

FM ALIGNMENT

GENERAL INFORMATION - The factory alignment is performed with laboratory equipment. The circuits are quite stable and not ordinarily subject to drift, therefore, before alignment is attempted, the set should be thoroughly checked for circuit troubles. An FM generator should be used for FM alignment.

ALIGNMENT CONDITIONS - Input level to the receiver +14V DC. During FM alignment the input amplitude must be set above or below the limiting level depending on the adjustment made. The limiting level is the point where further increase in input does not increase the output level. During alignment then, either keep the level below this point (below limiting level) or above this point (into limiting) as pointed out in the alignment procedure. In addition, the signal generator leads must be carefully shielded. If noise voltage on the generator leads is high enough to cause limiting, it is almost impossible to align the receiver properly because tuning adjustments will not show up as variations in the VTVM reading. To avoid this, the leads must be carefully shielded and kept short.

FM ALIGNMENT USING FM GENERATOR

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY	RADIO FREQUENCY	OUTPUT INDICATOR	ADJUST	REMARKS
FM-IF ALIGNMENT						
1	No gen. required	—	—	VTVM AC probe across 4.0 ohm output load	T1, T101, T102	Adjust for max noise output on VTVM
2	Direct thru ant receptacle	109Mhz (22.5Khz dev @ 400Hz mod- below limiting)	High end stop	"	TC3	Adjust for max output on VTVM
3	"	98Mhz (22.5Khz dev @ 400Hz mod- below limiting)	98Mhz	VTVM AC probe or scope across 4.0 ohm output load	TC2, TC1	" "
4	"	98Mhz (75Khz dev @ 400Hz mod- into limiting)	Tune receiver to best response	Scope across 4.0 ohm output load	T102	Observe for good waveform. When tuning thru resonance, if response is unsymmetrical, re-adjust T102 slightly to give equal signal drop off on each side of resonance

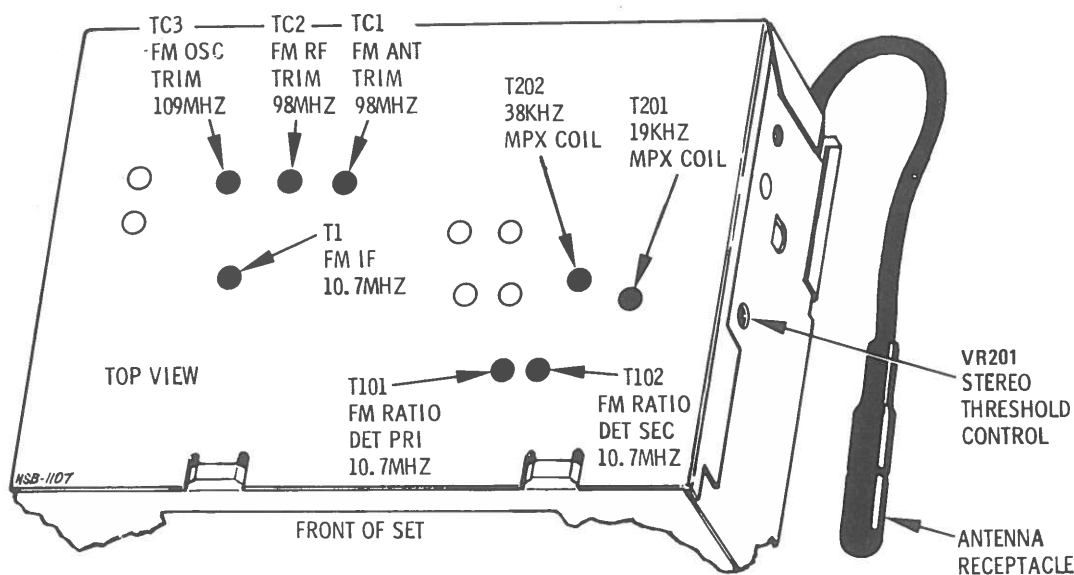


FIG. 25 - 2MM3515 FM & MPX ALIGNMENT POINT LOCATION

FM STEREO RECEPTION

When the receiver is tuned to a sufficiently strong FM stereo station, the stereo indicator will become illuminated, As long as 20uV or better of signal strength is received, the indicator will remain illuminated.

A recovered stereo signal is inherently more noisy than a comparable monaural signal; the weaker the signal, the higher the resultant noise level. Typically, the signal/noise ratio for a demodulated stereo signal is 20db less than that of an equivalent monaural signal. Consequently, a 40db signal/noise ratio would be required in monaural operation, before switching to stereo, if adequate signal/noise and separation are to be realized.

To maintain an acceptable signal/noise ratio when tuned to a weak FM stereo station, the receiver switches to the mon-

aural mode of operation. (The stereo indicator light will go out, both speakers will operate, but without the stereo effect.) As the signal strength increases the noise level will drop and the receiver will switch back to a stereo mode of operation. This switching action from stereo to monaural and back to stereo is automatic and requires no adjustments by the customer.

Good stereo reception requires a relatively strong composite signal on pin 3 of IC201 in addition to a positive DC voltage on pin 4. The DC voltage varies with signal strength and is derived from TR201. The DC voltage will rise to 1.5 volts (representing a received signal of 20uV or more) and then drop down to 0.9 volts as the receiver switches to stereo operation. In this way, a good signal/noise ratio is assured during stereo operation.

STEREO ALIGNMENT

The FM stereo multiplex system should be aligned only with the use of an FM multiplex generator.

The following steps must be performed before starting to align an FM stereo multiplex system.

1. The "AM-FM" switch must be in the "FM" position.
2. The generator output must be at a high RF level (100uV

better with local/distant switch in DISTANT position). The FM stereo light (PL702) should be lit during the alignment procedure. If it is not, either the generator output is too low, the circuits are out of alignment or inoperative.

3. FM radio "IF's" must be properly aligned before beginning multiplex alignment. CAUTION should be observed when servicing the multiplex IC. Shorting or grounding of contact pins will cause damage to the IC.

STEP	GENERATOR CONNECTION	MODULATION	OUTPUT INDICATOR	ADJUST	REMARKS
1	Connect an RF signal modulated with multiplex signal to antenna input	19Khz pilot @ 10% modulation	Connect low capacity probe of AC voltmeter to pin 2 of T201. Use lowest possible range on AC voltmeter	T201, 19Khz coil	1. Accurately tune radio to RF frequency of stereo generator. 2. Turn off left and right channel multiplex signals. 3. Adjust T201 for max output.
2	"	"	Connect low capacity probe of AC voltmeter to pin 13 of multiplex chip IC201. Use lowest possible range on AC voltmeter	T202, 38Khz coil	1. Adjust T202 for max output.
3.	"	"	Connect receiver speaker leads to output indicators (either separate meters or part of multiplex generator)	T202, then T201	1. First turn on left and right channel multiplex signals and adjust audio output to 1 watt in each channel. Then turn off right channel multiplex signal and adjust T201 and T202 for a minimum in the right channel output indicator (max separation). 2. Repeat procedure for left channel separation.
4.	"	19Khz pilot @ 10% modulation and 20UV level	Stereo indicator lamp PL702	VR201 (threshold control)	Adjust VR201 until lamp just becomes illuminated. Remove all test equipment and check for proper stereo operation.

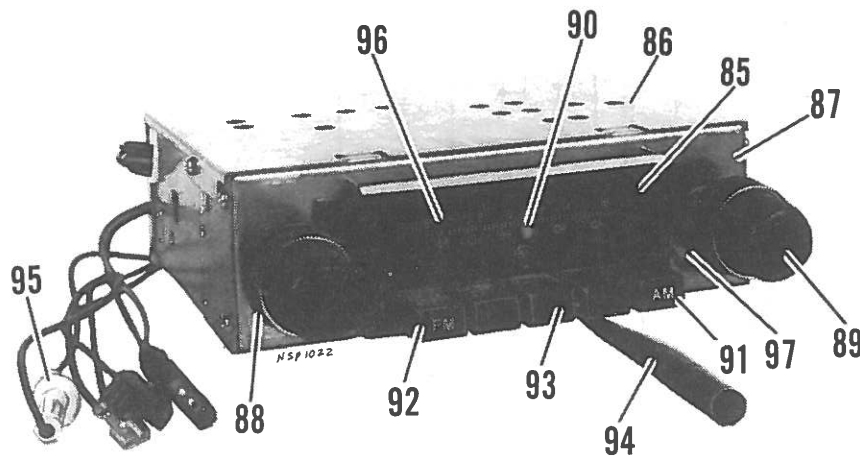


FIG. 26 - 2MM3515 PARTS LOCATION

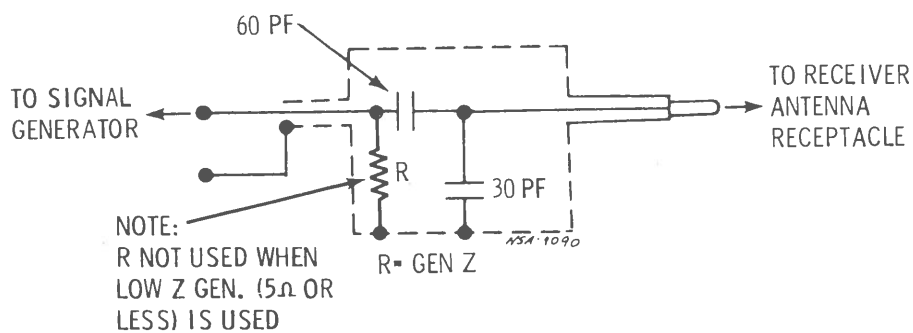
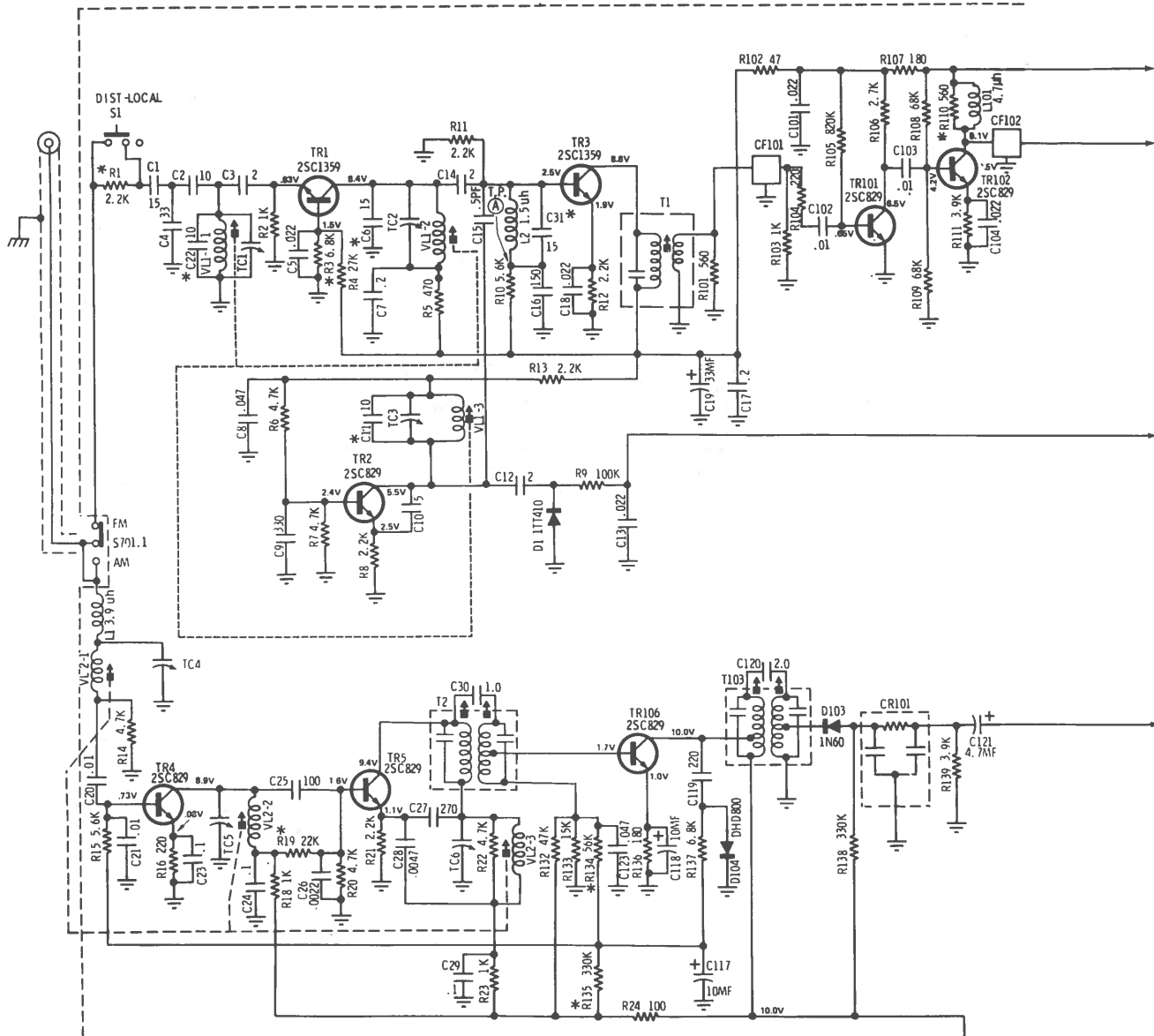


FIG. 27 - 2MM3515 AM DUMMY ANTENNA DETAIL

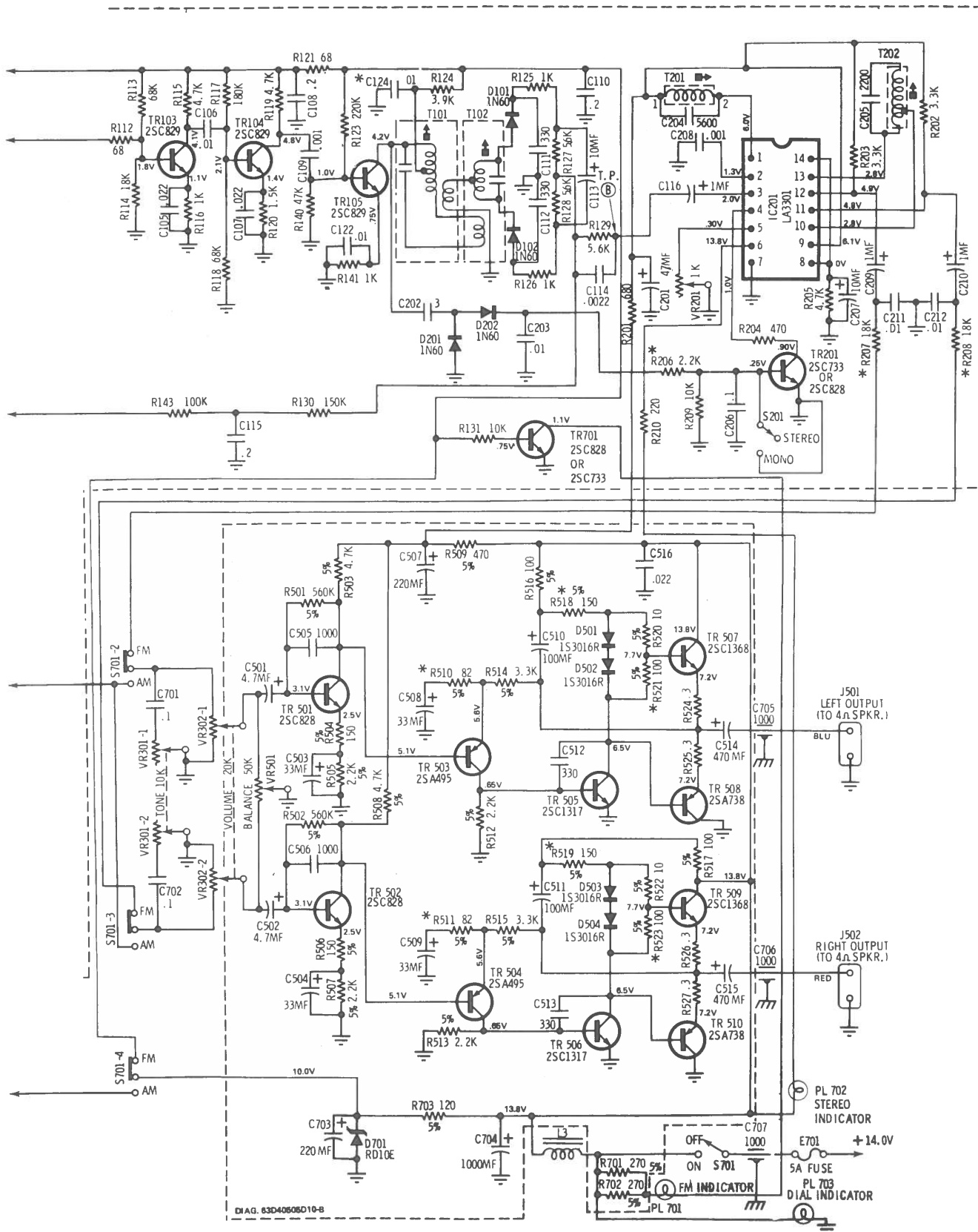


NOTES:
CAPACITORS: - UNLESS OTHERWISE SPECIFIED, DECIMAL VALUE LESS THAN 1. IN MF. ALL OTHERS IN PF.
VOLTAGES: - MEASURED FROM POINT INDICATED TO CHASSIS WITH A VTVM, $\pm 10\%$ NO SIGNAL INPUT.
INPUT VOLTAGE: - + 14.0 V. DC.
TUNING RANGE: AM: 540 TO 1610 KHZ
FM: 88 TO 108 MHZ
IF FREQ.: AM: 262.5 KHZ
FM: 10.7 MHZ

* EXACT VALUE DETERMINED BY PRODUCTION PROCESS, REPLACE WITH SAME VALUE AS ORIGINAL PART.

E C B
NOT VIEW
25C828
25C829
25C733
25C1317
25C1359
25A495

E C B
25C1368
25A738



AM & FM CORES ARE FACTORY SET & ARE NOT TO BE ADJUSTED. IF DAMAGE OCCURS IT IS RECOMMENDED THAT COMPLETE TUNER BE REPLACED.

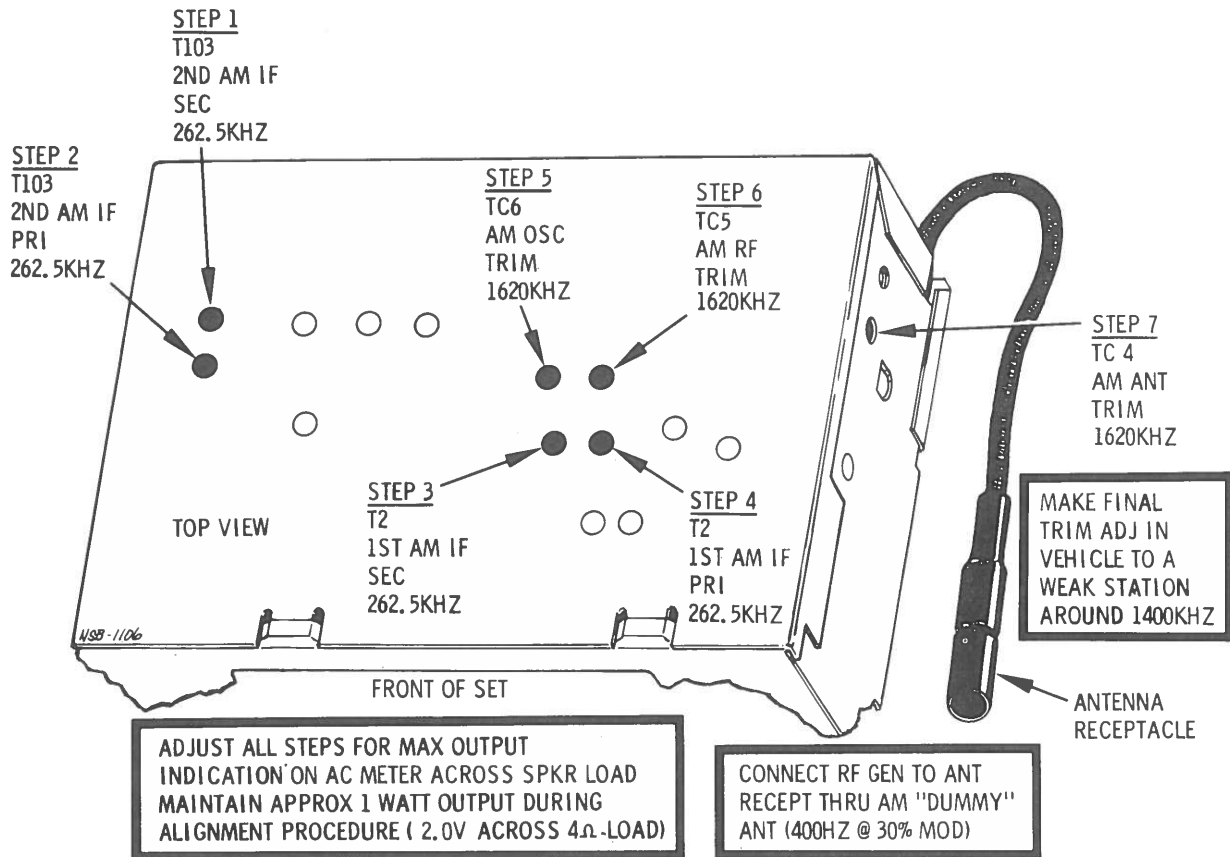
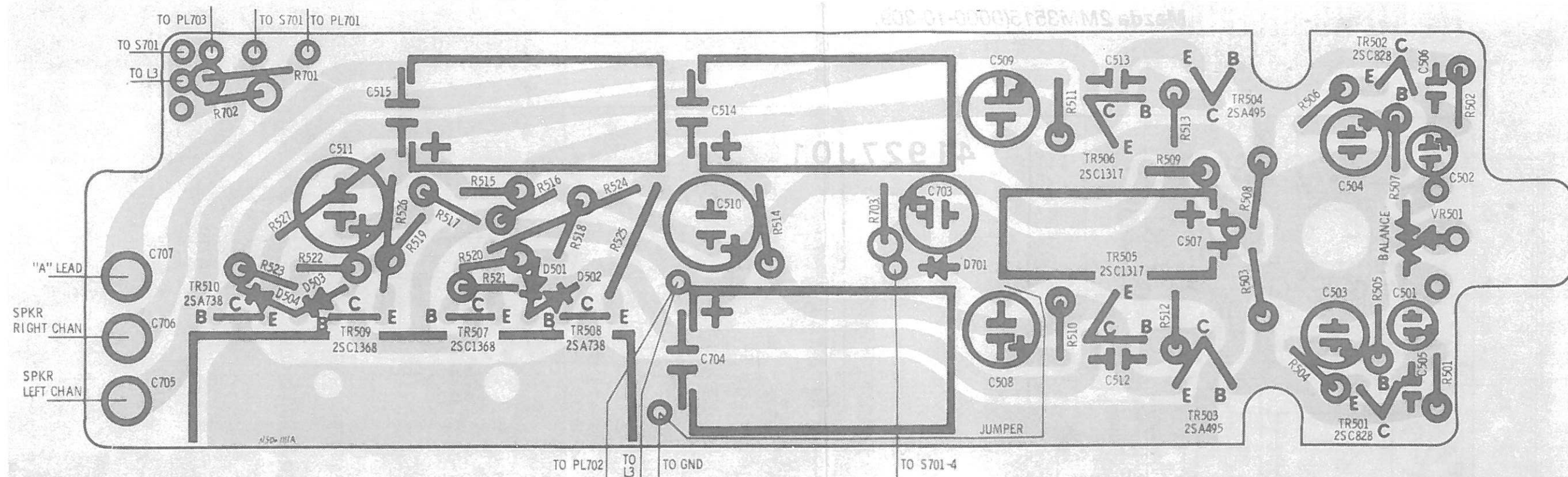
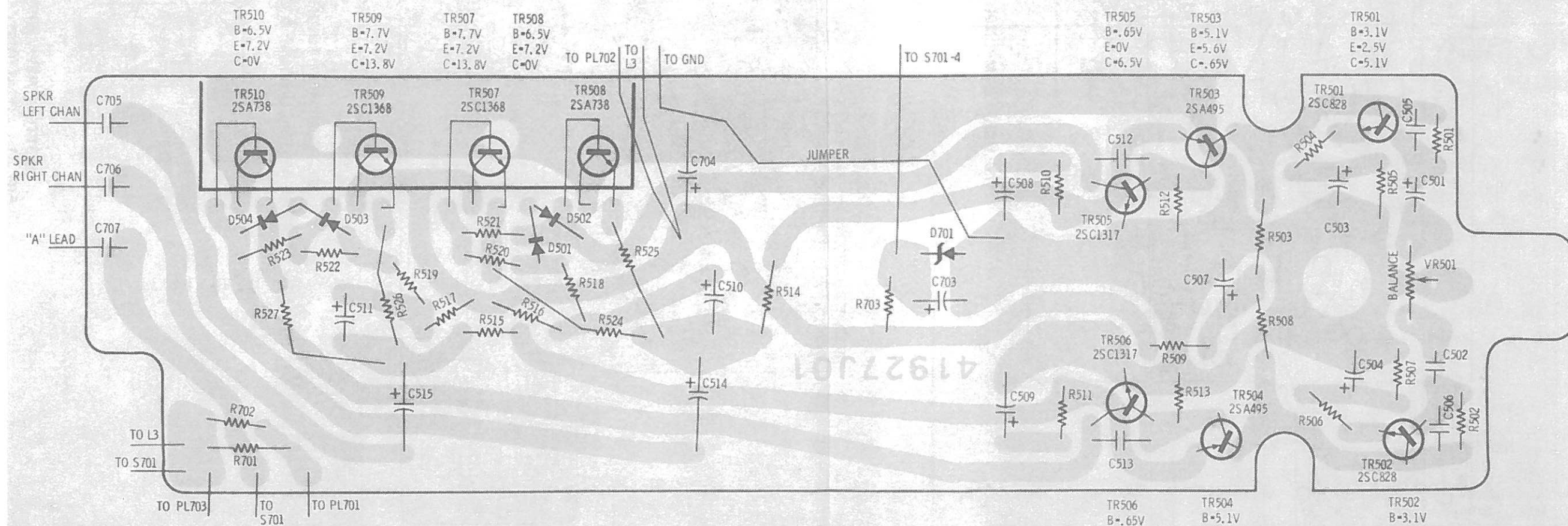


FIG. 32 - 2MM3515 AM ALIGNMENT POINT LOCATION

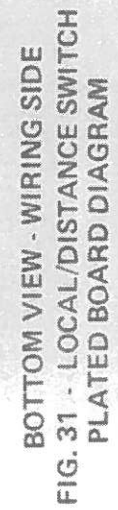
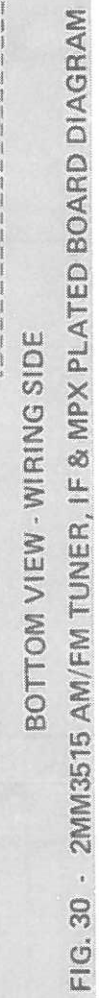


TOP VIEW - COMPONENT SIDE



BOTTOM VIEW - WIRING SIDE

FIG. 28 - 2MM3515 AUDIO AMP PLATED BOARD DIAGRAM



Mazda 2MM3515(0000-10-309)

2MM3515 PARTS LIST

NOTE: ALL PARTS LISTED ARE RECOMMENDED REPLACEMENT PARTS

REF. NO.	PART NUMBER	DESCRIPTION	REF. NO.	PART NUMBER	DESCRIPTION
ELECTRICAL PARTS					
CAPACITORS					
C1	21-45322G12	15PF 5% 50V disc	C203	21-45322G31	.01MF 50V disc
C2	21-45322G10	10PF .5PF 50V disc	C204	8-42195G05	5600PF
C3	21-45322G02	2PF .25PF 50V disc	C205	8-42195G01	2200PF
C4	21-45322G16	33PF 5% 50V disc	C206	21-41870J02	.1MF 24V disc
C5	21-45322G32	.022MF 50V disc	C207	23-44333G08	10MF 16V lytic
C6	21-41701J08	15PF	C208	21-45322G28	.001MF 50V disc
C7	21-41870J03	.2MF 24V disc	C209,		
C8	21-41870J01	.047MF 24V disc	210	23-44333G01	1MF 50V lytic
C9	21-45322G26	330PF 20% 50V disc	C211,		
C10	21-45322G05	5PF .25PF 50V disc	212	8-40135G14	.01MF
C11	21-41701J04	10PF	C501	23-44333G05	4.7MF 25V lytic
C12	21-45322G02	2PF .25PF 50V disc			
C13	21-45322G32	.022MF 50V disc		23-44333G05	4.7MF 25V lytic
C14	21-45322G02	2PF .25PF 50V disc	C503	23-44333G17	33MF 6.3V lytic
C15	21-45322G34	.5PF	C504	23-44333G17	33MF 6.3V lytic
C16	21-45322G24	150PF 10% 50V disc	C505	21-45322G28	.001MF 50V disc
C17	21-41870J03	.2MF 24V disc	C506	21-45322G28	.001MF 50V disc
C18	21-45322G32	.022MF 50V disc	C507	23-44333G37	220PF 16V lytic
C19	23-44333G18	33MF 10V lytic	C508	23-44333G19	33MF 16V lytic
C20,21	8-40135G14	.01MF 20% 50V film	C509	23-44333G19	33MF 16V lytic
C22	21-41701J04	10PF	C510,		
C23,24	21-41870J02	.1MF 24V disc	511	23-44333G31	100MF 16V lytic
C25	21-41701J07	100PF	C512,		
C26	8-40135G16	.0022MF 10% 50V film	513	21-45322G26	330PF 20% 50V disc
C27	21-41701J06	270PF	C514,		
C28	8-40135G15	.0047MF 10% 50V film	515	23-44333G49	470MF 16V lytic
C29	21-41870J02	.1MF 24V disc	C516	21-45322G32	.022MF 50V disc
C30	21-45322G01	1PF .25PF 50V disc	C701	21-41870J02	.1MF 50V disc
C31	21-45322G12	15PF 5% 50V disc	C702	21-41870J02	.1MF 50V disc
C101	21-45322G32	.022MF 50V disc	C703	23-44333G36	220MF 10V lytic
C102,			C704	23-44333G55	1000MF 16V lytic
103	21-45322G31	.01MF 50V disc	C705-		
C104,			707	21-41880J03	1000MF 500V FEED THRU
105	21-45322G32	.022MF 50V disc	TC1-		
C106	21-45322G31	.01MF 50V disc	3	20-45320G01	TRIMMER,variable:FM ANT,OSC,RF
C107	21-45322G32	.022MF 50V disc	TC4	20-41817J01	TRIMMER,variable:AM-ANT
C108	21-41870J03	.2MF 24V disc	TC5,6	20-41458J01	TRIMMER,variable:AM-OSC & RF
C109	21-45322G28	.001MF 50V disc	MISCELLANEOUS ELECTRICAL PARTS		
C110	21-41870J03	.2MF 24V disc	CF101,		
C111,			102	91-41273J03	FILTER,cer.(use:91-43353A72)
112	21-45322G26	330PF 20% 50V disc			(Replace as matched pairs)
C113	23-44333G08	10MF 16V lytic	CR101	51-41818J01	RC network
C114	21-45322G29	.0022MF 50V disc	D1	48-45323G01	DIODE, varactor:1TT410
C115	21-41870J03	.2MF 24V disc	D101-		
C116	23-44333G01	1MF 50V lytic	103	48-41768G01	DIODE,germanium:1N60
C117,			D104	48-134816	DIODE,silicon:DHD800
118	23-44333G08	10MF 16V lytic	D201,		
C119	21-45322G25	220PF 10% 50V disc	202	48-41768G01	DIODE:1N60
C120	21-45322G02	2PF .25PF 50V disc	D501-		
C121	23-44333G05	4.7MF 25V lytic	504	48-43265G01	VARISTOR:1S3016R
C122	21-45322G31	.01MF 50V disc	D701	48-41873J03	DIODE,zener:RD10E
C123	21-41870J01	.047MF 24V disc	E701	65-40348G01	FUSE,5 amp(use:65-134265)
C124	21-45322G31	.01MF 50V disc	PL701	65-45037G04	BULB,FM ind:6V-6MA
C201	23-44333G25	47MF 16V lytic	PL702	65-45037G06	BULB,stereo ind(use:65-45037G05)
C202	21-45322G03	3PF .25PF 50V disc	PL703	1-41900J42	BULB,dial light
			J501,		
			502	30-45005G02	CABLE,speaker
			S1	40-41861J01	SWITCH,local-distant
			S701-1		
			thru-4		AM/FM sw. pt of tuner

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

NOTE: ALL PARTS LISTED ARE RECOMMENDED REPLACEMENT PARTS

REF. NO.	PART NUMBER	DESCRIPTION	REF. NO.	PART NUMBER	DESCRIPTION
COILS & CHOKES			SWITCHES		
L1	24-41871J01	3.9uh	S1	40-41861J01	SLIDE:local-distant
L2	24-41872J01	1.5uh	S201		STEREO-MONO(pt of VR301,302)
L3	25-40894G03	CHOKE,filter	S701		AM/FM SELECTOR & ON-OFF
L101	24-45294G09	4.7uh:indicator			(pt of VR301,302)
INTEGRATED CIRCUITS			TRANSFORMERS		
IC201	51-41850J01	LA3301	T1	24-41864J01	FM IF
TRANSISTORS			T2	24-64670B01	AM IF
TR1	48-41816J01	2SC1359(A)	T101	24-41865J01	FM DISCRIMINATOR(Primary)
TR2	48-41815J02	2SC829(B)	T102	24-41866J01	FM DISCRIMINATOR(Secondary)
TR3	48-41816J01	2SC1359(A)	T103	24-64670B02	AM IF
TR4,5	48-41815J02	2SC829(B)	T201	24-41867J01	19Khz
TR101-106	48-41815J02	2SC829(B)	T202	24-41868J01	38Khz
TR201	48-44885G01	2SC828(S)	MECHANICAL PARTS		
TR501,502	48-44885G01	2SC828(S)	85	1-41700J07	BACKGROUND,dial scale:incl FM & Stereo Screen
TR503,504	48-43238G01	2SA495(Y)		84-42016J01	BOARD,plated:AM/FM/MPX(less components)
TR505,506	48-44886G01	2SC1317(Q)		84-41927J01	BOARD,plated:amp & filter
TR507	48-41784J03	2SC1368(C)		7-40507F13	BRACKET,pointer mtg
TR508	48-41785J03	2SA738(C)		7-40507F09	BRACKET,ret:disc clutch
TR509	48-41784J03	2SC1368(C)		43-43527A09	BUSHING,control mtg
TR510	48-41785J03	2SA738(C)		43-42072J02	BUSHING,dial light ret
TR701	48-44885G01	2SC828(S)		38-40538F13	BUTTON,pointer brkt mtg
RESISTORS				30-45005G02	CABLE,spkr
(THOSE LISTED, 5% OR BETTER, ALSO UNIQUE VALUES. REFER TO PL-76 FOR PARTS NO'S. OF OTHER VALUES.)				49-40549F01	CLUTCH,disc
R501	6-10053C88	560K 5% 1/2W		15-41845J01	COVER,bottom
R502	6-10053C88	560K 5% 1/2W		15-41860J01	COVER,top
R503	6-129669	4700 5% 1/4W	86	15-41852J01	ESCUTCHEON,sub:dial bkgrd ret.
R504	6-131276	150 5% 1/4W	87	44-40544F01	GEAR,crown:incl bushing & disc
R505	6-129804	2200 5% 1/4W		14-41878J01	INSULATOR,transistor
R506	6-131276	150 5% 1/4W		1-41700J16	KIT,installation:complete
R507	6-129804	2200 5% 1/4W	88	36-544812	KNOB,local/distance tone
R508	6-129669	4700 5% 1/4W	89	36-64341B01	KNOB>manual tune,vol
R509	6-129709	470 5% 1/4W		33-41313J01	NAMEPLATE,Motorola/Stereo
R510	6-10053C07	82 5% 1/2W		2-40000G20	NUT,hex:M9(use escut. mtg)
R511	6-10053C07	82 5% 1/2W	90	1-41700J12	POINTER & ARM
R512	6-129804	2200 5% 1/4W	91	38-40538F10	PUSHBUTTON:AM
R513	6-129804	2200 5% 1/4W	92	38-40538F11	PUSHBUTTON:FM
R514	6-129981	3300 5% 1/4W	93	38-40538F12	PUSHBUTTON:plain
R515	6-129981	3300 5% 1/4W	94	9-41390J01	RECEPTACLE,antenna
R516,517	6-131524	100 5% 1/4W		1-44981G04	RECEPTACLE,fuse:incl fuse
R518,519	6-131276	150 5% 1/4W		42-40542F06	RING,"E"ret:man tuning shaft
R520	6-10053B84	10 5% 1/2W	96	*61-40366F02	SCALE,dial
R521	6-131524	100 5% 1/4W		3-40011G58	SCREW,mch:M2.6x.45x3(Feed thru cap ret.)
R522	6-10053B84	10 5% 1/2W		3-40011G59	SCREW,mch:M3x6(PC bd mtg)
R523	6-131524	100 5% 1/2W		3-44205G01	SCREW,tpg:M3x.5x6(cover mtg)
R524-527	30-41857J01	.3 ohm wire		47-40547F09	SHAFT,man tuning:incl pinion gear
R701,702	6-10053C19	270 5% 1/2W		43-41851J01	SPACER,cable ret
R703	6-10053C11	120 5% 1/2W		41-40541F02	SPRING,tension:clutch mtg
VR201	18-42061J01	CONTROL VARIABLE		41-40541F01	SPRING,ret:man tuning shaft
VR301,302	18-41752J01	CONTROL,vol 20K & tone 10K		77-41994J01	TUNER,complete
VR501	18-41869J18	CONTROL,balance 50K		4-42091G07	WASHER,"C"(control mtg to dial scale)
				4-40504F02	WASHER,cup:clutch tension spring ret
			97	4-42219J01	WASHER,flat(control mtg)
				4-40504F01	WASHER,spring:crown gear & disc clutch assy.
				4-40504F03	WASHER,spring:pointer brkt mtg
				4-40070G28	WASHER,trim escut. ret.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

* DENOTES NEW ITEM APPEARING IN ANY LIST FOR FIRST TIME.