

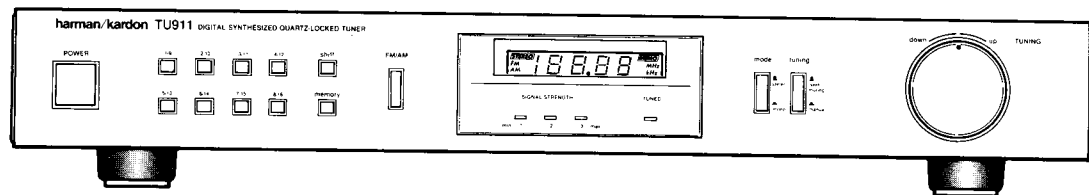
6190

The Harman Kardon Model TU911

Manual 119A

DIGITAL SYNTHESIZED QUARTZ-LOCKED TUNER

Technical Manual



The following marks found in the parts list of this manual identify the models as follows.

- UA : North America area model
- BK : North America area model Black version
- G : General model
- GB : General model Black version

harman/kardon

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1112-315119A3 P-088709 1500 Printed in Japan

SPECIFICATIONS

● FM SECTION

	Nominal	Limit
Tuning range	87.5 ~ 108.0MHz	
50dB Quieting Sensitivity		
Mono	14.2dBf	≧ 19dBf
Stereo	37.2dBf	≧ 41dBf
Usable Sensitivity	11.7dBf	≧ 15dBf
Image Ratio	49dB	≧ 40dB
IF Rejection	92dB	≧ 75dB
Spurious Response Rejection	94dB	
Capture Ratio	1.5dB	≧ 2dB
Alternate Channel Sensitivity	60dB	≧ 50dB
AM Rejection	59dB	≧ 45dB
Signal to Noise Ratio		
Mono	80dB	≧ 75dB
Stereo	73dB	≧ 68dB
Total Harmonic Distortion		
Mono	0.15%	≧ 0.3%
Stereo	0.18%	≧ 0.5%
Stereo Separation at 1 kHz	42dB	≧ 35dB
Output Level/Impedance (Stereo)	750mV/2.2kΩ	

● AM SECTION (North America area model only)

	Nominal	Limit
Tuning range	520 ~ 1,710kHz	
Usable Sensitivity		
External Antenna	12μV	≧ 20μV
Loop Antenna	355μV/m	≧ 700μV/m
Selectivity	33dB	≧ 26dB
Signal to Noise Ratio	53dB	≧ 48dB
Image Rejection	40dB	≧ 30dB
IF Rejection	66dB	≧ 50dB
● DIMENSION (W × H × D)	17-7/16" × 2-11/16" × 14-3/16" (443 × 68 × 360 mm)	
● WEIGHT	7.3 lbs.(3.3 kg)	
● POWER SUPPLIES		
for North America area model	AC 120V, 60Hz	
for General mode	AC 220/240V, 50/60Hz	
● POWER CONSUMPTION	14W	

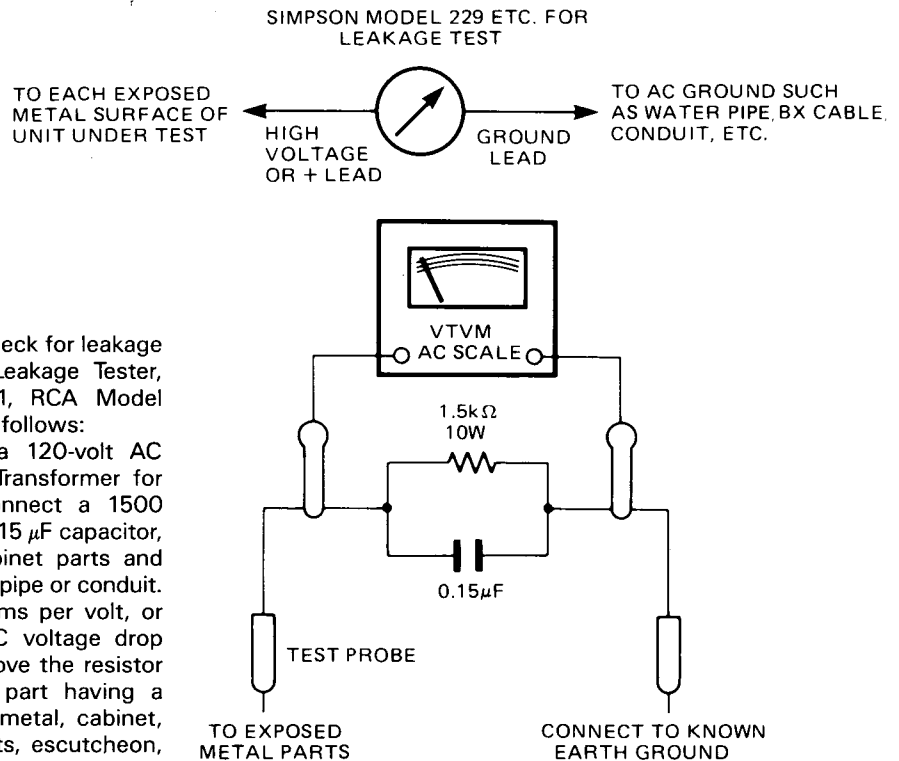
This specification is the target of servicing. But, there is a care that the specification is not applicable to the measurement condition and instrument.

Specifications and components subject to change without notice. Overall performance will be maintained or improved.

LEAKAGE TEST (FOR SERVICE ENGINEERS IN THE U.S.A.)

Before returning the unit to the user, perform the following safety checks:

1. Inspect all lead dress to make certain that leads are not pinched or that hardware is not lodged between the chassis and other metal parts in the unit.
2. Be sure that any protective devices such as nonmetallic control knobs, insulating fishpapers, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacity networks, mechanical insulators, etc. which were removed for servicing are properly reinstalled.
3. Be sure that no shock hazard exists; check for leakage current using Simpson Model 229 Leakage Tester, standard equipment item No. 21641, RCA Model WT540A or use alternate method as follows: Plug the power cord directly into a 120-volt AC receptacle (do not use an Isolation Transformer for this test). Using two clip leads, connect a 1500 Ohm, 10-watt resistor paralleled by a 0.15 μF capacitor, in series with all exposed metal cabinet parts and a known earth ground, such as a water pipe or conduit. Use a VTVM or VOM with 1000 Ohms per volt, or higher sensitivity to measure the AC voltage drop across the resistor. (See Diagram.) Move the resistor connection to each exposed metal part having a return path to the chassis (antenna, metal, cabinet, screw heads, knobs and control shafts, escutcheon, etc.) and measure the AC voltage drop across the resistor. (This test should be performed with the power switch in both the On and Off positions.) A reading of 0.35 volt RMS or more is excessive and indicates a potential shock hazard which must be corrected before returning the unit to the owner.



ALIGNMENT PROCEDURES (REFER TO PAGES 10, 11, 17 AND 18)

■ AM ADJUSTMENT

- Conditions :
- Set the AM mode by pressing the "FM/AM" button.
 - Press the "mode" switch to the "mono" (button in) position.
 - Standard modulation of the AM signal Generator is 400Hz at 30%.

Step	Alignment	Connection Equipments	Measurement Frequency	Station Display	Adjustment	For
1	IF	<ul style="list-style-type: none"> • Connect the AM Test Loop Antenna cable into the output jack of AM Signal Generator. Place AM Test Loop Antenna close enough to couple signal into the AM Loop Antenna. • Connect the VTVM and oscilloscope to the OUTPUT jacks. 	1400kHz	1400kHz	T251	Maximum output level and symmetrical curve on scope.
2	Tracking		1400kHz	1400kHz	TC251	Maximum output.
3			600kHz	600kHz	L251	Maximum output.
4			Repeat steps 2 and 3 for optimum sensitivity.			
5			Tuned indicator	1000kHz	1000kHz	

■ FM ADJUSTMENT

- Conditions :
- Set the FM mode by pressing the "FM/AM" button.
 - Press the "mode" switch to the "mono" (button in) position.

	U.S.A. model	General model
FM Signal Generator	1kHz, 100% modulation	1kHz, 45% modulation
Stereo Modulator	L + R = 45.5%, L - R = 45.5%, 19kHz = 9%	L + R = 22.5%, L - R = 22.5%, 19kHz = 8%

Step	Alignment	Connection Equipments	Measurement Frequency	Station Display	Adjustment	For
1	Discriminator	<ul style="list-style-type: none"> • Connect the FM Signal Generator to FM 300Ω BAL Antenna terminals through the 300Ω balanced dummy. [1mV(65dBf) input] • Connect the Oscilloscope and Distortion meter to the OUTPUT jacks. 	98.1MHz \pm 30 ~ 40kHz	98.1MHz	T201(A)	Adjust so that the TUNED indicator lights in the same range on both plus (+) and minus (-) sides of 98.1MHz.
2			98.1MHz	98.1MHz	T201(B)	Minimum distortion.
3			Repeat steps 1 and 2 for optimum sensitivity.			
4	Tuned indicator		98.1MHz	98.1MHz	VR351	Adjust so that the TUNED indicator lights at 18 μ V input. (14 μ V/75 Ω input for General model)
5	Signal indicator		98.1MHz	98.1MHz	VR351	Adjust so that the three SIGNAL STRENGTH indicator lights at 500 μ V input. (140 μ V/75 Ω input for General model)
6	Separation	<ul style="list-style-type: none"> • Connect the Stereo Modulator to FM Signal Generator. Connect FM Signal Generator to FM 300Ω BAL Antenna terminal through the 300Ω balanced dummy. • Connect the VTVM and Oscilloscope to the OUTPUT jacks. • Press the "mode" switch to the "stereo" (button out) position. 	98.1MHz	98.1MHz	VR301	Adjust so that the left channel output becomes minimum when only the right channel of the Stereo Modulator is modulated.
					VR301	Adjust so that the right channel output becomes minimum when only the left channel of the Stereo Modulator is modulated.
7	AGC voltage	<ul style="list-style-type: none"> • Connect the FM Signal Generator to FM 300Ω BAL Antenna terminals through the 300Ω balanced dummy. (500μV/75Ω input) • Connect the VTVM to TP1 (+) and ground (-). 	98.1MHz	98.1MHz	VR101	Adjust so that voltage becomes 1.7V.

CIRCUIT DESCRIPTION

■ FM TUNER SECTION

The FM signal which has entered through the antenna is high-frequency amplified in the front end unit FE101, mixed with the output of the local oscillator and converted into the 10.7MHz intermediate-frequency.

The 10.7MHz signal is amplified in the intermediate-frequency amplifying section which consists of CF201, Q201 and CF202 and fed to 1 pin of IC201. In IC201, the signal is transmitted through the IF amplifier in two steps, and after being detected in the quadrature, it is transmitted through the post amplifier to 12 pin and then input to 2 pin of IC301. In IC301, the pilot signal is detected out of the signal which has been fed and 38kHz signal is produced. Then by this signal, stereo signal is demodulated, output from 4 pin for the left channel and from 7 pin for the right channel be fed to the amplifier.

■ AM TUNER SECTION (North America area model only)

The AM signal which has entered through the antenna is transmitted through the tuning circuit consisting of L251 and TC251 to IC201. IN IC201 it undergoes high-frequency amplification, intermediate-frequency amplification local oscillation, intermediate-frequency amplification and detection, and then output from 15 pin. This signal is turned ON and OFF at Q703 and Q704 according to the signal from the input selector and fed to 2 pin of IC301.

■ MUTING CIRCUIT

If FM is received out of tuning or in a very weak field intensity, 28 pin of IC702 becomes high level. This is fed to the base of Q351, whose collector then becomes low level and the collector of Q4 high level. As a result, Q301 (L ch) and (R ch) are conducted to mute the output.

■ SYNTHESIZER SECTION

● FM

The local oscillation output at the front end is fed to 5 pin of the prescaler IC701 and after being frequency divided into 30 or 32, it is fed to 37 pin of the PLL synthesizer IC702. In IC702, the standard frequency is oscillated by the crystal oscillator, compared with the divided local oscillation output signal and output to 34 pin. This voltage is level converted at Q701 and Q702, and fed to the varicap diode at the front end.

● AM (North America area model only)

The local oscillation output is fed from 24 pin of IC201 to 39 pin of IC702. In IC702, the standard frequency is oscillated by the crystal oscillator, compared with the local oscillation output and output to 34 pin.

■ INDICATOR SECTION

● FREQUENCY DISPLAY

The serial data sent out of 27 pin of the PLL synthesizer IC702 is fed to 2 pin of the frequency indicating driver IC751, where the data is decoded to provide a signal which turns ON the indicator.

● SIGNAL STRENGTH

The voltage corresponding to the signal level is output from 16 pin of IC201 and input into 8 pin of the level comparator IC351. D367, D368 and D369 of the signal strength indicator turn ON according to the signal level.

● TUNING

8 pin of IC201 becomes low level when tuned and the tuned indicator D370 connected there turns ON.

BLOCK DIAGRAM

