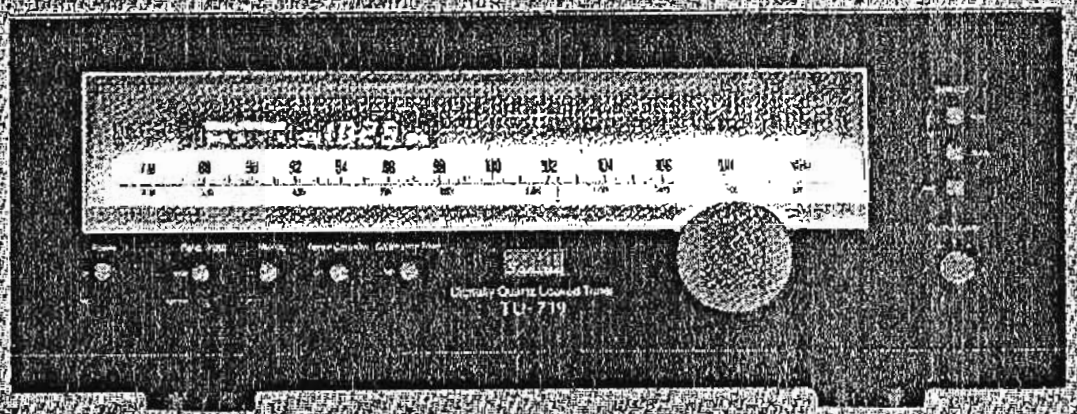


SERVICE MANUAL

DIGITALLY QUARTZ-LOCKED TUNER

SANSUI TU-719



SPECIFICATIONS

FM Section

Tuning range	88 to 108 MHz
Usable Sensitivity	
Mono (HF)	27.0 dBf (65 μ V, 1000 Hz)
DIN	0.95 μ V
Stereo (HF)	16.0 dBf
50 dB Quieting Sensitivity	
Mono	13.0 dBf
Stereo	25.0 dBf
Signal to noise ratio at 65 dBf	
Mono	6.5 dB
Stereo	16.0 dB
Distortion at 65 dBf (WIDE)	
Mono	less than 0.1% at 100 Hz
	less than 0.07% at 1000 Hz
	less than 0.1% at 6000 Hz
Stereo	less than 0.1% at 100 Hz
	less than 0.05% at 1000 Hz
	less than 0.1% at 6000 Hz
Alternate channel selectivity (at 400 kHz)	
WIDE	60 dB
NARROW	30 dB
Capture ratio	1.0 dB
Image response ratio	60 dB (at 98 MHz)
Spurious response ratio	45 dB (at 98 MHz)
Stereo separation	
	35 dB at 100 Hz
	40 dB at 1000 Hz
	35 dB at 6000 Hz
Frequency response	30 to 14,000 Hz
	+0.2 dB, -0.5 dB
Antenna input impedance	
	300 ohms balanced
	75 ohms unbalanced

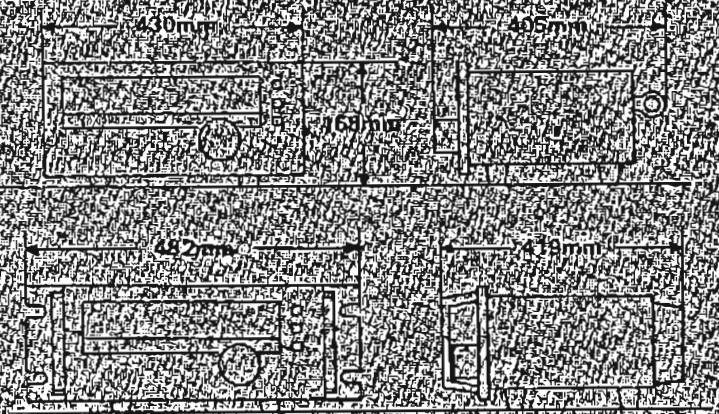
AM Section

Tuning range	540 to 1,600 kHz
Usable sensitivity (Bar antenna)	
	47 dBm (220 μ V/m)
Selectivity (10 kHz)	35 dB
Signal to noise ratio	36 dB

Others

Output voltage and impedance	
	0 to 7.5 mV/2 Ω (100 Hz)
Power requirements	100/120/220/240 V, 50/60 Hz
(For U.S.A. and Canada)	120 V, 60 Hz
Power consumption	23 W

Dimensions



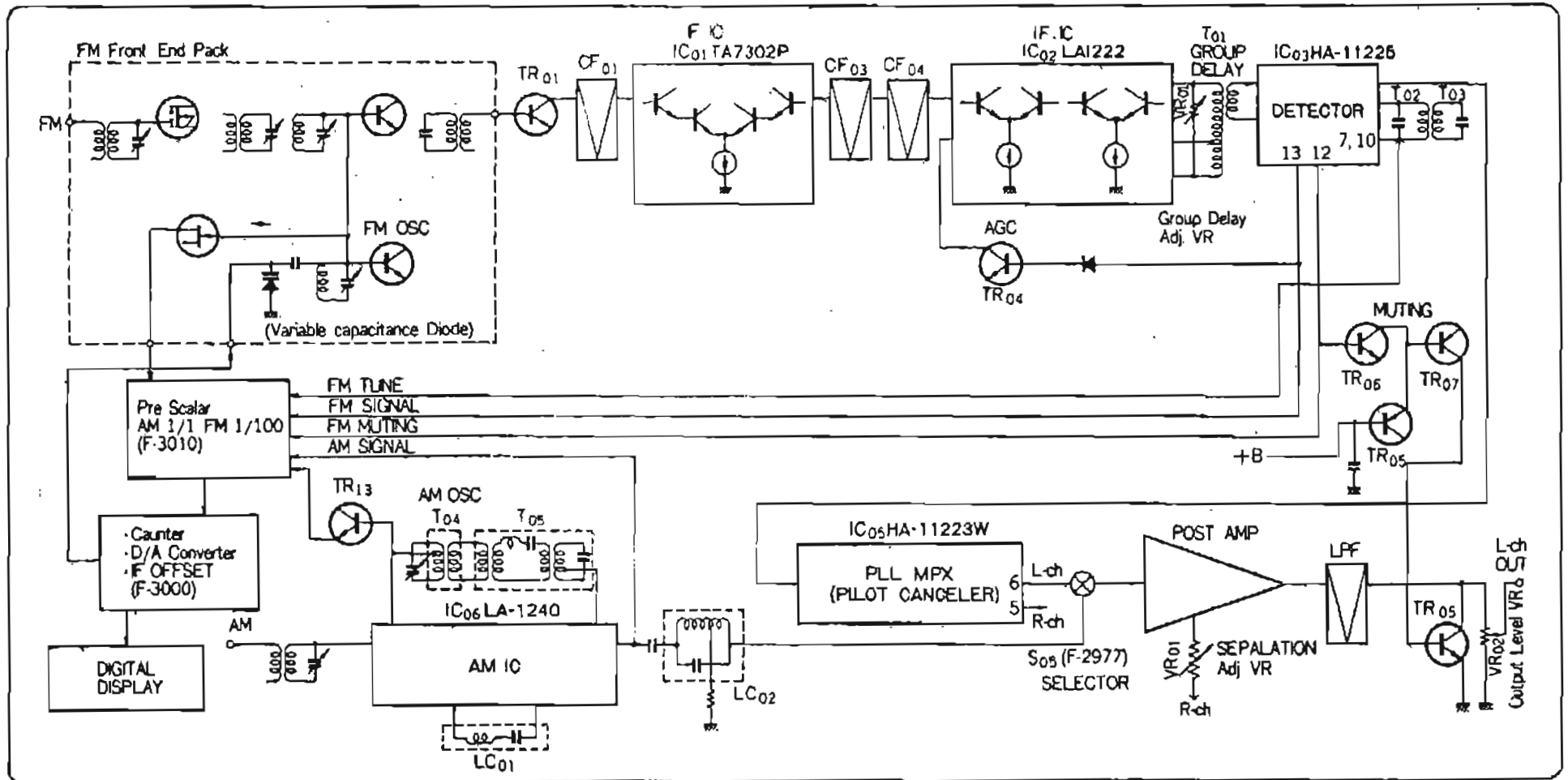
Weight	
	9.0 kg (19.8 lbs) net
	11.0 kg (24.3 lbs) packed

- * Design and specifications subject to changes without notice for improvements.
- * In order to simplify the explanation, illustrations may sometimes differ from the originals.



SANSUI ELECTRIC CO., LTD.

1. BLOCK DIAGRAM



2. OPERATIONS

2-1. Description of HA11223W

(1) Outline (See Figs. 2-1, 2-2, and 2-3.)

• The IC HA11223W is a PLL-MPX IC with a low distortion factor and a high signal-to-noise ratio. This IC performs two significant functions during stereophonic reception, namely a beat-reducing function for high frequencies and a pilot-cancelling function. In this section, a recently developed pilot canceler circuit is described.

• When decoding composite signals (composed of main signal, pilot signal, and subsignal), right-side and left-side signal can be obtained, but the pilot signal is also decoded so that it appears at output on the right and left channels as shown in Fig. 2-1. These signals, when amplified by an amplifier, are distorted by the non-linear part characteristic of the amplifier, resulting in poor tones. To avoid this, the pilot signals must be removed or cancelled from the composite signals before the decoder.

Fig. 2-2 shows how the pilot signals are cancelled in the IC HA11223W.

(2) Pilot-Cancelling Operation (See Figs. 2-1 and 2-3.)

• In the IC HA11223W, a composite signal (including a pilot signal) applied to the pin 2 is fed to a PLL and a decoder circuit through a preamplifier.

The 19 kHz square wave signal generated by the PLL circuit is advanced in phase by 90 deg against the input pilot signal. This square wave signal, after it is output to the pin 9 through a gain control amplifier (where the gain varies with the pilot signal level), is delayed by 90° in phase and converted to a triangle

wave signal by an external integration circuit connected to the pin 9, then applied to the pilot canceler circuit within IC from the pin 4. On the other hand, the composite signal input to the decoder circuit is applied to the pilot canceler circuit to attenuate the pilot signal, and fed to a 100% NFB amplifier, and then output to the pins 5 and 6 as left and right signals through the switching operation of the decoder.

Fig. 2-1
The Output Waveforms of 19 KHz Pilot Signal Switched by 38 KHz

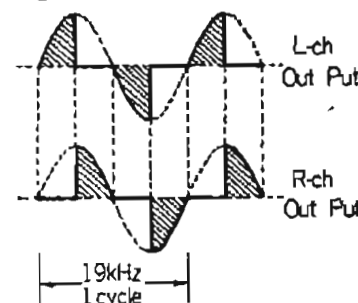


Fig. 2-2
Pilot-Cancelling Operation Waveform

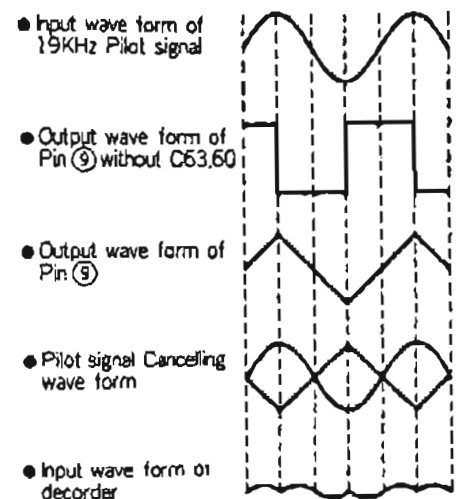


Fig. 2-3 HA11223W (MPXIC)

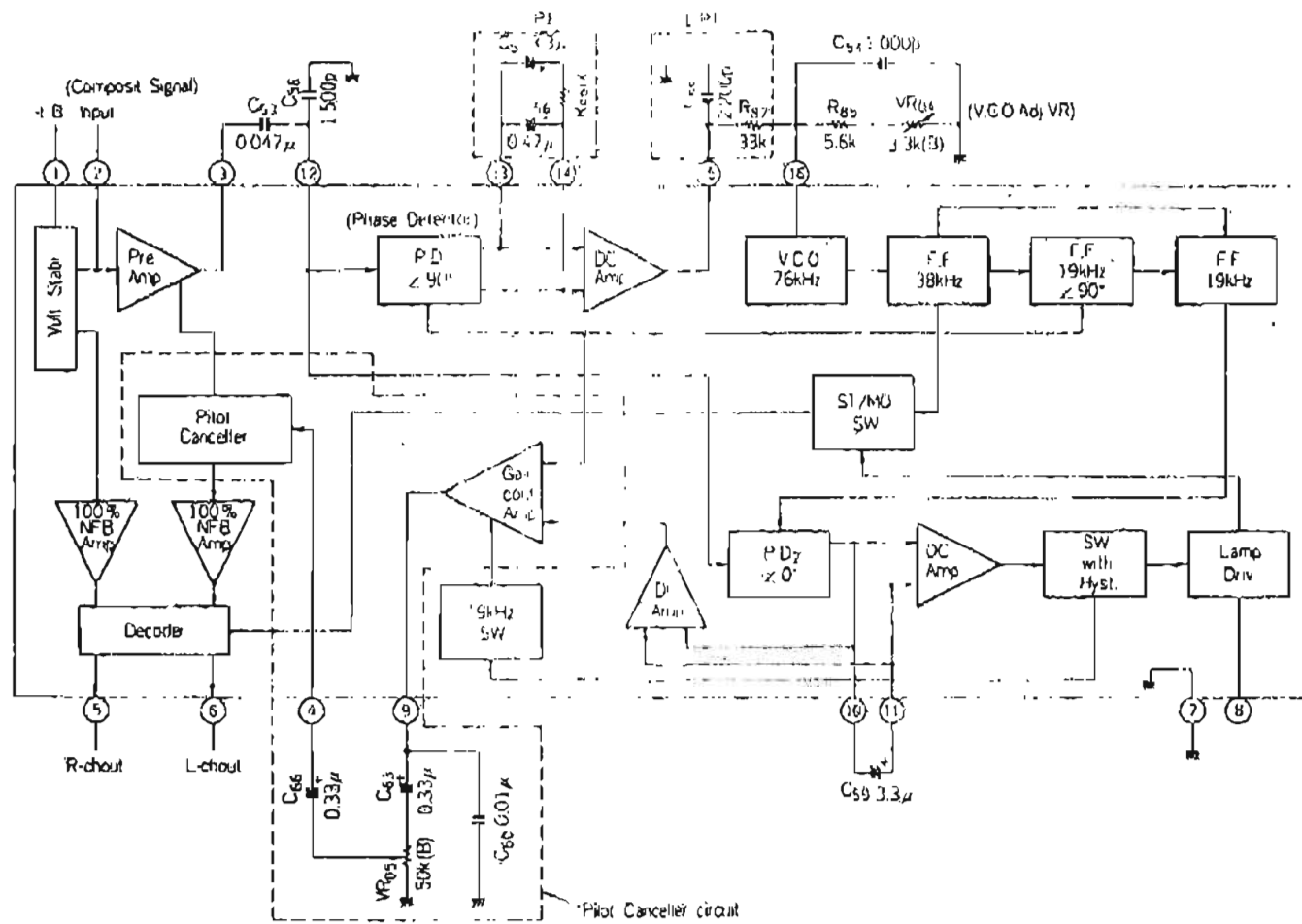


Fig. 2-4 Block Diagram of Digitally Quartz Locked System

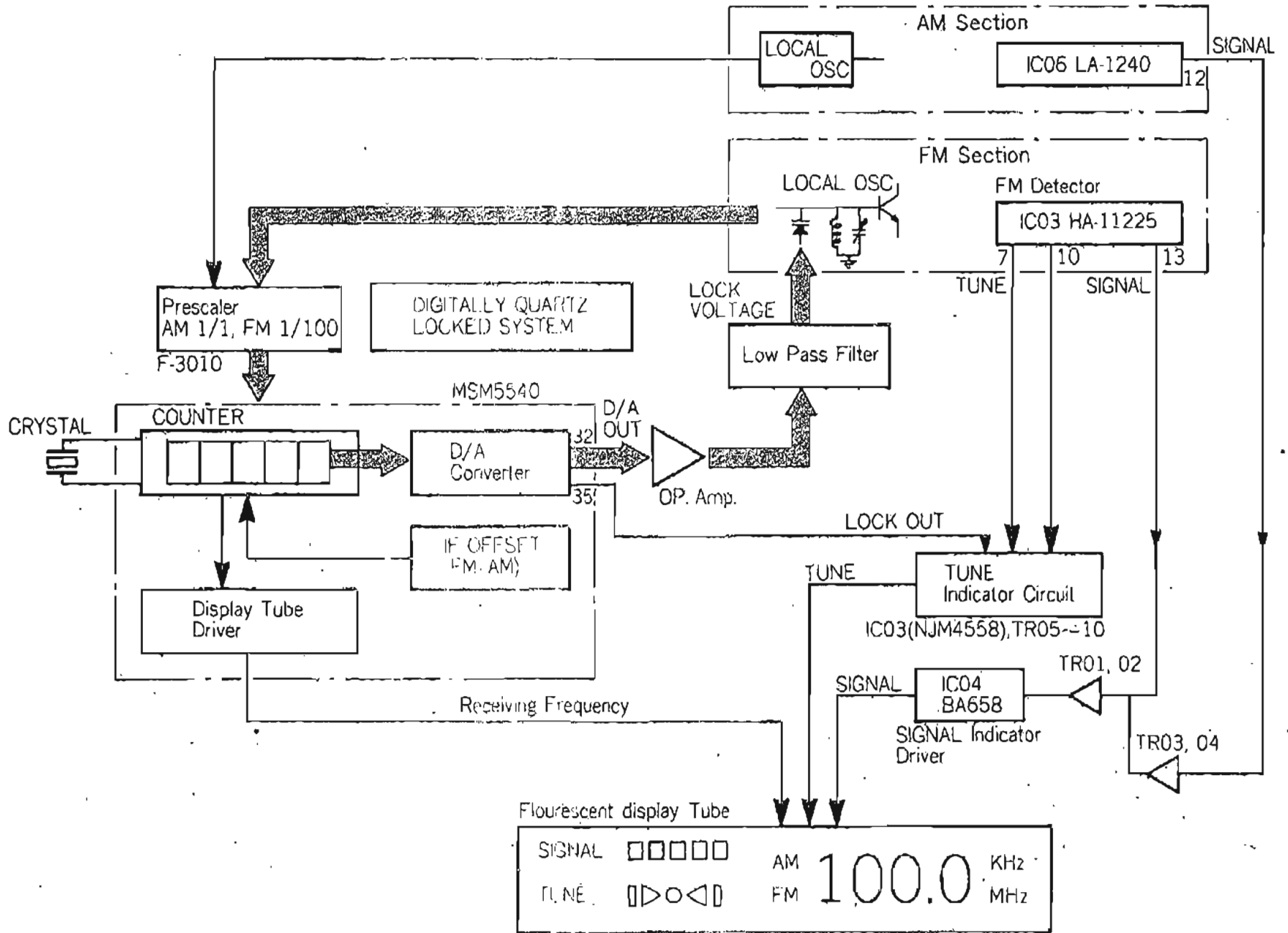


Fig. 2-5 Output of D/A Converter

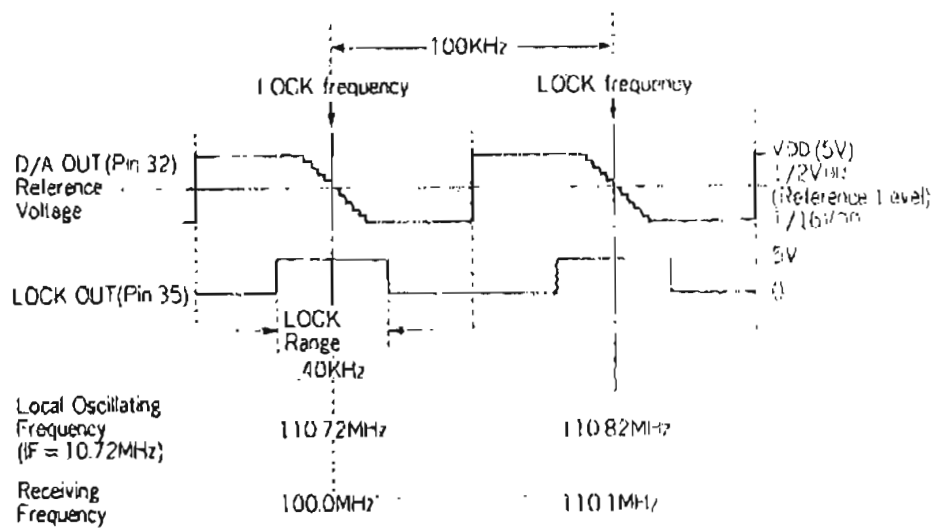
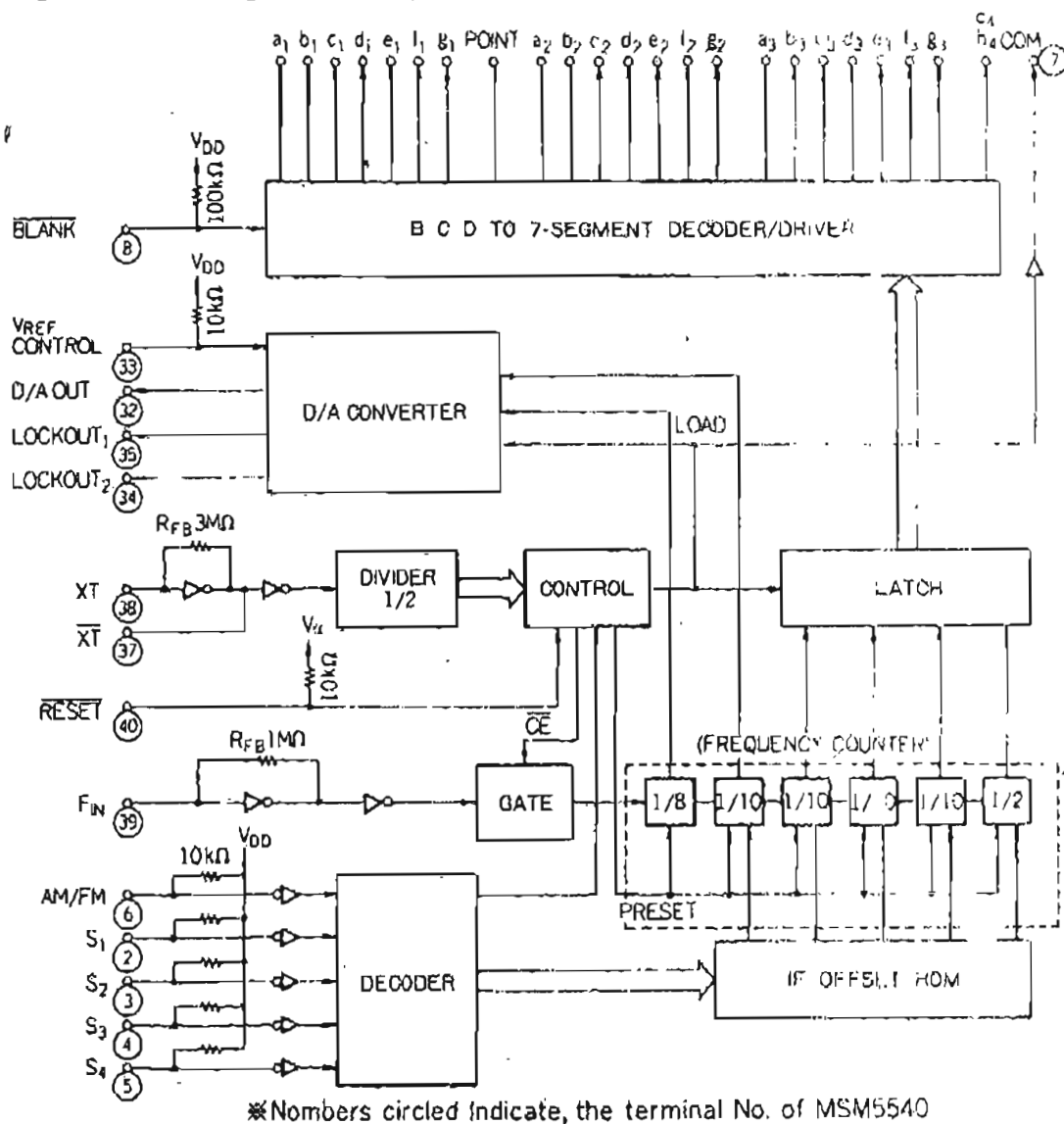


Fig. 2-6 Block Diagram of IC01/MSM5540



2.2 The principle of Digitally Quartz Lock System and Display System for received frequency, SIGNAL and TUNE

(1) Outline

In TU-719, newly developed Digitally Quartz Lock System and Display System for received frequency, electric-field strength (SIGNAL), and tuning or detuning (TUNE) are adopted additionally to the function of conventional FM, AM reception.

(2) Digitally Quartz Lock System (See Figs. 2-4, 2-5)

- Digitally quartz lock system employed in this model is to lock the local oscillating frequency in every 100 kHz increment by adding lock voltage as AFC signal produced by frequency counter & D/A converter to the variable capacitance diode at local oscillator, and making a loop indicated by the large arrows in Fig. 2-4.

Fig. 2-7 IF OFFSET ROM

	SELECT INPUT VALUE					IF FREQUENCY	IF OFFSET ROM VALUE	
	(6) AM/FM	(2) S1	(3) S2	(4) S3	(5) S4			
AM	H	H	H	H	X	454	-453.5	
	H	L	H	H	X	455	-454.5	
	H	H	L	H	X	456	-455.5	
	H	L	L	H	X	449	-448.5	
	H	H	H	L	X	450	-449.5	
	H	L	H	L	X	451	-450.5	
FM	L	H	H	H	H	A	10.62	+10.67
	L	L	H	H	H		10.64	+10.69
	L	H	L	H	H		10.66	+10.71
	L	L	L	H	H		10.68	+10.73
	L	H	H	L	H		10.70	+10.76
	L	L	H	L	H		10.72	+10.77
	L	H	L	L	H	10.74	+10.79	
	L	L	L	L	H	10.76	+10.81	
	L	H	H	H	L	B	10.62	-10.57
	L	L	H	H	L		10.64	-10.59
	L	H	L	H	L		10.66	-10.61
	L	L	L	H	L		10.68	-10.63
	L	H	H	L	L		10.70	-10.65
	L	L	H	L	L		10.72	-10.67
L	H	L	L	L	10.74		-10.69	
L	L	L	L	L	10.76		-10.71	

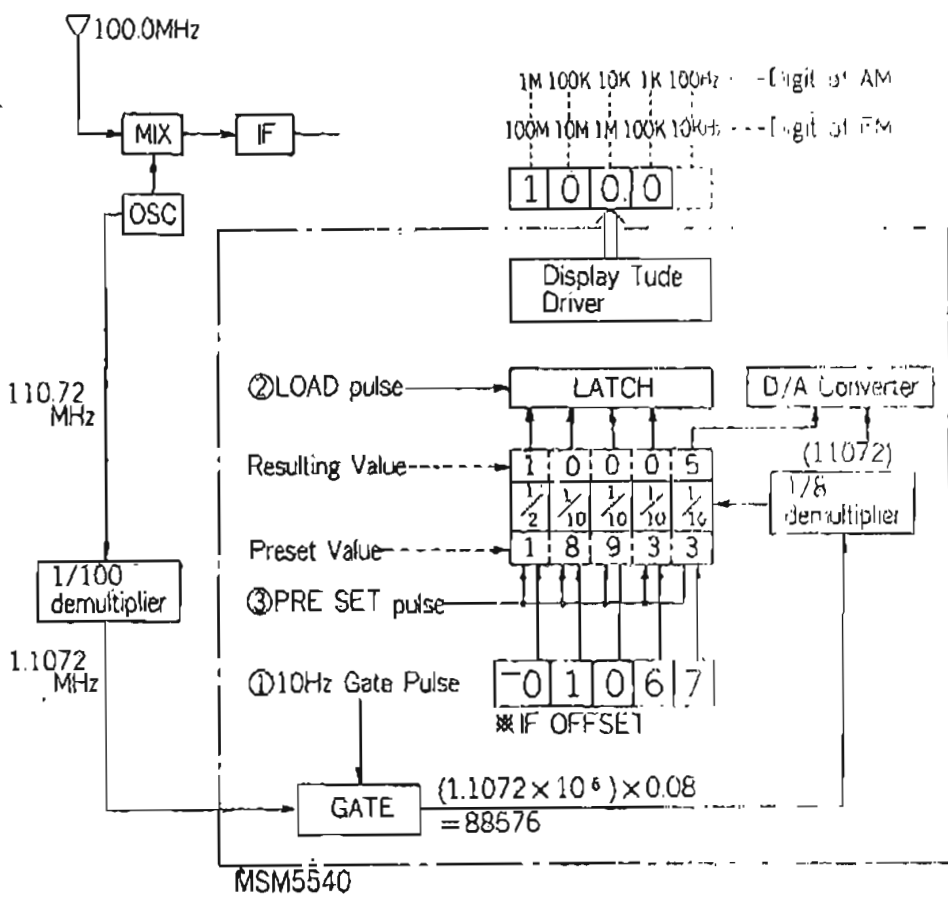
Numbers circled indicate, the terminal No. of MSM5540.
 In the table, (A) shows upper heterodyne and (B) indicates Lower heterodyne.
 IF OFFSET ROM Value does not change in either (H) or (L) Level.

- The output of local oscillator is applied to counter in the MSM5540 after demultiplied into 1/100 by prescaler, then counted till 10 kHz digit. D/A converter generates a voltage proportional to the value of end digit (10 kHz level) and this output is fed to varactor at local oscillator through operational amplifier (OP-amp) and low-pass filter as a lock voltage.
- The practical output of D/A converter (D/A OUT) is as shown in Fig. 2-5. If the local oscillating frequency is risen from the locked frequency for some reason, the output of D/A converter decreases than that of reference voltage, which makes lock voltage applied to varactor dropping. When the reverse voltage (lock voltage) applied to varactor is decreased, the junction capacitance of varactor is enlarged that the oscillating frequency becomes lowered till lock frequency.
- In addition, when tuning, the local oscillating frequency automatically locked with lock frequency if the oscillating frequency becomes within lock range.

(3) Display System for Received Frequency (See Fig. 2-4)

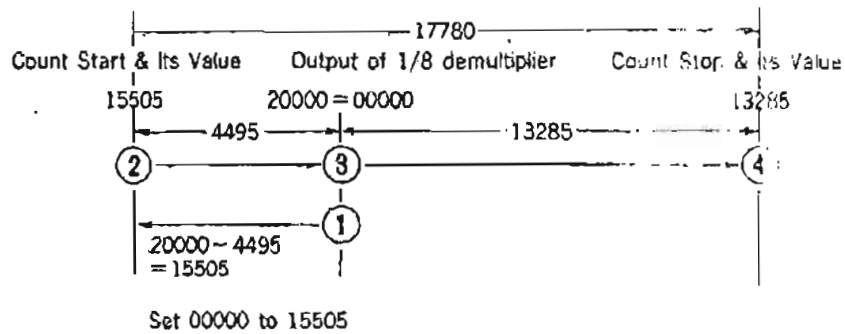
- Display System for Received Frequency consists of FM (or AM) local oscillator, prescaler, frequency counter, display tube driver, and fluorescent display tube as shown in Fig. 2-4. The output of FM (or AM) local oscillator is led to counter in MSM5540 after demultiplied into 1/100 (1/1, in case of AM reception) by the prescaler, however this counter is not only counting the oscillator output after demultiplied but also subtract the value corresponding to the intermediate frequency from the demultiplied local oscillator output, and the left subtracted from its output to the display tube driver.
- Operation of display system for Received Frequency during FM reception (See Fig. 2-8, 2-9)
 The operation of counter and display method are expressed by instancing when receiving FM broadcast of 100.0 MHz. Supposing intermediate frequency as 10.72 MHz, the local oscillating frequency of upper heterodyne reception in case of receiving 100.0 MHz FM broadcast is $100.0 + 10.72 = 110.72$ MHz.
 (In upper heterodyne detection, the receiving frequency is obtained to subtract intermediate frequency from oscillating frequency.)

Fig. 2-8 Display System for Received Frequency

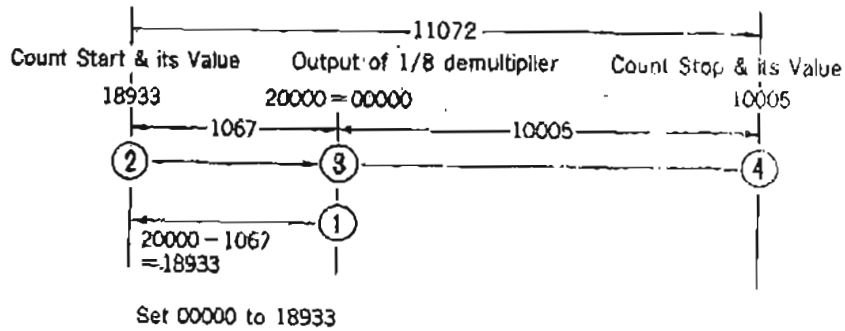


Count Operation

• AM Upper-side heterodyne



• FM Upper-side heterodyne



• This output of local oscillator is applied to MSM5540 as 1.1072 MHz signal after demultiplied into 1/100 by the prescaler. In MSM5540, the signal is led to gate at first then applied to 1/8 demultiplier.

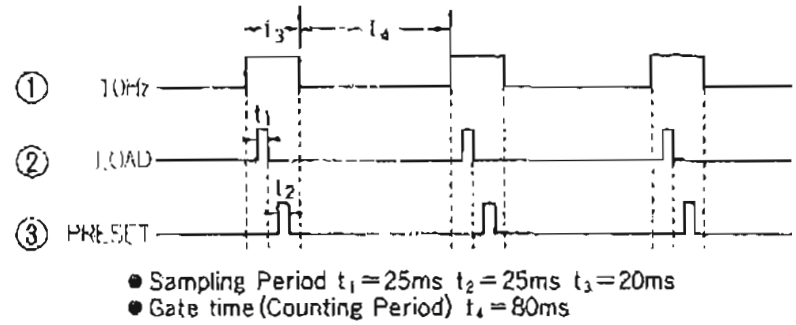
Since the gate is open for 80 msec during 100 msec., pulses $1.1072 \times 10^6 \text{ (Hz)} \times 0.08 \text{ (sec)} = 88576$ are applied to 1/8 demultiplier, thus pulses $88576 \times 1/8 = 11072$ are output from 1/8 demultiplier to counter.

• This counter being the presettable one with maximum count of 20,000, starts counting from the value preset and continues to count from 00000 after reaching the count of 19999.

At first, *IF OFFSET value is preset by the preset pulse in Fig. 2-9, then output pulses of 1/8 demultiplier are counted while the term the gate is open (the term t_4 , 80-msec. of 10 Hz pulses)

* IF OFFSET value is composed of (intermediate frequency) $\times 10^{-4}$ and the value 5 for rounding off the counter value of 10 kHz digit, however the intermediate frequency is transacted as a negative value when upper heterodyne detection and positive value when lower heterodyne detection.

Fig. 2-9 Timing Pulses



In this instance, the IF OFFSET value = $(-10.72 \times 10^6) \times 10^{-4} + 5 = -1067$.

Since the value next to the 19999 is 00000 (20000) in this counter, IF OFFSET value -1067 is preset to the counter as 18933 ($= 20000 - 1067$).

And next, after counting 11072 of 1/8 demultiplier output pulses, the value in the counter is $11072 - 1067 = 10005$ that the counting of 1/8 demultiplier output pulses and addition (or subtraction) of IF OFFSET value is performed simultaneously.

• The value of left four digit on the counter (1000) is led to LATCH by the LOAD Pulse in Fig. 2-9 and retains until the next LOAD pulse is applied.

The value retained in the LATCH (1000) is applied to display tube driver that the display on the tube becomes 100.0 MHz.

• IF OFFSET value can be selected from IF OFFSET ROM (IF OFFSET Read Only Memory) to meet with center frequency (intermediate frequency) of ceramic filter at IF stage. Therefore IF OFFSET value is determined to set voltage level of S1 ~ S4, AM/FM in Fig. 2-6 H or L in accordance with Fig. 2-7.

2. Operation of display system for received frequency during AM reception

• When receiving 1328 kHz broadcast signal by the set with intermediate frequency of 450 kHz and upper heterodyne system, the local oscillating frequency is 1778 ($1328 + 450$) kHz. Output of the local oscillator is led to 1/8 demultiplier through prescaler and the gate.

• While AM reception, the output of local oscillator is not demultiplied by the prescaler that pulses passing through while the gate is open toward 1/8 demultiplier is $1778 \times 10^3 \text{ (Hz)} \times 0.08 \text{ (sec.)} = 142240$. Therefore, the output pulses of 1/8 demultiplier are $142240 \times 1/8 = 17780$, and these pulses are applied to the counter and counted in the same way as FM reception.

• IF OFFSET value during AM reception is the value adding 5 to round off the digit of 0.1 kHz to (intermediate frequency) $\times 10^{-2}$. The intermediate frequency of upperheterodyne is transacted as negative value in the same way as FM reception. The IF OFFSET value is $(-450 \times 10^3) \times 10^{-2} + 5 = -4495$ in this case.

(4) Display system for SIGNAL (See Fig. 2-4)

Electric-field strength is indicated by the amount of signal indicator (1 ~ 8) lumination. The outputs of FM detector IC, HA11225 (pin 13) for signal meter and AM detector IC, LA1240 (pin 12) are applied to BA658 after amplified by TR01, 02 or TR01 ~ 04 respectively, and make the indicator luminous corresponding to the electric-field strength.

(5) Display system for TUNE (See Fig. 2-4)

Tune indicator shows the receiving condition of tuning, detuning or, complete detuning, and is driven by the tune indicator circuit composed of IC03, NJM4558 & TR05 ~ 10. The FM tune indication of tuning (| • |), complete detuning (| |) and upper or lower detuning (▶ ◀) is controlled by output of FM detector IC, HA-11225 (Pin 7, 10) and LOCK OUT signal of MSM5540 (Pin 35).

Fig. 2-10 Display of 7 Segment Type Mosaic Indicator

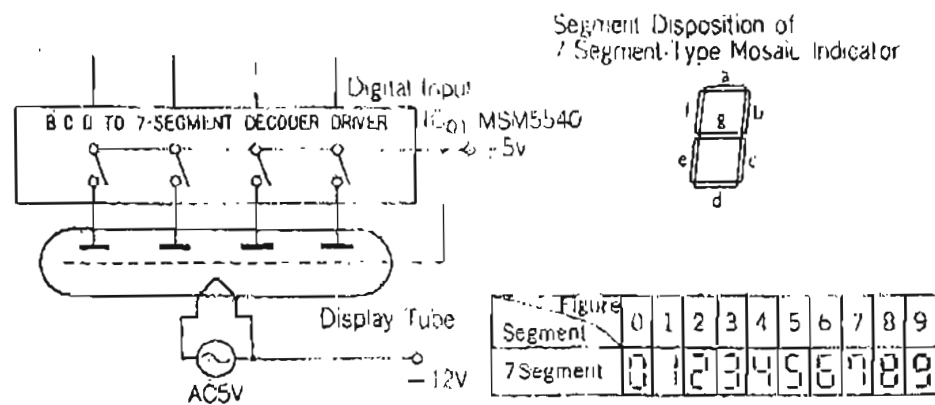
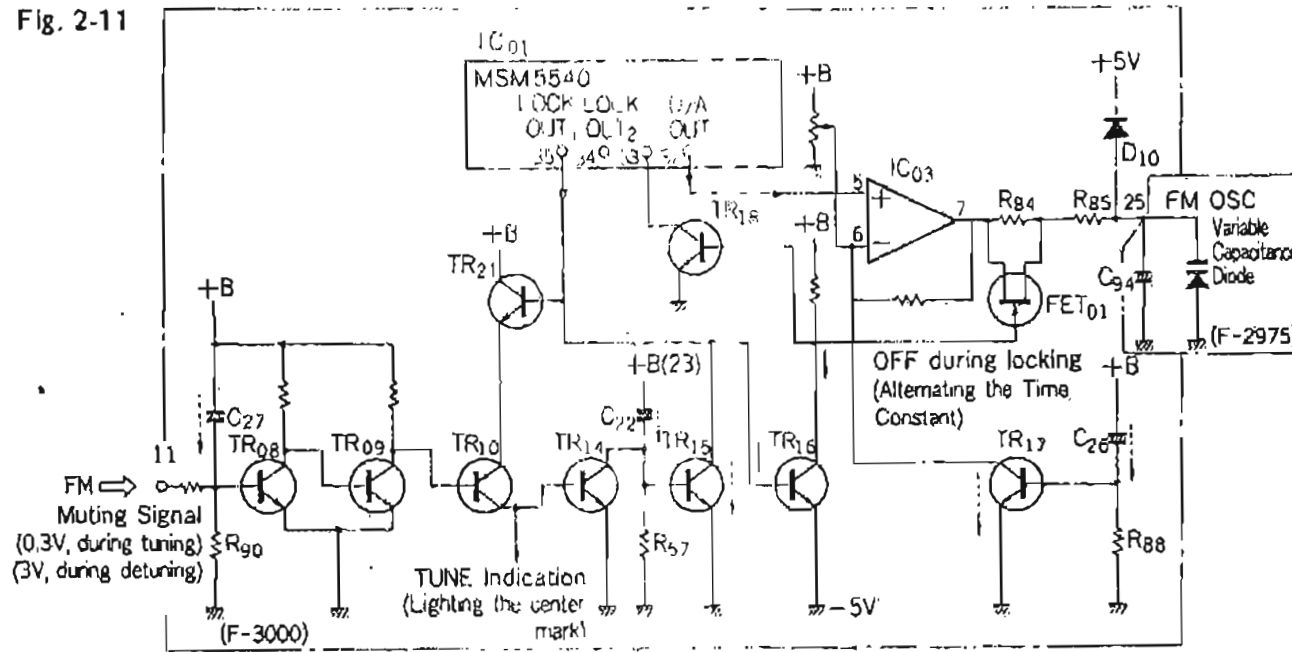


Fig. 2-11



3) Fluorescent Display Tube (See Fig. 2-10.)

The tuner TU-719 uses static type 7-segment fluorescent display tube. The connection is shown in Fig. 2-10. This display tube is a hot-cathode electron tube with a filament and luminous segments (corresponding to plates) coated with fluorescent materials, and can be driven at low operating voltages because space charges are generated by applying positive voltages to its grid. The plates are activated by a driver within the IC 01, MSM5540, and only plates on which a 5 V is impressed become luminous. Since the segments are arranged as shown in Fig. 2-10, when connected to the output of the IC01, they indicate a numeral.

segment fluorescent display tube is connected to the pin 31, if its voltage is +5 V, each mosaic-like segment lights.

In Schematic Diagram, the P₄, P₃, P₂ and P₁ represent 100 MHz, 10 MHz, 1 MHz, and 100 kHz digits.

As has been described previously, in order to perform the counter function within the IC 01 accurately, a quartz element with a frequency of 6.5536 MHz is attached to the pins 37 and 38 to generate the reference time.

- In the AM reception, the AM local oscillating frequency signal fed to the terminal 03 of the F-3010, is demultiplied into 1/1, and then output from the terminal 07 of the F-3010. The following operation is the same as that in the FM reception, but there is a difference: the round-off value is 500 kHz, and the P₄, P₃, P₂ and P₁ shown in Schematic Diagram represent 1 MHz, 100 kHz, 10 kHz and 1 kHz digits.

-3. Each Display Circuit and Actual Operation of Digitally Quartz Locked Circuit

1) Display Operation for Received Frequencies

(See Figs. 2-10, 2-11, and Schematic Diagram.)

- In the FM reception, the FM local oscillating frequency signal is fed to terminal 02 of the circuit board F-3010 and output from terminal 07 through TR 02 after demultiplied into 1/100 by IC 01, and IC 02. This output signal is counted, being fed to the pin 39 of the IC 01, MSM5540 on F-3000. Since the counter within the IC 01, MSM5540 is of presettable type, the preset input to the counter, namely the IF OFFSET value, can be set by connecting (either "H" or "L" connection) any of the A, B and C connected to the pins 2 to 6 of the IC 01 to each other with jumper wires according to the color of the ceramic filter used in the IF stage of the tuner. As the result, the local oscillating frequency minus the preset value is indicated as the received frequency.

The counted value is kept by the LATCH circuit of the IC 01 until the next count is terminated, and then fed to the BCD TO 7-SEGMENT DECODER/DRIVER. Thus, the pins 9 to 31 of the IC 01 carry a +5 V or an open digital signal voltage (See Fig. 2-10) to drive the display tubes directly. When static type 7-

(2) Operation of Digitally Quartz Locked Circuit

1. Locking Operation for FM Reception

(See Figs. 2-11, 2-12 and 2-13.)

- At the FM reception, when the LOCK LED on the panel is lit, a "H" voltage is output from the pin 35 of the IC01 (Fig. 2-11), turning ON the TR 16. Thus, the TR 18 is turned OFF and a "H" voltage develops at the pin 33 of the IC 01. As the result, analog signals of about 2.5 V ± 2 V are output from the pin 32 of the IC 01 and applied to the pin 5 of the IC03.

The operational amplifier IC 03 has a performance characteristic shown in Fig. 2-12. Since the voltage of its pin 6 is set to about 2.5 V by the VR 03, a 7 V output from the pin 7 is fed to the variable capacitance diode of the FM local oscillator through a low-pass filter built with the R 84 and C 94 shown in Fig. 2-11. The FET 01 functions as an on-off switch for the low-pass filter. When locking, the FET 01 is turned OFF and the TR 16 is turned ON. Therefore, the output of IC 03 is smoothed by the

Fig. 2-12 Operation of 1/2 IC03/NJM4558 as a Non-Inverting Amplifier

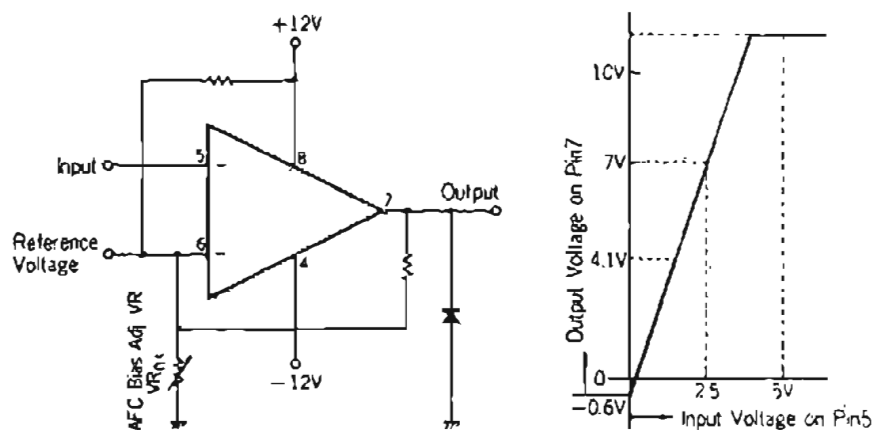


Fig. 2-13 Junction Capacitance VS. Reverse Voltage Characteristic

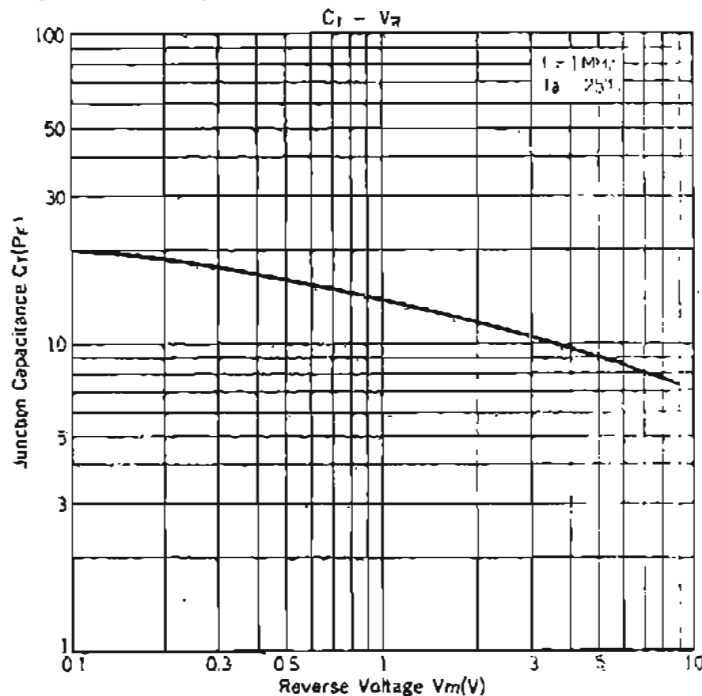
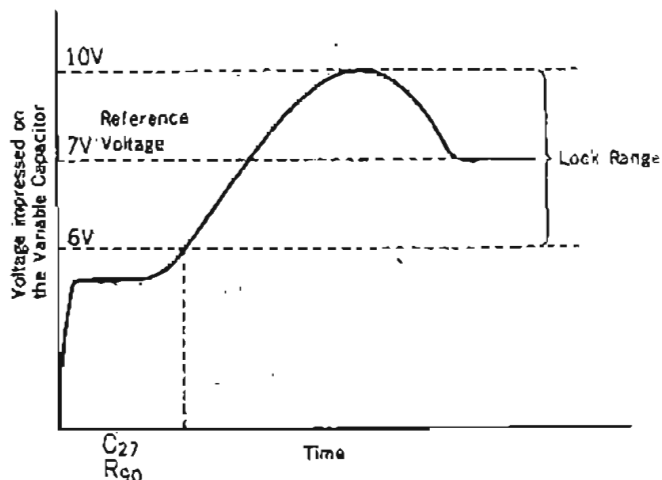


Fig. 2-14



low pass filter and then fed as a Lock Voltage to the variable capacitance diode.

The LOCK operation ceases since the FET 01 is turned ON when both the LOCK OUT signal voltage at the pin 35 and the voltage at the pin 33 are dropped to the "L" level, and simultaneously, the C 94 (Fig. 2-11) is rapidly charged up to 7 V.

- When the local oscillating frequency increases due to temperature drift and the analog signal output from the pin 32 of the IC 01 turns to the "L" level, since the pin 7 of the IC 03 supplies the variable capacitance diode with a "L" level voltage, the depletion layer in the junction of the variable capacitance diode is thinned and its junction capacitance increases. This allows the local oscillating frequency to decrease to its original frequency. (See Fig. 2-11.)

Fig. 2-13 is a diagram of the inverse voltage vs. junction capacity characteristics of the variable capacitance diode (at 1 MHz).

- When the LOCK LED lights, the TR 21 is turned ON, the voltage at the pin 35 of the IC 01 being in the "H" state. As the voltage at the terminal 11 of the F-3000 is 0.3 V during FM reception, with the result that the TRs 08 and 13 are OFF and the TRs 09, 10, and 12 are ON, the LOCK LED is lighted. (See Fig. 11.)

2. Detuning Operation for Received FM Broadcasting Frequencies (See Fig. 2-11.)

- Since the output from the pin 35 of the IC 01 is of "L" level, the TR 16 is turned OFF, the TR 18 ON. The D/A OUT signal at the pin 32 of the IC 01 is fixed to 2.5 V and applied to the pin 5 of the IC 03, developing an output voltage of 7 V at the pin 7. The output from the pin 7 of the IC 03 is fed to the variable capacitance diode through the FET 01, the FET 01 being turned ON with the TR 16 turned OFF. The LOCK LED remains unlighted because a 3 V output voltage develops at the terminal 11 of the F-3000 when detuning.

3. Tuning Operation for Received FM Broadcasting Frequencies (See Figs. 2-11 and 2-12.)

When the local oscillating frequency is tuned in a locked range of 110.72 MHz \pm 20 kHz as shown in Fig. 2-5, since "H" level voltage are output from the pin 35 of the IC 01 (Fig. 2-11) and the TR 16 and TR 18 are turned ON and OFF respectively, a "H" level voltage develops at the pin 33 of the IC 01. Thus, D/A OUT signals of 0.5 V to 4.5 V are output from the pin 32 and fed to the pin 5 of the IC 03. Referring to the performance characteristics of the IC 03 shown in Fig. 2-12, this D/A OUT signal to the pin 5 is output as approx. 6 V ~ 10 V output voltages from the pin 7 of the IC 03 to the variable capacitance diode.

The reference level voltage of the variable capacitance diode is 7 V at a local oscillating frequency of 110.72 MHz. If voltages of less than 7 V are applied to the variable capacitance diode for some reason, the local oscillating frequency is shifted in the plus direction, and if voltages of more than 7 V are applied, it is shifted in the minus direction.

- 4. When Switching Selector from AM to FM or Power Switch from OFF to ON (See Figs. 2-11 and 2-14.)
- When turning off and then on the power switch after locking a FM broadcasting frequency, or when switching the selector switch from AM to FM, the FM frequency may be out of lock. To avoid this, the voltage impressed on the variable capacitance diode is swept from 0 V to 12 V by using two time constant circuits (C 22/R 57, C 26/R 88), and moreover, another time constant circuit (C 27/R 90) is provided, considering the probability that FM OSC. frequency is locked to the 200 kHz-adjacent broadcasting frequency due to this sweep.

- When the selector is switched from AM to FM, the time constant operation is carried out as follows:

A voltage of +12 V is impressed on the terminal 23 of the F-3000, and the TR 15 is kept ON for a given time by the time constant of the C 22 and R 57, and then the output from the pin 35 of the IC 01 is kept to the "L" level for a certain term defined by the time constant. Thus, the TR 18 becomes ON since the TR 16 is turned OFF, and the D/A OUT signal (pin 32) from the IC 01 is fixed to about 2.5 V, whereas the TR 17 is kept ON for a given time by the time constant of the C 26 and R 88, and the voltage at the pin 6 of the IC 03 is dropped, and then a voltage of 12 V develops at the output pin 7 of the operational amplifier IC 03. Since the C 94 on the circuit board F-2975 is fully discharged by the D10, the voltage, applied to the variable capacitance diode, at the terminal 25 on the digital circuit board F-3000 is swept from 0 V to +12 V as shown in Fig. 2-14.

- To prevent the fact that 200 kHz-adjacent broadcasting frequencies may be locked, the TR 08 is kept ON state by the time constant of the C 27 and R 90 and the TRs 09, 10, and 14 are turned OFF. After the time equivalent to this time constant, the TR 08 is turned OFF and the TRs 09, 10, and 14 are turned ON because the voltage at the terminal 11 is dropped to 0 V on receiving a broadcast. As the result, immediately the C 22 is fully discharged, then the TR 15 is turned OFF and the TR 16 is turned ON, the broadcasting frequency is locked.

Fig. 2-15

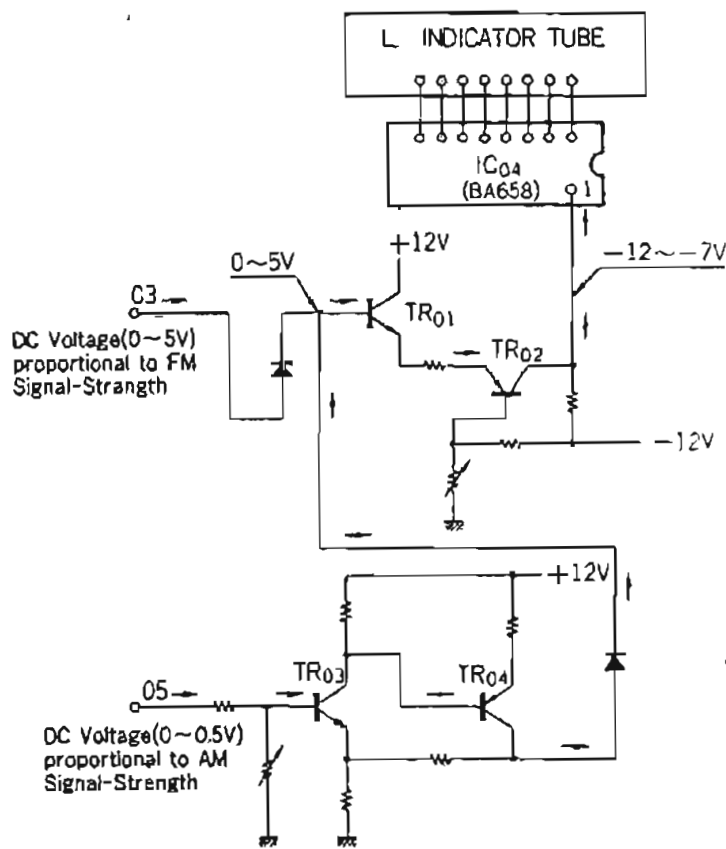
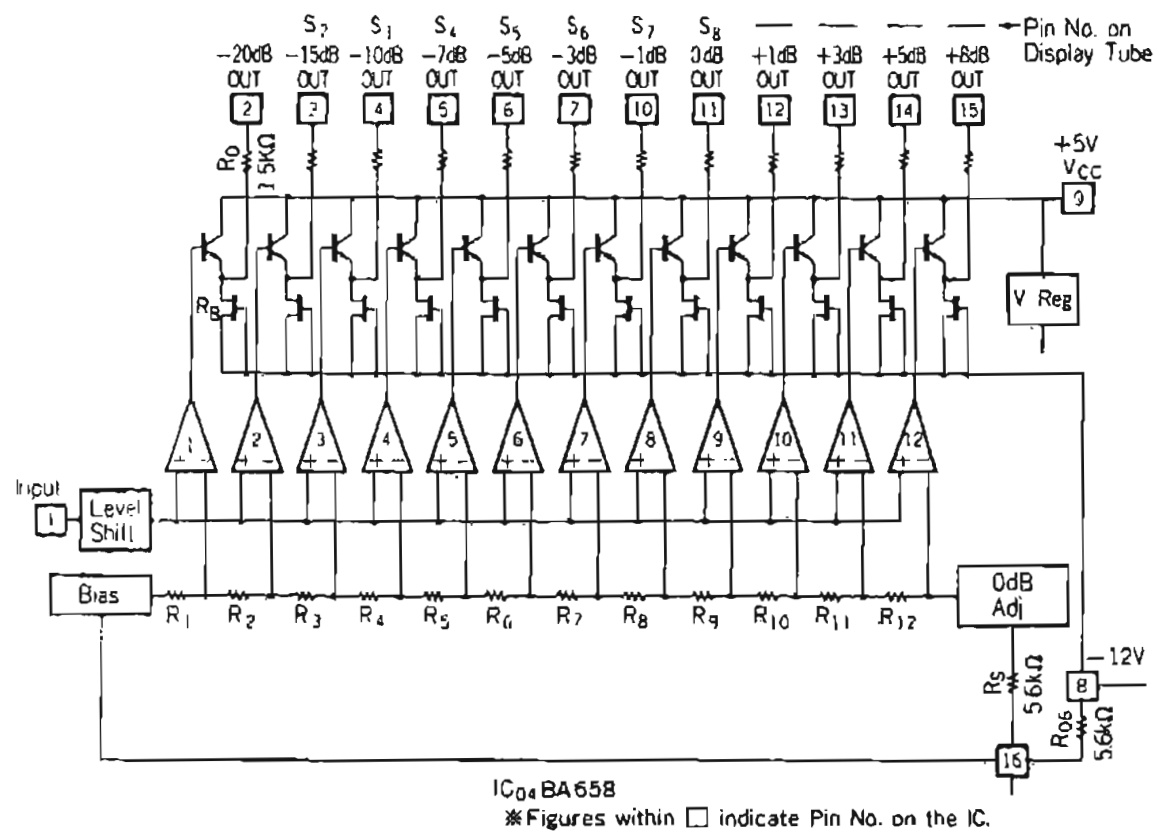


Fig. 2-16 Interior Schematic Diagram of TC04/BA658



(3) Display Operation on SIGNAL

(See Figs. 2-15 and 2-16.)

1. FM SIGNAL Display

The DC voltages of 0 to 5 V, proportional to the FM field strength, fed to the terminal 03 (Fig. 2-15) of the F-3000 are amplified by the TRs 01 and 02, and then applied as voltages of -12 V to -7 V to the pin 1 of the IC 04 (BA658). The input voltage to the pin 1 of the IC 04 is -12 V when no signal is input to the terminal 03. As shown in Fig. 2-16, the IC 04 generates the reference voltage necessary for comparison operation by means of R 1 to R 12. If an input voltage is higher than the reference voltage, the Vcc (+5 V) is supplied to S₂ to S₈ in the display tube to light. When not lighted, these of tube are kept at -12 V.

2. AM SIGNAL Display

The DC voltage of 0 to 0.5 V, proportional to the AM field strength, fed to the terminal 05 (Fig. 2-15) of the F-3000 is amplified by the TRs 03 and 04, and then applied as voltages of 0 to 5 V to the base of the TR 01. The following operation is similar to that in the FM SIGNAL display.

(4) TUNE Display (See Figs. 2-17 and 2-18.)

1. Display Operation for Tuning (See Fig. 2-17.)

When a FM broadcasting frequency is tuned, the TR 21 is turned ON, the voltage at the pin 35 of the IC 01 being the "H" state, and the TR 10 is turned ON, the voltage at the terminal 11 of the F-3000 being kept at 0 V during the FM reception. In this way, a voltage of 5 V is impressed on the display tube terminal marked with φ (On the schematic diagram) and the center mark (●) on the display tube is lighted.

If the FM broadcasting frequency is completely tuned, the left detuning mark (▶, L) does not light since the TR 06 is turned ON, and neither light the right detuning mark (◀, H), the output of the pin 1 of the IC 03 (NJM4558) being of -12 V and TR 05 being turned ON.

2. Display Operation for Complete Detuning (See Fig. 2-17.)

when a FM broadcasting frequency is completely detuned since the voltage at the terminal 11 of the F-3000 is 1.5 V and the TR 10 is tuned OFF, the mark "●" does not light.

On the other hand, the TR 07 is turned on because the voltage (-12 V) at the pin 3 of the IC 04 is applied to its base and a voltage of 5 V is applied to its emitter through the R 13. As the result, the marks (▶, L) and (◀, H) are not lit since the TRs 05 and 06 are turned ON.

Fig. 2-17

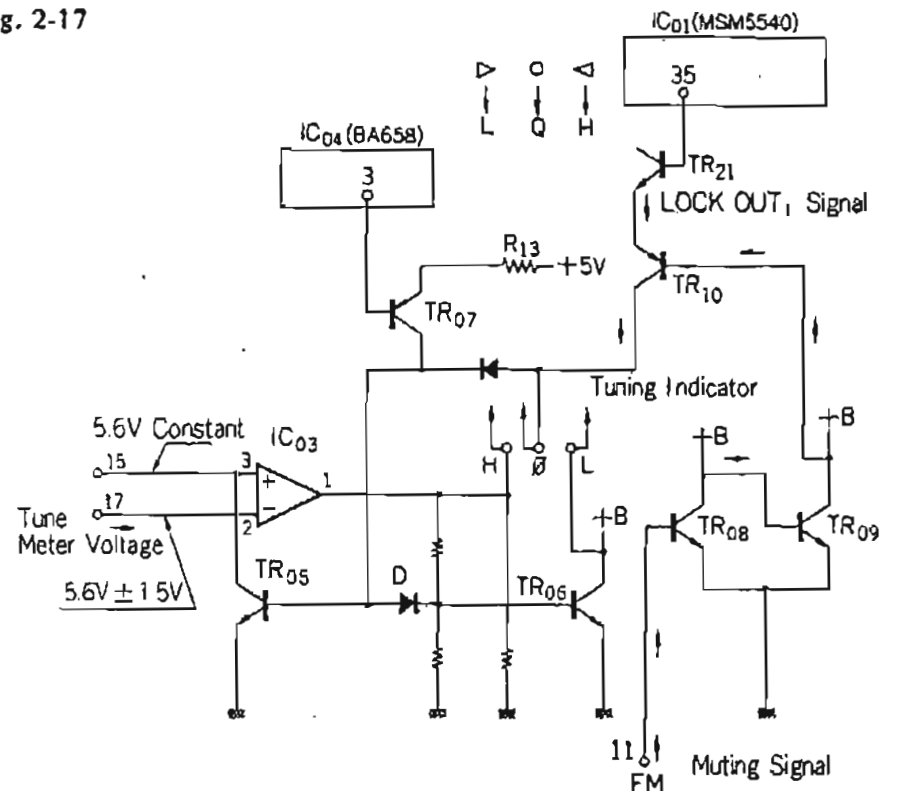
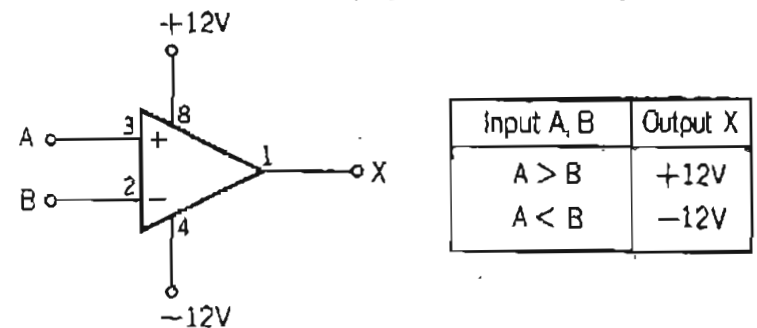


Fig. 2-18 Operation of 1/2 IC03/NJM4558 as a Comparator



3. Display Operation for Upper and Lower Detuning (See Figs. 2-17 and 2-18.)

The DC reference voltage (5.6 V constant) of the HA-11225 is applied to the terminal 15 of the F-3000 and the TUNE voltage (5.6 V ± 1.5 V) of the HA-11225 is applied to the terminal 17 of the F-3000. In the upper-side heterodyne system, if the tuning point is shifted above or below the broadcasting frequency, the TUNE voltage becomes approx. 4.1 V or 7.1 V respectively. These voltages are impressed on the pins 2 and 3 of the IC 03.

4. When Shifting Tuning Point Above Broadcasting Frequency (See Fig. 2-17 and 2-18.)

When the tuning point is shifted above the broadcasting frequency, since the voltage at the pin 3 of the IC 03 is fixed to 5.6 V and voltages of less than 4.1 V are impressed on the pin 2, a voltage of +12 V develops at the pin 1, with the result that the mark "H" lights.

The mark "L" goes out, the TR 06 (Fig. 2-17) being tuned ON. (See Fig. 2-18.)

5. When Shifting Tuning Point Below Broadcasting Frequency (See Fig. 2-18.)

When the tuning point is shifted below the broadcasting frequency, since voltage of more than 7.1 V are applied to the pin 2,

of the IC 03 and a voltage of -12 V develops at the pin 1, the mark "H" goes out. The mark "L" lights, the TR 06 being turned OFF by the -12 V. (See Fig. 2-18.)

6. TUNE Display for AM Reception (See Fig. 2-17.)

Since voltage at base and emitter of TR 07 are -12 V and +12 V respectively during AM reception, TR 07, 06 turn ON that mark "L" goes out.

Pin 2 of IC 03 being 20 mV and that of pin 3 being 0 V because TR 05 is kept ON, Pin 1 becomes -12 V to turn off mark "H". TR 10 being off, the center mark (●) does not become luminous.

3. NOTES

3-1. Changes of AM broadcasting frequencies based on I.T.U.

In Nov. 1978, AM broadcasting frequencies were changed wholly. The object of this revision is to eliminate international interferences by using integral multiples of 9 kHz for the AM broadcasting frequencies used in all districts except North and South America.

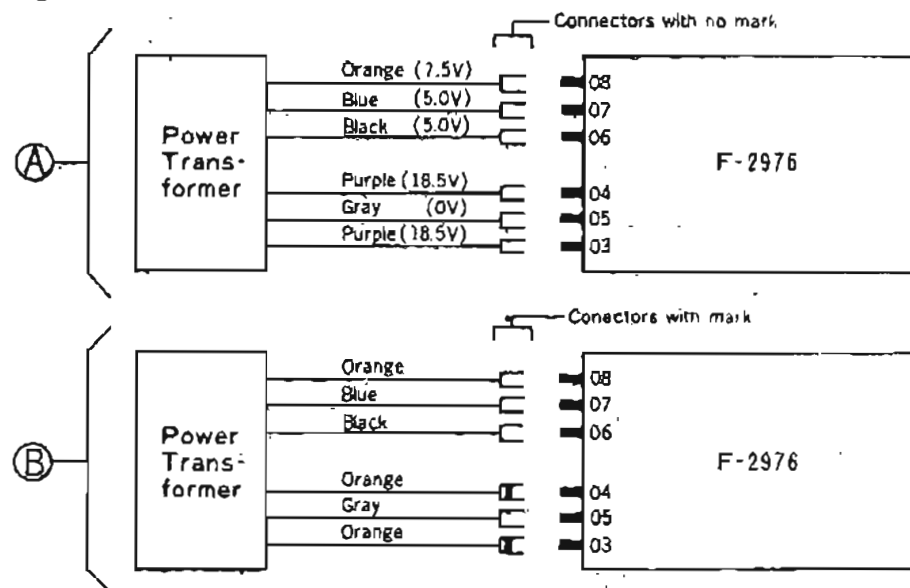
This was established by ITU (International Telecommunication Union).

3-2. Connections between secondary lead wires power transformer and connector pins of power printed circuit board (F-2976).

(See Fig. 3-1)

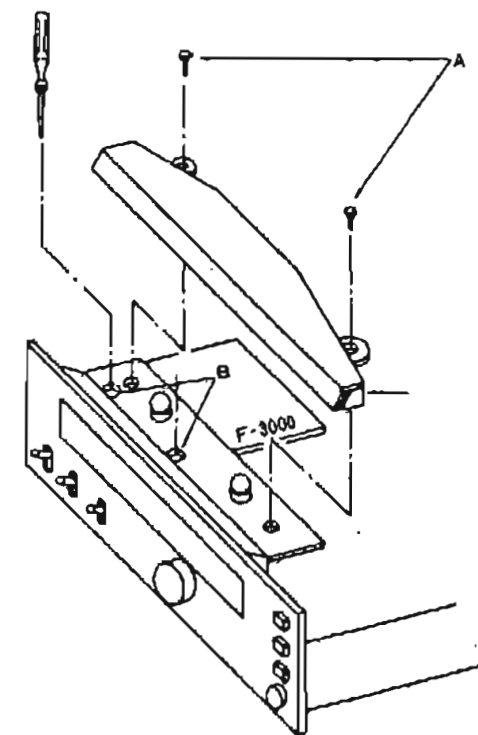
There are two types of transformers: the transformer A and the transformer B. When the transformer B is used, connect its connector to the connecting pin of the power supply substrate along the transformer A, regarding the mark * on its connector as a lead wire color.

Fig. 3-1.



4. REPLACEMENT OF MAIN PARTS

4-1. How To Remove F-3000



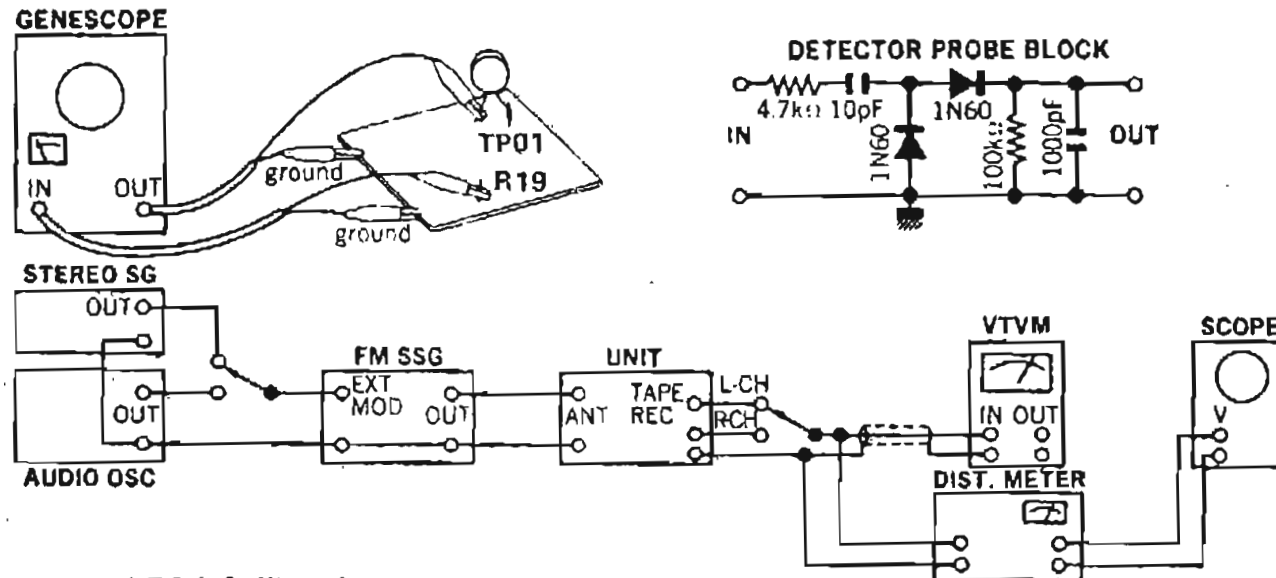
- Remove the hood and then the illumination cover by removing the two screws a.
- Remove the substrate F-3000 by removing the two screws from the holes B with a screw driver.

5. ADJUSTMENTS

5-1. FM Adjustment (See Top View on Page 10)

- Note: 1. Selector FM MONO
 2. Connection . . . Connect the output of genescope to TP through 100 pF ceramic capacitor.
 3. Steps 4 and 5 should be performed after confirming that the lock indicator does not become luminous when short-

- ing ground and collector of TR15 on F-3000.
 4. Before making adjustments of steps 2 ~ 5, run the unit for more than 2 minutes and make the dial pointer go round on the dial scale at once by tuning knob.



(1) FM IF, RF Adjustment and Dial Calibration

STEP	SUBJECT	FEED SIGNAL		MEASURE OUTPUT	ADJUST	ADJUST FOR	CONDITION
		FROM	TO				
1.	IF Coil	Output 90 dB Genescope	TCa3 (Front-end)	Point 6 at R23 (A) Use Detector Probe	IFT01 (Front-end)	Max. IF waveform	
			Point C at R27 (F-2975)	Point 1 at R35 (C) Use Detector Probe	T01 (F-2975)		
2.	Discriminator Coil In case of using Genescope	Output 80 dB Genescope	TCa3 (Front-end)	Point D at R84	T02 (F-2975) T03 (F-2975)	Steep linearity of S curve Make symmetrical S curve	
	Discriminator Coil In case of using Dist meter	98 MHz ANT Input 65 dBf (59.8 dB) 1000 Hz (100% MOD) FM SSG	ANT terminal 300Ω	OUT L or R-CH Dist Meter, VTVM & Scope	T01, T02, T03, VR02 VR07, VR08 (F-2975) IFT01 (Front-end)	Min THD	Adjust to optimum point to repeat Step 2 ~ 3
3.	Tune Indicator Adj.	Receive the nearest FM station		Between Terminal 41, 42 of F-2975 DC Volt Meter	T02 (F-2975)	DC 0V ±0.2V	
4.	Reference Voltage Adj.	No Input		Between Terminal 45 & Earth of F-3000 DC Volt Meter	VR03 (F-3000)	DC 7V ±0.2V	
5.	98 MHz Dial Calibration	No Input		Dial pointer	Tuning knob	98 MHz	
		Same as above		Display Indication	TCa4 (Front-end)	98 MHz	
6.	98 MHz RF Adj.	98 MHz ANT Input Minimum value with sine wave 1000 Hz (100% MOD) FM SSG	ANT terminal 300Ω	Out L or R-CH VTVM & Scope	TCa1, TCa2, TCa3 (Front-end)	Confirm Max. Output	
7.	Signal Volume	98 MHz ANT Input 65 dBf (59.8 dB) 1000 Hz (100% MOD) FM SSG	Same as above	Same as above	VR01 (F-3000)	Make every 8 lamps lighting	
		No ANT Input	Same as above	Same as above	VR01 (F-3000)	Make only 1 lamp lighting	

● Selection of Intermediate Frequencies (FM)

(See Figs. 3-2 & 3-3)

- * The digital locking point differs with the frequency rank of the ceramic filter used in the F-2975. When the central frequency (shown by a color) of the ceramic filter is changed, the following connection must be made by using jumper wires:

- * Unify the color marks of the FM ceramic filters (CF 01 ~ CF 04) on the F-2975 with the same color.
- * Select the joints A, B, and C according to color marks as shown in the following table then add jumper wire(s) with diode(s).

(2) FM STEREO Adjustment

Note: Selector FM AUTO

STEP	SUBJECT	FEED SIGNAL		MEASURE OUTPUT	ADJUST	ADJUST FOR	REMARKS
		FROM	TO				
1.	PLL VCO Adj.	98 MHz ANT Input 65 dBf (59.8 dB) FM SSG Pilot 19 kHz (9% MOD) R (or L) Mode 1 kHz + Pilot (100% MOD) STEREO SG	ANT terminal 300Ω	Stereo indicator	VR04 F-2975	Light Indicator	Adjust the VR within center of lighting level.
	PLL VCO Adj. In case of using Freq.	98 MHz ANT Input 65 dBf (59.8 dB) FM SSG (No MOD)	Same as above	TP01 F-2975 Use Freq. counter	VR04 F-2975	76 kHz ±150 Hz	
2.	PILOT cancel Adj.	98 MHz ANT Input 65 dBf (59.8 dB) FM SSG Pilot 19 kHz (9% MOD)	Same as above	OUT L-CH or R-CH VTVM & Scope	VR05 F-2975	Min. Output	Confirm Both Cancel
	PILOT cancel Adj. In case of Dist. meter	98 MHz ANT Input 65 dBf (59.8 dB) FM SSG Pilot 19 kHz (9% MOD) R-CH or L-CH MODE 1 kHz + Pilot (100% MOD)	Same as above	Same as above	VR05 F-2975	Min. Distortion	
3.	Separation	98 MHz ANT Input 65 dBf (59.8 dB) FM SSG Pilot 19 kHz (9% MOD) R Mode 1 kHz + Pilot (100% MOD) STEREO SG	Same as above	OUT L-CH VTVM & Scope	VR01 F-2977	OUT -45 dB	Confirm separation L-CH → R-CH (-45 dB)
4.	Muting level	98 MHz ANT Input 15 dBf (9.8 dB) FM SSG Pilot 19 kHz (9% MOD) SUB 1 kHz + Pilot (100% MOD) STEREO SG	Same as above	Stereo indicator	VR03 F-2975	Muting level 15 dBf (9.8 dB) indicator turns ON.	FM MUTING Switch ON

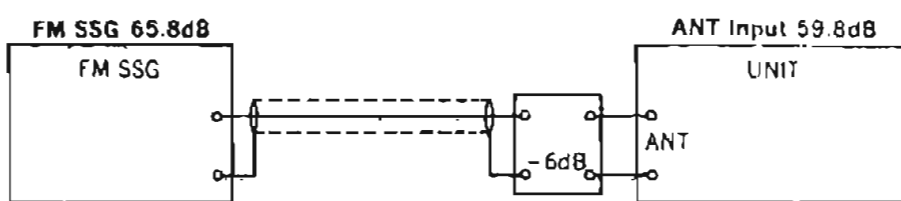
● NEW MEASUREMENT FOR FM.

Input signal level under the provision of IHFM-T-200, a new measurement method is indicated by available power ratio "dBf". To obtain approximate available power ratio "dBf", abstract 0.8 from attenuator indication of general FMSG (open load indication type); however, the former measurement, IHFM-T-100 is designated together too.

The way of modulation of IHFM-T-200 is shown below.

	modulation frequency	modulation mode	modulation factor
FM MONO	1000 Hz		100%
FM STEREO	1000 Hz	SUB	Pilot 9% Pilot + SUB 100%

- The relation between the standard input 65 dBf of IHFM-T-200 and the former indication "dB" is shown below.



● Abbreviations

Equipment

AM FM Generator Oscilloscope	Genescope
AM Standard Signal Generator	AM SSG
FM Standard Signal Generator	FM SSG
FM Stereo Generator	Stereo SG
Oscilloscope	Scope
Audio Oscillator	Audio Osc.
Distortion Meter	Dist. Meter

Others

Antenna	ANT.
Modulation	MOD.
Total Harmonic Distortion	T.H.D.

5-2. AM IF Adjustment & Dial Calibration (See Top View on Page 12)

Note: 1. Selector AM

STEP	SUBJECT	FEED SIGNAL		MEASURE OUTPUT	ADJUST	ADJUST FOR	CONDITION
		FROM	TO				
1.	IF Coil	Genescope Output 70 dB	TC02 (Front-end)	Between ground & terminal No. 13 on F-2975	T05, LC01 (F-2975)	Max. Output	
2.	600 kHz Dial Calibration	No Input		Dial Pointer	Tuning knob	600 kHz	
		Same as above		Display Indication	T04 (F-2975)	600 kHz	
	1400 kHz Dial Calibration	No Input		Dial Pointer	Tuning knob	1400 kHz	
		Same as above		Display Indication	TC02 (F-2975) (Front-end)	1400 kHz	
3.	600 kHz RF Adj.	600 kHz ANT Input 50 dB 400 Hz (MOD 30%) AM SSG	AM ANT terminal	Same as above	Bar Antenna	Same as above	
	1400 kHz RF Adj.	1400 kHz ANT Input 50 dB 400 Hz (MOD 30%) AM SSG	Same as above	Same as above	TC01 (F-2975) (Front-end)	Same as above	
4.	Signal Indicator VR. Adj.	1000 kHz ANT Input 80 dB 400 Hz (MOD 30%) AM SSG	Same as above	Signal Indicator lamps	VR02 (F-3000)	Make every 8 lighting	
		No NAT Input	Same as above	Same as above	VR02 (F-3000)	Make only 1 lamp lighting	
5.	9 kHz Notch filter Adj.	9 kHz 5 mV OSC	Between ground & terminal No. 13 on F-2975	OUT L or R-CH VTVM & Scope	LC02 (F-2975)	Min. Output	

• Intermediate frequency of AM Section (See Figs. 3-1 & 3-3)

Since the band pass filter of both 450 kHz type and 455 kHz type are adaptable to the IF stage of model TU-719, pay attention for inserting position of jumper wire and a diode for setting the IF OFFSET ROM value when replacement.

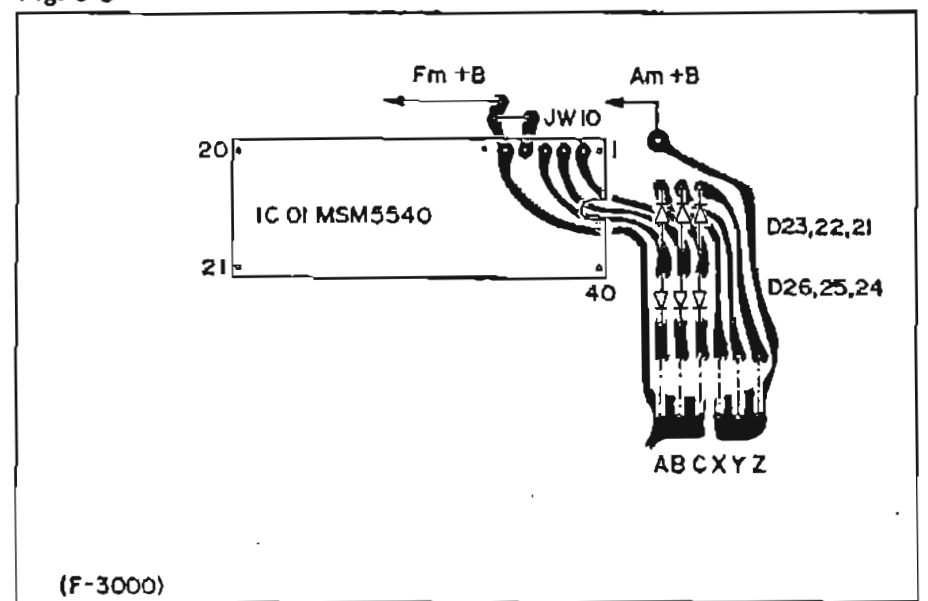
Fig. 3-1

Intermediate frequency	Stock No. of IF filter, T05 on F-2975	Inserting Position of jumper wire on F-3000	Inserting Position of Diode on F-3000
450 kHz	0910490	X	D23
455 kHz	4230680	Z	D21, D24

Fig. 3-2.

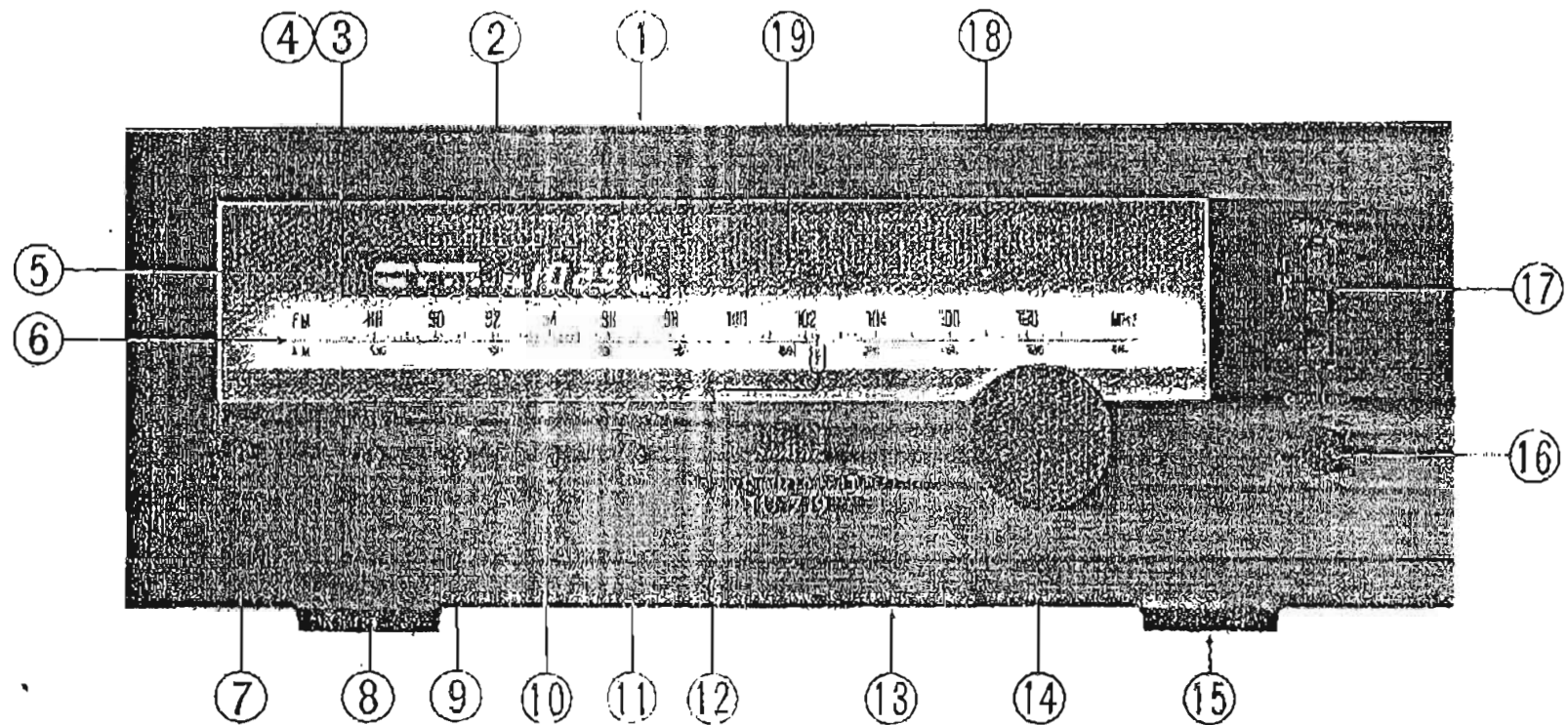
Colouring	Intermediate frequency	Connecting Position of Jumper wire on F-3000				Connecting Position of Diode on F-3000			
		A	B	C	Jumper wire Total Qty	D26	D25	D24	Diode Total Qty
Black	10.64MHz			●	1			●	1
Brown	10.66MHz		●		1		●		1
Blue	10.68MHz		●	●	2		●	●	2
Red	10.70MHz	●			1	●			1
Orange	10.72MHz	●		●	2	●		●	2
Gray	10.74MHz	●	●		2	●	●		2
White	10.76MHz	●	●	●	3	●	●	●	3

Fig. 3-3



6. OTHER PARTS

6-1. Front View



Parts List <Front View>

Parts No.	Stock No.	Description
1	5006880	Bonnet
2	7008141	Front Panel Ass'y
	5456640	Front Glass
	5305261	Frame, window
	5048221	Masking Sheet
	5507050	Front Glass Retainer Packing
	5336600	Sansui Mark
	5396690	Knob Ring
	5326620	Knob, AM, FM Selector Switch
	5286721	Knob Guide
	6906480	Knob Guide Spring
3	5059050	Display Unit Metal-mesh Cover
4	5446410	Film Filter, Display Unit
5	0030060	Display Unit
6	5408630	Dial Scale
7	1172000	Power Switch
	5326612	Knob, power switch
8	5326612	Knob, band width switch
9	1171800	Muting Switch
	5326612	Knob, muting switch
10	1171780	Noise Canceller Switch
	5326612	Knob, noise canceller switch
11	5326612	Knob, calibration tone switch
12	5416463	Dial Pointer Ass'y
13	5059001	Bottom Plate
14	5318901	Tuning Knob
15	5507070	Leg
16	1015490, 1	10kΩ B x 2, output level volume
	5318850	Knob, output level
17	1131440	AM, FM Selector Switch
18	0319050	FM Stereo Indicator
19	0319060	Quartz Locked Indicator

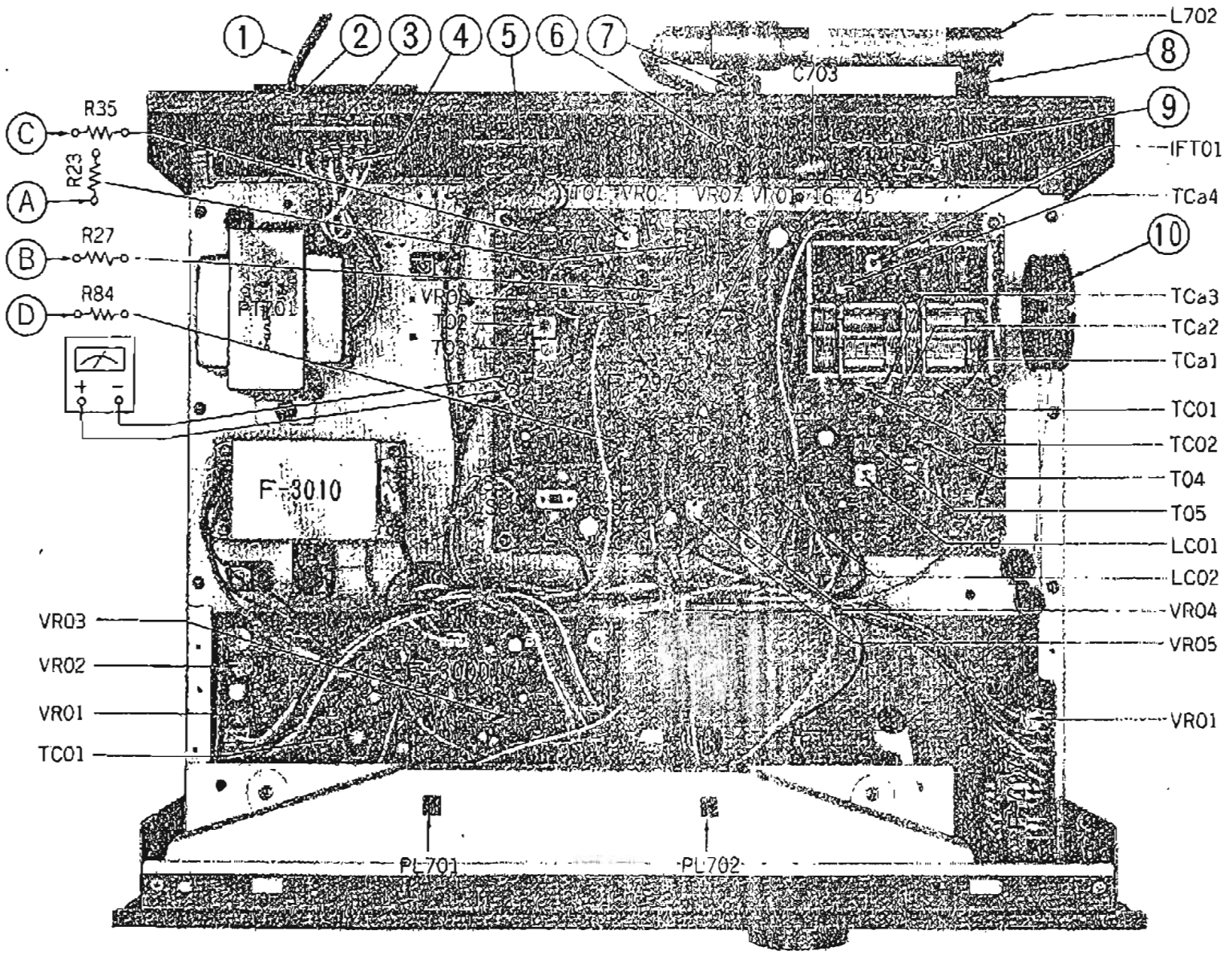
Parts List <Top View>

Parts No.	Stock No.	Description
1	3800470, 1	AC Cord
2	3910600	Strain Relief (AC Cord)
3	3510091	6P Voltage Selector Plug
	2410830	10P Voltage Selector Socket
4	2300060	Fuse Holder
5	2200300	2P Output Terminal
6	3910451	Strain Relief (Antenna Cord)
7	5286450	Bar Antenna Holder
8	5286480	Bar Antenna Holder (B)
9	2210310	Antenna Terminal Board
10	6146721	Pulley
L 702	4200960, 1	Bar Antenna
PT 701	4002950	Power Transformer
PL 701, 702	0400710	8V 300mA Pilot Lamp

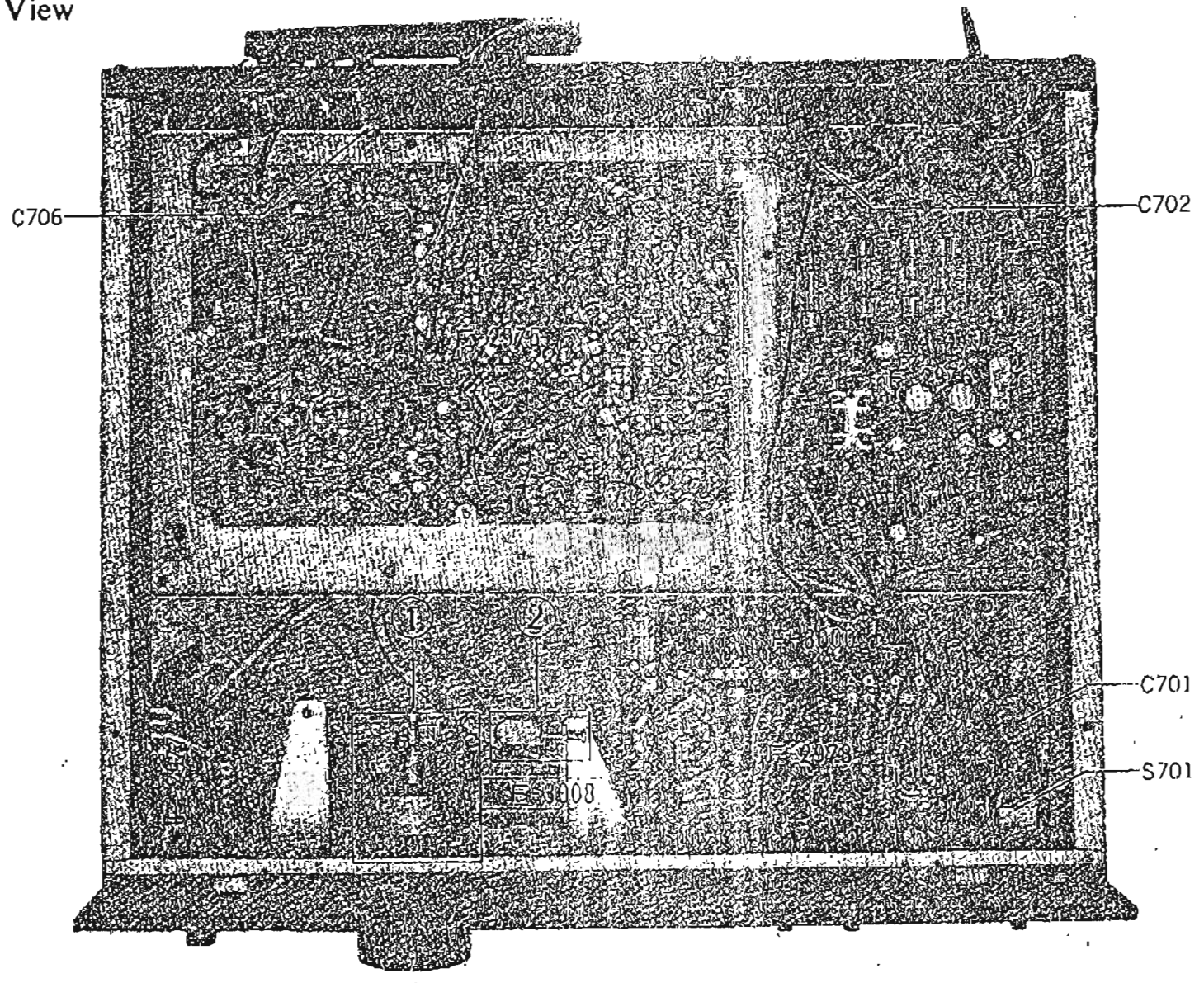
Parts List <Bottom View>

Parts No.	Stock No.	Description
1	7036650	Tuning Unit
2	7136091	Tension Unit
C 701	0659801	0.01μF 150V C.C.
C 702	0659802	0.0047μF 150V C.C.
C 703	0621682	6800pF 50V P.C.

Top View



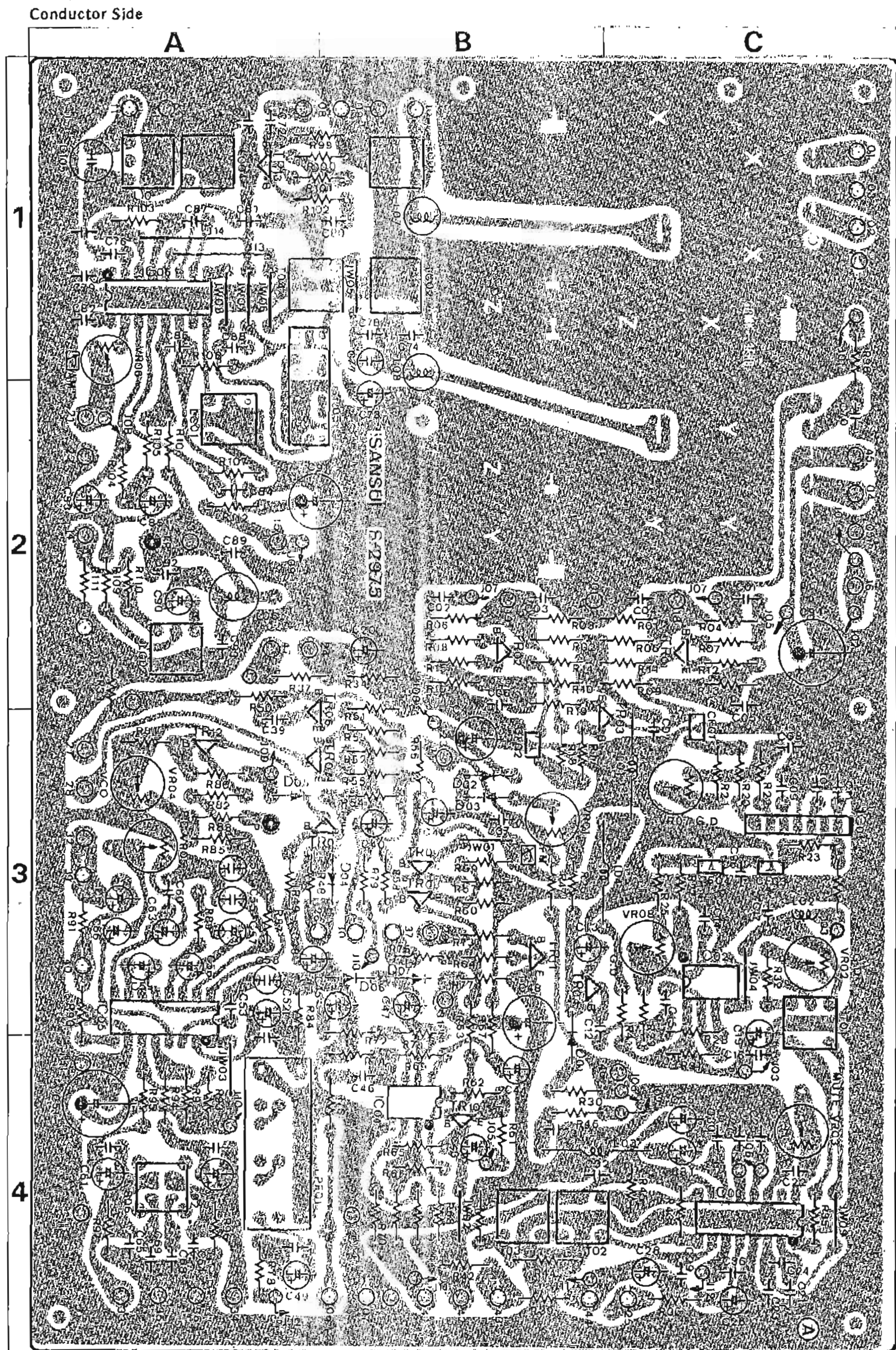
Bottom View



7. PARTS LOCATION & PARTS LIST

Since some of capacitors and resistors are omitted from parts lists in this Service Manual, refer to the Common Parts List for capacitors & resistors which was appended previously to each Sansui Manual.

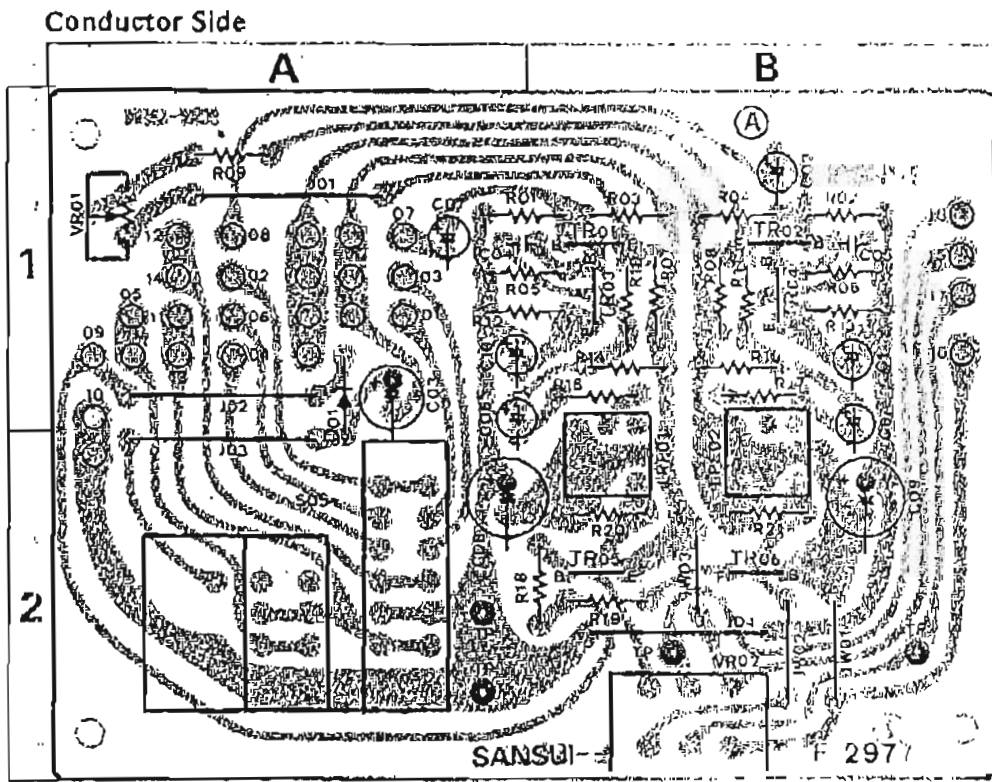
7-1. F-2975 FM, AM Circuit Board (Stock No. 7522121)



Parts List <F-2975>

Parts No.	Stock No.	Description	Position	Parts No.	Stock No.	Description	Position	Parts No.	Stock No.	Description	Position
*Transistors											
TR01	0306341, 2	2SC1674 L, K	2C	C 54	0622102	1000pF 125V P.C.	3A	T 05	4230680	Filter 455 kHz	
TR02	0306341, 2	2SC1674 L, K		C 55	0622222	2200pF 125V P.C.	3A		0910490	Filter 450 kHz	
TR03	0306341, 2	2SC1674 L, K		C 58	0573478	0.47µF 35WV T.C.	3A	LC 01	4230620	IF Coil 455 kHz	2A
TR04	0306341, 2	2SC1674 L, K	3B	C 67	0573339	3.3µF 35WV T.C.	3A	LC 02	0910450	Filter Coil	2A
TR05	0400510, 1	2SA733A P, O	3B	C 58	0622182	1500pF 125V P.C.	3A	LF 01	0910500	Low Pass Filter	
TR06	0305952, 3	2SC945 P, K	3A	C 59	0573109	3.3µF 35WV T.C.	3A		4236180	Low Pass Filter	
TR07	0300510, 1	2SA733A P, O	3A	C 62	0671436	0.33µF 35WV T.C.	3A	VR02	1035130	10kΩ B Group Delay	3C
TR12	0305952, 3	2SC945 P, K	3A	C 68	0573338	0.33µF 35WV T.C.	3A	VR03	1037080	Equalizer Adj. Volume	4C
TR13	0306341, 2	2SC1674 L, K	1A	C 74	0669104	2.2µF 50V C.C.	1B	VR04	1034240	3.3kΩ VCO Free run Adj. Volume	3A
*ICs											
IC 01	0360590	TA7302P	3C	C 78	0669210	10pF 50V C.C.	1B	VR06	1037090	60kΩ B Pilot Cancel Adj. Volume	3A
IC 02	0360510	LA1222	3C	C 95	0661330	33pF 50V C.C.	3C	VR07, 08	1035070	1kΩ B Group Delay	3C
IC 03	0360930	HA11225	4C	R 44	0231222	2.2kΩ 1/2W M.R.	4B			Equalizer Adj. Volume	
IC 04	0360680	HA11223	4B	L 01	4290011	Peaking Coil 3.5µH	3C			Volume	
IC 06	0360800	LA1240	1A	L 02	4900100	Inductor 3µH	3C			Volume	
*Diodes											
D 01	0311160	1S2473D	4B	L 03	4290011	Peaking Coil 3.5µH	4C	CF 01 ~ 04	0990030	10.7 MHz Ceramic Filter Ass'y	3C
D 04	0311160	1S2473D	3B	L 04	4290011	Peaking Coil 3.5µH	3B	S 06	1110270	De-Emphasis Switch	4A
D 05	0311160	1S2473D	3A	T 01	4236930	IF Coil 10.7 MHz	1B		7510761	Front End Pack (FF631J12)	
D 901	0311160	1S2473D		T 02	4236230	FM Detector Coil	4B				
C 36	0622101	100pF 125V P.C.	4C	T 03	4236240	FM Detector Coil	4B				
				T 04	4220710	OSC Coil	1A				

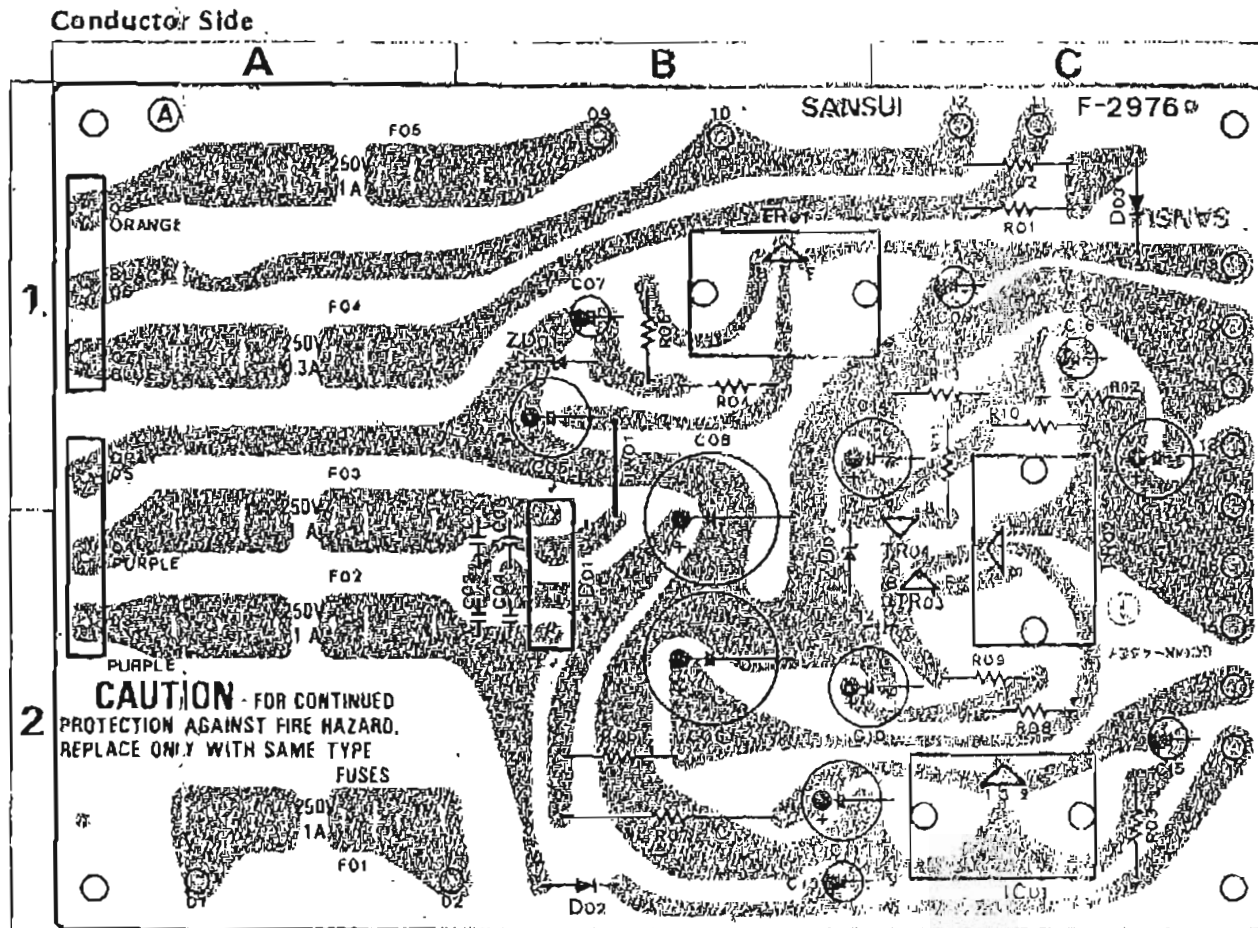
7-2. F-2977 AM, FM Selector Circuit Board (Stock No. 7597301)



Parts List

Parts No.	Stock No.	Description	Position
*Transistors			
TR01, 02	0306740, 1	2SC1845 F, E	1B
TR03, 04	0301090, 1	2SA992 F, E	1B
TR05, 06	0305952, 3	2SC945 P, K	2B
*Diode			
D 01	0311160	1S2473D	1A
*Zener Diode			
ZD01	0316390	RD6.2E	
C 04, 05	0661160	15pF 50V C.C.	1A, 1B
L 07, 08	4900280	Inductor 1µH	
LF 01, 02	0910520	Low-Pass Filter	2B
VR01	1035410	47kΩ Stereo Separation Volume	1A
VR02	1015490, 1	10kΩ Output Level Volume	2B
S 05	1131440	AM, FM Selector Switch	2A

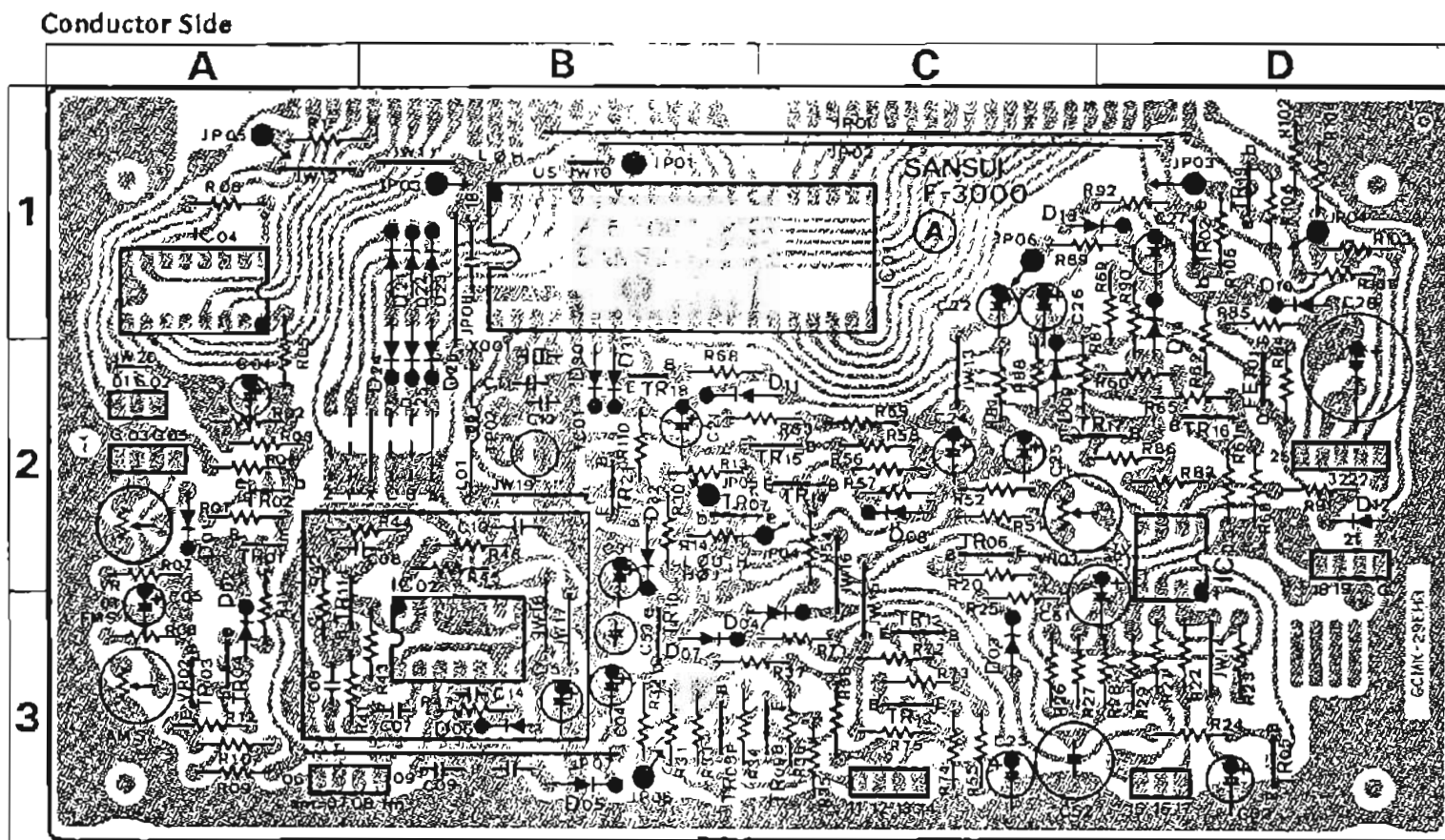
7-3. F-2976 Power Supply Circuit Board (Stock No. 7503251)



Parts List

Parts No.	Stock No.	Description	Position
*Transistors			
TR01	0303260 ~ 3	2SB536 N, M, L, K	1B
TR02	0308391 ~ 3	2SD313AL D, E, F	2C
TR03	0305951, 2	2SC945 O, P	2C
TR04	0305951, 2	2SC945 O, P	2C
*ICs			
IC 01	0360920	FS-7805M	2C
*Diodes			
D 01	0311700	RB-152	1B
D 02	0310340	10D1	2B
D 03	0310480	SV-03	1C
*Zener Diodes			
ZD01	0316290	RD-12E B	1B
ZD02	{ 0316390 0316400	RD6.2E B RD6.2E C	2B
R 01	0211330	33Ω 1W N.I.R.	1C
R 02	0211330	33Ω 1W N.I.R.	1C
R 06	0211100	10Ω 1W N.I.R.	2B
R 07	0133330	33Ω 3W Ce.R.	2B
F 02, 03	0432220	1A 250V AC Fuse	2A, 1A
F 04	0432220	0.3A 250V AC Fuse	1A
F 06	0432220	1A 250V AC Fuse	1A

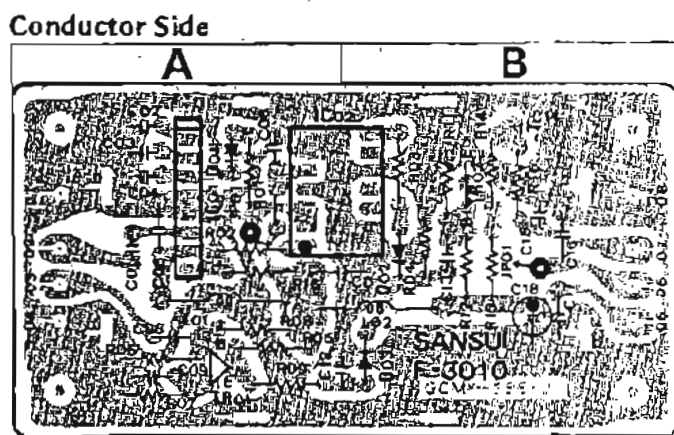
7-4. F-3000 Digitally Display Circuit Board (Stock No. 7597331)



Parts List

Parts No.	Stock No.	Description	Position	Parts No.	Stock No.	Description	Position	Parts No.	Stock No.	Description	Position
•Transistors											
TR01	0305951 - 3	2SC945 Q, P, K	2A	IC 03	0380770	NJM4658D	2D	D 31	0311160	1S2473D	2B
TR02	0300610 ~ 2	2SA733A P, Q, R	2A, 1D	IC 04	0360830	BA 658	1A	D 32	0311160	1S2473D	2B
TR03	0305951 - 3	2SC945 Q, P, K	3A	•FETs							
TR04	0300610 ~ 2	2SA733A P, Q, R	3A	FET01	{ 0370300 ~ 3	2SK117 O, Y, GR, BL	2D	C 11	0669216	16pF 50V C.C.	2B
TR05	0305961 ~ 3	2SC945 Q, P, K	3D		{ 0370340 ~ 7	2SK163K1, K2, L1, L2, M1, M2, N1, N2		C 12	0661220	22pF 50V C.C.	2B
TR06	0305951 ~ 3	2SC945 Q, P, K	2C	•Diodes							
TR07	0300610 ~ 2	2SA733A P, Q, R	2B	D 01	0311160	1S2473D	2A	L 01	4290011	3.5µH Peaking Coil	2B
TR08	0305951 ~ 3	2SC945 Q, P, K	3B	D 02	0311160	1S2473D	3A	•Trimmer Capacitor			
TR09	0305951 ~ 3	2SC945 Q, P, K	3C	D 03	0311160	1S2473D	3C	TC01	{ 1230060	20pF	2B
TR10	0300610 ~ 2	2SA733A P, Q, R	3C	D 04	0311160	1S2473D	3C		{ 1230140	20pF	
TR11	0305951 ~ 3	2SC945 Q, P, K	3C	D 07	0311160	1S2473D	3B	VR01	1035130	Volume 10kΩ B, Signal Indicator Adj. (FM)	2A
TR12	0305951 ~ 3	2SC945 Q, P, K	2C	D 08	0311160	1S2473D	2C	VR02	1035150	Volume 22kΩ B, Signal Indicator Adj. (AM)	3A
TR13	0305951 ~ 3	2SC945 Q, P, K	2D	D 09	0311160	1S2473D	2C	VR03	1035110	Volume 4.7kΩ B, AFC Adj.	2C
TR14	0305951 ~ 3	2SC945 Q, P, K	2D	D 10	0311160	1S2473D	1D	•Crystal			
TR15	0305951 ~ 3	2SC945 Q, P, K	2B	D 11	0311160	1S2473D	2B		0930040	Crystal (6.5536 MHz)	
TR16	0305951 ~ 3	2SC945 Q, P, K	1D	D 12	0311160	1S2473D	2D		0030060	Display Unit	
TR17	0305951 ~ 3	2SC945 Q, P, K	2B	D 13	0311160	1S2473D	1C	•ICs			
TR18	0300610 ~ 2	2SA733A P, Q, R	1D	D 14	0311160	1S2473D	1D	IC 01	0360910	MSM6540	1B
TR19	0300610 ~ 2	2SA733A P, Q, R	1D	D 21	0311160	1S2473D	1B				
TR20	0300610 ~ 2	2SA733A P, Q, R	2B	D 26	0311160	1S2473D	2B				
TR21	0305951 ~ 3	2SC945 Q, P, K	2B	D 30	0311160	1S2473D	2B				

7-5. F-3010 Prescalay Circuit Board (Stock No. 7597851)

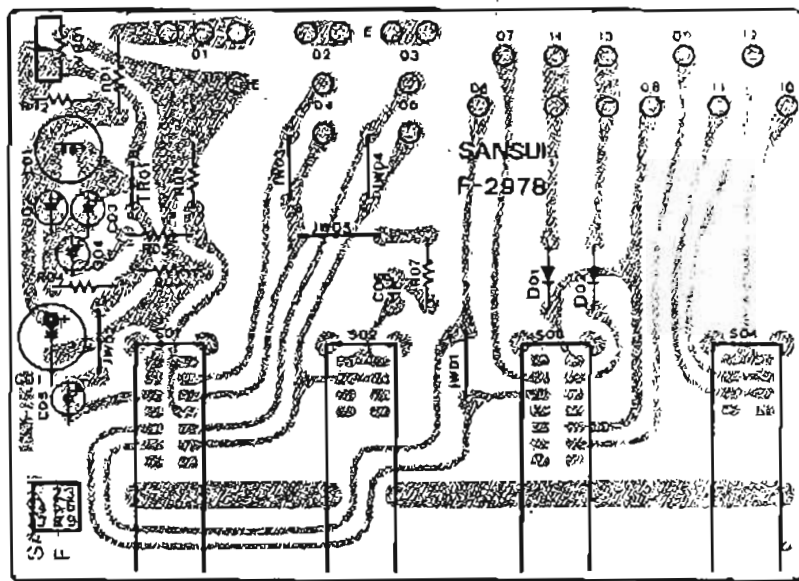


Parts List

Parts No.	Stock No.	Description	Position
•Transistor			
TR01	0306341, 2	2SC1674 L, K	A
TR02	0306341, 2	2SC1674 L, K	B
•IC			
IC 01	0361130	AN6821	A
IC 02	0361120	74LS90	A
•Diode			
D 01	0311160	1S2473D	A
D 02	0311160	1S2473D	B
D 03	0311160	1S2473D	B
•Peaking Coils			
L 01	4290011	3.5µH Peaking Coil	A
L 02	4290011	3.5µH Peaking Coil	B

7-6. F-2978 Switch Circuit Board (Stock No. 7597311)

Conductor Side



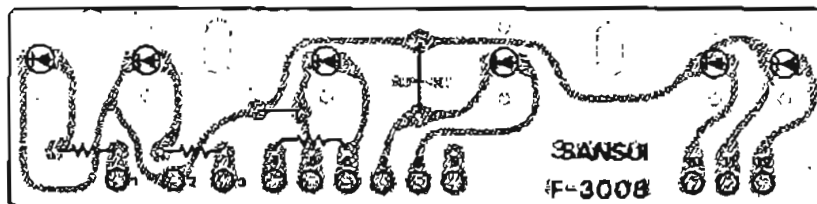
Parts List

Parts No.	Stock No.	Description
• Transistor		
TR01	0305951, 2	2SC945 Q, P
	0306740, 1	2SC1845 F, E
C 02	0573339	3.3μF 35V Ta.C.
C 03	0573229	2.2μF 35V Ta.C.
L 01	4900220	Inductor 100 mH
VR01	1035410	47kΩ B LEC Level Adj.
S 01	1171800	Lever Switch, Calibration Level
S 02	1171780	Lever Switch, Noise Canceller
S 03	1171800	Lever Switch, Muting
S 04	1171780	Lever Switch, Band Width

Note: The circuit board F-3008 are not supplied as the assembled, the individual parts on the circuit board, however, are provided for orders.

7-7. F-3008 L.E.D Circuit Board

Conductor Side



Parts List

Parts No.	Stock No.	Description
• LED		
LD01	0319050	FM Stereo (Red)
LD02	0319060	Quartz Locked (Green)

• Abbreviations

C.R.	Carbon Resistor	E.L.	Low Leak Electrolytic Capacitor
S.R.	Solid Resistor	E.B.	Bi-Polar Electrolytic Capacitor
Ca.R.	Cement Resistor	E.BL.	Low Leak Bi-Polar Electrolytic Capacitor
M.R.	Metal Film Resistor	Ta.C.	Tantalum Capacitor
F.R.	Fusing Resistor	F.C.	Film Capacitor
N.I.R.	Non-Inflammable Resistor	M.P.	Metalized Paper Capacitor
C.C.	Ceramic Capacitor	P.C.	Polystyrene Capacitor
C.T.	Ceramic Capacitor, Temperature Compensation	G.C.	Gimmic Capacitor
E.C.	Electrolytic Capacitor		

8. THREADING OF DIAL CORD

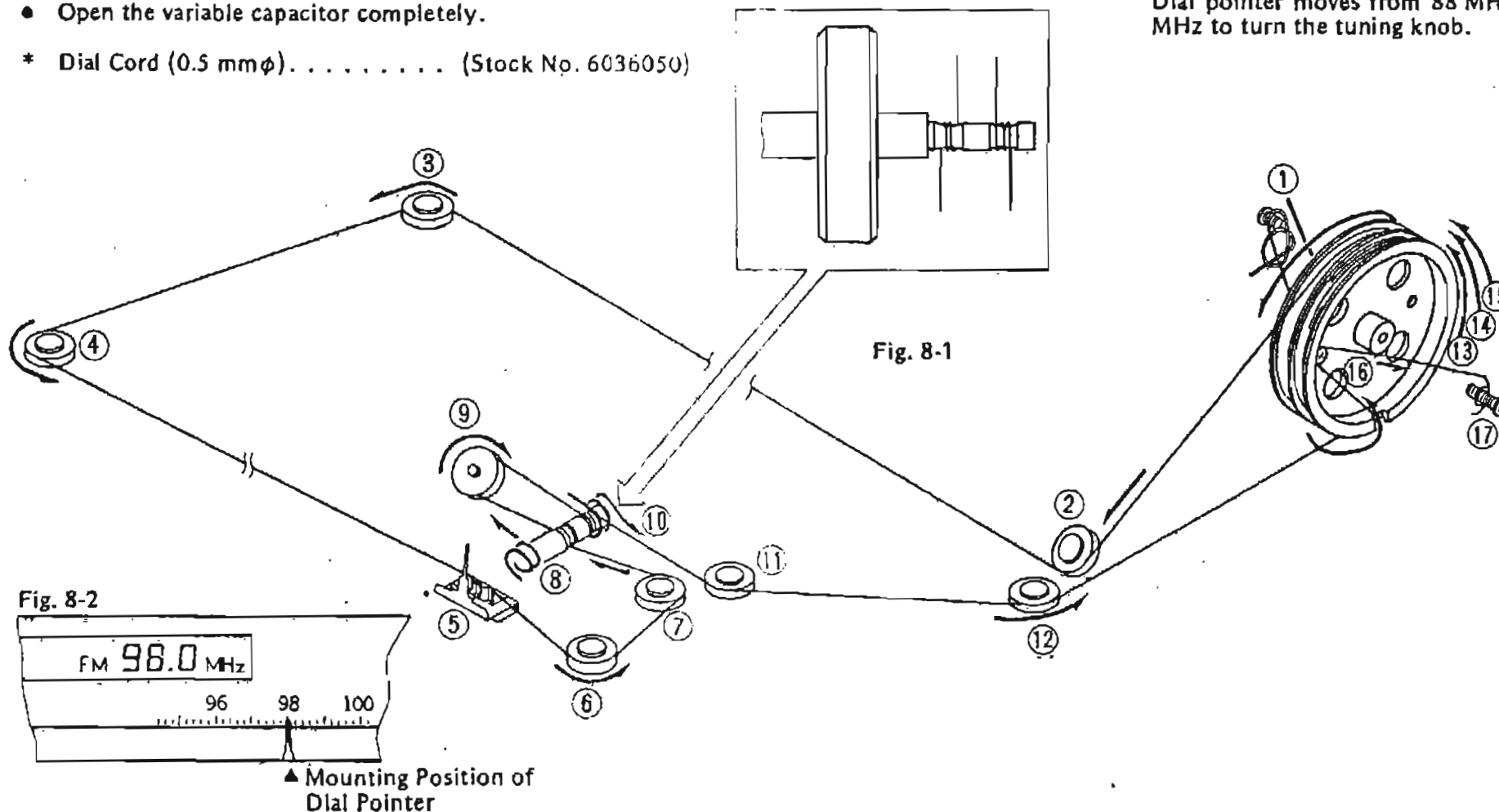
- If a dial cord is cut off or slips, replace it by following procedures. As this unit uses 0.5 mmφ cord, please replace it with the same type certainly.
- The length of dial cord is approximately 200 cm (78.7 inch).

8-1. Threading of Dial Cord

Thread the dial cord in numerical order from ① to ⑰ as Fig. 8-1.

- Open the variable capacitor completely.

* Dial Cord (0.5 mmφ). (Stock No. 6036050)

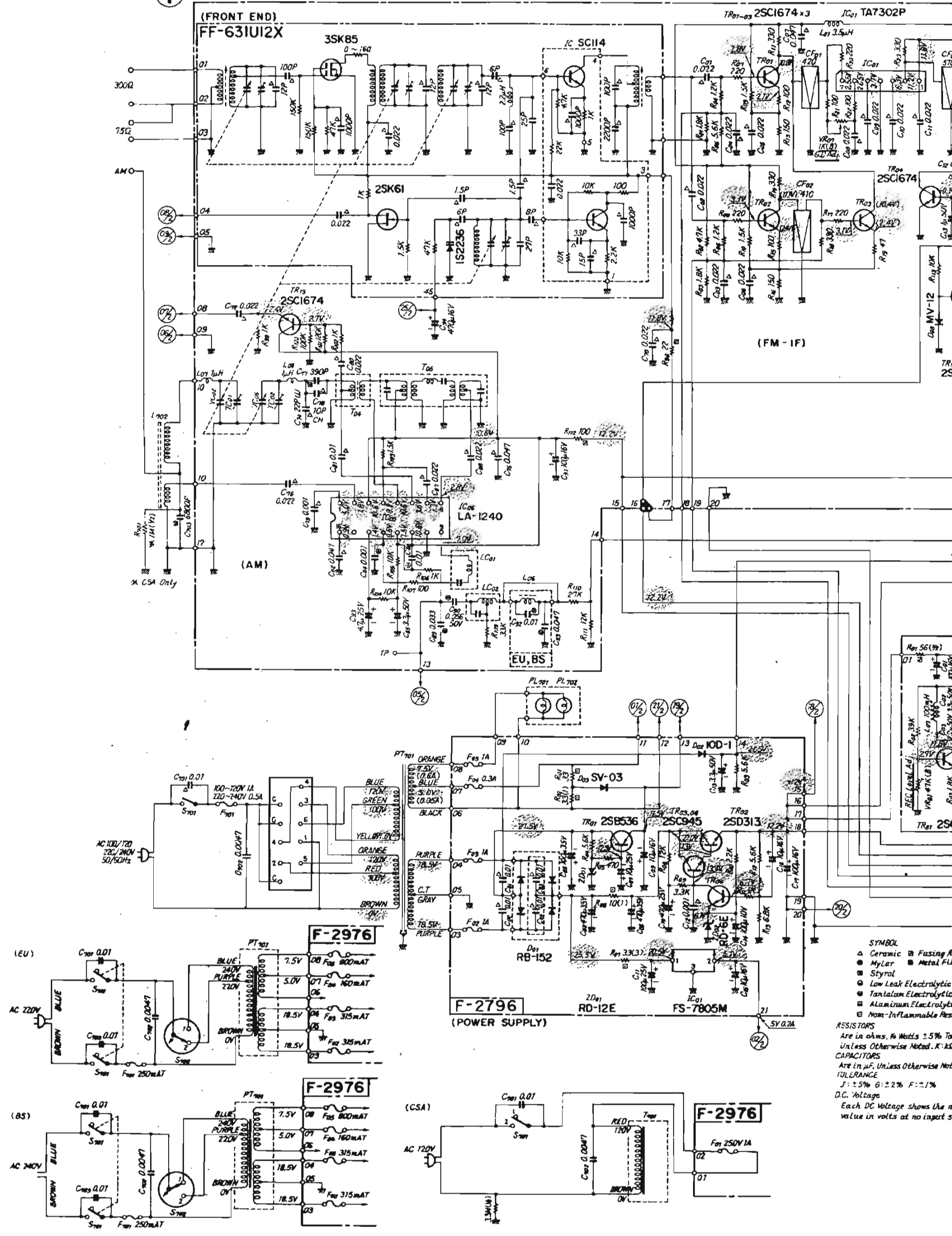


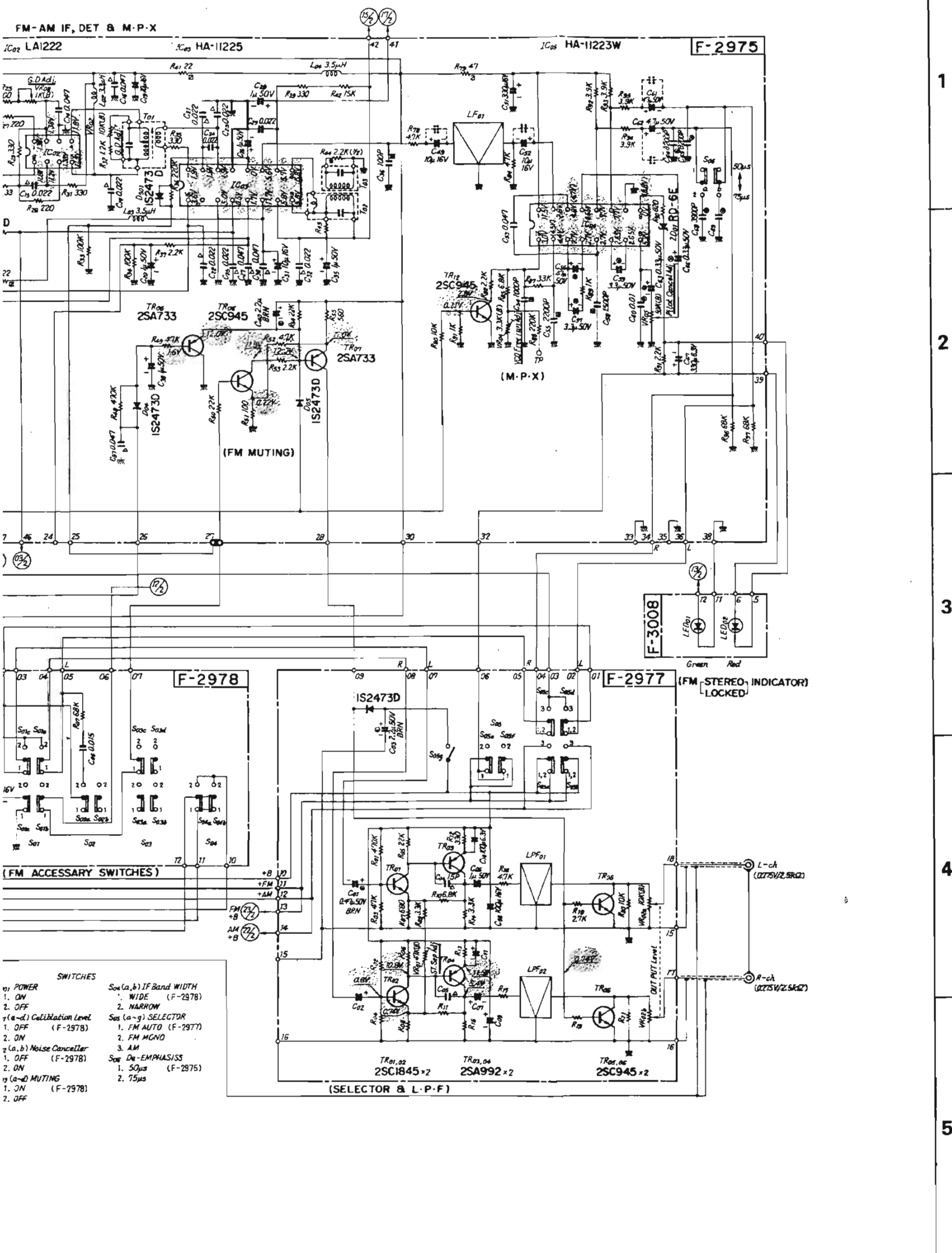
8-2. Attachment of Dial Pointer

1. After installing the dial string, turn on the power switch. If the digital display is in the "FM Reception" state as shown in Fig. 8-2, turn the tuning knob until the digital display indicates 98.0 MHz. Then, fix the pointer to the dial string, after setting the pointer to the 98.0 MHz value of the scale.
2. After attaching Dial pointer, confirm Dial pointer moves from 88 MHz to 108 MHz to turn the tuning knob.

9. SCHEMATIC DIAGRAM 9-1. Tuner Section

I (TUNER Section)

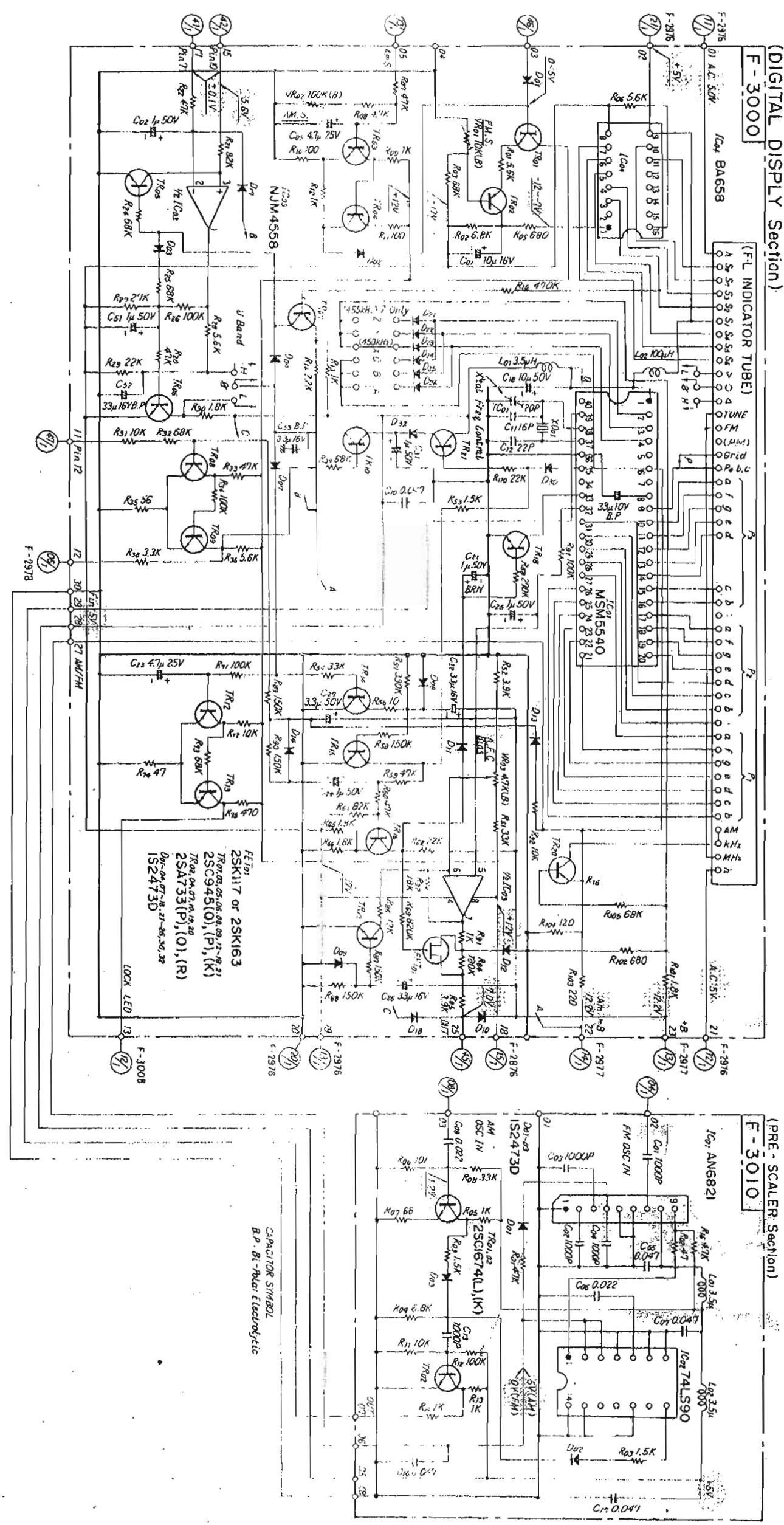




1
 2
 3
 4
 5

A B C D

9-2. Digital Display Section



- 2SA733A FS 7805M
- 2SA992
- 2SC945
- 2SC1674
- 2SC1845
- 2SB536
- 2SD313
- 2SK117
- 2SK163
- AN6821
- TA7302P
- MSM5540
- HA-11225
- HA-11223W
- LA1240
- 74LS90
- BA658
- LA-1222
- NJM4558
- 10D-1
- 1S2473D
- SV-03
- RD-6E
- RD-12E
- RB-152

SANSUI

COMMON PARTS LISTS FOR RESISTORS & CAPACITORS ONLY

Replacement Parts, most resistors & capacitors are common to Sansui models unless specified otherwise, therefore these resistors and capacitors in this list are not shown in parts lists of Service Manual. When replacing these parts, confirm the value, wattage (or capacity) and tolerance referring to this list and Schematic Diagram for easier check. When ordering parts, use the parts name and Stock No. referring to Parts Lists.

◇ TYPES OF COMMON RESISTORS & CAPACITORS

(Resistors)

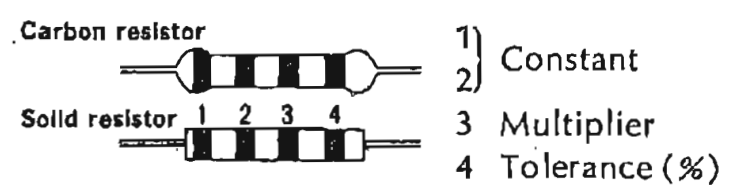
- Carbon resistor 1/4W
- Solid resistor 1/4W

(Capacitors)

- Ceramic capacitor
 - 1) 50V Standard type
 - 2) 50V Temperature compensation type
- Mylar capacitor (50V)
- Electrolytic capacitor (Vertical type)
 - 1) Non-polar type (6.3V~80V)
 - 2) Polar type (6.3V~80V)
 - 3) Polar type (25V & 50V) (low noise)

◇ Resistors

— How to read color cord —

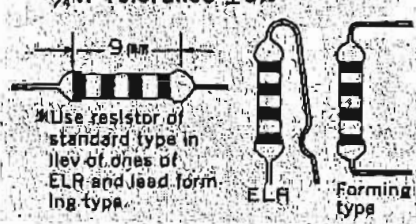


For example:

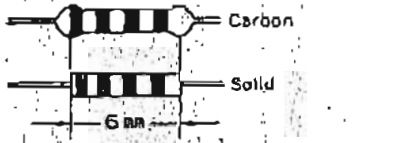
- 1. Brown 2. Red
 - 3. Orange 4. Silver
- $12 \times 10^3 (\Omega) \pm 10\%$
12k Ω $\pm 10\%$

Color	1	2	3	4
Black	0	0	10 ⁰	
Brown	1	1	10 ¹	
Red	2	2	10 ²	
Orange	3	3	10 ³	
Yellow	4	4	10 ⁴	
Green	5	5	10 ⁵	
Blue	6	6	10 ⁶	
Purple	7	7	—	
Gray	8	8	—	
White	9	9	—	
Gold	—	—	10 ⁻¹	± 5 %
Silver	—	—	10 ⁻²	± 10 %
Colorless	—	—	—	± 20 %

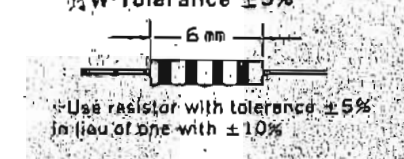
► RESISTORS

Value (Ω)	Stock No.
Carbon resistor (Standard type) 1/4W Tolerance ±5%	
	
1.5	0107159
1.8	0107189
2.2	0107229
2.7	0107279
3.3	0107339
3.9	0107399
4.7	0107479
5.6	0107569
6.8	0107689
8.2	0107829
10.0	0107100
12.0	0107120
15.0	0107150
18.0	0107180
22.0	0107220
27.0	0107270
33.0	0107330
39.0	0107390
47.0	0107470
56.0	0107560
68.0	0107680
82.0	0107820
100.0	0107101
120.0	0107121
150.0	0107151
180.0	0107181
220.0	0107221
270.0	0107271
330.0	0107331
390.0	0107391
470.0	0107471
560.0	0107561
680.0	0107681
820.0	0107821
1.0 K	0107102
1.5 K	0107152
1.8 K	0107182
2.2 K	0107222
2.7 K	0107272
3.3 K	0107332
3.9 K	0107392
4.7 K	0107472
5.6 K	0107562
6.8 K	0107682
8.2 K	0107822
10.0 K	0107103
12.0 K	0107123
15.0 K	0107153
18.0 K	0107183
22.0 K	0107223
27.0 K	0107273
33.0 K	0107333
39.0 K	0107393
47.0 K	0107473
56.0 K	0107563

Value (Ω)	Stock No.
68.0 K	0107683
82.0 K	0107823
100.0 K	0107104
120.0 K	0107124
150.0 K	0107154
180.0 K	0107184
220.0 K	2107224
270.0 K	0107274
330.0 K	0107334
390.0 K	0107394
470.0 K	0107474
560.0 K	0107564
680.0 K	0107684
820.0 K	0107824
1.0 M	0107105

Value (Ω)	Stock No.
Carbon resistor (Miniature type) 1/4W Tolerance ±5%	
	
4.7	0240479
5.6	0240569
6.8	0240689
8.2	0240829
10.0	0240100
12.0	0240120
15.0	0240150
18.0	0240180
22.0	0240220
27.0	0240270
33.0	0240330
39.0	0240390
47.0	0240470
56.0	0240560
68.0	0240680
82.0	0240820
100.0	0240101
120.0	0240121
150.0	0240151
180.0	0240181
220.0	0240221
270.0	0240271
330.0	0240331
390.0	0240391
470.0	0240471
560.0	0240561
680.0	0240681
820.0	0240821
1.0 K	0240102
1.2 K	0240122
1.5 K	0240152
1.8 K	0240182
2.2 K	0240222
2.7 K	0240272
3.3 K	0240332
3.9 K	0240392
4.7 K	0240472
5.6 K	0240562
6.8 K	0240682

Value (Ω)	Stock No.
8.2 K	0240822
10.0 K	0240103
12.0 K	0240123
15.0 K	0240153
18.0 K	0240183
22.0 K	0240223
27.0 K	0240273
33.0 K	0240333
39.0 K	0240393
47.0 K	0240473
56.0 K	0240563
68.0 K	0240683
82.0 K	0240823
100.0 K	0240104
120.0 K	0240124
150.0 K	0240154
180.0 K	0240184
220.0 K	0240224
270.0 K	0240274
330.0 K	0240334
390.0 K	0240394
470.0 K	0240474
560.0 K	0240564
680.0 K	0240684
820.0 K	0240824
1.0 M	0240105

Value (Ω)	Stock No.
Solid resistor 1/4W Tolerance ±5%	
	
2.2	0113229
2.7	0113279
3.3	0113339
3.9	0113399
4.7	0113479
5.6	0113569
6.8	0113689
8.2	0113829
10.0	0113100
12.0	0113120
15.0	0113150
18.0	0113180
22.0	0113220
27.0	0113270
33.0	0113330
39.0	0113390
47.0	0113470
56.0	0113560
68.0	0113680
82.0	0113820
100.0	0113101
120.0	0113121
150.0	0113151
180.0	0113181
220.0	0113221
270.0	0113271
330.0	0113331
390.0	0113391
470.0	0113471

Value (Ω)	Stock No.
560.0	0113561
680.0	0113681
820.0	0113821
1.0 K	0113102
1.2 K	0113122
1.5 K	0113152
1.8 K	0113182
2.2 K	0113222
2.7 K	0113272
3.3 K	0113332
3.9 K	0113392
4.7 K	0113472
5.6 K	0113562
6.8 K	0113682
8.2 K	0113822
10.0 K	0113103
12.0 K	0113123
15.0 K	0113153
18.0 K	0113183
22.0 K	0113223
27.0 K	0113273
33.0 K	0113333
39.0 K	0113393
47.0 K	0113473
56.0 K	0113563
68.0 K	0113683
82.0 K	0113823
100.0 K	0113104
120.0 K	0113124
150.0 K	0113154
180.0 K	0113184
220.0 K	0113224
270.0 K	0113274
330.0 K	0113334
390.0 K	0113394
470.0 K	0113474
560.0 K	0113564
680.0 K	0113684
820.0 K	0113824
1.0 M	0113105
1.2 M	0113125
1.5 M	0113155
1.8 M	0113185
2.2 M	0113225
2.7 M	0113275
3.3 M	0113335
3.9 M	0113395
4.7 M	0113475
5.6 M	0113565

◇CAPACITORS

TOLERANCE (%)

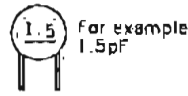
G	J	K	L	M
±2	±5	±10	±15	±20

Value (pF)	Stock No.	Indication
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Ceramic capacitor

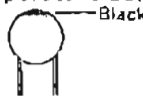
1) 50V Standard type

*No color indication on top



1 (±0.5pF)	0657109	1
1.5	0657159	1.5
2	0657209	2
3	0657309	3
4	0657409	4
5	0657509	5
6	0657609	6
7	0657709	7
8	0657809	8
9	0657909	9
10	0657100	10
12 (±10%)	0657120	12
15	0657150	15
18	0657180	18
22	0657220	22
27	0657270	27
33	0657330	33
39	0657390	39
47	0657470	47 pF
56	0657560	56 pF
68	0657680	68 pF
82	0657820	82 pF
100	0657101	100 pF
120	0657121	120 pF
150	0657151	150 pF
180	0657181	180 pF
220	0657221	220 pF
270	0657271	270 pF
330	0657331	330 pF
390	0657391	390 pF
470	0657471	470 pF
1000 (+80%/-20%)	0657102	0.001 μF
2200	0657222	0.0022 μF
4700	0657472	0.0047 μF
10000	0657103	0.01 μF
22000	0657223	0.022 μF
47000	0657473	0.047 μF

2) 50V Temperature Compensation type



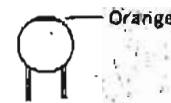
1.0	0669014	1
1.5	0669021	1.5
2.2	0669003	2.2
2.7	0669203	2.7
3.9	0669002	3.9
4.7	0669020	4.7
6.8	0669018	6.8
8.2	0669005	8.2
10.0	0661100	10
12.0	0661120	12
15.0	0661150	15
18.0	0661180	18
22.0	0661220	22
25.0	0661250	25 J

Value (pF)	Stock No.	Indication
------------	-----------	------------

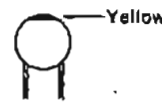
27.0	0661270	27 J
33.0	0661330	33 J
39.0	0661390	39 CM J
47.0	0661470	47 CM J
56.0	0661560	56 CM J
68.0	0661680	68 CM J
82.0	0661820	82 CM J
100.0	0661101	101 CM J



6.8	0669006	6.8
16.0	0662160	16
17.0	0662170	17
19.0	0669279	19
20.0	0662200	20
27.0	0669282	27 J



16.0	0663160	16
17.0	0663170	17
20.0	0669305	20
22.0	0669306	22



10.0	0664100	10
12.0	0669322	12



6.8	0669343	6.8
12.0	0666347	12
17.0	0669352	17
18.0	0669019	18



6.8	0669368	6.8
10.0	0669370	10
12.0	0669382	12
15.0	0669383	15

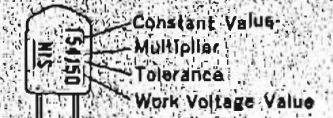


6.8	0669393	6.8
8.2	0669015	8
10.0	0669016	10
33.0	0669408	33
39.0	0669407	39

Value (μF)	Stock No.	W.V.
------------	-----------	------

Mylar capacitor

*Use capacitor with letter J (±5%)
In lieu of one with K (±10%)



15 × 10³ = 150,000 pF
= 0.15 μF (±5%, 50V)

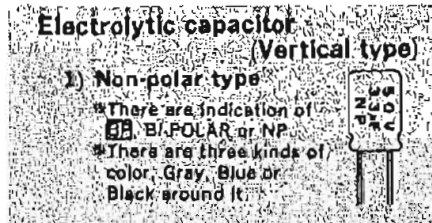


0.0068 μF (±10%, 50V)

0.001	0600106	50V
0.01	0600107	
0.1	0600108	
0.001	0600116	
0.011	0600117	
0.11	0600118	
0.0012	0600126	
0.012	0600127	
0.12	0600128	
0.0013	0600136	
0.013	0600137	
0.13	0600138	
0.0015	0600156	
0.015	0600157	
0.15	0600158	
0.0016	0600166	
0.016	0600167	
0.16	0600168	
0.0018	0600186	
0.018	0600187	
0.18	0600188	
0.002	0600206	
0.02	0600207	
0.2	0600208	
0.002	0600226	
0.022	0600227	
0.22	0600228	
0.0024	0600246	
0.024	0600247	
0.0027	0600276	
0.027	0600277	
0.27	0600278	
0.003	0600306	
0.03	0600307	
0.0033	0600336	
0.033	0600337	
0.33	0600338	
0.0036	0600366	
0.036	0600367	
0.0039	0600396	
0.039	0600397	
0.39	0600398	
0.004	0600406	
0.04	0600407	
0.0043	0600436	
0.043	0600437	
0.0047	0600476	
0.047	0600477	

▶ **CAPACITORS**

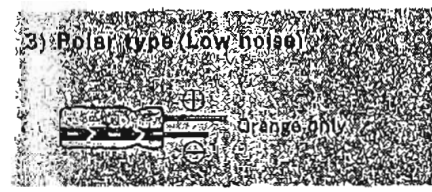
Value (nF)	Stock No.	W.V.	Value (μF)	Stock No.	W.V.	Value (μF)	Stock No.	W.V.	Value (μF)	Stock No.	W.V.
0.47	0600478	50 V	10.0	0533100	25 V	4.7	0513479	25 V	0.68	0519111	50 V
0.0005	0600505		100.0	0533101		100.0	0514101	35 V			
0.005	0600506		22.0	0533220		1000.0	0514102				
0.05	0600507		220.0	0533221		220.0	0514221				
0.0051	0600516		2.2	0533229		2200.0	0514222				
0.051	0600517		33.0	0533330		330.0	0514331				
0.0056	0600566		3.3	0533339		3.3	0514339				
0.056	0600567		47.0	0533470		470.0	0514471				
0.006	0600606		4.7	0533479							
0.06	0600607		68.0	0533680							
0.0062	0600626					10.0	0515100	50 V			
0.062	0600627		10.0	0535100	50 V	100.0	0515101				
0.0068	0600686		100.0	0535101		1000.0	0515102				
0.068	0600687		1.0	0535109		1.0	0515109				
0.0075	0600756		22.0	0535220		220.0	0515221				
0.075	0600757		2.2	0535229		2.2	0515229				
0.008	0600806		33.0	0535330		33.0	0515330				
0.08	0600807		3.3	0535339		330.0	0515331				
0.00082	0600826		47.0	0535470		3.3	0515339				
0.0082	0600826		0.47	0535478		47.0	0515470				
0.082	0600827		4.7	0535479		470.0	0515471				
0.00091	0600915		68.0	0535680		4.7	0515479				
0.0091	0600916										
0.091	0600917		4.7	0539001	80 V	100.0	0516101	63 V			



10.0	0530100	6.3 V
100.0	0530101	
1000.0	0530102	
22.0	0530220	
220.0	0530221	
33.0	0530330	
330.0	0530331	
47.0	0530470	
470.0	0530471	
100.0	0531101	10 V
22.0	0531220	
220.0	0531221	
33.0	0531330	
330.0	0531331	
3.3	0531339	
47.0	0531470	
470.0	0531471	
68.0	0531680	
10.0	0532100	16 V
100.0	0532101	
22.0	0532220	
220.0	0532221	
33.0	0532330	
330.0	0532331	
3.3	0532339	
47.0	0532470	
470.0	0532471	
4.7	0532479	
68.0	0532680	

100.0	0510101	6.3 V
1000.0	0510102	
220.0	0510221	
330.0	0510331	
47.0	0510470	
470.0	0510471	
100.0	0511101	10 V
1000.0	0511102	
220.0	0511221	
33.0	0511330	
330.0	0511331	
47.0	0511470	
10.0	0512100	16 V
100.0	0512101	
1000.0	0512102	
220.0	0512221	
33.0	0512330	
330.0	0512331	
47.0	0512470	
470.0	0512471	
10.0	0513100	25 V
100.0	0513101	
1000.0	0513102	
220.0	0513221	
33.0	0513330	
330.0	0513331	
47.0	0513470	
470.0	0513471	

100.0	0519301	75 V
220.0	0519302	
22.0	0529401	100 V
100.0	0519402	
2.2	0519403	
10.0	0519404	
2200.0	0519901	18 V
47.0	0519902	80 V
100.0	0519903	
220.0	0519904	



10.0	0519001	25 V
3.3	0519002	
1.0	0519101	50 V
3.3	0519102	
0.47	0519103	
1.5	0519104	
2.2	0519105	
4.7	0519106	
6.8	0519107	
10.0	0519108	
0.22	0519109	
0.33	0519110	