

Telex Model SH-100E

Active Device List

RF Board

Q101	MTFS3N03HD	FET	Power Switch
Q102	MMBT3906	bipolar	switch supply oscillator
Q103	MMBT3904	bipolar	switch supply oscillator
Q104	MMBT3904	bipolar	emitter follower
Q105	MMBR901	bipolar	RF Amplifier
Q106	MMBR901	bipolar	RF Amplifier
Q107	MMBT3904	bipolar	DC Switch
Q108	MMBT3906	bipolar	DC Switch
Q109	MMBR901	bipolar	Final RF Amplifier
Q110	2N3906	bipolar	DC Switch
HY101	HY101	IC	Voltage Controlled Oscillator
U101	78L05	IC	Voltage Regulator
U102	TL431	IC	Regulator
U103	PIC16C72	IC	Processor
U104	SA7025	IC	Phase Lock IC
D101	1N5817	Diode	Rectifier
D102	TMPD4148	Diode	Bias
D103	TMPD4148	Diode	Bias
DS101-108	-----	LED	Light Emitting Diodes

AF Board/with digital

Q1-2	ZVN4106	FET	Audio Clamp
Q3	MMBT3904	Bipolar	Audio Rectifier
Q4-6	MMBT3906	Bipolar	Audio Rectifier
U1:A/B	LM833	IC	Audio Amplifier
U2:A/B	NE570	IC	Compressor
DS1	Gen.	LED	Ref.
U3	MX609	IC	CVSD
U4	PIC1672	IC	Control
Q7	MMBT3904	Bipolar	Audio follower

SH-100E Theory of Operation

A. Audio

Input from the microphone is amplified by U1A. VR1 is user adjustable and varies the gain from 0 to 40 dB. U1B forms a low pass filter which cuts off at 4 kHz. U2A is a 2:1 compressor that is used for noise reduction.

B. A/D Circuit

The audio signal is fed to the A/D circuit which contains a continuously variable slope delta (CVSD) codec. This results in a non-return-to zero (NRZ) level asynchronous data stream operating at 62.5 kilobaud. This data stream is fed to the transmitter which contains a frequency modulator, resulting in non-coherent frequency shift keying (NFSK). L7, C29, and R24 form a low pass filter which removes components of the data stream falling outside the occupied bandwidth limit. VR102 is used to set the frequency deviation to comply with 74.861e6.

C. RF Output

HY101 is a VCO that runs at the output frequency. No multiplication takes place in the RF chain. Q105, Q106, and Q109 buffer and amplify the carrier. VC102 and VC103 are tuned to resonate in the center of the frequency range. L109 and C132 form a low pass filter to attenuate harmonics of the carrier. Q108 controls the current through Q109 and thus the power output. This is about 10mW with S105 closed and 1mW with S105 open. Q107 is used to switch the entire output section on after the synthesizer achieves lock.

D. Synthesizer

U104 is a PLL that is serially loaded from microprocessor U103. U103 monitors S102 and S103, the channel selection switches, and loads new data into U104 if the switches are changed. RF from the VCO is fed to the PLL via C119 and R117. Y101 provides the reference frequency for U104. VC101 is used to set this to exactly 16 MHz. U104 controls the VCO through the loop filter consisting of R118, R119, C117 and C118. Modulation is fed to the bottom of C117.

E. Power Supply

Q102, Q103, and associated components form a boost supply which raises the 3 volts from the two AA batteries to 9 volts. This is used to operate the audio and RF output circuits. U101 provides 5 volts for operating the synthesizer and microprocessor.

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Transmitter Tune Instructions

1. Terminate the transmitter RF Board output into a 50 Ohm splitter connected to a RF Power Meter, Frequency Counter, and Spectrum Analyzer.
2. Connect a 600 Ohm source Audio Generator to the microphone input at E1 and E2. Set the generator to 1000 Hz, 8 mV RMS output.
3. Set the microphone Mic Gain Control fully clockwise (maximum gain).
4. Set the test fixture DC Power Supply to 3.0 VDC, 300 mA Current Limit.
5. Connect the DC supply to the battery input connector.
6. Set S105 switch to the HI Power position.
7. Set the Channel Selector switch to "00".
8. Set the transmitter ON/OFF Switch to ON. Check the input current. To be less than 200 mA initial current.
9. Note the RF Output Power. Adjust VC102 and VC103 for maximum output power. Nominal RF Output is 10.0 mW. (Before splitter loss).
10. Note the RF Output Power again. Set S105 switch to the LO power position. Nominal RF Power output should be 1.0 mW. Return S105 to the HI position.
11. Note the RF Signal on the spectrum analyzer. Adjust VR102 to comply with FCC Part 74.861e6. (maximum operating bandwidth not to exceed 200 KHz).

SH-100E Transmitter Tune, Continued.

12. Note the Transmitter Frequency. Adjust VC101 for the correct channel "00" frequency.

13. N/A

14. Recheck the final battery current. To be less than 250 mA.

END TUNE AND TEST.