EXT RCDR OUT REAR
REAR-R PREAMP OUT
REAR-R PREAMP IN
REAR-L PREAMP OUT
REAR-L PREAMP IN
TO TUNER
+11.4V TO CARTRIDGE PLAYER INDICATORS
FRONT R EXT MON IN
NOTES
1. LINE VOLTAGE ADJUSTED TO 120 VAC FOR ALL MEASUREMENTS, EXCEPT AS NOTED ALL VOLTAGES ±20%.
2. DC VOLTAGES MEASURED WITH DC VTVM TO CHASSIS WITH NO INPUT SIGNAL.
3. [ ] DENOTES INPUT SIGNALS IN MILLIVOLTS MEASURED WITH AC VTVM TO CHASSIS FOR 200mV AT RCDR OUT JACKS.
CONTROL/PREAMPLIFIER PB2247-1
AL2247-175 40

POWER AMPLIFIER PB2291-1

Symbol	Description	Part No.	Sug. Ret.
C801, 802	Tantalum, 1uF, 35V	CL22305-3	.80
C803, 804	Ceramic, 47pF, 10%, 500V, N330	C50B652-19	.30
C805, 806	Electrolytic, 22uF, 35V	CE22326-6	.40
C807, 808	Ceramic, 330pF, 10%, 500V	C50B651-1	.30
C809	Electrolytic, 47uF, 35V	CE22326-15	.70
C810, 823,	Ceramic, 0.1uF, 35%, 100V	C51163-1	.80
C810, 823, 824	Ceramic, 0.1uF, 35%, 100V	C51163-1	.80
C811, 812	Electrolytic, 100uF, 16V	CE22326-12	.40
C811, 812	Electrolytic, 100uF, 16V	CE22326-12	.40
C813, 814	Ceramic, 150pF, 10%, 500V	C50B651-9	.30
C815	Electrolytic, 22uF, 63V	CE22326-17	.40
C817, 818, 819, 820	Ceramic, 220pF, 10%, 500V	C50651-15	.30
C821, 822	Electrolytic, 1600uF, 50V	CE22324-47	2.15
CR801, 802	Silicon Stabistor	SIT51B096-12	1.00
CR803, 804, 805, 806	Silicon Stabistor	SIT51B096-5	.95
Q801, 802	Transistor	TR02051-1	.75
Q803, 804	Transistor	TR01014	.50
Q805, 806	Transistor	TR01053-1	1.45
Q807, 808	Transistor	TR01062-1	1.90
Q809, 810	Transistor	TR02062-1	2.00
Q811, 812	Transistor	TR02057-3	3.70
Q813, 814	Transistor	TR01057-3	3.40
R801, 802	180K	R33DC184J	.30
R803, 804	68K	R33DC683J	.30
R805, 806, 807, 808	3.9K	R33DC392J	.30
R809, 810, 819, 820	100	R33DC101J	.30
R811	150K	R33DC154J	.30
R812	470	R33DC471J	.30
R813, 814	22K	R33DC223J	.30
R815, 816	33	R33DC330J	.30
R817, 818	1.2K	R33DC122J	.30
R821, 822, 823, 824	1.5K	R33DC152J	.30
R825, 826	Variable, 100	R50B150-19-11	.70
R827, 828, 829, 830	Composition, 120, 5%, ½W	RC20BF121J	.30
R831, 832	Wirewound, 0.33, 5%, 5W	RW5WR33J	.50
R833, 834	Wirewound, 0.39, 5%, 5W	RW5WR39J	.50
R835, 836	Composition, 10, 5%, ½W	RC20BF100J	.30

NOTE: Unless otherwise specified, all resistors are Carbon Film in ohms, 5%, 1/3 Watt. K = Kilohms, M = Megohms





AL2291-IIIA

CENTER VOLTAGE TEST

Slide FRONT and REAR VOLUME controls to 0. Warm-up unit about 10 minutes. Set line voltage to 120 VAC.

Connect common lead of DC VTVM to pin 5R (or chassis). Connect probe to the junction of R831 - R833 (left channel) and R832 - R834 (right channel). Meter should indicate 18V ±3V at each junction. Check Center Voltage on both front and rear amplifier boards.

IDLING CURRENT ADJUSTMENT

Slide FRONT and REAR VOLUME controls to 0. Warm-up unit about 10 minutes. Set line voltage to 120 VAC.

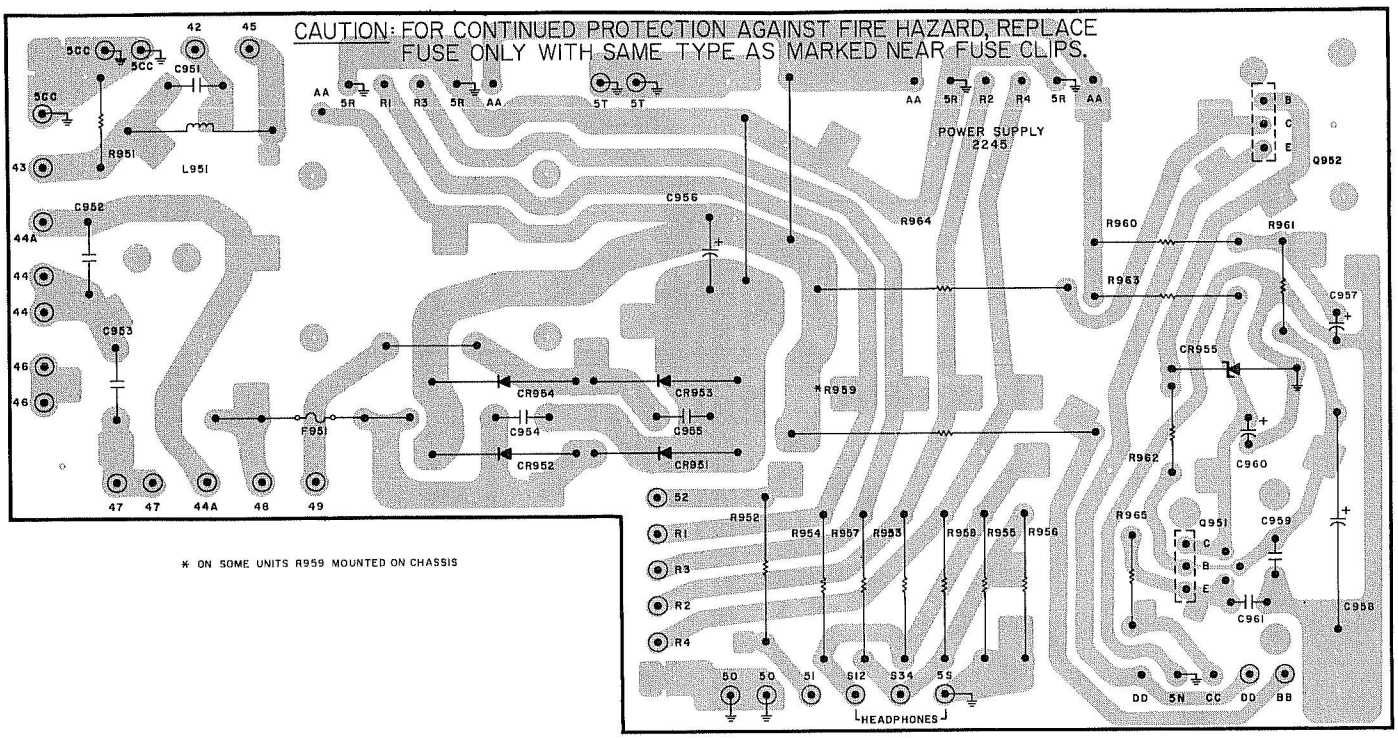
FRONT AMPLIFIERS

(1) Connect DC VTVM across R831 and R833. See illustration. Set IDLING ADJ R825 for indication of 15 to 35 mV.

(2) Connect DC VTVM across R832 and R834 and adjust R826 for 15 to 35 mV indication.

REAR AMPLIFIERS

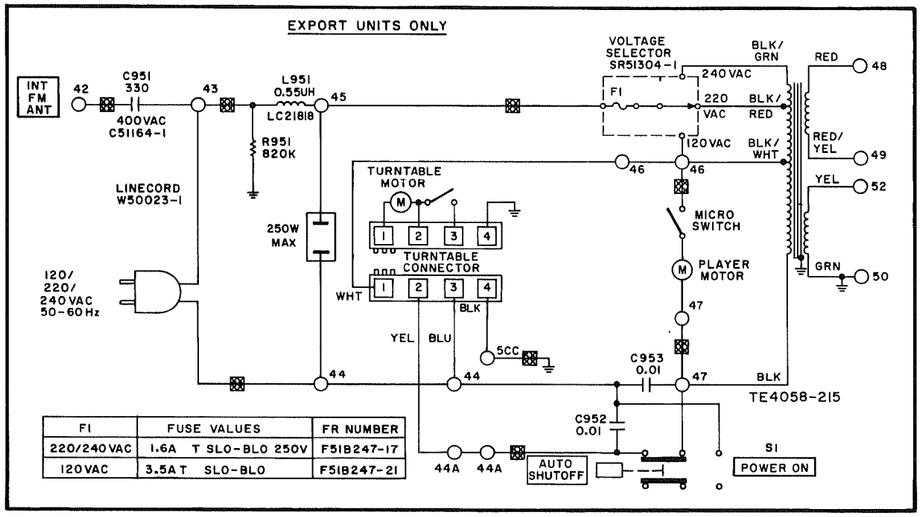
Repeat steps (1) and (2).



POWER SUPPLY PB2245-1, -2

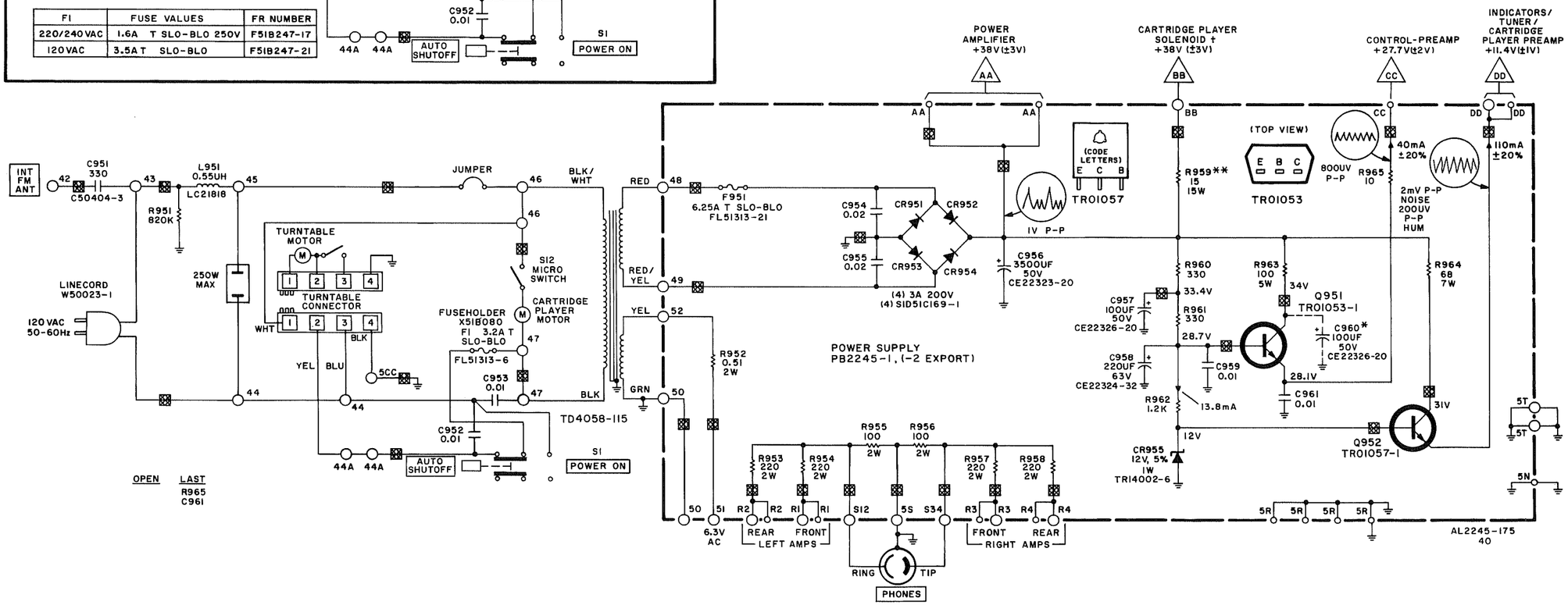
Symbol	Description	Part No.	Sug. Ret.
C951	Ceramic, 330pF, +80-20%, 1400V	C50404-3	.45
*C951	Ceramic, 330pF, 20%, 400VAC	C51164-1	.90
C952, 953	Ceramic, 0.01uF, +80-20%, 150V	C50404-4	.50
C954, 955	Ceramic, 0.02uF, 20%, 500V	C50B567-3	.35
C956	Electrolytic, 3500uF, 50V	CE22323-20	4.15
C957, 960	Electrolytic, 100uF, 50V	CE22326-20	.75
C958	Electrolytic, 220uF, 63V	CE22324-32	1.25
C959, 961	Ceramic, 0.01uF, +80-20%, 100V	C50B570-1	.40
CR951, 952, 953, 954	Silicon Diode	SID51C169-1	.75
CR955	Zener Regulator 12V, 5%, 1W	TR14002-6	1.05
F951	Fuse, Slo-Blo, 6¼A, 125V	FL51313-21	.70
L951	RF Choke, 0.55uH	LC21818	.60
Q951	Transistor	TR01053-1	1.45
Q952	Transistor	TR01057-1	2.75
R951	Composition, 820K, 10%, ½W	RC20BF824K	.30
R952	Wirewound, 0.51, 5%, 2W	RW200WR51J	.60
R953, 954, 957, 958	Wirewound, 220, 5%, 2W	RW200 W221J	.45
R955, 956, 963	Wirewound, 100, 5%, 2W	RW200W101J	.45
R959	Wirewound, 15, 5%, 15W	RW15W150J	.60
R960, 961	Carbon Film, 330, 5%, 1/3 W	R33DC331J	.30
R962	Composition, 1.2K, 5%, ½W	RC20BF122J	.30
R964	Wirewound, 68, 5%, 7W	RW7W680J	.50
R965	Composition, 10, 5%, ½W	RC20BF100J	.35
F1	Fuse, Slo-Blo, 3.2A, 125V	FL51313-6	.65
*F1	Fuse, Slo-Blo, 3.5A, 120V	F51B247-21	.60
*F1	Fuse, Slo-Blo, 1.6A, 250V	F51B247-17	.60
S1	Switch, Power On (Part of 5-switch assembly)	SP50200-52-1	6.65
	*Switch, Voltage Selector	SR51304-1	1.65
	AC Outlet, 250W	JK20665	.65
	Connector, Changer, 4-terminal	J50375-4	.45
	Fuseholder	X51B080	1.35
	Line Cord	W50023-1	1.25
	Transformer, Power	TD4058-115	19.20
	*Transformer, Power	TD4058-215	29.55

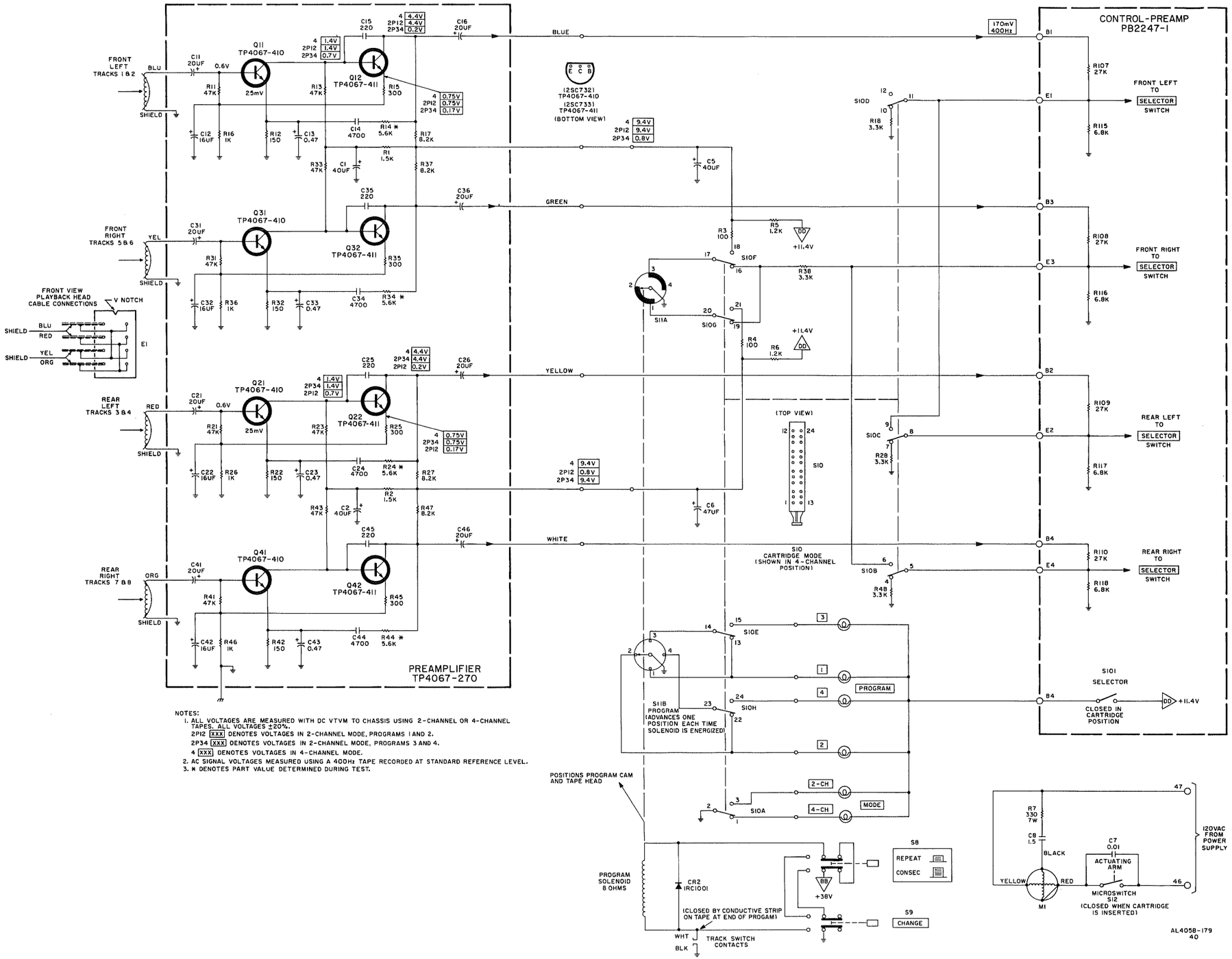
*Used in PB2245-2 only



NOTES:

1. LINE VOLTAGE SET TO 120VAC FOR ALL DC VOLTAGE MEASUREMENTS.
2. EXCEPT AS NOTED, ALL VOLTAGES ±20%.
3. DC VOLTAGES MEASURED WITH DC VTVM TO CHASSIS WITH NO INPUT SIGNALS, *SELECTOR* IN *AUX* POSITION.
4. *C960 NOT USED IN ALL UNITS.
5. **ON SOME UNITS R959 MOUNTED ON CHASSIS.
6. † BB MOMENTARILY DROPS TO 12V WHEN PROGRAM SOLENOID IS ACTUATED.





NOTES:
1. ALL VOLTAGES ARE MEASURED WITH DC VTVM TO CHASSIS USING 2-CHANNEL OR 4-CHANNEL TAPES. ALL VOLTAGES ±20%.
   2P12 [XXX] DENOTES VOLTAGES IN 2-CHANNEL MODE, PROGRAMS 1 AND 2.
   2P34 [XXX] DENOTES VOLTAGES IN 2-CHANNEL MODE, PROGRAMS 3 AND 4.
   4 [XXX] DENOTES VOLTAGES IN 4-CHANNEL MODE.
2. AC SIGNAL VOLTAGES MEASURED USING A 400Hz TAPE RECORDED AT STANDARD REFERENCE LEVEL.
3. * DENOTES PART VALUE DETERMINED DURING TEST.

FUNCTIONAL OPERATION

Insertion of a tape cartridge automatically closes microswitch S12, which supplies AC power to the motor. When a 4-channel cartridge is inserted, all four channels of the preamplifier are activated, equalizing and amplifying signals to the output terminals.

In 4-CH operation, the 8-track cartridge contains two programs.

Program 1:

Track 1	Front left channel
Track 5	Front right channel
Track 3	Rear left channel
Track 7	Rear right channel

Program 2:

Track 2	Front left channel
Track 6	Front right channel
Track 4	Rear left channel
Track 8	Rear right channel

There are two mechanical positions for the tape head, up or down. Pressing CHANGE pushbutton S9 actuates the program solenoid. The solenoid moves a pawl which engages and rotates the program cam. A transfer pin which rides on the cam surface causes the tape head to alternately moves up for Program 1 or down for Program 2. The program solenoid is also actuated by a conductive strip placed on the tape at the end of the program.

With REPEAT - CONSEC switch S8 in the CONSEC position, the program in progress continues to play until the conductive strip contacts the track switch, shifting the tape head to play the next program automatically. In the REPEAT position, the B+ to the program solenoid is opened. This prevents actuation of the solenoid and shifting of the tape head when the conductive strip contacts the track switch. Thus the same program is repeated. Pressing CHANGE pushbutton S9 actuates the program solenoid in either CONSEC or REPEAT. In REPEAT, B+ to the solenoid is fed through contacts of the CHANGE switch.

There are four separate programs contained in a 2-channel cartridge.

Program 1:

Track 1	Left channel
Track 5	Right channel

Program 2:

Track 2	Left channel
Track 6	Right channel

Program 3:

Track 3	Left channel
Track 7	Right channel

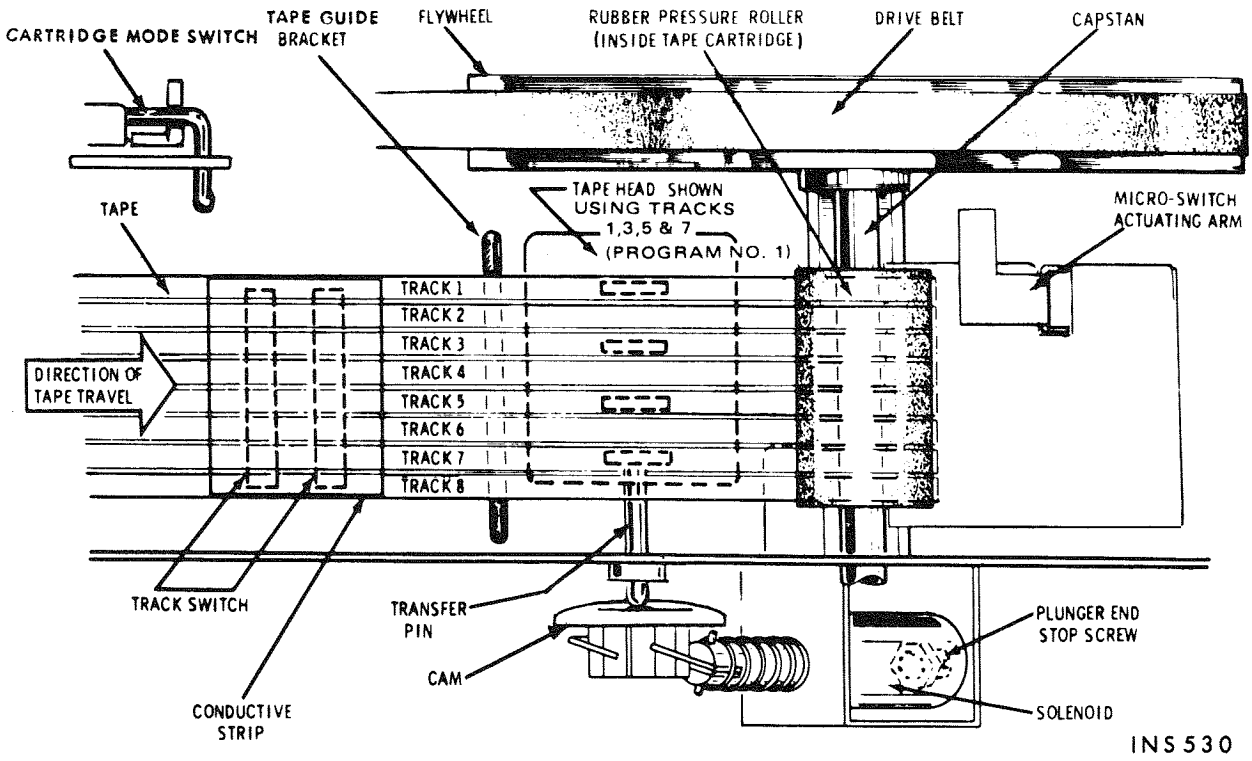
Program 4:

Track 4	Left channel
Track 8	Right channel

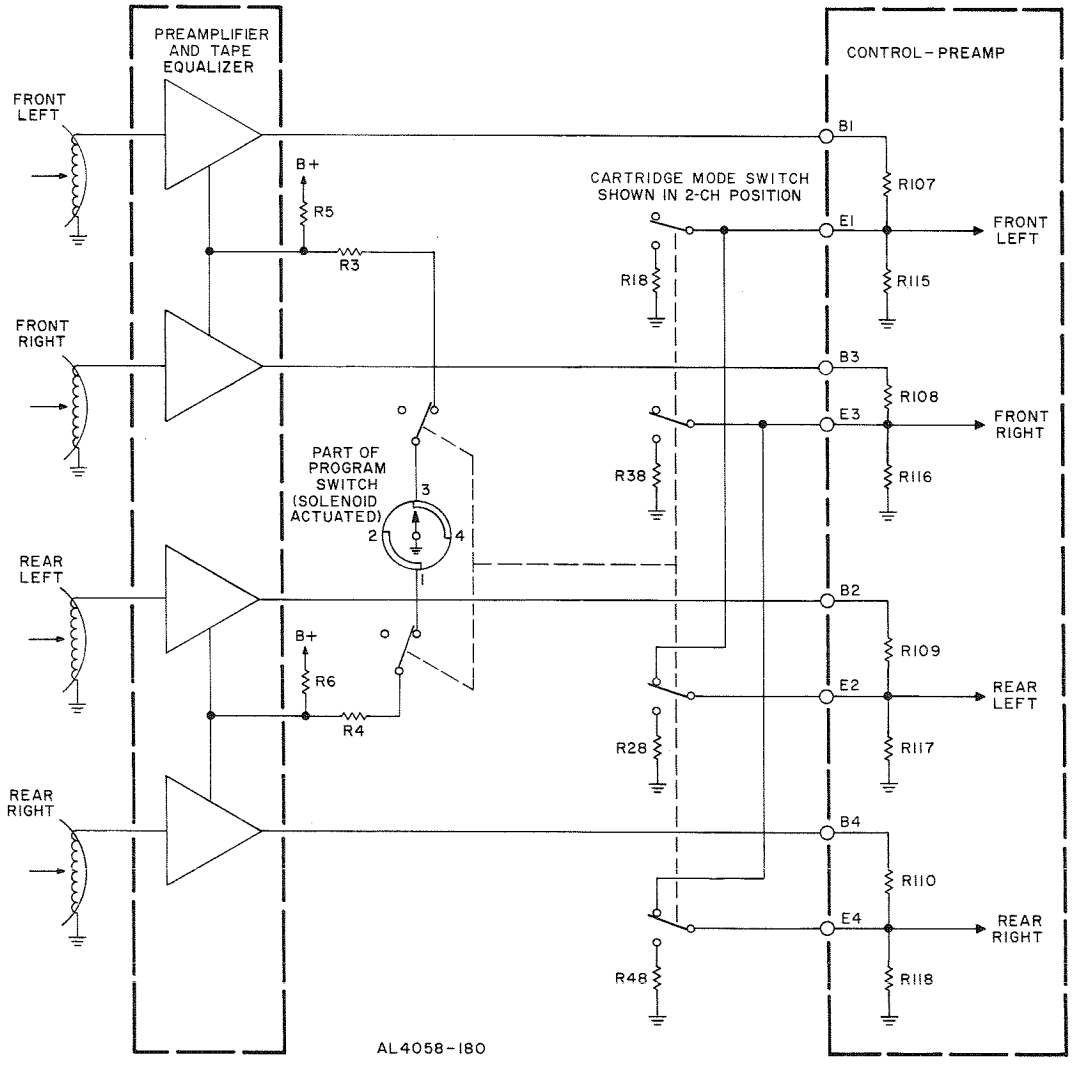
When a 2-channel cartridge is inserted, it engages the actuating arm of cartridge mode microswitch S10, and it is actuated. (A slot in the 4-channel cartridges bypasses the engaging arm of the microswitch.) To prevent playing two independent stereo (2-channel) programs simultaneously (one program on tracks 1 and 5, and the other on tracks 3 and 7), the B+ feeding the front or rear preamplifier channels is turned off, making only one pair of channels active at a time. For programs 1 and 2 the front channels of the preamplifier are active, for programs 3 and 4 the rear channels are active. Program switch S11B does the switching. The program switch is a rotary type operated by the program solenoid in conjunction with the cam. In addition, the left front and left rear channels are paralleled in 2-channel mode and the right front and rear channels are similarly paralleled. Cartridge mode switch S10 makes the parallel connections.

When active channels are paralleled with inactive channels, a normal 6dB drop in the output level results from paralleling source impedances. In 4-channel operation, resistors R18, R28, R38, and R48 are switched in across the input resistors of the control-preamp (R115, R116, R117, and R118). The parallel resistors reduce the output level approximately 6dB to maintain equal output levels in the 2- and 4-channel modes.

The appropriate CARTRIDGE MODE and PROGRAM lamps are switched on through S10 and S11. With a 4-channel cartridge, switch connections are such that only PROGRAM lamps 1 and 2 can light.

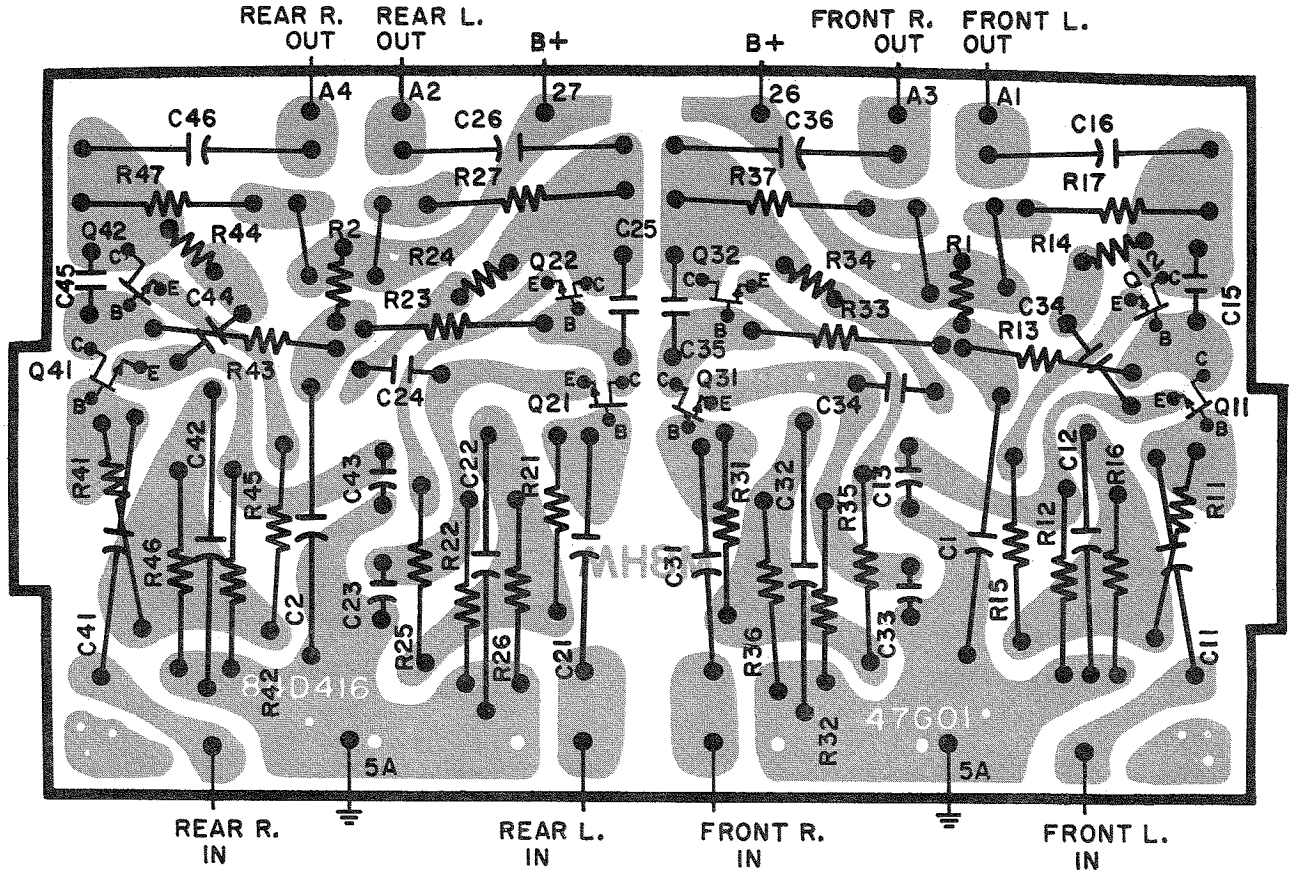


INS530



AL4058-180

PREAMPLIFIER TP4067-270



INS 527

COPPER SIDE

PREAMPLIFIER TP4067-270

Symbol	Description	Part No.	Sug. Ret
C1, 2	Electrolytic, 40uF, 16V	TP4067-401	1.45
C11, 16, 21, 26, 31, 36, 41, 46	Electrolytic, 20uF, 16V	TP4067-403	.85
C12, 22, 32, 42	Electrolytic, 16uF, 16V	TP4067-404	1.45
C13, 23, 33, 43	Electrolytic, 0.47uF, 10V	TP4067-405	1.15
C14, 24, 34, 44	Mylar, 4700pF, 10%, 50V	TP4067-406	1.00
C15, 25, 35, 45	Ceramic, 220pF, 10%, 100V	TP4067-407	.85
Q11, 21, 31, 41	Transistor	TP4067-410	3.85
Q12, 22, 32, 42	Transistor	TP4067-411	3.85
R1, 2	Composition, 1500, 10%, ½W	RC20BF152K	.30
R11, 13, 21, 23, 31, 33, 41, 43	Composition, 47K, 10%, ¼W	RC07BF473K	.40
R12, 22, 32, 42	Composition, 150, 5%, ¼W	RC07BF151J	.40
R14, 24, 34, 44	Composition, 5.6K, 10%, ¼W	RC07BF562K	.40
R15, 25, 35, 45	Composition, 300, 5%, ¼W	RC07BF301J	.40
R16, 26, 36, 46	Composition, 1K, 10%, ¼W	RC07BF102K	.35
R17, 27, 37, 47	Composition, 8.2K, 10%, ¼W	RC07BF822K	.35

MISCELLANEOUS

Symbol	Description	Part No.	Sug. Ret.
C5	Electrolytic, 40uF, 35V	TP4067-401	1.45
C6	Electrolytic, 47uF, 35V	CE22324-22	.70
C7	Ceramic, 0.01, 10%, 600V	C2747	.50
C8	Mylar, 1.5uF, 250V	TP4067-408	1.55
CR2	Diode, Silicon, IRC 1001	TP4067-409	1.75
M1	Motor (P/o Motor Assembly)	TP4067-501	30.00
R3, 4	Composition, 100, 5%, 1/3W	R33DC101J	.30
R5, 6	Composition, 1.2K, 5%, 1/3W	R33DC122J	.30
R7	Wirewound, 330, 10%, 7W	TP4067-412	.85
R18, 28, 38, 48	Composition, 3.3K, 5%, ½W	RC20BF332J	.35
--	Lamp, 28V, 40mA	LM21436-3	.60
--	Lamp Assembly, Cartridge (6 lamps)	AS521431-2	12.00
--	Solenoid Assembly, Program	TP4067-504	5.45
S8, 9	Switch, Repeat-Consec, Change	SP50200-51	2.65
S10	Switch, Cartridge Mode	TP4067-133	.80
S11	Switch, Program (P/o Cam Shaft Assembly)	TP4067-505	5.25
S12	Microswitch, AC	TP4067-024	4.05

SUGGESTED TEST CARTRIDGES

RCA No.	Description
323	400Hz, full track, at standard recording level, in a 2-channel cartridge shell.
326	8kHz, full track azimuth alignment, in a 2-channel cartridge shell.
340	Check for proper head indexing and channel orientation.
353	3.15kHz wow and flutter.
523	Same as 323, in a 4-channel cartridge shell.
526	Same as 326, in a 4-channel cartridge shell.
540	Same as 340, in a 4-channel cartridge shell.
554	1kHz, recorded on tracks 2 and 6 at standard recording level, in a 4-channel cartridge shell.
572	Spot frequency test containing 50Hz, 1kHz, and 8kHz tones

Order tapes directly from:

RCA RECORDS
Special Products Division
1133 AVENUE OF THE AMERICAS
NEW YORK, N. Y. 10036

SOLENOID END-STOP ADJUSTMENT

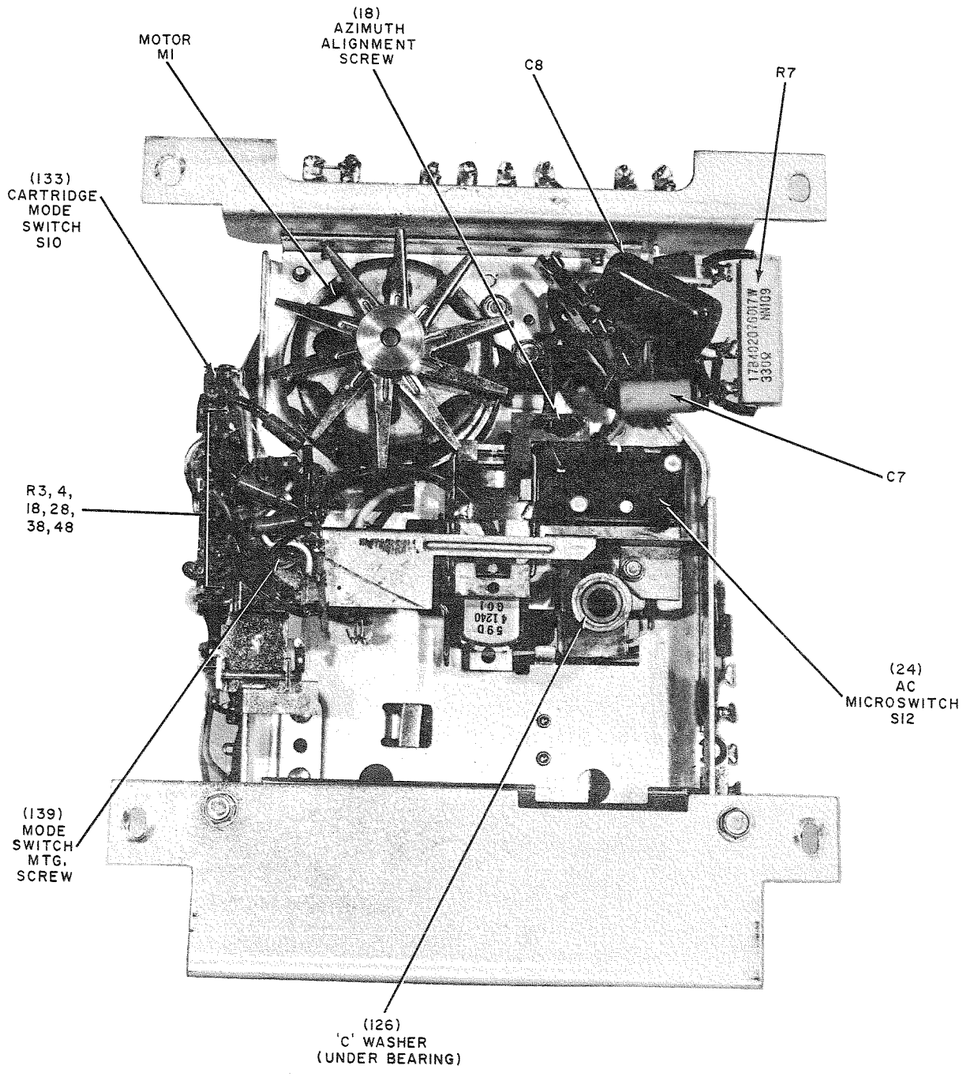
(1) Insert any 2-CH or 4-CH cartridge. A test cartridge is not required.
(2) Back-out solenoid end-stop adjustment (42) until the tape head completely stops indexing.
(3) Turn end-stop adjustment in the opposite direction 1 turn.
(4) Check operation by indexing head several times. Program lights should advance in the proper sequence.

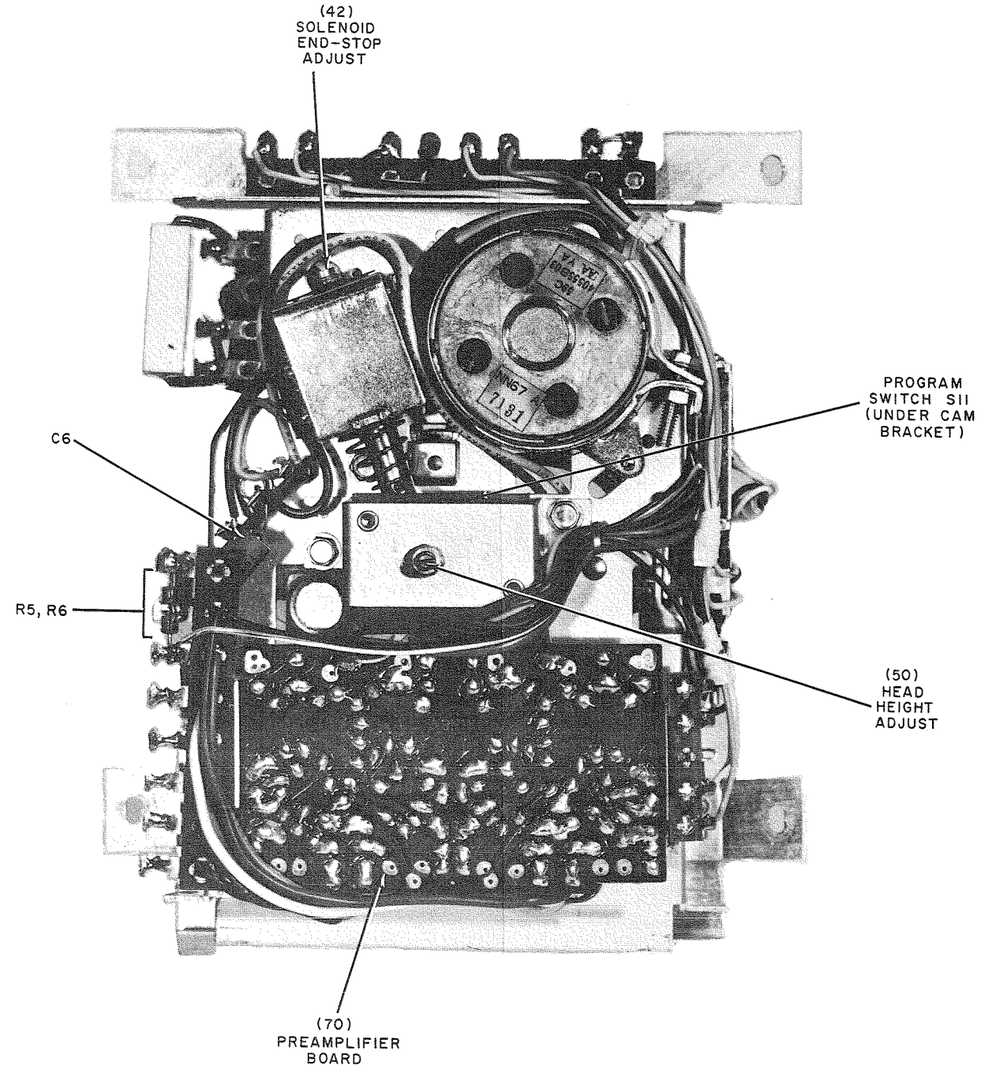
AZIMUTH ALIGNMENT

(1) Connect an AC VTVM to the FRONT-R RCDR OUT jack and set SELECTOR to CARTRIDGE position. Insert test cartridge 323 or 523.
(2) Adjust the azimuth alignment screw (18) for maximum output.
(3) Insert test cartridge 326 or 526 and adjust for maximum output as in step (2).
(4) Lock adjustment screw in place using glyptol, loctite, Duco, or other suitable cement. Be careful to avoid getting cement on the drive belt.

HEAD HEIGHT ADJUSTMENT

(1) Set BASS and TREBLE controls to minimum. (This reduces the noise level so that head height may be more accurately adjusted to reduce crosstalk.) Set SELECTOR to CARTRIDGE and MODE/EXT TAPE MONITOR to 4-CH STEREO.
(2) Connect an AC VTVM to MAIN FRONT-R SPEAKER terminal and press MAIN SPKRS pushbutton. Insert test cartridge 554 and press CHANGE pushbutton to play PROGRAM 2.
(3) Loosen lock nut (52) located on the bottom of cam bracket (51) and adjust cam shaft (50) for maximum output.
(4) Connect AC VTVM to MAIN FRONT-L SPEAKER terminal and check output as outlined above.
(5) Reconnect AC VTVM to MAIN FRONT-R SPEAKER terminal and press CHANGE pushbutton to play PROGRAM 1. The noise/crosstalk level should be -45dB or better.





CARTRIDGE PLAYER DISASSEMBLY

NOTE: Index numbers used in parenthesis refer to exploded view.

REMOVING FLYWHEEL
(1) Remove cartridge player from chassis.
(2) Remove drive belt (10).
(3) Rotate flywheel so that the two ends of 'C' washer (126) are accessible from the front.
(4) Using two small bladed screwdrivers (or similar tools) push both ends of 'C' washer simultaneously to displace it from shaft.
(5) Rotate flywheel so that the rounded portion of 'C' washer is at the front. Insert a small, pointed tool (preferably with a right angle bend at the tip) in the cutaway portion of the 'C' washer, between the washer and shaft, and pull washer from shaft.
(6) Remove flywheel (15) and flywheel spacer (131).

REMOVING HEAD-MOUNT/CAPSTAN HOUSING
(1) Remove flywheel.
(2) Remove antistatic bracket (111) by taking out holding screw (1).
(3) Remove screw (21) near the capstan well which secures shield (22).
(4) Remove cartridge mode switch (133), and terminal strip by removing terminal strip mounting screw (139). Remove actuating arm (125) from the switch.
(5) Remove screws (128) and (129) holding the cartridge mode switch mounting bracket (127) to the side of the chassis.
(6) Unsolder shield (22) mounted in a slot in the mechanism frame. Be careful not to bend the shield when removing it.
(7) Remove screw (36) holding solenoid terminal strip (136).
(8) Remove screw (53) holding cam bracket (51).
(9) Remove screw (35) located between solenoid and cam bracket.
(10) Remove the two screws holding the AC microswitch (24). Remove the switch insulator (26) and motor actuating arm (25).
(11) Remove the playback head. Refer to REMOVING PLAYBACK HEAD procedure.
(12) Lift the capstan housing assembly (C) slightly and slide the head connector between the cross spring.
(13) Lift the head and capstan housing assembly from the chassis.

CAUTION: The head transfer pin (68) is now free and will fall out if the chassis is turned upside-down. The rounded edge of this pin goes toward the switch, the flat side faces the head.

REMOVING PLAYBACK HEAD
(1) Remove flywheel.
(2) Loosen allen-head screw (97) securing playback head.
(3) Loosen head in mount by applying a slight downward pressure (with index finger), at the upper front edge of the head.
(4) Slide the head and cable assembly out the front of the head retainer (95). Carefully pull the head out of the head socket connector (93).

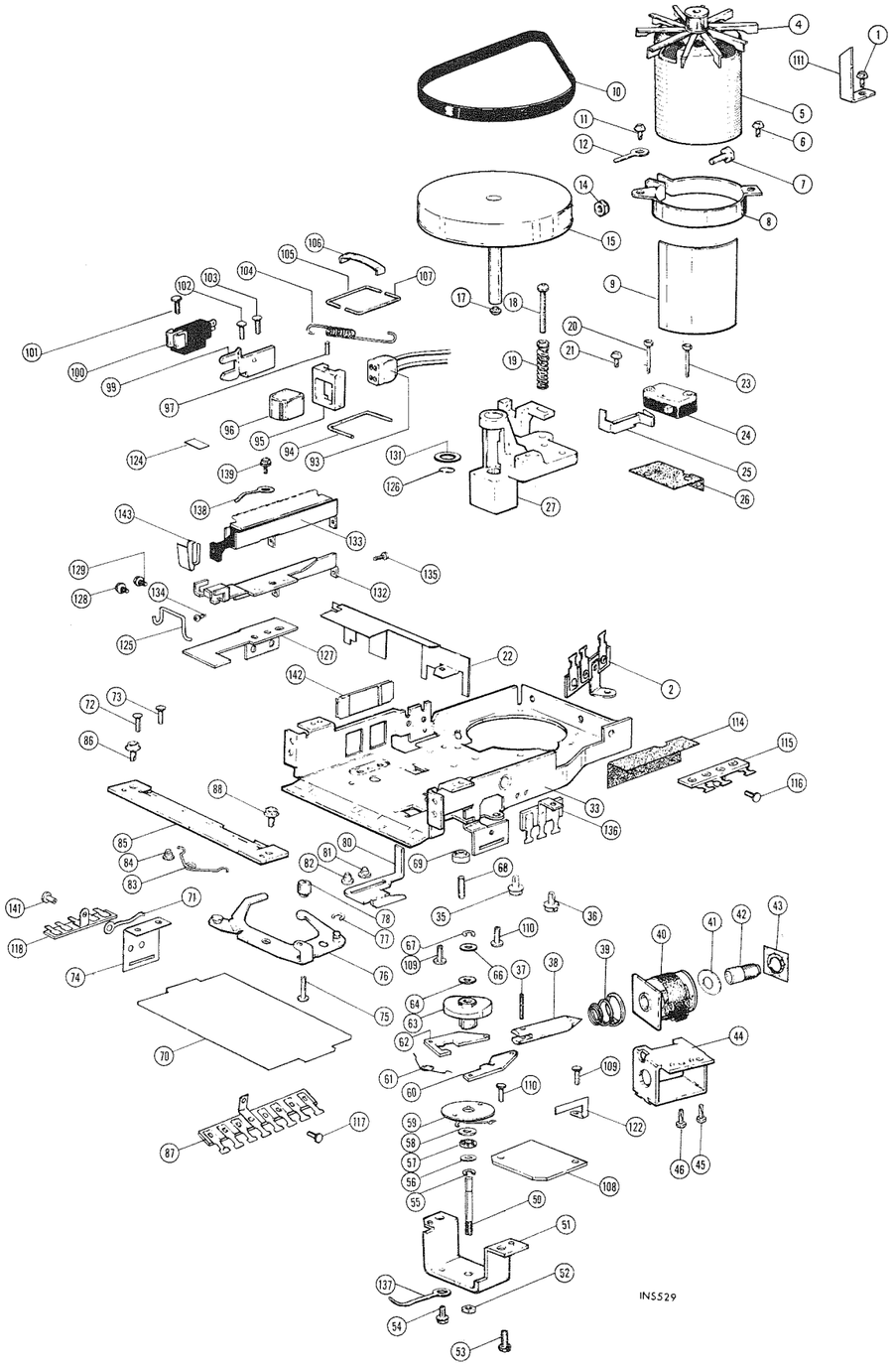
NOTE: The colored dot on the top of the socket, and the dot on the top rear (pin side) of the head show correct orientation when the head is replaced.

(5) Remove the metal shim (124) located beneath the head on the front edge of the bracket.

INSTALLATION CAUTION: Before plugging head into socket, place a small-bladed screwdriver (or similar tool) between the cross bracket and the front part of the head bracket to support the rear of the socket. Then, carefully push head into socket.

REMOVING MOTOR
(1) Lift off drive belt (10).
(2) Unsolder motor wires from terminal strip (136).
(3a) If the pulley/fan assembly (4) is set-screw mounted, loosen the screw and remove the assembly.
(3b) On some units, the motor shaft and pulley/fan assembly are cemented together. The assembly can be removed by inserting a small screwdriver under the fan to pry the pulley/fan assembly from the shaft while heating the motor shaft with a soldering iron (to soften the cement).
(4) Remove tension adjustment screw (11), noting its original position. Remove screw (6) on opposite mounting bracket.
(5) Carefully remove motor, motor bracket (8), and shield (9) intact.

INSTALLATION NOTE: As a guide, use a straight-edge across the flywheel and pulley when adjusting the height of the motor, so that the flat end of the pulley and top of flywheel are in the same plane.



MECHANICAL PARTS

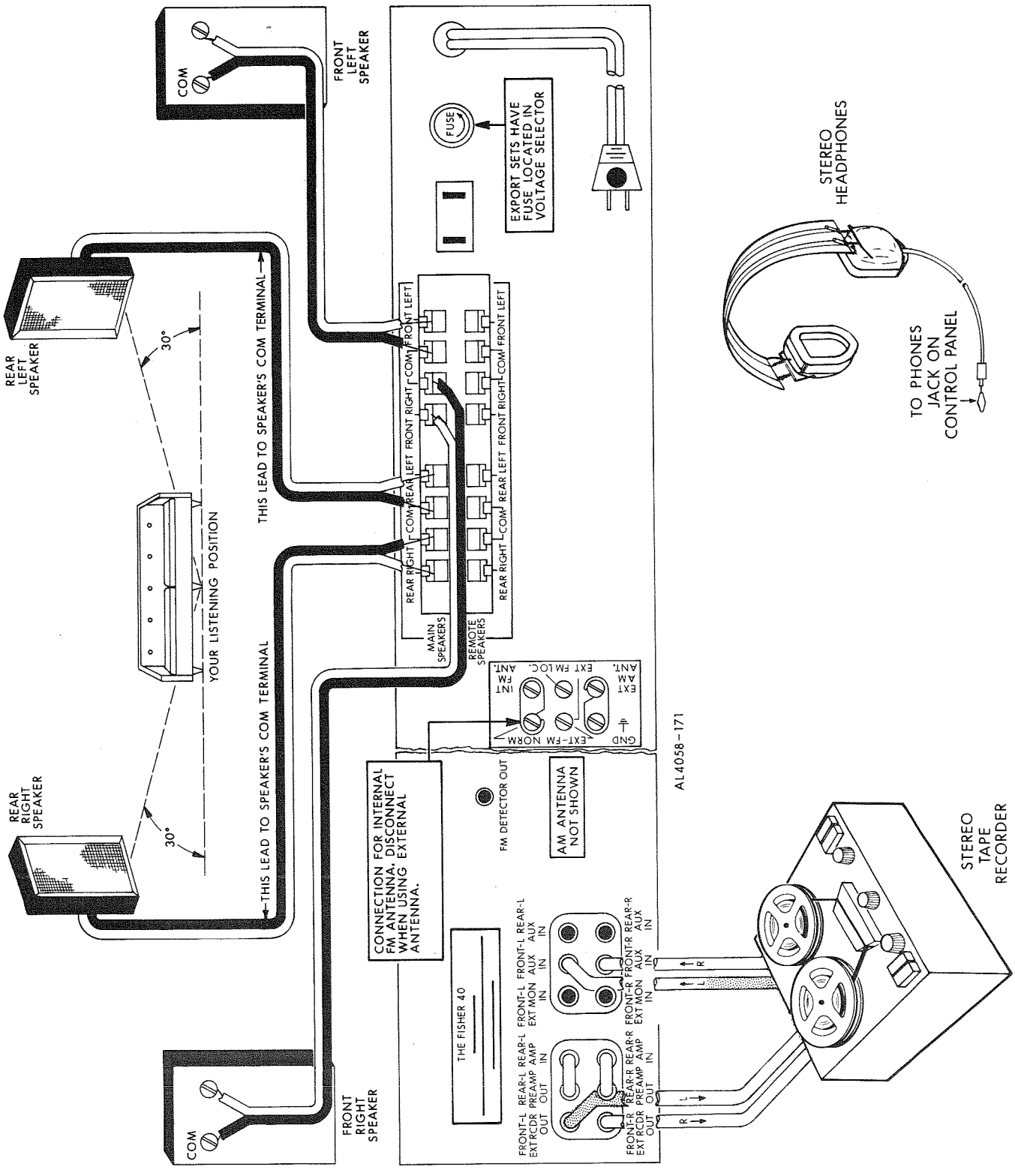
Item	Description	Part No.	Sug. Ret.
1, 6, 11	Screw, Tpg: 6-32x¼	TP4067-201	.10
2	*Terminal Strip	—	
4	Pulley/Fan Ass'y: 60Hz	TP4067-004	3.50
-	Pulley/Fan Ass'y: 50Hz	TP21349	3.50
A	Motor less Pulley/Fan	TP4067-501	30.00
5	Motor Only	p/oTP4067-501	--
7	Screw, Tpg: 8-32x¾	p/oTP4067-501	--
8	Motor Mounting Bracket	p/oTP4067-501	--
9	Magnetic Shield	p/oTP4067-501	--
10	Drive Belt	TP4067-010	1.60
12	*Wraparound Lug	—	--
14	Nut, Hex: 8-32	p/oTP4067-501	--
B	Flywheel Ass'y	TP4067-502	2.30
15	Flywheel and Shaft	p/oTP4067-502	--
17	Capstan Shaft Bearing	p/oTP4067-502	--
18	Screw, Mach: 4-40x¾	TP4067-018	.20
19	Azimuth Adjust Spring	TP4067-019	.40
20, 23	Screw, Tpg: 4-40x5/8	TP4067-020	.10
21	Screw, Tpg: 4-40x¼	TP4067-021	.40
22	*Shield	—	--
24	AC Microswitch	TP4067-024	4.05
25	Motor Actuating Arm	TP4067-025	.70
26	*Switch Insulator	—	--
C	Capstan Housing Ass'y	TP4067-503	7.15
27	Capstan Housing/Block	p/oTP4067-503	--
33	*Chassis	—	--
35, 36	Screw, Tpg: 8-32x9/32	TP4067-035	.10
37	Spiral Pin (Ratchet Plunger)	TP4067-037	.50
38	Solenoid Plunger	TP4067-038	.85
39	Solenoid Spring	TP4067-039	.40
D	Solenoid Ass'y	TP4067-504	5.45
40	Solenoid Coil	p/oTP4067-504	--
41	Spring Washer	p/oTP4067-504	--
42	Solenoid Stop	p/oTP4067-504	--
43	Spring Nut	p/oTP4067-504	--
44	Solenoid Bracket	p/oTP4067-504	--
45, 46	Screw, Mach: 6-32x5/32	TP4067-045	.10
E	Cam Shaft Ass'y	TP4067-505	5.15
50	Cam Shaft	p/oTP4067-505	--
51	Cam Bracket	p/oTP4067-505	--
52	Nut, Hex: 8-32	p/oTP4067-505	--
53	Screw, Tpg: 8-32x3/8	TP4067-053	.40
54	Screw, Tpg: 6-20x¼	TP4067-054	.40
55	Washer, 'C'	p/oTP4067-505	--
56, 58, 66	Washer, Flat	p/oTP4067-505	--
57	Thrust Bearing	p/oTP4067-505	--
59	Program Switch Rotor	p/oTP4067-505	--
60	Push Ratchet Pawl	TP4067-060	.50
61	Pawl Tension Spring	TP4067-061	.50
62	Pull Ratchet Pawl	TP4067-062	.50
63	Ratchet Cam	p/oTP4067-505	--
64	Spring Washer	p/oTP4067-505	--
67	Washer, 'C'	p/oTP4067-505	--
68	Transfer Pin	TP4067-068	.95
69	Transfer Pin Bushing	TP4067-069	.65
70	Preamplifier Board	TP4067-270	29.75
71	*Wraparound Lug	—	--
72, 73, 116, 141	*Rivet: .122x1/8	—	--
74	Spring Bracket	TP4067-074	.55
75	*Rivet: .088x15/32	—	--
76	Ejector Lever	TP4067-076	1.20
77	Washer, 'C'	TP4067-077	.35
78	Cartridge Return Roller	TP4067-078	.40
80	Slide Bracket	TP4067-080	.55
81, 82, 84	*Shoulder Rivet	—	--
83	Ejector Spring	TP4067-083	.55
85	Hold-Down Bracket	TP4067-085	.65
86, 88	Screw, Tpg: 8-32x¼	TP4067-086	.40
87	*Terminal Strip	—	--
93	Head Socket Connector	TP4067-093	3.00
94	L (bottom) Radius Arm	p/oTP4067-503	--
95	Head Retainer	p/oTP4067-503	--
96	Tape Head, 4-Channel	TP4067-096	30.00
97	Screw, Tpg: 4-40x3/16	TP4067-097	.40
99	Tape Guide Bracket	TP4067-099	1.00
100	Track Switch	TP4067-100	1.15
101, 102, 103, 109, 110, 117	*Rivet: 122x3/16	—	--
104	Head Tension Spring	TP4067-104	.85
105	L (top) Radius Arm	p/oTP4067-503	--
106	Spring Clip	p/oTP4067-503	--
107	R (top) Radius Arm	p/oTP4067-503	--
108	Program Switch Stator	p/oTP4067-505	--
111	Antistatic Bracket	TP4067-211	1.00
114	*Terminal Insulator	—	--
115	*Terminal Strip	—	--
118	*Terminal Strip	—	--
122	Spring	p/oTP4067-505	--
124	Head Shim	TP4067-124	.50
125	Actuating Arm	TP4067-125	.70
126	Washer, 'C'	TP4067-126	.50
127	*Switch Mounting Bracket	—	--
128, 129	Screw, Tpg: 8-18x¼	TP4067-128	.10
131	Flywheel Spacer	TP4067-131	.35
132	Switch Bracket	TP4067-132	1.60
133	Switch, Cartridge Mode	TP4067-133	.80
134, 135	Screw, Tpg: 6-40x¼	TP4067-134	.10
136	*Terminal Strip	—	--
137, 138	*Wraparound Lug	—	--
139	Screw, Tpg: 6-20x¼	TP4067-054	.10
142	Cartridge Guide Spacer	TP4067-142	.40
143	Actuating Arm	TP4067-143	.65

*Replacement part NOT supplied by Fisher Radio

TROUBLE SHOOTING GUIDE

CAUTION: IN ANALYZING THE CAUSE OF COMPLAINT, DO NOT INSERT ADDITIONAL TAPE CARTRIDGES UNTIL THE POSSIBLE CAUSE AND REMEDY HAVE BEEN REFERRED TO IN THIS GUIDE.

SYMPTOM	CAUSE	REMEDY
Tape breaks or winds up around capstan shaft.	1. Defective tape cartridge.	Replace cartridge with known good cartridge.
Squealing or excessive wow.	1. Defective tape cartridge.	Replace cartridge with known good cartridge.
	2. Defective capstan shaft and/or bearings.	Replace flywheel assembly, and/or capstan housing.
Drive belt slips off flywheel (also slow tape start-up).	1. Defective Drive belt.	Replace drive belt.
	2. Motor bracket bent (drive shaft not vertical).	Straighten bracket. If belt rides high on pulley, insert screwdriver between motor and flywheel (in circular slot of chassis) and pry motor away from flywheel until shaft is aligned. If belt rides low, insert screwdriver in slot on opposite side of motor and pry toward flywheel until aligned. CAUTION: DO NOT APPLY PRESSURE TO PULLEY.
Tape pulls out of center of cartridge when cartridge is removed from unit.	1. Undersized or burred tape guide slot.	Deburr slot or replace guide bracket.
Poor tape drive (also wow and flutter).	1. Flywheel and/or motor pulley dirty or greasy.	Use isopropyl alcohol to clean the outer edge of flywheel, motor pulley, and capstan shaft.
	2. Drive belt improperly installed.	Make certain rough surface of belt is on inside. (Rough surface drives flywheel.) On belts with stripes, install belt with stripes on outside.
	3. Drive belt defective (stretched, etc.).	Replace drive belt.
	4. Defective capstan shaft, and/or bearings.	Replace flywheel assembly, and/or capstan housing.
Crosstalk.	1. Defective tape cartridge.	Replace cartridge with known good cartridge.
	2. Tape head out of adjustment.	Check head height and azimuth adjustments as outlined on page 19
	3. Head mounting hardware binding.	Check for obstructions or bent mounting rods. Index head to lower position, then lift up head. It should have sufficient tension to spring back without binding.
	4. Tape guide bracket not positioning tape correctly with respect to head.	Check distance between bottom edge of tape guide bracket and chassis. If distance is not .095 to .100, replace tape guide bracket.
	5. Defective cam and shaft assembly.	Replace cam and shaft assembly.
	6. Tape head not indexing correctly.	See "Improper Head Indexing".
Motor does not run when cartridge is inserted.	1. Microswitch not actuated.	Replace switch, or bend actuating arm enough to actuate switch when cartridge is inserted.
Intermittent audio during tape operation.	1. Intermittent tape-capstan, or tape-to-head contact.	See "Poor Tape Drive".
	2. Intermittent head-connecting cable.	Determine if cable is faulty by wiggling receptacle end of cable, or feed a signal into input of preamplifier. If cable is faulty, replace.
Improper head indexing, intermittent head indexing.	1. Inadequate tension on solenoid plunger return spring.	Increase spring tension, or replace spring.
	2. Defective plunger.	Replace solenoid plunger.
	3. Solenoid plunger end-stop screw not properly adjusted.	Adjust solenoid end-stop screw as outlined on page 19
	4. Cam tension spring out of hole, or missing.	Insert spring into its hole, or replace spring.
	5. Defective cam and shaft assembly.	Replace cam and shaft assembly.
Unit does not change Program	1. Solenoid not operating.	Check solenoid circuit. Repair or replace defective parts.
	2. Tape head not indexing properly.	See "Improper Head Indexing".
Slow speed (also see "Poor Tape Drive").	1. Binding tape cartridge.	Replace cartridge with known good cartridge.
	2. Defective drive belt.	Replace drive belt.
	3. Defective capstan shaft, and/or bearings.	Replace flywheel assembly, and/or capstan housing.



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