

AM/FM STEREO TUNER

**T-300**

**SERVICE MANUAL**

## CIRCUIT DESCRIPTION

### GENERAL

LUX T-300 is all solid state high-fidelity AM/FM stereo transistorized radio tuner. The circuitry used in this instrument is mostly integrated in 5 printed circuit boards. The FM tuner circuit board is completely shielded, and mounted on a 7-gang AM/FM tuning capacitor. Conventional wiring is used in mains selector, function switch sections and front and rear panel assembly parts.

### FM TUNER FL517U BOARD

The RF-amplifier is designed to provide stable amplification, sharp selectivity at FM broadcast frequencies, and an optimum noise figure. Dual-gate MOS field-effect transistors are ideally suited for this job as they have characteristics similar to that of a conventional transistor or a junction field-effect transistor and in addition have wide dynamic range. The latter characteristic results in very low cross-modulation products. The advantage of the dual-gate MOS FET is its superior cross-modulation performance as a function of AGC. The stage employs dual-gate MOS FET (3SK40) in a common-source configuration, and the RF signal is applied to gate No. 1, and gate No. 2 is used for gain control. The double-tuned coupling is employed between RF and mixer stages to provide sharp selectivity. The mixer stage is designed to minimize the spurious responses and maximize the noise figure. The 3SK40 mixer transistor (dual-gate MOS FET) operates in the common-source configuration with the RF signal applied to the gate 1 terminal and local-oscillator signal to the gate 2. The 10.7 MHz IF output from the mixer is coupled to the first IF-amplifier stage by means of a double-tuned transformer T101. The SE3001 local oscillator transistor is operated in a common-collector circuit that generates a clean oscillator wave-form to minimize the generation of spurious responses. The oscillator signal is coupled to the mixer gate by means of 2-picofarad capacitor, which isolates the tuned circuit of the oscillator from the input circuit of the mixer and thus minimizes the possibility of oscillator instabilities as a result of "pulling".

### IF-AMPLIFIER

The IF-amplifier uses a 2SC381R transistor, two LM703LH integrated-circuits, and a TA7061AP integrated-circuit. The selectivity stages are two block filters, which consist of five poles, and a double-tuned transformer. The LM703LH integrated-circuit is a basic differential amplifier with constant-current transistor that provides 35dB power gain. The TA7061AP integrated-circuit consists of three differential amplifier in cascade. Each differential pair is isolated from the succeeding pair by a common-collector stage used as a buffer. The amplifier section provides 68dB total power gain at 10.7MHz, and features an output stage with exceptionally good limiting characteristics because of its transistor constant-current sink. The selectivity of this IF section is determined by the block filters in the interstage amplifying paths. The filters provide extremely sharp skirt selectivity and flat response inside the

pass band. Detector transformer T203 is designed to provide the wide peak-to-peak separation required for good multiplex operation. A null-type meter connected across the output of the ratio detector is used as a center tuning indicator. L201 and C228 remove the 10.7MHz component from the output signal. The IF signal for AGC is extracted from the collector of Q201 to drive Q210.

Q210 acts as an IF-amplifier to drive the voltage doubler D206, D207. This DC voltage is applied to Q101 on the FM TUNER as an AGC BIAS. The IF signal extracted from the output of the T202, is amplified by Q208 buffer amplifier to drive the rectifier D210 and associated components. This DC voltage drives signal meter and muting circuits. VR204 is the calibration adjustment. The amplitude component of IF signal, extracted from the output of the second block filter F202, is rectified by D209. The AC component of this signal is amplified by two transistors Q214, Q215, and feeds to the multipath check terminal.

### MULTIPLEX DEMODULATOR

The composite multiplex signal from the ratio detector is applied to the base of transistor Q301 through SCA filter T301. Q301 is an isolation stage which provides a high impedance load for the ratio detector and a low impedance source for the demodulator circuit. The composite multiplex signal is extracted from its emitter circuit and the 19KHz pilot signal is taken from a tuned circuit in the collector circuit. The 19KHz pilot signal, separated by the tuned coupling circuits T302, is amplified by Q303 to drive the frequency doubler. The output of Q303 is fed to a balanced full-wave rectifier which consists of D301, D302 and the secondary winding of T303. The output of the rectifier is unfiltered and develops both DC and 38KHz components. The 38KHz component is amplified by Q305 and appears at the secondary winding of T304. The composite signal taken from the emitter of Q301 is added to the 38KHz sub-carrier in the secondary winding of T304 through Q302 FET muting circuit and Q304 emitter follower circuit which drives the composite signal. The demodulator circuit employs four diodes in a balanced bridge arrangement. The system cancels much of the residual RF products. The 38KHz pulses switch the composite signal in the switching transformer to produce L and R signals at the output when the sub-carrier has the proper phase with respect to the composite signal. Demodulated L and R signals are applied to buffer amplifiers Q306, Q307 which are used for matching of succeeding low-pass filter. All components above 16KHz are eliminated by the low-pass filter LF301, therefore residual sub-carrier level is less than 66dB. Demodulated L and R signals through the noise-filter and de-emphasis networks.

The network that connects the emitters of Q305 and Q308 provides a form of negative feedback between left and right channels. Any residual L signals in the R channel are cancelled out by the signals from the L channel. The same is true on residual R signals in the L channel. VR301 therefore provides the maximum channel separation. VR302 is used to compensate for differences in demodulator efficiency and provide equal overall gain in both channels with respect to

the maximum separation. The 38KHz signal, extracted from the collector of Q305 is coupled to D308 through C314. This half-wave rectifier feeds a DC signal to the stereo indicator DC-amplifier which is located on PB328 IF board.

#### FM MUTING AND STEREO INDICATOR CIRCUIT

In the muting circuitry signal strength and centre tuning are the two functions that are required to enable the muting on-off switching. Plus a command from the stereo multiplex decoder, when the function switch is at the stereo only or mono position.

In the signal strength path, a DC voltage which drives the signal strength meter also feeds Q217 & 218 which form a Schmitt trigger, turned on by an adequate signal. In the centre tune path, Q206 and 207 together with Q208 and 209 form a bi-directional level detecting Schmitt trigger sensing, the output from Q205, a 709 operational amplifier is used as a DC amplifier with a high input impedance so as not to load the discriminator, to amplify, an error DC voltage appearing at the discriminator when the set is not correctly tuned.

The collectors of Q209 and Q218 which form a "wired OR" gate then control the bias of Q305 the 38KHz amplifier enabling the stereo multiplex to operate, but is manually defeated when the "Function" switch is at "MONO", additionally the gate also controls via the muting switch of FET which allows audio from Q301 to appear via an emitter follower Q304 at the switching matrix by passing the multiplex circuitry for "MONO" only.

In "Stereo only" the presence of a pilot is detected by Q219, 220 and 221 which enables the decoding matrix to operate and turn off the FET.

In either "stereo only" or "FM stereo" a stereo broadcast pilot detected by the same Q219 and Q220 drive the "stereo beacon" lamp on the front panel.

#### AM TUNER

A ferrite-rod antenna assembly which includes the tuned antenna transformer L701 selects the RF-signal from the desired radio broadcast station and couples it to the base of the Q401 RF-amplifier transistor. In the converter stage, the RF-signal from the RF-amplifier is mixed with a local oscillator signal to produce a signal at the receiver intermediate frequency of 455KHz. The antenna circuit, RF-amplifier, and converter are tuned together by means of mechanically ganged variable capacitor so that the local oscillator frequency difference is always 455KHz. The signal from the converter stage is amplified by two IF-amplifier stages. The amplified IF-signal is then demodulated in the detector circuit consisting of D405 and associated components.

D404 and associated components in the collector circuit of the second IF-amplifier develops a negative voltage proportional to the input RF signal. This voltage is applied to the base of the first IF-amplifier Q403 as AGC bias. Since Q403 acts DC-amplifier, RF-amplifier transistor Q401 is controlled by the collector current of Q403. VR401 is used to adjust the Q401 collector current for setpoint.

#### AM MUTING

The DC output of D405 is amplified by Q405, 406 amplifiers. When interstation noise or insufficient signal is available, the DC output of D405 is insufficient to make Q406 conduction. Therefore, Q405 cuts off and Q406 is completely muted. When the tuner receives the sufficient signal, which is enough to turn on Q405, Q406 is off, in this case Q407 is properly biased and allows the audio signal to pass to the succeeding circuit.

#### POWER SUPPLY

A regulated power supply provides a stable DC voltage which is applied to all circuit boards. The DC output from the rectifier is filtered and applied to the series regulator Q211. Transistor Q213 compares a sample of the output voltage, picked off at VR202, with a reference voltage supplied by the zener diode D208. A change in conduction of Q212 and Q211 that offsets the original voltage shift.

<b>FM Section</b>	
Frequency Range:	88 MHz ~ 108 MHz
IHF Sensitivity:	1.7 $\mu$ V/98 MHz
Sensitivity for 50 dB S/N:	2.2 $\mu$ V
Alternate Channel Selectivity:	75 dB/98 MHz, 100 $\mu$ V, $\pm$ 400 KHz
AM Suppression:	53 dB/98 MHz, 1 mV
Capture Ratio:	1.5 dB/98 MHz, 1mV
Image Rejection:	90 dB/98 MHz
IF Rejection:	100 dB/98 MHz
S/N Ratio:	75 dB/98 MHz, 1 mV, mono
Frequency Response:	20 ~ 15,000 Hz/stereo, +0.2dB -1.8dB
THD:	20 ~ 15,000 Hz/mono, -1.8dB 0.2%/50 Hz, stereo 0.12%/400 Hz, stereo 0.3%/10 KHz, stereo 0.1%/400 Hz, mono
Stereo Separation:	42 dB/400 Hz 30 dB/50 ~ 10 KHz
Carrier Leak:	-66 dB
Muting Threshold:	5 $\mu$ V/98 MHz, 400 Hz, 30% mod. 4 ~ 30 $\mu$ V/98 MHz, variable
Antenna Impedance:	300 $\Omega$ (balanced) 75 $\Omega$ (unbalanced)
Output Level:	1.7V/98 MHz, 400Hz, 100% mod.
Output Impedance:	300 $\Omega$
<b>AM Section</b>	
Frequency Range:	525 KHz ~ 1605 KHz
IHF Sensitivity:	14 $\mu$ V (250 $\mu$ V/m/1 MHz)
Image Rejection:	80 dB/1MHz, EXT. ANT.
IF Rejection:	80 dB/1 MHz, EXT.ANT.
Frequency Response:	40 ~ 5,000 Hz/1 MHz, 30% mod.
THD:	0.6%/1 MHz, 10 mV, 400 Hz, 30% mod.
S/N Ratio:	48 dB/1 MHz, 10 mV, 400 Hz, 30% mod.
Muting Threshold:	320 $\mu$ V/m/1 MHz, 400Hz, 30% mod. 140 ~ 1000 $\mu$ V/m/1 MHz, 400 Hz, 30% mod, variable
Output Level:	400 mV/1 MHz, 400Hz 30% mod.

## T-300 ALIGNMENT PROCEDURE

The alignment procedure described in each chart may be performed independently, without affecting the others.

Warm up the signal generators for at least 15 minutes to make certain if they are stabilized at their operating temperature particularly generators containing vacuum tubes. Consult the instruction manual supplied with the particular test instrument for specific information concerning connection and operation. The test equipment listed here is intended only as a guide, but alternate instruments should be of similar quality.

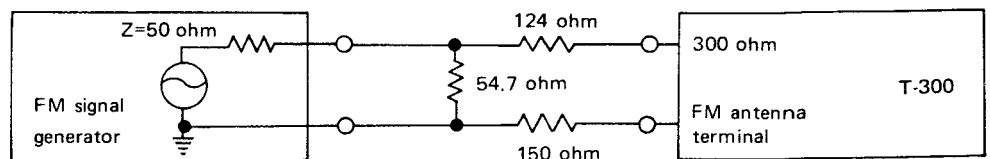
The following instruments are required for a complete alignment of the tuner.

### 1. Measurement instruments and tools

Signal source	1) FM signal generator (FMSG)	Output indicator	6) AM standard loop antenna
	2) Sweep generator (SWG)		7) Oscilloscope (CRO)
	3) AM signal generator (AMSG)		8) Distortion meter (HDM)
	4) FM stereo modulator (MPXSG)		9) AC volt meter (ACVTVM)
	5) Audio oscillator (AFO)		10) DC volt meter (DCVTVM)
		Tools	11) Hex head alignment tool
			12) Thin plastic shaft alignment tool

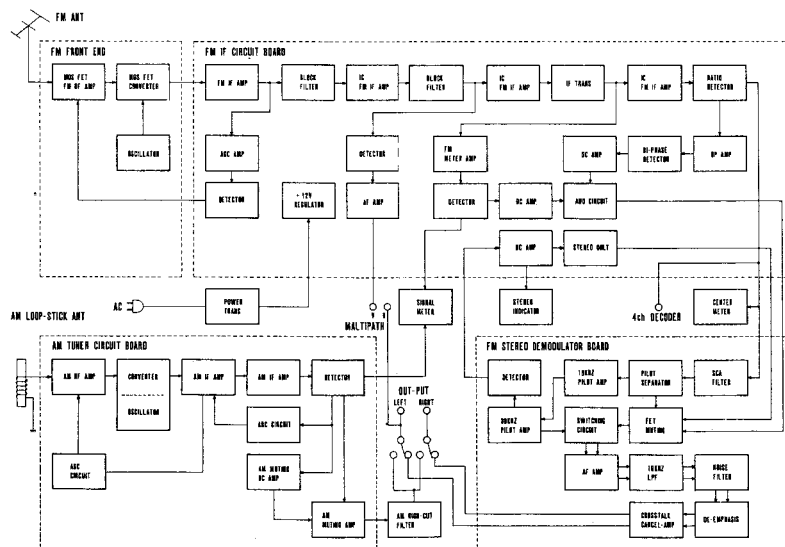
### 2. General alignment conditions

- 1) The normal test voltage is within 10% of what is indicated on the tuner with less than 2% harmonic distortion.
- 2) Unless otherwise specified, the normal ambient temperature is 15~25°C and humidity 55 ~ 75%. But as far as correct judgement is ensured 5~35°C, 45 ~ 85% is allowable.
- 3) FM dummy antenna shall be as follows if not otherwise specified.  
The output voltage of the signal generator is 1/4 of the unloaded terminal voltage.



- 4) Connect the low side of signal source and the output indicator to the chassis ground as close as possible to the high side connection unless otherwise specified.
- 5) The 10.7MHz marker used in each section of the alignment should be the same.
- 6) Marker insertion and amplitude should not distort the oscilloscope trace.
- 7) The AM standard loop antenna should be set above the ferrite loopstick antenna.
- 8) The output level of the sweep generator is measured by the output attenuator regardless of its terminated impedance.
- 9) FM modulation 100% with  $\pm 75\text{kHz}$ .

### Block diagram



Step.	Signal Source Connected to	Set signal to	Set Radio Dial to	Output Indicator Connected to	Adjust	Adjust for
1	Set MODE switch to FM mono, muting switch to off, hi-blend switch to normal, antenna attenuator switch to out and the mains power switch to off.					
2	Remove wiring of TP2 and TP3					
3	Press power switch for on					
4				DCVTVM PB328 5 or 6	VR202 (PB328)	DCVTVM reading 12V ± 0.2
5	Sweep generator Point 2 of PB328	±400KHz sweep centred at 10.7MHz generator output level 120dB Sweep verocity 3 ~ 10Hz	Quiet point on band near 98MHz	Oscilloscope PB328 TP1		Find a centre frequency where symmetrical response can be obtained in the vicinity of -3dB to -6dB and make note of it.
6				Oscilloscope PB328 TP2		Find a centre frequency where symmetrical response can be obtained in the vicinity of -3dB to -6dB and make note of it.
7		±400KHz sweep centred at 10.7MHz generator output level 100dB Sweep verocity 3 ~ 10Hz		Oscilloscope PB328 TP4	T201 core T202 core	Symmetrical and maximum swing response centred at the frequency noted by step 5
8					T204 core	
9				PB328 TP5		
10		±400KHz sweep centred at 10.7MHz generator output level 40dB Sweep verocity 3 ~ 10Hz		PB328 24	T203 top core T203 bottom core	Maximum linearity and amplitude of "S" curve centred at the frequency noted by step 5 and 6.
11						
12	Solder TP2 and TP3 using jumper lead.					
13	FM signal generator Across FM antenna terminals through 300-ohm matching net work	Reduce the output level to zero (interstation receiving condition) 98MHz at 400Hz, 100% modulation Generator output level 1mV	Quiet point on band near 98MHz Correct reception of 98 MHz signals from FMSSG at the centre of tuning meter	Oscilloscope Distortion meter ACBTVM Output terminals	T203 top core T203 bottom core	Centre indication of tuning meter Minimum distortion - this point should be adjusted in the range of -0.5dB reduce of output level from the core position of peak output level.
14						
15	Repeat steps 13 and 14 as necessary to obtain the maximum output level and minimum distortion at "0" point of tuning meter and to let the meter show "0" at interstation state.					
16	FM signal generator Across FM antenna terminals through 300-ohm matching net work	98MHz at 400Hz, 30% modulation Output level 1 mV 88MHz at 400Hz, 30% modulation Output level 1 mV	98MHz	Oscilloscope Distortion meter ACVTVM Output terminals	T204 core VR204	Identify the peak point of signal meter with the centre of tuning meter Adjust the swing of signal meter so as to indicate 90% swing of full of scale
17						

Step.	Signal Source Connected to	Set Signal to	Set Ratio Dial to	Output Indicator Connected to	Adjust	Adjust for
18	FM signal generator Across FM antenna terminals through 300-ohm matching net work	88MHz at 400Hz, 100% modulation Output level 1 mV	88MHz		L104	Accurate reception of 88MHz signals at 88MHz dial calibration
19		108MHz at 400Hz, 100% modulation Output level 1 mV	108MHz		TC104	Accurate reception of 108MHz signals at 108MHz dial calibration
20	Repeat steps 18 and 19 so that correct dial calibration can be obtained					
21	FM signal generator Across FM antenna terminals through 300-ohm matching net work	88MHz at 400Hz, 100% modulation Output level 5 ~ 10µV	88MHz	Oscilloscope Distortion meter ACVTVM Output terminals	T101 top core T101 bottom core L101 L102 L103	Maximum swing of signal meter
22						
23						
24						
25						
26	FM signal generator Across FM antenna terminals through 300-ohm matching net work	108MHz at 400Hz, 100% modulation generator output level 5 ~ 10µV	108MHz	Oscilloscope Distortion meter ACVTVM Output terminal		Maximum swing of signal meter
27						
28						
29		Reduce the output level to zero (interstation receiving condition)	Quiet point on band near 98MHz		T203 top core	Centre indication of tuning meter
30		98MHz at 400Hz, 100% modulation Output level 1 mV	Correct reception of 98MHz signals from FMSG at the centre of tuning meter		T203 bottom core	Minimum distortion below 0.2%. This step No.30 is merely for the confirmation of step No.17, and core should not exceed 1/10 turn
31	Repeat step 29 and 30 as necessary to obtain the maximum output voltage and minimum distortion at the centre of tuning meter and to let the meter show centre at interstation state.					
32	FM signal generator Across FM antenna terminals through 300-ohm matching net work	88MHz at 400Hz, 100% modulation	88MHz	Oscilloscope Distortion meter ACVTVM Output terminal		IHF maximum usable sensitivity which is the minimum output level of FMSG required for distortion and noise to be -30dB of total output
33		108MHz at 400Hz, 100% modulation	108MHz			
34	Repeat steps 20 ~ 31 so that the maximum IHF sensitivity can be obtained					
35	Set the muting switch at normal position					
36	FM signal generator Across FM antenna terminals through 300-ohm matching net work	98MHz at 400Hz, 30% modulation Output level 5µV	98MHz		VR201	The swing of signal meter should be 30% swing of full scale. Unless this figure is obtained, turn it out within 10% ~ 40% limit

Step.	Signal Source Connected to	Set Signal to	Set Radio Dial to	Output Indicator Connected to	Adjust	Adjust for
37	FM signal generator Across FM antenna terminals through 300-ohm matching net work	98MHz at 400Hz, 30% modulation Output level 5µV	98MHz	Oscilloscope Distortion meter ACVTVM Output terminal	VR203	Fix VR203 at the point where output signals appear
38	Set the MODE switch at FM stereo position					
39	FM signal generator	98MHz at 19KHz, 3 ~ 5% modulation	98MHz	Oscilloscope PB121 TR1	T302 core	Maximum amplitude of oscilloscope
40	Across FM antenna terminals through 300-ohm matching net work	Output level 1 mV		(Oscilloscope should be of small input capacitance)	T303 core	
41					T304 core	
42	Repeat steps 39 ~ 41 more than two times so that each coil can be completely turned					
43	FM signal generator	98MHz at 19KHz, 10% (L-R) 400Hz 45% or 90%	98MHz	Oscilloscope Distortion meter ACVTVM	T304 core	To obtain peak of output voltage. (This adjustment relative to stereo distortion.)
44	Across FM antenna terminals through 300-ohm matching net work	98MHz at 19KHz, 10% (L+R) 400Hz 45% or 90%		Output terminal	VR302	To equalize the output level of L-CH with that of R-CH
45		98MHz at 19KHz, 10% R-CH 90%			VR301	To minimize the cross-talk to L-CH. The cross-talk should be less -35dB than the output level of R-CH
46		98MHz at 19KHz, 10% L-CH 90%			VR302	The cross-talk to R-CH should be less -35dB than L-CH output level, and be the same with the cross-talk of step No.45
47	Set the MODE switch at AM position, hi-cut switch at normal position and muting switch at off position					
48	Set the VR401 (PB460) at nearly the centre, and turn the VR702 (AM-muting) out towards counter-clockwise direction					
49	Connect TP2 and TP3 (PB460) provisionally.					
50	Output of Sweep generator	±40KHz sweep centred at 455 KHz generator output level 70 ~ 80dB Sweep velocity 3 ~ 10Hz	Quiet point on band near 1600KHz	Genescope PB460⑦	T403 top core	Maximum symmetrical response centred at 455KHz with same height at 450KHz and 460KHz
51	PB460① through 1 µF mylar capacitor				T403 bottom core	
52					T404 top core	
53					T404 bottom core	
54					T405 core	
55	Remove wiring at step No.49					
56	Standard radiating loop antenna placed	600KHz at 400Hz, 30% modulation.	600KHz	Oscilloscope ACVTVM	T402 core	Dial pointer to be tuned at 600KHz

Step.	Signal Source Connected to	Set Signal to	Set Radio Dial to	Output Indicator Connected to	Adjust	Adjust for
57	near AM built-in antenna	Adjust SG to obtain such field strength that signal meter sound always swing 30% ~ 50%	600KHz	Output terminal	Bar antenna coil L701	Maximum ACVTVM reading - Slide coil bobbin
58					T401 core	Maximum ACVTVM reading
59		1,400KHz at 400Hz, 30% modulation Same adjustment for field strength noted at step No.56 ~ 58	1,600KHz		TC703	Dial pointer to be tuned at 1,600KHz
60					TC701	Maximum ACVTVM reading
61					TC702	
62	Repeat steps 56 and 59 as necessary to obtain exact tuning point on dial scale. Repeat steps 57, 58, 60 and 61 to obtain maximum sensitivity.					
63	Fix by adhesive agent the core and bobbin of the bar antenna aligned at step 57					
64	Connect the output of AMSG to antenna terminal through ceramic capacitor of 200pF	1,000KHz at 400Hz, 30% modulation Field strength 50dB/m	1,000KHz	Oscilloscope Distortion meter ACVTVM Output terminal	VR401	Fix VR401 at the point where signal meter shows 80% swing: When difficult turn it out within 70% swing.
65	Standard radiating loop antenna placed near AM built-in antenna	600KHz at 400Hz, 30% modulation	600KHz			IHF maximum usable sensitivity which is equivalent to electric field strength at the loopstick antenna adjusted by attenuator of AMSG so that noise and distortion can be -20dB of total output.
66		1,600KHz at 400Hz, 30% modulation	1,600KHz			
67	Set the muting switch at normal position					
68	Standard radiating loop antenna placed near AM built-in antenna	1,000KHz at 400Hz, 30% modulation Field strength 50dB/m	1,000KHz	Oscilloscope Distortion meter ACVTVM Output terminal	VR501	Fix VR501 at the point where output signals appear
69	Put the power switch to "OFF". Then all the adjustments are finished.					



## SEMICONDUCTOR REFERENCE CHART

Transistors ( $T_a = 25^\circ\text{C}$ )

Type	MAX. RATING			CHARACTERISTICS								
	Pt W	V <sub>ceo</sub> V	I <sub>c</sub> mA	h <sub>fe</sub>				f <sub>T</sub> MHz				NF maxdB
				min	max	I <sub>c</sub> mA	V <sub>ce</sub> V	min	typ	I <sub>c</sub> mA	V <sub>ce</sub>	
2SC381R	0.1	30	20	40	80	1	6	250	---	1	6	---
2SC372Y	0.2	30	100	120	240	10	1	80	200	1	10	---
2SC1000GR	0.2	50	100	200	1200	2	6	---	80	2	6	2
2SD235D/Y	1.5	35	3000	40	240	500	5	---	1	500	5	---
2SA562Y	0.3	-30	-400	120	240	-100	-1	---	---	---	---	---
SE3001	0.2	12	---	---	---	---	---	---	---	---	---	4

Field Effect Transistor (MOS), ( $T_a = 25^\circ\text{C}$ )

Type	MAX. RATING			CHARACTERISTICS							
	Pt mW	V <sub>ds</sub> V	I <sub>d</sub> mA	I <sub>dss</sub> mA			C <sub>rss</sub> pF		g <sub>fs</sub>		
				min	max	V <sub>ds</sub> V	max	V <sub>ds</sub> V	typ	I <sub>dss</sub> mA	
3SK40	250	20	25	4	25	10	0.05	15	10	5	

Field Effect Transistor (Junction), ( $T_a = 25^\circ\text{C}$ )

Type	MAX. RATING			CHARACTERISTICS							
	Pt mW	V <sub>gds</sub> V	I <sub>g</sub> mA	I <sub>dss</sub> mA			C <sub>iss</sub> pF		g <sub>m</sub>		
				min	max	V <sub>ds</sub> V	max	V <sub>ds</sub> V	min	V <sub>ds</sub>	
2SK30-0	100	-50	10	0.6	1.4	10	8.2	0	1.5	10	

Diodes ( $T_a = 25^\circ\text{C}$ )

Type	MAX. RATING			CHARACTERISTICS			
	I <sub>F</sub> A	V <sub>r</sub> V	Surge A	I <sub>f</sub>		I <sub>r</sub>	
				mA	V <sub>f</sub> V	μA	V <sub>r</sub> V
1S188	0.05	-35	0.5	0.004	0.1	-75	-10
KB165	0.05	---	---	0.003	0.65	---	---
KB265	0.03	---	---	0.003	1.31	---	---
1S1554V	0.1	-50	1	100	1.0	0.5	-50
SIRB10	1	-100	30	500	1.05	-10	-100

Voltage-reference Diode

Type	MAX. RATING		CHARACTERISTICS						
	P mW	at T <sub>a</sub> , °C	V <sub>z</sub>		r <sub>z</sub>		I <sub>s</sub>		
			V	I <sub>z</sub> mA	ohm	I <sub>z</sub> mA	μA	V <sub>s</sub> V	
WZ071	500	25	7.1	10	10	10	1	3	
WZ120	500	25	12	5	15	5	1	10	

**INTEGRATED CIRCUIT SPECIFIC CHART**  
**LM703LH**

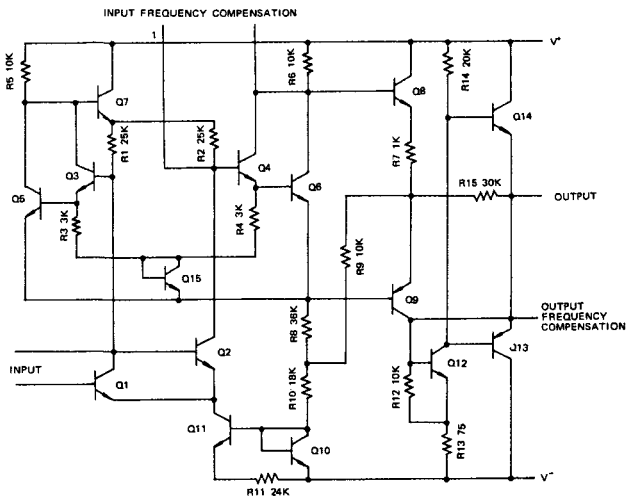
**MAXIMUM LIMITS OF DEVICE**

	Symbol	Rating	Unit
Max. supply voltage	V <sub>cc</sub>	20	V
Output collector voltage	V <sub>7</sub>	24	V
Input voltage	V <sub>3 - 5</sub>	±5.0	V
Max. dissipation	PD	200	mW
Operating temperature	T <sub>a</sub>	-55 ~ +125	°C
Storage temperature	T <sub>stg</sub>	-65 ~ +150	°C

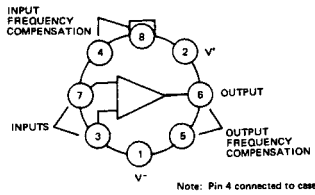
**ELECTRICAL SPECIFICATION**

PARAMETER	CONDITION	MIN	TYP	MAX	UNITS
Input Offset Voltage	T <sub>A</sub> = 25°C, R <sub>S</sub> ≤ 10kΩ		2.0	4.0	mV
Input Offset Current	T <sub>A</sub> = 25°C		100	500	nA
Input Bias Current	T <sub>A</sub> = 25°C		0.3	1.5	μA
Input Resistance	T <sub>A</sub> = 25°C	50	250		kΩ
Output Resistance	T <sub>A</sub> = 25°C		150		Ω
Supply Current	T <sub>A</sub> = 25°C, V <sub>S</sub> = ±15V		2.6	6.6	mA
Transient Response	V <sub>IN</sub> = 20 mV, C <sub>L</sub> ≤ 100pF T <sub>A</sub> = 25°C		0.3	1.0	μs
			10	30	%
Slewing Rate	T <sub>A</sub> = 25°C		0.25		V/μs
Input Offset Voltage	R <sub>S</sub> ≤ 10kΩ			10	mV
Average Temperature Coefficient of Input Offset Voltage	R <sub>S</sub> = 50Ω R <sub>S</sub> = 10kΩ		6.0		μV/°C
			12		μV/°C
Large-Signal Voltage Gain	V <sub>S</sub> = ±15V, R <sub>L</sub> = ≥ 2kΩ V <sub>OUT</sub> = ±10V	15,000	45,000		
Output Voltage Swing	V <sub>S</sub> = ±15V, R <sub>L</sub> = 10kΩ V <sub>S</sub> = ±15V, R <sub>L</sub> = 2kΩ	±12	±14		V
		±10	±13		V
Input Voltage Range	V <sub>S</sub> = ±15V	±8.0	±10		V
Common Mode Rejection Ratio	R <sub>S</sub> ≤ 10kΩ	65	90		dB
Supply Voltage Rejection Ratio	R <sub>S</sub> ≤ 10kΩ		25	200	μV/V
Input Offset Current	T <sub>A</sub> = +70°C T <sub>A</sub> = 0°C		75	400	nA
			125	750	nA
Input Bias Current	T <sub>A</sub> = 0°C		0.36	2.0	μA

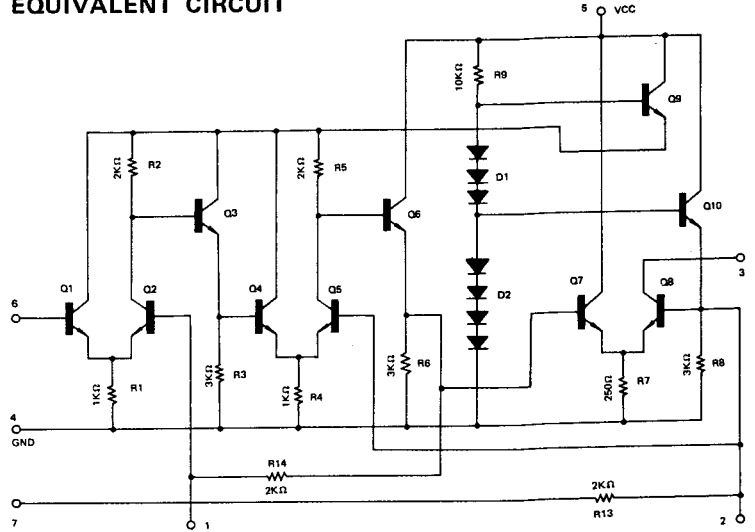
### EQUIVALENT CIRCUIT



### PIN CONNECTION (Top view)



### EQUIVALENT CIRCUIT

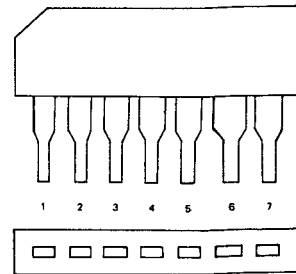


### INTEGRATED CIRCUIT SPECIFIC CHART TA7061AP

#### MAXIMUM LIMITS OF DEVICE

	Symbol	Rating	Unit
Max. Vcc	Vcc	15	V
Input voltage (terminals 6-7)	VI	±3	V
Max. dissipation	PD	300	mW
Operating temperature (Vcc = 7.5V)	Topr	-30 ~ 75	°C
Storage temperature	Tstg	-55 ~ 125	°C

### PIN CONNECTION



### ELECTRICAL SPECIFICATION (Ta = 25°C)

	Symbol	Condition of measurement	Min.	Typ.	Max.	Unit
Current vs supply Vcc	Icc	Vcc = 6.0V		11	13	mA
		Vcc = 7.5V	7	8.5		
Gain (dB)	Gp	Vcc = 7.5V, f = 10.7MHz	66	69	72	dB
Input impedance	RI	Vcc = 7.5V, f = 10.7KHz		5		KΩ
Input capacitance	CI		6		pF	
Output impedance	Ro	Vcc = 7.5V, f = 10.7MHz		10		KΩ
Output capacitance	Co		5		pF	
Input voltage for full limiting	VI (lim)	Vcc = 7.5V, RL = 1KΩ		600		μV

**INTEGRATED CIRCUIT SPECIFIC CHART**

**CUA709C**

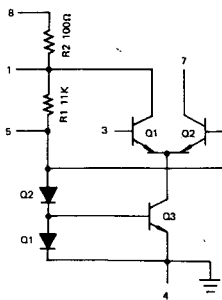
**MAXIMUM LIMITS OF DEVICE**

	Rating	Unit
Supply Voltage	± 18	V
Power Dissipation	250	mW
Differential Input Voltage	± 5	V
Input Voltage	± 10	V
Output Short-Circuit Duration ( $T_A = 25^\circ\text{C}$ )	5	sec
Storage Temperature Range	-65 ~ +150	°C
Operating Temperature Range	0 ~ +70	°C

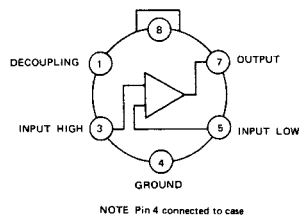
**ELECTRICAL SPECIFICATION ( $T_a = 25^\circ\text{C}$   $V_{cc} = 12\text{V}$ )**

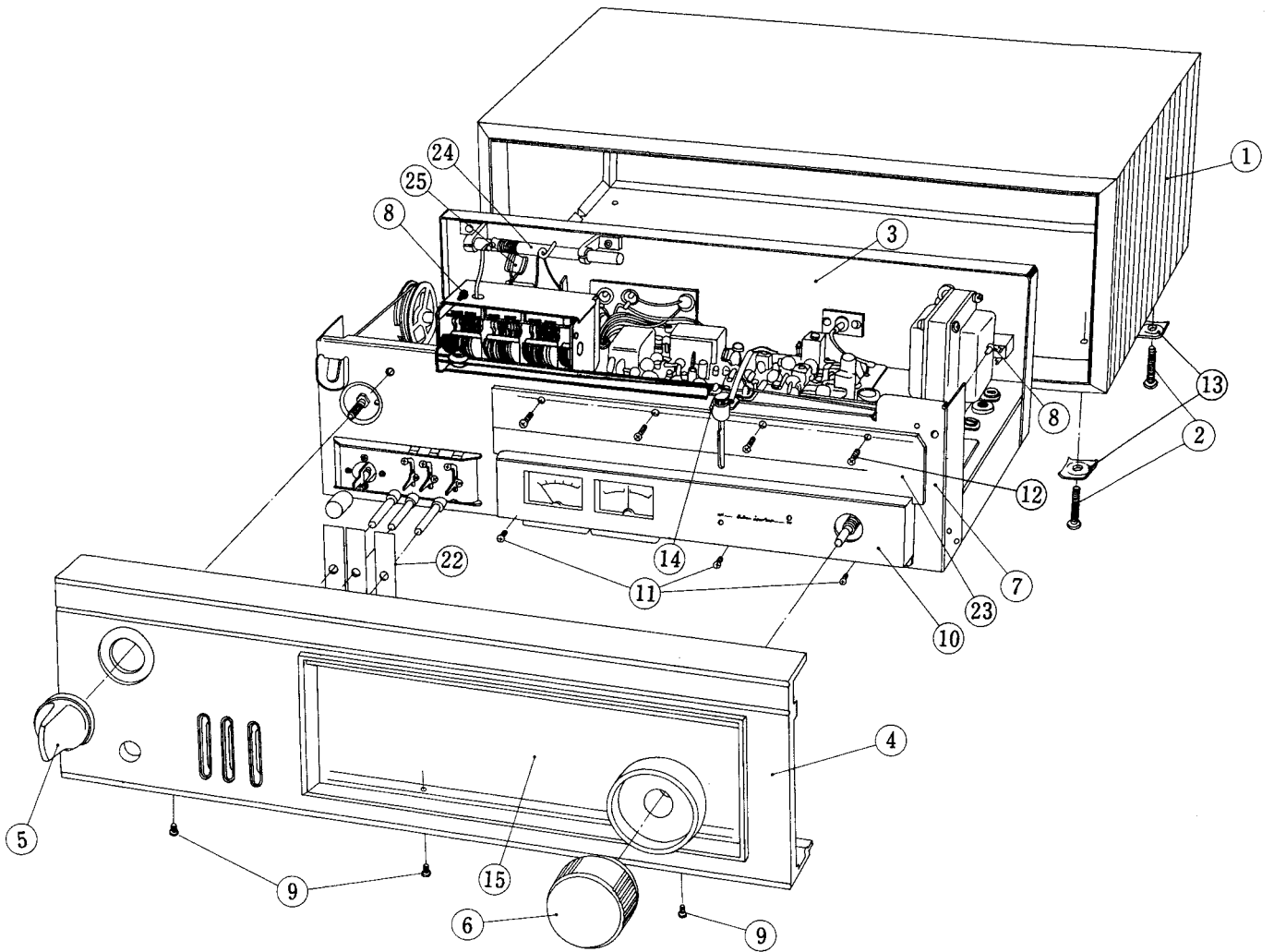
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Power Consumption	$e_{in} = 0$		71	96	mW
Quiescent Output Current	$e_{in} = 0$	1.5	2.5	3.3	mA
Peak-to-Peak Output Current	$e_{in} = 400\text{mV rms}, f = 10.7\text{KHz}$	3.0	5.0		mA
Output Saturation Voltage				1.7	V
Forward Transadmittance	$e_{in} = 10\text{mV rms}, f \leq 10.7\text{ MHz}$	24.0	33.0		mmho
Reverse Transadmittance	$e_{in} = 10\text{mV rms}, f \leq 10.7\text{ MHz}$		0.002		mmho
Input Conductance	$e_{in} < 10\text{mV rms}, f \leq 10.7\text{MHz}$		0.35	1.0	mmho
Input Capacitance	$e_{in} < 10\text{mV rms}, f \leq 10.7\text{MHz}$		9.0	12.5	pF
Output Capacitance	$f \leq 10.7\text{MHz}$		2.6	4.0	pF
Output Conductance	$f \leq 10.7\text{MHz}$		0.03	0.05	mmho
Noise Figure	$R_s = 500\Omega, f = 10.7\text{MHz}$		6.0		dB
	$R_s = 500\Omega, f = 100\text{MHz}$		8.0		dB
Maximum Stable Gain	$f = 100\text{MHz}$		28.0		dB

**EQUIVALENT CIRCUIT**

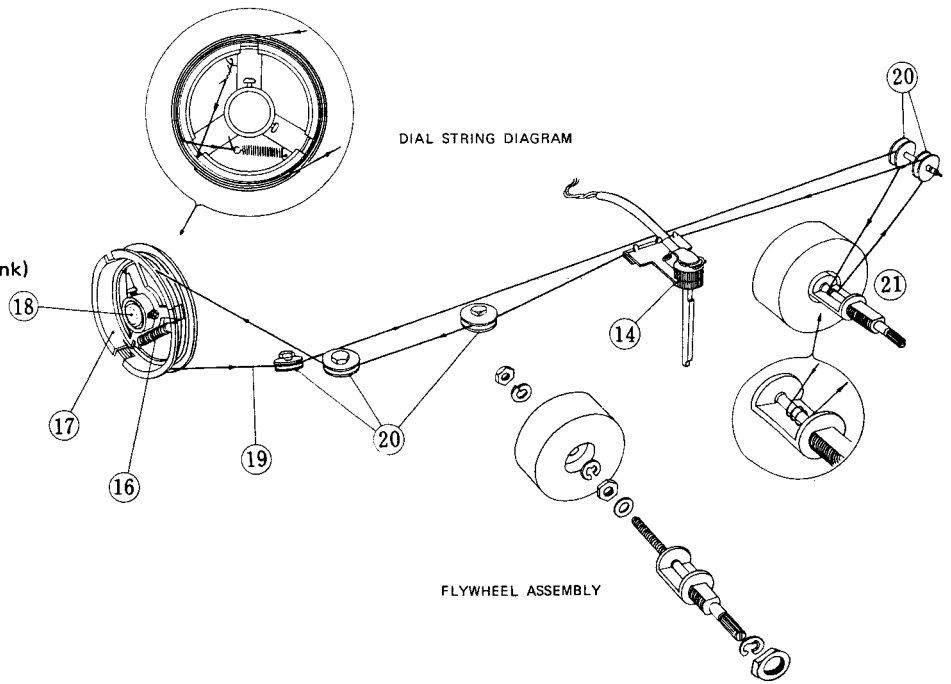


**PIN CONNECTION (Top view)**

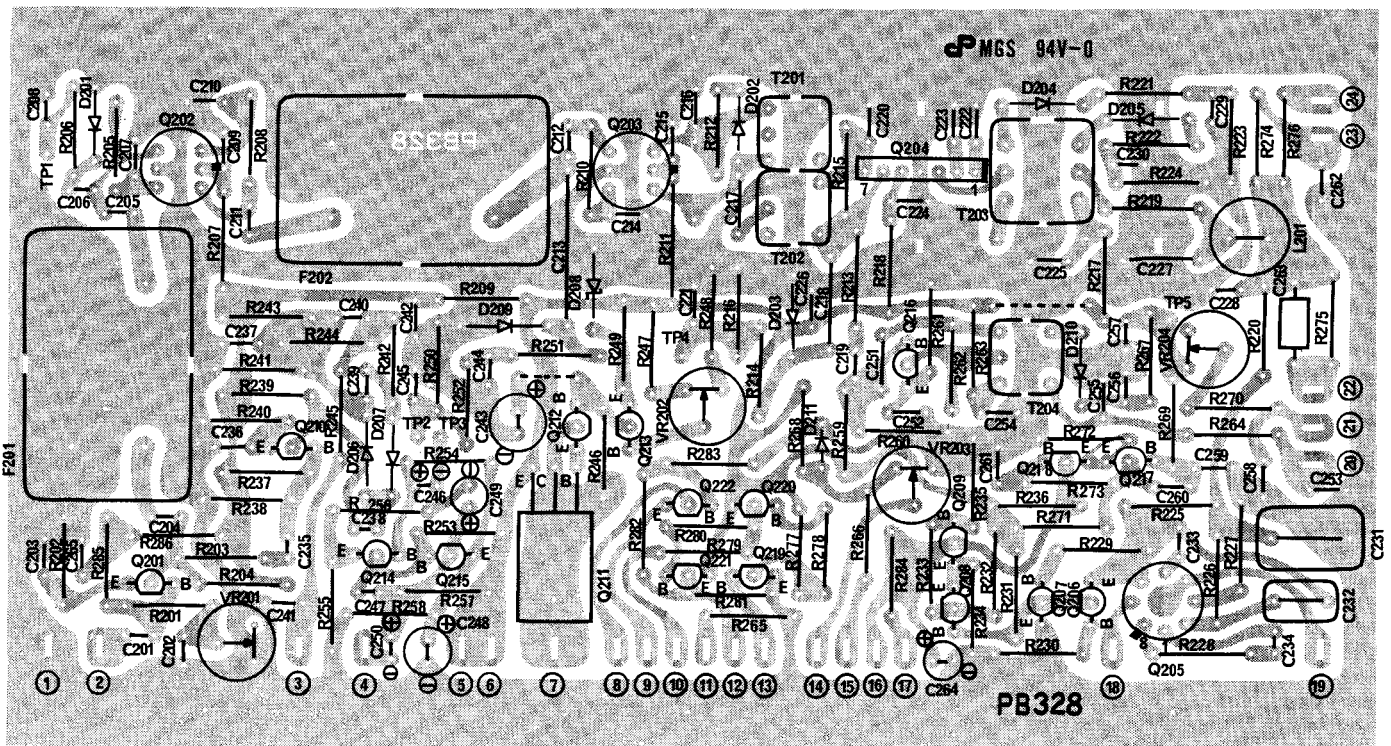




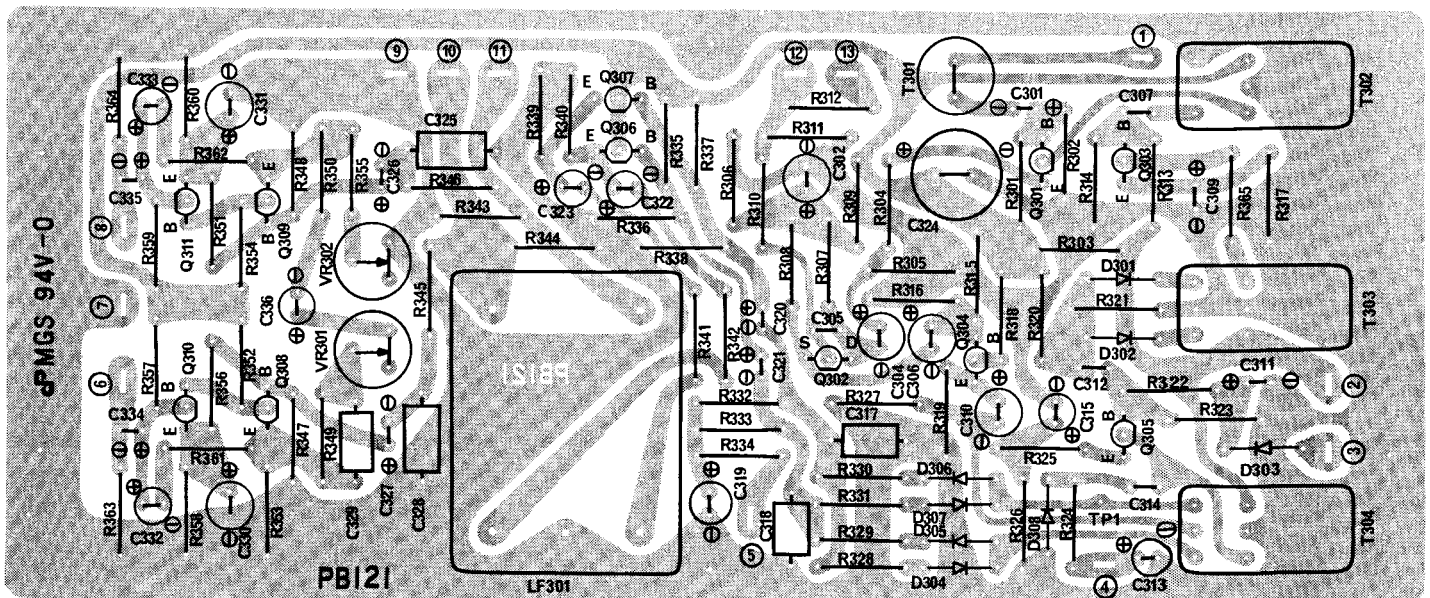
- 1 Wooden Case
- 2 Screw 4mm x 5mm
- 3 Back Panel
- 4 Front Panel
- 5 Mode Selector Knob
- 6 Tuning Knob
- 7 Sub-panel
- 8 Screw 4mm x 6mm
- 9 Screw 3mm x 6mm
- 10 Meter holder
- 11 Screw 3mm x 8mm (Self tapping)
- 12 Screw 3mm x 10mm (Self Countersunk)
- 13 Square tooth washer
- 14 Tuning Pointer Ass'y
- 15 Dial Glass
- 16 Spring (tension for dial cord)
- 17 Drum
- 18 V.C. shaft
- 19 Dial Cord
- 20 Plastic Pulley
- 21 Tuning Shaft and Flywheel Ass'y
- 22 Paper Mask
- 23 Dial Scale
- 24 Bar Antenna
- 25 Balun



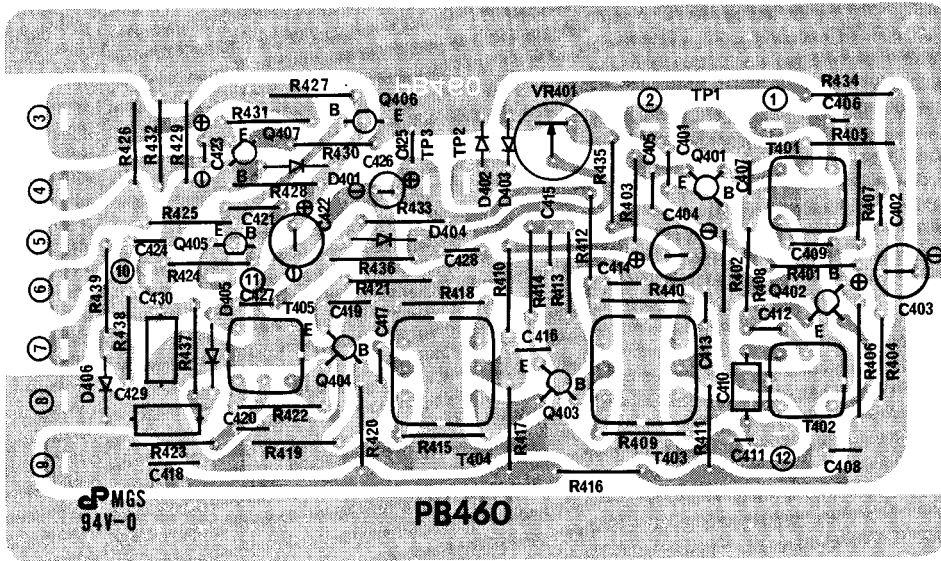
PB 328 CIRCUIT BOARD



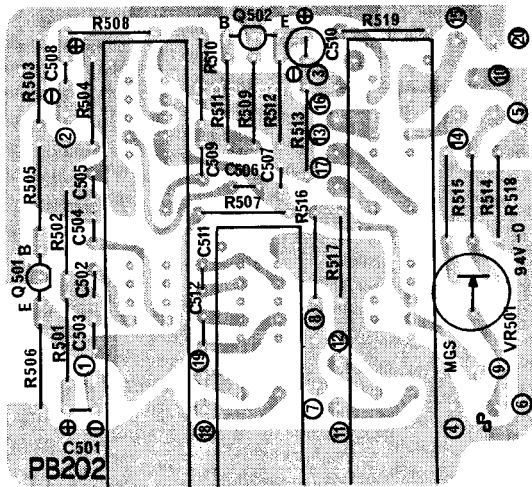
PB 121 CIRCUIT BOARD



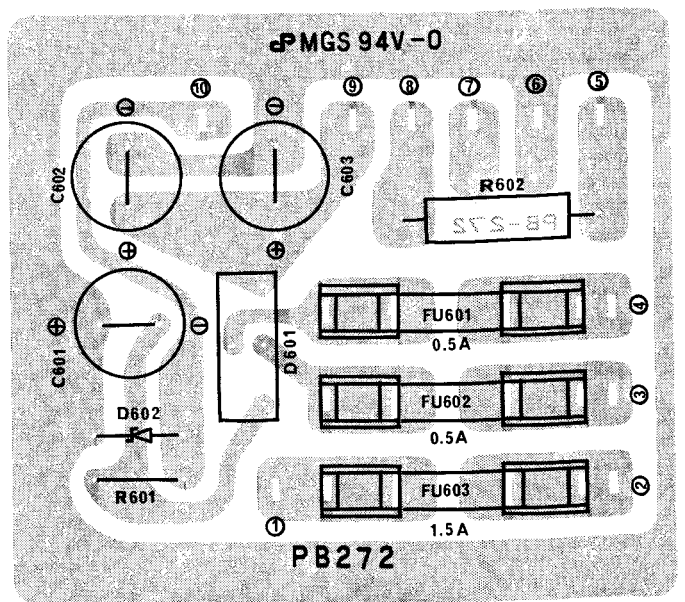
**PB 460 CIRCUIT BOARD**



**PB 202 CIRCUIT BOARD**



**PB 272 CIRCUIT BOARD**



## REPLACEMENT PARTS

RESISTORS:  $\pm 5\%$  1/4 watt deposited carbon, unless noted otherwise

SYMBOL NO.	DESCRIPTION	SYMBOL NO.	DESCRIPTION	SYMBOL NO.	DESCRIPTION	SYMBOL NO.	DESCRIPTION
R101	150Kohm	R243	68Kohm	R317	1.8Kohm	R412	470ohm
R102	100Kohm	R244	100Kohm	R318	22ohm	R413	470ohm
R103	1Mohm	R245	100Kohm	R319	4.7Kohm	R414	120ohm
R104	12Kohm	R246	10Kohm	R320	220Kohm	R415	150Kohm
R105	100Kohm	R247	680ohm	R321	10Kohm	R416	100ohm
R106	220ohm	R248	1.5Kohm	R322	10Kohm	R417	10Kohm
R107		R249	6.8Kohm	R323	10Kohm	R418	150Kohm
R108	100ohm	R250	470Kohm	R324	15Kohm	R419	10Kohm
R109	1Mohm	R251	10Kohm	R325	330ohm	R420	82Kohm
R110	100Kohm	R252	10Kohm	R326	1Kohm	R421	100ohm
R111	470Kohm	R253	100Kohm	R327	22Kohm	R422	22Kohm
R112	100Kohm	R254	220Kohm	R328	10Kohm	R423	100ohm
R113	470ohm	R255	1Kohm	R329	10Kohm	R424	56Kohm
R114	220ohm	R256	330Kohm	R330	10Kohm	R425	1Kohm
R115	10Kohm	R257	10Kohm	R331	10Kohm	R426	56Kohm
R116	4.7Kohm	R258	2.2Kohm	R332	220Kohm	R427	15Kohm
R117	100ohm	R259	15Kohm	R333	220Kohm	R428	330Kohm
R118	820ohm	R260	2.2Kohm	R334	4.7Kohm	R429	100Kohm
		R261	1Kohm	R335	220Kohm	R430	1.5Kohm
R201	470ohm	R262	15Kohm	R336	220Kohm	R431	4.7Kohm
R202	1Kohm	R263	470ohm	R337	220Kohm	R432	56Kohm
R203	2.2Kohm	R264	22ohm	R338	220Kohm	R433	10Kohm
R204	1.8Kohm	R265	120ohm	R339	3.3Kohm	R434	3.9Kohm
R205	820ohm	R266	820ohm	R340	3.3Kohm	R435	5.6Kohm
R206	100Kohm	R267	470ohm	R341	3.3Kohm	R436	10Kohm
R207	470ohm	R268	1.5Kohm	R342	3.3Kohm	R437	470ohm
R208	1.8Kohm	R269	47Kohm	R343	3.3Kohm	R438	3.3Kohm
R209	100ohm	R270	1.8Kohm	R344	3.3Kohm	R439	1.5Kohm
R210	820ohm	R271	33Kohm	R345	33Kohm	R440	150Kohm
R211	470ohm	R272	22ohm	R346	33Kohm		
R212	470ohm	R273	33Kohm	R347	470Kohm	R501	2.2Kohm
R213	1Kohm	R274	33Kohm	R348	470Kohm	R502	6.8Kohm
R214	10Kohm	R275	27Kohm	R349	8.2Kohm	R503	330Kohm
R215	2.2Kohm	R276	10Kohm	R350	22ohm	R504	820Kohm
R216	100Kohm	R277	15Kohm	R351	270ohm	R505	1Kohm
R217	1Kohm	R278	10Kohm	R352	120Kohm	R506	5.6Kohm
R218	390ohm	R279	180ohm	R353	2.7Kohm	R507	12Kohm
R219	47ohm	R280	47Kohm	R354	120Kohm	R508	27Kohm
R220	100Kohm	R281	4.7Kohm	R355	2.2Kohm	R509	330Kohm
R221	1Kohm	R282	100Kohm	R356	270Kohm	R510	820Kohm
R222	1Kohm	R283	10Kohm	R357	3.3Kohm	R511	1Kohm
R223	6.8Kohm	R284	39Kohm	R358	820ohm	R512	5.6Kohm
R224	6.8Kohm	R285	3.3Kohm	R359	3.3Kohm	R513	270Kohm
R225	150Kohm	R286	470ohm	R360	820ohm	R514	12Kohm
R226	56Kohm			R361	56Kohm	R515	390ohm
R227	27Kohm	R301	150Kohm	R362	56Kohm	R516	56Kohm
R228	1.5Kohm	R302	100Kohm	R363	470Kohm	R517	82Kohm
R229	22Kohm	R303	47Kohm	R364	470Kohm	R518	27Kohm
R230	22Kohm	R304	330ohm	R365	3.3Kohm	R519	10Kohm
R231	100Kohm	R305	4.7Kohm			R520	1Mohm
R232	33Kohm	R306	33Kohm	R401	4.7Kohm	R521	1Mohm
R233	56Kohm	R307	220Kohm	R402	18Kohm	R522	1Mohm
R234	100ohm	R308	220Kohm	R403	1.5Kohm	R523	1Mohm
R235	47Kohm	R309	100Kohm	R404	22Kohm		
R236	6.8Kohm	R310	1Mohm	R405	10Kohm	R601	180ohm
R237	22Kohm	R311	47Kohm	R406	15Kohm	R602	2W 4.7ohm
R238	3.3Kohm	R312	100Kohm	R407	2.2Kohm		
R239	4.7Kohm	R313	10Kohm	R408	2.2Kohm	R701	22ohm
R240	1Kohm	R314	2.2Kohm	R409	150Kohm	R702	56ohm
R241	47Kohm	R315	150Kohm	R410	1.5Kohm	R703	56ohm
R242	10Kohm	R316	100Kohm	R411	2.7Kohm	R704	100ohm



## CAPACITORS

SYMBOL NO.	DESCRIPTION	SYMBOL NO.	DESCRIPTION	SYMBOL NO.	DESCRIPTION	SYMBOL NO.	DESCRIPTION
C101	18pF	C106	5000pF	C111	100pF	C116	8pF
C102	47pF	C107	22pF	C112	5000pF	C117	33pF
C103	5000pF	C108	47pF	C113	100pF	C118	5000pF
C104	5000pF	C109	5000pF	C114	2pF	C119	15pF
C105	22pF	C110	5000pF	C115	22pF		

SYMBOL NO.	DESCRIPTION	SYMBOL NO.	DESCRIPTION
C201	0.01 $\mu$ F +80% -20% 25V ceramic	C257	0.01 $\mu$ F +80% -20% 25V ceramic
C202	0.01 $\mu$ F +80% -20% 25V ceramic	C258	0.04 $\mu$ F +80% -20% 25V ceramic
C203	0.04 $\mu$ F +80% -20% 25V ceramic	C259	0.04 $\mu$ F +80% -20% 25V ceramic
C204	0.01 $\mu$ F +80% -20% 25V ceramic	C260	0.04 $\mu$ F +80% -20% 25V ceramic
C205	0.01 $\mu$ F +80% -20% 25V ceramic	C261	0.04 $\mu$ F +80% -20% 25V ceramic
C206	470 $\mu$ F $\pm$ 20% 50V ceramic	C262	0.04 $\mu$ F +80% -20% 25V ceramic
C207	0.04 $\mu$ F +80% -20% 25V ceramic	C263	270 pF $\pm$ 5 % 50V polystyrol
C208	0.01 $\mu$ F +80% -20% 25V ceramic	C264	4.7 $\mu$ F +80% -20% 25V ceramic
C209	0.04 $\mu$ F +80% -20% 25V ceramic	C265	0.04 $\mu$ F +80% -20% 25V ceramic
C210	0.04 $\mu$ F +80% -20% 25V ceramic		
C211	0.01 $\mu$ F +80% -20% 25V ceramic	C301	0.47 $\mu$ F +50% -20% 35V solid tantalum
C212	0.01 $\mu$ F +80% -20% 25V ceramic	C302	33 $\mu$ F +50% -10% 16V electrolytic
C213	470 pF $\pm$ 20% 50V ceramic	C303	
C214	0.04 $\mu$ F +80% -20% 25V ceramic	C304	33 $\mu$ F +50% -10% 16V electrolytic
C215	0.04 $\mu$ F +80% -20% 25V ceramic	C305	0.01 $\mu$ F +80% -20% 25V ceramic
C216	0.04 $\mu$ F +80% -20% 25V ceramic	C306	33 $\mu$ F +50% -10% 16V electrolytic
C217	2.2 pF $\pm$ 5% 500V ceramic	C307	0.01 $\mu$ F +80% -20% 25V ceramic
C218	470 pF $\pm$ 20% 50V ceramic	C308	
C219	470 pF $\pm$ 20% 50V ceramic	C309	0.1 $\mu$ F +50% -20% 35V solid tantalum
C220	0.04 $\mu$ F +80% -20% 25V ceramic	C310	33 $\mu$ F +50% -10% 16V electrolytic
C221	0.04 $\mu$ F +80% -20% 25V ceramic	C311	0.47 $\mu$ F +50% -20% 35V solid tantalum
C222	0.04 $\mu$ F +80% -20% 25V ceramic	C312	0.01 $\mu$ F +80% -20% 25V electrolytic
C223	0.04 $\mu$ F +80% -20% 25V ceramic	C313	4.7 $\mu$ F +75% -10% 25V electrolytic
C224	0.04 $\mu$ F +80% -20% 25V ceramic	C314	100 pF $\pm$ 10% 50V ceramic
C225	0.04 $\mu$ F +80% -20% 25V ceramic	C315	4.7 $\mu$ F +75% -10% 25V electrolytic
C226	0.04 $\mu$ F +80% -20% 25V ceramic	C316	
C227	470 pF $\pm$ 20% 50V ceramic	C317	470 pF $\pm$ 5% 50V polystyrol
C228	100 pF $\pm$ 10% 50V ceramic	C318	470 pF $\pm$ 5% 50V polystyrol
C229	470 pF $\pm$ 20% 50V ceramic	C319	33 $\mu$ F +50% -10% 16V electrolytic
C230	470 pF $\pm$ 20% 50V ceramic	C320	0.47 $\mu$ F +50% -20% 35V solid tantalum
C231	0.39 $\mu$ F $\pm$ 10% 50V mylar	C321	0.47 $\mu$ F +50% -20% 35V solid tantalum
C232	0.082 $\mu$ F $\pm$ 10% 50V mylar	C322	4.7 $\mu$ F +75% -10% 25V electrolytic
C233	220 pF $\pm$ 10% 50V ceramic	C323	4.7 $\mu$ F +75% -10% 25V electrolytic
C234	0.0047 $\mu$ F $\pm$ 10% 50V mylar	C324	470 $\mu$ F +75% -10% 16V electrolytic
C235	470 pF $\pm$ 20% 50V ceramic	C325	1600pF $\pm$ 5 % 50V polystyrol
C236	0.04 $\mu$ F +80% -20% 25V ceramic	C326	0.47 $\mu$ F +50% -20% 35V solid tantalum
C237	0.04 $\mu$ F +80% -20% 25V ceramic	C327	0.47 $\mu$ F +50% -20% 35V solid tantalum
C238	470 pF $\pm$ 20% 50V ceramic	C328	1600pF $\pm$ 5% 50V polystyrol
C239	0.01 $\mu$ F +80% -20% 25V ceramic	C329	1600pF $\pm$ 5% 50V polystyrol
C240	0.01 $\mu$ F +80% -20% 25V ceramic	C330	33 $\mu$ F +50% -10% 16V electrolytic
C241	0.04 $\mu$ F +80% -20% 25V ceramic	C331	33 $\mu$ F +50% -10% 16V electrolytic
C242	0.04 $\mu$ F +80% -20% 25V ceramic	C332	4.7 $\mu$ F +75% -10% 25V electrolytic
C243	47 $\mu$ F +50% -10% 16V electrolytic	C333	4.7 $\mu$ F +75% -10% 25V electrolytic
C244	0.01 $\mu$ F +80% -20% 25V ceramic	C334	0.47 $\mu$ F +50% -20% 35V solid tantalum
C245	0.01 $\mu$ F +80% -20% 25V ceramic	C335	0.47 $\mu$ F +50% -20% 35V solid tantalum
C246	0.1 $\mu$ F +50% -20% 35V solid tantalum	C336	10 $\mu$ F +50% -10% 16V electrolytic
C247	470 pF $\pm$ 20% 50V ceramic		
C248	33 $\mu$ F +50% -10% 16V electrolytic	C401	0.04 $\mu$ F +80% -20% 25V ceramic
C249	4.7 $\mu$ F +75% -10% 25V electrolytic	C402	0.04 $\mu$ F +80% -20% 25V ceramic
C250	0.1 $\mu$ F +50% -20% 35V solid tantalum	C403	47 $\mu$ F +50% -10% 16V electrolytic
C251	0.47pF $\pm$ 5% 500V ceramic	C404	47 $\mu$ F +50% -10% 16V electrolytic
C252	0.04 $\mu$ F +80% -20% 25V ceramic	C405	0.04 $\mu$ F +80% -20% 25V ceramic
C253	0.04 $\mu$ F +80% -20% 25V ceramic	C406	10 pF $\pm$ 1pF NPO 50V ceramic
C254	0.04 $\mu$ F +80% -20% 25V ceramic	C407	0.04 $\mu$ F +80% -20% 25V ceramic
C255	0.04 $\mu$ F +80% -20% 25V ceramic	C408	0.04 $\mu$ F +80% -20% 25V ceramic
C256	0.01 $\mu$ F +80% -20% 25V ceramic	C409	0.04 $\mu$ F +80% -20% 25V ceramic

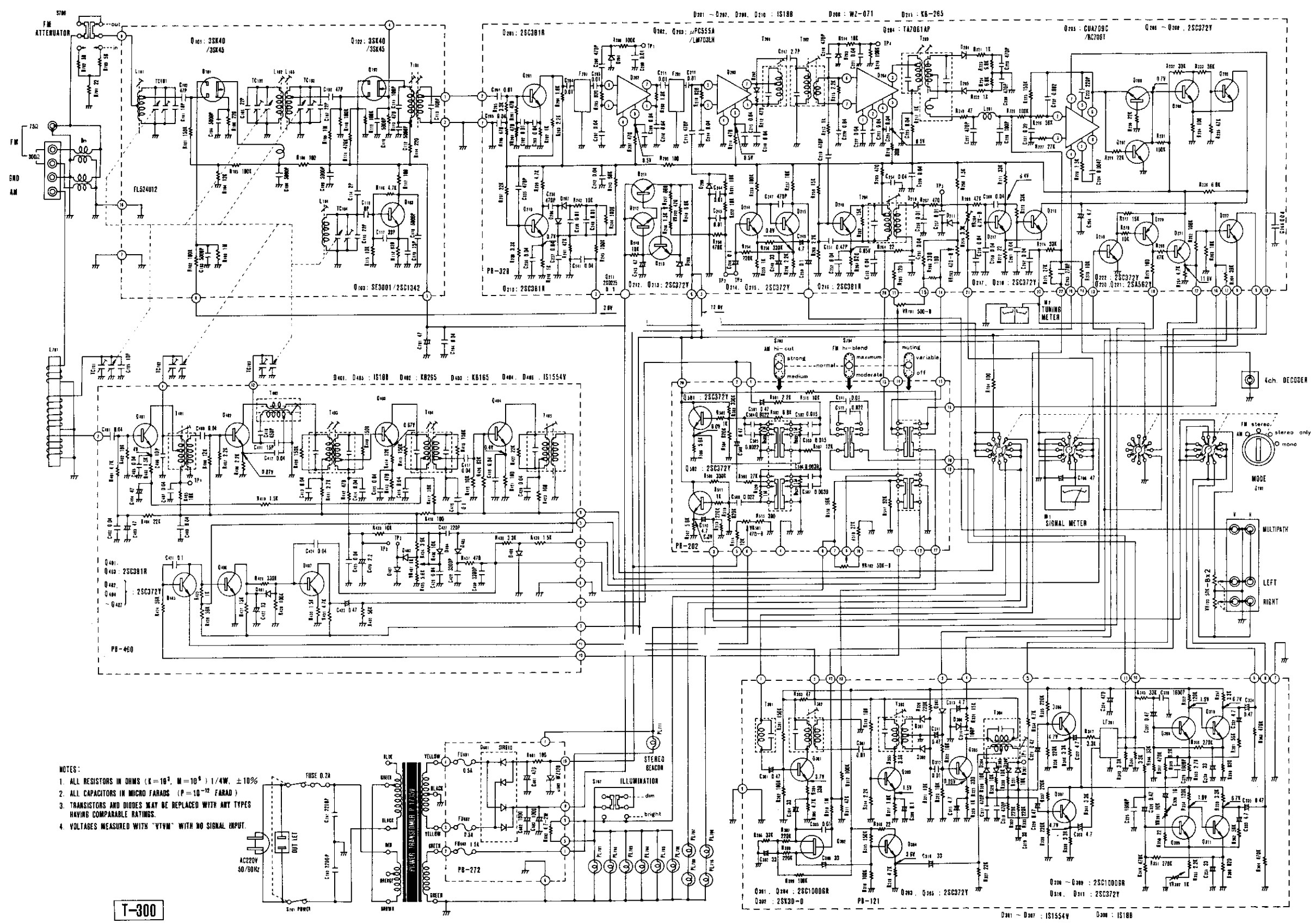
SYMBOL NO.	DESCRIPTION	SYMBOL NO.	DESCRIPTION
C410	450 pF ±5 % 50V ceramic	C502	0.015μF±10% 50V mylar
C411	15 pF ±10% NPO 50V ceramic	C503	0.015μF±10% 50V mylar
C412	0.04μF +80% -20% 25V ceramic	C504	0.0022μF±10% 50V mylar
C413	0.04μF +80% -20% 25V ceramic	C505	0.0022μF±10% 50V mylar
C414	0.04μF +80% -20% 25V ceramic	C506	0.0039μF±10% 50V mylar
C415	0.04μF +80% -20% 25V ceramic	C507	0.0039μF±10% 50V mylar
C416	0.04μF +80% -20% 25V ceramic	C508	0.47μF +50% -20% 35V solid tantalum
C417	0.04μF +80% -20% 25V ceramic	C509	0.022μF±10% 50V mylar
C418	0.1 μF +80% -20% 25V ceramic	C510	0.47μF +50% -20% 35V solid tantalum
C419	0.04μF +80% -20% 25V ceramic	C511	0.022μF±10% 50V mylar
C420	0.04μF +80% -20% 25V ceramic	C512	0.022μF±10% 50V mylar
C421	0.1 μF +80% -20% 25V ceramic	C601	470 pF +50% -10% 25V electrolytic
C422	33 μF +50% -10% 16V electrolytic	C602	1000μF+50% -10% 25V electrolytic
C423	0.47μF +50% -20% 35V solid tantalum	C603	1000μF+50% -10% 25V electrolytic
C424	0.04μF +80% -20% 25V ceramic	C701	47 μF +50% -10% 16V electrolytic
C425	0.04μF +80% -20% 25V ceramic	C702	2200pF±20% 250V mylar
C426	2.2 μF +75% -10% 50V electrolytic	C703	2200pF±20% 250V mylar
C427	220 pF ±10% 50V ceramic	C704	0.04μF +80% -20% 25V ceramic
C428	0.04μF +80% -20% 25V ceramic	C705	10 pF ±1pF NPO 50V ceramic
C429	3300pF± 5% 50V polystyrol	C706	47 μF +50% -10% 16V electrolytic
C430	3300pF± 5% 50V polystyrol	C707	0.04μF +80% -20% 25V ceramic
C501	0.47μF +50% -20% 35V solid tantalum		

**TRANSISTORS & I.C.s**

SYMBOL NO.	DESCRIPTION	SYMBOL NO.	DESCRIPTION
Q101	3SK40/3SK45 FM RF amplifier	Q222	2SC372Y For Stereo Only
Q102	3SK40/3SK45 FM Mixer	Q301	2SC1000GR Pilot Separator
Q103	SE3001/2SC1342 FM Local Oscillator	Q302	2SK30-0 FM Muting
Q201	2SC381R FM IF Amplifier	Q303	2SC372Y Pilot Amp.
Q202	μPC555A/LM703LH FM IF Amp. & Limiter	Q304	2SC1000GR Composite Stereo Signal Driver
Q203	μPC555A/LM703LH FM IF Amp. & Limiter	Q305	2SC372Y 38KHz Sub Carrier Amp.
Q204	TA7061AP FM IF Limiter	Q306	2SC1000GR Audio Amp.
Q205	CuA709C/RC709T AF Signal Rejection & DC Amp.	Q307	2SC1000GR Audio Amp.
Q206	2SC372Y BI Phase Detector	Q308	2SC1000GR Audio Amp.
Q207	2SC372Y BI Phase Detector	Q309	2SC1000GR Audio Amp.
Q208	2SC372Y DC Amplifier	Q310	2SC372Y Audio Amp.
Q209	2SC372Y DC Amplifier	Q311	2SC372Y Audio Amp.
Q210	2SC381R FM AGC Amp.	Q401	2SC381R AM RF Amp.
Q211	2SD235D/Y FM AGC Amp.	Q402	2SC372Y AM Converter
Q212	2SC372Y Regulator	Q403	2SC381R AM 1st IF Amp.
Q213	2SC372Y Regulator	Q404	2SC372Y AM 2nd IF Amp.
Q214	2SC372Y Regulator	Q405	2SC372Y DC Amp. For AM Muting
Q215	2SC372Y Multipath Amp.	Q406	2SC372Y DC Amp. For AM Muting
Q216	2SC381R FM Signal Strength Meter Amp.	Q407	2SC372Y AM Muting
Q217	2SC372Y DC Amp.	Q501	2SC372Y Audio Amp.
Q218	2SC372Y DC Amp.	Q502	2SC372Y Audio Amp.
Q219	2SC372Y DC Amp.		
Q220	2SA562Y Stereo Beacon Driver		
Q221	2SA562Y Mono Bias For MPX Switching Bridge		

**DIODES**

SYMBOL NO.	DESCRIPTION	SYMBOL NO.	DESCRIPTION
D201	IS188 Test Point Detector	D207	IS188 FM AGC Detector
D202	IS188 FM Limiter	D208	WZ-071 Voltage-Reference Diode
D203	IS188 Test Point Detector	D209	IS188 Multipath Detector
D204	IS188 FM Ratio Detector	D209	IS188 FM Meter Detector
D205	IS188 FM Ratio Detector	D211	KB265 Temperature Compensation
D206	IS188 FM Ratio Detector		



- NOTES:
1. ALL RESISTORS IN OHMS ( $K=10^3$ ,  $M=10^6$ ) 1/4W,  $\pm 10\%$
  2. ALL CAPACITORS IN MICRO FARADS ( $P=10^{-12}$  FARAD)
  3. TRANSISTORS AND DIODES MAY BE REPLACED WITH ANY TYPES HAVING COMPARABLE RATINGS.
  4. VOLTAGES MEASURED WITH "VTVM" WITH NO SIGNAL INPUT.

T-300

Note: Due to continued research for improvements, LUX reserves the right to alter the circuit and specifications without notice.

SYMBOL NO.	DESCRIPTION	SYMBOL NO.	DESCRIPTION
D301	IS1554V Frequency Doubler	D401	IS188 AM Muting Noise Rejecting Diode
D302	IS1554V Frequency Doubler	D402	KB265 AM AGC Temperature Compensator
D303	IS1554V Buffer Fpr Discharge	D403	KB165 AM AGC Temperature Compensator
D304	IS1554V Buffer Fpr Discharge	D404	IS1554V AM AGC Detector
D305	IS1554V MPX Switching	D405	IS188 AM Detector
D306	IS1554V MPX Switching	D406	IS1554V AM Signal Meter Swing
D307	IS1554V MPX Switching		
D308	IS188 Rectifier For Stereo Beacon	D601	SIRB10 Rectifire For DC Supply
		D602	WZ120 Voltage-Reference Diode

### VARIABLE RESISTORS

SYMBOL NO.	DESCRIPTION	SYMBOL NO.	DESCRIPTION
VR201	470 ohm Semi Fixed For FM IF Gain Adjustment	VR401	1Kohm Semi Fixed Bias Setting
VR202	470 ohm Semi Fixed For DC Supply	VR501	470 ohm Semi Fixed AM Muting Level
VR203	470 ohm Semi Fixed For FM Fixed Muting Level		
VR204	4.7 ohm Semi Fixed For FM Signal Meter Sensitivity	VR701	500 ohm Variable FM Muting Level
		VR702	50Kohm Variable AM Muting Level
VR301	10Kohm Semi Fixed For FM Separation	VR703	50Kohm X-2 Audio Output Level
VR302	1Kohm Semi Fixed For FM Separation Balance		

### SWITCHES

SYMBOL NO.	DESCRIPTION	SYMBOL NO.	DESCRIPTION
S701	2-2 Power	S704	2-3 FM Hi Blend
S702	4-8-4 Mode	S705	4-3 Muting
S703	4-3 AM HI Cut	S706	2-2 FM Attenuator

### TRANSFORMERS & FILTERS & ETC.

SYMBOL NO.	DESCRIPTION	SYMBOL NO.	DESCRIPTION
T101	TKAC-14733K FM IF Trans.	T401	YXR-19030BD AM RF Trans.
T201	TKAC-14733K FM IF Trans.	T402	YXR-18909GN AM Oscillator Trans.
T202	TKAC-14733K FM IF Trans.	T403	V6AQC-20025AA AM 1st IF Trans.
T203	V4FCC-20693BCV FM Discriminator Trans.	T404	V6AQC-20025AA AM 2nd IF Trans.
T204	TKAC-14733K FM Meter Trans.	T405	YMC-15002A AM Detector Trans.
T301	1001 SCA Filter	Bn	BALUN VHF Trans.
T302	02-1163 19KHz (Pilot) Trans.	L701	Loop-Stick Antena AM Antena
T303	02-1164 19KHz (Frequency Doubler) Trans.	L201	1039 FM IF Choke Coil
T304	02-1165 38KHZ (Switching) Trans.	P-1735V	P-1735V Power Trans.
LF301	LUX-14561 16KHz Low-Pass Filter		