



MA2G FM STEREO ADAPTOR

SERVICE AND TEST PROCEDURES

Service and test information is outlined in this manual to enable the MA-2 stereo adaptor to be serviced and repaired in the field with test equipment found in most service shops.

Balance and phase adjustment methods are outlined that may be accomplished by listening to the loudspeaker output. These adjustments are performed very accurately with a small amount of practice and ear training.

The alignment and service procedures included herein are as follows:

1. Balance and phase adjustment methods.

TEST EQUIPMENT REQUIRED FOR SERVICING

Audio Signal Generator
 Audio Vacuum Tube Voltmeter
 Oscilloscope - equivalent to GE ST2A
 Voltohmmeter

BALANCE ADJUSTMENT PROCEDURES

Three alternate methods for adjustment of balance control (R-4) are outlined in the following as Methods A, B, and C. Method A will be the most practical for field service but will require a small amount of ear training and practice. The aural effect of the widening and narrowing of stereo separation by rotating control R4 is easily grasped when standing in the exact center of a stereo speaker system separated at a distance of approximately 6 feet. The stereo system must be in phase. These system checks are easily made by listening to the speaker system from a monaural program. When the system is properly adjusted for monaural the sound will come from the exact center of the two speakers. Do this before attempting to practice the procedure outlined in Method A. After experiencing the aural effects of the adjustment of R4 when directly in front of the speaker system, the technician will be able to duplicate the adjustment from the back of a console phonograph.

METHOD "A"- This is an aural method by listening to a stereo amplifier speaker system with the signal source being an FM stereo station broadcasting a stereo program.

1. Properly tune in the FM station on the FM tuner and adjust the stereo amplifier for proper stereo operation.
2. Rotate control R-4 in the adaptor to its complete clockwise position. (Use a plastic screwdriver. This places the arm of the control at ground or at OFF position. No L+R information can now pass the control and appear in the amplifier output. Only L-R information will be heard.

3. Stand as close to the speakers as is possible and midway between the right and left speakers. The sound of the L-R signal only will produce a "phantom" effect where the sound seems to float around the room, and come from a point to your rear. (Note: if severe distortion is noticed at this point, perform the 19KC and 38KC filter adjustment.

4. Rotate control R4 in the adaptor counterclockwise until the sound appears to come from the right and left speakers and just loses the "phantom" effect. THIS IS THE CORRECT ADJUSTMENT. The control will have been turned approximately one-quarter turn counterclockwise.

5. As the control R4 is rotated farther counterclockwise the sound will proportionately appear to come from a point closer to the center of the two speakers, causing a complete loss of stereo separation. (All of the sound will appear to come from a point between right and left speaker). If the control R-4 is not turned up enough for proper stereo separation the stereo separation will be extreme and annoying with a "hole" in the center between the two speakers.

(See Separation Effect Sketch)

METHOD "B" - Adjustment with use of audio signal generator, and audio vacuum tube voltmeter.

1. Connect a 1 volt rms 1000 cycle audio signal to the input jack of the adaptor.
2. Adjust R-4 in the adaptor to produce 1 volt rms at the left output jack.

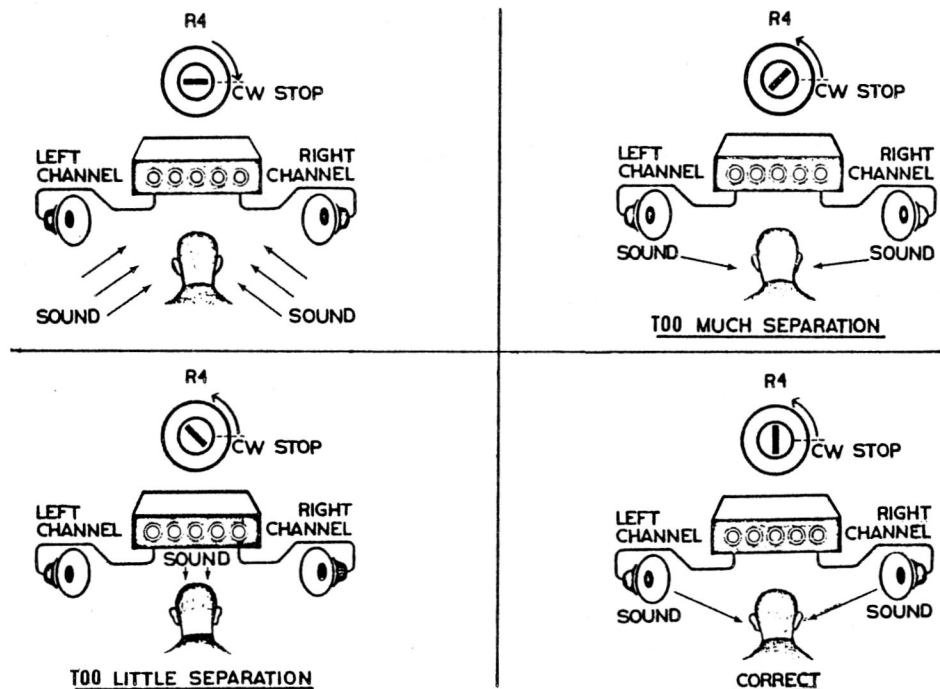
(a) With this method it has to be assumed that we have unity gain in L-R channel. A ± 3 db unity gain spec. is listed for the adaptor.

(Note: If the output signal is observed with an oscilloscope the wave may appear distorted. This is due to the fact that there is no 19KC pilot and hence no 38KC carrier to unclamp the detector diodes. (D1-D2).

METHOD "C" - (Most accurate method)

By tuning in an FM Stereo Station broadcasting program or test signal transmitted on one channel (left or right) only.

1. Properly tune in the FM station on the FM tuner.
2. Rotate the stereo amplifier balance control to the stereo channel (left or right) that is opposite from the channel being broadcast. Listen or measure the voltage at the speaker being used.
3. Adjust R-4 in the adaptor for minimum signal.



SEPARATION EFFECT BY R-4 ADJUSTMENT

SUBCARRIER ADJUSTMENT

The subcarrier adjustment procedure is accomplished in two steps. Subcarrier phase is set by adjustment of oscillator coil L1, and the regenerated 38KC subcarrier is peaked to maximum amplitude by adjustment of L2.

SUBCARRIER PHASE ADJUSTMENT

This is an aural method to adjust oscillator coil L1 by use of a transmitted FM stereo signal.

1. Properly tune in an FM station broadcasting an FM Stereo program.
2. Be sure the FM stereo Adaptor is connected properly to the tuner and amplifier.
3. Rotate separation control R4 in the adaptor to its complete clockwise position. This will remove all L+R information, therefore the sound output heard from the speakers will be detected L-R information only.
4. Rotate the stereo amplifier balance control completely to the right (or left). Adjust tone controls for min Bass and max Treble.
5. Listen carefully to the sound output of the selected right (or left) speaker. If the oscillator is not adjusted to 19KC a beat or squeal will be heard which overpowers the station program. If the oscillator is running at 19KC the program material will be distinct. One small area of the complete tuning range of L1 will produce 19KC. This area covers approximately 240 degrees of one slug revolution. The phase of the generated 38KC signal is shifted ± 180 degrees during

this area of slug rotation. The proper setting for the slug of coil L1 is at the exact midpoint between the out of sync beat or squeal.

Use a plastic hex head adjusting tool. By rotating the slug clockwise from the extreme counterclockwise area where the beat or squeal is heard the following successive signal changes will be noted. A clear program peak, a null, a clear program peak (center), a null, a clear program peak and then into the clockwise area of beat or squeal. The correct phase setting is with the slug of L1 adjusted to the midpoint of the center peak of distinct program material.

ADJUSTMENT OF 38KC COIL L2

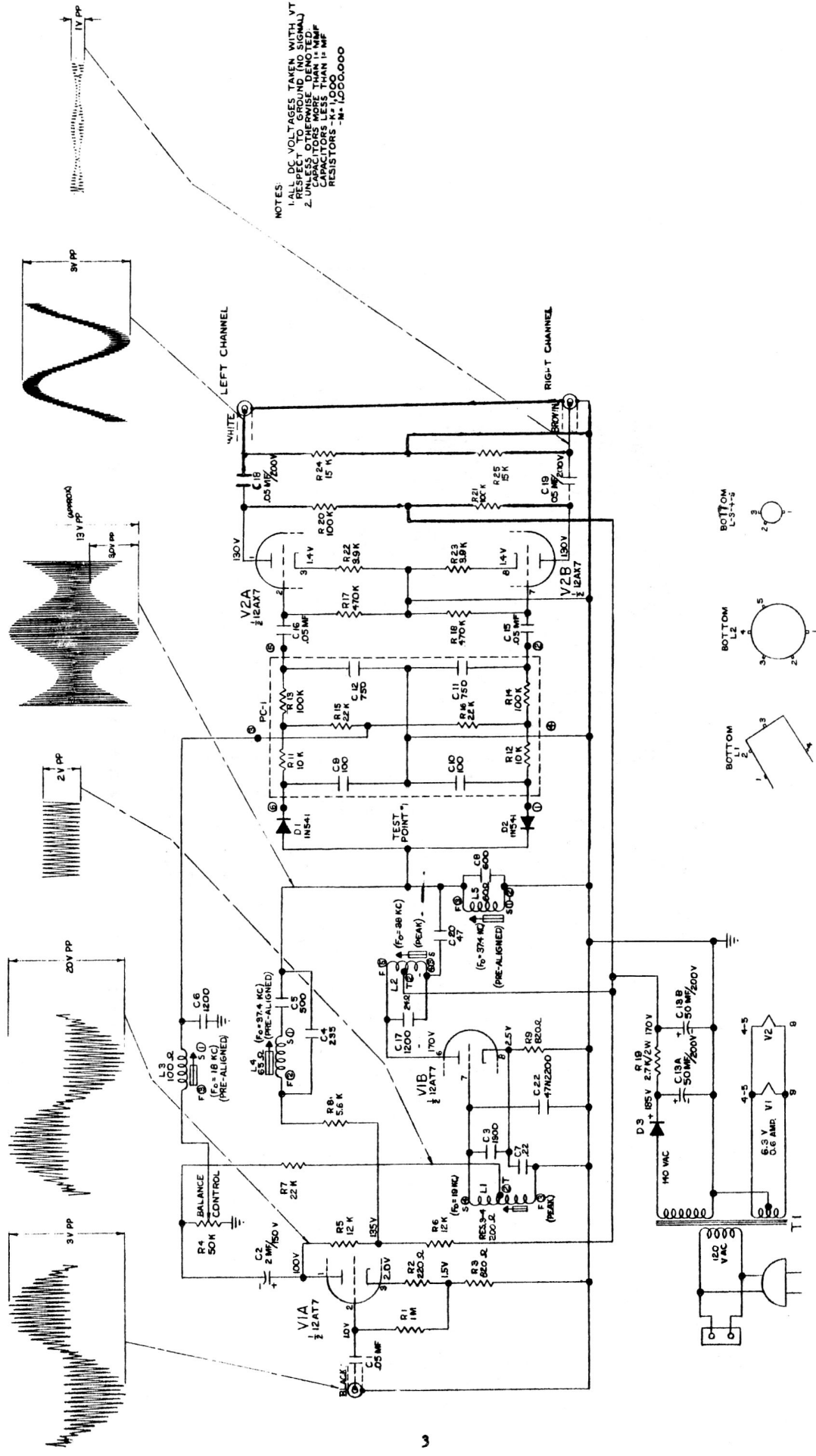
After completing the subcarrier phase adjustment with coil L1, the 38KC filter coil L2 is peaked by the following procedure.

1. Apply a vacuum tube voltmeter or oscilloscope test probe to the plate (pin 6) of oscillator tube V1 (12AT7). A 470,000 ohm 1/2 watt resistor should be used in series with the VTVM or scope probe and pin 6 for isolation. Adjust the slug of L2 to peak the 38KC response as observed on the VTVM or scope.

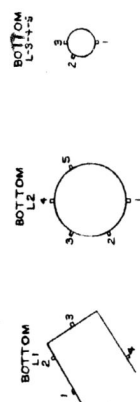
After this adjustment remove the VTVM or scope connections and repeat the 19KC phasing adjustment procedure as outlined in the preceding text. Listen carefully for least high frequency distortion on loud passages of program while adjusting.

When the subcarrier phase and peaking adjustments are completed the stereo separation control R4 is adjusted for optimum stereo separation. Use any of the R-4 balance adjustment methods outlined

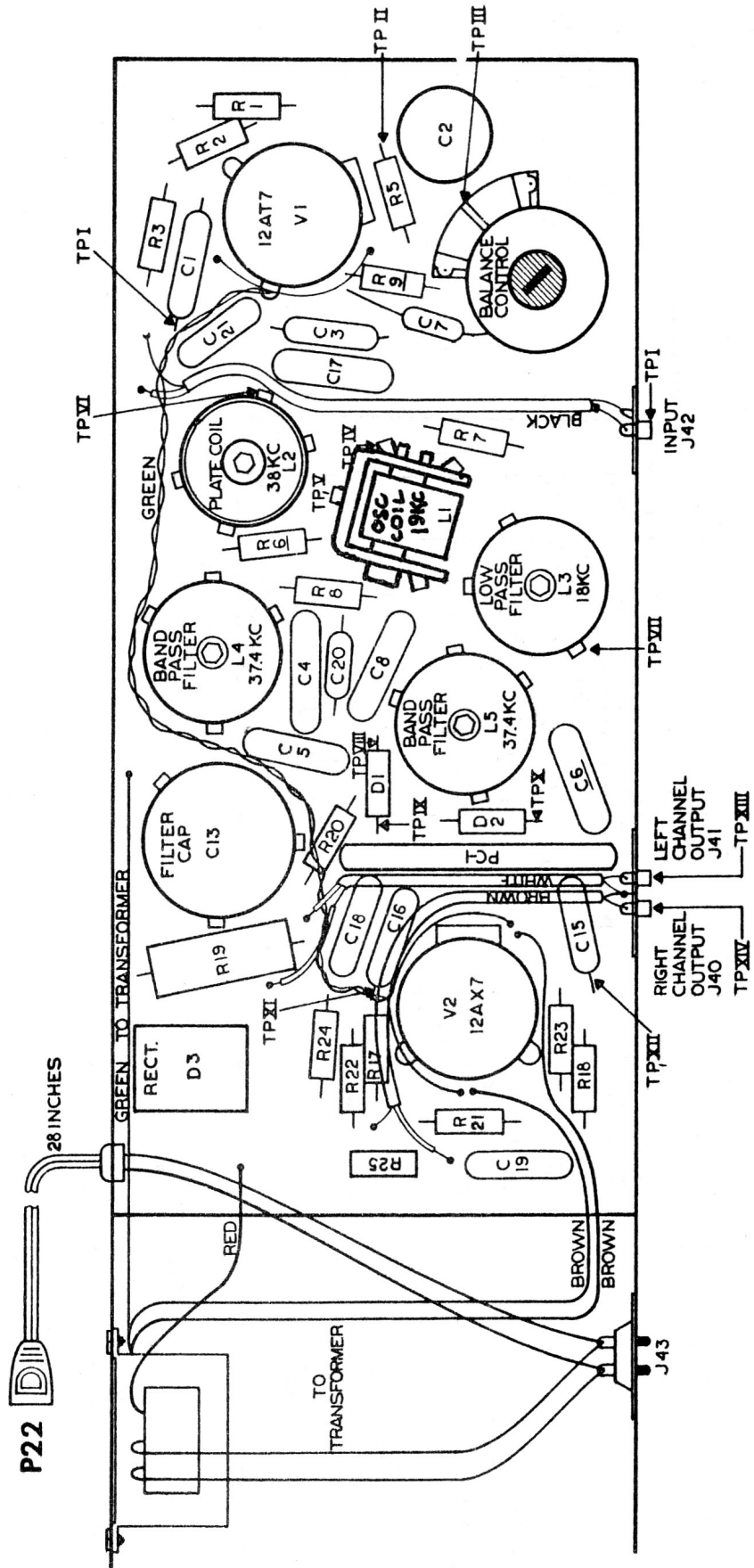
COMPOSITE SIGNAL
1000 CPS L ONLY



NOTES:
1. ALL DC VOLTAGES TAKEN WITH VT VM WITH
RESPECT TO GROUND (NO SIGNAL)
2. PULSED SIGNALS MORE THAN 100 MF
CAPACITORS LESS THAN 11 MF
RESISTORS - 1/4, 1/2, 1, 10, 100, 1000



MA-2G SCHEMATIC DIAGRAM



CHASSIS LAYOUT MA2G FM STEREO ADAPTOR

REPLACEMENT PARTS LIST

CAT. NO.	SYMBOL	DESCRIPTION	CAT. NO.	SYMBOL	DESCRIPTION																					
CAPACITORS			RECTIFIERS																							
EA31X20	C2	Elec. 2 MFD @150V	EA16X1	D1,D2	Diode - IN541																					
EA18X21	C3	MICA 1300 MMF \pm 5% - 300V	EA57X5	D3	Rectifier, Selenium																					
EA18X22	C4	MICA 235 MMF \pm 5% - 300V-	MISCELLANEOUS																							
EA18X23	C6,C17	MICA 1200 MMF \pm 5% - 300V																								
EA18X33	C7	Ceramic .22 MFD \pm 10% -100V	<table border="0"> <tr> <td>EA88X15</td> <td>T.</td> <td>Transformer, Power</td> </tr> <tr> <td>EABX38</td> <td></td> <td>Jack, Phono (Single Type)</td> </tr> <tr> <td>EABX24</td> <td></td> <td>Jack, Phono (Dual Type)</td> </tr> <tr> <td>EABX39</td> <td></td> <td>Receptacle (Power Cord)</td> </tr> <tr> <td>EA66X6</td> <td></td> <td>Lead, Power</td> </tr> <tr> <td>EA34X12</td> <td>V1,V2</td> <td>Socket, Tube (9 Pin)</td> </tr> <tr> <td>EA46X8</td> <td></td> <td>Shield, Tube (9 Pin)</td> </tr> </table>			EA88X15	T.	Transformer, Power	EABX38		Jack, Phono (Single Type)	EABX24		Jack, Phono (Dual Type)	EABX39		Receptacle (Power Cord)	EA66X6		Lead, Power	EA34X12	V1,V2	Socket, Tube (9 Pin)	EA46X8		Shield, Tube (9 Pin)
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EA46X8		Shield, Tube (9 Pin)																								
EA31X21	C13	Elec. 50/50 MFD @ 200V																								
EA18X32	C20	Ceramic, 47 MMF \pm 10% -500V																								
EA18X31	C22	Ceramic, 47 MMF \pm 10% -500V																								
EA33X11	C9,C10,C11 C12,R11,R12 R13,R14,R15 R16	RC Couplate																								
COILS																										
EA36X6	L1	Coil, Oscillator	COMMON RESISTORS \pm 10% 1/2 WATT UNLESS OTHERWISE SPECIFIED																							
EA36X11	L2	Coil, 38KC Filter																								
EA36X12	L3	Coil, Time Delay																								
EA36X13	L4	Coil, Filter #1																								
EA36X14	L5	Coil, Filter #2																								
COMMON CAPACITORS			R1	1 Meg																						
	C1	.05 MFD - 100V \pm 20%	R2	220 Ohm																						
	C5	500 MMF - 300V \pm 5%	R3	820 Ohm																						
	C8	600 MMF - 300V \pm 5%	R5	12 K																						
	C15	.05 MFD - 100V \pm 20%	R6	12 K																						
	C16	.05 MFD - 100V \pm 20%	R7	22 K																						
	C18	.05 MFD - 200V \pm 20%	R8	5.6 K																						
	C19	.05 MFD - 200V \pm 20%	R9	820 Ohm																						
RESISTORS			R17	470 K																						
EA49X37	R4	Potentiometer, (Variable resistor) 50K	R18	470 K																						
EA13X1	R19	Resistor, Carbon-2.7K, 1 Watt	R20	100 K																						
			R21	100 K																						
			R22	3.9 K																						
			R23	3.9 K																						
			R24	15 K																						
			R25	15 K																						

ALL PARTS NOT LISTED BY CATALOGUE NUMBER ARE STANDARD PARTS
 AVAILABLE FROM YOUR LOCAL PARTS JOBBER

SUBJECT TO CHANGE OR WITHDRAWAL WITHOUT NOTICE

July 1962

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