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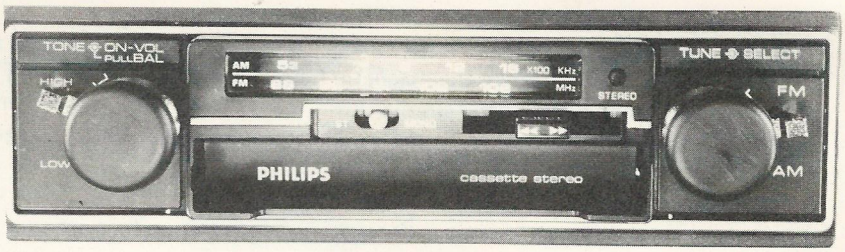


Service Manual

FOUR TRACK CAR CASSETTE STEREO PLAYER

12 V

WITH AM/FM/FM STEREO RADIO

SPECIFICATIONS

TUNING RANGE	AM: 515 to 1605 kHz. FM: 88 to 108 MHz.
INTERMEDIATE FREQUENCY	AM: 455 kHz. FM: 10.7 MHz.
NUMBER OF TRACKS	4 Tracks 2 Channels
TAPE CARTRIDGE	Stereo/Monaural Compact Cassette
PINCHROLLER PRESSURE	350 to 450 g.
TAKE UP TORQUE	45 to 55 g.cm.
POWER OUTPUT	3.5 watts
SPEAKER IMPEDANCE	4 ohms per Channel
POWER SUPPLY	12 volt Negative to Earth
CURRENT	approx. 0.6 amp. (at 0.5 watt output)
SEMICONDUCTORS	7IC's 9 Transistors 8 Diodes

THE MICRO REED SWITCH

Micro reed switches basically consist of 2 reed pieces sealed inside a glass tube as shown in Fig. 1a. Magnetism is induced in the 2 reed pieces (N and S polarities) by the permanent magnet shown in Figs 1b and 1c.

When the magnetic attractive force exceeds the reed elasticity, the reed tips make contact with each other, thereby closing the circuit. When the magnetic field strength is reduced again, the reed tips spring back to their former positions, thereby opening the circuit.

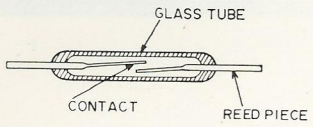


Fig. 1a Basic Structure of the Micro Reed Switch

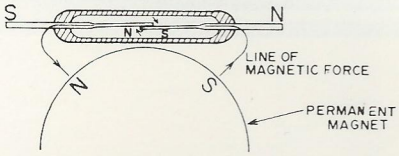


Fig 1b Switched ON Status

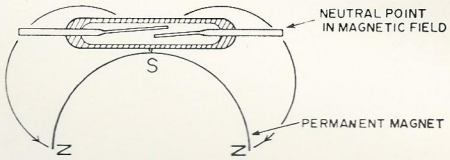


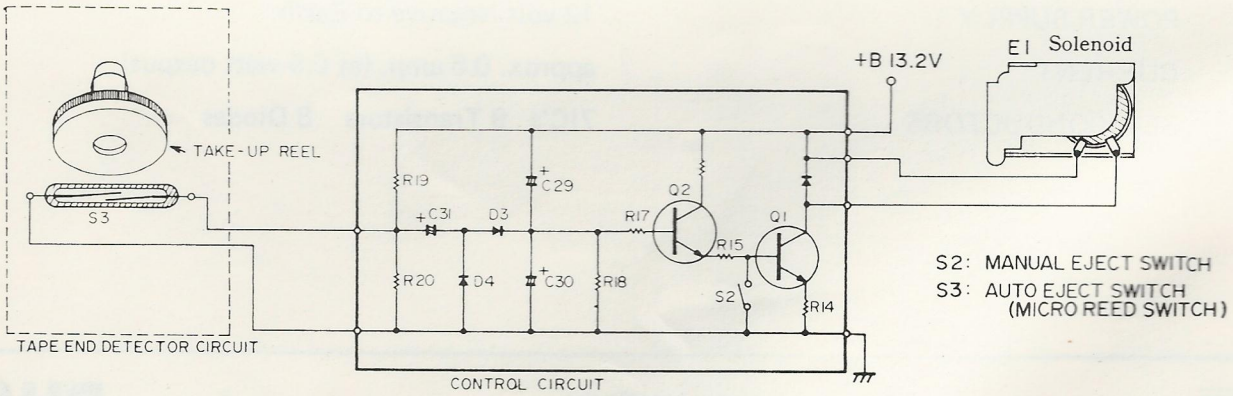
Fig. Switched OFF Status

CASSETTE HOLDING & TAPE END DETECTOR CIRCUITS

Cassette holding in the AC180 is effected by using the electrical circuits described below in place of the conventional mechanical methods.

1. **Cassette Holding Lock**
   a) The cassette holding mechanism is operated by the solenoid E1 which is controlled by Q1 and Q2.
   b) The power switch is turned on by inserting the cassette tape. Because of the C30 charging current, a voltage is applied via R17 to the base of Q2 thereby turning Q2 ON.
   c) This causes Q1 to be turned on and a current to flow through the solenoid E1, thus operating the cassette holding mechanism.

2. **Tape End Detector Circuit**
   a) During the play mode, the magnet on the rotating take up reel causes the reed switch to constantly open and close, thus generating a O.V. to 6.V. square wave which is applied across R20. This square wave is passed via C31 to charge up C30 thereby supplying bias to Q2 for the play mode to be continued.
   b) When the take up reel stops at the end of the tape, the reed switch stops operating and remains in either the ON or the OFF position.
   c) The input signal across R20 is now stopped and the C30 bias voltage discharged via R18. With this drop in bias voltage, Q2 is de-activated and the current to E1 is switched OFF. The holding lock is released, the cassette tape ejected and the power to the unit switched OFF.
   d) The cassette tape is ejected about 2 or 3 seconds after the take up reel stops.



3. **Manual Eject**

When the eject button is depressed, the leaf switch S2 is turned on, thereby grounding the Q1 base. Q1 is consequently turned off, the E1 solenoid released, and the cassette tape ejected.

4. **Mechanical Eject Operations During Fast Forward and Rewind Modes**

When the end of the tape is reached during fast forward and rewind modes, the tape end detector circuit is activated in the same manner as described above. However, there is a slight modification in the related mechanical operation sequence:

TAPE END ⟶ TAKE-UP REEL STOP (2-3 seconds) ⟶ E1 TURNS OFF ⟶ FAST FORWARD OR REWIND BUTTON IS RELEASED ⟶ TAPE EJECT.

PLAYBACK HEAD ADJUSTMENT (Azimuth)

Normally, the adjustment is precisely set at the factory and further adjustment should not be required unless the playback head or its mounting components are replaced.

Incorrect adjustment will cause a reduction in performance.

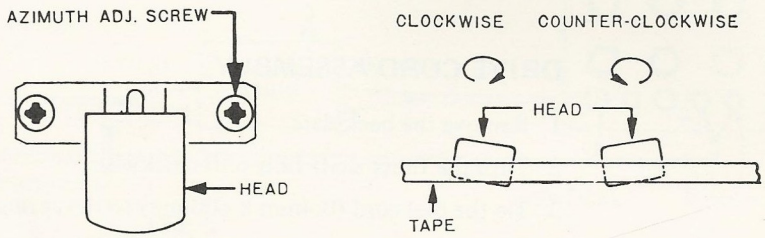


Fig. 2

If the azimuth is moved, then carefully adjust the azimuth screw (from above or below) as shown in Fig. 2.

Using a Test Tape for Azimuth Adjustment

Insert a test tape and set the control knobs as follows:

VOL. CONTROL KNOB (VOL)	Normal Volume
BALANCE CONTROL KNOB (BAL)	Central
BASS CONTROL KNOB	Central
TREBLE CONTROL KNOB	Right Hand Side

Carefully adjust the azimuth adjustment screw for maximum volume and treble tones. It is recommended that a VTVM or Circuit Tester is connected to the speaker terminals for obtaining the maximum value because the test tape for azimuth adjustment is recorded in high treble tones.

If a test tape is not available, use a stereo music tape with some high treble tones (piano or violin music) and follow the same procedure as above.

CLEANING

After extended use, a layer of iron-oxide from the tape can build-up on the tape playback head and the drive capstan. The oxide layer prevents the tape from making full contact with the playback head, resulting in a gradual loss of high frequency response and an increased noise level. In the case of the capstan, the oxide deposit can cause slippage (wow) which might be mistaken for a more serious mechanical problem. To clean the head, a swab moistened with alcohol should be used.

WARNING – Do not use a solvent such as lighter fluid or thinners as these may cause damage to plastic parts or instrument finish.

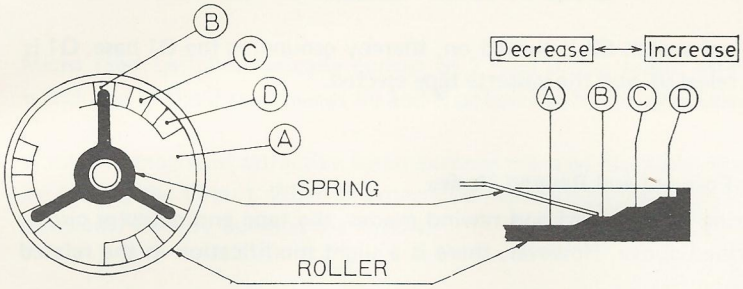
First, using the end of a pencil, press the rod in the cassette door back until it clicks into position and then thoroughly clean the playback head, capstan and pinchroller.

After cleaning, press the eject button to return the rod to its original position.

DEMAGNETISATION

The playback head may become magnetised over a period of time. A magnetised head will record noise on a tape, even when it is being used for playback, so it is important that the head be periodically demagnetised. This can be done with a commercial demagnetiser (or degausser).

ADJUSTMENT FOR TAKE-UP TORQUE



With the motor rotating use an appropriate gauge to measure the take up torque which should normally be 50 g.cm. If necessary, the torque may be adjusted to this figure by moving the spring up or down the adjustment steps in the take up head. (See Fig. 5).

Fig. 3

DRIVE CORD ASSEMBLY

1. Remove the backplate.
2. Turn the tuner shaft fully anti-clockwise.
3. Tie the dial cord (0.4mm x 600mm) to the spring (ref. diagram "A"0.
4. Hook the spring on to the chassis lugs (ref. diagram "B" items 1 & 2).
5. Wind the cord around the pulley (ref. diagram "B" item 3) and then take it around pulleys 4 & 5. Take the cord under the pulley (item 6) and wind round one turn before passing it through the pulley slit and tying it to the pulley – secure it with a small drop of adhesive.
6. Unhook the spring from lug No. 2.
7. Re-assemble the backplate.
8. Fit the pointer to the backplate, align it with the pointer mark as shown in diagram "C" and secure it with a suitable adhesive.

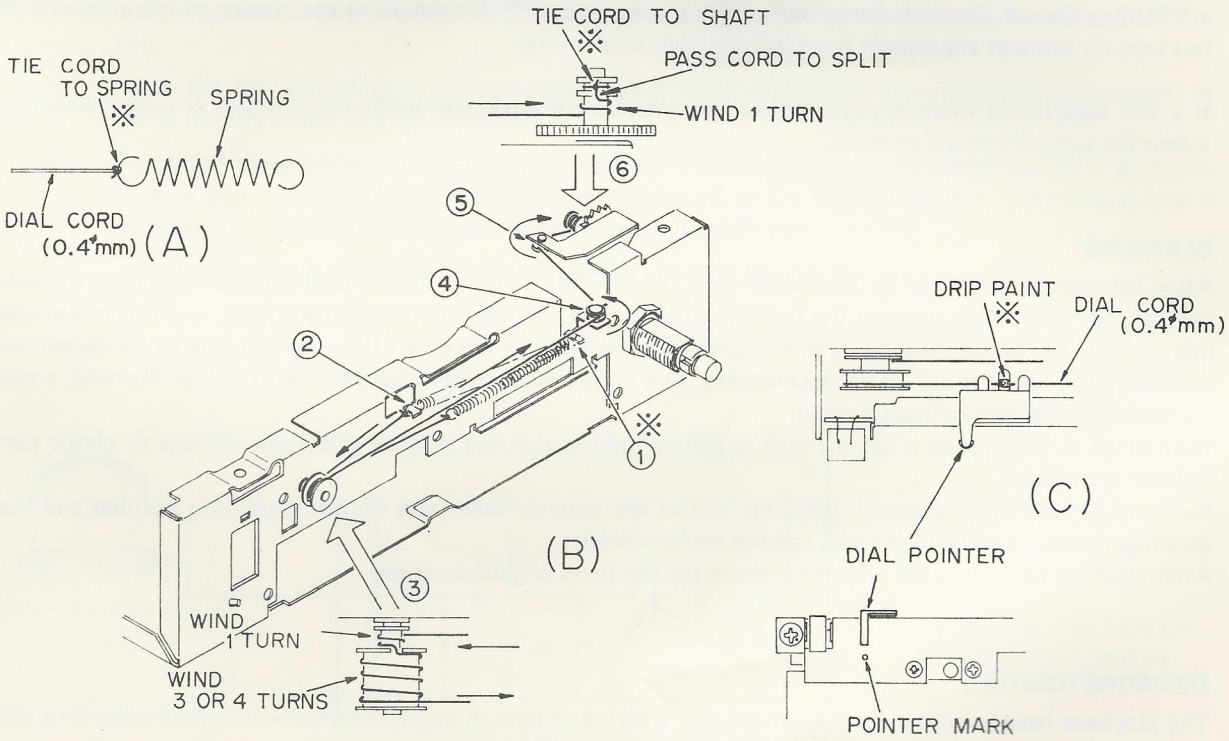


Fig. 4

AM ALIGNMENT

〔1〕 IF Alignment

(1) Preparations for alignment

a. Connections

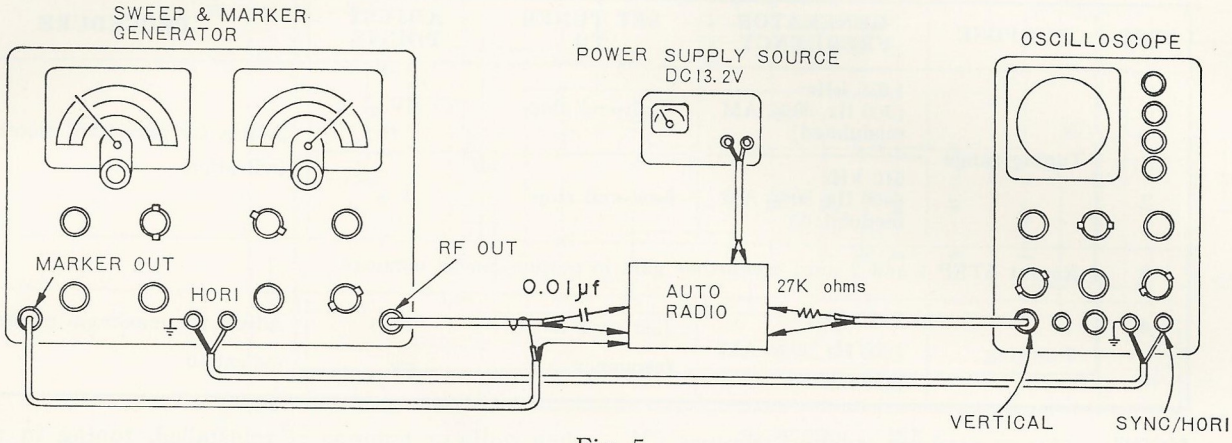


Fig. 5

SWEEP GENERATOR OUTPUT	OSCILLOSCOPE VERTICAL INPUT	OSCILLOSCOPE HORIZONTAL INPUT
Connect TP1 in Fig. 10 through 0.01 μF capacitor	Connect TP3 in Fig. 10 through 27k-ohm resistor	Connect with HORIZONTAL terminal of sweep generator

b. Power supply : 13.2 VDC

c. Switch : Band selector for AM

d. Controls : Volume for minimum
Tone for high

(2) Alignments (Refer to Fig. 10 for ADJUST POINTS.)

STEP	PURPOSE	SWEEP GENERATOR FREQUENCY	SET TUNER TO	ADJUST POINTS	PROCEDURE
1	IF	455 kHz	Near 1,000 kHz no signal exists	$T_{3,\ 6}$	Get maximum IF curve and best symmetry on both sides.
2	Repeat STEP 1 until no further gain in output can be obtained.				

〔2〕 Tracking Alignment

(1) Preparations for alignment

a. Connections

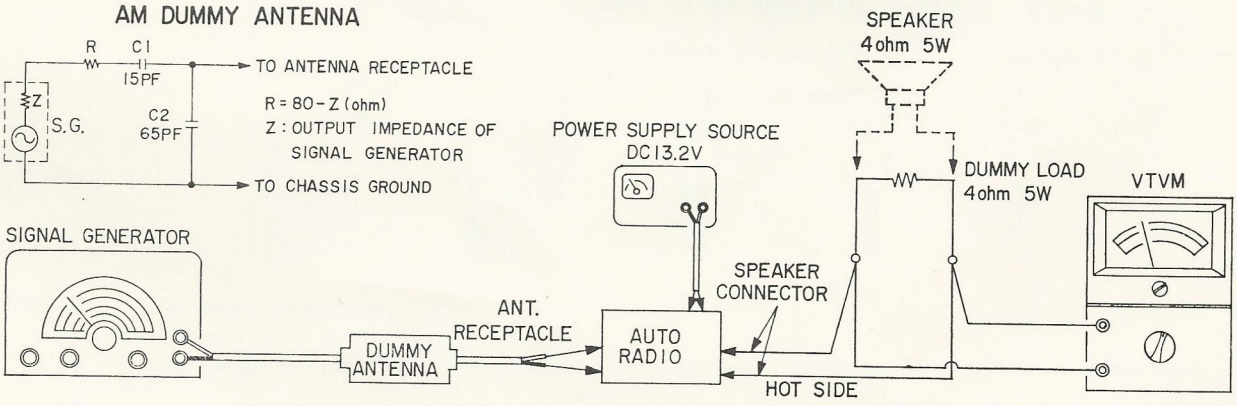


Fig. 6

b. Power supply : 13.2 VDC

c. Switch : Band selector for AM

d. Controls : Volume for maximum

Tone for high

(2) Alignment (Refer to Fig. 10 for ADJUST POINTS.)

STEP	PURPOSE	GENERATOR FREQUENCY	SET TUNER TO	ADJUST POINTS	PROCEDURE
1	Tuning range	1,635 kHz (400 Hz, 30%, AM modulated)	High-end stop	CV_2	Adjust for maximum meter indication.
2		510 kHz (400 Hz, 30%, AM modulated)	Low-end stop	T_2	
3	Repeat STEP 1 and 2 until no further gain in output can be obtained.				
4	Tracking	1,400 kHz (400 Hz, 30%, AM modulated)	Just tune in SG frequency	CV_1	Adjust for maximum meter indication.
5				CV_3	

NOTE: Always readjust antenna trimmer CV_1 when radio or antenna is reinstalled, tuning in a weak station around 1,400 kHz and get maximum volume.

FM ALIGNMENT

The FM front end is accurately aligned at the factory, and normally should not require further adjustment.

The FM front end supplied as a replacement part is also completely adjusted for tuning range and tracking and the only adjustments required will be the IF transformers.

If it does become necessary to re-align the front end, then proceed as follows:

[1] IF Alignment

(1) Preparations for alignment

a. Connections (Refer to Fig. 5)

SWEEP GENERATOR OUTPUT	OSCILLOSCOPE VERTICAL INPUT	OSCILLOSCOPE HORIZONTAL INPUT
Connect TP1 in Fig. 10 through 0.01 μF capacitor	Connect TP3 in Fig. 10 through 27k-ohm resistor	Connect with HORIZONTAL terminal of sweep generator

b. Power supply : 13.2 VDC

c. Switch : Band selector for FM

d. Controls : Volume for minimum

Tone for high

(2) Alignment (Refer to Fig. 10 for ADJUST POINTS.)

STEP	PURPOSE	SWEEP GENERATOR FREQUENCY	SET TUNER TO	ADJUST POINTS	PROCEDURE
1	IF circuit	Center frequency varies according to the color of the ceramic filter (Refer to chart given below)	Near 98 MHz no signal exists	T_1, T_{101}	S-curve adjust for full gain and length at linears. (See Fig. 8)
2					
3	Detector circuit				Keep S-curve straight at the center, and adjust waveform for best symmetry of S-curve against the axis as much as possible. (See Fig. 8)
4	Repeat STEP 1 to 3 until no further gain output can be obtained.				

COLOR	CENTER FREQUENCY
Black	10.64 MHz ± 30 kHz
Blue	10.67 MHz ± 30 kHz
Red	10.70 MHz ± 30 kHz
Orange	10.73 MHz ± 30 kHz
White	10.76 MHz ± 30 kHz

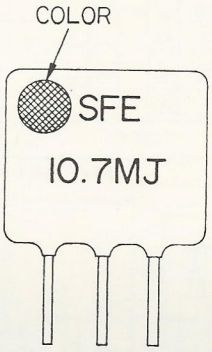


Fig. 7

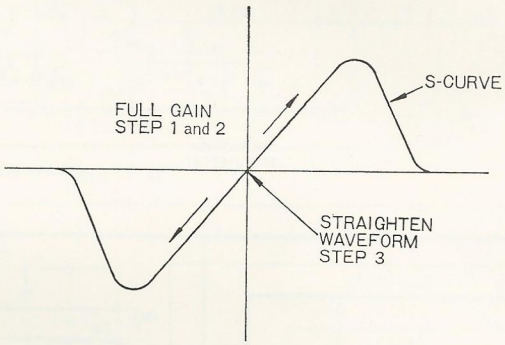


Fig. 8

NOTE: In the FM circuit there are two ceramic filters and it is important that **both filters have the same color code** (i.e. same center frequency). If a defective filter is replaced with one of the same color no adjustment is needed. If a defective filter is replaced with one of a different color then **both** filters must be charged and readjustment will be necessary.

[2] Tracking alignment (Refer to Fig. 10 for ADJUST POINTS.)

(1) Preparations for Alignment

a. Connections

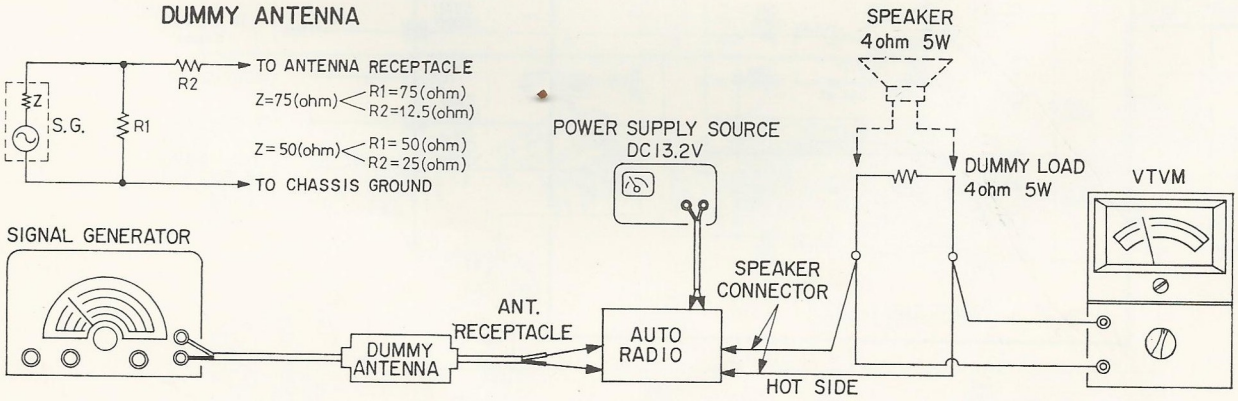


Fig. 9

b. Power supply : 13.2 VDC

c. Switch : Band selector for FM

d. Controls : Volume for maximum
Tone for high

(2) Alignment (Refer to Fig. 10 for ADJUST POINTS)

STEP	PURPOSE	GENERATOR FREQUENCY	SET TUNER TO	ADJUST POINTS	PROCEDURE
1	Tuning range	87.5 MHz (400 Hz, 30%, FM modulated)	Low-end stop	CV c	Adjust for maximum meter indication.
2		109 MHz (400 Hz, 30%, FM modulated)	High-end stop		109 MHz must be received.
3	Tracking	98 MHz (400 Hz, 30%, FM modulated)	Just tune in SG frequency	CV_{101}	Adjust for maximum meter indication.
4				CV_{102}	

[3] FM STEREO (MPX.) SEPARATION ADJUSTMENT

(1) Alignment (Refer to Fig. 10)

a. Adjustment with frequency counter

Connect frequency counter to TP_4 as per Fig. 8 and adjust RV_6 so that the counter frequency becomes 19 kHz ± 100 Hz.

b. Adjustment without frequency counter.

Tune in a stereo broadcast and slowly adjust RV6 until the stereo indicator LED lights up. Continue adjusting RV6 in the same direction until the LED goes out and then set RV6 to the mid position of the lighting range.

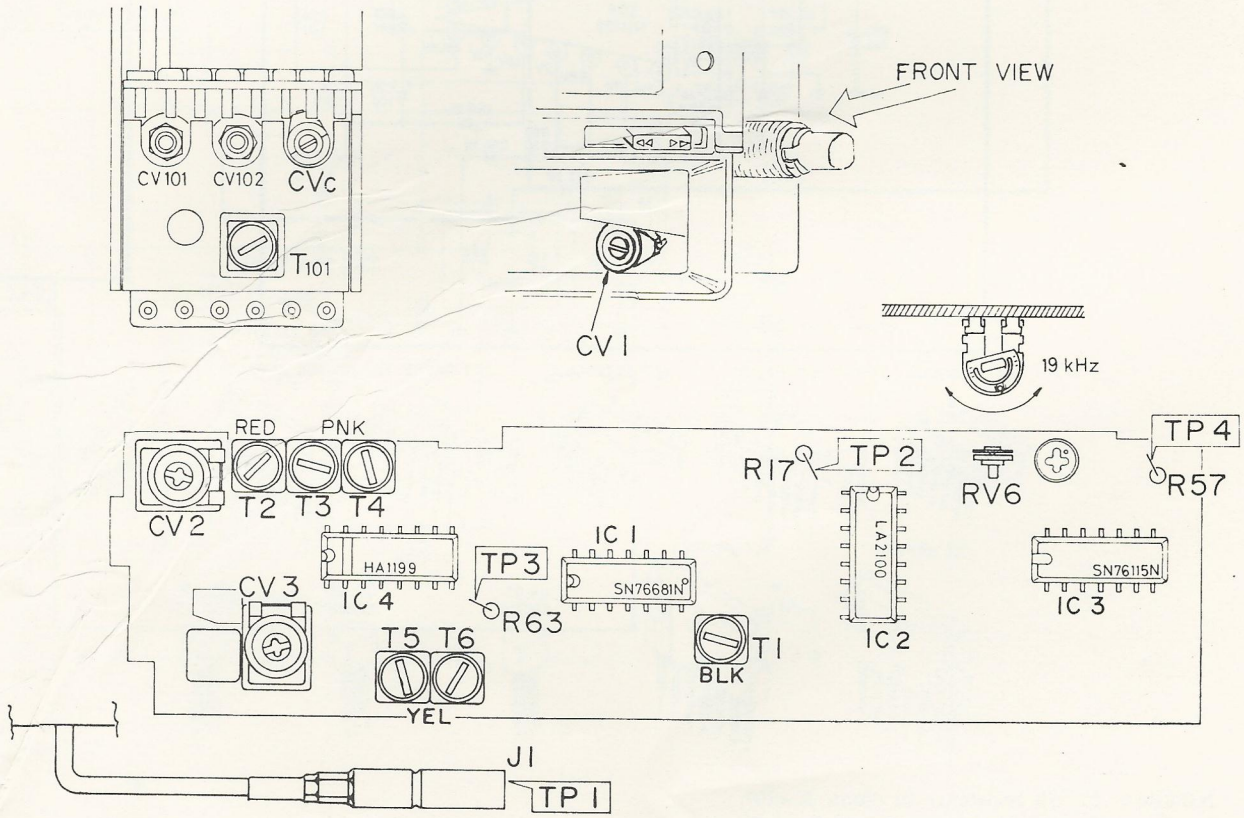


Fig. 10 ADJUST POINTS

REF. NO.	DESCRIPTION			SERVICE CODE
CAPACITORS				
C1, 85, 86	.1μF	50V	Ceramic	4802 122 47055
C2, 41, 44, 48	.47μF	50V	Electro	4802 124 47065
C3, 9, 78, 79, 89, 95, 96	47μF	10V	Electro	4802 124 47016
C4	10ρF	50V	Ceramic	4822 120 21054
C5, 6, 7, 8, 30, 43, 46, 55, 65, 68	.01μF	50V	Ceramic	4822 122 30043
C10, 12, 13	.02μF	50V	Ceramic	4822 121 41143
C11	33μF	10V	Electro	4802 124 47013
C14, 15	3ρF	50V	Ceramic	4822 120 31039
C16	150ρF	50V	Ceramic	4822 120 21085
C17, 22, 26	680ρF	50V	Ceramic	4822 120 21103
C18, 40, 76, 77, 82, 83, 88	10μF	16V	Electro	4802 124 47044
C19, 36, 39, 58	4.7μF	25V	Electro	4802 124 47034
C20, 21, 23, 25	330ρF	50V	Ceramic	4822 120 21094
C24	5ρF	50V	Ceramic	4822 120 21046
C27	68ρF	50V	Ceramic	4822 120 21076
C28, 34, 61, 73, 74	1000ρF	50V	Ceramic	4822 120 21107
C29	6800ρF	50V	Ceramic	4822 120 21129
C31	1μF	50V	Electro	4802 124 47037
C32, 35	560ρF	50V	Ceramic	4822 122 30126
C33, 38, 54, 90, 91	.0022μF	50V	Ceramic	4802 121 47086
C37, 49	220μF	16V	Electro	4802 124 47018
C42, 47, 71, 72	.015μF	50V	Mylar	4802 121 47161
C45	.05μF	12V	Ceramic	4802 121 47168
C50	.22μF	100V	Mylar	4802 121 47175
C51	.47μF	100V	Mylar	4802 121 47179
C52	470ρF	50V	Styrol	4802 122 47081
C53	39ρF	50V	Ceramic	4822 122 31069
C56	.1μF	50V	Mylar	4802 121 47134
C57, 69	.047μF	50V	Ceramic	4802 121 47167
C59	120ρF	50V	Ceramic	4802 122 37062
C60, 64	200ρF	50V	Ceramic	4822 120 21089
C62	680ρF	50V	Ceramic	4822 120 21103
C63, 67	2ρF	50V	Ceramic	4822 120 21035
C66, 87	22μF	16V	Electro	4802 124 47021
C70	100μF	16V	Electro	4802 124 47049
C75	.0047μF	50V	Mylar	4802 121 47063
C80, 81	.01μF	50V	Mylar	4802 121 47158
C84, 92, 93	220μF	10V	Electro	4802 124 47006
C94	2200μF	16V	Electro	4802 124 47019
C97, 98	1000μF	10V	Electro	4802 124 47003
C99, 100	.15μF	50V	Mylar	4802 121 47173
C101–104	1000ρF	Feed	Through	4802 122 77004
CV1	AM Antenna trimmer			4082 125 67038
CV2.3	AM RF Osc. trimmer			4802 125 57042
RESISTORS & CONTROLS	NOTE: All resistors are standard values and tolerances unless specified otherwise.			
RV1 – 5, S6	10k + 10k + 20k + switch			4802 102 57012
RV6	Variable resistor 10k ohm			4822 100 10024
IC's				
IC1	SN76681N			4802 209 87178
IC2	LA2100			4802 209 87179
IC3	SN76115N			4802 209 87061
IC4	HA1199			4802 209 87122
IC5	M51521L			4802 209 87107
IC6	UPC1181H – EF			4802 209 87181
IC7	UPC1182H – EF			4802 209 87182
TRANSISTORS				
Q1, 2, 3	In FM Tuner			
Q4, 5	2SC710 – C			4822 130 44195
Q6, 9	2SC1317 – QR. Use BC337			4822 130 40855
Q7, 8	2SC828 – QR			4822 130 40965
DIODES				
D1, 2	1S446			4822 130 30281
D3	RD9R1E – C			4802 130 37009
D4, 5	1S1555			4802 130 37033
D6	1S1885			4802 130 37123
D7	LED RED GL2PR1			4802 130 37187

REF. NO.	DESCRIPTION	SERVICE CODE
COILS & TRANSFORMERS		
L1	Choke	4802 158 17098
L2	Choke	4802 157 57046
L3, 5, 6	Part of AM Tuner	—
L4	Choke	4802 158 17104
L7	Solenoid	4802 281 57011
L9	Choke	4802 157 57079
T1	FM IF	4802 153 57077
T2	AM Oscillator	4802 156 27097
T3, 4	AM IF	4802 153 17165
T5, 6	AM IF	4802 153 17166
MISCELLANEOUS ELECTRICAL		
CF1, 2	Ceramic filter (in pairs)	4822 242 70247
Tu	FM Front end and AM coil assy.	4802 210 17086
J1	Receptacle (antenna)	4802 320 17027
NL1	Neon lamp	4822 134 20016
A1	Playback head	4802 249 37012
S1	Rotary switch AM/FM	4802 273 27014
S2	Slide switch stereo/mono	4802 277 27054
S3	Reed switch & PC board	4802 214 57086
S4	Leaf switch (manual eject)	4802 278 97041
S5, 6	Slide Switch radio/player	4802 277 27055
PL1	Lamp (dial light)	4802 134 47088
	Fuse holder lead assy.	4802 321 27189
	Fuse 3 amp.	4802 253 47006
	Speaker lead (left)	4802 321 27191
	Speaker lead (right)	4802 321 27192
MISCELLANEOUS MECHANICAL		
1	Knob (front)	4802 413 47153
2	Knob (rear)	4802 411 47006
3	Escutcheon (flat)	4802 459 57038
4	Nose piece	4802 459 57039
25	Knob FF/rewind	4802 410 37006
	Screw 2mm dia. x 4mm lg.	4822 502 11059
	Screw 3mm dia. x 4mm lg.	4822 502 11189
	Screw 3mm dia. x 5mm lg.	4822 502 10558
	Screw 3mm dia. x 5mm lg.	4822 502 11064
	Screw 3mm dia. x 10mm lg.	4822 502 10689
CASSETTE DECK		
3	Runner (right)	4802 403 27039
4	Runner (left)	4802 403 27041
5	Lever	4802 403 27042
7	Lever	4802 403 27043
8	Spring	4802 492 37237
16	Playback lead	4802 249 37012
22	Pinchroller assy.	4802 403 47016
25	Solenoid (E1)	4802 281 57011
27	Micro switch (S1)	4802 271 37008
28	Leaf switch (S2)	4802 278 97041
31	Roller	4802 403 27044
32	Roller	4802 403 27045
42	Lever	4802 403 27047
44	Slip mechanism	4802 528 27042
45	Spring	4802 492 57032
47	Slip mechanism	4802 528 27043
48	PC Board assy.	4802 214 57086
50	Flywheel & capstan	4802 528 87087
53	Motor & pulley	4802 361 27045
55	Belt	4802 538 30175
67	Screw 2 x 3mm	4802 535 17005
68	Screw 2 x 8mm	4822 502 10681
69	Screw 2.3 x 10mm	4802 502 17039
70	Screw 2.6 x 4mm	4822 502 11084
72	E-type ring 1.2mm	4822 530 70119
73	E-type ring 1.5mm	4822 530 70121
74	E-type ring 2mm	4822 530 70122
76	E-type ring 3mm	4822 530 70123
	Cassette Deck complete	4802 691 27024

SCHEMATIC

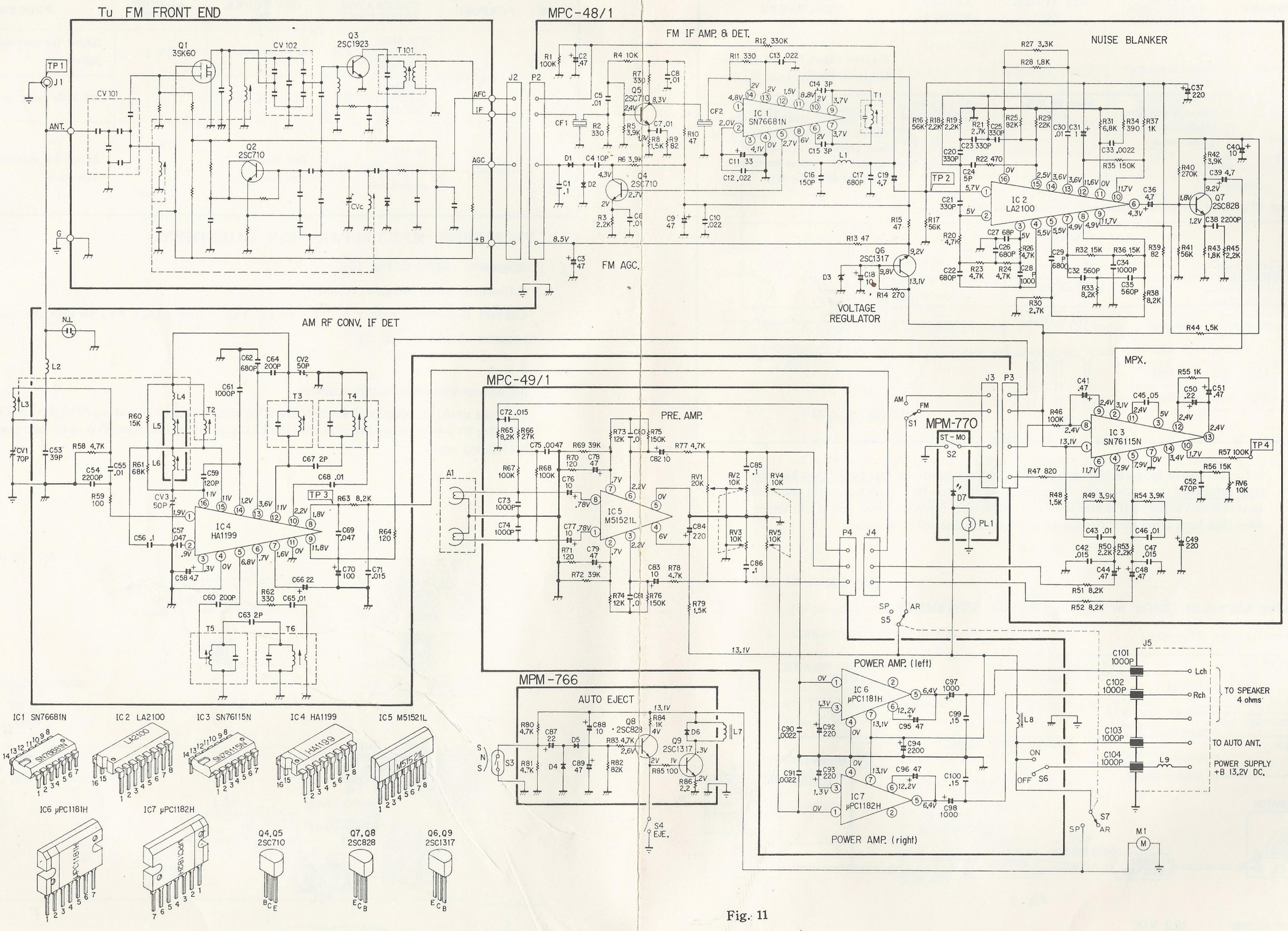
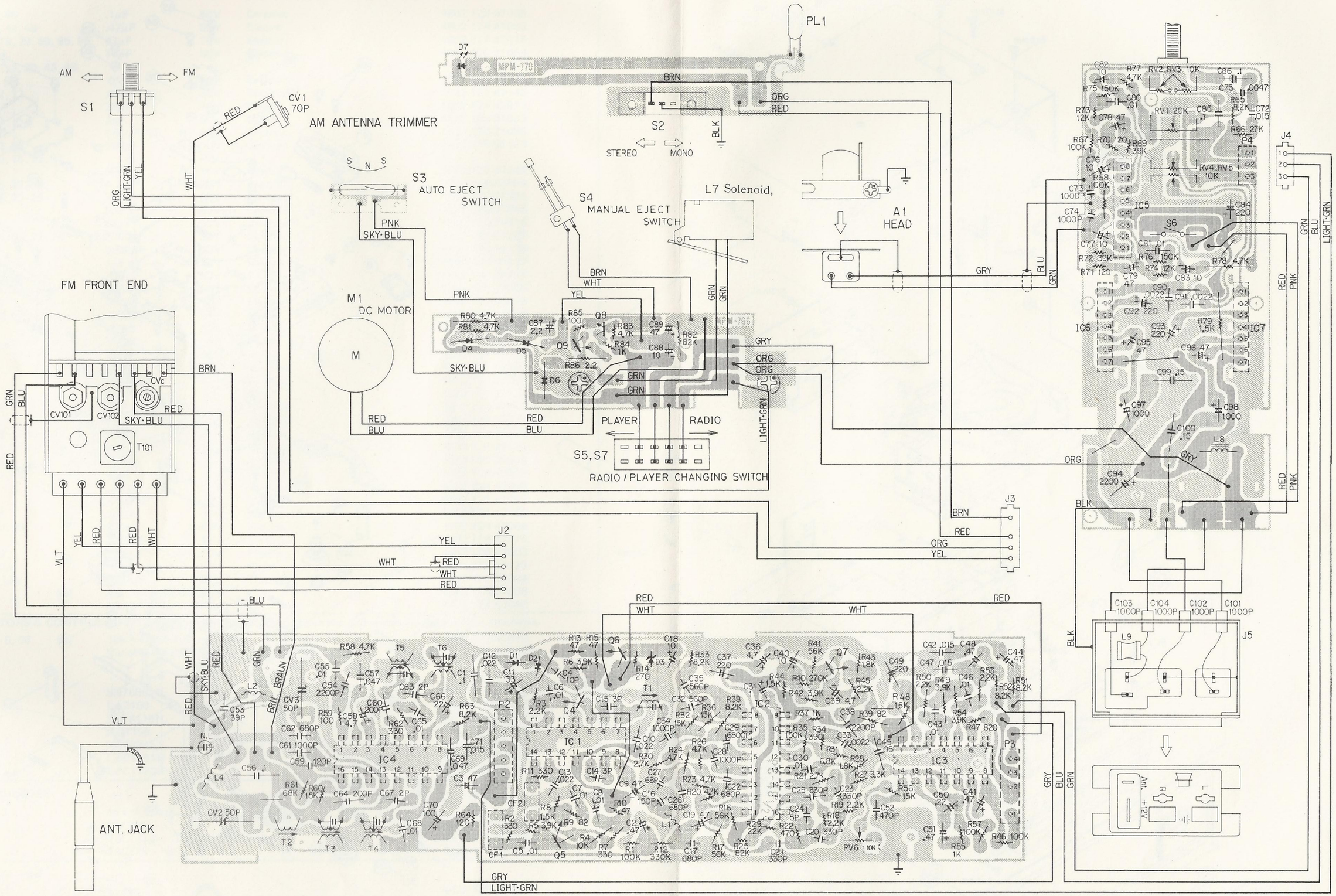


Fig. 11

NOTES:
1. All resistance in ohms, K=10^3
2. All capacitance in μF, P=$\mu\mu$F
3. DC voltage measured with 100k ohm per volt meter, power supply set at 13.2 VDC, no signal input.

WIRING ON PC BOARD



Pin No. / IC	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
IC 1	4.8V	2.0V	4.1V	0V	2.7V	2.0V	3.7V	6.0V	3.7V	2.0V	8.8V	1.5V	2.0V	2.0V	/	/
IC 2	5.7V	5.0V	5.0V	5.5V	5.5V	4.3V	4.9V	4.9V	11.7V	11.7V	0V	11.6V	3.6V	3.6V	2.5V	0V
IC 3	13.1V	3.1V	5.0V	7.9V	11.7V	11.7V	0V	2.4V	2.4V	1.7V	2.4V	2.4V	2.4V	3.4V	/	/
IC 4	1.9V	0.9V	0.3V	0V	6.8V	0.7V	1.6V	1.8V	11.8V	2.2V	0V	11.0V	3.6V	1.2V	11.0V	11.0V
IC 5	0.78V	0.7V	2.2V	6.0V	0V	2.2V	0.7V	0.78V	/	/	/	/	/	/	/	/
IC 6, 7	0V	/	1.3V	0V	6.4V	12.2V	13.1V	/	/	/	/	/	/	/	/	/

Fig. 12

	B	E	C
Q 4	2.7V	2.0V	4.3V
Q 5	2.4V	1.8V	8.3V
Q 6	9.8V	9.2V	13.1V
Q 7	1.8V	1.2V	9.2V
Q 8	2.6V	2.0V	4.0V
Q 9	1.0V	0.2V	0.3V