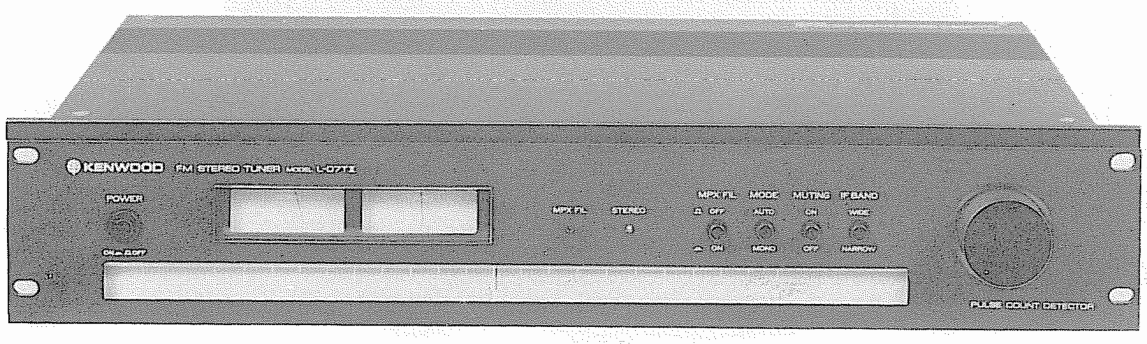
KENWOOD

HI/FI STEREO COMPONENTS

SERVICE MANUAL

L-07TII



FM STEREO TUNER

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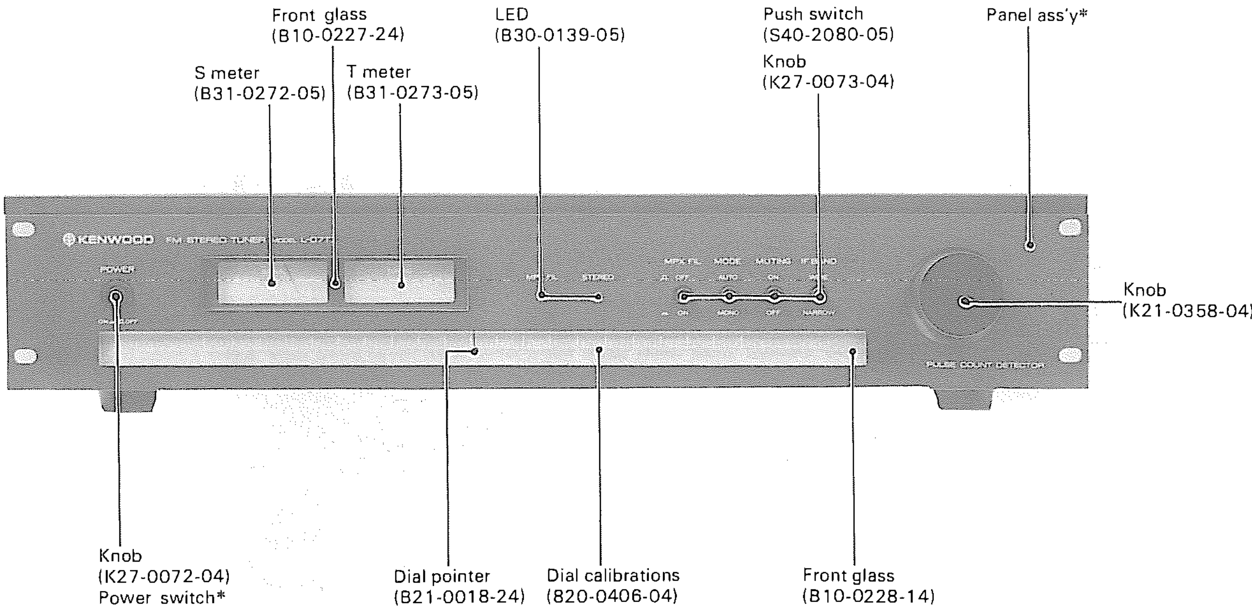
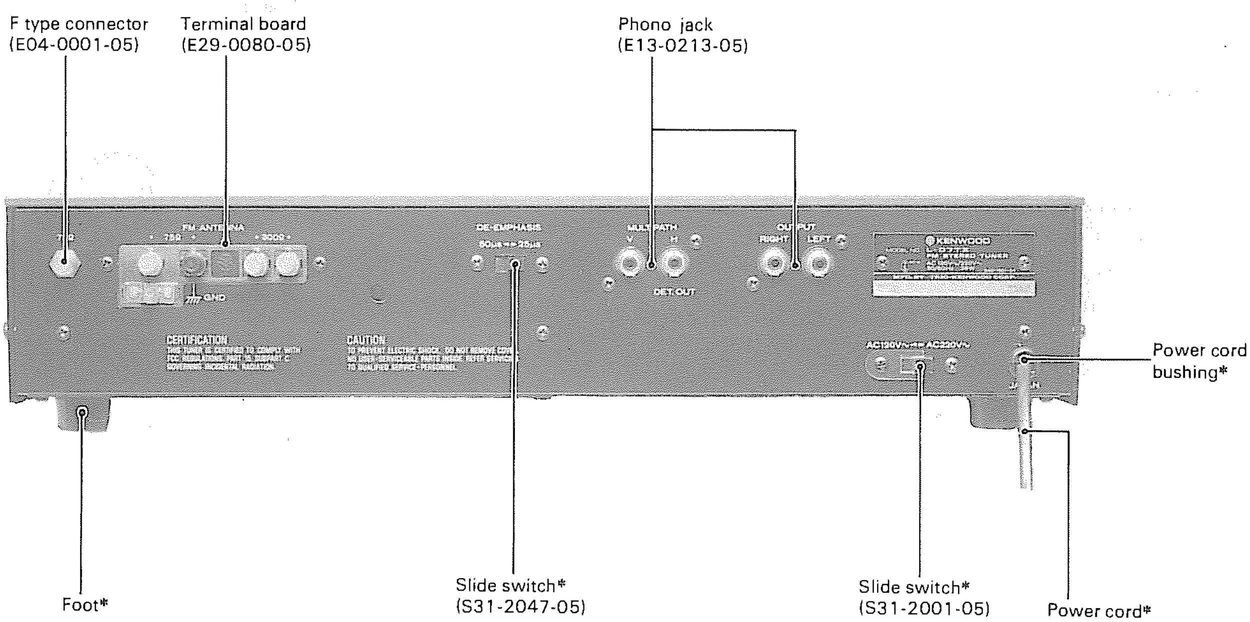
Note:
Component and circuitry are subject to modification to insure best operation under differing local conditions. This manual is based on, the U.S. (K) standard, and provides information on regional circuit modification through use of alternate schematic diagrams, and information on regional component variations through use of parts list.

Region	Code
U.S.A.	K
Canada	P
PX	U
Australia	X
Europe	W
Scandinavia	L
England	T
South Africa	S
Other Areas	M

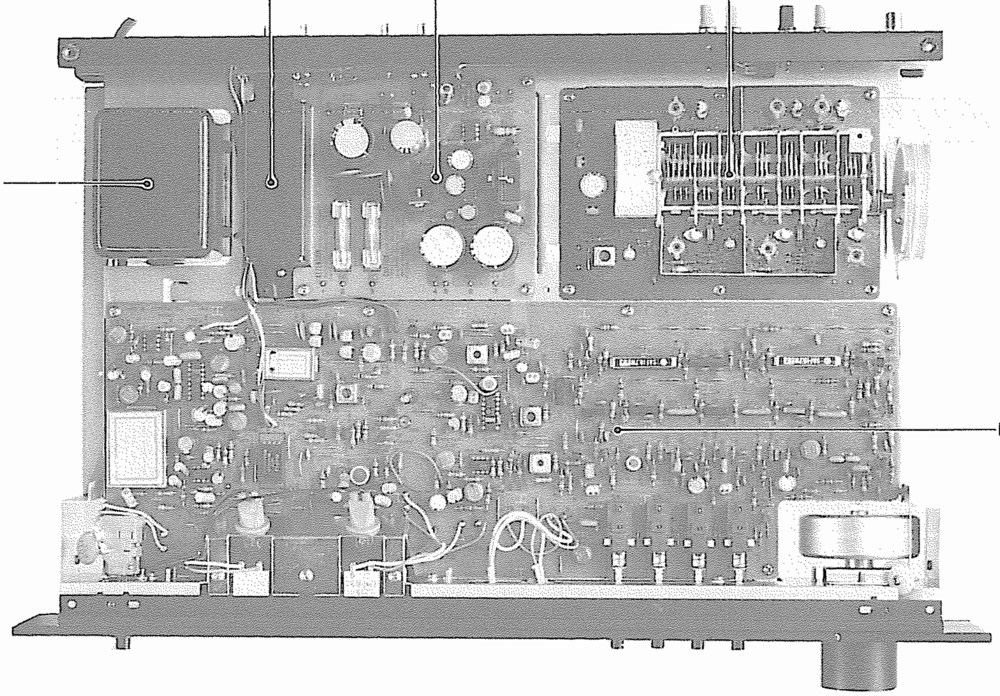
EXTERNAL VIEW





* Refer to Parts List.

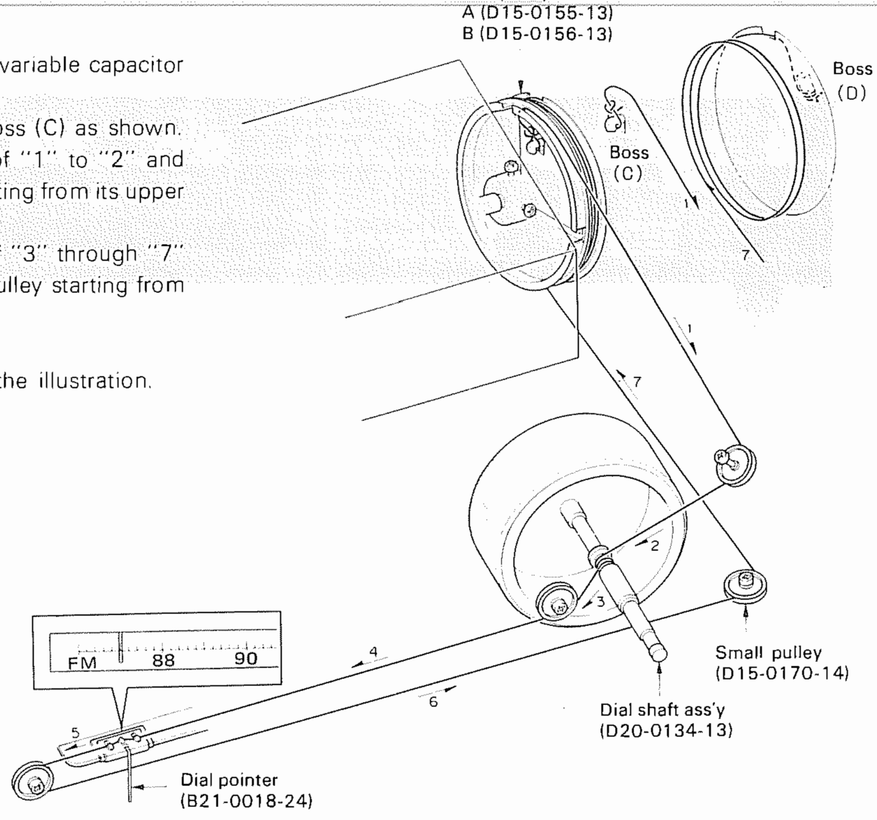
INTERNAL VIEW/DIAL CORD STRINGING



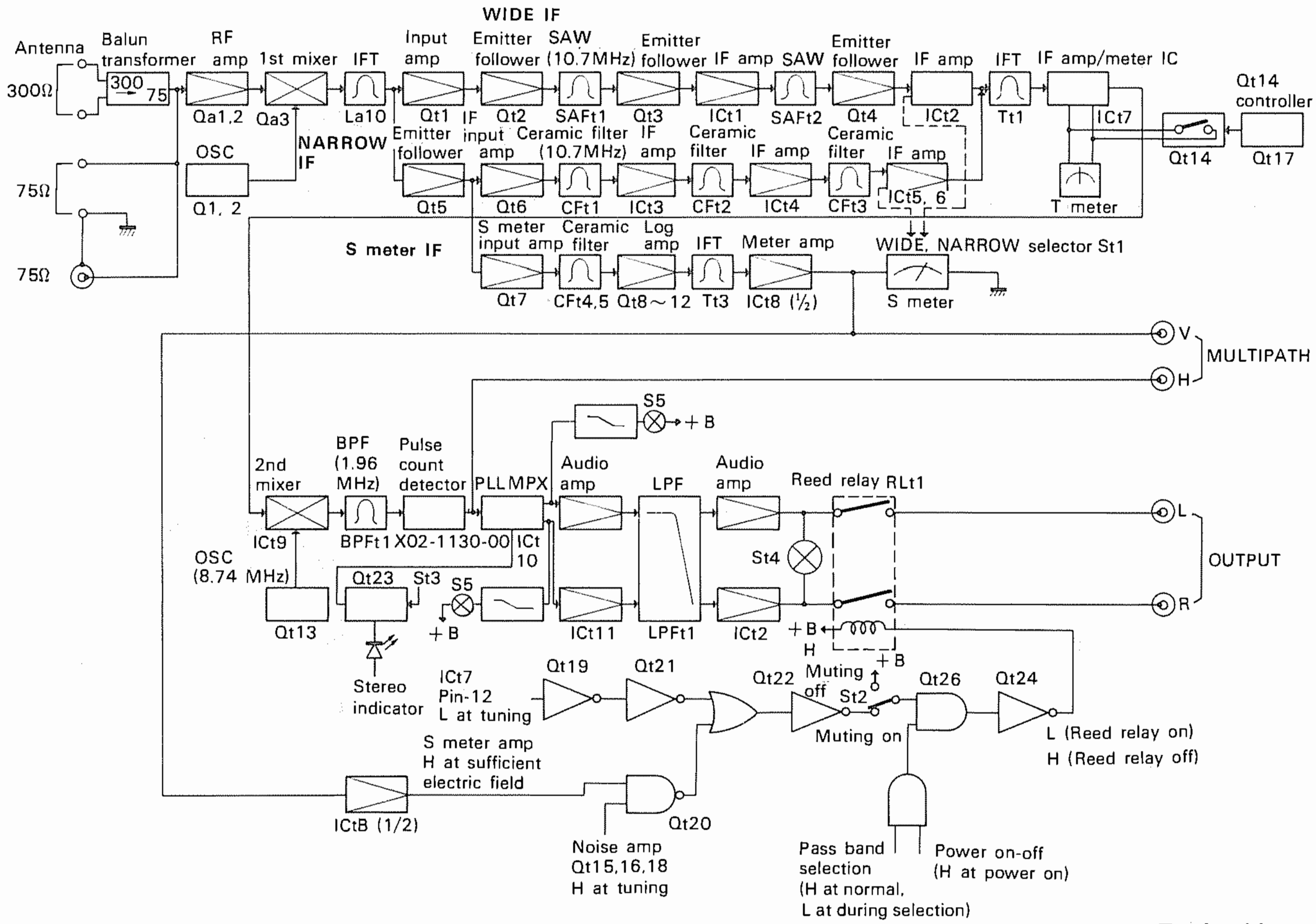
* Refer to Parts List.

DIAL CORD STRINGING

1. Fully close the variable capacitor.
2. Fix the dial pulley on the shaft of the variable capacitor using 2 screws.
3. Tie the end of the dial cord to the boss (C) as shown.
4. Dress the dial cord in the direction of "1" to "2" and wind 2 turns around the dial shaft starting from its upper side.
5. Dress the dial cord in the direction of "3" through "7" and wind it 2 turns around the dial pulley starting from its lower side.
6. Fix it to the boss (D).
7. Mount the dial pointer as shown in the illustration.



BLOCK DIAGRAM



Truth table

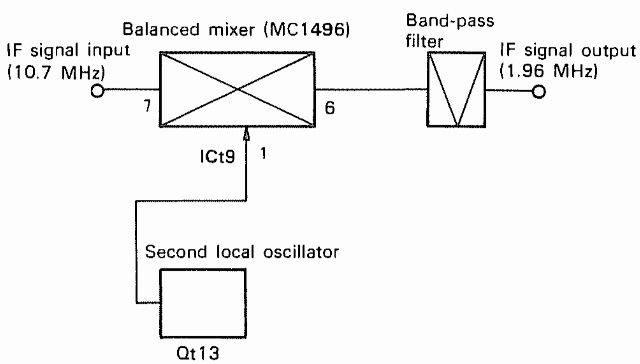
	A	B	Y
NOT : A—▷o—Y	L	–	H
	H	–	L
NAND : A, B—Y	L	L	H
	L	H	H
	H	L	H
	H	H	L
OR : A, B—Y	L	L	L
	L	H	H
	H	L	H
	H	H	H
AND : A, B—Y	L	L	L
	L	H	L
	H	L	L
	H	H	H

CIRCUIT DESCRIPTION

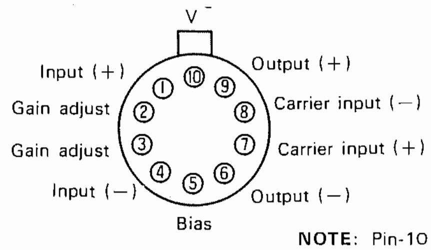
This manual explains the pulse count detector and MPX circuit. For the muting circuit, noise amplifier, and NARROW/WIDE switching circuit, refer to model L-07T service manual. Also, refer to model 600T service manual for the S-meter circuit.

PULSE COUNT DETECTION

Ratio detector and Foster Seeley detector have been used for FM detection, however, these detector do not have wide linear range in the S-curve characteristics. In this mode, pulse count detection system, which was also used in model 600T, is employed, and double converting system is used so as to improve S N ratio and distortion. The 10.7 MHz IF signal is converted into 1.96 MHz IF signal before it is demodulated by the pulse count detector.

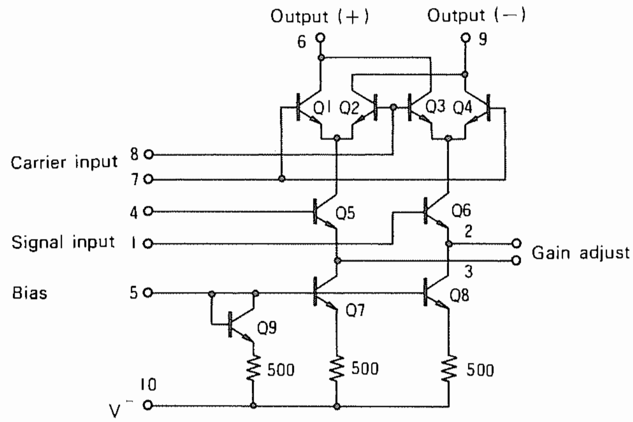


Double converting section block diagram



NOTE: Pin-10 is connected to the case.

MC1496 (K package) pin configulation



MC1496 (K package) equivalent circuit

The balanced mixer MC1496 is a multiplier consisting of a dual balanced differential circuit, and outputs the product of two input signals. The MC1496 is also used for the synchronous detectors (KT-8300 multicative detector) and demodulators.

Qt13 is the collector tuning LC oscillator generating 8.74 MHz, which is multiplied by 10.7 MHz using ICt9. Then, IF signals of 1.96 MHz (difference) and 19.44 MHz (sum) are obtained at the output of the ICt9. The band-pass filter only passes 1.96 MHz IF signal which is necessary for the pulse count detector.

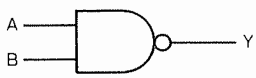
Different from model 600T, this model employs SN74LS03 TTL (Transistor Transistor Logic) IC which contains 4 NAND gates.

1. Digital circuits

There are only two signal levels, "high" and "low", in digital circuits. In this system, NAND gate and inverter circuit modules are used with +5V supply voltage. The NAND gate has inputs A and B, and output Y. The output level is determined depending on the input levels as shown in the truth table.

CIRCUIT DESCRIPTION

(1) NAND gate

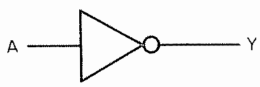


Truth table

A	B	Y
L	L	H
L	H	H
H	L	H
H	H	L

The NAND gate has inputs A and B, and output Y. The output level is determined depending on the input levels as shown in the truth table.

(2) Inverter (NOT)

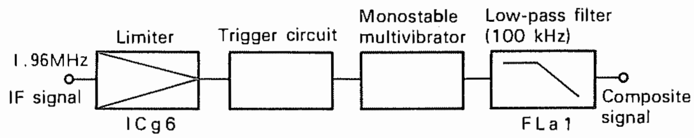


Truth table

A	Y
L	H
H	L

The inverter has input A and output Y. The output level is opposite to the input level.

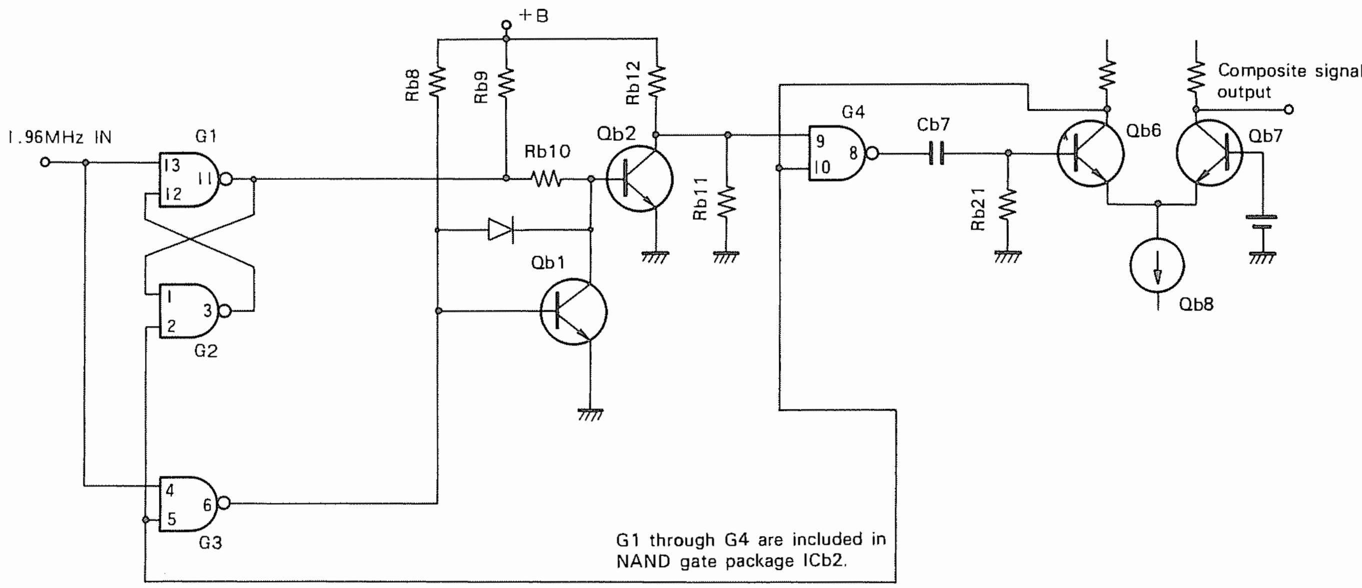
2. Pulse counting circuit



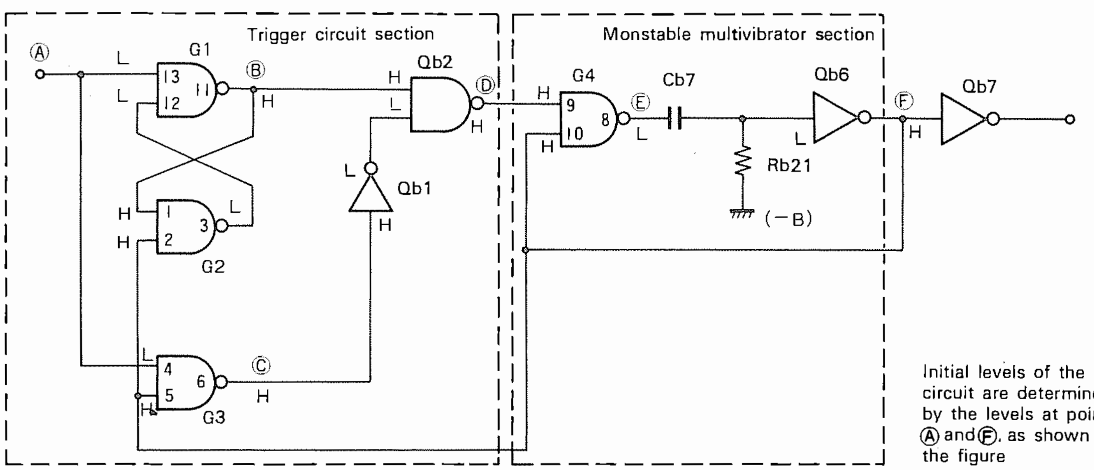
Pulse count detector block diagram

The principle of pulse count detection is as follows:

The IF signal is clipped by the limitter, formed into the trigger pulse, then applied to the monstable multivibrator. The monostable multivibrator emits pulses, and they are integrated to form the composite signal. Circuit operation is explained in detail with the timing chart, as follows:



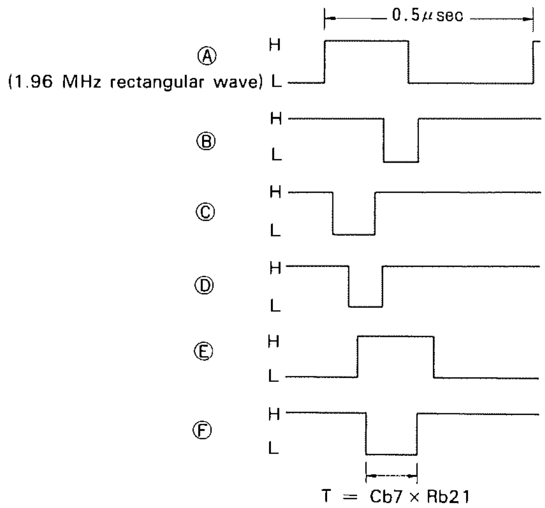
Pulse count detector (Major part)



Initial levels of the circuit are determined by the levels at points Ⓐ and Ⓕ, as shown in the figure

Logical circuit for the pulse counter detector

CIRCUIT DESCRIPTION



Timing chart

The above figure indicates wave forms at several points in the circuit when the 1.96 MHz rectangular wave is input at pointⒶ.

The signal is delayed by 20 nS when it passes each logical gate. Signal levels of the circuit when no input signal is applied are shown in the previous figure.

The circuit operates as follows:

(1) When point Ⓐ becomes "H",
G1 pin-13 becomes "H". (Level "H" is kept while point Ⓐ is "H".)
G3 pin-4 becomes "H".
PointⒸ(G3 pin-6) becomes "L" with a 20 nS time delay.
Lower input of Qb2 becomes "H".
Point Ⓓ beomes "L" with a 20 × 3 nS time delay.
Point Ⓔ (G4 pin-8) becomes "H" with a 20 × 4 time delay.
PointⒻ becomes "L" with a 20 × 5 nS time delay.

NOTE: When point Ⓕ becomes "L", G4 pin-10 also becomes "L", and point E keeps "H" even if point Ⓓ (G4 pin-9) turns to "H".

(2) When point Ⓕ becomes "L",

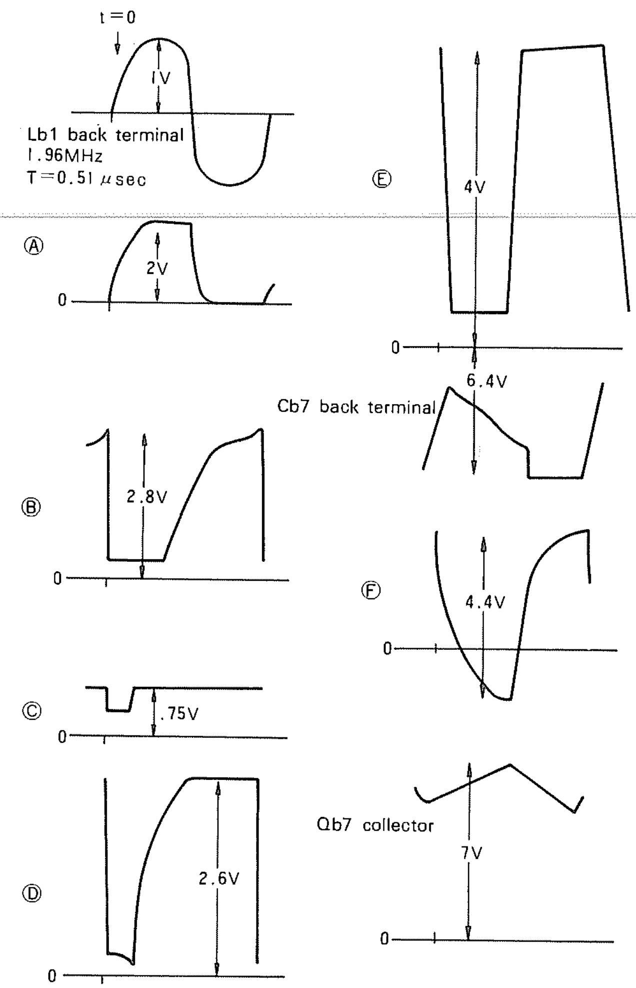
G3 pin-5 becomes "L".	G2 pin-2 becomes "L".
Point Ⓒ (G3 pin-6) become "H" with a 20 nS time delay.	G2 pin-3 becomes "H".
Lower input of Qb2 becomes "H" with a 20 × 2 nS time delay.	Point B (G1 pin-11) becomes "L" with a 20 × 2 nS time delay.

NOTE: Point Ⓓ becomes "L" momentarily when the upper input of Qb2 becomes "L" slower than that the lower input becomes "H". However, point Ⓔ of G4 keeps "H" steadily since G4 pin-10 is "L".

(3) When point Ⓕbecomes "H",
The input of Qb6 becomes "H" momentarily when point E has turned to "H". However, the level decreases gradually because Cb7 is started charging, and pointⒻ returns to "H" when the level becomes lower than the threshold. The time required to return to "H" is determined by values of Cb7 and Rb21. This pulse is the output of the monostable multivibrator.
G4 pin-9 has already returned to "H" since the signal had been put out.
G4 pin-10 becomes "L".
PointⒺ(G4 pin-8) becomes "L" with 20 nS delay time.
Cb7 discharges and maintains the state until the next pulse will be input.
G3 pin-5 becomes "H".
PointⒸdoes not change the level because input pin-4 is "L".

NOTE: Point Ⓑbecomes "H" 20 nS after pointⒶ(G1 pin-13) has become "L".

The following figures show actual waveforms at each point on the circuit. The DC level might slightly be varied.



CIRCUIT DESCRIPTION

The output of the monostable multivibrator is integrated by low-pass filter FLa1, then becomes the composite signal.

Qb3 and Qb5 are used for clamping, in which Qb3 limits the upper signal level by the base voltage +0.6V, and Qb5 limits the lower signal level by the base voltage −0.6V. Qb4 functions as the emitter follower for impedance matching.

Power supply +5V for ICb2 is stabilized by Db2.

MPX-AUDIO

The composite signal is divided into R and L by ICt10, then led to the output terminal through the low-pass filter, audio-amplifier, and relay.

1. HA11223

IC HA11223 is used for stereo demodulation.

(1) Features

Monolithic IC with DIL 16-pin package

Built-in pilot canceling function

100% negative feedback circuit provides low distortion factor (0.01%/300mV monaural).

High input impedance (75kΩ)

Large S/N ratio (86 dB/300 mV input).

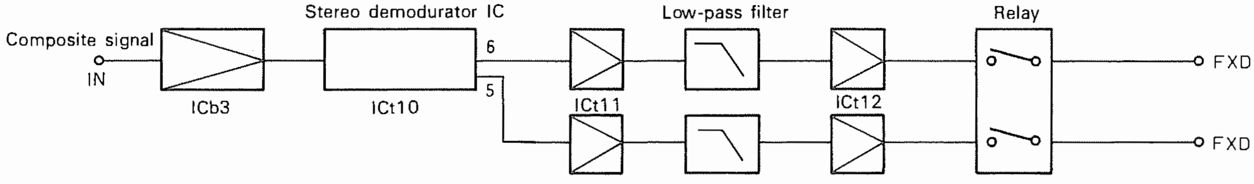
Improved PLL circuit provides small stereo distortion factor at high frequency (0.06%/10 kHz at Main-ch input).

(2) Principle of operation

The composite signal is connected to the pre-amplifier through IC pin-2. Then, the output of the pre-amplifier is led to the synchronous detector through the pilot canceler, 100% NFB amplifier, and the output is also led to the phase detector ∠ 90° through Ct102. The VCO oscillates at random at approximately 76 kHz when the control voltage is not applied, and changes 19 kHz by FF 38 kHz and FF 19 kHz ∠ 0°, then the phase is compared with that of the pilot signal by the phase detector ∠ 90°. A multiplier is used for the phase detector, and it produces output signal which is proportional to the product of two input signals (19 kHz pilot and 19 kHz VCO). (The output is produced when the phase difference is not 90°.) The output signal is filtered by the low-pass filter (Ct104, 105, Rt108), amplified by the DC amplifier, then applied to the VCO. The VCO controls the output so that it has the phase difference of 90° from the pilot signal. Then 38 kHz sub-carrier, the phase of which is locked to the pilot signal, is obtained, and sent to the synchronous detector as a switching signal through the stereo/monaural circuit. The stereo/monaural circuit makes the demodurated audio signal monaural by equalizing the phase of the 38 kHz signal when a monaural signal is received, or when a very weak stereo signal is received. The stereo/monaural circuit operates as follows.

The pilot signal is multiplied by a 19 kHz signal (in the same phase as the pilot signal) by means of the phase detector ∠ 0°. The phase detector output is a DC voltage in proportional to the amplitude of the pilot signal, and it is amplified by the DC amplified by the DC amplifier to drive the lamp circuit, and at the same time, it sets the stereo/monaural circuit so as to send the 38 kHz signal to the synchronous detector.

This IC is different from conventional one, including the pilot canceler circuit. The 19 kHz signal, the phase of which precedes the pilot signal by 90°, is input to the gain control amplifier. Also, the output of the phase detector ∠ 0° is partly applied to the gain control amplifier via the DC amplifier. Consequently, the triangle wave in the same phase as that of the pilot signal appears at the output gain control amplifier. The level of the triangle wave is adjusted by VRt6 and applied to pin-4. The phase of the triangle wave is inverted by the pilot canceler, then added to the pilot signal to reduce the 19 kHz component in the composite signal. The 19 kHz switch functions to shut off the output of the gain control amplifier when receiving the monaural broadcasts.



MPX-audio section block diagram

PARTS LIST

Note:
Resistors except the special types (example: cement, metal film, etc.) are not detailed in PARTS LIST. With regard to the value, refer to the schematic diagram on the PC board illustration.
Resistors not detailed are carbon type (1/4W or 1/8W).
☆ : New parts

TOTAL

Ref. No.	Parts No.	Description	Re-marks
—	A01-0343-03	Case	
—	A20-1302-02	Panel ass'y K,P,M,W,L	☆
—	A20-1311-02	Panel ass'y T	☆
—	A50-0051-03	Side plate (L)	
—	A50-0052-03	Side plate (R)	
—	B03-0132-04	Dress board	☆
—	B07-0241-14	Ring ϕ8	☆
—	B07-0242-14	Ring ϕ7 × 4	☆
—	B10-0227-24	Front glass (meter)	☆
—	B10-0228-14	Front glass (Dial calibrations)	☆
—	B11-0001-14	Filter (meter)	
—	B20-0406-04	Dial calibrations	
—	B21-0018-24	Dial pointer	
—	B30-0075-05	Pilot lamp × 5	
—	B30-0139-05	LED × 2	
—	B30-0150-05	Pilot lamp × 2	
—	B31-0272-05	S meter	
—	B31-0273-05	T meter	
—	B46-0055-20	Warranty card P	
—	B46-0060-00	Warranty card T	
—	B46-0061-20	Warranty card K	
—	B50-1751-00	Instruction manual K	
—	B50-1752-00	Instruction manual P,M	
—	B50-1753-00	Instruction manual T	
—	B50-1754-00	Instruction manual W,L	
—	B59-0088-00	Guide book K,P,M,W,L	
C1,2	CK45E3D103PMU	Ceramic capacitor 0.01μF +100%, −0% T,W,L,	
C1	C90-0145-05	Ceramic capacitor 0.01μF 125WV K	
C1	C91-0023-05	Ceramic capacitor 0.01μF 250WV M	
C1	C91-0025-05	Film capacitor 0.01μF P	
—	D15-0155-13	Dial pulley (A)	
—	D15-0156-13	Dial pulley (B)	
—	D15-0170-14	Small pulley × 4	
—	D20-0134-13	Dial shaft ass'y	
—	D32-0075-04	Switch stopper	
—	E04-0001-05	F type connector	
—	E05-0125-05	F type plug (for 3C-2V)	
—	E29-0080-05	Terminal board	
—	E30-0181-05	Power cord K,P	
—	E30-0459-05	Power Cord W	
—	E30-0505-05	Audio cord	
—	E30-0545-05	Power cord M	
—	E30-0585-05	Power cord L	
—	E30-0602-05	Power cord T	
—	G01-0314-04	Dial spring	
—	G01-0358-04	Spring × 5	
—	H01-1822-04	Carton box K,M,W,L	☆
—	H01-1823-04	Carton box P	☆
—	H01-1824-04	Carton box T	☆
—	H12-0063-23	Buffer fixture	
—	H12-0064-23	Buffer fixture	
—	H20-0394-04	Polyethylene cover K,P,T,W,L	
—	H20-0416-04	Polyethylene cover M	
—	H25-0029-04	Polyethylene bag 60 × 110	
—	H25-0078-04	Instruction bag	
—	H25-0096-04	Polyethylen bag	
—	H25-0148-04	Warranty bag	
—	H39-0015-05	Carton box stopper	
—	H40-0004-04	Anti-rust paper	
—	J02-0088-05	Foot × 4 K	
—	J02-0089-05	Foot × 4 P,M,T,W,L	
—	J19-0509-04	LED holder × 2	
—	J41-0024-15	Power cord bushing W	
—	J41-0033-05	Power cord bushing T,L	
—	J41-0034-05	Power cord bushing K,P,M	
—	J61-0024-05	Wire cramper	
—	J61-0038-05	Cord band	
—	K21-0358-04	Knob (ϕ38) TUNING	
—	K27-0072-04	Knob (ϕ8) POWER	
—	K27-0073-04	Knob (ϕ7) × 4 Push switch	
—	L01-1491-05	Power transformer K,P	
—	L01-1492-05	Power transformer L	
—	L01-1495-05	Power transformer M	
—	L01-1496-05	Power transformer W	
—	L01-1497-05	Power transformer T	
—	L19-0009-05	Balun transformer	
—	N09-0299-05	Flat head machine screw with hexagonal head × 4	
—	N29-0033-05	Push rivet × 4	
—	N29-0047-05	Push rivet	
—	S31-2001-05	Slide switch M,W	
—	S40-1004-05	Power switch K,P	
—	S40-1005-05	Power switch M	
—	S40-2092-05	Power switch T,W,L	
—	T90-0202-05	FM indoor antenna	
—	W01-0084-05	Hexagonal wrench	
—	X00-1980-00	Power supply PC board ass'y M	
—	X00-1980-11	Power supply PC board ass'y K,P	
—	X00-1980-61	Power supply PC board ass'y T,W,L	
—	X01-1270-10	FM front end PC board ass'y	
—	X02-1130-00	Plse count detector PC board ass'y	
—	X02-1140-11	IF PC board ass'y K,P	
—	X02-1140-21	IF PC board ass'y M	
—	X02-1140-61	IF PC board ass'y T,W,L	
—	351-0008-04	Dial cord	

POWER SUPPLY (X00-1980-00,11,61)

Ref. No.	Parts No.	Description	Re-marks
		CAPACITOR	
Ck1 ∼ 4	Ck45E2H103P	Ceramic 0.01μF +100% −0%	
Ck5	C90-0325-05	Electrolytic 2200μF 25WV	
Ck6	CE04W1E471EL	Electrolytic 470μF 25WV	
Ck7	CE04W1E221EL	Electrolytic 220μF 25WV	
Ck8	CE04W1C221EL	Electrolytic 220μF 16WV	
Ck9	CK45F1H473Z	Ceramic 0.047μF +80% −20%	
Ck10	CE04W1H010EL	Electrolytic 1μF 50WV	
Ck11	C90-0350-05	Electrolytic 3300μF 16WV	
Ck12	CE04W1E101EL	Electrolytic 100μF 25WV	
Ck13	CE04W1H010EL	Electrolytic 1μF 50WV	
Ck14	C90-0350-05	Electrolytic 3300μF 16WV	
Ck15	CK45E2H103P	Ceramic 0.01μF +100% −0%	
Ck16	CE04AW1H3R3MEL	Electrolytic 3.3μF 50WV	
Ck17	CE04AW1C100MEL	Electrolytic 10μF 16WV	
Ck18	CE04AW1H3R3MEL	Electrolytic 3.3μF 50WV	
		RESISTOR	
Rk1	RS14GB3A391J	Metal oxide film 390Ω ±5% 1W	
Rk8	RS14GB3A821J	Metal oxide film 820Ω ±5% 1W	
Rk11	RC05GF2H182KMA	Carbon 1.8kΩ ±10% 1/2W	

PARTS LIST

Ref. No.	Parts No.	Description	Re-marks
SEMICONDUCTOR			
Qk1	V03-0270-05	Transistor 2SC945 (P,Q)	
Qk2	V04-0330-20	Transistor 2SD330 (D,E)	
Qk3	V01-0084-05	Transistor 2SA733 (P,Q)	
Qk4	V01-0116-05	Transistor 2SA755 (B,C)	
ICk1	V30-0217-05	IC NJM4558D	
Dk1	V11-0460-05	Diode S1RBA10	
Dk2	V11-0076-05	Diode 1S1555	
	V11-0271-05	or 1S2076	
Dk3	V11-0295-05	Diode W068	
Dk4, 5	V11-0076-05	Diode 1S1555	
	V11-0271-05	or 1S2076	
DZk1	V11-0431-05	Zener diode EQA01-06S	
DZk2	V11-0455-05	Zener diode EQA01-18R	
MISCELLANEOUS			
Fk1,2	F05-8012-05	Fuse 800mA 250V SEMKO -61	
	F05-8015-05	Fuse 800mA 250V -00	
	F05-8018-05	Fuse 800mA 250V UL -11	
Fk3	F05-2521-05	Fuse 2.5A 250V -00	
	F05-2523-05	Fuse 2.5A 250V UL -11	
	F05-2528-05	Fuse 2.5A 250V SEMKO -61	
–	J13-0041-05	Fuse clip × 6 -00, -11	
–	J13-0054-05	Fuse clip × 6 -61	

FM FRONT END (X01-1270-10)

Ref. No.	Parts No.	Description	Re-marks
CAPACITOR			
Ca1	CC45CH1H150J	Ceramic 15pF ±5%	
Ca2~4	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ca5	CC45SL1H100D	Ceramic 10pF ±0.5pF	
Ca6	CC45CH1H220J	Ceramic 22pF ±5%	
Ca7	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ca8	CC45CH1H220J	Ceramic 22pF ±5%	
Ca9	C91-0037-05	Ceramic 0.47pF ±5%	
Ca10	CC45CH1H220J	Ceramic 22pF ±5%	
Ca11	CC45SL1H100D	Ceramic 10pF ±0.5pF	
Ca12, 13	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ca14	CC45SL1H100D	Ceramic 10pF ±0.5pF	
Ca15	CC45CH1H220J	Ceramic 22pF ±5%	
Ca16	C91-0030-05	Ceramic 0.51pF ±5%	
Ca17	CC45CH1H220J	Ceramic 22pF ±5%	
Ca18	CC45SL1H101K	Ceramic 100pF ±10%	
Ca19	CC45SL1H221J	Ceramic 220pF ±5%	
Ca20	CC45CH1H180J	Ceramic 18pF ±5%	
Ca21, 22	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ca23	CE04W1C471EL	Electrolytic 470μF 16WV	
Ca24	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ca25	CQ93M1H103K	Mylar 0.01μF ±10%	
RESISTOR			
Ra8	RD14GY2E151JMA	Carbon 150Ω ±5% 1/4W	
Ra13	RD14GY2E151JMA	Carbon 150Ω ±5% 1/4W	
Ra16	RD14GY2E101JMA	Carbon 100Ω ±5% 1/4W	
SEMICONDUCTOR			
Qa1,2	V30-0285-10	FET CC3588DE	
Qa3	V09-0125-10	FET 3SK59(Y)	
COIL/IFT/INDUCTOR			
La1	L31-0377-05	FM ANT coil	
La2	L33-0025-05	Choke coil	
La3,4	L31-0381-05	FM RF coil	
La5	L31-0382-05	FM RF coil	
La6	L33-0025-05	Choke coil	
La7	L31-0381-05	FM RF coil	
La8	L31-0382-05	FM RF coil	
La9	L40-102-41	Choke coil	
La10	L30-0296-05	FM IFT	
La11	L33-0025-05	Choke coil	
La12,13	L40-1092-44	Ferri-inductor	
MISCELLANEOUS			
TCa1~6	C05-0010-15	Ceramic trimmer 10pF	
–	C01-0202-05	Variable capacitor	
–	E23-0046-04	Terminal × 5	
–	E29-0041-04	Lead plate × 2	

PULSE COUNT DETECTOR (X02-1130-00)

Ref. No.	Parts No.	Description	Re-marks
CAPACITOR			
Cb1~3	CK45F1H473Z	Ceramic 0.047μF +80%-20%	
Cb4	CE04W1A470EL	Electrolytic 47μF 10WV	
Cb5	CE04W1C100EL	Electrolytic 10μF 16WV	
Cb6	CE04W1H010EL	Electrolytic 1μF 50WV	
Cb7	CQ09FS1H121J	Polystyrene 120pF ±5%	
Cb8	CE04W1C221EL	Electrolytic 220μF 16WV	
Cb10	CE04W1H010EL	Electrolytic 1μF 50WV	
Cb11~13	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Cb14	CE04W1C470EL	Electrolytic 47μF 16WV	
Cb15	CC45SL1H101K	Ceramic 100pF ±10%	
Cb16	CC45SL1H220K	Ceramic 22pF ±10%	
Cb17,18	CE04W1C470EL	Electrolytic 47μF 16WV	
Cb19~21	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
RESISTOR			
Rb21	RN92BC2E682F	Metal film 6.8kΩ ±1% 1/4W	
SEMICONDUCTOR			
Qb1, 2	V03-0098-05	Transistor 2SC535 (B,C)	
Qb3	V01-0084-05	Transistor 2SA733 (Q,R)	
Qb4, 5	V03-0098-05	Transistor 2SC535 (B,C)	
Qb6, 7	V03-0098-05	Transistor 2SC535 (C)	
Qb8	V03-0447-05	Transistor 2SC1681 (GR,BL)	
ICb1	V30-0087-05	IC TA7060P	
ICb2	V30-0267-10	IC SN74LS03	
ICb3	V30-0264-10	IC HA1457	
Db1	V11-0076-05	Diode 1S1555 or 1S2076	
Db2	V11-4101-60	Zener Diode XZ053	
FERRI-INDUCTOR/FILTER			
Lb1	L40-1092-02	Ferri-inductor	
Lb2~4	L40-3301-03	Ferri-inducter	
Lb5	L40-1092-02	Ferri-inductor	
Lb6, 7	L40-3301-03	Ferri-inductor	
FLb1	L79-0059-05	Low pass filter	

IF (X02-1140-11,21,61)

Ref. No.	Parts No.	Description	Re-marks
CAPACITOR			
Ct1~30	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ct31	CC45SL1H101K	Ceramic 100pF ±10%	
Ct32	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ct33	CK45B1H561K	Ceramic 560pF ±10%	
Ct34	CE04AW1H010MEL	Electrolytic 1μF 50WV	
Ct35	CE04W1C330EL	Electrolytic 33μF 16WV	
Ct36	CE04W1E4R7EL	Electrolytic 4.7μF 25WV	
Ct37	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ct38, 39	CE04W1H010EL	Electrolytic 1μF 50WV	
Ct40~45	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ct46	CC45SL1H270K	Ceramic 27pF ±10%	
Ct47	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ct48	CE04W1C330EL	Electrolytic 33μF 16WV	
Ct49, 50	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ct51	CQ93M1H102K	Mylar 0.001μF ±10%	
Ct52, 53	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ct54	CE04W1C330EL	Electrolytic 33μF 16WV	
Ct55	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ct56	CQ93M1H102K	Mylar 0.001μF ±10%	
Ct57, 58	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ct59	CQ93M1H102K	Mylar 0.001μF ±10%	
Ct60~62, 64	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ct65	CQ93M1H102K	Mylar 0.001μF ±10%	
Ct66, 67	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ct68	CK45B1H561K	Ceramic 560pF ±10%	
Ct69~71	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ct72	CE04W1A101EL	Electrolytic 100μF 10WV	
Ct74~77	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ct78~81	CK45F1H473Z	Ceramic 0.047μF +80%-20%	
Ct82	CC45TH1H390J	Ceramic 39pF ±5%	
Ct83	CC45CH1H150J	Ceramic 15pF ±5%	
Ct84	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ct85	CQ93M1H103K	Mylar 0.01μF ±10%	
Ct86, 87	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ct88	CK45F1H473Z	Ceramic 0.047μF +80%-20%	
Ct89	CK45B1H471K	Ceramic 470pF ±10%	
Ct90	CE04W1E4R7EL	Electrolytic 4.7μF 25WV	
Ct91	CE04W1A470EL	47μF 10WV	
Ct92	CE04W1E4R7EL	Electrolytic 4.7μF 25WV	
Ct93	CQ09FS1H121J	Polystyrene 120pF ±5%	
Ct94	CE04W1E4R7EL	Electrolytic 4.7μF 25WV	
Ct95	CQ93M1H472K	Mylar 0.0047μF ±10%	
Ct96	CQ93M1H223K	Mylar 0.022μF ±10%	
Ct97	CE04W1C470EL	Electrolytic 47μF 16WV	
Ct99	CE04W1E4R7EL	Electrolytic 4.7μF 25WV	
Ct100	CE04W1C221EL	Electrolytic 220μF 16WV	
Ct101	CQ93M1H152J	Mylar 0.0015μF ±5%	
Ct102	CQ93M1H473J	Mylar 0.047μF ±5%	
Ct103	CQ09FS1H102J	Polystyrene 1000pF ±5%	
Ct104	CE04AW1H3R3MEL	Electrolytic 3.3μF 50WV	
Ct105	CE04AW1HR47MEL	Electrolytic 0.47μF 50WV	
Ct106	CE04AW1H3R3MEL	Electrolytic 3.3μF 50WV	
Ct107	CQ93M1H103K	Mylar 0.01μF ±10%	
Ct108, 109	CE04AW1H3R3MEL	Electrolytic 3.3μF 50WV	
Ct110, 111	CQ93M1H752GMA	Mylar 7500pF ±2% -11,61	
Ct110, 111	CQ93M1H153GMA	Mylar 0.015μF ±2% -21	
Ct112, 113	CE04AW1HR47MEL	Electrolytic 0.47μF 50WV	
Ct116, 117	CE04W1E4R7EL	Electrolytic 4.7μF 25WV	
Ct118, 119	CE04AW1HR68MEL	Electrolytic 0.68μF 50WV	
Ct120~122	CE04W1C100EL	Electrolytic 10μF 16WV	
Ct123, 124	CE04W1E4R7EL	Electrolytic 4.7μF 25WV	
Ct125	CQ93M1H273J	Mylar 0.027μF ±5%	
Ct126, 127	CK45B1H561K	Ceramic 560pF ±10%	
Ct128~132	CK45F1H103Z	Ceramic 0.01μF +80%-20%	
Ct135	CQ93M1H102K	Mylar 0.001μF ±10%	
Ct136	CE04AW1H0R1MEL	Electrolytic 0.1μF 50WV	
Ct137	CQ93M1H103K	Mylar 0.01μF ±10%	
Ct138	CK45F1H473Z	Ceramic 0.047μF +80%-20%	
Ct139	CC45SL1H271K	Ceramic 270pF ±10%	
Ct140, 141	CQ93M1H153GMA	Mylar 0.015μF ±2% -11	
	CQ93M1H752GMA	Mylar 7500pF ±2% -21, -61	
RESISTOR			
Rt7,12,15,20,23,26,32,35,38,41,53, 55,62,66,70,74,85,91,124,135,136	RD14GY2E101JMA	Flame-proof carbon 100Ω ±5% 1/4W	
Rt110	RD14GY2E560JMA	Flame-proof carbon 56Ω ±5% 1/4W	
Rt109, 110	RN92BC2E332F	Metal film 3.3kΩ ±1% 1/4W	
Rt114	RD14GY2E220JMA	Flame-proof carbon 22Ω ±5% 1/4W	
Rt171	R92-0173-05	Carbon 2.2MΩ ±20% 1/2W -11	
SEMICONDUCTOR			
Qt1	V09-0071-05	FET 2SK55 (D)	
Qt2~5	V03-0098-05	Transistor 2SC535 (B, C)	
	V03-0091-05	or 2SC381 (R,O)	
Qt6	V09-0071-05	FET 2SK55 (D, E)	
Qt7~13	V03-0098-05	Transistor 2SC535 (B,C)	
	V03-0091-05	or 2SC381 (R, O)	
Qt14	V09-0110-05	FET 2SK68 (L, M)	
Qt15, 16	V03-0504-05	Transistor 2SC828A (P, Q)	
	V03-0270-05	or 2SC945 (P, Q)	
Qt17	V03-9991-05	Transistor 2SC828 (R)	
	V03-0405-05	or 2SC945 (P)	
Qt18	V03-0504-05	Transistor 2SC828A (P, Q)	
	V03-0270-05	or 2SC945 (P, Q)	
Qt19	V03-9991-05	Transistor 2SC828 (R)	
	V03-0405-05	or 2SC945 (P)	
Qt20~26	V03-0504-05	Transistor 2SC828A (P, Q)	
	V03-0270-45	or 2SC945 (P, Q)	
ICt1	V30-0177-05	IC μPC577H	
ICt2~6	V30-0087-05	IC TA7060P	
ICt7	V30-0133-05	IC HA1137W (05)	
ICt8	V30-0217-05	IC NJM4558D	
ICt9	V30-9972-05	IC MC1496K	
ICt10	V30-0266-20	IC HA11223W	
ICt11, 12	V30-0271-40	IC NJM4559D (F)	
Dt1~6	V11-0076-05	Diode 1S1555	
	V11-0271-05	or 1S2076	
Dt7	V11-0051-05	Diode 1N60	
Dt8~15	V11-0076-05	Diode 1S1555	
17~22	V11-0271-05	or 1S2076	
POTENTIOMETER			
VRt1	R12-0003-05	Potentiometer 470Ω (B) S meter input level	
VRt2, 3	R12-5018-05	Potentiometer 220kΩ (B) S meter level	
VRt4	R12-1004-05	Potentiometer 4.7kΩ (B) Noise amp input	
VRt5	R12-1037-05	Potentiometer 3.3kΩ (B) VCO	
VRt6	R12-5002-05	Potentiometer 100kΩ (B) Pilot canceller	
VRt7, 8	R12-5002-05	Potentiometer 100kΩ (B) Seperation (WIDE)	
VRt9	R12-1003-05	Potentiometer 2.2kΩ (B) Seperation (NARROW)	
SWITCH			
St1~4	S40-2080-05	Push switch × 4	
St5	S31-2047-05	De-emphasis	
IFT/FERR-INDUCTOR/FILTER			
Tt1	L30-0247-05	FM IFT	
Tt2	L30-0304-05	FM IFT	☆
Tt3	L30-0246-05	FM IFT	
Tt4	L30-0148-15	FM IFT	
Lt1, 2	L40-2292-44	Ferri-inductor 2.2μH	
Lt3	L40-1015-25	Ferri-inductor 100μH (J)	
Lt4~6	L40-2292-44	Ferri-inductor 2.2μH	
Lt7	L40-1805-25	Ferri-inductor 18μH (J)	
Lt8~12	L40-3301-44	Ferri-inductor 33μH	
Lt13	L40-6825-64	Ferri-inductor 6.8mH	
Lt14	L40-2292-44	Ferri-inductor 2.2μH	
BPFt1	L79-0058-05	Band pass filter 1.96MHz	
LPFt1	L79-0062-05	Low pass filter 17.5kHz	☆
CFt1	L79-0069-05	IF filter ass'y	☆
MISCELLANEOUS			
RLt1	S51-2037-05	Read relay	
–	E13-0213-05	Phono Jack 2P × 2	

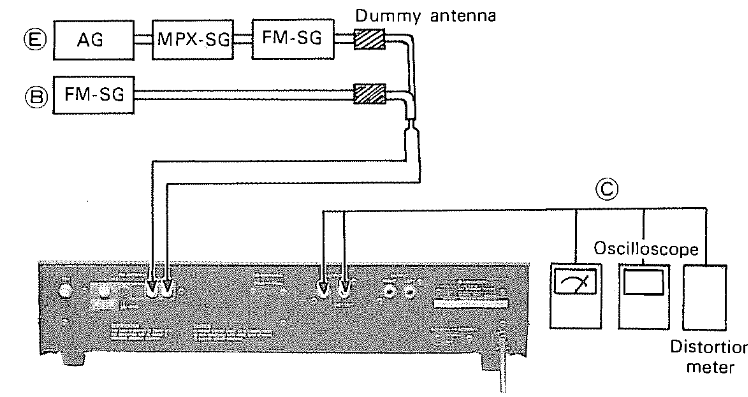
ADJUSTMENT

MUTING switch is OFF and MODE switch is AUTO, unless otherwise specified.

NO.	ALIGNMENT	TEST EQUIPMENT		TUNER SETTING	OUTPUT INDICATOR	ADJUSTMENT POINTS	REMARKS
		CONNECTION	SETTING				
1	IFT *1	Ⓐ	95 MHz 1 kHz (Mod) 75 kHz (Dev)	95 MHz WIDE	Lissajous' figure	La10, Tt1	Symmetrical waveform and maximum deflection
2a	TRACKING	Ⓑ	90 MHz 1 kHz (Mod) 75 kHz (Dev)	90 MHz WIDE	Ⓒ	La8, La7, La5, La4, La3, La1	Maximum deflection
2b	TRACKING	Ⓑ	106 MHz 1 kHz (Mod) 75 kHz (Dev)	106 MHz WIDE	Ⓒ	TCa6, TCa5, TCa4, TCa3, TCa2, TCa1	Maximum deflection
3a	S METER	Ⓑ	95 MHz 0 (Dev) 20 dB (ANT input)	95 MHz WIDE	S meter	Tt3	Maximum deflection
3b	S METER	Ⓑ	95 MHz 0 (Dev) 100 dB (ANT input) VRt1→Max.	95 MHz WIDE	S meter	VRt2	S meter indication is "10".
3c	S METER	Ⓑ	95 MHz 0 dB 7 dB (ANT input)	95 MHz WIDE	S meter	VRt1	S meter indication is "1".
4a	T METER	Ⓑ	95 MHz 1 kHz (Mod) 75 kHz (Dev)	95 MHz WIDE	Ⓒ	Position of tuning knob	Adjust the tuning knob so that the noise appears symmetrically on upper and lower peaks of the weak antenna input signal. *2
4b	T METER	Ⓑ	95 MHz 1 kHz (Mod) 75 kHz 60 dB (ANt input)	95 MHz WIDE	T meter	Tt2	T meter's pointer is in the center zone.
5	NOISE AMP	Ⓑ	95 MHz 1 kHz (Mod) 75 kHz (Dev) SG output (ANT input)→Min.	95 MHz NARROW	Gate of Qt14	VRt4*3	Adjust VRt4 so that the gate potential of Qt4 becomes 7~7.5V. Then, confirm that T meter operates with a 7 dB FM signal (ANT input)
6	MUTING LEVEL	Ⓑ	95 MHz 1 kHz (Mod) 75 kHz (Dev) 29 dB (ANT input) MUTING : ON	95 MHz WIDE	Ⓒ	VRt3	VRt3's position is where output can be derived.
7	VCO	Ⓑ	95 MHz 0 (Dev) 60 dB (ANT input)	95 MHz WIDE	Ⓓ	VRt5	76 kHz ± 200 Hz
8	19 kHz CANCELLER	Ⓔ	95 MHz Pilot signal 60 dB (ANT input)	95 MHz WIDE	SSVM to pin-5 and pin-6 of ICt10	VRt6	Minimum output (average value of L and R)
9a	SEPARATION (1)	Ⓔ	95 MHz 1 kHz (Mod) 68.25 kHz (Dev) 60 dB (ANT input) SELECTOR→L	95 MHz WIDE	Ⓒ	VRt7	Minimum crosstalk
9b	SEPARATION (2)	Ⓔ	95 MHz 1 kHz (Dev) 68.25 kHz (Dev) 60 dB (ANT input) SELECTOR→R	95 MHz WIDE	Ⓒ	VRt8	Minimum crosstalk
9c	SEPARATION (3)	Ⓔ	95 MHz 1 kHz (Mod) 68.25 kHz (Dev) 60 dB (ANT input) SELECTOR→L (R)	95 MHz NARROW	Ⓒ	VRt9	Minimum crosstalk (average value of L and R)
10	DISTORTION	Ⓔ	95 MHz 1 kHz (Mod) 68.25 kHz (Dev) 60 dB (ANT input) SELECTOR→L + R	95 MHz WIDE	Ⓒ	La10*4	Minimum distortion

TEST INSTRUMENTS

- Oscilloscope .... **OSC**
- AM signal generator .... **AM-SG**
- FM signal generator .... **FM-SG**
- Audio generator .... **AG**
- Digital voltmeter .... **SSVM**
- FM multiplex generator .... **FM-MPX**
- Frequency counter
- DC voltmeter



NOTES ON ADJUSTMENT

1. The IFT needs no adjustment. But after replacement it should be adjusted. If it is adjusted, the IF detector must be manufactured.
2. Refer to the figure.
3. VRt4 must have been turned fully clockwise until VR4 is adjusted, since it affects muting operation.
4. If La10 is turned, the S-meter indication will vary. Then, 3b and 3c must be readjusted.
5. The local oscillator, which is included in the variable capacitor, has been adjusted at the time of delivery.
6. 0 dB = 1 μV.
7. Tt4 has been adjusted by the special tool, and it must be changed.

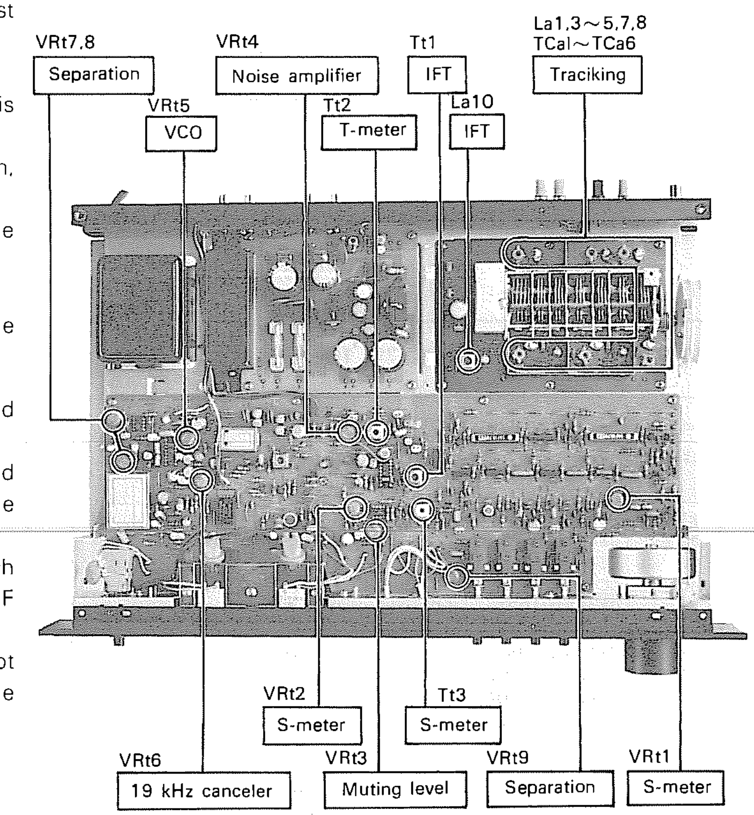
However, the Tt4 must be readjusted when the second local oscillator (Qt3) has been replaced.

First, tune the 85 MHz non-modurated signal, and measure the first IF frequency which outputs from Tt1 by the frequency counter.

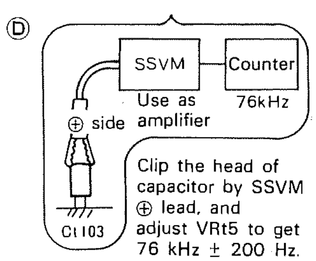
Next, adjust Tt4 so that the second IF frequency which outputs from ICt6 pin-6 becomes the value of the first IF frequency divided by 5.5

If the frequency counter which can measure 10.7 MHz is not available, set the central frequency of the ceramic filter to the first IF frequency.

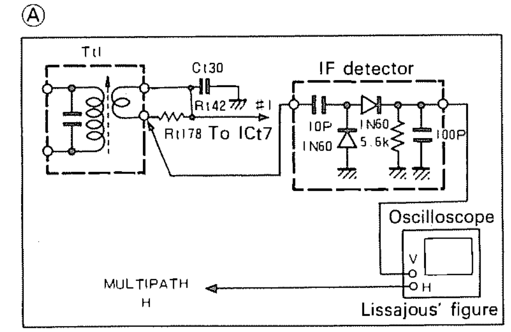
Red:	10.70 kHz
Blue:	10.68 kHz
Orange	10.72 MHz
Brown:	10.66 MHz
Gray:	10.74 MHz
Black:	10.64 MHz
White:	10.76 MHz



Ⓓ

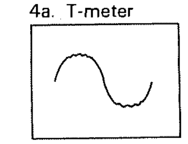


Ⓐ



* 2

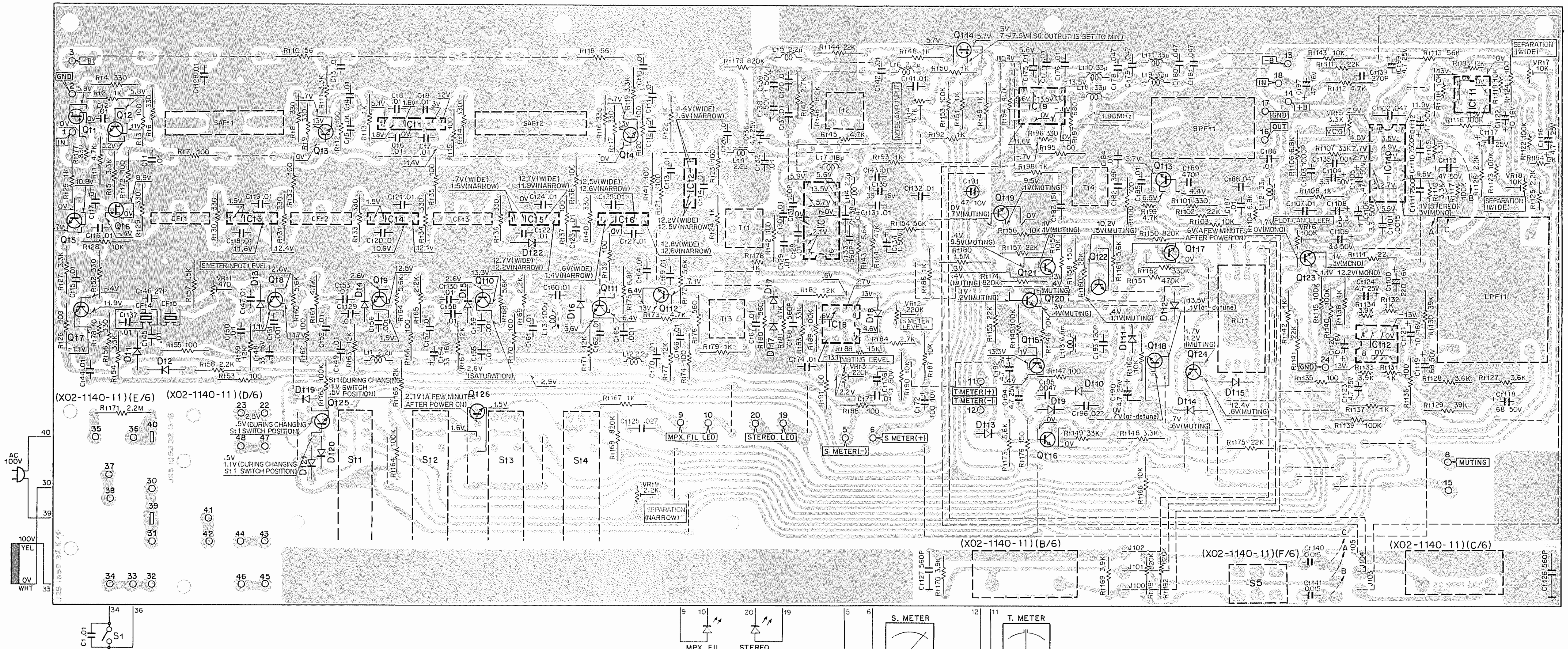
4a. T-meter

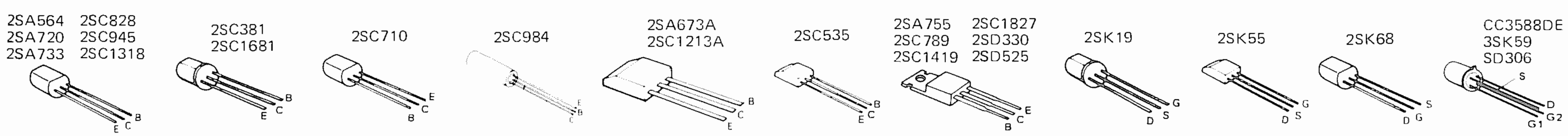


Adjust the tuning knob so that the noise appears symmetrically on upper and lower peaks of the weak antenna input signal.

PC BOARD

▼ IF (X02-1140-11)

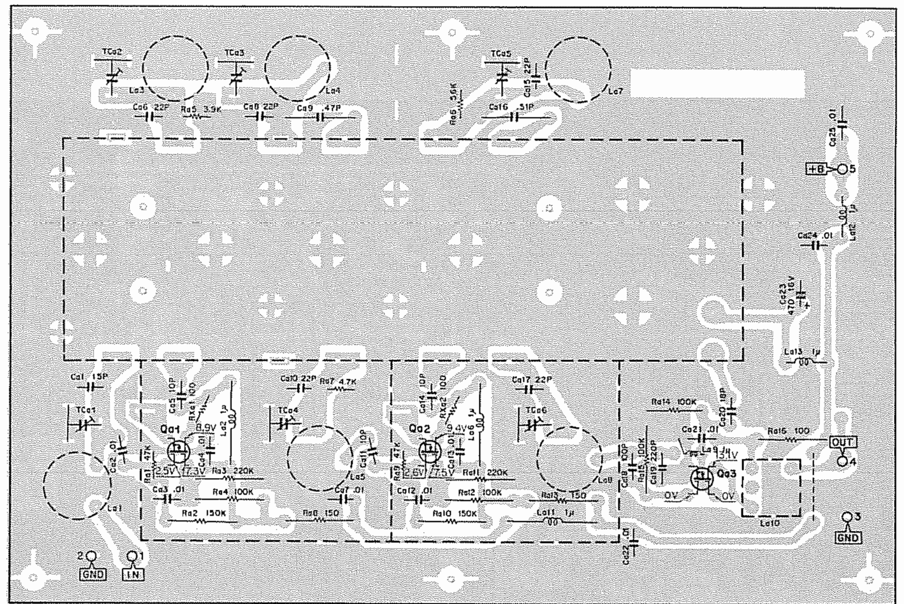


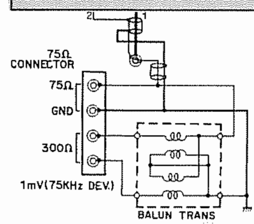


Q1	: 2SK55 (D)
Q2～5,7～13	: 2SC535 (B,C) or 2SC381 (R,O)
Q6	: 2SK55 (D,E)
Q14	: 2SK68 (L,M)
Q15,16,18,20～26	: 2SC828A (P,Q) or 2SC945 (P,Q)
Q17,19	: 2SC828 (R) or 2SC945 (P)
D1～6,8～15,17,19～22	: 1S2076 or 1S1555
D7	: 1N60
IC1	: μPC577H
IC2～6	: TA7060P
IC7	: HA1137W-05
IC8	: NJM4558D
IC9	: MC1496K
IC10	: HA11223W
IC11,12	: NJM4559D (F)

PC BOARD/SEMICONDUCTOR SUBSTITUTIONS

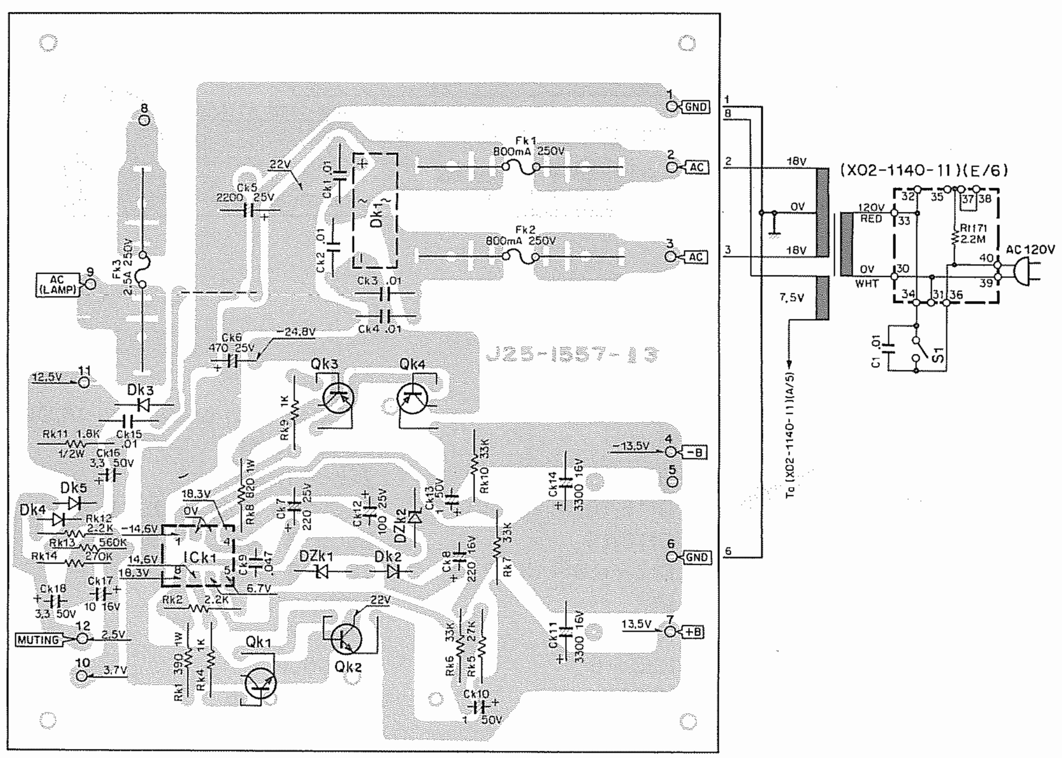
▿ FM FRONT END (X01-1270-10)





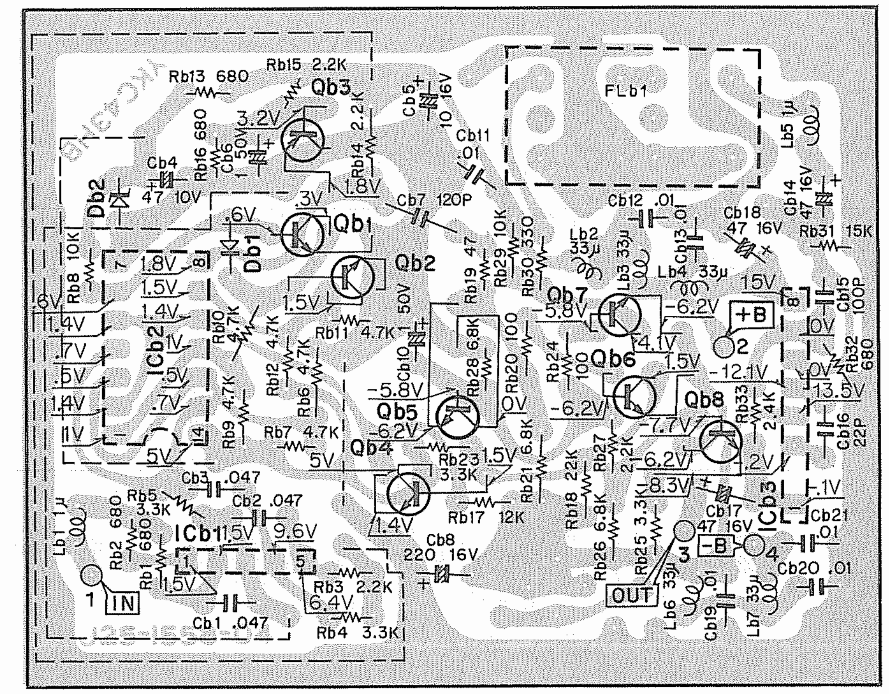
Qa1,2: CS3588DE, Qa3: 3SK59(Y)

▿ POWER SUPPLY (X00-1980-11)



Qk1: 2SC945(P,Q), Qk2: 2SD330(D,E) or 2SC1419(B,C), Qk3: 2SA733(P,Q), Qk4: 2SA755(B,C), Dk1: SIRBA10, Dk2,4,5: 1S2076 or 1S1555, Dk3: WO6B, DZk1: EQA01-06S, DZk2: EQA01-18R, ICk1: NJM4558D.

▿ PULSE COUNT DETECTOR (X02-1130-00)



Qb1,2,4,5: 2SC535(B,C), Qb3: 2SA733(Q,R), Qb6,7: 2SC535(C), Qb8: 2SC1681(GR,BL), ICb1: TA7060P, ICb2: SN74LS03, ICb3: HA1457, Db1: 1S2076 or 1S1555, Db2: XZ053.

SEMICONDUCTOR SUBSTITUTIONS

PC BOARD ASS'Y	REF. NO.	SEMICONDUCTOR	SUBSTITUTIONS
X00-1980-11	Qk1	2SC945 (P, Q)	2SC828 (R,Q), 2SC828A (P,Q), 2SC1213A, 2SC1318, 2SC1318A
	Qk2	2SC1419 (B, C), 2SD330 (E, D)	2SD525, 2SC789, 2SC1827
	Qk3	2SA733 (P, Q)	2SA564A, 2SA673A, 2SA720, 2SA720A
	Qk4	2SA755 (B, C)	—
X01-1270-10	Qa1, 2	CC3588DE	SD306
	Qa3	3SK59 (Y)	—
	OSC	2SC710	—
X02-1130-00	Qb1, 2 4～7	2SC535 (B, C)	2SC381 (R, O)
	Qb3	2SA733 (Q, R)	2SA564A, 2SA673A, 2SA720, 2SA720A
	Qb8	2SC1681 (GR, BL)	—
	ICb1	TA7060P	—
	ICb2	SN74LS03	—
	ICb3	HA1457	—
X02-1140-11	Qt1	2SK55 (D)	2SK19
	Qt2～ 5	2SC535 (B, C), 2SC381 (R, O)	—
	Qt6	2SK55 (D, E)	2SK19
	Qt14	2SK68 (L, M)	2SK30A (Q, R, Y)
	Qt15, 16 18, 20～26	2SC828A (P, Q) 2SC945 (P, Q)	2SC984, 2SC1213A, 2SC1318, 2SC1318A
	Qt17, 19	2SC828 (R), 2SC945 (P)	2SC984, 2SC1213A, 2SC1318, 2SC1318A
	ICt1	μPC577H	—
	ICt2	TA7060P	—
	ICt7	HA1137W	—
	ICt8	NJM4558D	NJM4559D, RC4558T

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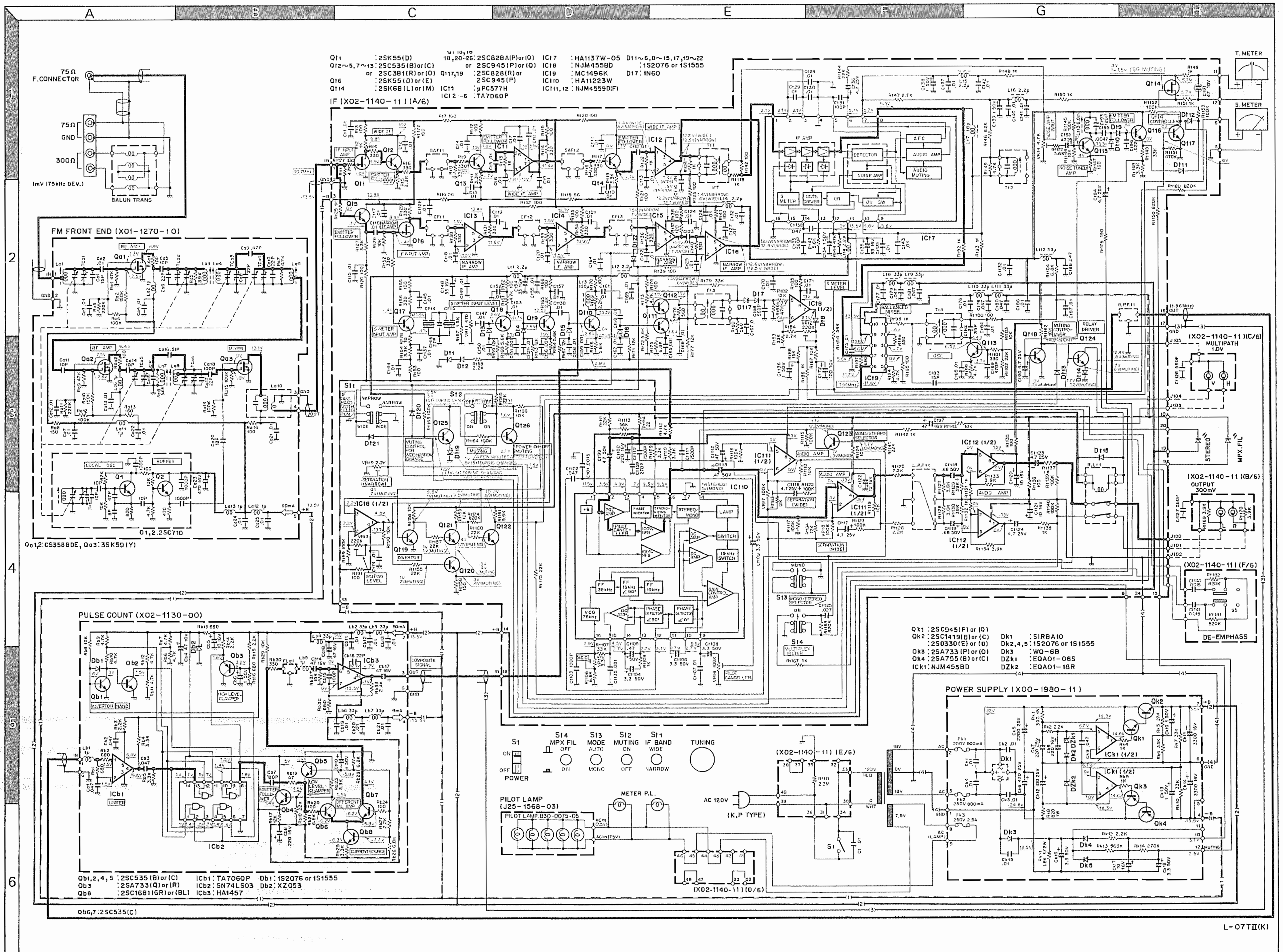
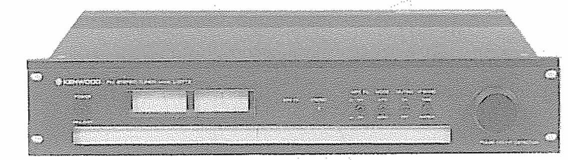
FM STEREO TUNER

L-07TII





PERFORMANCE

Usable Sensitivity	9.8 dBf	(1.7 μV)
50 dB Quieting Sensitivity		
(Mono)	14.7 dBf	(3.0 μV)
(Stereo)	37.2 dBf	(40 μV)
Signal to Noise Ratio		
(Mono)	84 dB	
(Stereo)	80 dB	
Total Harmonic Distortion	WIDE	NARROW
Mono at 1,000 Hz	0.035%	0.14%
50 Hz ~ 10,000 Hz	0.06%	0.27%
15,000 Hz	0.075%	0.075%
Stereo at 1,000 Hz	0.065%	0.2%
50 Hz ~ 10,000 Hz	0.1%	0.5%
15,000 Hz	0.5%	1.5%
Capture Ratio	0.7 dB	1.3 dB
Alternate Channel Selectivity	30 dB	100 dB (400 kHz)
Stereo Separation		
at 1,000 Hz	52 dB	50 dB
50 Hz ~ 10,000 Hz	45 dB	38 dB
15,000 Hz	40 dB	32 dB
Frequency Response	20 Hz to 15,000 Hz +0.2 dB, −1.0 dB	
Spurious Response Ratio	120 dB	
Image Response Ratio	120 dB	
IF Response Ratio	110 dB	
AM Suppression Ratio	65 dB	
Sub Carrier Product Ratio	70 dB	
SCA Rejection Ratio	75 dB	
Antenna Impedance	300 ohms balanced & 75 ohms unbalanced	
FM Frequency Range	88 MHz to 108 MHz	
Output Level		
at 400 Hz 100% Mod Fixed	1.0 V,	1.0 k ohms
Multipath Output		
Vertical	0.1 V,	1 k ohms
Horizontal	0.3 V,	10 k ohms
FM DET Out	0.3 V,	10 k ohms

GENERAL

Power Consumption	28 watts		
Dimensions	W	18-29/32"	(480 mm)
	H	3-15/16"	(100 mm)
	D	13-15/32"	(342 mm)
Weight (Net)	17.2 lbs	(7.8 kg)	
(Gross)	20.95 lbs	(9.5 kg)	

2SA564 2SC828
2SA720 2SC945
2SA733 2SC1318

2SC381
2SC1681

2SC710

2SC984

2SA673A
2SC1213A

2SC535

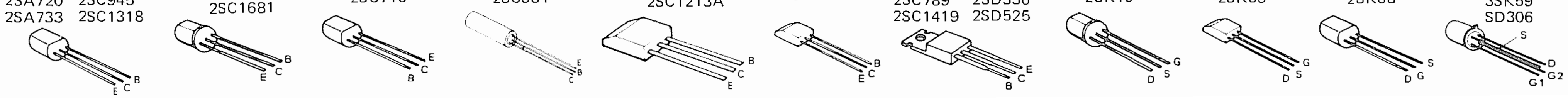
2SA755 2SC1827
2SC789 2SD330
2SC1419 2SD525

2SK19

2SK55

2SK68

CC3588DE
3SK59
SD306



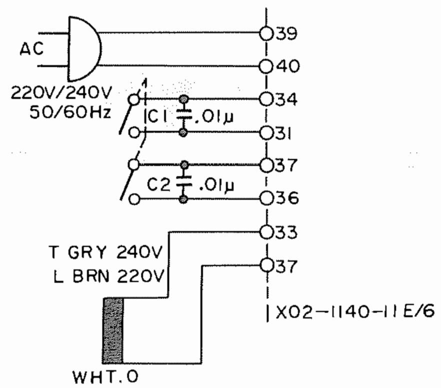
DC voltages and Dc currents are measured with 20kΩ/V VOM under stereo broadcast reception.

L-07TII L-07TII

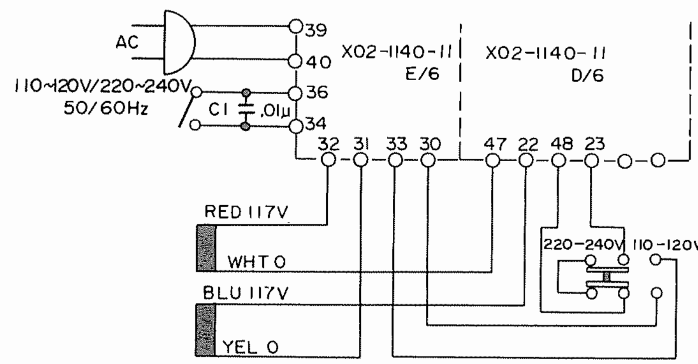
ALTERNATE SCHEMATIC DIAGRAM

▿ POWER CIRCUIT

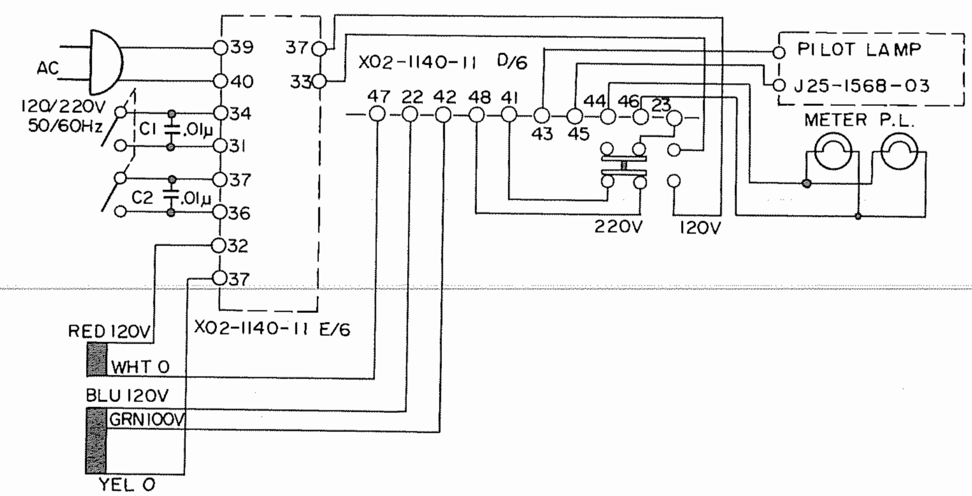
(1) T, L type



(2) M type

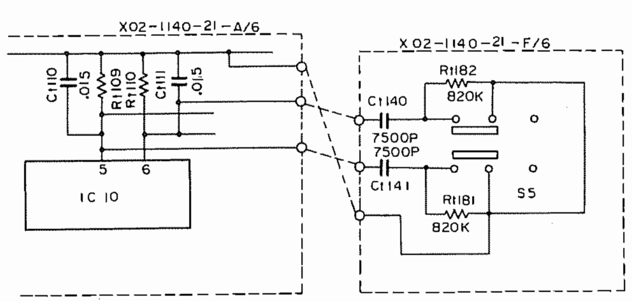


(3) W type

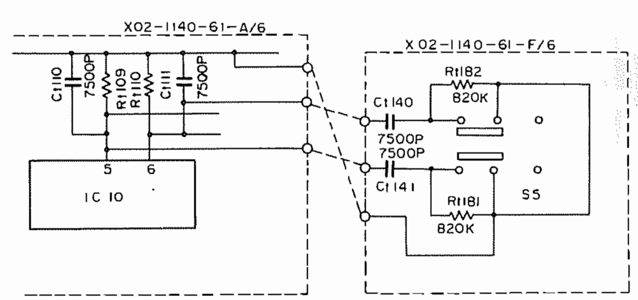


▿ DE-EMPHASIS CIRCUIT

(1) X02-1140-21



(2) X02-1140-61



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