

■ Adjustment Description

Logic Board Adjustment

Test Apparatus

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|---|------|
| 1. 20A/30V Power Supply | 1set |
| 2. Ammeter | 1set |
| 3. Digital Voltmeter | 1set |
| 4. Test Jumper Cables (mating with test ports of TR-800 and the communication test set) | |
| 5. Communication System Analyzer (such as HP8921 series) | 1set |

Adjustment

Radio Configuration

Use HR-800E to program the TR-800. Table I and table II illustrate the factory default settings in a general operation mode. The "Ignition Sense Time" of main radio defines time delay from SETUP to KNOCKDOWN.

Table I Radio Programming Preset

Item	Main Radio	Slave Radio
AUX3 I/O	Ext. PTT	Ext. PTT
AUX4 I/O	Rx Carrier(Tone)	Rx Carrier(Tone)
AUX5 I/O	Rx Tone(Carrier)	Rx Tone(Carrier)
Horn Alert Logic	NA	1s
Ignition Sense	0h0m	NA
Drop Out Delay	3s	
Scan Gap Time	400ms	
Repeater Hang Time	2s	

Table II Logic Board Switch Configuration:

Toggle Switch	S01-1	S01-2	S01-3	S01-4	S01-5	S01-6	S01-7	S01-8	S01-9	S01-10
Factory Default	ON	OFF	OFF	ON	ON	ON	ON	ON	OFF	ON

Test Procedure

a) Base Station Mode

Make sure the TR-800 is in SETUP state and deactivate RPT & OPT functions. The TR-800 operates on base station mode with main radio to transmit and slave radio to receive (similar to a mobile radio). Correctly cable the test ports to communication system analyzer before adjustment.

Item	Condition	Measure		Adjustment		Specification/Remark
		Instrument	Point	Point	Method	

					S/N; decrease the signal output amplitude of the analyzer, check the duplex sensitivity.	Repeater audio distortion: ≤3%@3W ≤10%@5W Tx S/N: ≥42dB (wide) ≥37dB (narrow) Max. Power output (without duplexer): 45±2W(UHF) 50±2W(VHF)
Rx audio output	Any channel without tones	Communication test set	J0103	/	Check the audio output amplitude of 5 pin on the accessory connector	Audio output: ≥200mV
Repeater Hang Time	Any channel	Communication test set	/	/	In the repeater setup state, terminate the signal output of the analyzer, check the repeater hang time.	Repeater hang time: 2S
Linked audio relay	Any channel without tones	Communication test set	Main radio Tx connector	RV0103	Adjust the audio output amplitude of the analyzer MIC to 120mV into 3 pin of J0103; adjust RV0103 to obtain a 60% system deviation, check modulation distortion and TX S/N	Tx frequency deviation: 3.0±0.2kHz (wide) 1.5±0.1kHz (narrow) Modulation distortion: ≤3% Tx S/N: ≥45dB (wide) ≥40dB (narrow)
Repeater Scan	Any channel	Signal generation or radio	/	/	Set SCAN key active	Use signal generator or portable transmitter to test whether repeater scanning works correctly and processes retransmission, and repeat testing on other channels.

c) Uni-directional Repeater Mode (reverse)

Make sure the TR-800 is in SETUP state and activate OPT function. The TR-800 operates on uni-directional repeater mode with slave radio keys main radio to repeat transmission (backward direction). Correctly cable the test ports to communication system analyzer before adjustment.

Item	Condition	Measure		Adjustment		Specification/Remark
		Instrument	Point	Point	Method	

MONI	Any channel	/	/	MONI	Check up	Long press the monitor key, the main radio processes monitoring, with red LED flashes.
Slave radio transmit	Any channel without tones	Communication test set	Slave radio Rx connector	/	Adjust the audio output amplitude of the analyzer MIC to 7mV into 3 pin of J0109, check the TX frequency dev. Matching of 60% system Dev., check modulation distortion and TX S/N.	duplex frequency deviation: 3.0±0.2kHz (wide) 1.5±0.1kHz (narrow) Modulation distortion: ≤3% Tx S/N: ≥ 45dB (wide) ≥40dB (narrow)
Uni-directional repeater (reverse)	Channels with/ without tones	Communication test set	Slave radio Rx connector	RV0102	Adjust the signal output amplitude of Analyzer to -47dBm, adjust RV0102 to obtain a frequency dev. of 60%; check the modulation distortion and TX S/N; decrease the signal output amplitude, check the duplex sensitivity.	Duplex sensitivity: -117(+1/-3dBm) CTCSS duplex sensitivity: -117(+1/-3dBm) CDCSS duplex sensitivity: -117(+1/-3dBm) Repeater frequency deviation: 2.9±0.2kHz (wide) 1.4±0.1kHz (narrow) Repeater audio distortion: ≤3%@3W ≤10%@5W Tx S/N: ≥42dB (wide) ≥37dB (narrow) Max. Power output (without duplexer): 45±2W(UHF) 50±2W(VHF)

d) Radio Kill Function

Item	Condition	Measure		Adjustment		Specification/Remark
		Instrument	Point	Point	Method	
Remote Knockdown	Channel with optional signaling	Radio	/	/	Set S01-2 "ON"	Transmit DTMF code via the portable radio to remotely disable the main radio, orange LED goes out and the TR-800 is in knockdown state

e) Knockdown State

Item	Condition	Measure		Adjustment		Specification/Remark
		Instrument	Point	Point	Method	
Knockdown state	Any channel with SETUP disabled	Handheld microphone or test cable	/	MONI, SCAN pushbutton	/	Short or long press of the monitor and scan button is disabled; unable to transmit with palm microphone or test cable connected, only receives (i.e. only slave radio works and receive only)

f) Provisory Settings

At the end of the test, set S01-2, S01-3, S01-9 to "OFF" to prohibit users the access to the D.B.D feature, only your dealer or skilled technicians are authorized to enable this feature upon the requirement of users.

Power Management Board Adjustment

Test Apparatus

1、20A/30V Power Supply	1set
2、Analog ammeter	1set
3、Digital Voltmeter	1set
4、12V lead acid battery (not fully charged)	1set

Circuit detect and temperature-control test

Connect CN0201 (To Power Supply) and CN0204 (To Ext. Battery) with DC power output 13.8V respectively.

Item	Condition	Measure		Adjustment		Specification/Remark
		Instrument	Point	Point	Method	
AC to DC over-voltage detect	/	Digital voltmeter	CR0219	CN0201	Increase or decrease the input voltage	Gradually increase the voltage of CN0201 to 16.4V, the protection circuit will drive KR01 to revert to DC power supply. Decrease the voltage of CN0201 to 13.4V and return to AC power supply.
AC mains fail detect	/	/	CR0219	CN0201	Close or open input voltage	Remove the voltage of CN0201, driving KR01 to revert to DC power supply with CR0219 illuminates; Apply voltage to CN0201, and KR01 is activated, then return to AC power supply with CR0219 goes out.
Battery low detect	Close CN0201 voltage	Digital voltmeter	CR0219 ,BAT LOW	CN0204	Raise or lower input voltage	Gradually decrease the voltage of CN0204 to 10.2V, driving KR01 to cut down DC power supply, with CR0219 goes out, "BAT LOW" provides a low; Apply voltage to CN0201, with CR0219 flashes briefly, then return to AC power supply; remove the voltage of CN0201, gradually increase the voltage of CN0204 to 12V, the KR01 is activated to toggle to DC power supply with CR0219 illuminates.
Thermal controlled fan	Soldering iron or hot air gun	Digital voltmeter	Fan	Rth0201	Heating or cooling	Heat the Rth0201 with soldering iron or hot air gun, check the voltage of fan increases

						(6.0V~11.5V) with the air flow increases.
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Floating charge test

Connect CN0204 to 12V battery; CN0201 remains connected with 13.8V power supply.

Item	Condition	Measure		Adjustment		Specification/Remark
		Instrument	Point	Point	Method	
Floating charge	/	Analog Ammeter	CN0204	/	Check	Check the charging current is about 400mA, and will drop to 10-25mA when fully charged.

Duplexer Instructions

Electrically a duplexer is a device using sharply tuned resonate circuits to isolate a transmitter from a receiver. This allows both of them to operate on the same antenna at the same time without the transmitter RF frying the receiver. Before using your repeater, you must tune the duplexer using one of the following three methods for ensuring that the duplexer is tuned to the correct frequencies of operation:

- ◆ ***Pre-Tuned Method (preferred method)***

Order the duplexer from the manufacturer or supplier pre-tuned to the desired frequencies. This is not a “method” of tuning the duplexer but does not require any field tuning or test equipment. Note that there must be a separation of the transmit and receive frequencies. This is called “split”. On two meters the split is about 600 KHz. On 70cm the split is much easier to do 5MHz.

- ◆ ***Visual Method***

Use a tracking (sweep) generator and spectrum analyzer to adjust the tuning of the pass bands and reject bands of the duplexer.

- ◆ ***Emergency Method***

The following paragraphs address a simple method of tuning a “notched” duplexer such as DT04 UHF duplexer. This is not as accurate a method of tuning as the visual method afforded by the tracking generator /spectrum analyzer sweep setup but it is much less costly. It may be sufficiently good for all but the most exacting applications.

Use this method only when the operating frequencies of the main radio and slave radio meet the requirements of the duplexer. The duplexer you can order from HYT is notched type (band-reject) only and the minimum separation available is 4MHz on UHF band and 3.5MHz on VHF band. Note that this notched type duplexer offers a considerably narrow bandwidth. If the operating transmitter/receiver frequencies for the TR-800 are appreciably different than that of duplexer specification, degraded performance of the repeater will result.

The following procedure assumes that the duplexer is applied and the radios should be connected to the proper ports of the duplexer with the RF coaxial cables provided in the TR-800 kit. The duplexer should not be mounted on the bracket and the tuning screws of the duplexer (on the other side of the cavities, opposite to the RF connectors) should be accessible.

Programming the Radios

1. Program the main radio with an additional “receive only” mode at the frequency of receive (assume that the main radio operates as transmitter of a uni-directional repeater).
2. Program the slave radio with an additional “receive only” mode at the frequency of transmit (assume that the slave radio operates as receiver of a

uni-directional repeater).

3. Connect a communications test set, such as HP8921 series, or an RF signal generator to the antenna port of the duplexer. The test set should be operating in the "Generate" mode. Modulate the RF source with a 1kHz tone at 60% system deviation to facilitate "hearing" the signal during the tune-up procedure.

Tuning the Main Radio Section

Tuning the main radio section of the duplexer begins with the tuning screw closest to the antenna port of the duplexer.

1. Adjust the frequency of the communication test set or generator to that of receive.
2. Place the main radio on the receive frequency mode defined in Step 1 under "Programming the Radios".
3. Adjust the level of the communication test set or generator until the main radio emits a weak signal.
4. Increase the level of the communication test set or generator by approximately 20dB.
5. Adjust the tuning screw of the duplexer for the greatest rejection of the signal. This will appear as a noisier signal. **If necessary:**
 - 5A. Slightly loosen the locking nuts of the tuning screws to allow the tuning screws to turn more freely (but not "sloppy") **and**
 - 5B. Increase the level of the communication test set or generator to maintain an audible 1kHz tone.
6. Repeat steps Step 4, Step 5, Step 5A and Step 5B for each of the tuning screws on the duplexer. Begin with the tuning screw closest to the antenna port and move in order toward the tuning screw closest to the main radio port.
7. Tighten the locking nuts of the tuning screws.

To avoid damage to the tuning screws and to allow fine tuning of the duplexer, do not over tighten the locking nuts.

8. Repeat Step 5, Step 5A and Step 5B to fine-tune the main radio section of the duplexer.

Tuning the Slave Radio Section

Tuning the slave radio section of the duplexer begins with the tuning screw closest to the antenna port of the duplexer.

9. Adjust the frequency of the communication test set or generator to that of transmit.
10. Place the slave radio on the receive frequency mode defined in Step 2 under "Programming the Radios".
11. Adjust the level of the communication test set or generator until the slave radio emits a weak signal.
12. Increase the level of the communication test set or generator by approximately 20dB.
13. Adjust the tuning screw of the duplexer for the greatest rejection of the signal.

This will appear as a noisier signal. **If necessary:**

- 13A. Slightly loosen the locking nuts of the tuning screws to allow the tuning screws to turn more freely (but not “sloppy”) **and**
- 13B. Increase the level of the communication test set or generator to maintain an audible 1kHz tone.
- 14. Repeat steps Step 12, Step 13, Step 13A and Step 13B for each of the tuning screws on the duplexer. Begin with the tuning screw closest to the antenna port and move in order toward the tuning screw closest to the slave radio port.
- 15. Tighten the locking nuts of the tuning screws.

To avoid damage to the tuning screws and to allow fine tuning of the duplexer, do not over tighten the locking nuts.

- 16. Repeat Step 13, Step 13A and Step 13B to fine-tune the slave radio section of the duplexer.