FM TRACKING

Proceed as follows before beginning FM tracking adjustment

- Connect the FM SG (FM signal generator) to the FM ANTENNA 300Ω terminal.
- Connect the SIGNAL meter or DC voltmeter between Tuner ass'y TP terminal and ground.
- Switch the FUNCTION switch to the FM position, the FM MUTING switch to the OFF position.
- The tuning coil in the FM front end does not have an adjusting core. Consequently, tracking adjustment at 90MHz are performed by regulating the gap between rotor and stator of the tuning capacitors (VC1, VC2, and VC3). The expression "adjust VC (VC1, VC2, and VC3)" found in the text means that the two outer rotor blades of each of these tuning capacitors are to be extended outwards with spatula (Part No. GGK-066) as shown in Fig. 7-2.

1. Set the TX-610 dial pointer to a frequency in the 106MHz region so that there will be no input signal.
2. Adjust core of T3a so that the TUNING meter indicator to dead center.
3. Next tune more accurately to 106MHz, and set the FM SG output to 106MHz, 60 to 80dB (modulation 400Hz, ±75kHz deviation).
4. Adjust TC1 to obtain maximum deflection of the SIGNAL meter indicator.
5. Then tune the dial pointer to 90MHz, and set the FM SG output frequency to 90MHz.
6. Adjust the VC3 to obtain maximum deflection in the SIGNAL meter, and a dead center reading in the TUNING meter.
7. Repeat steps 3 to 6 above.
8. Reset the FM SG output level to 20 — 30dB, and adjust TC2 and TC4 at 106MHz, and VC1 and VC2 at 90MHz in the same manner as described above in steps 3 to 7. These adjustments will ensure optimum sensitivity in the 90 to 106MHz range, and minimum difference in sensitivity between the two extreme frequencies.
9. Set the FM SG output to 98MHz and tune the TX-610 to this position.
10. Adjust the core of T2 to obtain maximum deflection in the SIGNAL meter.
11. Retune to a position with no input signal.
12. Adjust core of T3a again to set the TUNING meter indicator to dead center.
13. Set the FM SG output to 98MHz and 66dB, and tune the TX-610 to this position.
14. Then adjust the core of T3b to reduce distortion in the demodulator output (OUTPUT) to a minimum.
15. Repeat steps 11 to 14 above until both specifications (center TUNING meter reading in the absence of input signal, and minimum distortion in demodulator output) are satisfactorily met.

FM MPX

- Connect the MPX SG (FM multiplex generator) to the FM SG external modulator terminal.
- Set the FM MUTING switch to the ON position.

1. Set the FM SG output to 98MHz and 66dB (unmodulated), and tune the TX-610 to this position.
2. Adjust VR1 to obtain a 19kHz signal at terminal No.8.
3. Then set the FM SG output level to 85dB, and the modulation mode to external. Then with the MPX SG, set Main to 1kHz, L+R to ±67.5kHz deviation, and pilot signal to ±67.5kHz deviation, and pilot signal to ±7.5kHz deviation.
4. Rotate the T2 core around by up to 90° in either direction to reduce the demodulator output distortion to a minimum.

REC LEVEL CHECK

- Connect the FM SG to the FM antenna 300Ω terminal.
- Switch the FUNCTION switch to the FM position.

1. With the FM SG at modulation frequency of 400Hz, 100% modulation, and an output of 80dB, check the output level of TX-610.
2. Switch the REC REVEL CHECK switch to the ON position, and adjust VR3 so that the output level is −6dB below the level found in step 1 above.

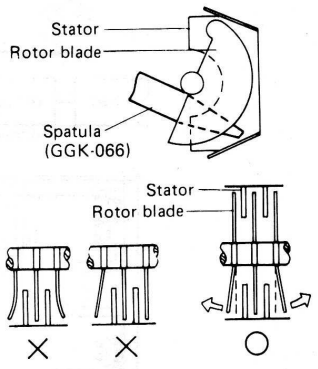


Fig. 7-2 Adjustment of tuning capacitor

AM TRACKING

- Connect the AM SG (AM signal generator) to the AM antenna terminal via a 1kΩ resistor.
- Switch the FUNCTION switch to the AM position.

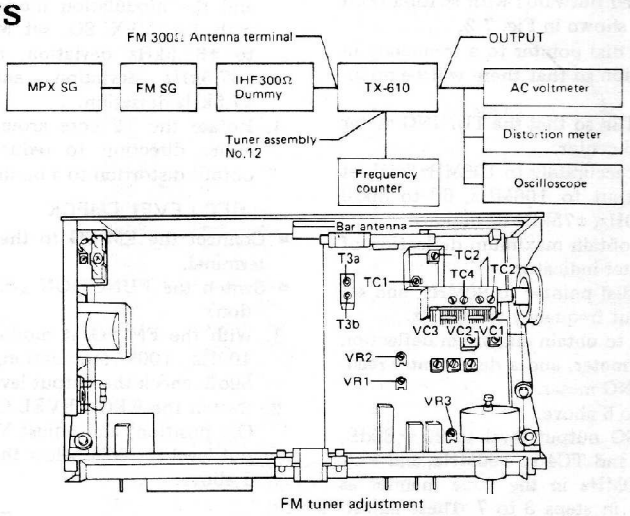
1. Tune the TX-610's dial pointer to 600kHz, and the AM SG output to 600kHz, 100dB (modulation 400Hz, 30%).
2. Adjust core of T4 to obtain maximum deflection of the SIGNAL meter indicator.
3. Then tune to 1400kHz, and also set the AM SG output frequency to 1400kHz.
4. This time adjust TC4 to obtain maximum SIGNAL meter deflection.
5. Repeat steps 1 to 4 above.
6. Set the AM SG output level to 30dB, adjust the coil along the bar-antenna and F6 at 600kHz, and TC5 at 1400kHz, in the same manner as described in the above steps. This is the adjustment for optimum sensitivity across the frequency band, and minimum difference in sensitivity at different frequencies.

AM TUNING METER

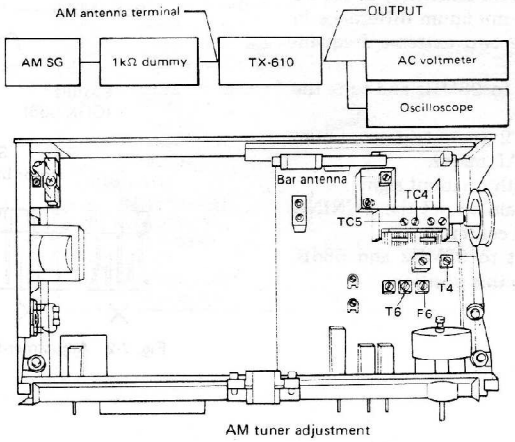
- Connect the AM SG to the AM antenna termina via 1kΩ resistor.
- Switch the FUNCTION switch to the AM posi tion.

1. Tune the TX-610's dial pointer to 1000kHz and the AM SG output to 1000kHz, 80dE (modulation 400Hz, 30%).
2. Adjust the core of T6 so that the TUNINC meter indicator to dead center.

ADJUSTMENTS



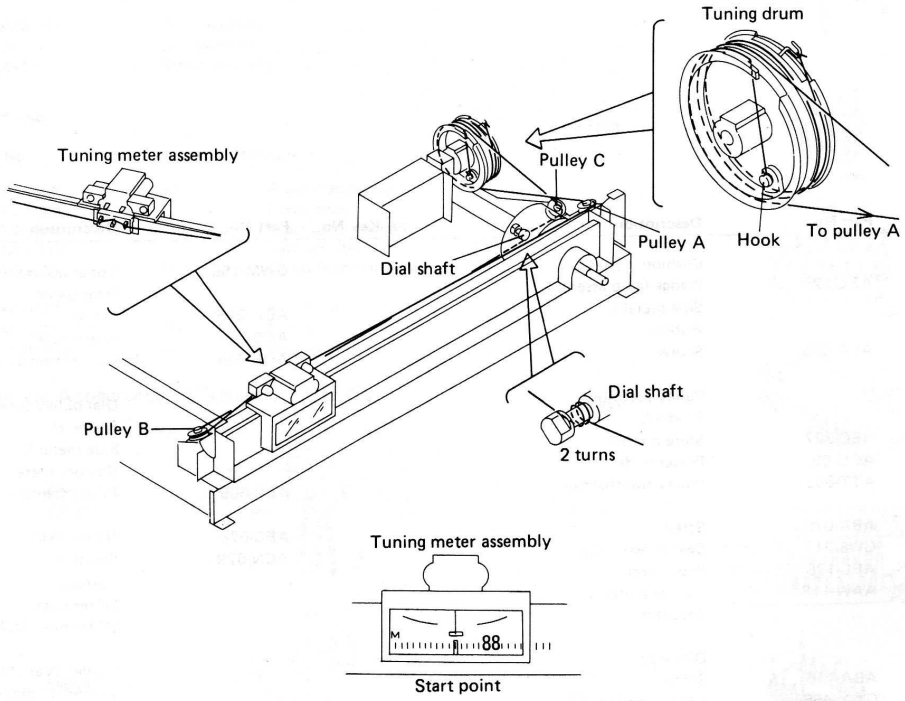
FM tuner adjustment



AM tuner adjustment

DIAL CORD STRINGING

1. Remove the top cover and front panel.
2. Remove the tuning drum from the shaft of the tuning capacitor.
3. Tie one end of the cord to the hook located inside the tuning drum.
4. Rotate the tuning capacitor right around until the rotor blades are fully intermeshed.
5. Secure the tuning drum back onto the tuning capacitor shaft, making sure that the securing screw faces directly upward.
6. Pass the cord out through the small opening in the circumference of the tuning drum (see diagram), make half a turn around the tuning drum, and then pass the cord around pulleys A and B in that order. Next make 3 turns around the dial shaft, then pass around pulley C, make 2 more turns around the tuning drum (along the tuning drum groove), and finally tie the cord to the spring, checking that there is a certain amount of tension in the cord.
7. Rotate the tuning drum to check that the cord moves freely and smoothly. Then cut off any excess cord.
8. Next rotate the dial shaft in the counter clockwise direction (i.e. tuning capacitor rotor blades fully intermeshed). Align the dial pointer with the tuning dial "start point", and then attach it to the cord.
9. Finally apply "paint lock" to the spots where the dial pointer is attached to the cord in order to secure the connection.



Parts List

NOTES:

- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*

Key No.	Part No.	Description
	ANE-291	Bonnet case
	ABA-079	Screw
	AAD-200	Lever Knob
	GWX-456	LED assembly
	ANB-849	Front panel assembly
	ABA-066	Screw
	AAA-063	Knob
		Cushion
	AEL-129	Wedge lamp assembly
		Side metal L
		Rubber
	ABA-066	Screw
		Pulley assembly
		Frame L
	AEC-327	Sterein relief
	ADG-023	Power code
	ATT-663	Power transformer
	ABA-079	Screw
	GWS-217	Switch assembly
	AEL-128	Pilot lamp
	AAW-118	Tuning meter
		Smoother
		Dial stay
	ABA-116	Screw
	GWX-456	LED assembly
		Dial scale hold metal
		Dial scale board
		Dial scale hold metal B
		Shaft hold metal
	B22-016	Washer
	B71-004	Nut 9ϕ
	AXA-256	Dial shaft assembly
	GWM-156	Tuner assembly
		Rear panel
	ABA-246	Screw
	AEC-337	Strein relief
	ADE-034	Connection code
		Dial pulley assembly
		Frame R
		Side metal R
		Bottom plate
	AEC-609	Foot assembly
	AEC-678	Nylon rivet
⚠	ACN-029	Resistor
		Cushion
		2P terminal
		2P terminal (GND)
		Holder (Variable capacitor)
		Terminal holder
		Serial plate
	ABA-067	Screw
	RN2P 0R5K	Resistor

SCHEMATIC DIAGRAMS, P.C. BOARD PATTERNS AND PARTS LIST

MISCELLANEA

NOTES:

- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*

Ex. 1 *When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).*

560Ω	*56 x 10¹*	*561*	*RD¼PS* 5 6 1 *J*
47kΩ	*47 x 10³*	*473*	*RD¼PS* 4 7 3 *J*
0.5Ω	*0R5*	. . . . .	*RN2H* 0 R 5 *K*
1Ω	*010*	. . . . .	*RSIP* 0 1 0 *K*

Ex. 2 *When there are 3 effective digits (such as in high precision metal film resistors).*

5.62kΩ	*562 x 10¹*	*5621*	*RN¼SR* 5 6 2 1 *F*

Miscellaneous Parts List

ASSEMBLY

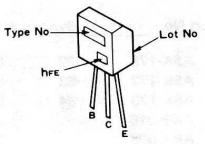
Part No.	Symbol & Description
GWM-156	Tuner assembly
GWX-456	LED assembly
GWS-217	Switch assembly

OTHERS

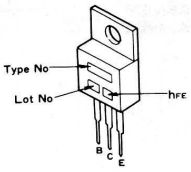
Part No.	Symbol & Description	
⚠ ATT-663	T1	Power transformer
⚠ ADG-023		Power code
ANB-849		Front panel assembly
AAW-118		Tuning meter
AEL-129	PL3	Wedge lamp assembly
AEL-128	PL1, PL2	Pilot lamp
⚠ ACN-029	R1	Resistor
RN2P 0R5K	R2	Resistor

External Appearance of Transistors and ICs

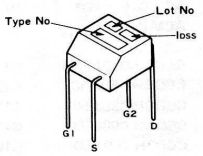
2SC461
2SC535



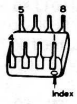
2SD712



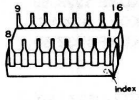
3SK73



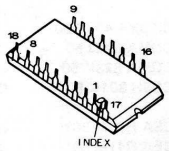
HA1201



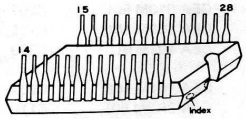
HA1197



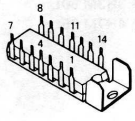
PA3007



PA4006



LB1416



PARTS LIST OF P.C. BOARD ASSEMBLY

Parts List of Tuner Assembly (GWM-156)

TRANSFORMER AND COILS

Part No.	Symbol & Description	
ATB-623	T1	Bar-antenna assembly
ATE-039	T2	FM matching coil
ATE-045	T3	FM detector transformer
ATB-066	T4	AM oscillator coil
ATB-061	T5	AM detector transformer
ATB-062	T6	AM detector transformer
ATF-053	F1, F2	FM ceramic filter
ATF-089	F3, F4	Low pass filter
ATF-076	F5	AM ceramic filter
ATF-038	F6	455kHz filter
T24-028	L5	RF choke coil

CAPACITORS

Part No.	Symbol & Description	
ACK-012	VC1	Variable resistor
ACM-006	TC1	Ceramic trimmer
CCDUJ 090J 50	C1	
CCDCH 150J 50	C13	
CCDCH 330J 50	C12	
CCDCH 080D 50	C11	
CCDPH 150J 50	C10	
CCDUJ 120J 50	C4	
CCDSL 101J 50	C5, C106	
CCDSL 060D 50	C6, C302	
CCDXL 120J 50	C315	
CGB R47K 500	C9	
CCDSL 221J 50	C110, C111	
CKDYB 102K 50	C307, C308	
CKDYB 122K 50	C321	
CKDYX 473M 25	C409	
CKDYF 103Z 50	C2, C3, C7, C8, C14, C109, C113, C301, C303, C310-C313, C316	
CKDYF 223Z 50	C101, C102, C105, C108, C114, C116, C117, C201, C317, C322	
CKDYF 473Z 50	C103, C104, C304, C305	
CQMA 472J 50	C203, C204	
CQMA 823K 50	C408	
CQSH 331K 50	C314	
CEA R22M 50L	C323, C324	
CEA R47M 50L	C210, C410, C411	
CEA 010M 50L	C207, C208, C212, C213, C406	
CEA 100M 16L	C112, C306, C325, C407	
CEA 101M 6L	C309	
CEA 101M 10L	C202	
CEA 2R2M 50L	C115, C205, C206	
CEA 220M 10L	C214	
CEA 3R3M 50L	C320	
CEA 4R7M 35L	C211, C319	
CEA 470M 10L	C107	
CEA 471M 16L	C401, C402	
CEA 471M 25L	C403	
CEA 221M 25L	C404	
CEA 101M 16L	C405	
CEA 010M 50L	C318	
ACG-018	C209	

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

RESISTORS

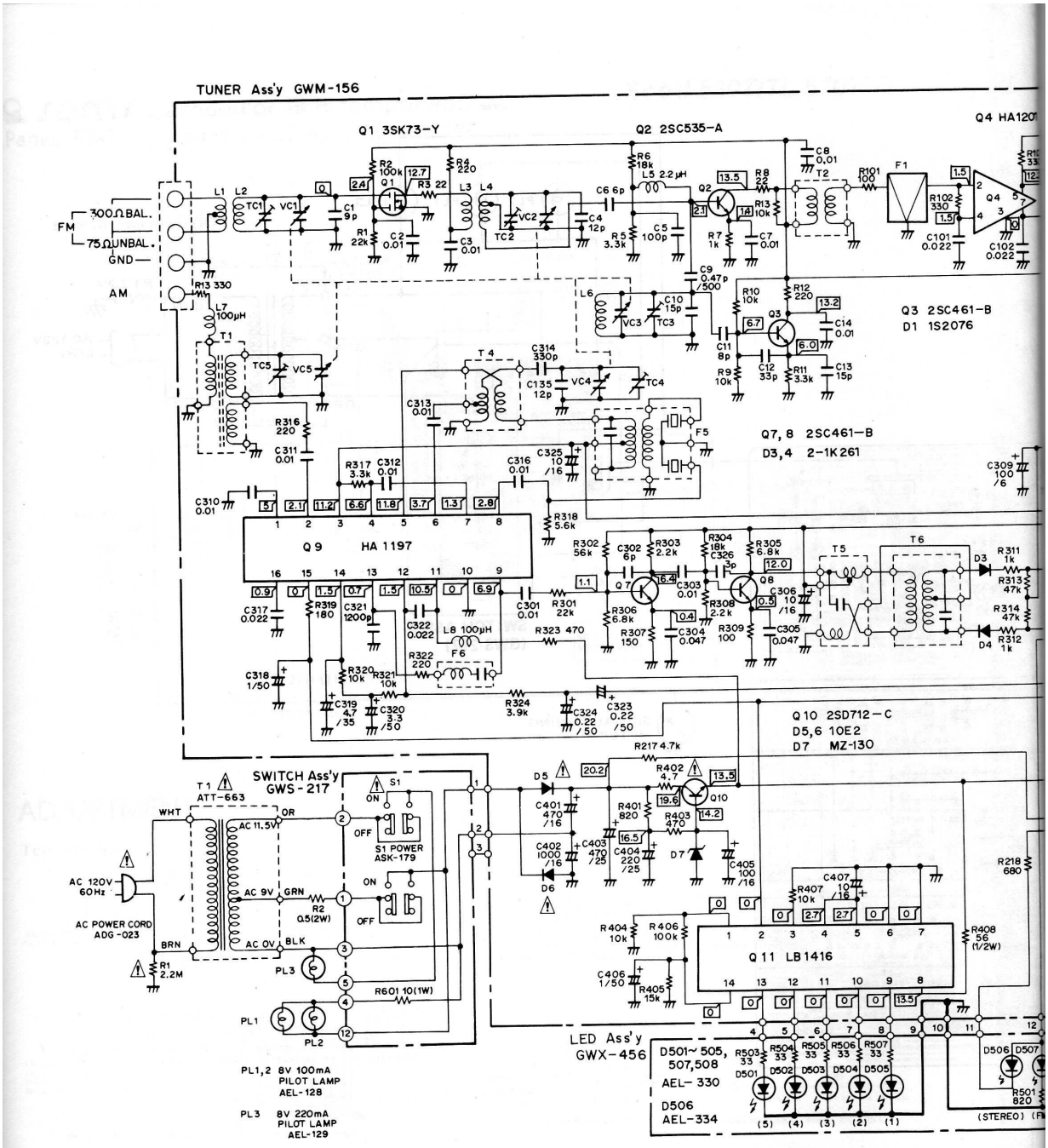
Part No.	Symbol & Description		
ACP-082	VR1	Semi fixed	6.8k
ACP-083	VR2, VR3	Semi fixed	33k
RD¼PM □□□ J	R1–R12, R101–R121, R201–R213, R215–R218, R301–R324, R401, R403–R407, R409, R410		
RD¼PQ □□□ J	R214		
RD¼PM □R□ J	R402		
RD½PS □□□ J	R408		

SEMICONDUCTORS

Part No.	Symbol & Description
3SK73	Q1
2SC535	Q2
2SC461	Q3, Q7, Q8
HA1201	Q4
PA3007-A	Q5
PA4006-A	Q6
HA1197	Q9
2SD712	Q10
⚠ (2SD313)	
LB1416	Q11
1S2076	D1, D2
(1S2473)	
(1S1555)	
2-1K261	D3, D4
10E2	D5, D6
⚠ (SIB01-02)	
KZL-140	D7

OTHERS

Part No.	Symbol & Description	
ASK-178	S2	Lever switch (FUNCTION)
ASK-172	S3	Lever switch (MUTING)
ASK-173	S4	Lever switch (REC LEVEL CHECK)
AKB-016		Terminal (ANTENNA)
ABA-025		Screw
ABA-026		Screw
ABA-082		Screw



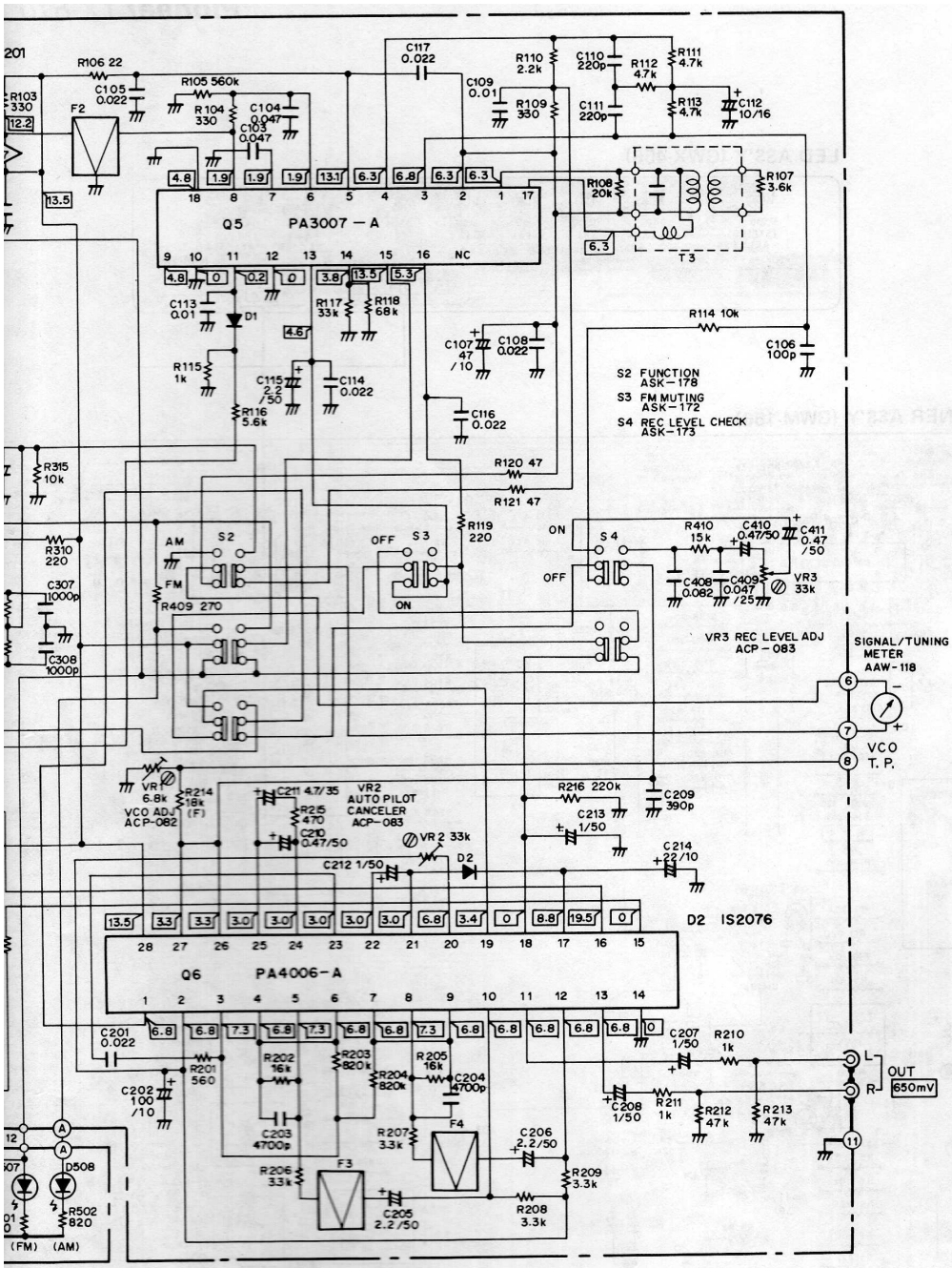
1. RESISTORS:
Indicated in Ω, ¼W, ±5% tolerance unless otherwise noted k : kΩ, M : MΩ, (F) : ±1%, (G) : ±2%, (K) : ±10% tolerance

2. CAPACITORS:
Indicated in capacity (μF)/voltage (V) unless otherwise noted p : pF
Indication without voltage is 50V except electrolytic capacitor.

3. VOLTAGE, CURRENT:
: DC voltage (V) at no input signal
mV: Signal voltage at FM 400Hz 75kHz DEV.

4. OTHERS:
⊘ : Adjusting point.
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing be sure to use parts of identical designation.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

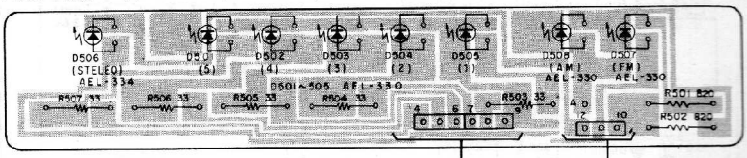


SWITCHES:

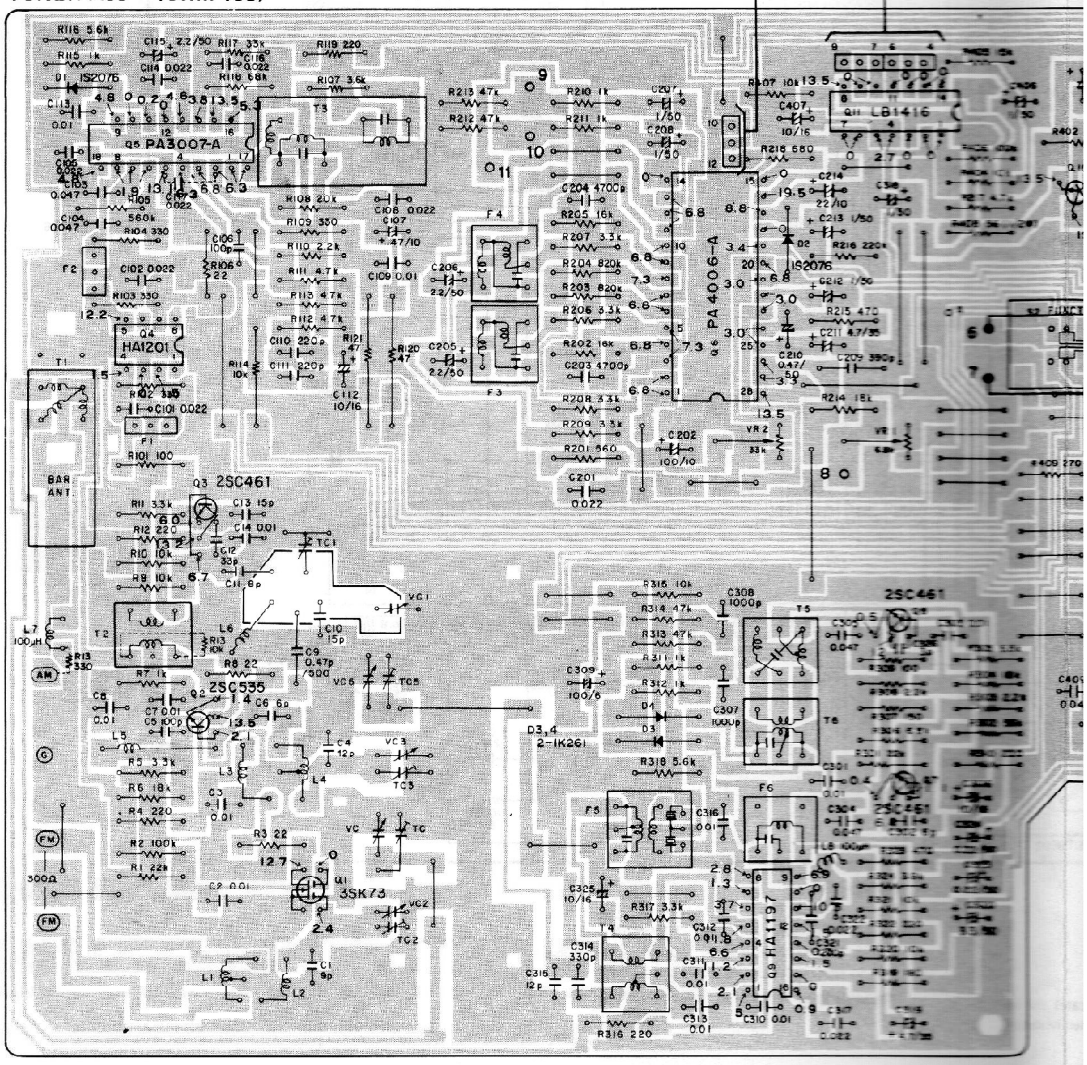
S1 :	POWER	ON — OFF
S2 :	FUNCTION	FM — AM
S3 :	FM MUTING	ON — OFF (MONO)
S4 :	REC LEVEL CHECK	ON — OFF

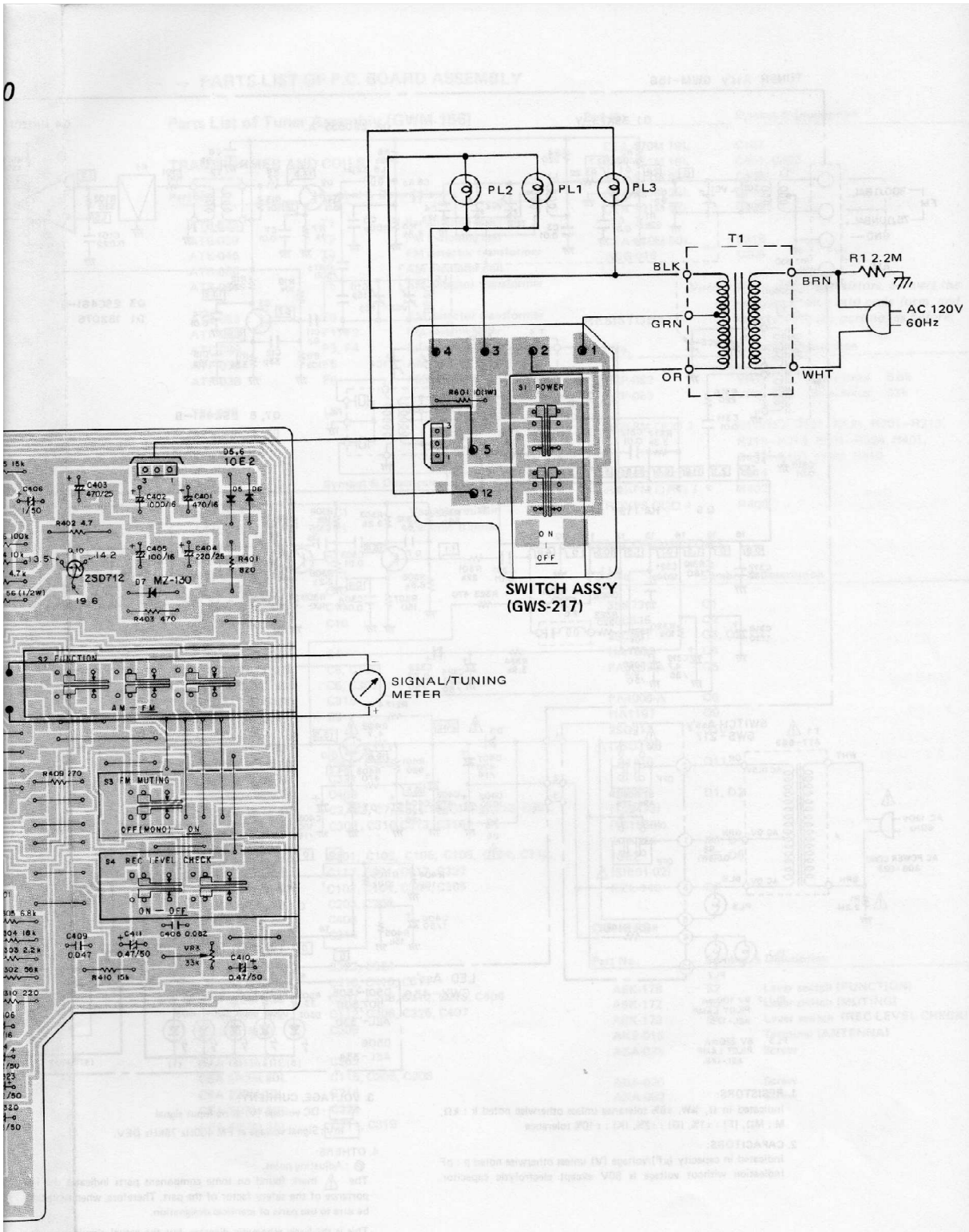
The underlined indicates the switch position.

LED ASS'Y (GWX-456)



TUNER ASS'Y (GWM-156)




PL2
PL1
PL3
T1
BLK
BRN
GRN
OR
WHT
R1 2.2M
AC 120V
60Hz
4
3
2
1
5
12
S1 POWER
ON
OFF
SWITCH ASS'Y
(GWS-217)
SIGNAL/TUNING
METER
S2 FUNCTION
AM — FM
S3 FM MUTING
OFF(MONO) — ON
S4 REC LEVEL CHECK
ON — OFF
2SD712
MZ-130