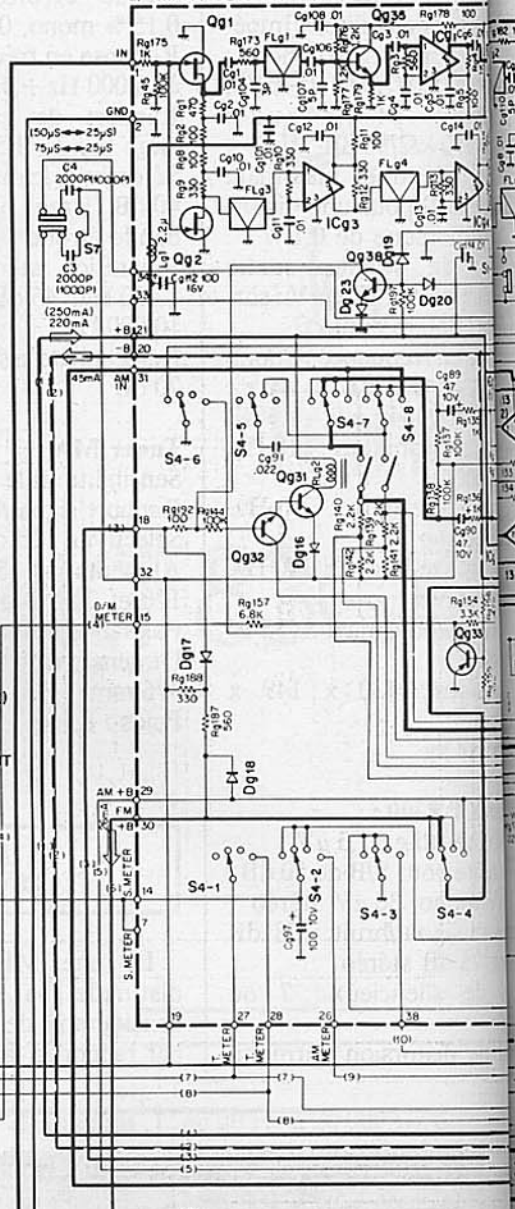
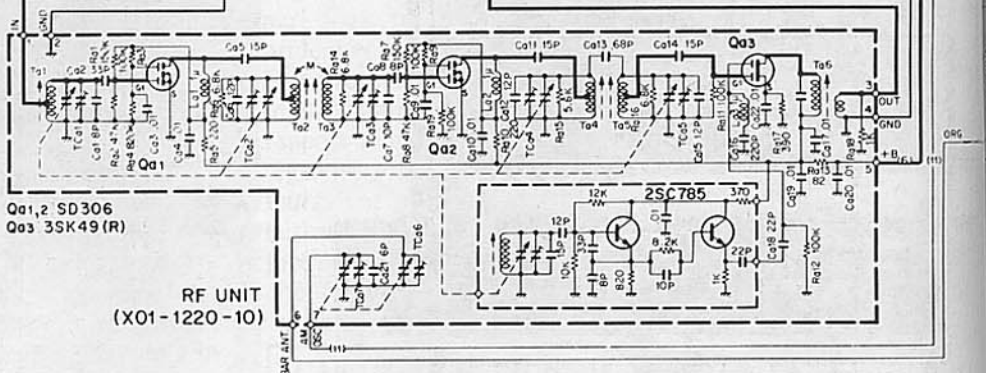
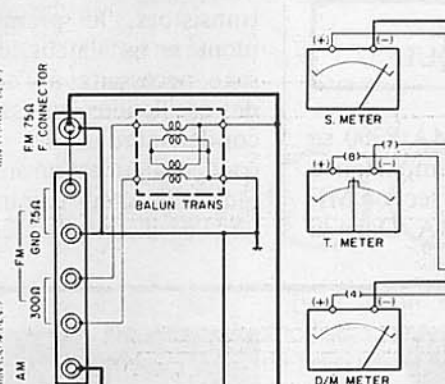


Qg1, 2 2SK55 (D), Qg10~14, 18, 19, 31, 32, 38 2SC945 (P) or (Q)
 Qg5~7, 35, 36 2SC535 (B), Qg8, 9, 33 2SA733 (P) or (Q)
 Qg15~17, 29, 30 2SC1345 (D) or (E), Qg20, 21, 23, 25, 27 2SK68 (L)
 or (M), Qg22, 24, 26, 28 2SC1345 (E), Dg19, 20 1N60
 Dg1~5, 7~11 1N60, Dg6, 8, 23, 35~5~18, 23, 35 1S1555 or 1S2076
 ICg1~7, 9 TA7060P, ICg8: μ PC577H(E) or (F), ICg10, 14 RC4558T
 ICg11, 13 RC4558TA, ICg12: HA1156W

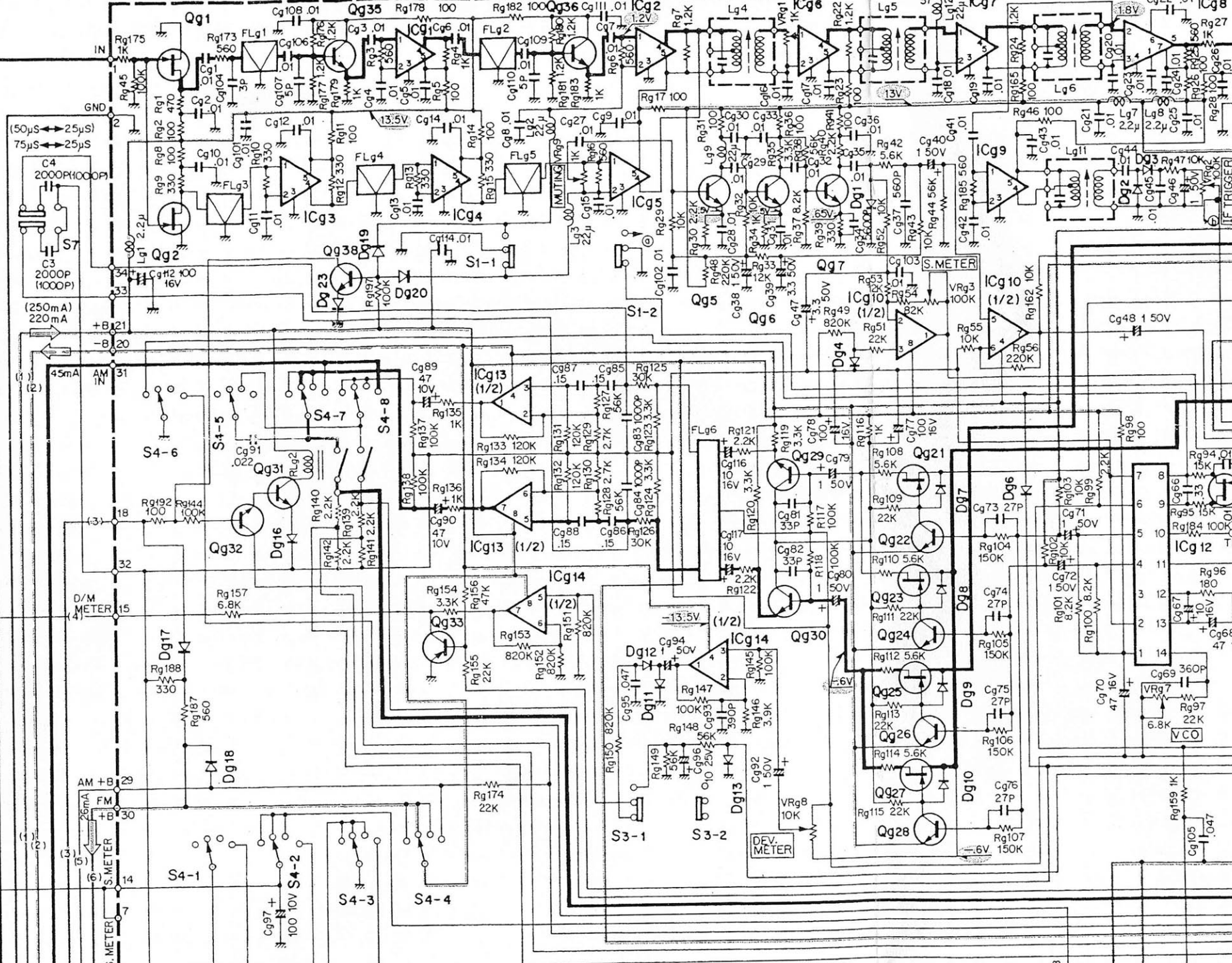
IF MPX AUDIO UNIT (X05-1350-10)

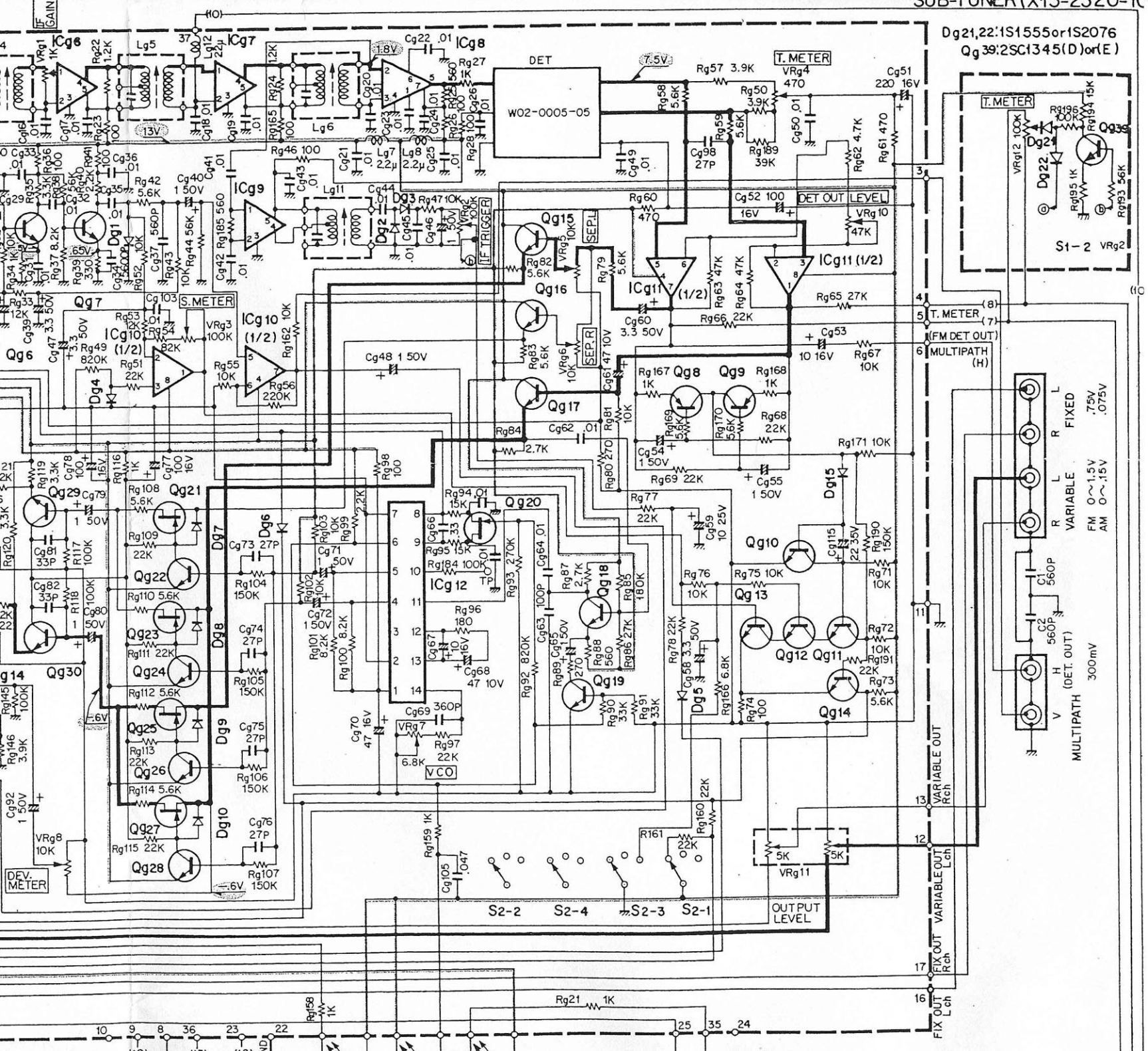


FM 75 Ω F CONNECTOR
 FM GND 75 Ω
 3000
 AM

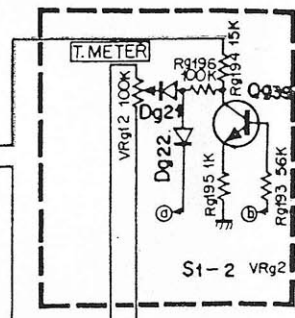


IF MPX AUDIO UNIT (X05-1350-10)

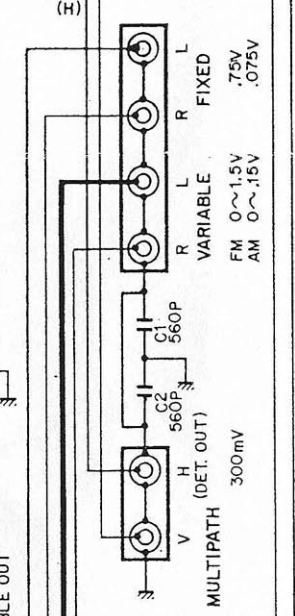




Dg21,22:1S1555or1S2076
 Qg39:2SC1345(D)or(E)



(8) T. METER
 (7) (FM DET OUT)
 (6) MULTIPATH (H)



FIX OUT Lch
 17
 FIX OUT Rch
 16
 VARIABLE OUT Lch
 13
 VARIABLE OUT Rch
 11
 MULTIPATH (H)
 6
 (FM DET OUT)
 7
 T. METER
 (8)
 4
 5
 3
 2
 1

300mV
 V H (DET. OUT)
 C1 560P
 C2 560P
 VARIABLE
 FM 0~1.5V
 AM 0~.15V
 R L
 R L
 R L
 R L
 FIXED
 .75V
 .075V

1mV (75KHz DEV.)

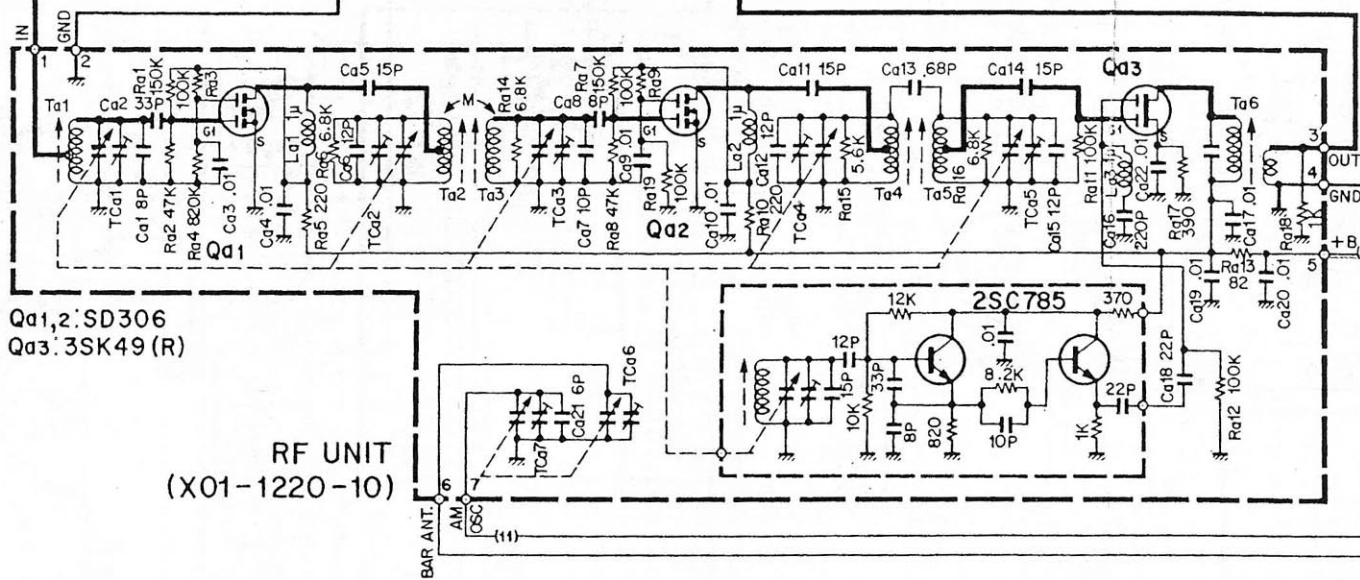
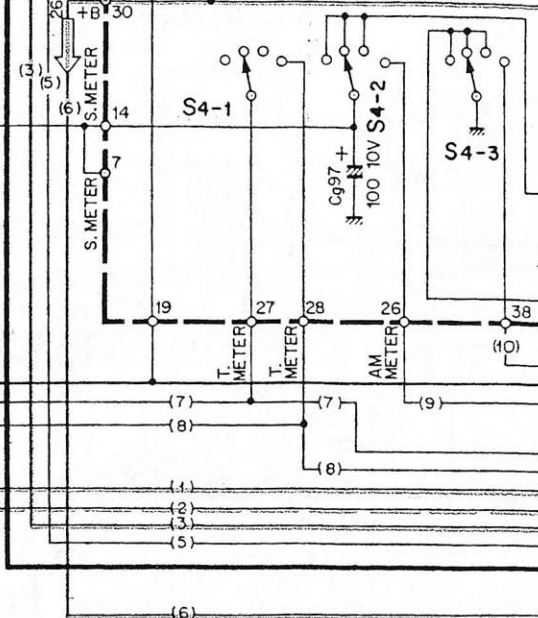
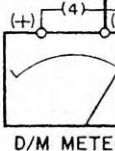
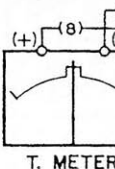
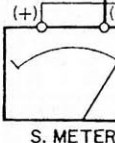
1mV (30% DEV.)

FM 75Ω
F. CONNECTOR

FM
GND 75Ω
300Ω

AM

BALUN TRANS



Qa1,2: SD306
Qa3: 3SK49 (R)

RF UNIT
(X01-1220-10)

CIRCUIT DESCRIPTIONS

FM-RF (X01-1220-10)

1. ADOPTION OF DD TYPE DUAL GATE MOS-FET (Qa1, Qa2)

The RF amplifier employs DD (Double-Diffused) type MOS-FET elements. This type of FET has been processed through diffusion repeated twice, and hence it offers a better high-frequency characteristic and a shorter channel length to be controlled by gate potential. The noteworthy features are (1) preferable large-input characteristic, (2) preferable spurious response and mutual modulation characteristics, (3) sensitivity with low noise figure (NF), and (4) stabilized performance with a small feedback capacity.

2. ADOPTION OF HIGH-ACCURACY 6-GANG VARIABLE CAPACITOR

The high-frequency selective circuit is composed of single-double-double tuning stages. Such a multistage type circuit may often result in degradation of distortion factor. However, this tuning circuit with an optimum Q has been designed by the adoption of a high-accuracy 6-gang variable capacitor with minimal tracking and gang errors, and by the reduction of load capacity realized by DD type MOS-FET. Thus, preferable image rejection, spurious response, and IF interference characteristics are obtained without sacrificing distortion characteristics.

3. MIXER WITH MOS-FET (Qa3)

A dual gate MOS-FET is employed to suppress mutual modulation in the mixing stage.

4. LOCAL OSCILLATOR

A buffer circuit assures the stabilized supply of local oscillation output to the mixer so that the characteristics for AM suppression and cross-modulation can be improved. Since the local oscillator is joined with the variable capacitor, there is no error between actual setting and circuit operation.

TUNER (X05-1350-10)

FM-IF

The IF circuit can be switched over to NARROW or WIDE. The wide-band circuit is composed of Qg1, FLg1, Qg35, ICg1, FLg2, Qg36, ICg2, and Lg4. FLg1 and FLg2 are a 4-pole LC concentrated filter having a ideal group-delay characteristic. Qg35 and Qg36 compose an emitter-follower circuit which prevents deterioration of group-delay characteristic when a large input is applied.

The narrow-band circuit is composed of Qg2, FLg3, ICg3, FLg4, ICg4, FLg5, ICg5, and Lg4. FLg3, FLg4, and FLg5 are a 4-element phase linear type ceramic filter with excellent group-delay characteristics. These make it possible to obtain a selectivity of 110 dB. Switching over between NARROW and WIDE is effected by switching on ICg2 or ICg5. (This selection is possible with S1.) ICg2 or ICg5 is switched off when No. 2 terminal is grounded. After passing through the wide band or narrow band circuit, the 10.7 MHz IF signal is amplified at ICg6, ICg7, and ICg8, and then transmitted to the DET circuit.

Function of Qg38: When the IF circuit is switched over either to NARROW or WIDE, the muting circuit is switched on to suppress shock noise.

FM-DET

The detector circuit is assembled into a unit (W02-0005-05). It is a wide-band detector circuit of multicative detection system. This system is composed of phase shifter, wave shaping circuit, and multiplier having a low distortion characteristic. The detection band width is 5 MHz and a low distortion characteristic of 0.04% is realized over more than 1 MHz range. SN ratio is more than 85 dB. This detector circuit generates balanced output.

FM-MPX

The balanced output from the detector circuit is amplified by ICg11 and the main signal is fed to DSDC (Double switching demodulator circuit) through emitter-follower Qg17. The sub-signal for left channel passes through emitter-follower Qg15 and that for right channel passes through emitter-follower Qg16, both fed to DSDC. In this way, the newly designed DSDC cancels the leak components of right and left demodulators with exclusively installed canceling circuits. Adjustment for channel separation is independently performed at right and left circuits. Therefore separation for both channels can be adjusted to optimum values respectively.

As an analog switch, an excellent FET is used for MPX demodulator switching to obtain low distortion factor and high separation characteristic. This FET switching system is put to practical use by uniquely-designed FET driving circuit. Distortion factor of this circuit is less than 0.02% in monaural and less than 0.05% in stereo reproduction. Qg22, Qg24, Qg26, and Qg28 repeat on-off performance at 38 kHz to obtain the function of FET switching. Dg7 ~ 10 are used for the improvement of distortion characteristics.

CIRCUIT DESCRIPTIONS

The 38 kHz switching signal is generated by ICg12. The composite signal is amplified at Qg18 and applied to No. 11 terminal of ICg12. The 38 kHz sub-carrier signal is obtained from No. 4 and 5 terminals. A pilot signal is taken out of the composite signal by the aid of filter function of PLL. However, if the loop response is too fast, this filter function will be weakened and the sub-carrier will be mixed with main- and sub-signals, thus giving rise to a sort of cross-modulation distortion. Most part of distortion in the high-frequency range during stereo reproduction is caused by this phenomenon. Also in the low-frequency range, there will be a peak distortion in the vicinity of 200 Hz due to jitter in PLL (phase difference by LPF leakage). In order to eliminate high-frequency and jitter distortions, the input level of PLL (No. 11 terminal) is lowered after the stereo indicating lamp has been lit up. This delays the loop response (capture range narrowed), and increases the filter effect. In practical usage, emitter resistance of Qg18 is changed by Qg19 to give variation in amplification degree. In this manner, the amount of composite signal into ICg12 is increased or decreased. Qg19 is turned off while broadcast signals are received.

AUDIO AMP

The audio signals demodulated for the right and left channels enter the emitter-follower circuit of Qg29 or Qg30. After a carrier leak has been removed at low-pass filter FLg6, these signals are amplified at the final amplifier of ICg13 and generated as tuner output.

ACCESSORY CIRCUITS

1. S METER (FM)

A signal for the S meter passes through the AGC AMP of Qg5 ~ 7, is amplified at 1/2 ICg10, and is detected at Dg5. Indication is almost linear up to 1 mV while the SN ratio is completely saturated.

2. MULTIPATH METER

A signal for the multipath meter is amplified at 1/2 ICg10 and detected at Dg13. This meter is used to detect the AM component in 10.7 MHz IF signal and to supervise the amount of multi-path.

3. DEVIATION METER

The peak value of modulation is indicated by percentage, regarding deviation of 75 kHz as 100%. The composite signal is amplified at ICg14 and detected at Dg11 and Dg12. The obtained output is used to give deflections at the deviation meter. Qg33 is used to prevent the deflection at the muting level or lower.

4. T METER

A difference in balanced outputs (in reverse phase) from the multicative detector (W02-0005-05) is used to give deflections at the T meter.

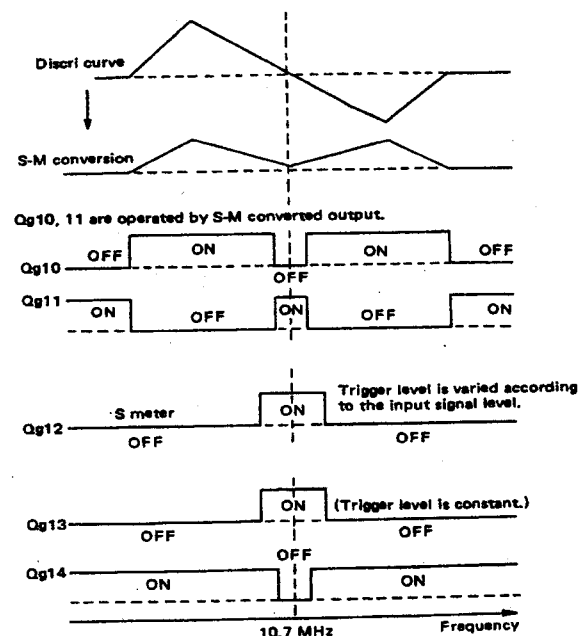
5. MUTING

The muting control signal is obtained from the AND circuit by utilizing the following 3 signals: (1) signal for deflecting the S meter (varied with input level), (2) signal from IF circuit, and (3) signal obtained from the S curve of DET through S-M conversion.

When the signal of (1) above is obtained, Qg12 is turned on. The signal of (2) is the detection output obtained from the circuit consisting of ICg9, Lg11, Dg2, and Dg3. This signal causes Qg13 to be turned on. The signal of (3) is obtained from the S curve of DET through S-M conversion effected by the phase detector circuit consisting of Qg8 and Qg9. With this signal, Qg10 is turned off and Qg11 is turned on when broadcast signals are received. Qg14 is turned off when all of Qg11 ~ 13 are turned on. It clears the muting function. If at least one of Qg11 ~ 13 is turned off, Qg14 is turned on and the muting function is obtained.

Qg31 and Qg32 are used to compose a relay driving circuit which can be switched on or off by a muting control signal or by a signal which can be obtained after the set has been energized (rectified signal from DK3).

The muting circuit can be set to either of the two purposes. It can be used for the major purpose of inter-station noise suppression, or when a high-quality station (SN ratio being 50 dB or higher) is selected for stereo reception.



ADJUSTMENTS

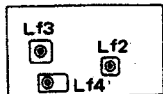
TEST EQUIPMENTS

RF signal generator RF-SG
 Oscilloscope scope
 Solid state volt meter (input impedance: more than 1MΩ) .. SSVM
 DC volt meter DCVM
 FM stereo generator MPX-SG
 Frequency counter
 Distortion meter

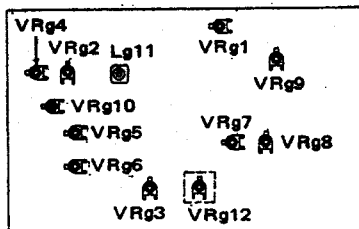
NOTE

- * Tuning dial is set to the proper point corresponding to no radio stations.
- * RF-SG is set to the lower response possible on oscilloscope.
- * The output level of RF-SG is made a 6 dB drop by the dummy ant.
- * The input level 60 dB means 66 dB on RF-SG.
- * Repeat TRACKING adjustment several times and confirm the reception of broadcasting.
- * Test point is shown in the schematic diagram.

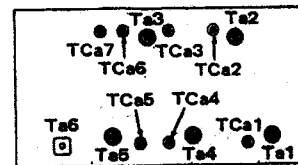
No.	ALIGN	TEST EQUIPMENTS		TUNER SETTING	OUTPUT INDICATOR	ADJUSTMENT POINTS	REMARKS
		CONNECTION	SETTING				
FM SECTION							
1	DISCRIMINATOR	-	-	-	T meter	VRg4 VRg12	Make the pointer position in the center of the meter (at Narrow mode) Make the pointer position in the center of the meter (at Wide mode)
2	TRACKING	RF-SG to ANT terminal via dummy ant.	90 MHz 1 kHz (Mod) 75 kHz (Dev)	90 MHz	SSVM, distortion meter & scope to output jack (L)	Ta1 ~ 5	Maximum deflection, minimum distortion
3			105 MHz 1 kHz (Mod) 75 kHz (Dev)	105 MHz		TCa1 ~ 5	
4	Repeat "DISCRIMINATOR" adjustment						
5	IF TRIGGER	RF-SG to ANT terminal via dummy ant.	100 MHz 0 (Dev) 80 dB	100 MHz	DCVM to TP1	Lg11	Maximum DC voltage
			100 MHz 0 (Dev) 10 dB	- ditto -	- ditto -	Ta8	Maximum DC voltage
6	IF TRIGGER LEVEL	- ditto -	100 MHz 0 (Dev) 80 dB	- ditto -	- ditto -	VRg2	Adjust DC voltage to 1.8 V
7	IF GAIN	-	-	-	- ditto -	VRg1	Adjust DC voltage to 0.6 V
8	S METER	RF-SG to ANT terminal via dummy ant.	100 MHz 0 (Dev) 80 dB	100 MHz	S meter	VRg3	Make the pointer indication "5" digit
9	MUTING LEVEL	- ditto -	100 MHz 0 (Dev) 18 dB	- ditto -	SSVM & scope to output jack (L)	VRg9	Adjust VRg9 so that muting operation is on
10	VCO	-	-	-	Frequency counter to TP2	VRg7	Adjust VCO frequency to 19 kHz
11	OUTPUT LEVEL	- ditto -	100 MHz 1 kHz (Mod) 75 kHz (Dev) 80 dB	100 MHz	SSVM & scope to FM DET OUT	VRg10	Adjust OUTPUT LEVEL to 300 mV
12	SEPARATION	RF-SG to ANT terminal MPX-SG to RF-SG ext. Mod.	MPX-SG: SELECTOR → L or R 1 kHz (Mod)	- ditto -	SSVM & scope to output jack (R)	VRg6	Minimum deflection
			RF-SG: 100 MHz, 60 dB 68.25 kHz (Dev)		SSVM & scope to output jack (L)	VRg6	Minimum deflection
13	DISTORTION	- ditto -	MPX-SG: SELECTOR → L + R 1 kHz (Mod) RF-SG: 100 MHz, 60 dB 75 kHz (Dev)	- ditto -	SSVM, scope & distortion meter to output jack (L)	Ta8	Minimum distortion
14	DEVIATION METER	RF-SG to ANT terminal via dummy ant.	100 MHz 1 kHz (Mod) 75 kHz (Dev) 60 dB	- ditto -	D meter	VRg8	100% deflection
AM SECTION							
1	IF	RF-SG to ANT terminal via dummy ant.	1000 kHz 400 Hz, 30% (Mod) 100 dB	1000 kHz	SSVM & scope to output jack (L)	Lf4	Maximum deflection
2	TRACKING	- ditto -	800 kHz 400 Hz, 30% (Mod) 100 dB	800 kHz	- ditto -	Lf3 Bar antenna	- ditto -
3			1400 kHz 400 Hz, 30% (Mod) 100 dB	1400 kHz		TCa6, 7	



AM UNIT
(X03-1020-10)



FM TUNER
(X05-1350-10)



RF UNIT
(X01-1220-10)