ST-636

US Model
Canadian Model
AEP Model
UK Model
E Model
SCN Model

FM/AM PROGRAM TUNER

SPECIFICATIONS

GENERAL

Power Requirements: 120 V ac, 60 Hz (Canadian, US model)
120, 220 or 240 V ac adjustable
50/60 Hz (E model)
220 V ac, 50 Hz (AEP, SCN model)
240 V ac, 50 Hz (UK model)

Power Consumption: 28W

Dimensions: Approx. 430(w) x 135(h) x 315(d) mm
17(w) x 5¼ (h) x 12⅜(d) inches
Including projecting parts and controls

Weight: Approx. 5.7 kg, 12 lb 10 oz (net)
Approx. 6.7 kg, 14 lb 13 oz (in shipping carton)

FM TUNER SECTION

Antenna: 300 Ω balanced
75 Ω unbalanced, coaxial cable input

Tuning Range: 87.5 – 108 MHz

Intermediate Frequency: 10.7 MHz

Sensitivity at 46 dB Quieting: (40 kHz deviation)
40 μV (MONO)
50 μV (STEREO)

Sensitivity at 50 dB Quieting:
3.5 μV, 16.1 dBf (MONO)
45 μV, 38.3 dBf (STEREO)

Usable Sensitivity: 1.4 μV, S/N = 26 dB (40 kHz deviation); DIN
18 μV, 10.3 dBf; IHF

S/N Ratio: 75 dB (MONO)
70 dB (STEREO)

Harmonic Distortion: at 1 kHz
0.1% (MONO)
0.2% (STEREO)

– Continued on page 2 –

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!

LES COMPOSANTS IDENTIFIÉS PAR UNE TRAME ET UNE MARQUE ⚠ SUR LES DIAGRAMMES SCHÉMATIQUES, LES VUES EXPLOSÉES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPLÉMENTS PUBLIÉS PAR SONY.

SONY®

SERVICE MANUAL

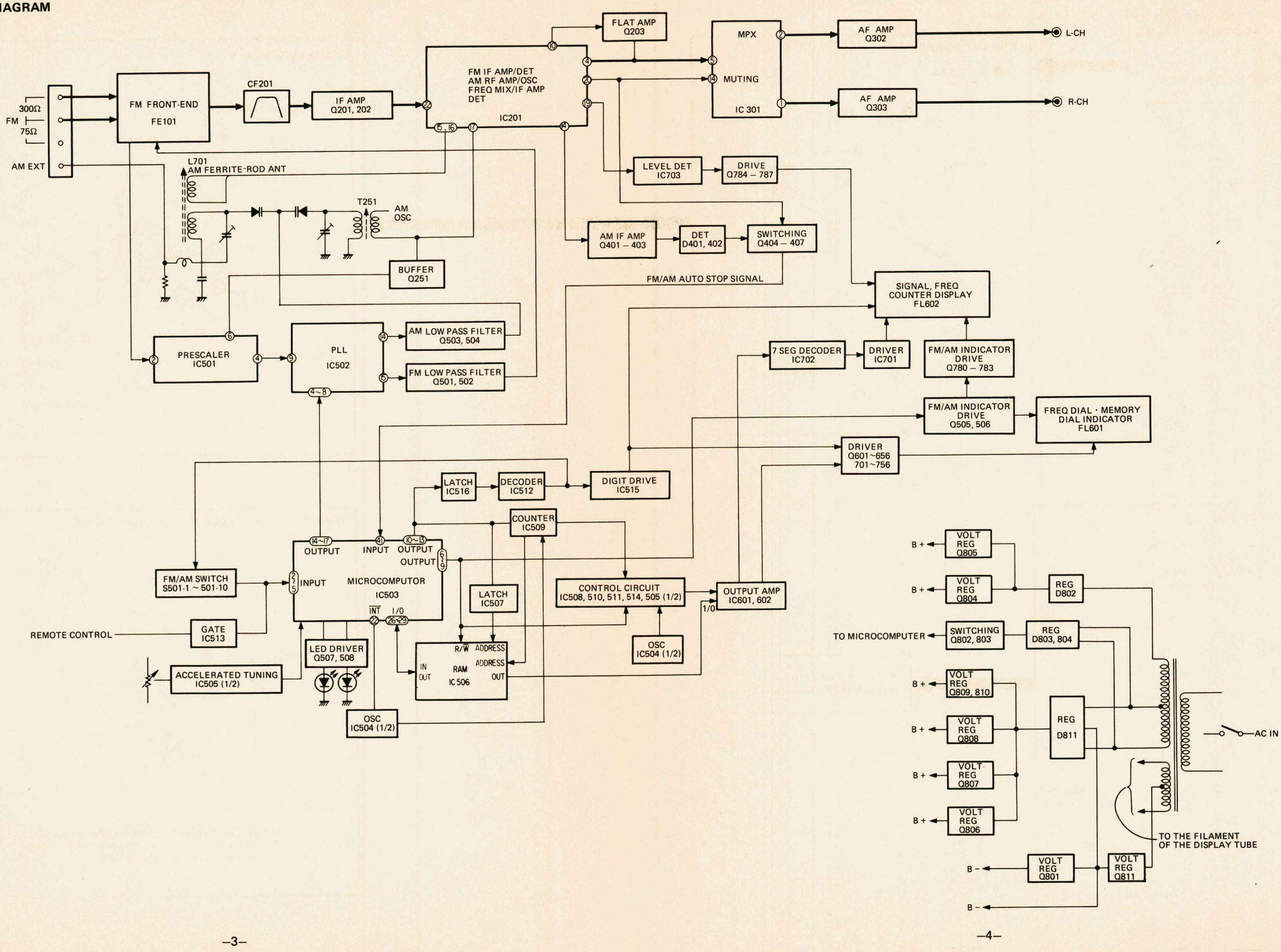
IM Distortion:	0.1% (MONO) 0.2% (STEREO)
Separation:	45 dB at 1 kHz
Frequency Response:	30 Hz – 15 kHz $^{+0.5}_{-2.0}$ dB (IHF) 40 Hz – 12.5 kHz $^{+0.5}_{-1.0}$ dB (DIN)
Selectivity:	75 dB at 300 kHz (at 40 kHz deviation) 80 dB at 400 kHz (at 75 kHz deviation)
Capture Ratio:	1.0 dB
AM Suppression Ratio:	54 dB
Image Response Ratio:	80 dB
Spurious Response Ratio:	90 dB
Muting Threshold:	Approx. 5 μV
Output Level:	450 mV, 4.7 kilohms at 40 kHz deviation (DIN) 450 mV, 4.7 kilohms at 75 kHz deviation (IHF)

AM TUNER SECTION

Frequency Range:	UK, AEP, SCN model: 522 – 1,602 kHz E, US, Canadian model: 522 – 1,602 kHz (with channel plan selector set at 9 kHz) 530 – 1,610 kHz (with channel plan selector set at 10 kHz)
Antenna:	Ferrite bar antenna External antenna terminal
Intermediate Frequency:	450 kHz
Usable Sensitivity:	250 μV ferrite-rod antenna 100 μV, external antenna at 1,000 kHz
S/N Ratio:	52 dB at 50 m V/m
Harmonic Distortion:	0.3% at 50 m V/m, 400 Hz
Selectivity:	50 dB at 9 kHz

SECTION 1
OUTLINE

1-1. BLOCK DIAGRAM



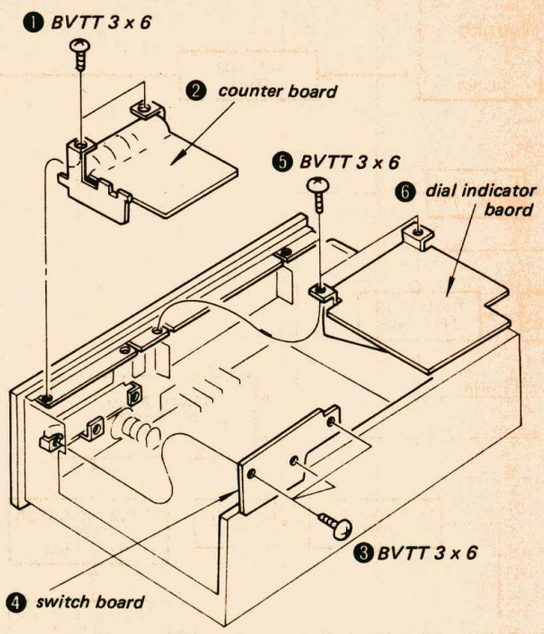
SECTION 2
DISASSEMBLY

Note: Follow the disassembly procedure in the numerical order given.

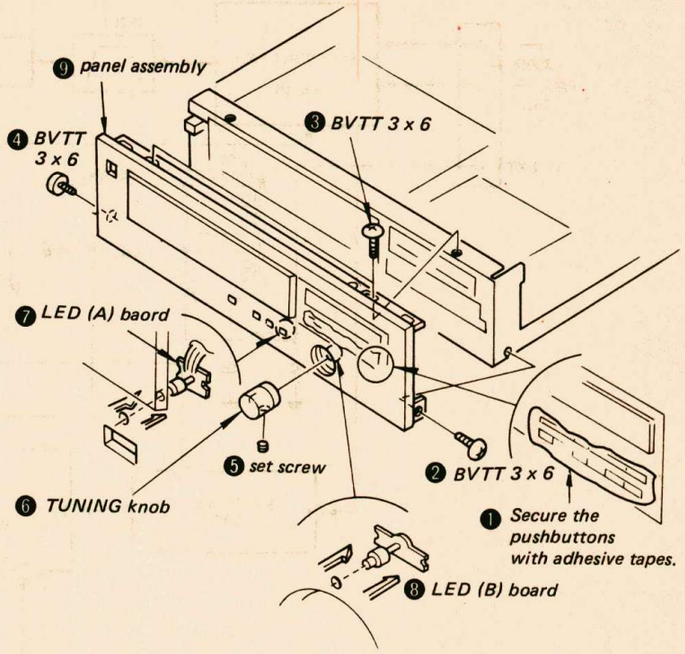
CASE

- **Remove six case screws.**

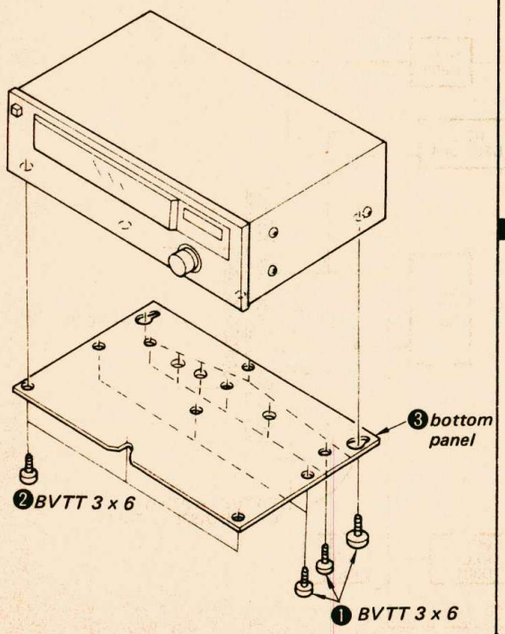
CIRCUIT BOARDS



PANEL ASSEMBLY

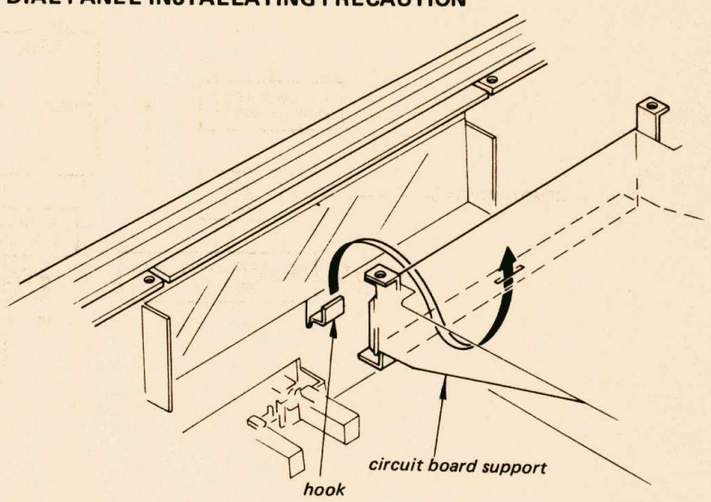


BOTTOM PANEL



The main board can be checked in this condition.

DIAL PANEL INSTALLATING PRECAUTION



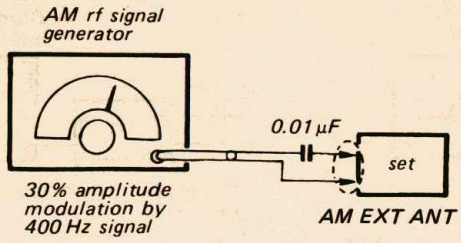
Hook the circuit board support onto the panel assembly. Be sure that the terminals of the dial indicating tube do not touch the chassis (panel assembly).

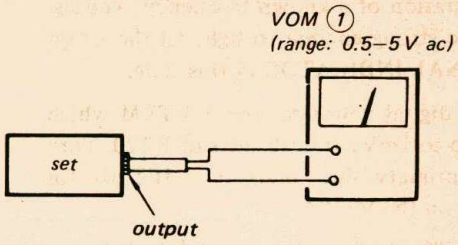
SECTION 3
ADJUSTMENTS

3-1. ELECTRICAL ADJUSTMENTS

AM SECTION

Setting: Band select: AM



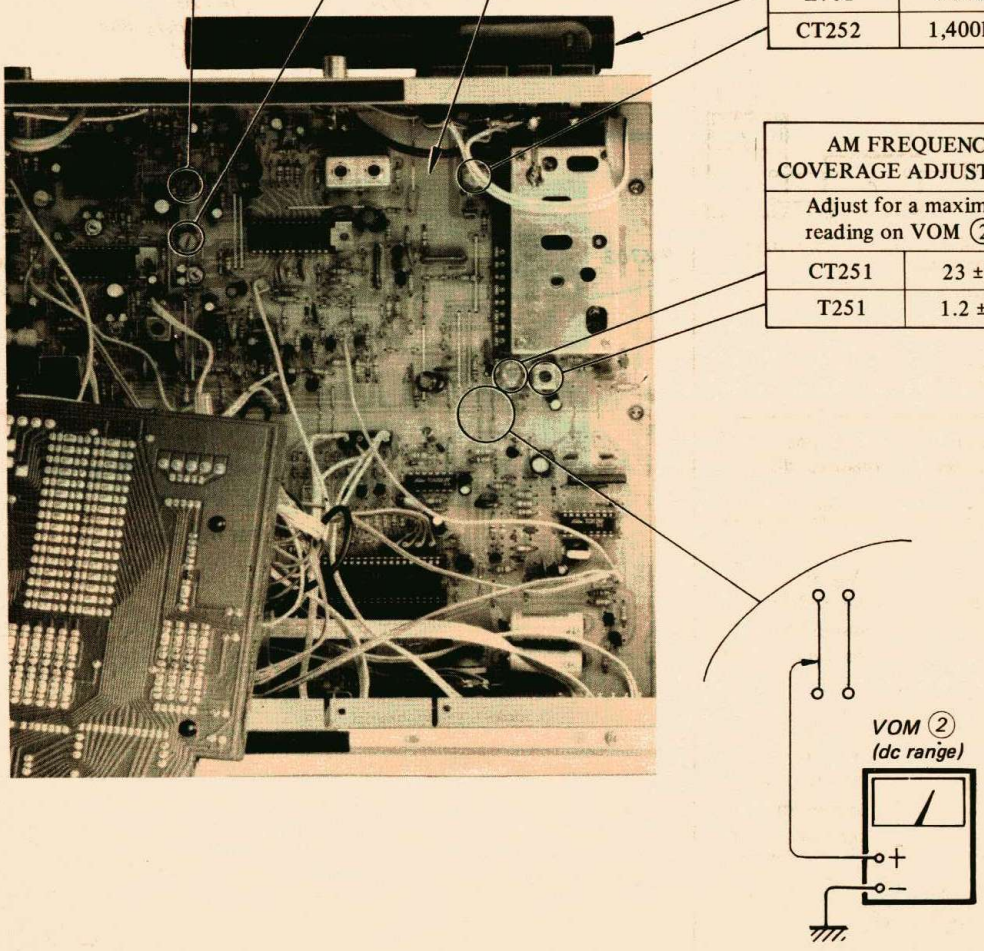


- Repeat the procedures in each adjustment several times, and the frequency coverage and tracking adjustments should be finally done by the trimmer capacitors.

AM IF ALIGNMENT	
Adjust for a maximum reading on VOM (1).	
450kHz	
IFT203	IFT202

AM TRACKING ADJUSTMENT	
Adjust for a maximum reading on VOM (1).	
L701	600kHz
CT252	1,400kHz

AM FREQUENCY COVERAGE ADJUSTMENT		DIAL INDICATION
Adjust for a maximum reading on VOM (2).		
CT251	23 ±0.5V	1,610kHz
T251	1.2 ±0.2V	522kHz



The FM front-end is carefully adjusted at the factory and is supplied as one whole block for replacement.

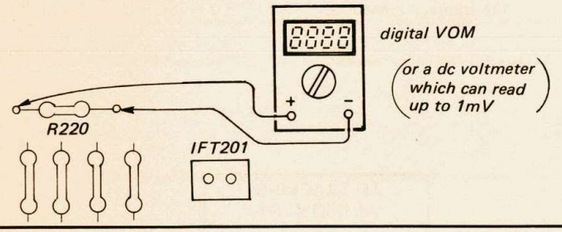
FM SECTION

Discriminator Adjustment

A) Primary Side

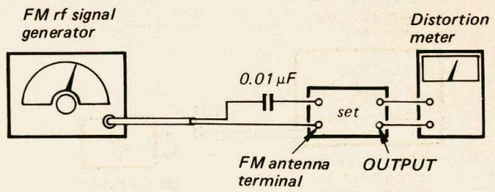
1. Receive a station of a known frequency. The signal must be strong enough to light all the lamps of the SIGNAL INDICATOR at this time.
2. Connect a digital voltmeter (or a VTVM which can read up to 1mV) at both sides of R220. Turn the core (primary side: orange) of IFT201 for 0V reading on the VTVM.

Note: When the ceramic filter is replaced, these adjustments should be made.
Repeat the secondary side and primary side adjustments several times.



B) Secondary Side

Procedure:



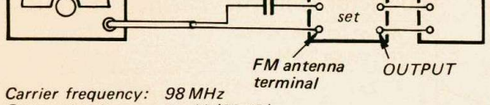
Carrier frequency: 98 MHz
Modulation: 400 Hz, 75 kHz deviation (100%)
Output level: 1 mV (60 dB)

1. Turn the core (secondary side: black) of IFT201 for minimum distortion reading on the distortion meter.

C) After the adjustment, perform the automatic tuning and confirm that the received signal points are the same for both right and left (up and down) scanning. Confirm this by receiving at least three stations.

FM Stereo Separation Adjustment

Procedure:

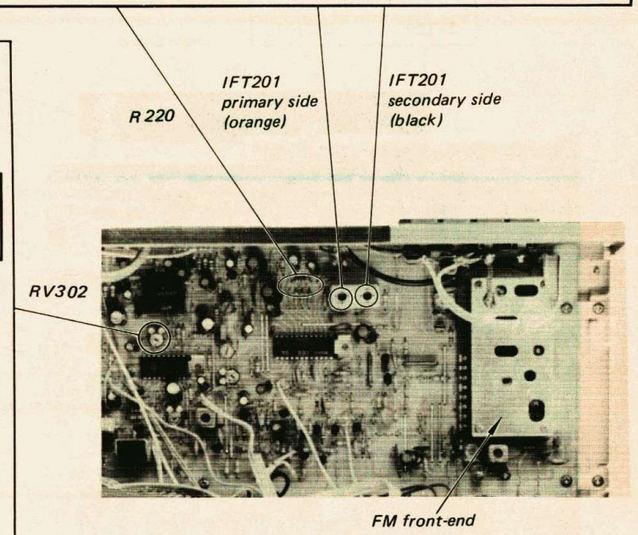


Carrier frequency: 98 MHz
Output level: 1 mV (60 dB)
Mode: Stereo
Modulation:
Audio (400 Hz): 67.5 kHz deviation (90%)
Pilot (19 kHz): 7.5 kHz deviation (10%)

FM stereo signal generator output channel	VTVM connection	VTVM reading (dB)
L-CH	L-CH	Ⓐ
R-CH	L-CH	Ⓑ Adjust RV302 for minimum reading.
R-CH	R-CH	Ⓒ
L-CH	R-CH	Ⓓ Adjust RV302 for minimum reading.

L-CH Stereo separation: Ⓐ – Ⓑ
R-CH Stereo separation: Ⓒ – Ⓓ

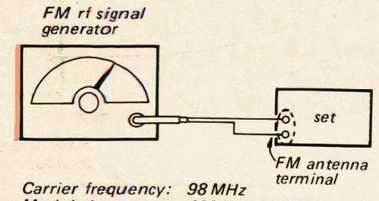
The difference between separations of both channels should be equal.



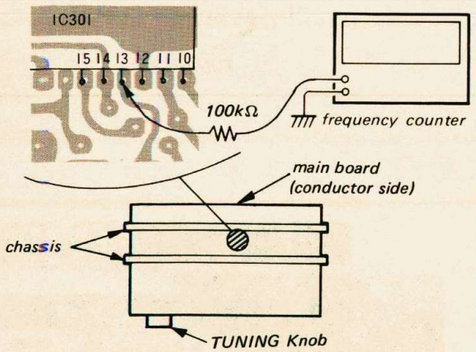
76kHz Adjustment

A) Regular Method

Procedure:



Carrier frequency: 98 MHz
Modulation: 400 Hz, 75 kHz deviation (100%)
Output level: 1 mV (60 dB)

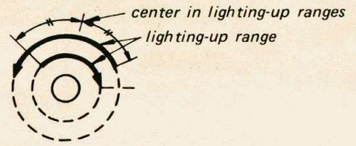


1. Turn for 98MHz.
2. Adjust RV301 so that the frequency counter reads between 76kHz ±100Hz.

B) Simple Method

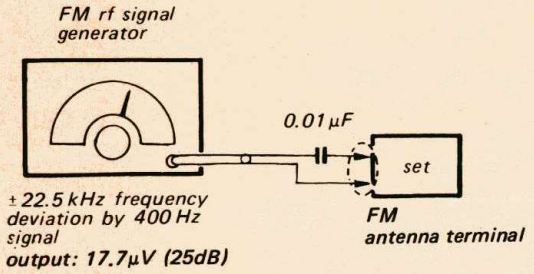
Procedure:

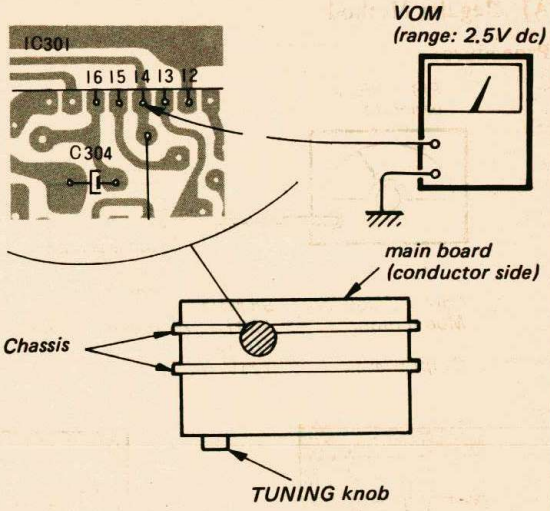
1. Tune the set to the FM stereo broadcasting signal.
2. Turn RV301 clockwise or counterclockwise and memorize the lighting-up range of stereo lamp.
3. Secure RV301 the center in lighting-up range of both turns as shown below.



Auto Stop Muting Level Adjustment

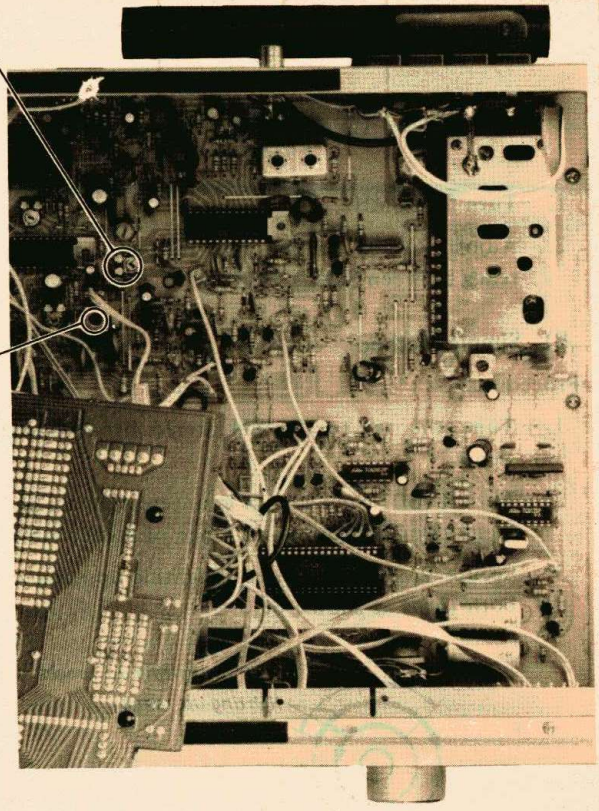
Procedure:





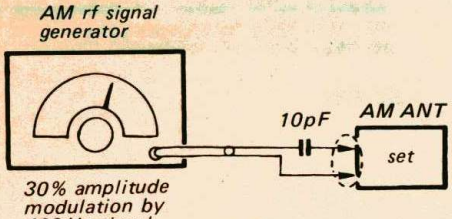
1. Adjust RV201 so that the voltage at terminal 14 of IC301 is between 2.2 ±0.1V.

RV201



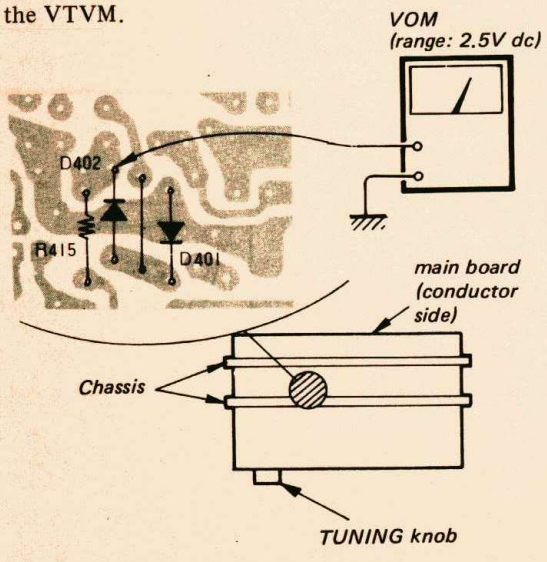
AM Auto Stop Adjustment

Procedure:



1. Adjust T401 to obtain maximum reading on the VTVM.

T401



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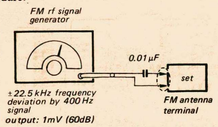
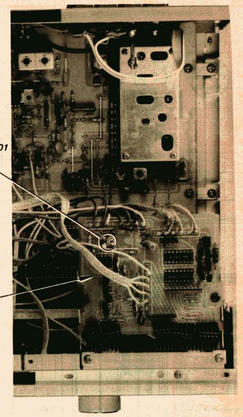
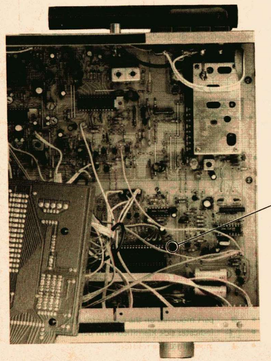
Signal Indicator Adjustment

Procedure:



1. Adjust RV701 so that all the lamps of the SIGNAL INDICATOR light up when a signal is received.



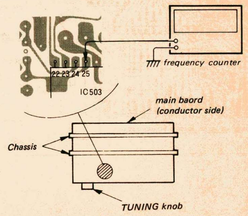


Clock Frequency Adjustment

Procedure:

1. Adjsut T501 so that the frequency counter reads between 485±3kHz.

   Note: Be sure that the capacitance of the frequency counter is lower than 100pF.



- **Replacement Semiconductors**

  For replacement, use semiconductors except in ( ).

IC201 : CX168

IC301 : CX178

IC501 : CX554
IC502 : TC9125P (TC9125)

IC503 : TMP4320P7301 (TMP4320P)

IC504, 505 : MSM4069 (TC4069)
IC507, 516 : TC4042BP (TC4042)
IC508, 510 : TC4012BP (TC4012)
IC509 : TC4516BP (TC4516)
IC511, 513 : TC4001BP (TC4001)
IC512 : TC4028BP (TC4028)
IC514 : TC4011BP (TC4011)

IC506 : TC5501P-1 (TC5501)

IC515, 701 : TC5066BP (TC5066)

IC601, 602 : TMS1025N2L (TMS1025)

IC702 : TC4055BP (TC4055)

IC703 : TL489CP

Q201, 202 : 2SC710-13 (2SC710)

Q701 721
Q724 757
Q203, 301 303
Q401 409, 501
Q504 506, 510
Q782, 783, 788
Q802, 803
Q804, 810 : 2SC1364
Q805 : 2SC1475
Q808 : 2SD809
: 2SC1364 (2SC1815)

Q251, 502, 503 : 2SK23A-824 (2SK23A)

Q507 509, 780
Q781, 784 787
: 2SA1015
Q811 : 2SA684 (2SA733)

Q601 621
Q624 657
: 2SA1027R

(2SA970)

Q801 : 2SA671 (2SA755)

Q806, 807, 809 : 2SC1061 (2SC1419)

D201, 202, 403
D502 504
D509 528
D529, 530
D531, 532
D601 607
D805, 806
D401, 402 : 1T22AM (1T22A)
: 1S1555

D251, 252 : KV1226

D404 : GL9PR21
D405 : GL9NG21

D505 508 : MV104V

D551 : GL2HY1 (GL2HY)

D552 : GL2PR1 (GL2PR)

D801 : EQB01-21 (EQA01-21R)
D809 : EQB01-10 (EQA01-10S)
D810 : EQB01-05 (EQA01-05R)
D812 – 814 : EQB01-20 (EQA01-20R)
D815 : EQB01-16 (EQA01-16R)
D816 : EQB01-09 (EQA01-09R)
D817 : EQB01-07 (EQA01-07R)
D818 : EQB01-32 (EQA01-32R)

D802 – 804 : 10E2

(RA1Z)

D811 : S1VB20 (S1VB10)

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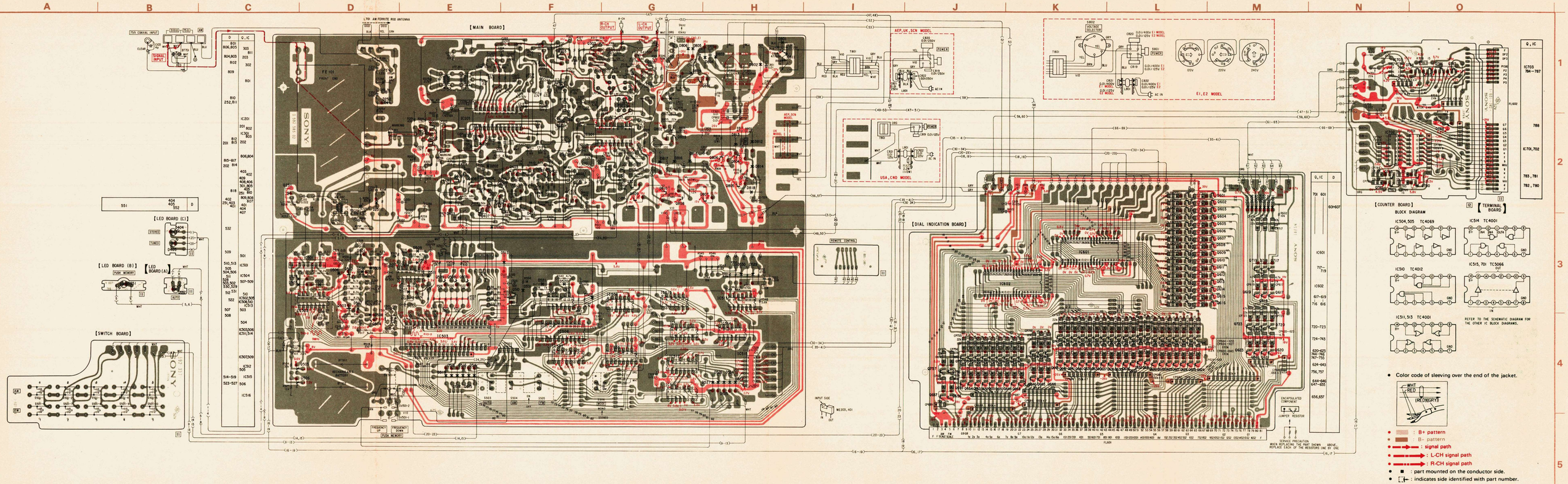
4-1. MOUNTING DIAGRAM

– Conductor Side –

SECTION 4
DIAGRAMS



- Color code of sleeving over the end of the jacket.

- : B+ pattern
- : B- pattern
- : signal path
- : L-CH signal path
- : R-CH signal path
- ■ : part mounted on the conductor side.
- : indicates side identified with part number.
- ▲ : nonflammable resistor.

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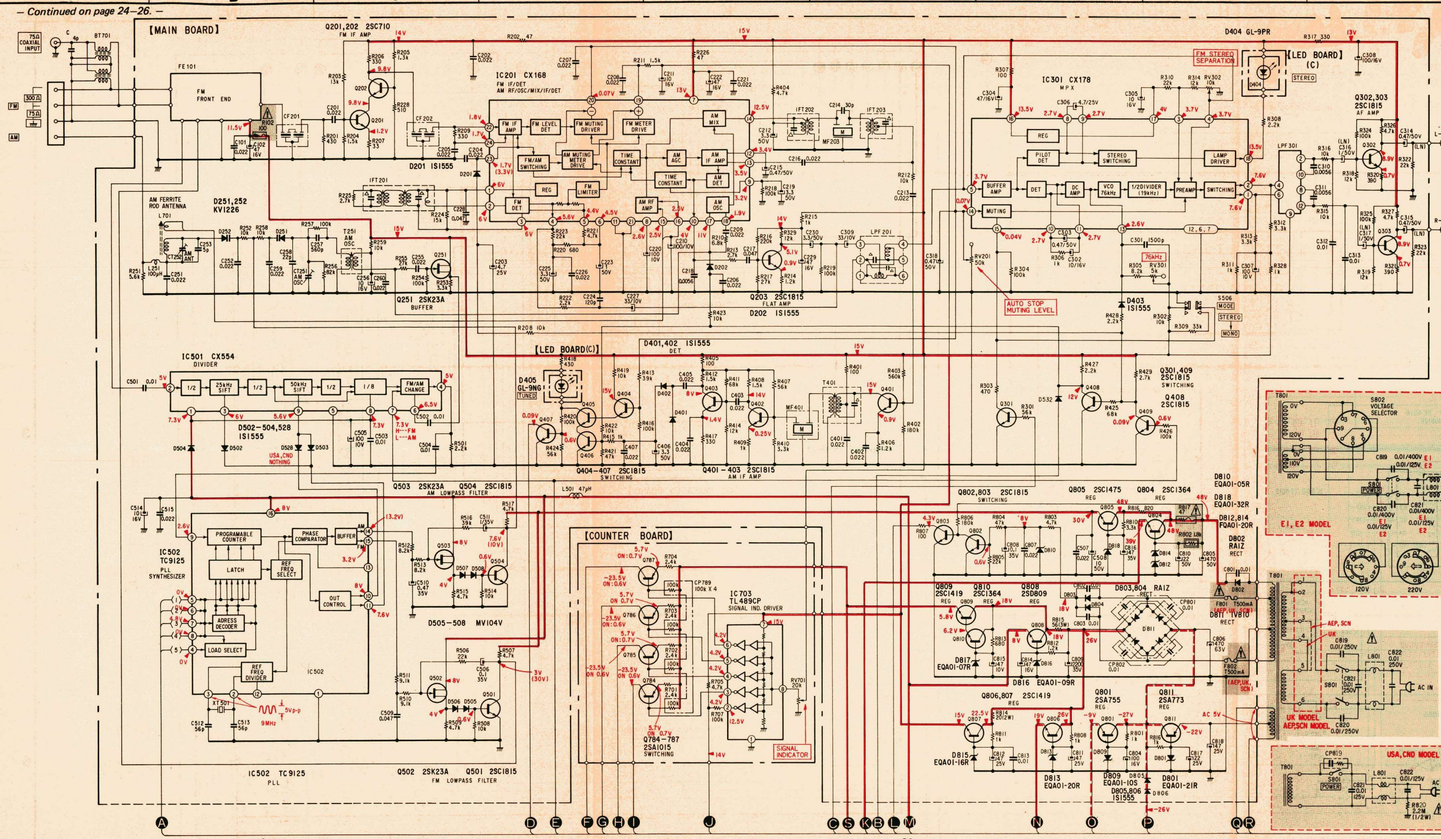
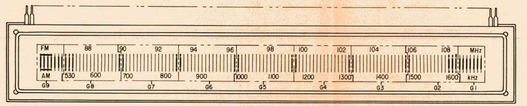
4-2. SCHEMATIC DIAGRAM

– Continued on page 24–26. –





PIN No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
CONNECTION	F	F	AM	G9	FM	α	d	G9	G8	1a	2a	3a	G8	4a	5a	G8	6a	G7	7a	8a	9a	G7	10a	11a	12a

	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
	G7	13a	G6	14a	15a	16a	G6	1S1	2S1	3S1	G5	4S1	G5	5S1	6S1	7S1	G5	8S1	9S1	G5	10S1	G4	11G1	12G1	13S1	G4	14S1	15S1

	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81
	16G1	G4	A4	G3	1S2	2S2	3S2	4S2	5S2	G3	6S2	G2	7S2	8S2	G2	9S2	10S2	G2	11S2	G1	12S2	G1	13S2	14S2	15S2	G1	16S2	NC	F

- All capacitors are in μF unless otherwise noted. pF : μμF 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in ohms, ¼W unless otherwise noted. kΩ : 1000 Ω, MΩ : 1000 kΩ
- : nonflammable resistor.
- : fusible resistor.
- △ : internal component.
- : panel designation.
- : adjustment for repair.
- : B+ bus.
- : B– bus.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under FM detuned conditions with a VOM (20 kΩ/V).
- ( ) : AM
- Switch

Ref. No.	Switch	Position
S501	PROGRAMMED TUNING	OFF
S503	AUTO	OFF
S504	AM	OFF
S505	FM	OFF
S506	MODE	STEREO FM-AM MUTING
S801	POWER	OFF
SV501	UP, DOWN MEMORY	OFF

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

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4-3. SCHEMATIC DIAGRAM

— Continued from page 19-22. —

CIRCUIT DIFFERENCE DISTINGUISHED BY THE COLOR OF THE CERAMIC FILTER.

COLOR OF THE CERAMIC FILTER MARK (MHz)	D502	D503	LEAD WIRE CONNECTION AT MARK ■
YEL (10.775)	○	○	○ (0)
WHT (10.75)	×	○	○ (0)
ORG (10.725)	○	×	○ (0)
RED (10.7)	×	×	○ (0)
BLU (10.675)	○	○	× (1)
BLK (10.65)	×	○	× (1)
GRN (10.625)	○	×	× (1)

○—USED
×—NOT USED

Refer to page 22 for the notes.

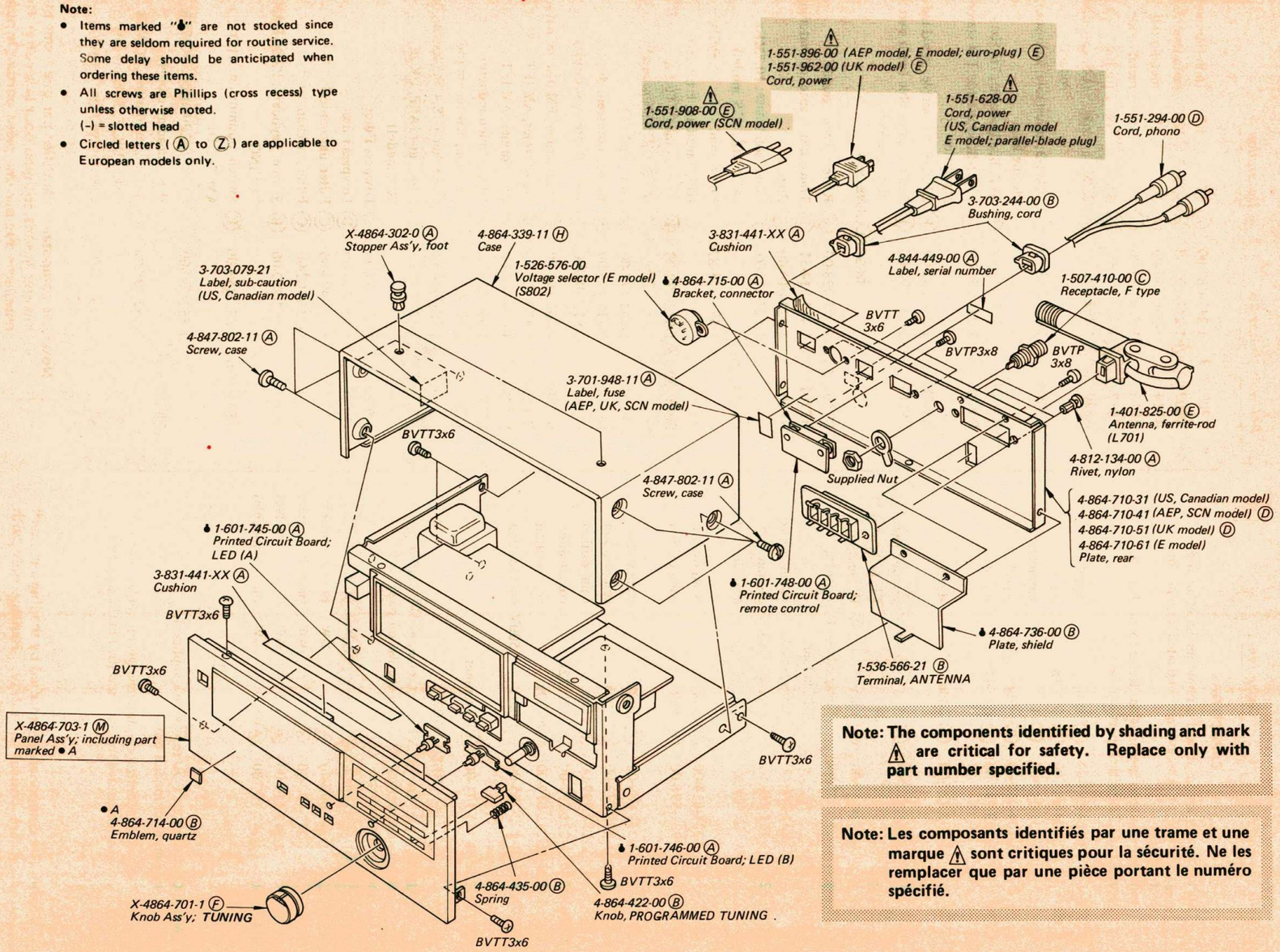
[MAIN BOARD (1/2)]

[SWITCH BOARD]

[COUNTER BOARD]

[DIAL INDICATION BOARD]

Note:
- Items marked "•" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (-) = slotted head
- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.



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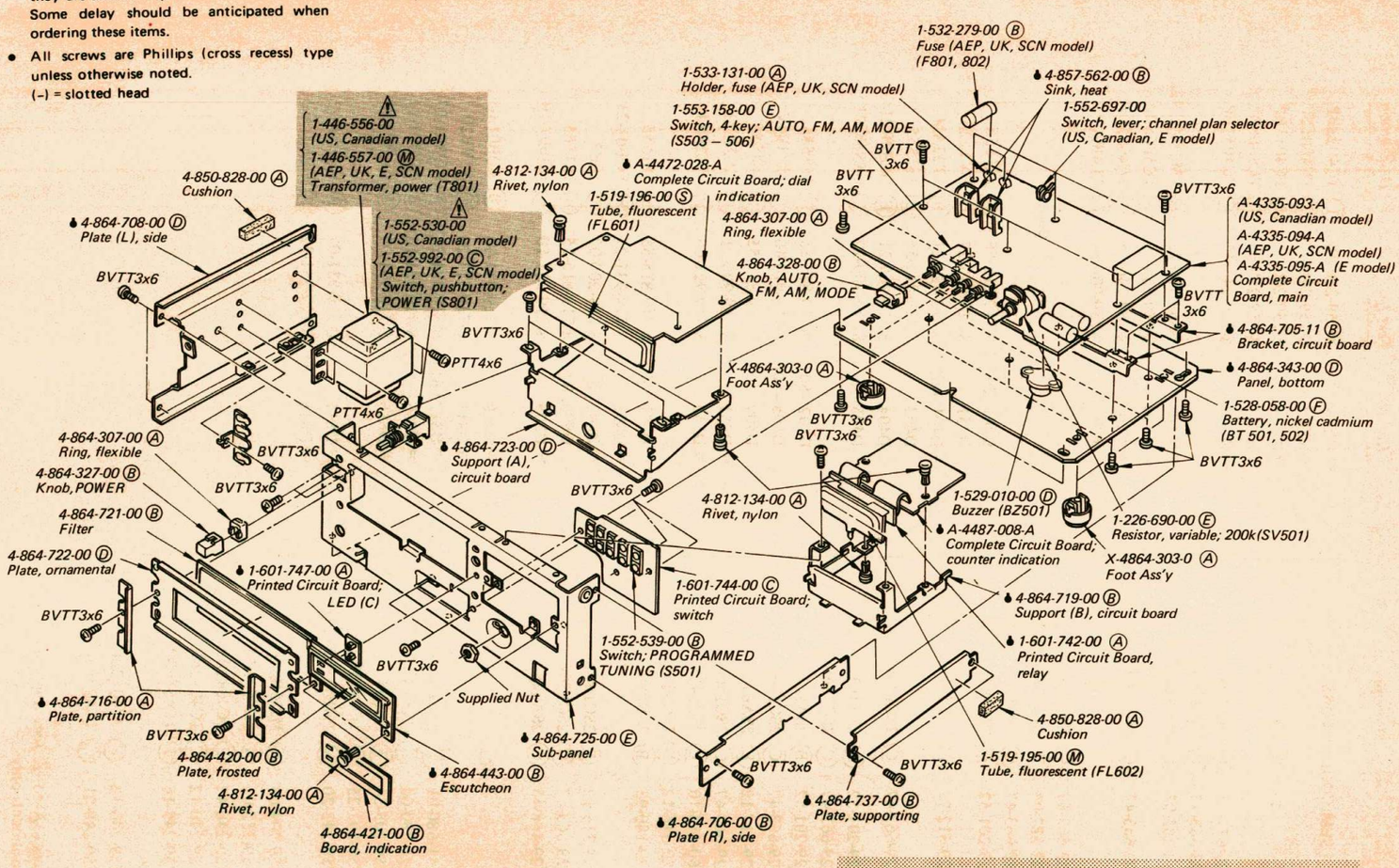
  (-) = slotted head
- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.



Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

SECTION 6
ELECTRICAL PARTS LIST

Ref. No.	Part No.		Description
			SEMICONDUCTORS
			Transistors
⇒Q201, 202	8-729-671-13	(B)	2SC710-13
⇒Q203	8-729-663-47	(C)	2SC1364
⇒Q251	8-722-382-04	(E)	2SK23A-824
⇒Q301–303, ⇒Q401–409	8-729-663-47	(C)	2SC1364
⇒Q501	8-729-663-47	(C)	2SC1364
⇒Q502, 503	8-722-382-04	(E)	2SK23A-824
⇒Q504–507	8-729-663-47	(C)	2SC1364
Q508–510	8-729-201-52	(B)	2SA1015
⇒Q601–621, ⇒Q624–657	8-729-612-77	(B)	2SA1027R
⇒Q701–721, ⇒Q724–757	8-729-663-47	(C)	2SC1364
Q780, 781	8-729-201-52	(B)	2SA1015
⇒Q782, 783	8-729-663-47	(C)	2SC1364
Q784–787	8-729-201-52	(B)	2SA1015
⇒Q788	8-729-663-47	(C)	2SC1364
⇒Q801	8-729-317-12	(E)	2SA671
⇒Q802–804	8-729-663-47	(C)	2SC1364
Q805	8-760-413-10	(B)	2SC1475
⇒Q806, 807	8-729-316-12	(D)	2SC1061
Q808	8-729-180-93	(B)	2SD809
⇒Q809	8-729-316-12	(D)	2SC1061
Q810	8-729-663-47	(C)	2SC1364
⇒Q811	8-729-468-43	(C)	2SA684
			ICs
IC201	8-751-680-01	(I)	CX168
IC301	8-751-780-00	(G)	CX178
IC501	8-759-205-54	(J)	CX554
⇒IC502	8-759-291-25	(K)	TC9125P
⇒IC503	8-759-243-20	(N)	TMP4320P7301
⇒IC504, 505	8-759-904-69	(C)	MSM4069
⇒IC506	8-759-255-01	(K)	TC5501P-1
⇒IC507	8-759-240-42	(F)	TC4042BP
⇒IC508	8-759-240-12	(C)	TC4012BP
⇒IC509	8-759-245-16	(J)	TC4516BP
⇒IC510	8-759-240-12	(C)	TC4012BP
⇒IC511	8-759-240-01	(C)	TC4001BP
⇒IC512	8-759-240-28	(I)	TC4028BP
⇒IC513	8-759-240-01	(C)	TC4001BP
⇒IC514	8-759-240-11	(B)	TC4011BP
⇒IC515	8-759-250-66	(F)	TC5066BP
⇒IC516	8-759-240-42	(F)	TC4042BP
⇒IC601, 602	8-759-990-25	(H)	TMS1025N2L
⇒IC701	8-759-250-66	(F)	TC5066BP
⇒IC702	8-759-240-55	(G)	TC4055BP
IC703	8-759-904-89	(D)	TL489CP
			Diodes
D201, 202	8-719-815-55	(B)	1S1555
D251	8-719-912-27	(G)	KV1226
⇒D401, 402	8-719-422-21	(B)	1T22AM
D403	8-719-815-55	(B)	1S1555
D404	8-719-909-21	(B)	GL9PR21
D405	8-719-909-22	(B)	GL9NG21
D502–504	8-719-815-55	(B)	1S1555
D505–508	8-719-910-40	(B)	MV104V
D509–532	8-719-815-55	(B)	1S1555
⇒D551	8-719-900-21	(B)	GL2HY1
⇒D552	8-719-921-00	(B)	GL2PR1
D601–607	8-719-815-55	(B)	1S1555
⇒D801	8-719-931-21	(B)	EQB01-21
⇒D802–804	8-719-200-02	(B)	10E2
D805, 806	8-719-815-55	(B)	1S1555
⇒D809	8-719-931-10	(B)	EQB01-10
⇒D810	8-719-931-05	(B)	EQB01-05
⇒D811	8-719-511-20	(C)	S1VB20
⇒D812–814	8-719-931-20	(B)	EQB01-20
⇒D815	8-719-931-16	(B)	EQB01-16
⇒D816	8-719-931-09	(B)	EQB01-09
⇒D817	8-719-931-07	(B)	EQB01-07
⇒D818	8-729-931-32	(B)	EQB01-32

Note: Circled letters ((A) to (Z)) are applicable to European models only.

⇒: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

Ref. No.	Part No.		Description		
			CAPACITORS		
			All capacitors are in μF and ceramic unless otherwise noted. 50 WV or less are not indicated except for electrolytics. Common capacitors are omitted. Refer to the lists on pages 32 and 33 for their part numbers.		
C257	1-104-071-00	(B)	560p		styrol
C301	1-104-081-00	(B)	0.0015		styrol
C511	1-131-347-00	(B)	1	35V	tantalum
C516	1-104-067-00	(B)	390p		styrol
C518	1-103-741-00	(A)	0.0047		styrol
C525	1-103-721-00	(A)	680p		styrol
C819–822	1-161-744-00	(B)	0.01	400V	ceramic (AEP, UK, E1, SCN model)
	1-161-749-00	(B)	0.01	125V	(E2 model)
C819	1-231-325-00		Encapsulated Component (US model)		
	1-231-345-00		Killer, spark (Canadian model)		
C821, 822	1-161-749-00		0.01	125V	ceramic (US, Canadian model)
CP501	1-231-614-00	(B)	10k		composition
CP502	1-231-598-00	(B)	56k		composition
CP780	1-231-689-00	(B)	100k		composition
CP781	1-231-572-00	(B)	100k		composition
CP782	1-231-599-00	(B)	10k		composition
CP783–786	1-231-597-00	(B)	33k/22k		composition
CP787, 788	1-231-619-00	(B)	100k		composition
CP801, 802	1-102-355-00	(A)	0.01	500V	composition
CT251, 252	1-141-171-00	(B)	Trimmer		
			RESISTORS		
			All resistors are in ohms. Common ¼W carbon resistors are omitted. Refer to the list on page 34 for their part numbers.		
R102	1-217-399-00	(B)	100	¼W	fusible
R202, 226	1-247-099-00	(A)	47	¼W	(non-flammable)
R307	1-247-107-00	(A)	100	¼W	(non-flammable)
R317	1-247-119-00	(A)	330	¼W	(non-flammable)
R401, 405	1-247-107-00	(A)	100	¼W	(non-flammable)

Note: Circled letters ((A) to (Z)) are applicable to European models only.

⇒: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Ref. No.	Part No.		Description		
R708, 709	1-247-087-00	(A)	15	¼W	(non-flammable)
R802	1-247-137-00	(A)	1.8k	¼W	(non-flammable)
R814	1-206-470-00	(A)	20	2W	metal-oxide
R815	1-206-529-00	(A)	56	3W	metal-oxide
R817	1-217-395-00	(B)	47	¼W	fusible
R820	1-202-723-00	(A)	2.2M	½W	(US, Canadian model)
⇒RV201	1-226-238-00	(A)	50kΩ-B; adjustable; auto-stop, muting level		
⇒RV301	1-226-235-00	(A)	5kΩ-B; adjustable; 76kHz		
RV302	1-226-236-00	(A)	10kΩ-B; adjustable; FM stereo separation		
RV701	1-226-237-00	(B)	20kΩ-B; adjustable; signal indication		
SV501	1-226-690-00	(E)	200kΩ; adjustable (with switch); station select		
			MISCELLANEOUS		
BT501, 502	1-522-058-00	(F)	Battery, rechargeable		
BT701	1-417-014-31	(B)	Transformer, antenna matching		
BZ501	1-529-010-00	(D)	Buzzer		
CF201, 202	1-527-277-91	(F)	Filter, solid state; 10.7MHz (AEP, UK, SCN model)		
	1-527-278-XX		Filter, solid state; 10.7MHz (US, Canadian, E model)		
F801, 802	1-532-279-00	(B)	Fuse (in tube), T0.5A (AEP, UK, SCN model)		
FE101	1-463-295-00	(M)	Front End (W)		
FL601	1-519-196-00	(S)	Tube, fluorescent display		
FL602	1-519-195-00	(M)	Tube, fluorescent display		
IFT201	1-404-167-00	(D)	Transformer, FM discriminator		
IFT202	1-409-323-00	(B)	Transformer, AM IFT		
IFT203	1-409-324-00	(B)	Transformer, AM IFT		
L251	1-407-169-XX	(A)	100μH, microinductor		
L701	1-401-825-00	(E)	Antenna, MW ferrite-rod		
L801	1-421-328-11		Filter, line (US, Canadian model)		
	1-421-302-XX	(C)	Filter, line (AEP, UK, E, SCN model)		
LPF201	1-231-657-00	(C)	Lowpass Filter		
LPF301	1-231-574-00	(D)	Lowpass Filter		
MF203	1-527-403-00	(C)	Filter, mechanical		
MF401	1-527-402-00	(C)	Filter, mechanical		
S501	1-552-539-00	(B)	Switch, keyboard; PROGRAMMED TUNING		
S503–506	1-553-158-00	(E)	Switch, pushbutton; AUTO, FM, AM, MODE		
S801	1-552-530-00		Switch, pushbutton, POWER (US, Canadian model)		
	1-552-992-00	(C)	Switch, pushbutton, POWER (AEP, UK, E, SCN model)		
S802	1-526-576-00		Selector, voltage (E model)		

Note: Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

Ref. No.	Part No.		Description
T251	1-405-886-00	(B)	Coil, MW osc
T401	1-527-400-00	(B)	Coil, filter
T501	1-409-323-00	(B)	Coil, filter
T801	⚠1-446-556-00		Transformer, power (US, Canadian model)
	⚠1-446-557-00	(M)	Transformer, power (AEP, E, UK, SCN model)
XT501	1-527-551-00	(E)	Crystal Osc
	1-506-305-00		F Type Plug (US, Canadian model)
	1-507-410-00	(C)	Receptacle, F type
	1-508-482-00	(C)	F Type Plug (AEP, UK, SCN model)
	⚠1-533-131-00	(A)	Holder, fuse (AEP, UK, SCN model)
	1-535-108-00	(A)	Pin (AEP, UK, SCN model)
	1-536-566-21	(B)	Terminal Plate
	1-551-294-00	(D)	Cord, shield (with pin)
	⚠1-551-628-00		Cord, power (US, Canadian, E2 model)
	⚠1-551-896-00	(E)	Cord, power (AEP, E1 model)
	⚠1-551-908-00	(E)	Cord, power (SCN model)
	⚠1-551-962-00	(E)	Cord, power (UK model)
	⚠1-551-966-00	(G)	Adaptor, power cord (AEP, E1 model)
	⚠1-551-967-00	(E)	Adaptor, power cord (UK model)

COMPLETE CIRCUIT BOARDS

•	A-4335-093-A	Main (US, Canadian model)
•	A-4335-094-A	Main (AEP, UK, SCN model)
•	A-4335-095-A	Main (E model)
•	A-4472-028-A	Dial Indication
•	A-4487-008-A	Counter Display

PRINTED CIRCUIT BOARDS

•	1-601-748-00	(B)	Remote Control
•	1-601-743-00	(C)	Counter
•	1-601-744-00	(C)	Switch
•	1-601-745-00	(A)	LED (A)
•	1-601-746-00	(A)	LED (B)
•	1-601-747-00	(A)	LED (C)

- Power Cord:
  E1 — euro-plug
  E2 — parallel-blade plug

ACCESSORIES AND PACKING MATERIALS

Part No.		Description
1-501-184-00	(C)	Antenna, feeder
1-508-482-00	(C)	Plug, f-type
3-701-630-00	(A)	Bag, plastic
3-783-012-11	(D)	Manual, instruction (AEP, UK, SCN model)
3-783-012-21		Manual, instruction (US, Canadian model)
3-794-623-11	(B)	Card, instruction (German, Spanish)
3-794-624-21	(B)	Card, instruction (English, French)
3-794-781-11	(J)	Leaflet (Swedish, Dutch)
4-864-354-00	(B)	Sheet, plastic
4-864-361-00	(B)	Cushion
4-864-726-00	(D)	Carton, individual

Note: Circled letters ((A) to (Z)) are applicable to European models only.

- Items marked "•" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

ELECTROLYTIC CAPACITORS

Note: Circled letter ((A) to (Z)) are applicable to European models only.

→ : Use the high voltage rated one.

CAP. (μF)	RATING 6.3 VOLT. PART No.	10 VOLT. PART No.	16 VOLT. PART No.	25 VOLT. PART No.	35 VOLT. PART No.	50 VOLT. PART No.
0.47					→	1-121-726-00 (A)
1.0					→	1-121-391-00 (A)
2.2					→	1-121-450-00 (A)
3.3	→	→	→	1-121-392-00 (A)	→	1-121-393-00 (A)
4.7	→	→	→	1-121-395-00 (A)	→	1-121-396-00 (A)
10	→	→	1-121-651-00 (A)	1-121-398-00 (A)	→	1-121-738-00 (A)
22	→	→	1-121-479-00 (A)	1-121-480-00 (A)	1-121-662-00 (A)	1-121-152-00 (A)
33	→	→	1-121-403-00 (A)	1-121-404-00 (A)	1-121-652-00 (B)	1-121-405-00 (A)
47	→	1-121-352-00 (A)	1-121-409-00 (A)	1-121-410-00 (A)	1-121-653-00 (B)	1-121-411-00 (A)
100	→	1-121-414-00 (A)	1-121-415-00 (A)	1-121-416-00 (A)	1-121-357-00 (B)	1-121-417-00 (B)
220	1-121-419-00 (B)	1-121-420-00 (B)	1-121-421-00 (A)	1-121-422-00 (B)	1-121-261-00 (C)	1-121-423-00 (B)
330	1-121-751-00 (B)	1-121-805-00 (B)	1-121-521-00 (C)	1-121-654-00 (B)	1-121-655-00 (D)	1-121-656-00 (C)
470	1-121-424-00 (B)	1-121-425-00 (C)	1-121-426-00 (C)	1-121-733-00 (B)	1-121-361-00 (E)	1-121-810-00 (D)
1000	–	1-121-736-00 (C)	1-121-245-00 (D)	1-121-657-00 (D)	1-121-388-00 (E)	1-123-061-00 (F)
2200	1-121-658-00 (B)	1-121-659-00 (C)	1-121-660-00 (D)	1-123-067-00 (F)	1-121-984-00 (F)	–
3300	1-121-661-00 (D)	1-123-075-00 (E)	1-123-071-00 (F)	–	–	–

CAP. (μF)	100 VOLT. PART No.	160 VOLT. PART No.	250 VOLT. PART No.	350 VOLT. PART No.
0.47	–	–	–	–
1.0	1-123-249-00 (A)	1-123-252-00 (A)	1-123-003-00 (B)	1-121-168-00 (B)
2.2	1-123-250-00 (A)	1-123-026-00 (B)	–	1-123-028-00 (B)
3.3	1-121-995-00 (A)	–	1-123-004-00 (B)	1-123-006-00 (C)
4.7	1-123-255-00 (A)	1-121-246-00 (B)	1-121-759-00 (B)	1-123-007-00 (D)
10	1-121-126-00 (B)	1-121-999-00 (B)	1-123-254-00 (C)	1-123-008-00 (D)
22	1-121-996-00 (C)	1-123-253-00 (C)	1-123-005-00 (D)	1-123-022-00 (D)
33	1-121-997-00 (C)	1-121-757-00 (C)	–	–
47	1-123-251-00 (C)	1-121-919-00 (C)	–	–
100	1-123-084-00 (E)	–	–	–

CERAMIC CAPACITORS (A)

CAP. (pF)	RATING 50 VOLT. PART No.	CAP. (pF)	50 VOLT. PART No.	CAP. (pF)	50 VOLT. PART No.	CAP. (μF)	50 VOLT. PART No.
0.5	1-101-837-00	22	1-102-959-00	150	1-101-361-00	0.001	1-102-074-00
0.75	1-101-586-00	24	1-102-960-00	160	1-101-367-00	0.0012	1-102-118-00
1.0	1-102-934-00	27	1-102-961-00	180	1-102-976-00	0.0015	1-102-119-00
1.5	1-101-576-00	30	1-102-962-00	200	1-102-977-00	0.0018	1-102-120-00
2.0	1-102-935-00	33	1-102-963-00	220	1-102-978-00	0.0022	1-102-121-00
3	1-102-936-00	36	1-102-964-00	240	1-102-979-00	0.0027	1-102-122-00
4	1-102-937-00	39	1-102-965-00	270	1-102-980-00	0.0033	1-102-123-00
5	1-102-942-00	43	1-102-966-00	300	1-102-981-00	0.0039	1-102-124-00
6	1-102-943-00	47	1-101-880-00	330	1-102-820-00	0.0047	1-102-125-00
7	1-102-944-00	51	1-101-882-00	360	1-102-821-00	0.0056	1-102-126-00
8	1-102-945-00	56	1-101-884-00	390	1-102-822-00	0.0068	1-102-127-00
9	1-102-946-00	62	1-101-886-00	430	1-102-823-00	0.0082	1-102-128-00
10	1-102-947-00	68	1-101-888-00	470	1-102-824-00	0.01	1-102-129-00
11	1-102-948-00	75	1-101-890-00	510	1-101-059-00	0.022	1-101-005-00
12	1-102-949-00	82	1-102-971-00	560	1-102-115-00	0.047	1-101-006-00
13	1-102-950-00	91	1-102-972-00	680	1-102-116-00		
15	1-102-951-00	100	1-102-973-00	820	1-102-117-00		
16	1-102-952-00	110	1-102-815-00				
18	1-102-953-00	120	1-102-816-00				
20	1-102-958-00	130	1-101-081-00				

0.001μF = 1,000pF

CERAMIC (SEMICONDUCTOR) CAPACITORS (A)

→ : Use the high voltage rated one.

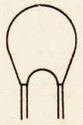
CAP. (μF)	RATING 25 VOLT. PART No.	50 VOLT. PART No.	CAP. (μF)	25 VOLT. PART No.	50 VOLT. PART No.
0.001	→	1-161-039-00	0.018	1-161-016-00	1-161-054-00
0.0012	→	1-161-040-00	0.022	1-161-017-00	1-161-055-00
0.0015		1-161-041-00	0.027	1-161-018-00	1-161-056-00
0.0018		1-161-042-00	0.033	1-161-019-00	1-161-057-00
0.0022		1-161-043-00	0.039	1-161-010-00	1-161-058-00
0.0027	→	1-161-044-00	0.047	1-161-021-00	1-161-059-00
0.0033	→	1-161-045-00	0.056	→	1-161-060-00
0.0039	→	1-161-046-00	0.068	→	1-161-061-00
0.0047	→	1-161-047-00	0.082	1-161-024-00	1-161-062-00
0.0056	→	1-161-048-00	0.1	1-161-025-00	1-161-063-00
0.0068	→	1-161-049-00			
0.0082	1-161-012-00	1-161-050-00			
0.01	1-161-013-00	1-161-051-00			
0.012	→	1-161-052-00			
0.015	1-161-015-00	1-161-053-00			

MYLAR CAPACITORS Ⓐ

Note: Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

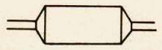
CAP. (μF)	RATING 50 VOLT. PART No.	100 VOLT. PART No.	200 VOLT. PART No.	CAP. (μF)	50 VOLT. PART No.	100 VOLT. PART No.	200 VOLT. PART No.	CAP. (μF)	50 VOLT. PART No.	100 VOLT. PART No.	200 VOLT. PART No.
0.001	1-108-227-00	1-108-365-00	1-108-409-00	0.01	1-108-239-00	1-108-377-00	1-108-421-00	0.1	1-108-251-00	1-108-389-00	1-108-433-00
0.0012	1-108-351-00	1-108-366-00	1-108-410-00	0.012	1-108-357-00	1-108-378-00	1-108-422-00	0.12	1-108-363-00	1-108-390-00	1-108-434-00
0.0015	1-108-228-00	1-108-367-00	1-108-411-00	0.015	1-108-240-00	1-108-379-00	1-108-423-00	0.15	1-108-252-00	1-108-391-00	1-108-435-00
0.0018	1-108-352-00	1-108-368-00	1-108-412-00	0.018	1-108-358-00	1-108-380-00	1-108-424-00	0.18	1-108-364-00	1-108-392-00	1-108-436-00
0.0022	1-108-230-00	1-108-369-00	1-108-413-00	0.022	1-108-242-00	1-108-381-00	1-108-425-00	0.22	1-108-254-00	1-108-393-00	1-108-437-00
0.0027	1-108-353-00	1-108-370-00	1-108-414-00	0.027	1-108-359-00	1-108-382-00	1-108-426-00	0.27	1-108-854-00	–	–
0.0033	1-108-232-00	1-108-371-00	1-108-415-00	0.033	1-108-244-00	1-108-383-00	1-108-427-00	0.33	1-108-855-00	–	–
0.0039	1-108-354-00	1-108-372-00	1-108-416-00	0.039	1-108-360-00	1-108-384-00	1-108-428-00	0.39	1-108-856-00	–	–
0.0047	1-108-234-00	1-108-373-00	1-108-417-00	0.047	1-108-246-00	1-108-385-00	1-108-429-00	0.47	1-108-857-00	–	–
0.0056	1-108-355-00	1-108-374-00	1-108-418-00	0.056	1-108-361-00	1-108-386-00	1-108-430-00				
0.0068	1-108-237-00	1-108-375-00	1-108-419-00	0.068	1-108-249-00	1-108-387-00	1-108-431-00				
0.0082	1-108-356-00	1-108-376-00	1-108-420-00	0.082	1-108-362-00	1-108-388-00	1-108-432-00				

TANTALUM CAPACITORS



CAP. (μF)	RATING 3.15 VOLT. PART No.	6.3 VOLT. PART No.	10 VOLT. PART No.	16 VOLT. PART No.	20 VOLT. PART No.	25 VOLT. PART No.	35 VOLT. PART No.
							→: Use the high voltage rated one.
0.01					→	→	1-131-396-00 Ⓑ
0.015						→	1-131-397-00 Ⓑ
0.022						→	1-131-398-00 Ⓑ
0.033						→	1-131-399-00 Ⓑ
0.047						→	1-131-400-00 Ⓑ
0.068					→	→	1-131-401-00 Ⓑ
0.1					→	→	1-131-402-00 Ⓑ
0.15					→	→	1-131-403-00 Ⓑ
0.22					→	→	1-131-404-00 Ⓑ
0.33					→	1-131-409-00 Ⓑ	1-131-405-00 Ⓑ
0.47	–	–	–	–	1-131-412-00 Ⓑ	→	1-131-406-00 Ⓑ
0.68	–	–	–	1-131-415-00 Ⓑ	→	1-131-410-00 Ⓑ	1-131-407-00 Ⓑ
1.0	–	–	1-131-418-00 Ⓑ	–	1-131-413-00 Ⓑ	→	1-131-408-00 Ⓑ
1.5	–	1-131-421-00 Ⓑ	–	1-131-416-00 Ⓑ	→	1-131-411-00 Ⓑ	1-131-348-00 Ⓑ
2.2	1-131-424-00 Ⓑ	–	1-131-419-00 Ⓑ	–	1-131-414-00 Ⓑ	1-131-355-00 Ⓑ	1-131-349-00 Ⓑ
3.3	–	1-131-422-00 Ⓑ	–	1-131-417-00 Ⓑ	1-131-362-00 Ⓑ	1-131-356-00 Ⓑ	1-131-350-00 Ⓑ
4.7	1-131-425-00 Ⓑ	–	1-131-420-00 Ⓑ	1-131-369-00 Ⓑ	1-131-363-00 Ⓑ	1-131-357-00 Ⓑ	1-131-351-00 Ⓒ
6.8	–	1-131-423-00 Ⓑ	1-131-376-00 Ⓑ	1-131-370-00 Ⓑ	1-131-364-00 Ⓑ	1-131-358-00 Ⓒ	1-131-352-00 Ⓒ
10	1-131-426-00 Ⓑ	1-131-383-00 Ⓑ	1-131-377-00 Ⓑ	1-131-371-00 Ⓑ	1-131-365-00 Ⓒ	1-131-359-00 Ⓒ	1-131-353-00 Ⓓ
15	1-131-390-00 Ⓑ	1-131-384-00 Ⓑ	1-131-378-00 Ⓑ	1-131-372-00 Ⓑ	1-131-366-00 Ⓒ	1-131-360-00 Ⓓ	–
22	1-131-391-00 Ⓑ	1-131-385-00 Ⓑ	1-131-379-00 Ⓒ	1-131-373-00 Ⓒ	1-131-367-00 Ⓓ		
33	1-131-392-00 Ⓑ	1-131-386-00 Ⓒ	1-131-380-00 Ⓒ	1-131-374-00 Ⓓ			
47	1-131-393-00 Ⓒ	1-131-387-00 Ⓒ	1-131-381-00 Ⓓ	–			
68	1-131-394-00 Ⓑ	1-131-388-00 Ⓒ	–	–			
100	1-131-395-00 Ⓓ	–	–	–			

TANTALUM CAPACITORS



CAP. (μF)	RATING 3 VOLT. PART No.	6.3 VOLT. PART No.	10 VOLT. PART No.	16 VOLT. PART No.	20 VOLT. PART No.	35 VOLT. PART No.
0.033						1-131-273-00 Ⓔ
0.047						1-131-274-00 Ⓔ
0.068						1-131-275-00 Ⓔ
0.1						1-131-276-00 Ⓓ
0.15						1-131-277-00 Ⓓ
0.22			–	–	1-131-262-00 Ⓓ	1-131-278-00 Ⓓ
0.33			–	–	1-131-263-00 Ⓓ	1-131-279-00 Ⓓ
0.47			1-131-169-00 Ⓓ	–	1-131-264-00 Ⓓ	1-131-280-00 Ⓓ
0.68			–	1-131-258-00 Ⓓ	1-131-265-00 Ⓓ	1-131-281-00 Ⓓ
1.0			1-131-254-00 Ⓓ	–	1-131-266-00 Ⓓ	1-131-282-00 Ⓓ
1.5		1-131-250-00 Ⓓ	–	–	1-131-267-00 Ⓓ	1-131-283-00 Ⓔ
2.2		–	–	1-131-259-00 Ⓓ	1-131-268-00 Ⓓ	1-131-284-00 Ⓔ
3.3		–	1-131-255-00 Ⓓ	–	1-131-269-00 Ⓓ	–
4.7		1-131-251-00 Ⓔ	1-131-171-00 Ⓓ	–	1-131-270-00 Ⓓ	–
6.8		–	–	1-131-260-00 Ⓓ	1-131-271-00 Ⓔ	–
10	–	–	1-131-256-00 Ⓓ	–	1-131-272-00 Ⓔ	–
15	–	1-131-252-00 Ⓓ	–	1-131-261-00 Ⓔ		
22	–	–	1-131-257-00 Ⓔ	–		
33	1-131-176-00 Ⓓ	1-131-253-00 Ⓔ	1-131-173-00 Ⓒ	–		
47	1-131-288-00 Ⓕ	1-131-174-00 Ⓓ	–	–		
100	1-131-177-00 Ⓓ					

1/4 WATT CARBON RESISTORS Ⓐ

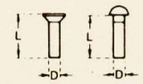
Note: Circled letter Ⓐ is applicable to European models only.

Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.
1.0	1-246-401-00	10	1-246-425-00	100	1-246-449-00	1.0k	1-246-473-00	10k	1-246-497-00	100k	1-246-521-00	1.0M	1-246-545-00
1.1	1-246-402-00	11	1-246-426-00	110	1-246-450-00	1.1k	1-246-474-00	11k	1-246-498-00	110k	1-246-522-00	1.1M	1-210-814-00
1.2	1-246-403-00	12	1-246-427-00	120	1-246-451-00	1.2k	1-246-475-00	12k	1-246-499-00	120k	1-246-523-00	1.2M	1-210-815-00
1.3	1-246-404-00	13	1-246-428-00	130	1-246-452-00	1.3k	1-246-576-00	13k	1-246-500-00	130k	1-246-524-00	1.3M	1-210-816-00
1.5	1-246-405-00	15	1-246-429-00	150	1-246-453-00	1.5k	1-246-577-00	15k	1-246-501-00	150k	1-246-525-00	1.5M	1-210-817-00
1.6	1-246-406-00	16	1-246-430-00	160	1-246-454-00	1.6k	1-246-578-00	16k	1-246-502-00	160k	1-246-526-00	1.6M	1-210-818-00
1.8	1-246-407-00	18	1-246-431-00	180	1-246-455-00	1.8k	1-246-579-00	18k	1-246-503-00	180k	1-246-527-00	1.8M	1-210-819-00
2.0	1-246-408-00	20	1-246-432-00	200	1-246-456-00	2.0k	1-246-580-00	20k	1-246-504-00	200k	1-246-528-00	2.0M	1-210-820-00
2.2	1-246-409-00	22	1-246-433-00	220	1-246-457-00	2.2k	1-246-581-00	22k	1-246-505-00	220k	1-246-529-00	2.2M	1-210-821-00
2.4	1-246-410-00	24	1-246-434-00	240	1-246-458-00	2.4k	1-246-582-00	24k	1-246-506-00	240k	1-246-530-00	2.4M	1-244-754-00
2.7	1-246-411-00	27	1-246-435-00	270	1-246-459-00	2.7k	1-246-583-00	27k	1-246-507-00	270k	1-246-531-00	2.7M	1-244-755-00
3.0	1-246-412-00	30	1-246-436-00	300	1-246-460-00	3.0k	1-246-584-00	30k	1-246-508-00	300k	1-246-532-00	3.0M	1-244-756-00
3.3	1-246-413-00	33	1-246-437-00	330	1-246-461-00	3.3k	1-246-585-00	33k	1-246-509-00	330k	1-246-533-00	3.3M	1-244-757-00
3.6	1-246-414-00	36	1-246-438-00	360	1-246-462-00	3.6k	1-246-586-00	36k	1-246-510-00	360k	1-246-534-00	3.6M	1-244-758-00
3.9	1-246-415-00	39	1-246-439-00	390	1-246-463-00	3.9k	1-246-587-00	39k	1-246-511-00	390k	1-246-535-00	3.9M	1-244-759-00
4.3	1-246-416-00	43	1-246-440-00	430	1-246-464-00	4.3k	1-246-488-00	43k	1-246-512-00	430k	1-246-536-00	4.3M	1-244-760-00
4.7	1-246-417-00	47	1-246-441-00	470	1-246-465-00	4.7k	1-246-489-00	47k	1-246-513-00	470k	1-246-537-00	4.7M	1-244-761-00
5.1	1-246-418-00	51	1-246-442-00	510	1-246-466-00	5.1k	1-246-490-00	51k	1-246-514-00	510k	1-246-538-00	5.1M	1-244-762-00
5.6	1-246-419-00	56	1-246-443-00	560	1-246-467-00	5.6k	1-246-491-00	56k	1-246-515-00	560k	1-246-539-00		
6.2	1-246-420-00	62	1-246-444-00	620	1-246-468-00	6.2k	1-246-492-00	62k	1-246-516-00	620k	1-246-540-00		
6.8	1-246-421-00	68	1-246-445-00	680	1-246-469-00	6.8k	1-246-493-00	68k	1-246-517-00	680k	1-246-541-00		
7.5	1-246-422-00	75	1-246-446-00	750	1-246-470-00	7.5k	1-246-494-00	75k	1-246-518-00	750k	1-246-542-00		
8.2	1-246-423-00	82	1-246-447-00	820	1-246-471-00	8.2k	1-246-495-00	82k	1-246-519-00	820k	1-246-543-00		
9.1	1-246-424-00	91	1-246-448-00	910	1-246-472-00	9.1k	1-246-496-00	91k	1-246-520-00	910k	1-246-544-00		

HARDWARE NOMENCLATURE

Screw:

– P 3 x 10
- L: Length in mm
- D: Diameter in mm
- Type of head
- Indicated slotted-head only. Unless otherwise indicated, it means cross-recessed head (Phillips type).



Nut, Washer, Retaining ring:

N 3
- Diameter of usable screw or shaft
- Reference designation

Reference Designation	Shape	Description	Remarks
		SCREWS	
P		pan-head screw	binding-head (B) screw for replacement
PWH		pan-head screw with washer face	binding-head (B) screw and flat washer for replacement
PS PSP		pan-head screw with spring washer	binding-head (B) screw and spring washer for replacement
PSW PSPW		pan-head screw with spring and flat washers	binding-head (B) screw and spring and flat washers for replacement
R		round-head screw	binding-head (B) screw for replacement
K		flat-countersunk-head screw	
RK		oval-countersunk-head screw	
B		binding-head screw	
T		truss-head screw	binding-head (B) screw for replacement
F		flat-fillister-head screw	
RF		fillister-head screw	
BV		braizer-head screw	

Reference Designation	Shape	Description	Remarks
		SELF-TAPPING SCREWS	
TA		self-tapping screw	ex: TA, P 3 x 10
PTP		pan-head self-tapping screw	binding-head self-tapping (TA, B) screw for replacement
PTPWH		pan-head self-tapping screw with washer face	binding-head self tapping (TA, B) screw and flat washer for replacement
PTTWH		pan-head thread-rolling screw with washer face	binding-head (B) screw and flat washer for replacement
		SET SCREWS	
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2.6 x 4, hexagon socket
		NUT	
N		nut	
		WASHERS	
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
		RETAINING RINGS	
E		retaining ring	
G		grip-type retaining ring	

Sony Corporation

9-958-732-11

80B02117-1
Printed in Japan

FM/AM PROGRAM TUNER

ST-636

US Model
Canadian Model
AEP Model
E Model
UK Model
SCN Model

SUPPLEMENT

File this supplement with the service manual.

CIRCUIT DESCRIPTION

No. 1
February, 1980

SONY®
SERVICE MANUAL

CIRCUIT DESCRIPTION

This unit is an FM stereo/FM-AM tuner and is equipped with a built-in FM/AM quartz-lock synthesizer. As a microcomputer is being used, this unit has the functions of automatic tuning, frequency memorization, digital display of the received signal frequency, etc.

1. During POWER ON

When the power is switched on, the signal that was being received immediately before the power was last switched off will be received and the frequency of that signal will be displayed. This has been made possible by the back-up battery power supplied to the RAM (IC506).

2. The LAST-BAND Display

If the band indicated is FM when the power is switched on and if the AM button is pushed at this time, AM frequency that was last being received before the power switch has been turned off will be received and displayed.

3. Back-up Power Supply and POWER ON

The two functions above are made possible by the back-up battery supplied to the memory IC, which stores the data. Therefore, if the back-up battery is disconnected even once before the main power is turned on, then these data will not be memorized. In this case, when the power is switched on again the upper FM band edge frequency will be received, displayed, and the mode turns into AUTO at the same time. The MEMORY display for both AM and FM will be at the upper band edges, and the markers will be one for each FM and AM band.

4. Tuning without a Signal

Consider that the following setting has been made.

AUTO button: OFF
MODE button: STEREO

In this condition, the received frequency varies if the TUNING knob is turned clockwise or counter - clockwise.

1) High speed tuning
The tuning frequency decreases when the TUNING knob is turned counterclockwise (DOWN direction) by 45° (until the knob stops) and finally stops when the lower band-edge is reached. When the knob is turned clockwise (UP direction) the frequency increases towards the upper band-edge. When released, the knob returns to its central position due to a spring.

2) Slow speed tuning
When the TUNING knob is returned to a position within the range marked by the dotted line in Fig. 1-1, the tuning frequency changes slowly.

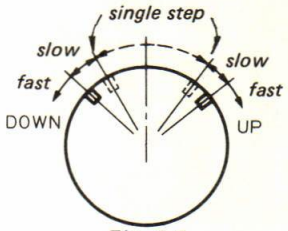


Fig. 1-1.

3) Single step tuning
The tuning frequency changes one step when the TUNING knob is turned to the click-stop point (15° from the center) in either left or right direction. The difference of this step is:
FM: 0.1MHz (US, Canadian model)
0.05MHz (AEP, UK, SCN, E model)
AM: 1kHz
The frequency will not change more than one step even if the knob is held in that position continuously.

5. Digital Display

The receiving frequency is displayed digitally as follows.

FM: □□.□0 MHz (US, Canadian model)
FM: □□.□0 MHz, □□.□5 MHz (AEP, UK, E, SCN model)
AM: □□□□.0 kHz

6. Automatic Tuning

When the AUTO button is pressed, the AUTO indicator turns ON to indicate the AUTO tuning condition. Next, automatic scanning of the tuning frequency begins if the tuning knob is turned slightly in either left or right direction.

In either the AM or the FM mode, the automatic scanning is continued up to the upper or lower band edge and then the scanning direction is reversed automatically. This scanning continues when there is no signal until the AUTO state is released by pressing the AUTO button again. Also, if the antenna is connected and a signal of sufficient strength is present at the receiver input, then the automatic tuning stops as soon as a sufficiently strong signal is received.

In the AM mode, this automatic scanning stops at a receiving frequency which is an integral multiple of 9kHz after a sufficiently strong signal is received. (9kHz or 10kHz can be selected for US, Canadian, E model.)

7. PROGRAMMED TUNING

This set can memorize the frequencies of five AM stations and five FM stations (that is, a total of ten stations).

1) Memory method
To memorize a station, receive the station and push the tuning knob, whereby the PUSH MEMORY display lights up. Then, turn one of the PROGRAMMED TUNING buttons 1 – 5 (FM or AM, according to the mode) then the frequency of that station will be memorized in the corresponding memory location.

Note:

- The memory display stays on only for about 5 to 6 seconds and goes off automatically. Memorize the station during this period. Only one memory is possible at this time.
- If a PROGRAMMED TUNING button for AM is pressed when the signal being received is FM or vice versa, then that station will not be memorized and the memory display turns off as soon as the button is pressed.

When the memorization has been completed, the memory display will light red.

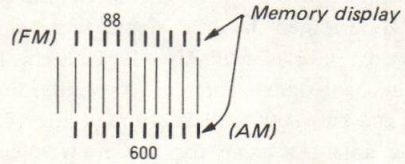


Fig. 1-2.

2) Sequency of memorization
This unit memorizes the frequencies in the order of increasing frequencies. For example, consider that 100MHz is first memorized by pressing PROGRAMMED TUNING button 1 and then 93MHz is memorized by pressing PROGRAMMED TUNING button 2. If button 4 is pressed thereafter, then the 93MHz signal will be received when button 1 is pushed and the 100 MHz signal will be received when button 2 is pressed.

3) Reading out
The memorized frequencies are read out by simply pressing the memory buttons 1 – 5. There is no need to press the band selector buttons.
For example, assume that button 1 of FM is memorizing 93MHz and button 5 of AM is memorizing 600kHz. If we assume that button 5 of AM was lately memorized, then the tuning indicator and the memory indicator will be around 600kHz with the frequency of 600kHz being displayed digitally. If button 1 of FM is now pressed, the tuning indicator moves to 93MHz, the frequency of 93MHz is displayed in the digital display, and the band is automatically switched to FM. Thus, the band switching from AM to FM and vice versa are made automatically when these ten memory buttons are pressed.

8. PLL Quartz Lock Synthesizer

1) The loop determining the local oscillator frequency:
This loop consists of IC501 (frequency divider for FM) and IC502 (PLL system) the input of which is the output from the local oscillator, and the transistors Q501 – 504 which provide the dc voltage to drive the local oscillator.

2) IC501 (Frequency divider: FM only)
This IC divides the frequency of the output from the local oscillator by a factor of 1/8 and feeds the resulting signal to IC502. This IC also contains the circuits for shifting the frequency by 25kHz and 50kHz which allow for perfect tuning by compensating for the variations in the ceramic filters. It is possible to change the tuning frequency in steps of 50kHz so as to meet the requirements in Europe, by the simultaneous use of IC502 (PLL) and IC503 (microcomputer).
The FM/AM switching is made by changing the voltage at terminal ⑦ to "H" (high level) for FM and "L" (low level) for AM. For AM signals, this IC is simply used as a gate.

3) IC502 (PLL)
This IC502 consists of a programmable counter, a phase comparator, a buffer, a reference-frequency divider circuit, latches, decoders, etc. The frequency divided signal from IC501 (during FM reception) is supplied to the programmable counter to further divide its frequency, and the phase difference between this signal and the reference frequency signal is detected in the phase comparator. The output of the phase comparator is passed through a low pass filter. The microcomputer controls the factor of division at the programmable counter and these control signals from the microcomputer are supplied to terminals ④ – ⑧.
The signal at terminal ④ is the LOAD signal. The data at terminals ⑤ –⑧ will be read into the latches only when this LOAD signal is HIGH. This number read into the latches is used for determining the factor of division carried out by the programmable frequency divider. The data input via the terminals ⑤ –⑧ are updated only when the tuning frequency is changed, and hence the signals at these terminals will be at the low level at all other times.

● Reference frequency
The crystal connected at terminals ② and ③ oscillates 9MHz frequency. This signal is converted into either a 12.5kHz or a 1kHz signal depending on the signal from the microcomputer and is fed to the phase comparator.

● Phase comparator and buffer
This compares the phases of the signals from the reference oscillator and the local oscillator after frequency division. The output of the buffer will be at the LOW level only when the frequency divided local oscillator signal is delayed with respect to the reference signal. The buffer output will be at the HIGH level while the local

oscillator signal is advanced in phase compared to the signal from the reference oscillator.

4) Q501 – Q504 (Active low pass filter)
The output from the buffer (terminals ⑭, ⑮) is supplied to the low pass filter which converts the digital buffer output into an analog signal. This filtered signal from the low pass filter is supplied to the variable capacitance diode of the local oscillator thereby controlling the frequency of the local oscillator.

5) Frequency division data from IC503 (Microcomputer)
The data signals from the microcomputer at terminals ④ to ⑧ of IC502 are normally at the LOW level. When checking this, it is suggested that the set be tuned to a band edge and the measurement be made while keeping the tuning knob rotated in the direction in which the frequency no longer changes (that is, in the DOWN direction when the set is tuned to the lower band edge). The data output signals consist of LOAD signal and data signals. Further, the data signal is consisted of address signals and data set signals and they are sent alternately in turns. Fig. 1-3 shows the timing of these signals.

The waveforms as shown in Fig. 1-3 can be obtained on the oscilloscope (storage oscilloscope or a dual beam oscilloscope). As is clear from this figure, the signals consist of the address signals followed by the data set signals sent alternately. Since the data is read only when the LOAD signal is HIGH, the address signal for the first digit is read in first. This data is then supplied to the address decoder.
The data set signal for the first digit is read in when the LOAD signal rises "HIGH" again. This signal will then be read into the latch whose address is determined by the signal from the address decoder (this signal was read in earlier). Thus the data set signals for the 10's digits, the 100's digit and the 1000's digit are read into the latches. The data set signal for the mode selection is supplied in a similar way because this data determines the reference signal as follows. (The data is given by the three signals A, B, and C.)

Mode data from the microcomputer (mode setting)			Reference frequency (kHz)	
C	B	A		
0	0	0	1	AM
1	0	0	12.5	FM
1	0	1	12.5	FM

Table 1-1.

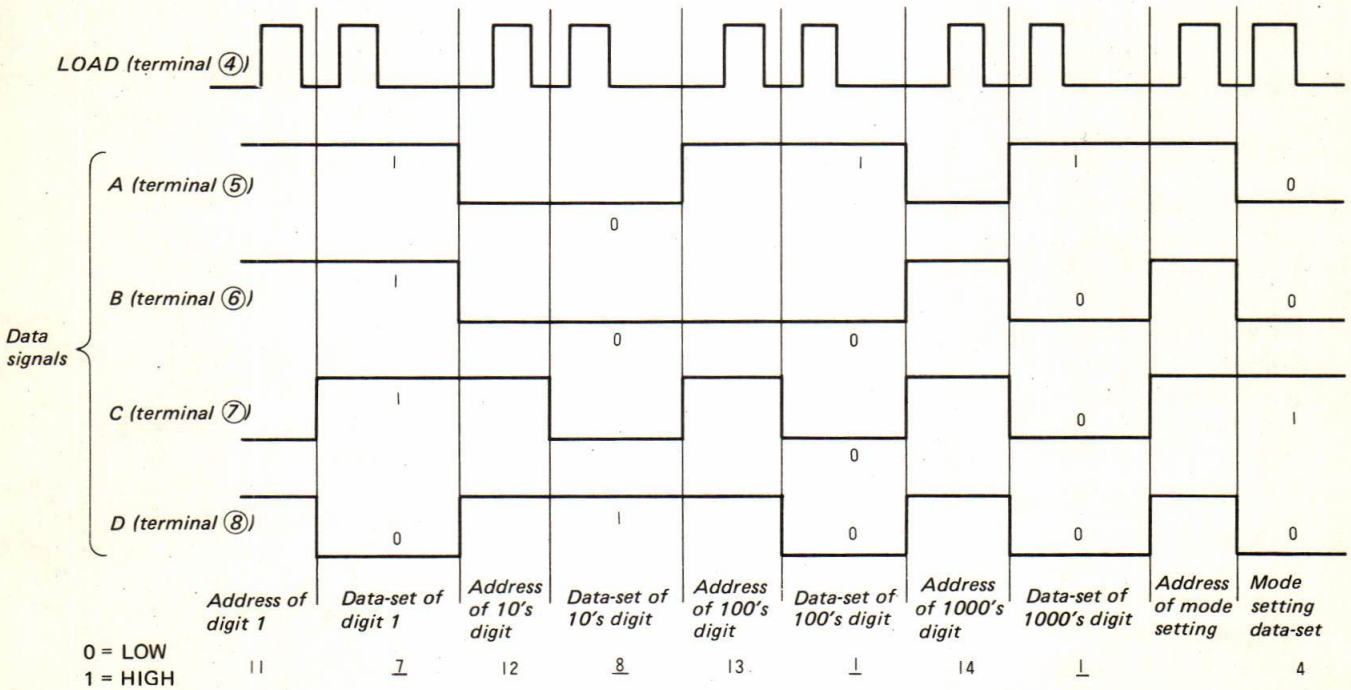


Fig. 1-3.

The following information is provided by the signals shown in Fig. 1-3 (the data signals indicate the factor of frequency division).

Factor of frequency division:
1187 (this is actually the local oscillator frequency)

Reference frequency: 12.5 kHz

In this example, the local oscillator signal is first frequency divided by a factor of 1/8 in IC501 and then again by a factor of 1/793 in IC502 and then input to the phase comparator. Since the reference frequency is 12.5kHz we have:

$$\frac{fx}{8xN} = 12.5\text{kHz} \ldots\ldots \text{(Equ. 1)}$$

where fx: local oscillator frequency
N: factor of frequency division
Received signal frequency-local oscillator frequency: 10.7MHz

If the condition above is satisfied, then the data signals from the microcomputer are correct.

9. Fine Adjustment of the FM IF Frequency

The frequency of the ceramic filter depends upon the rank, and hence any variations in this frequency are corrected by IC501, 502, and 503. For example, if a ceramic filter with an orange code mark (10.725MHz) is used, this frequency is higher than that of the required 10.7MHz by 25kHz. In other words, in order to reduce the IF frequency to 10.725 MHz it is necessary to increase the local oscillator frequency by 25kHz.

Local oscillator frequency	–	Received signal frequency	=	IF frequency
(118.7MHz)	–	(108MHz)	=	(10.7 MHz)
(118.725MHz)	–	(108MHz)	=	(10.725 MHz)

By turning on the 25kHz shift circuit of IC501 (terminal ③), the local oscillator frequency can be increased by 25kHz. This is actually done by adding the frequency division output from the terminal ⑩ or ⑪ of IC502. The frequency division output (terminals ⑩ and ⑪) of IC502 function as follows.

Data signal from the microcomputer (Mode setting data-set)			Reference frequency (kHz)	Freq. divided output from the programmable counter	
C	B	A		Terminal ⑩	Terminal ⑪
0	0	0	1	ON	OFF
1	0	0	12.5	OFF	ON
1	0	1	12.5	ON	ON

OFF .... The frequency division output will not be present. (HIGH level)
ON ..... The output will be available.

Table 1-2.

Therefore, the pattern connections will be different depending on the color code marking on the ceramic filter.

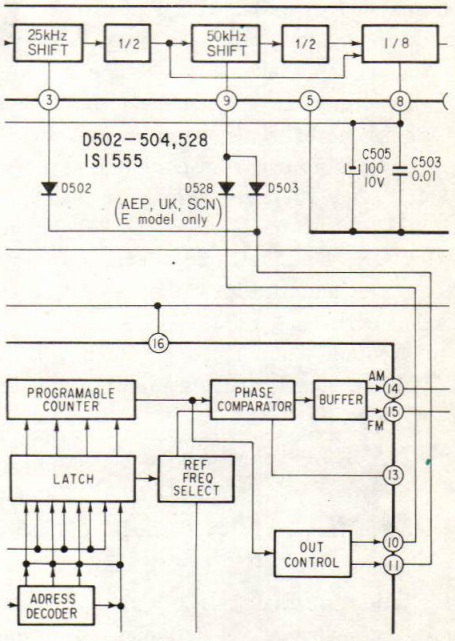


Fig. 1-4.

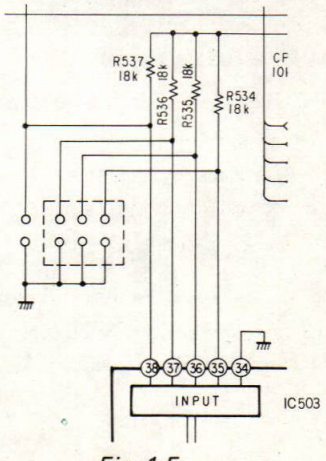


Fig. 1-5

Circuit connections dependent upon the ceramic filter color code

Color code on the ceramic filter (MHz)	D502	D503	Jumper wire connections (to terminal (38) of IC503)
yellow (10.775)	○	○	○ (0)
white (10.75)	×	○	○ (0)
orange (10.725)	○	×	○ (0)
red (10.7)	×	×	○ (0)
blue (10.675)	○	○	× (1)
black (10.65)	×	○	× (1)
green (10.625)	○	×	× (1)

○: Not present ×: Present

Table 1-3.

The jumper wire connections indicated in Table 1-3 are for changing the terminal (38) of IC503 (microcomputer) to the "0" or the "1" level. This changes the frequency division factor (N) of the programmable counter IC502.

By changing the terminal (38) of IC503 to "1", the factor of frequency division changes to (N-1), while this factor is at N when the terminal is at "0" level. Taking the example when a blue color coded ceramic filter is used, we note that its frequency is 10.675MHz and therefore the local oscillator frequency will have to be decreased by 25kHz. If D502, D503 turn ON, the 25kHz and 50kHz shift circuits of IC501 operate and the local oscillator frequency is effectively increased by 75kHz. Therefore the local oscillator frequency will be 118.775MHz when receiving a 108MHz signal, that is the intermediate frequency will be:

$$118.775\text{MHz} - 108\text{MHz} = 10.775\text{MHz}$$

Therefore, it is sufficient now if we reduce the local oscillator frequency by 0.1MHz so as to obtain the IF frequency of 10.675MHz.

This reduction of 0.1MHz in the local oscillator frequency is achieved by reducing the frequency division factor of the programmable counter to N-1 by changing the terminal (38) of IC503 to '1'. Therefore:

$$118.7\text{MHz} - 108\text{MHz} = 10.7\text{MHz}$$

$$118.675\text{MHz} - 108\text{MHz} = 10.675\text{MHz}$$

Equ. 1 easily explains why the local oscillator frequency decreases by 0.1MHz when the frequency division factor is decreased by 1.

$$\frac{fx}{8\times(N-1)} = 12.5\text{kHz}$$

fx: local oscillator frequency

Let us check whether fx changes from 118.7 to 118.6MHz when N is descreased by 1.

$$\frac{fx}{8\times(1187-1)} = 12.5\text{kHz}$$

$$fx = 8\times 1186\times 12.5\text{kHz} = 118{,}600\text{kHz} = 118.6\text{MHz}$$

Now because of the 75kHz shift by IC501 we have:

$$118{,}600\text{kHz} + 75\text{kHz} = 118{,}675\text{kHz} = 118.675\text{MHz}$$

Therefore:

$$118.675\text{MHz} - 108\text{MHz} = 10.675\text{MHz}$$

This is equal to the frequency of the blue color coded ceramic filter. These calculations are simplified in the following manner:

When the 25kHz shift is ON:
Division factor = 8N + 2

When the 50kHz shift is ON:
Division factor = 8N + 4

When both 25kHz and 50kHz shifts are ON:
Division factor = 8N + 6

Substituting this in the earlier equation:

$$\frac{fx}{8\times(N+6)} = 12.5\text{kHz}$$

$$\frac{fx}{8\times(1187-1)+6} = 12.5\text{kHz}$$

This is −1 when terminal (38) of IC503 is 1,
This is 0 when terminal (38) of IC503 is 0.

$$\frac{fx}{8\times 1186+6} = 12.5\text{kHz}$$

$$fx = (8\times 1186+6)\times 12.5\text{kHz}$$
$$= 118.675\text{MHz}: \text{the local oscillator frequency}$$

Changing the division factor to N-1 or shifting the frequency by 25kHz results in a change in the frequency of the signal input to the phase comparator. Therefore, this difference is converted into a voltage which is applied to the variable capacitance diode thereby controlling the local oscillator frequency.

- **Frequency Change in Steps of 50kHz (AEP, UK, SCN, E model).**

To meet the requirements in Europe, the tuning frequency can be changed in steps of 50kHz.

As can be understood from Table 1-2, there will be a frequency division output at terminal (10) of IC502 according to the mode setting data set signal A.

If terminal (10) of IC501 is connected with the 50kHz shift circuit, the local oscillator frequency will shift by 50kHz when terminal (10) is ON. (Remains the same when it is OFF.)

Following the next procedure, the tuning frequency will be changed in steps of 50kHz.

The frequency division (N) is changed to (N+1), (N+2), (N+3) ... . By changing the mode setting data set signal A to either "0" or "1", the 50kHz shift circuit is turned "ON" or "OFF".

Frequency division	N (1007)		N+1 (1008)		N+2 (1009)		N+3 (1010)
Mode setting date set signal	0	1	0	1	0	1	0
Frequency (MHz)	90.00	90.05	90.10	90.15	90.20	90.25	90.30

When the frequency division (N) is changed to (N+1), (N+2) .. , then the frequency will increase in steps of 100kHz. And it will increase in steps of 50kHz when the 50kHz shift circuit is on.

10. FM/AM Band Selection (See Fig. 1-6.)

The band selection FM/AM is controlled by the microcomputer output at terminal ⑨ of IC503.

This signal will be at the "H" level for FM and at the "L" level for AM. Q505, 506, 780 – 783 are used for switching over FM/AM and MHz/kHz displays.

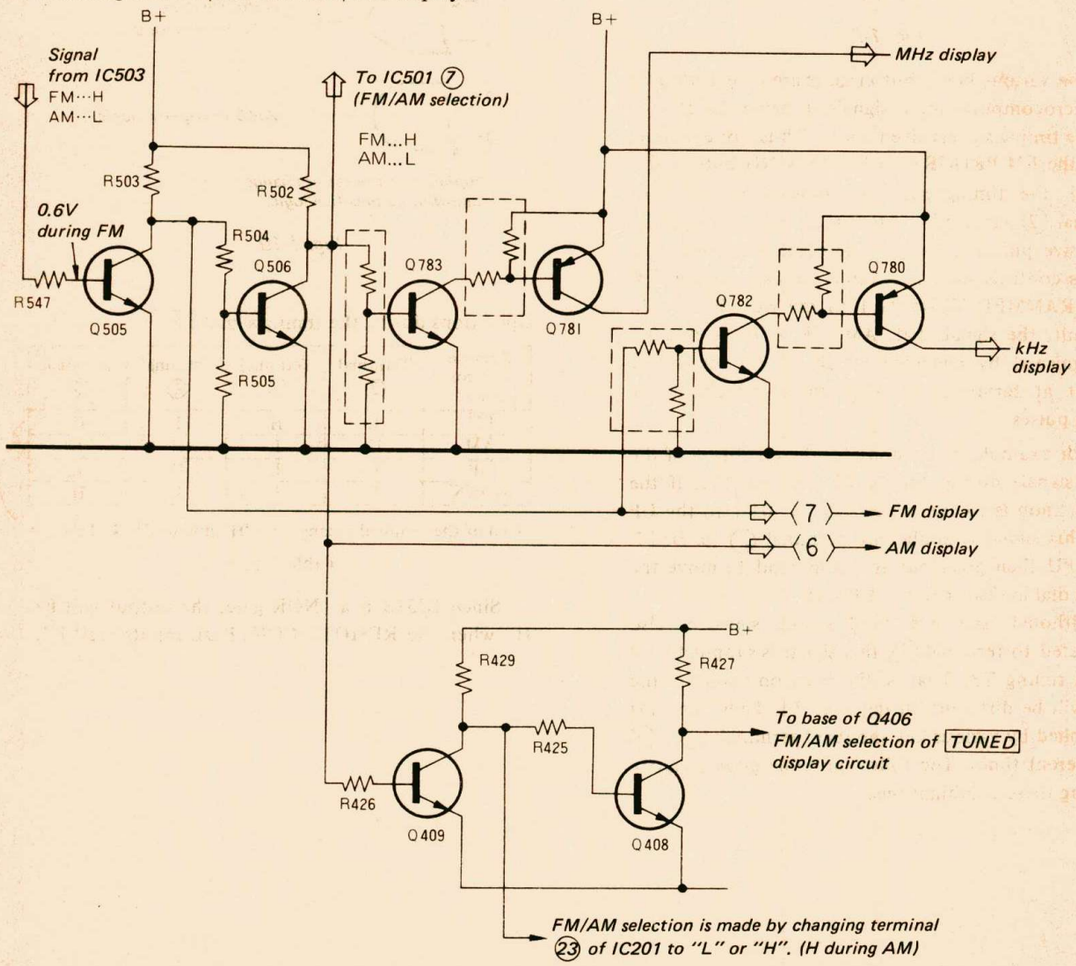


Fig. 1-6.

11. AUTO STOP Circuit (See Fig. 1-7.)

The muting signal in either bands AM/FM from IC201 is supplied to the base of Q404. An "H" level signal during FM or an "L" level signal during AM is fed to the base of Q406 via R422. In the FM mode, therefore, Q406 will be ON because of the "H" level signal fed to its base. When the band is being scanned in the FM AUTO TUNING mode Q404, 405 will turn on due to the FM muting signal, by which TUNED (D405) lights up. When Q404 – 406 turn ON, Q407 turns off and hence the terminal ㊶ of IC503 changes to the "H" level which stops the operation of the microcomputer.

The AM muting signal is supplied in the same way as in FM mode to the base of Q404. However, this AM muting signal cannot be used alone for operating the auto-stop function because the band of this signal varies depending on the strength of the incoming radio signal, thereby causing the auto-stop function to operate inaccurately. Therefore, the signal components are detected in a narrow band circuit before supplying them to the base and are then supplied to the base to turn Q406 ON or OFF.

Since Q405 will be off when the FM/AM signal is not present at its base, Q407 will turn on due to the base current drive that is provided in this condition. This, in turn, presents a LOW level signal to terminal ㊶ of IC503. Since this current is very small it will not be sufficient to light up D405.

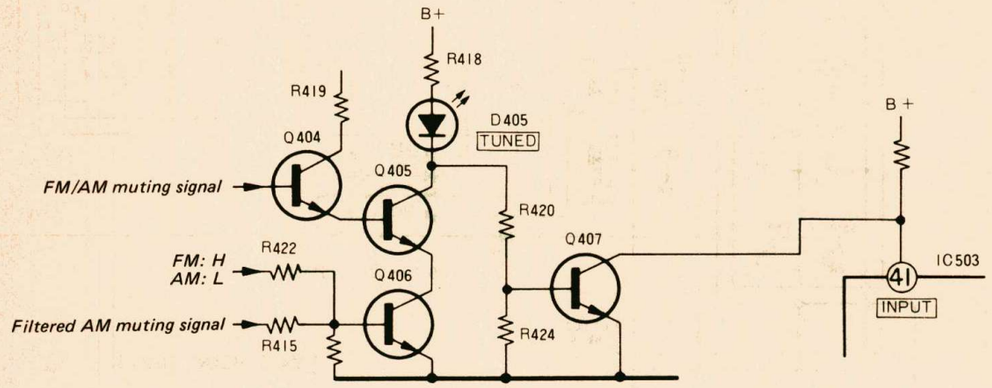


Fig. 1-7.

12. Key Inputs

The following is the circuit diagram of this section.

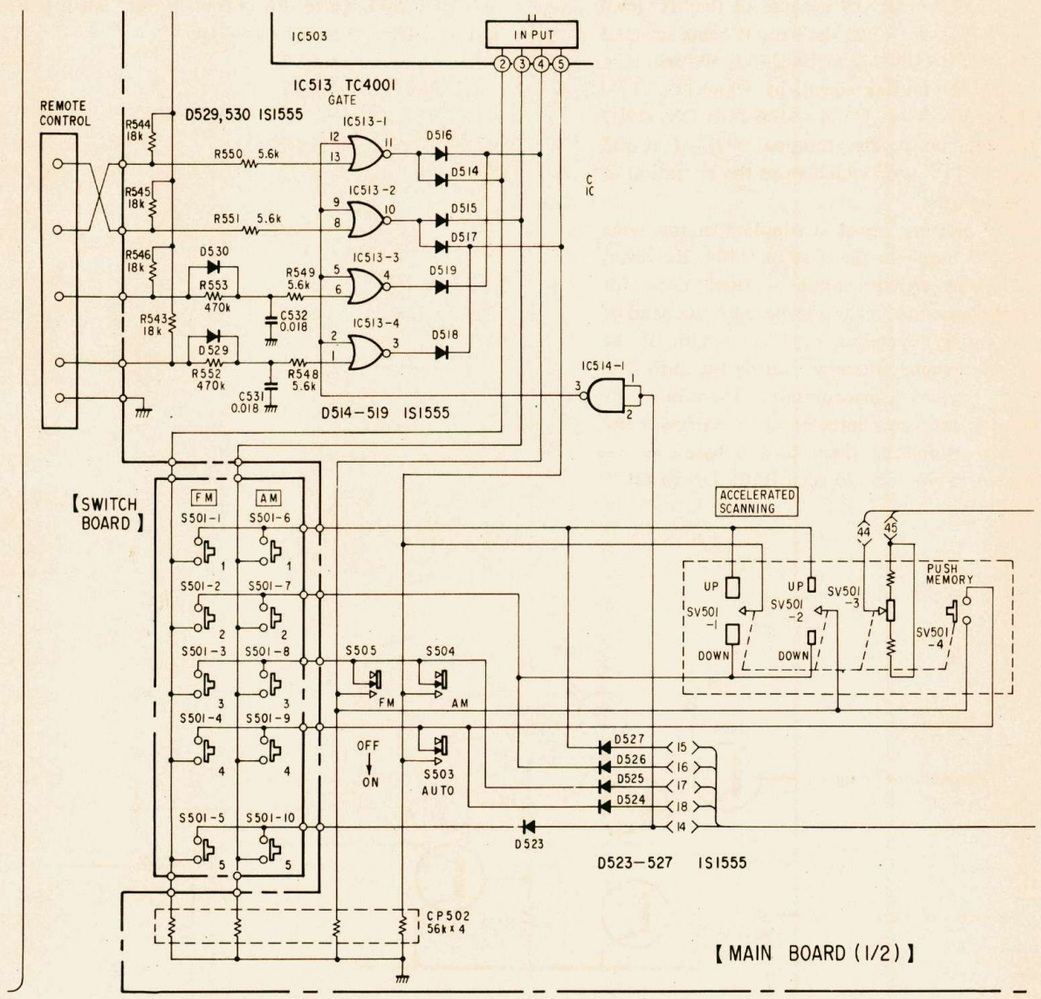


Fig. 1-8.

Terminals ② – ⑤ of IC503 are the input terminals for these signals. These signals are used for controlling the FM/AM band selection, memory operation, etc. The signals from IC512 are given to D523 – 527. These waveforms are shown below.

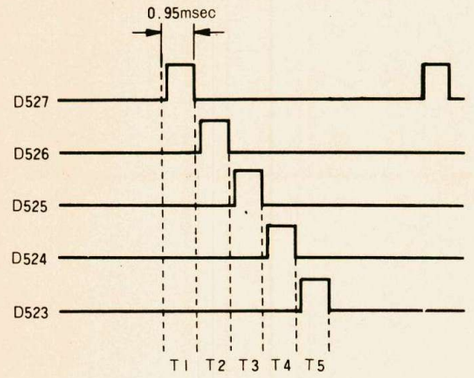


Fig. 1-9.

The various key input circuits are constituted by the microcomputer input signals at terminals ② – ⑤ and the timing signals given above. Thus, for example, when the FM PROGRAMMED TUNING button 1 is pushed, the timing pulse T1 appears at the input terminal ② via D527. After receiving three similar successive pulses (T1), the microcomputer starts the various controls such as sending the data for the FM PROGRAMMED TUNING 1 to the PLL IC, etc. In this unit, the signals FM, AM, UP, DOWN, etc., are distinguished by checking which of the inputs are present at terminals ② – ⑤ during which of the timing pulses.

For example, if we consider the condition of the input signals during timing T1, we find that if the tuning knob is rotated to switch SV501-1 to the UP side, this signal is applied to terminal ⑤ via D527. The CPU then gives out the command to move the tuning dial indicator to the UP side.

Although the AM band switch signal is also connected to terminal ⑤, this signal is supplied only during timing T3. That is, the decision made by the CPU will be different during time T1. Thus, the CPU is supplied by various key inputs at terminals ② – ⑤ at different times. The following table gives a matrix showing these combinations.

INPUT \ T	T1 (D527)	T2 (D526)	T3 (D525)	T4 (D524)	T5 (D523)
Terminal ②	FM1	FM2	FM3	FM4	FM5
Terminal ③	AM1	AM2	AM3	AM4	AM5
Terminal ④	UP2	DOWN2	FM	MEMORY	
Terminal ⑤	UP1	DOWN1	AM	AUTO	

UP 1, DOWN 1: Single step control
Up 2, DOWN 2: Accelerated scanning control

Table 1-4.

13. Remote Control Terminals

The complement of the signal T5 ($\overline{T5}$) is supplied to IC513. IC513 is an NOR gate, but this can be considered as an AND gate as shown below.

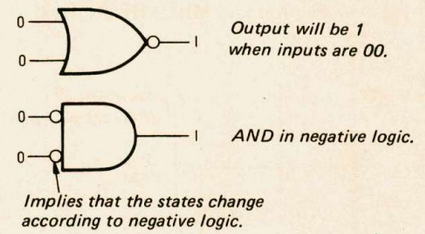


Fig. 1-10.

Operations during the timing signal $\overline{T5}$

Remote control input	Terminal ②	Terminal ③	Terminal ④	Terminal ⑤
$\overline{FM}$	L	H	L	H
$\overline{AM}$	H	L	H	L
$\overline{UP}$	L	L	H	L
$\overline{DOWN}$	L	L	L	H

Two of the terminals changes to "H" due to D514–D517.

Table 1-5.

Since IC513 is an NOR gate, the output will be "H" when the REMOTE CONTROL inputs are "L".

14. Accelerated Tuning

If the tuning knob is turned in the DOWN direction, the receiving frequency decreases by one step, which is 0.1MHz in the FM band (or also 0.05MHz for AEP, UK, SCN, E model). This operation will be described below. (Refer to the circuit diagram given below.)

for step changes in tuning, SV501-1 moves to (A), SV501-2 to (B), and SV501-3 to (C). In this case only SV501-1 turns ON. IC505 is connected as an astable multivibrator circuit oscillating at a low frequency. The output of this oscillator is input to terminal (40) of IC503 where it controls the speed of accelerated tuning.

If the tuning knob is rotated further, SV501-2 turns ON and SV501-3 is connected to the resistor side. This changes the effective resistance in the circuit of the multivibrator and its frequency becomes much higher. This increased frequency is supplied to terminal (40) and increases the tuning speed.

The tuning speed will be faster when the tuning knob is turned further.

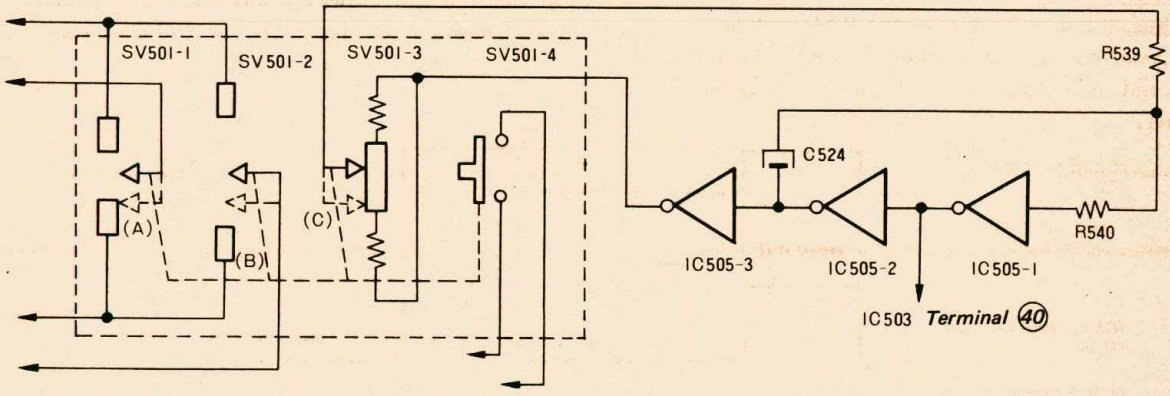


Fig. 1-11.

15. RAM (IC506)

The FM/AM preset data, last channel data, last band data, dial flourescent panel display data, data displayed in the frequency counter, etc., in this set are memorized in a Random Access Memory (RAM). The RAM used here has a 256 word × 4 bit configuration of which the locations 0 – 127 are used for the preset data, last band data, last channel data, etc., and the locations 128 – 255 are used for the dial flourescent panel display data, and the frequency counter display data. This arrangement of data in the memory is shown in the table below.

Location	Address		Data	
	IC507 A7~A4	IC509 A3~A0	D4 D3 D2 D1	
0 to 127	0000 to 0111	0000 to 1111	0 0 0 1 to 0 1 0 1	Last channel, last band, etc.
128 to 256	1000 to 1111	0000 to 1111	0 0 0 0 to 0 0 0 1	Dial flourescent panel display, etc.

Table 1-6.

1) Reading out the data from the RAM

The data comes out when some signals in IC506 are in the following conditions.

- CE2 . . . . . H level
- R/$\overline{W}$ . . . . . H level (Read)
- OD . . . . . L level
- $\overline{CE1}$ . . . . . L level

When the conditions given above are satisfied, the data in the different locations are supplied when the address A0 – A7 are updated.

IC507 and 509 are used for this purpose of updating the address. IC507 handles the upper 4 bits and IC509 handles the lower 4 bits. IC509 is a presettable counter in which the initial data from the microcomputer is first preset before reading out the display data from the RAM. The address is updated successively by clocking this counter using the clock signal generated by IC504.

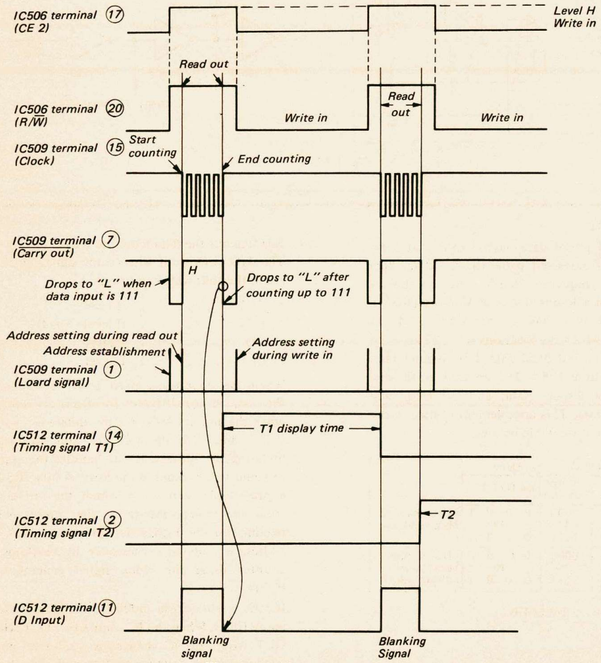
IC509 counts from 0000 to 1111 repeatedly many times. When the IC counts to 111, $\overline{CARRY\ OUT}$ from this IC changes to "L" level and is applied to the microcomputer and detects the completion of the reading.

IC507 is a latch circuit which retains the data temporarily. This IC receives and retains the upper 4 bits of the RAM address. The inputs to this IC are signals generated by the microcomputer. These signal lines are used commonly for both the address signals and the digit signals used for generating the timing signals (T1 – T7). The microcomputer also provides the other signal necessary for extracting the address signals from these lines, which is applied to the clock terminal of IC507. (This signal is also applied to IC509, as will be described later.) The data present at the inputs of IC507 will be latched when the signal at the clock input is "H". This data will remain at the output until the clock input changes to "H". Thus, the upper 4 bits of the RAM address for the read out are determined by the address signals and the clock signal from the microcomputer.

A signal from the microcomputer is also supplied to the LOAD terminal of IC509. The data from the microcomputer at the preset data terminals of IC509 will be stored compulsorily in the counter IC509 when this LOAD signal changes to "H". When reading out the preset data, etc., the necessary address signals are set in IC507 and IC509 from the microcomputer, and the data read out consequently from the RAM is sent to the I/O port terminals (26) – (29) of the microcomputer.

The data read out from the RAM as above are sent to the dial display circuits of IC601, 602, and to the microcomputer.

The figure below shows the waveforms at various locations when the data is being read out from and is being written into the RAM.



Waveforms (FM mode, dial indication: f min)

Fig. 1-12.

As is clear from Fig. 1-12, the $\overline{\text{CARRY OUT}}$ signal changes to "L" after IC509 has counted up to 1111. When $\overline{\text{CARRY OUT}}$ changes to "L", the D input at terminal (11) of IC512 changes to "L" whereby IC512 gives out the timing signals. Therefore, the D input to IC512 will be "H" when the data is being read out from the RAM. Since there is no timing signal outputs during this period when the D input is "H", neither the dial displays or the frequency displays will be made during this period. This, in other words, acts as the blanking signal for the display in order to blank out the changing data and the flickering data. This blanking signal is also applied to the microcomputer where it is used for detecting the completion of the read-out. When the microcomputer detects the end of data read-out, it moves to the subsequent oeprations.

2) Writing in the data

The data is written in the RAM when the following conditions are satisfied at IC506.

- CE2 . . . . . H level
- R/$\overline{\text{W}}$ . . . . . L level ($\overline{\text{write}}$)
- OD . . . . . H level
- $\overline{\text{CE1}}$ . . . . . L level

The operations for writing the data in the memory are made when a new channel preset data is to be stored in the memory or when the last band data has to be updated. The address of the location of writing in is supplied by the microcomputer via IC507, 509 to the memory IC.

16. Dial Display Circuit

The data read out from the RAM is supplied to the data input terminals (2), (3), (39), (40) of IC601, 602. At the same time, the lower 4 bits of the RAM address are also supplied to the decoder in IC601, 602. Of these four bits, only three bits are connected to the decoder. The other bit is connected to the STROBE DATA terminal. This bit determines which of the two ICs (IC601, 602) is to be used. IC601 and IC602 have seven 4-bit latches each, making a total of 14 latches which are being used for only 13 types of addresses.

Of these 13 types of addresses, 7 are handled by IC602 and the remaining 6 by IC601. The following figure shows the addresses of the different sections in one of the grids. Here 1 – 7 are handled by IC602, and 9 – 14 are handled by IC601. 14 is the address of the digital frequency display section. As can be seen from the circuit diagram, the display tube consists of such 7 blocks and other sections.

All the data from 1 – 14 for each of the blocks is stored in the RAM. These are the data supplied to IC601 and IC602. These data inputs and address data signals determine which part to illuminate in the dial dispaly tube. When the data is set in the IC, the required part will illuminate when the timing signal is applied to the grid. There is, however, some relation between these data signals and the timing signal. For example, the timing signal for data from locations 128 – 143 is T1 while that for the data from the locations 144 – 159 is T2. This control is carried out by the microcomputer.

A blanking signal is given between T1 and T2 so that there will be no double display nor flickering display.

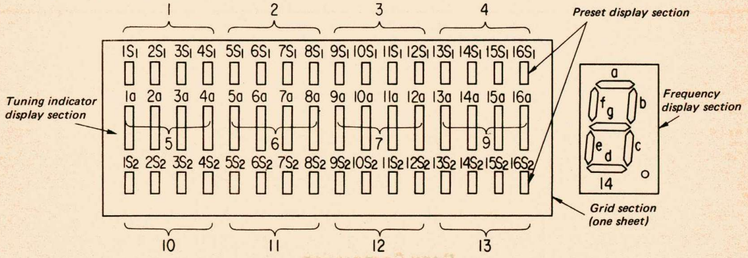


Fig. 1-13.

1) **The STROBE DATA signal**

The following figure shows the switching circuit for the STROBE DATA signal. (0)(1)(1) show the binary signals corresponding to a data of 7 and (1)(0)(0) correspond to 9 and [1][0][0][0] correspond to 8. The signals will be supplied to IC602 when this data is in the range 1 – 7 and to IC601 in the range 9 – 14.

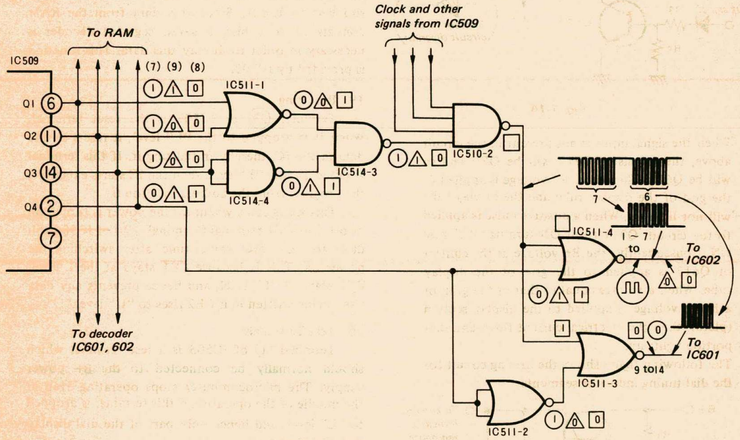


Fig. 1-14.

2) The dial display tube

The dial display tube has the construction as shown in the figure on the right.

1S1, 1a, 1S2 are connected to the respective segments 1S1, 1a, and 1S2 of the grids. Only the grids are separated into different blocks. (However, G1 and G2, G6 and G7 are connected externally.)

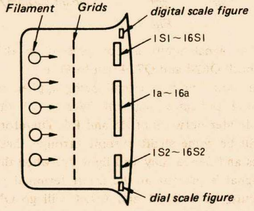


Fig. 1-15.

More than a hundred transistors are being used between IC601, 602 and the dial display tube. The circuit is as shown below.

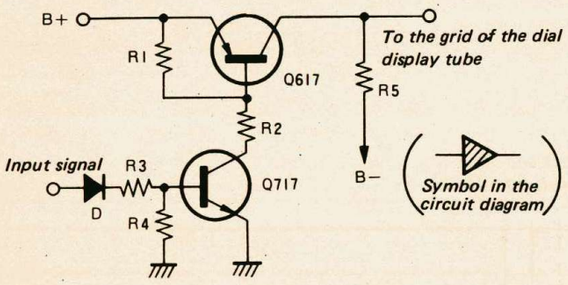


Fig. 1-16.

When the signal input is not present in the circuit above, the transistor Q717 will be OFF and so will be Q617. Therefore, B– voltage is applied to the grid of the display tube and the display tube will not light up. When a positive pulse is applied to the circuit, Q717 turns ON turning Q617 also ON. Consequently, the B+ voltage at the emitter of Q617 is applied to the grid of the display tube. When a voltage equal to that of the grid, or a larger voltage is applied to the display section (plate), then the electrical current flows and that portion lights up.

The following figure shows the driving circuit for the dial tuning indicator segments.

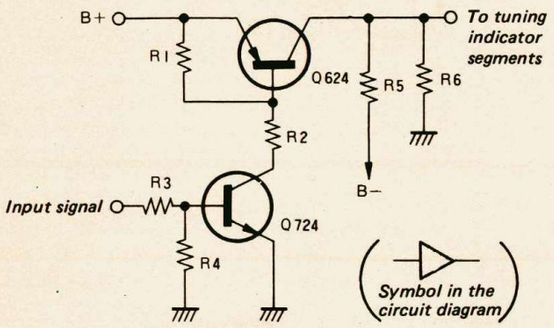


Fig. 1-17.

When the signal input is not present in this circuit, both Q624 and Q724 will be OFF.

However, some voltage is still being applied to the tuning indicator segment because of the voltage divider network of R5 and R6. Therefore there will be some slight current through these segments and hence they will light up. when the input signal is present at the input terminal of this circuit, both Q624 and Q724 will go ON thereby applying B+ voltage fully to the grid and hence that segment will glow much brighter than the other segments. The drive circuits for the FM/AM (preset marker) segments is the same as the circuit given in Fig. 1-17 except that R6 is not present in these circuits. Therefore these segments will not light when Q624 and Q724 are OFF.

18. Frequency Display

The data for the frequency display are stored in the RAM. The data read out from the RAM is supplied to IC601. Since this data from the RAM consists of four bits, a seven segment decoder is necessary in order to display this data. This function is provided by IC702.

19. Resetting

Terminal (23) of IC503 is the reset terminal. When it is dropped to the "L" level, it resets all the data in the IC, thereby initializing it. If this terminal is raised to the "H" level, then the IC starts executing the program from the address location 0.

This set is reset whenever the power is turned on or off. The $\overline{CE1}$ terminal (terminal (19)) of IC506 will drop to "L" level some time after switching the power on. This is because $\overline{CE1}$ stays at the L level, R/$\overline{W}$ stays at "L" level, and hence prevents any data from being written in if CE2 rises to "H" level.

20. Test Terminals

Terminal (1) of IC503 is a test terminal which should normally be connected to the B+ power supply. The microcomputer stops operating even in the middle of the operation if this terminal is dropped to "L" level, and hence only part of the dial display may illuminate.

Sony Corporation

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ST-636

PRELIMINARY

US Model
Canadian Model
AEP Model
UK Model
E Model
SCN Model

FM/AM PROGRAM TUNER

SPECIFICATIONS

GENERAL

Power Requirements: 120 V ac, 60 Hz (Canadian, US model)
120, 220 or 240 V ac adjustable 50/60 Hz (AEP, E, SCN model)
240 V ac, 50 Hz (UK model)

Power Consumption: 28W

Dimensions: Approx. 430(w) x 135(h) x 315(d) mm
17(w) x 5¼ (h) x 12⅜(d) inches
Including projecting parts and controls

Weight: Approx. 5.7 kg, 12 lb 10 oz (net)
Approx. 6.7 kg, 14 lb 13 oz (in shipping carton)

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!

LES COMPOSANTS IDENTIFIÉS PAR UNE TRAME ET UNE MARQUE ⚠ SUR LES DIAGRAMMES SCHÉMATIQUES, LES VUES EXPLOSÉES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPLÉMENTS PUBLIÉS PAR SONY.

FM TUNER SECTION

Antenna:	300 Ω balanced 75 Ω unbalanced, coaxial cable input
Tuning Range:	87.5 – 108 MHz
Intermediate Frequency:	10.7 MHz
Sensitivity at 46 dB Quieting: (40 kHz deviation)	40 μV (MONO) 50 μV (STEREO)
Sensitivity at 50 dB Quieting:	3.5 μV, 16.1 dBf (MONO) 45 μV, 38.3 dBf (STEREO)
Usable Sensitivity:	1.4 μV, S/N = 26 dB (40 kHz deviation); DIN 18 μV, 10.3 dBf; IHF
S/N Ratio:	75 dB (MONO) 70 dB (STEREO)
Harmonic Distortion:	at 1 kHz 0.1% (MONO) 0.2% (STEREO)
IM Distortion:	0.1% (MONO) 0.2% (STEREO)
Separation:	45 dB at 1 kHz
Frequency Response:	30 Hz – 15 kHz $^{+0.5}_{-2.0}$ dB (IHF) 40 Hz – 12.5 kHz $^{+0.5}_{-1.0}$ dB (DIN)
Selectivity:	75 dB at 300 kHz (at 40 kHz deviation) 80 dB at 400 kHz (at 75 kHz deviation)
Capture Ratio:	1.0 dB
AM Suppression Ratio:	54 dB
Image Response Ratio:	80 dB
Spurious Response Ratio:	90 dB
Muting Threshold:	Approx. 5 μV
Output Level:	450 mV, 4.7 kilohms at 40 kHz deviation (DIN) 450 mV, 4.7 kilohms at 75 kHz deviation (IHF)

— Continued on page 2 —

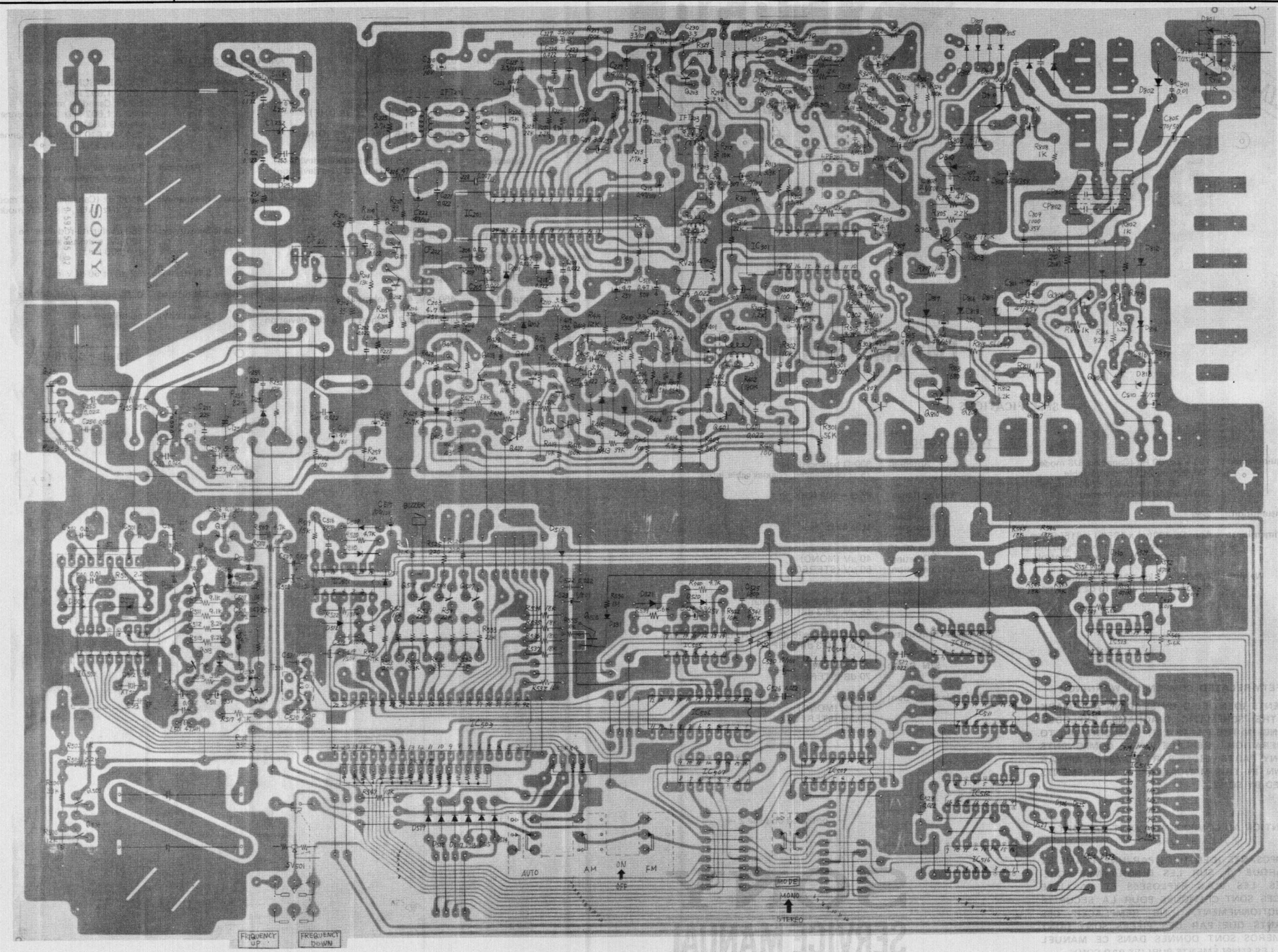
AM TUNER SECTION

Frequency Range:	UK, AEP, SCN model: 522 – 1,602 kHz E, US, Canadian model: 522 – 1,602 kHz (with channel plan selector set at 9 kHz) 530 – 1,610 kHz (with channel plan selector set at 10 kHz)
Antenna:	Ferrite bar antenna External antenna terminal
Intermediate Frequency:	450 kHz (Canadian, US, E model) 468 kHz (AEP, UK, SCN model)
Usable Sensitivity:	250 μV ferrite-rod antenna 100 μV, external antenna at 1,000 kHz
S/N Ratio:	52 dB at 50 m V/m
Harmonic Distortion:	0.3% at 50 m V/m, 400 Hz
Selectivity:	50 dB at 9 kHz

0 dB = 0.775 V

SONY®
SERVICE MANUAL

1. MOUNTING DIAGRAM 【MAIN BOARD】



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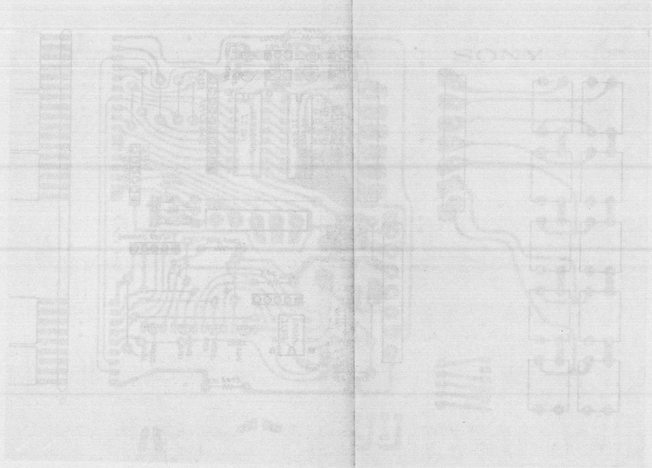

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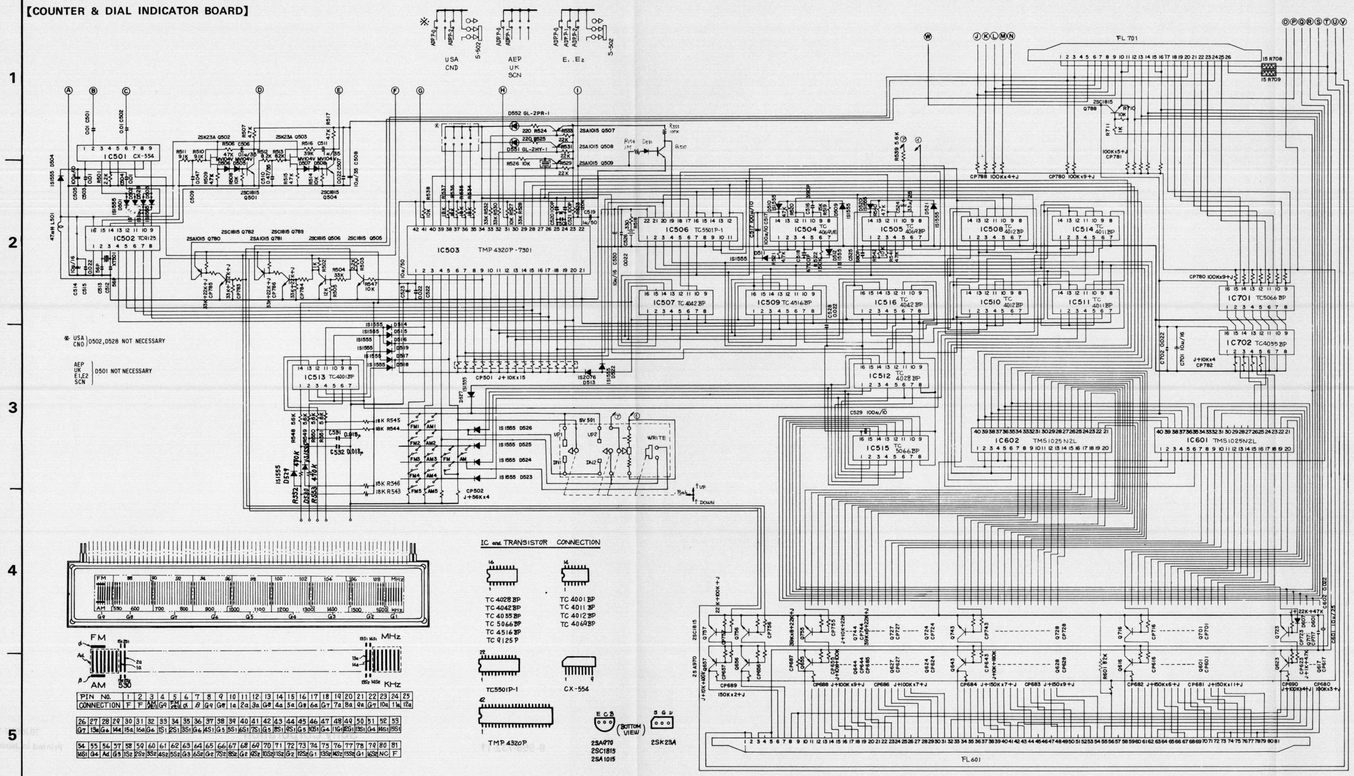
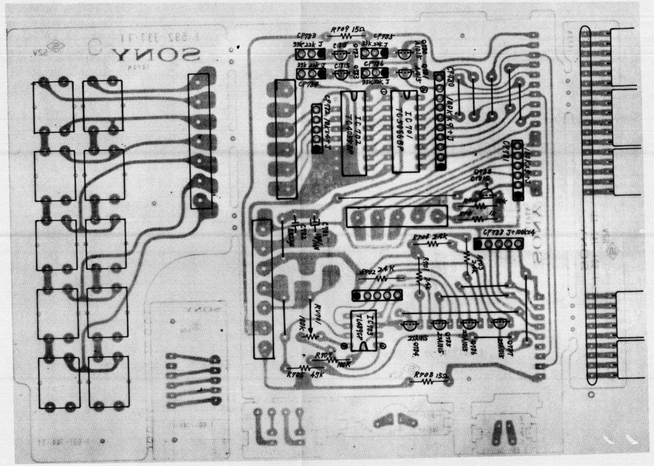
4. SCHEMATIC DIAGRAM

【COUNTER & DIAL INDICATOR BOARD】



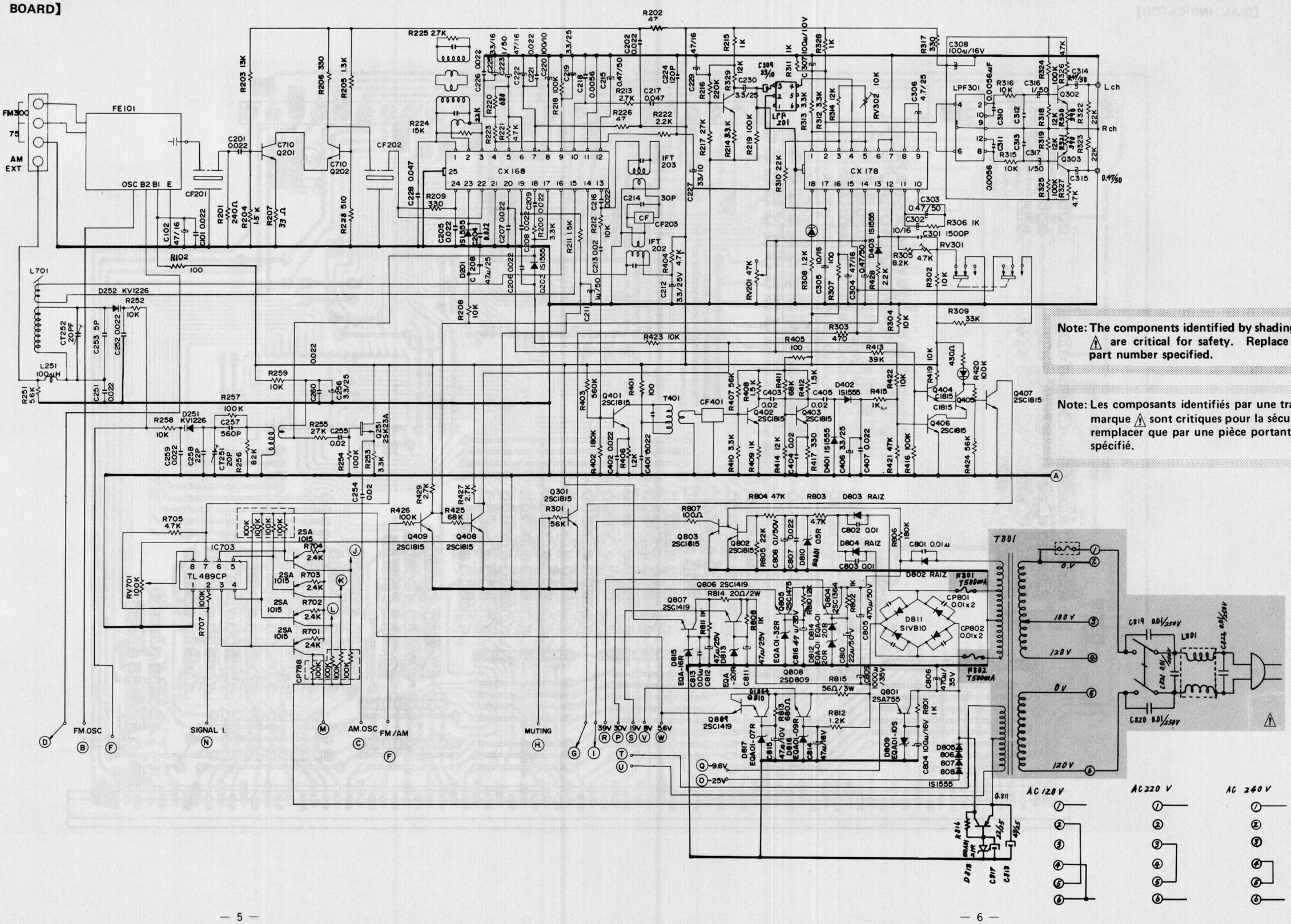
5. MOUNTING DIAGRAM

【COUNTER BOARD】



2. SCHEMATIC DIAGRAM

【MAIN BOARD】



Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

3. MOUNTING DIAGRAM

【DIAL INDICATOR】