Shure Incorporated
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UHF Wireless System

SERVICE MANUAL CHANGE NOTICE

U2 HAND-HELD TRANSMITTER

Changes and corrections have been made to the Service Manual for the U2 UHF Hand-Held Transmitter. These changes will make it easier to repair the transmitters. To update your Service Manual, remove the pages identified in the tables below and replace them with the pages attached to this Change Notice. Note that there are no changes to pages not specifically identified in the tables below.

U2 SERVICE MANUAL REVISION HISTORY

Release	Part Number	Date Code
Original	25A1022	QE
Revision 1	25B1022	SA
Revision 2	25C1022	TD
Revision 3	25C1022	AG

CHANGES EFFECTIVE JULY 2, 2001

REMOVE these pages from the U2 Service Manual	INSERT these Revised pages into the U2 Service Manual
22	22

Printed in U.S.A.
25–1022–2 (AG)

SHURE®

Service Manual

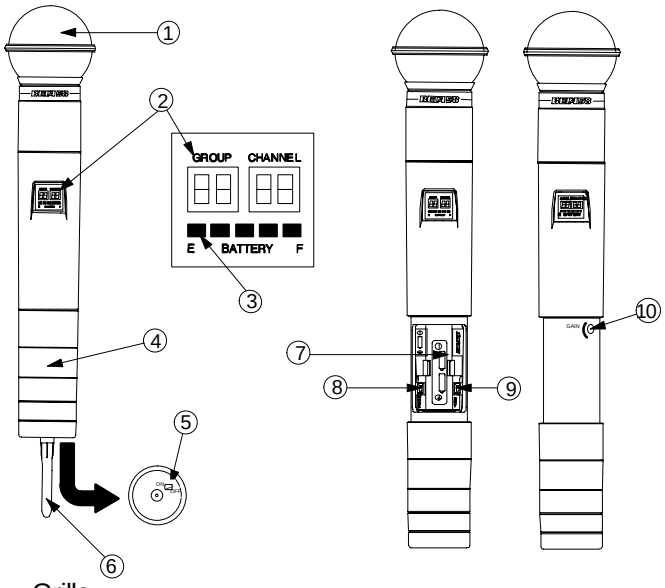
U2 Hand-Held UHF Transmitter

General

Characteristics

The Shure Model U2 Hand-Held UHF Transmitter is a microprocessor controlled microphone-transmitter operating in the 774 to 862 MHz frequency range. This product is intended for use in high-end installed sound, rental, and concert sound applications. Different frequency variations are available in various countries.

Controls and Indicators



1. Grille
2. Programmable Display
3. Battery Fuel Gauge
4. Battery Cover
5. ON/OFF Switch
6. Antenna
7. Battery Compartment
8. MODE Button
9. SET Button
10. Audio Gain Control

Figure 1. U2 Transmitter Controls and Indicators

Service Note: Shure recommends that all service procedures be performed by a Factory-Authorized Service Center or that the product be returned directly to Shure Brothers Inc.

Licensing: Operation may require a user license. Frequency or power-output modifications may violate this product's approvals. Contact your country's communications authorities.

25B1022 (AG)

Printed in U.S.A.

Circuit Description

Audio Section

Audio enters L248, an inductor used as an rf choke. The signal is ac-coupled through C201 into a 26 dB user-adjustable gain stage around U201B. This gain stage is externally accessible to the user. C249, C250, and C209 protect the preamplifier and bias circuits from rf interference. R212 and R241 set up a half-supply bias, and R238 sets the ac input impedance.

The amplified audio signal is then passed through a pre-emphasis network before entering the compression stage. R230, R202, and C203 set up two corners for the pre-emphasis network. The pre-emphasis boosts the high frequencies before transmission.

This network feeds an NE575 compandor, U203, which utilizes an external amplifier U204B. The compandor performs 2:1 logarithmic compression of the audio signal. Additionally, the pre-emphasis network plays a role in setting the hinge point (0 dB gain) of the compandor.

Transistors Q211 and Q207, along with crystal Y202, form the tone key oscillator circuit. This circuit provides a stable, continuous 32.768 kHz sine wave. Transistor Q201 buffers the tone key signal before it is added to the audio signal.

The tone key signal is used in the receiver to provide audio output only when the tone key signal is present in the transmitted signal; therefore, if the tone key or the transmitter is turned off, the receiver will be muted. The tone key squelch eliminates receiver noise associated with loss of a carrier. Q206 acts as a switch for toggling the tone key ON/OFF. It is controlled by the microprocessor. R286 allows for the tone key amplitude level to be set.

The tone key circuit is powered via U210B. This is a dc amplifier used to multiply the 3V battery voltage up to 4.5 V (gain = 1.5). As the battery voltage drops, the tone key supply voltage drops, decreasing the amplitude of the oscillator. This is used to detect low battery in the receiver. (This feature was eliminated for JB models.)

The tone key signal, along with the processed audio signal, is then fed to a summing amplifier U204A. R231 and R234 set up a half-supply bias. R207, at the output of the summing amplifier, is used to help prevent spurious oscillations from the operational amplifier. After passing ac-coupling capacitor C213, the signal is fed to the rf module.

Rf Section

Processed audio enters an internal potentiometer R227, which is adjusted for 45 kHz deviation (100% modulation) with a -7.2 dBV 1 kHz tone at the output of the front audio stage (pin 1 of U201). (On JB models, R227 is adjusted for 5 kHz deviation with a –67.2 dBV, 1 kHz tone injected into the mic input.) The audio is then fed to the tuning voltage pin of the voltage controlled oscillator (VCO) and modulates the carrier directly. The use of a phase locked loop (PLL) frequency-synthesized system eliminates the need for multiplier stages, resulting in a much higher degree of spectral purity. The VCO is shielded to prevent interfer-

ence from external rf fields. Regulated 5 Vdc power from the dc/dc converter ensures frequency stability even if the battery voltage drops.

The VCO is capable of tuning from 782 to 810 MHz with a 1 to 4 V tuning voltage range. At the output of VCO U206, the rf signal splits into two paths. The output of the VCO is coupled by C207 to the frequency control pin of synthesizer U205.

The synthesizer's internal circuitry divides the signal as necessary to the desired reference frequency of 125 kHz. The synthesizer contains a quartz-controlled reference oscillator circuit operating from a 4.0 MHz crystal, Y203, that is adjusted by means of trimmer VC201.

The transmitter output frequency is user-selectable in pre-set increments. The size of the increment and the overall frequency range depend on the model (KK, JB, MB, MC, MD, etc.). Frequency selection is made via microprocessor U104, which interfaces with the user through the mode/select switches.

The output of the synthesizer is a series of pulses which are integrated by a passive loop filter, R226, C231, R251, C237, R243, and C257, to produce a control voltage signal. The control voltage signal is then connected to the VCO through amplifier U210A which is used to isolate the PLL filter from the audio modulation signals.

The VCO output is also coupled to an rf power resistive pad consisting of R255, R256, R257, R258, and an LC-matching network containing C270, L202, and C217. The rf power amplifier, a dual gate MESFET, Q203, is fixed tuned, and configured as a common source device. Amplifier stability is obtained through resistive loading on input R237. The output of Q203 contains a low-pass matching network, L207, and LC-type low pass filter, LP201, providing a high degree of spectral purity. The output of the low-pass filter feeds a microwave isolator that reduces the production of reverse third-order intermodulation products.

The transmitter is capable of delivering +10 dBm (10 mW), maximum to the 50 Ω helical antenna. During transmitter power up and frequency selection, the rf power is muted by bringing the base of Q209 high. This provides approximately 45 dB rf attenuation until the PLL has locked.

The transmitter rf is then unmuted by bringing the base of Q209 low. During transmitter power off conditions, voltage is first removed from the VCO by bringing the base of Q208 high. In this way, the transmitter carrier signal is not allowed to drift off frequency during power on or power off conditions.

U2 Display Board

The Display Board consists of following circuitry blocks:

Microcontroller Section

The microcontroller section consists of microcontroller U104 and the liquid crystal display (LCD). The microcontroller has an on-board LCD driver. R104, R105, and R107 supply the microcontroller with the LCD drive voltage for a 4-plex drive.

The LCD indicates the UHF frequency group and channel, and also has a battery fuel gauge. A 4.000 MHz oscillator, Y101, provides the

operating frequency to the microcontroller. The oscillator circuit includes C102, C103, R106. R108. U105, R113, and C107 form the reset circuit. U105 is the reset IC that resets U104 microcontroller if the 5 Vdc normal operating voltage falls below 3.5 Vdc. R112 is the pull-up resistor for the U104 programming voltage pin.

Memory Section

The memory section consists of U101, a non–volatile EEPRAM chip that stores current transmitter settings and has the mapping of the compatible groups and channels.

Battery Management Section

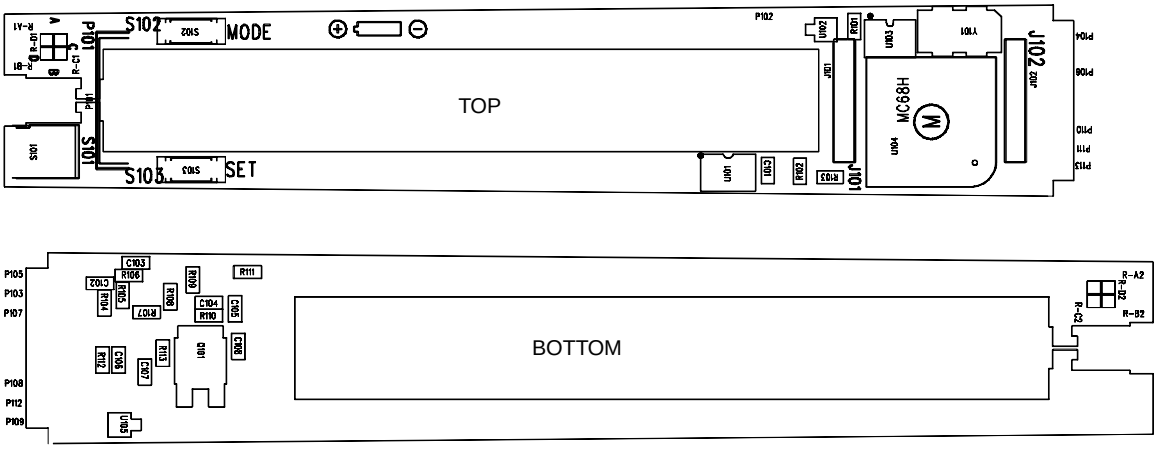
The battery management section consists of comparator U103. It is used to measure the effective battery voltage, with reference to +5 Vdc, by measuring the time taken to charge capacitor C105 to a reference threshold of 0.1 VDE ± 0.01 Vdc. The battery is checked approximately every five seconds. Comparator U103 alternately charges C105 with +5 Vdc reference and then the battery voltage (DPLUS signal). The microcontroller calculates the battery voltage by comparing the time difference to charge C105, up to a reference threshold of 0.1 Vdc ± 0.01 Vdc, with the +5 Vdc reference voltage and the battery voltage.

User Interface Section

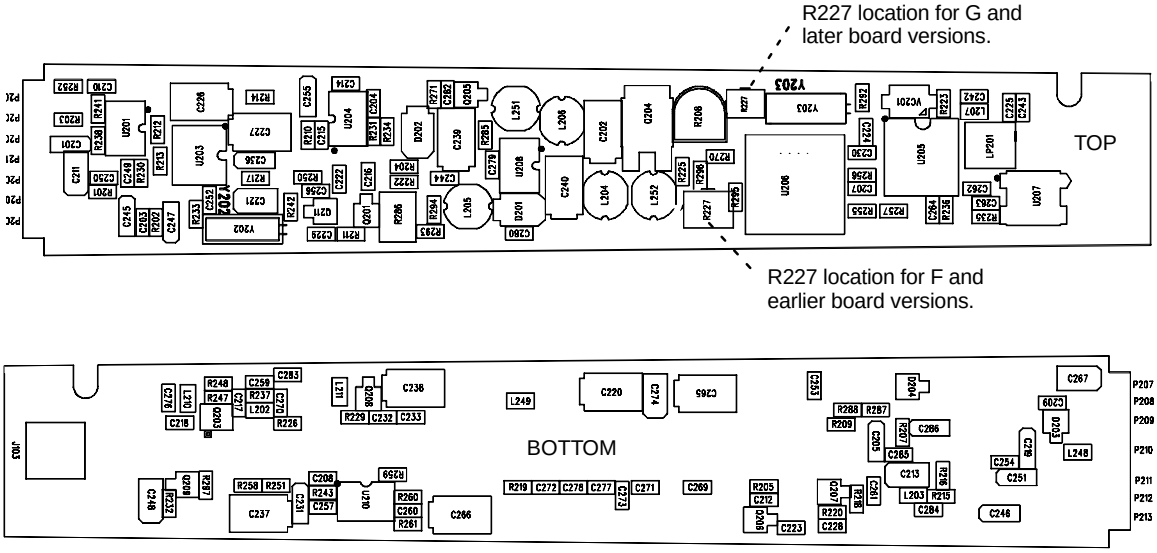
The user interface section consists of power, MODE, and SET switches. The LCD provides the user with feedback for all switch operations.

Preliminary Tests

Test Component Locations



DIGITAL DISPLAY BOARD



RF-AUDIO BOARD

Figure 2. Test Component Locations

Listening Test

Before completely disassembling the transmitter, operate it to determine whether it is functioning normally and try to duplicate the reported malfunction. Refer to the *User Guide* for operating instructions, troubleshooting, and specifications.

Review any customer complaint or request, and focus the listening test on any reported problem. The following, more extensive, functional tests require partial disassembly.

Functional Tests

Refer to the Disassembly section to partially disassemble the transmitter for the following functional tests.

Use dc blocks at all rf outputs to protect test equipment.

Use a U4 receiver for the following functional tests.

Test Set-Up

1. Dc voltages are present at most rf test points. Use dc blocks to protect the test equipment, if necessary.
2. Insert two fresh AA batteries into the U2 battery nest.
3. Connect the audio analyzer to the microphone via the microphone test head.

Rf Power

1. Attach a U4 antenna to the spectrum analyzer.
2. Turn the U2 on and hold it very close to the antenna. Move the U2 up and down to maximize power on the spectrum analyzer.
3. Verify that output power is greater than 3 dBm.

Current Drain

1. Apply 3.0 Vdc to the battery terminals.
2. Connect the amp meter between the positive (+) battery lead and the positive (+) battery terminal of the U2 transmitter.
3. Verify that the current drain is less than 110 mA.

Frequency Response

Values between board versions may vary slightly; the following values are *typica*l values.

1. With the transmitter set to minimum gain, apply 100 mVrms at 1 kHz to its input.

   If you have a version with a 6 dB pad (JB model), apply 200 mVrms at 1 kHz.

2. Connect the audio analyzer's input to the unbalanced output of the U4 receiver.
3. Make sure the receiver volume control is set to maximum.
4. With respect to the 1 kHz level, measure –8.5 dBu ± 2 dB.

5. Change the frequency to 100 Hz and verify that the measurement from the U4 unbalanced output is within ± 3.0 dB with respect to the 1 kHz level.
6. Change the frequency to 10 kHz and verify that the measurement from the U4 unbalanced output is within ± 1.5 dB with respect to the 1 kHz level.

Notes

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Disassembly and Assembly

ATTENTION
Observe precautions when handling this static-sensitive device.

1. Refer to Figure 2 and remove the microphone head from the U2.
2. Remove the retaining ring from inside the top of the case, using a pair of needle-nosed pliers.
3. Remove the screw located beneath the battery cup.
4. Slide the circuit board assembly out by pushing up on the antenna.
5. After completing all repairs, slide the circuit boards back into the case; then reinstall the retaining ring, screw and microphone head.

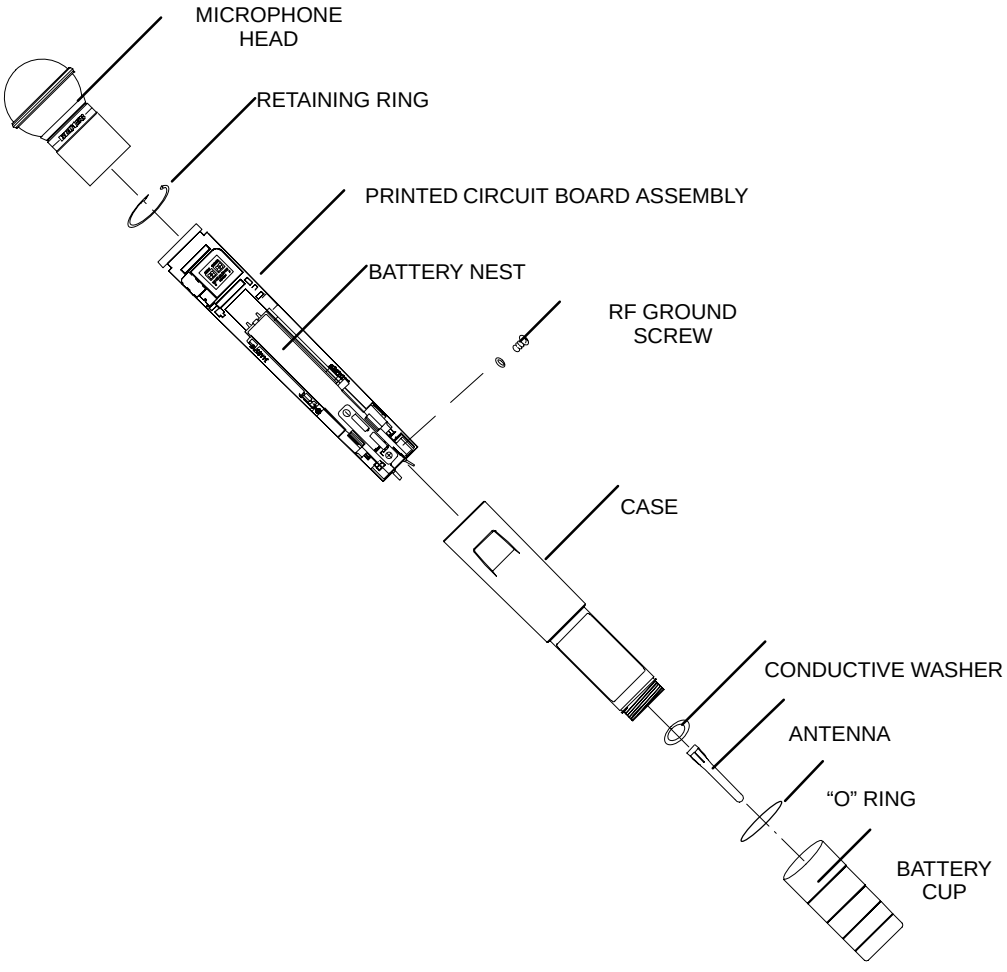

Figure 3. U2 Transmitter Disassembly and Assembly

Notes

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Service Procedures

Service Note

Units With Date Codes Earlier Than August 1996

A small number of synthesizer ICs (U204) can experience start-up problems with the 4 MHz crystal reference oscillator. The problem will only occur for certain values of tuning capacitance.

The transmitter displays the correct group and channel information. However, the carrier will have moved to its lowest possible frequency (around 750 MHz). The tuning voltage of the VCO will read 0 Vdc.

Adjusting the crystal's tuning capacitor to its lowest value should cause the 4 MHz crystal oscillator to start up, and the carrier will lock to the proper frequency.

The tuning capacitor can now be readjusted to center the carrier to within ± 1000 kHz. However, once the unit is turned off, the problem may return.

All units with **August 1996** date codes or later have a 10 kΩ resistor from pin 2 of the synthesizer to ground to insure that the internal oscillator will start up for all values of tuning capacitance (C239). Safe values for the resistor are from 16.8 to 33.2 kΩ.

Antenna Replacement

The top printed circuit board (pcb) is connected to the bottom pcb by a multi–pin connector. Two wires also lead to the battery connector and a three-wire flat cable that connects the pcbs to the microphone jack.

Handle the pcbs with care to avoid damaging these connections.

1. Open the battery compartment cover and remove the batteries.
2. Remove the belt clip.
3. Remove the two screws from the back of the case.
4. Lift the top half of the transmitter case away to expose the pcbs.
5. Remove the single screw visible next to the antenna connector.
6. Use the antenna to gently lift up both pcbs far enough so that the antenna assembly clears the case, or remove the top pcb to gain better access to the bottom pcb.
7. Remove the antenna by unscrewing it from the connector. Make sure that the washer on the antenna clears the case.
8. Install the new antenna by screwing it onto the connector. If necessary, replace the conductive rubber gasket at the base of the antenna.
9. Return the pcbs to their original position.
10. Reinstall the single screw next to the antenna connector.
11. Perform these steps in reverse order to reassemble the unit.

Test Equipment

Measurement Reference

dBu is a measure of *voltage*, and dBm is a measure of *power*.

For example, the HP8903 should be labeled dBu instead of dBm because it is a voltage measurement. These two terms are often used interchangeably even though they have different meanings.

Audio levels in dBu are marked as dBm on the HP8903.

dB Conversion Chart		
0 dBV	=	2.2 dBu
0 dBu	=	0 dBm, assuming the load = 600 Ω

Table 1
Test Equipment

Equipment Type	Model
Audio analyzer	*Hewlett-Packard 8903B
Digital multimeter	Fluke 87
Rf signal generator	Hewlett-Packard 8656B
Frequency counter	Hewlett-Packard 53181A
Spectrum analyzer	Hewlett-Packard 8590L
Shure U4 receiver	Shure U4
SMC to BNC Adapter	PT1838S
Audio Test Head	PT1840
Test Head Brass Ring	PT1838Y

*Audio levels in dBu are marked as dBm on the HP8903B.

Reference Material

Use the Shure UHF Wireless System *User's Guide* for information on Controls, Operation, Specifications, etc. Refer to the appropriate *User's Guide* or *User's Guide Supplement* for information on frequency compatibility.

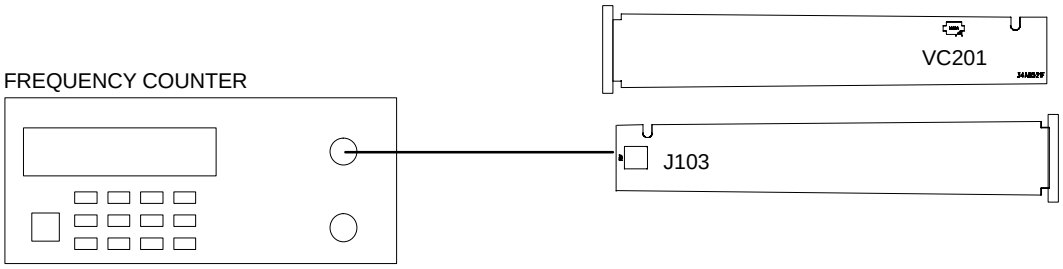
Test Set-Up

1. Use a UA802 0.61 m (2 ft) coaxial cable or an RG58 low-loss 50 Ω cable for all cable connections.
2. Include the insertion loss of the cables and connectors in rf conductive power measurements.
3. Audio gain potentiometer R208 does not need to be preset; however, on JB models, GAIN should be set to maximum.
4. All rf measurements should be made through 50Ω SMC connector J103.
5. Proper adapters should be used to connect the test equipment.
6. Apply 3.0 Vdc from a dc power supply to the respective U2 battery terminals.
7. Turn on the U2 by switching S101 to the ON position.

Output Power Confirmation

1. Using the spectrum analyzer, verify output power is at least +8 dBm. JB models must have at least +8 dBm, but cannot exceed +10 dBm.
2. Rf output power is not adjustable.

Rf Alignment



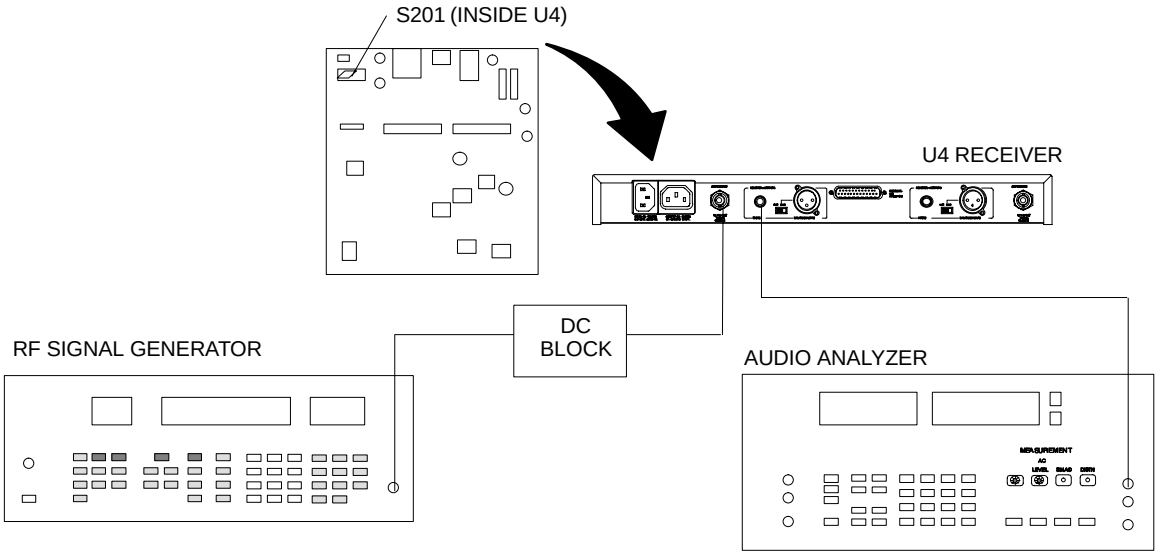
U2 Transmitter		Frequency Counter	
Power (S101):	ON	Connect CH2:	J103
Gain:	For JB models: set to maximum		

Figure 4. Rf Alignment Configuration

1. Verify that the transmitter is ON; switch S101 is set to the ON position.
2. Connect the transmitter to the frequency counter via J103.
3. Determine the transmitter operating frequency by comparing the group and channel information on the LCD to the tables in the *User's Guide* and *User's Guide Supplements*.
4. Adjust variable capacitor VC201 until the frequency counter measurement matches the desired frequency, ±1 kHz, found in the *User's Guide* and *User's Guide Supplements*.

Audio Alignment

Deviation Reference Voltage

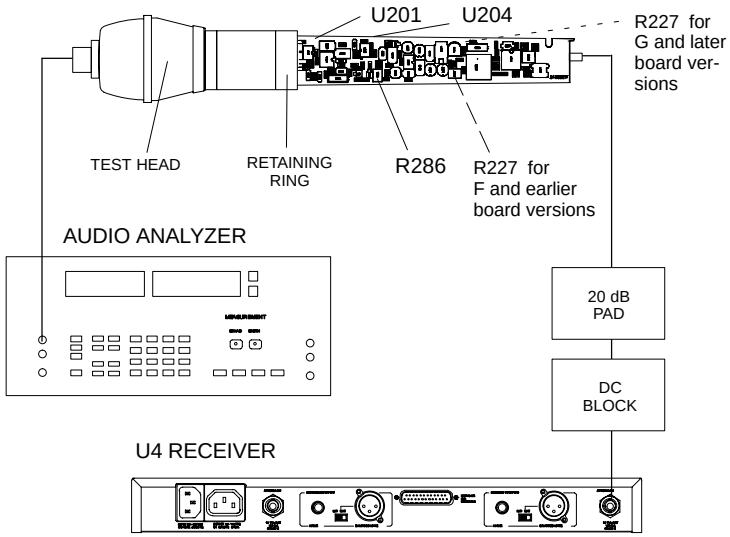


U4 Receiver		Audio Analyzer		Rf Signal Generator	
Output:	Unbalanced	Measurement:	AC level	INT:	FM
Gain:	Maximum	**Filters:**		INT:	1 kHz
Squelch:	Mid	Low-Pass (30 kHz):	ON	Output Amplitude:	–50 dBm
Tone Key (S201):	OFF	High-Pass (400 Hz):	ON		

Figure 5. Deviation Reference Voltage Set-Up

1. Turn the U2 transmitter OFF.
2. Remove the cover of the U4 receiver to expose the pcbs.
3. Connect the rf signal generator to antenna port A or B on a U4 receiver. Make sure the dc block is on the rf signal generator.
4. Set the rf signal generator to the same frequency as the U2.
5. Set the rf signal generator internal FM tone to 1 kHz modulation.
6. Set the rf signal generator deviation to 45 kHz for UA, UB, MA, MB, MC, and MD models; 40 kHz for KK models; and 5 kHz for II models.
7. Set the rf signal generator amplitude to –50 dBm.
8. Turn the U4 receiver ON and set switch S201 inside the U4 to the OFF position. This will disable the tone key function.
9. Set the output level of the U4 receiver to maximum.
10. Connect the voltmeter section of the audio analyzer to the unbalanced output of the U4.
11. Verify that the voltage is 4.2 ± 0.5 dBu (1.26 ± 0.07 V) for UA, MA, UB MB, MC, MD, and KK models, and -26.2 ± 0.5 dBu for II models. This is the ***deviation reference voltage*.**
12. Disconnect the rf signal generator from the U4 and move switch S201 on the U4 to the ON position.
13. Turn OFF the rf output power from the rf signal generator.

Deviation Reference Voltage Adjustment



U2 Transmitter		Audio Analyzer	
Power:	+3 Vdc	Measurement:	AC level
Gain:	Minimum; for JB models set to MAX	Output:	1 kHz
		Filters:	
		Low-Pass (30 kHz):	ON
		High-Pass (400 Hz):	ON

Figure 6. Microphone Test Head Configuration

1. Slide the U2 circuit boards into the supplied test head retaining ring assembly.
2. Attach the microphone test head to the test head retaining ring assembly.
3. Connect the audio analyzer output to the microphone test head input. Connect the shield probe to the audio analyzer's input.
4. Turn the U2 transmitter ON.
5. Adjust the audio analyzer output for 1 kHz to achieve a level of -5.0 dBu (436 mV) at pin 7 of U201 on the transmitter. For JB models, adjust the audio analyzer for 1 kHz and -65 dBu at the input of the test head.
6. Connect the transmitter rf output to an antenna port on the U4 through a dc block and a 20 dB pad.
7. Connect the U4 unbalanced output to the audio analyzer's input.
8. Adjust R227 until the audio analyzer reads the deviation reference voltage determined in the previous test, ±0.05 dB (±0.2 dB for JB models).
9. Disconnect the audio analyzer from the U4 unbalanced output.

Tone Key Level Adjustment

1. Use a dc power supply to apply 2.5 ± 0.01 Vdc to the battery terminals.
2. No audio is applied to the audio input.
3. Do not use filters on the measuring instrument.
4. The tone key frequency will be approximately 32.768 kHz.
5. Adjust R286 so that a tone key level of -22.8 ±0.1 dBu (56 mV) is measured at pin 1 of U204. For JB models, this level is –24.7dBu ±0.1 dBu (45 mV).

Bench Checks

Dc Problems

- Verify the battery voltage is between 2 and 3.5 V.
- Check for proper Vcc and +5 V rf at Q208 (make all dc measurements with respect to rf ground unless otherwise specified). if incorrect voltage is present, check the biasing resistors values.
- Trace the dc back to the dc to dc converter.
- Check the power switch.
- Look for open coils, cracked parts, reversed polarity capacitors, solder shorts. if there is a short to ground from 5 V, isolate different parts of the circuit.
- Verify rf OFF signal changes from +5V at power up/power down to 0V during normal operation. Trace the signal to the microprocessor. Q208 should be saturated during normal operation.
- Verify that battery voltage appears at U208, pin 1. Check for reversed polarity capacitors C239 and C247.
- Verify Vds of Q204 is approximately –.025 V. Q204 should be saturated.
- Verify 5V dc/dc converter output at U208, pin 8. Check for open coil L205, reversed polarity or bad diodes D201 and D202, or bad converter U208.

Rf Problems

- If the carrier is out of specification by less then 40 kHz and cannot be corrected by adjusting VC201, check the values of VC201, C224 and Y203. If these values are correct, replace Y203. As a last resort, replace synthesizer U205.
- If the carrier frequency is not between 782 and 810 MHz, or is unstable, the loop is unlocked. Check the solder connections at the, head board, VCO, microprocessor (traces LE, D, and CK) and synthesizer U205.
- Check for 4 MHz oscillation at pins 1 and 2 of U205. if not replace the crystal Y203.
- Check the values and polarity of the loop filter: R226, C231, R251, C237, R243, C257 U210, R227, and R270.
- Check the bias voltage of U205 pins 3 and 4 and U210, pin 8.
- As a last resort, replace synthesizer U205. The tuning voltage of the VCO should be about 3 Vdc when the transmitter is programmed for 800 MHz operation.

Low Rf Output Power

- Check the polarity of the microwave isolator (rf IN is marked with a dot).
- Check the polarity of the low-pass filter (rf IN is marked with a dash).
- Check the polarity of Q203.
- Check for missing ground connections.
- Verify VCO output power.
- Check dc level at VCO Vcc pin.
- Isolate the VCO from the rest of the circuit by removing R255, R256 and C207. The carrier frequency will no longer be locked, but the output power from the VCO should be approximately 2 dBm into a 50Ω load.
- Check the VCO power output. If it is still low, the VCO is faulty.
- Verify power across C270. Isolate the rest of the circuit by removing L202.
- Check the values of R255, R256, R257, R258, and C217.
- Verify dc bias of Q203. Verify rf Mute signal changes from +5V at power up/down to 0V during normal operation. If Q209 is not saturated during normal operation, the rf power at the antenna port will be attenuated by approximately 45 dB.
- Isolate components, starting from the antenna port and working back to the rf power amplifier.
- Check continuity from U207, pin 4, to the center conductor of J201.
- Remove microwave isolator U207 and check the power output of the low-pass filter at LP201, pin 4.
- Remove the low-pass filter and check the power output of the amplifier at LP201, pin 1.
- Check the values of input and output matching networks Q203, C270, L202, C217, L207, C225, and L210. Look for open coils.
- Check the values of bypass capacitors C259, C283, C242, C218, and C276.
- Replace Q203.

Excessive Current Drain

- Isolate different sections of the circuit (rf, Audio, Digital, dc/dc Converter). Look for capacitors with reversed polarity and improper resistor values.

Deviation Problems

- If R227 cannot be adjusted to obtain 45 kHz deviation, isolate the problem in the Audio or rf section.
- Check the value of R227.

Replacement Parts and Drawings

Model Variations

Different frequency versions of the U2 transmitter are currently available for use in various countries. Each version is identified in the table below by country code, frequency range, and printed circuit board version.

Table 2
U2 Model Variations

COUNTRY CODE	FREQUENCY RANGE	COUNTRY DESIGNATION	RF-AUDIO PC BOARD NUMBER
UA	782–806 MHz	U.S.A. and Canada	90UA8741K
UB	692–716 MHz	U.S.A.	90UB8741K
MA	782–810 MHz	Germany	90MA8741K
MB	800–830 MHz	Europe	90MB8741K
MC	774–782 MHz	Netherlands	90MC8741K
MD	To create an MD board, order the 90MB8741K PCB and install the MD EEPROM		
JB	806–810 MHz	Japan	90JB8741K
KK	838–862 MHz	United Kingdom	90KK8741K

Table 3
U101 EPROM Table

Country Code	Shure Part Number
UA	188T131UA
UB	188T131UB
MA	188T131MA
MB	188T131MB
MC	188T131MC
MD	188T131MD
JB	188T131JB
KK	188T131KK

Parts Designations

The following comments apply to the parts list and the schematic:

Resistors: Unless otherwise noted, all resistors are surface-mount with $^{1}/_{10}$ W rating and 1% tolerance.

Capacitors: Unless otherwise noted, non-polarized capacitors are surface-mount NPO dielectric types with a 100 V capacity and a 5% tolerance, and polarized capacitors are tantalum types.

Table 4
Replacement Parts

Reference Designation	Description	Shure Part Number
A1	SM58 dynamic cartridge assembly	R158
A2	SM87A condenser cartridge assembly	R165
A3	BETA 87A condenser cartridge assembly	R166
MP1	Antenna, UA, MB, MC, MD, JB models	95A2029
MP2	Antenna, KK model	95B2029
MP3	Antenna, UB model	95C2029
MP4	Battery nest	65B1784
MP5	Battery nest screw	30K8136A
MP6	Compression spring (for battery nest)	44A311
MP8	Contact (gold mic contact)	53E2039
MP9	Handle (black)	32B827F
MP10	Headboard, pcb	34A1106B
MP11	Lens	65A1785
MP15	LCD (liquid crystal display)	95A8934
MP16	O–ring	66A307
MP17	Plug	36A8067
MP18	Sleeve (bottom portion of handle)	31B1721C
MP19	Retaining Clip Ring	30A1314
MP20	Washer (EMI)	36B8066
MP21	Screw, Round Head, #4 x 0.25	30C622B

Table 5
Printed Circuit Board Replacement Parts: Side 1

Reference Designation	Description	Shure Part Number
	Non-SMT Components	
J101,102	Socket strip (for LCD)	56G8068
P101	Battery contact (positive terminal)	56A8061
R208	Audio gain potentiometer, 0.1 W, 20%, 20 k	46B8049
S101	Power switch, toggle, DPDT	55A189
S102,103	Switch, pushbutton, SPST (for Mode/Set)	55A187
Y202	Tone key Crystal, 32.768 kHz	40A8010
Y203	Crystal, 4 MHz (for U205 reference)	40A8012
	SMT Components	
D201,202	Rectifier, Schottky, MBRS140	184A16
L204,205,206, 251,252	Inductor 15%, 33 µH	162B16
LP201	Filter, low pass, 33 MHz BW	162A17
Q201,205,211	Transistor, NPN SOT-23, MMBT5089L	183A38
Q204	Transistor, MOS FET, MDT3055EL	183A35
R227,286	Trimming pot, 1/4 W, 25%, 1 k	146B02
R230	Resistor, 1/10 W, 1–5, 249	145BF2490
U102	Diode, switching, 7000L	184A08
U103	Integrated Circuit, Comparator, LM339D	188A136
U201,204	Integrated Circuit, 33178	188A18
U203	Compander, integrated circuit, NE575	188A126
U205	PLL Frequency Synthesizer	188A134
U208	Integrated Circuit, 5V dc/dc converter, MAX751CSA	188A182
VC201	Capacitor, trim, 7 / 50 pF	152H02
Y101	Crystal, 4 MHz (for micro–controller reference)	140A005

Table 6
Printed Circuit Board Replacement Parts: Side 2

Reference Designation	Description	Shure Part Number
Non-SMT Components		
J103	Antenna connector, SMC	95A8641
SMT Components		
D203,204	Diode, dual	184A08
L202	Inductor 20%, 0.12 µH	162A10
L203,210,211, 248,249	Inductor 10%, 0.18 µH	162R10
Q101	Transistor, MOS FET, MDT3055EL	183A35
Q203	Transistor, Dual Gate Ga As MESFET, NE25139	183C12
Q207	Transistor, NPN SOT-23, MMBT5089L	183A38
Q206,208,209	Transistor, PNP SOT-23, MMBT5087	183A01
U105	Voltage detector	188B210
U210	Dual operational amplifier	188A118

Table 7
UA206 VCO Selection

Country Code	UA206 VCO Range	Shure Part Number
UA MA MC JB	782–810 MHz	187A10R
KK	837–863 MHz	187B10R
MB MD	800–830 MHz	187C10R
UB	692–716 MHz	187D10R

Table 8
UA207 Microwave Isolator Selection

UA207 Country Code	Shure Part Number
UA MA MB MC MD JB	187A07
KK	187B07
UB	187C07

Notes

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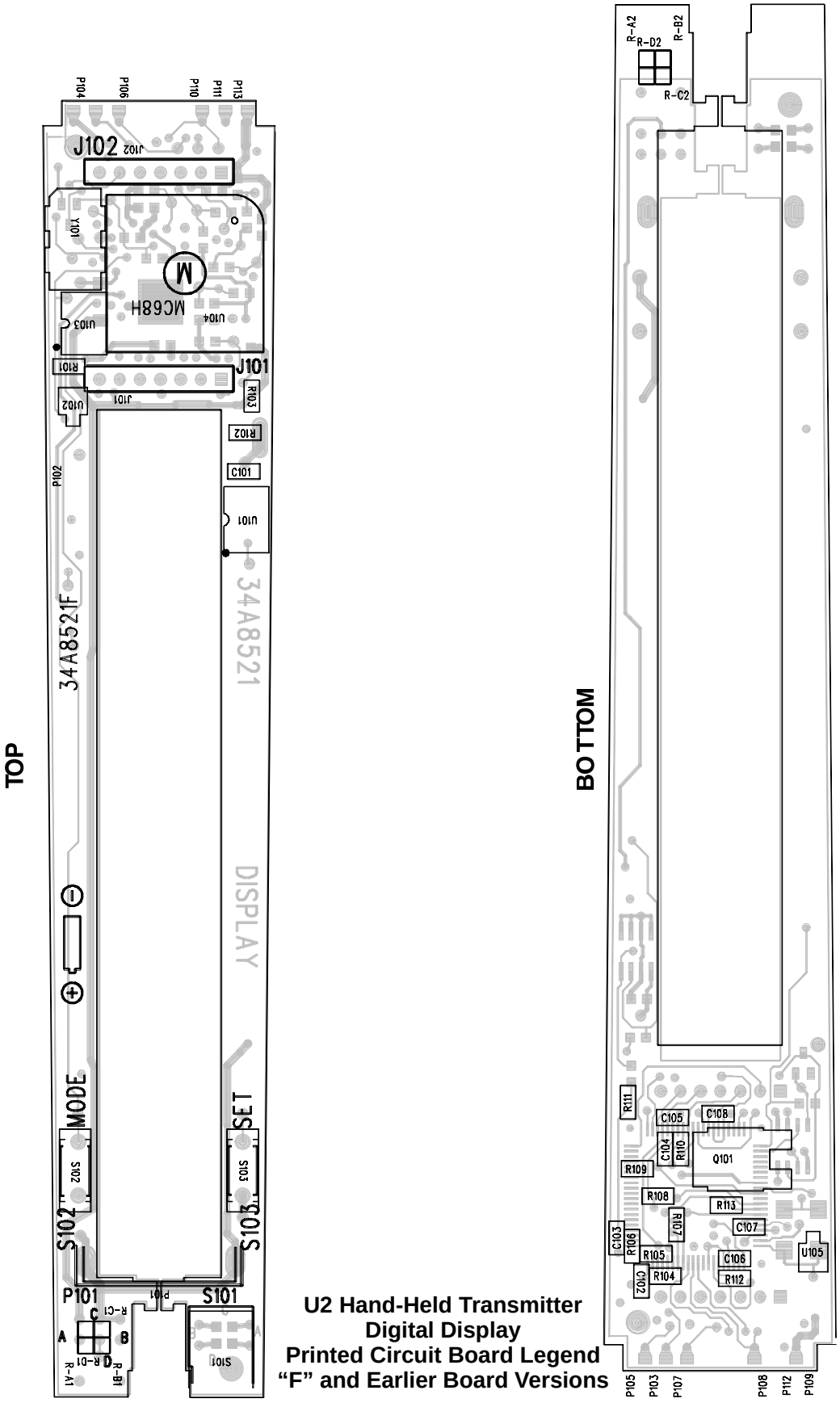
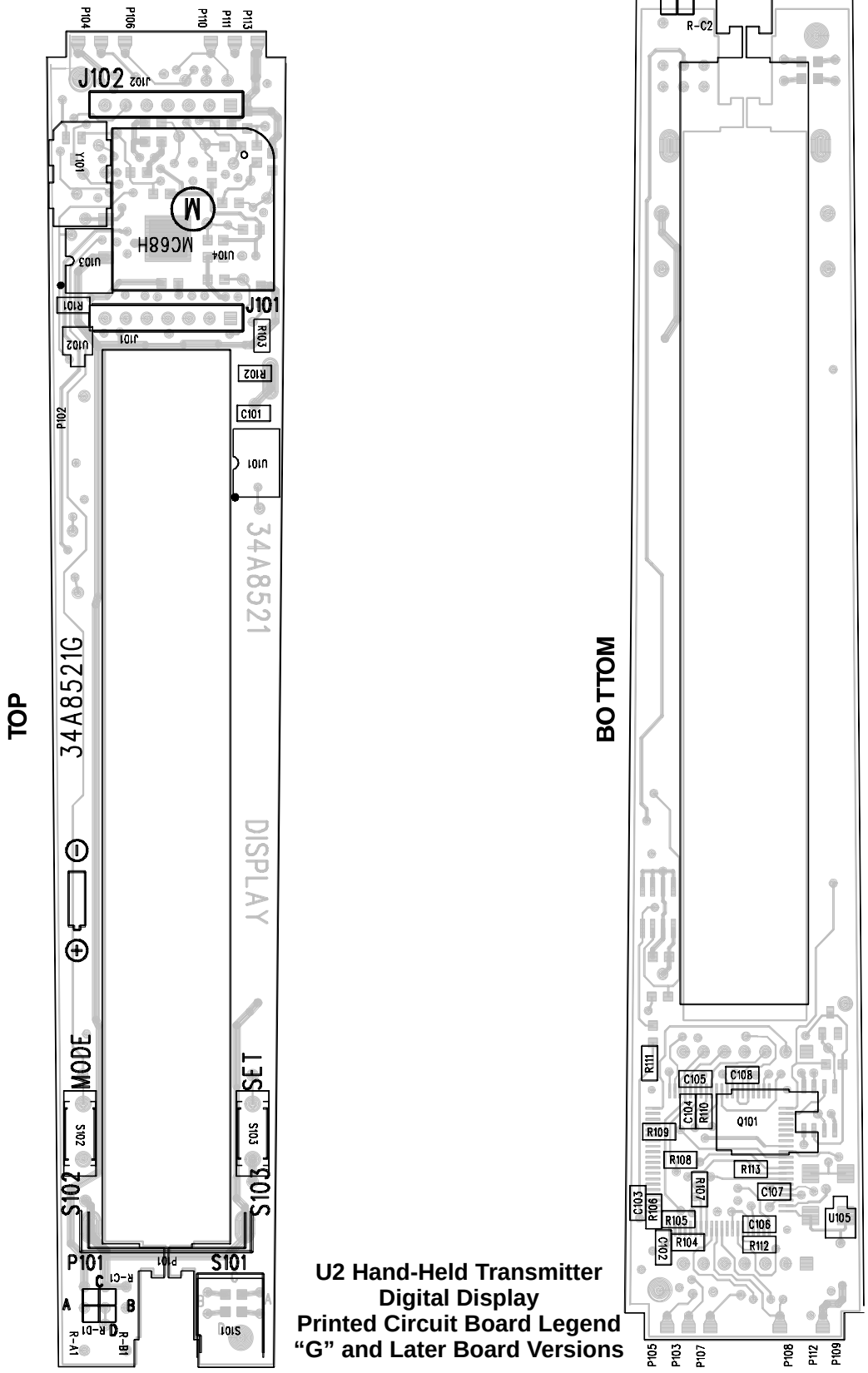
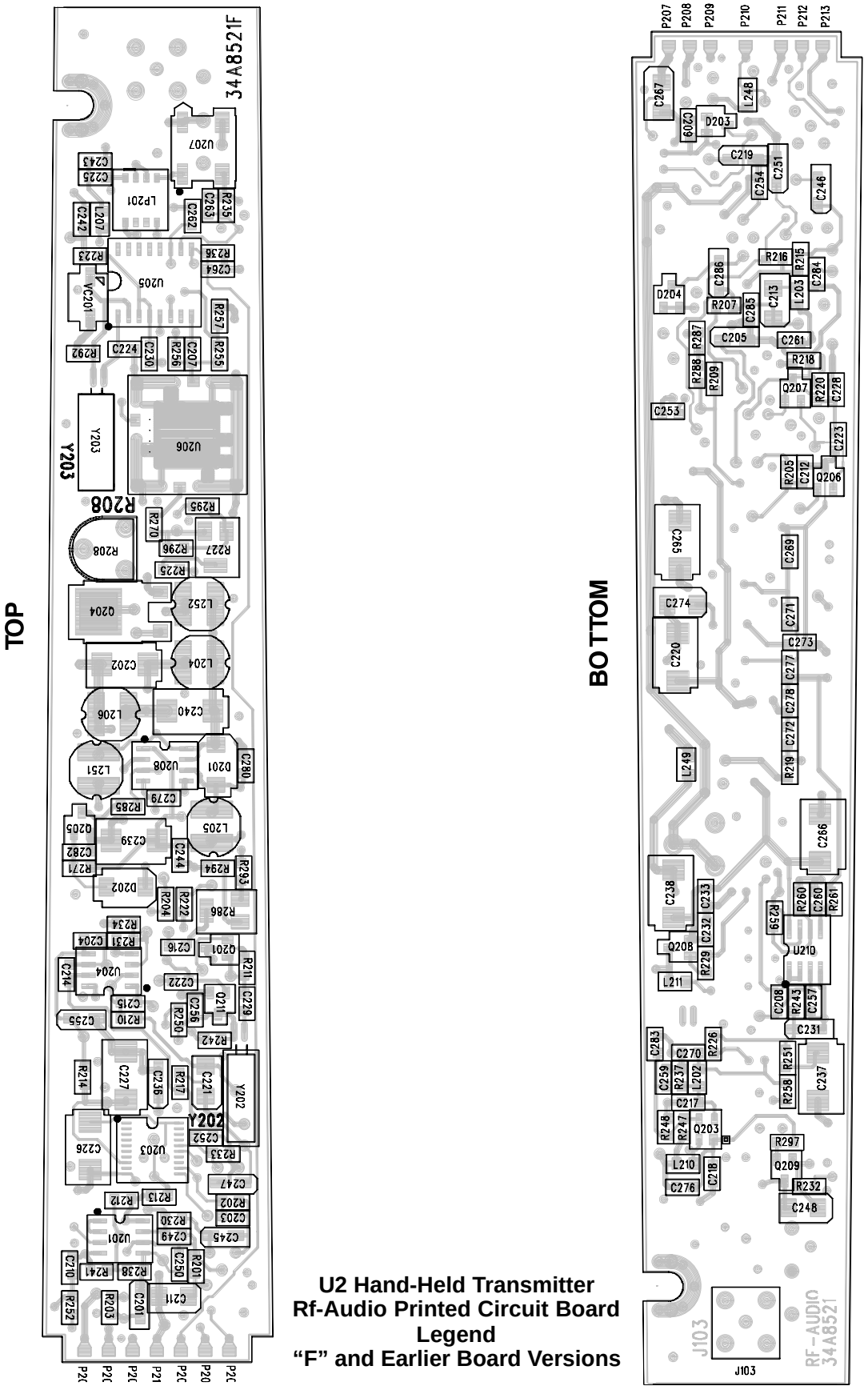


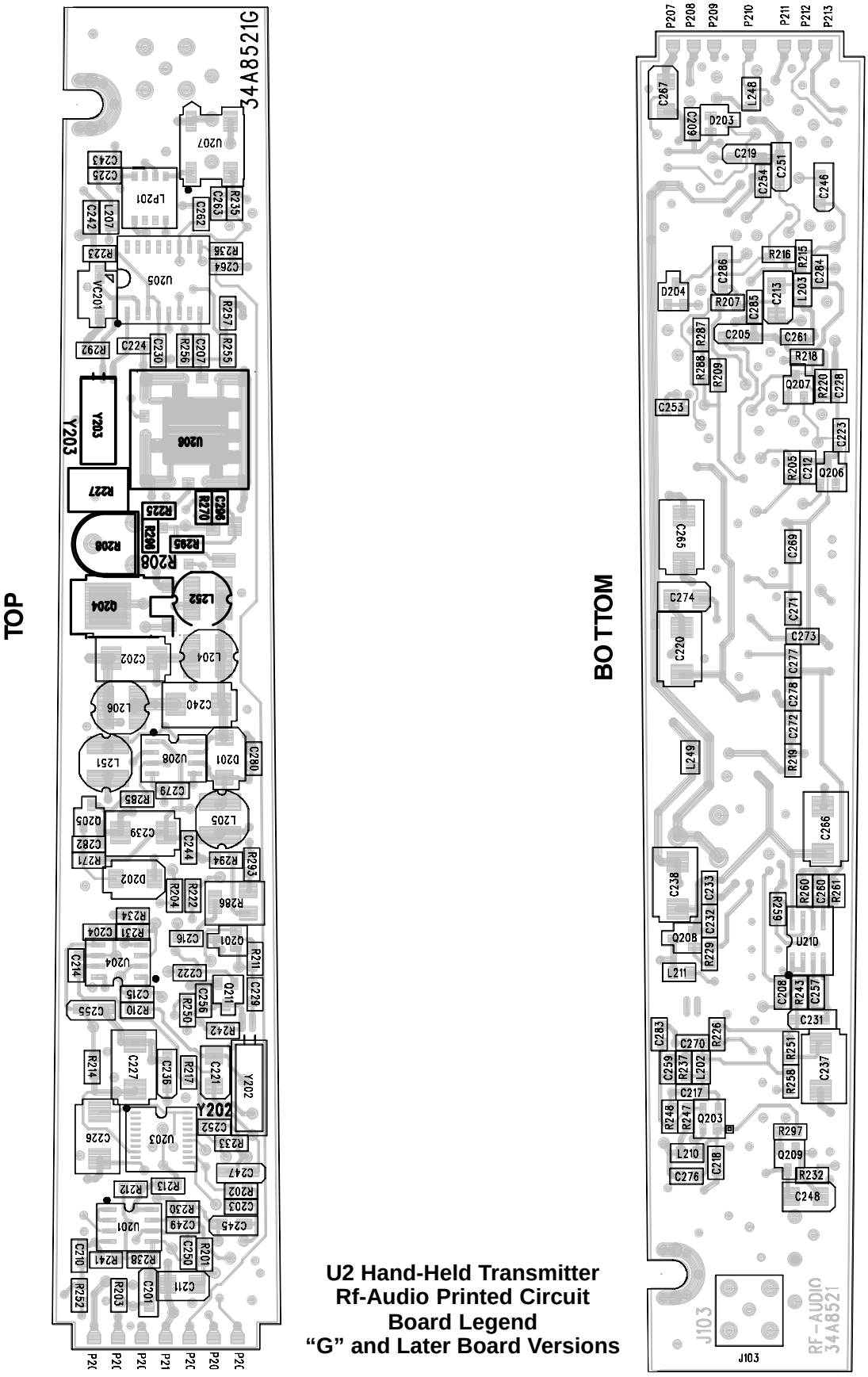
U2 Hand-Held Transmitter
Digital Display
Printed Circuit Board Legend
“F” and Earlier Board Versions



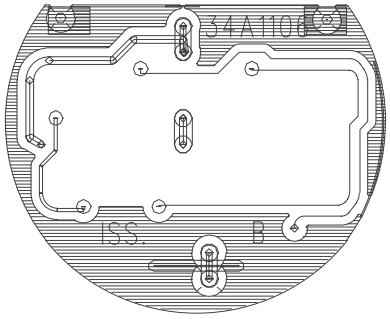
U2 Hand-Held Transmitter
Digital Display
Printed Circuit Board Legend
“G” and Later Board Versions

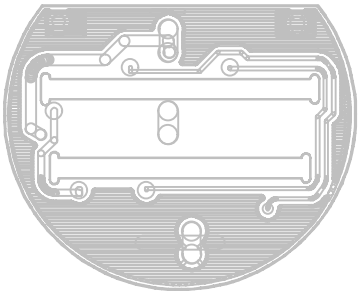


U2 Hand-Held Transmitter
Rf-Audio Printed Circuit Board
Legend
"F" and Earlier Board Versions



U2 Hand-Held Transmitter
Rf-Audio Printed Circuit
Board Legend
“G” and Later Board Versions





U2 Hand-Held Transmitter
Microphone Head Board

Notes

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