
3800+ Boards
TX Tuning Specification

1. Transmitter System

1.1.1 Transmitter Output

There are two ways to provide the transmitter output with a frequency modulated, high frequency signal:

- * When the transmitter is the master, using the signal of the master oscillator generated by the transmitter.
- * When the transmitter is the slave, choosing slave input "SYNC IN" and switching the "slave" at the open and shut valve.

You can adjust the output power of the transmitter output by using potentiometer VR23.

1.1.2 Master / Slave Switchover

You can change operation of the TX from master to slave by using open and shut valve.

1.1.3 Master Operation

The internal oscillator generates 8.2MHz of center frequency which has been modulated, and it is the signal of high frequency from 7.7MHz to 8.7 MHz.

Three different modulation frequencies are available: 150Hz/160Hz/170Hz, and default is 180 Hz.

1.1.4 Cable Synchronization

You can input synchronization signals at Input P2 "SYNC IN".

The input synchronization signal has been in output P3"SYNC IN" and P4"SYNC IN" for cable synchronization.

The synchronization signal at input P2 is also available to be the output synchronization signal unconditionally.

1.2 Technical Data

- * Center Frequency: 8.2 MHz
- * Sweeping Frequency: 7.7 MHz to 8.7 MHz
- * Modulation Frequency: Default is 180Hz
- * Antenna Impedance: 200 ohms
- * 1 cable of synchronization input
- * 2 cables of synchronization output
- * Power input: 24VDC 0.8A

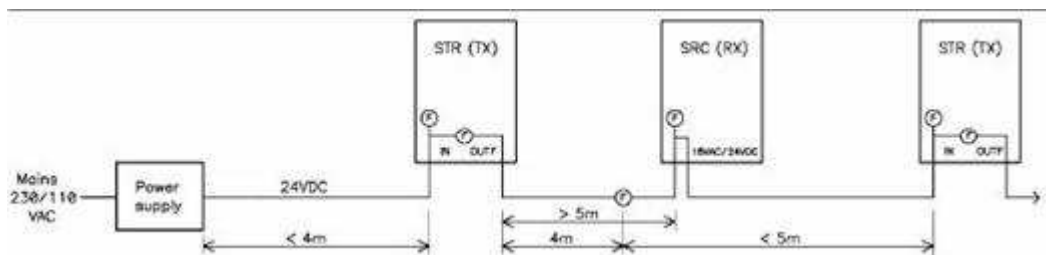
2. Transmitter Configurations

2.1 Power Supply and Filter

The maximum length of the cable without filter should not exceed 5 meters.

If you have to use longer cable for the power supply, you should add a filter per approx. 4 meters.

The power output P6 (DC OUT) with filter of the additional transmitter can also be used as a filter.



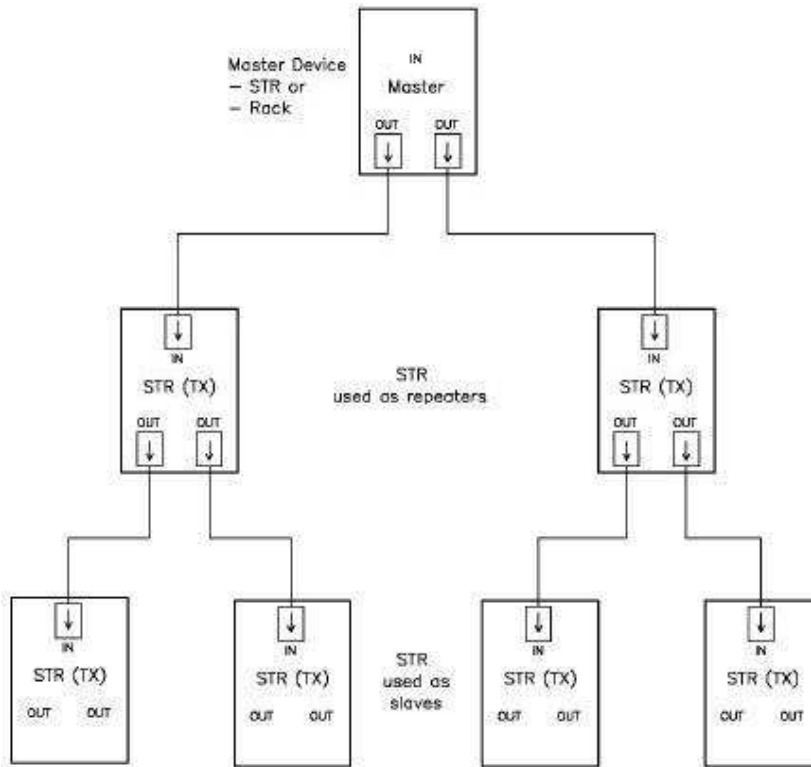
The cable of power supply should be shielded twin-lead cable (including 2 wires) with $2 \times 0.5\text{m}^2$ per wire, and the shielded layer needn't connecting with system. If the environment has strong interferenc

e, then please use cable with safety cover.

2.2 Synchronization

If two or more TX antennas are installed closely, all the TX antennas should be synchronized. You may use HF cables for Synchronization.

The following diagram of 3-stage synchronization is applicable to cable synchronization:



3-Stage Synchronization

For small installation (≤ 7 TX), one TX is the master and the others are slaves.

For big installation (> 7 TX), another master unit for supplementary should be installed.

NOTE: The synchronization signal can only be occurred one time per stage of installation.

2.3 Cable Synchronization Mode

Note: Cable synchronization normally requires using ferrite ring to reduce undesirable resonances.

Cable synchronization can only be implemented in small installation with interference-free environment. And the installation should be handled by experienced technicians.

Using dual-core shielded cable for cable synchronization. Make sure that the same color wire is always connected to the relevant terminal (SYNC-SYNC, IN-OUT) for avoiding phase errors. Both end of the wire shielded should be connected to the relating transmitter board. Don't worry about the ground would be a circuit because relevant disconnections are made on the PCB.

The following details can be layed out by the diagram of "3-stage synchronization".

Master:

* Master mode: switching the "master" at the open and shut valve

* Synchronization output: P3 (SYNC OUT), P4 (SYNC OUT)

Slave:

- * Slave mode: switching the “slave” at the open and shut valve
- * Cable synchronization mode
- * Synchronization input: P2 (SYNC IN)
 - * Synchronization output: P3 (SYNC OUT), P4 (SYNC OUT)

Note: A modulated signal (regenerated) is available at synchronization output P3 (SYNC OUT) and P4 (SYNC OUT).

3. Tuning

3.1 Instruments

The following instruments are recommended for TX tuning:

- * Oscilloscope, 2 channels (100 MHz—could be provided power by battery)
- * Oscilloscope probes (10:1)
- * AGON sweep span meter (Order no: 963 600 209)
- * Multimeter for DC and AC measurements
- * EAS tester
- * **Mini flat tip screwdriver**

3.2 Preparation

Make sure:

- * The antenna cable (loops inside of the frame) is connected to antenna connector
- * System power is switched off
- * The desired mode (master or slave) is selected
- * If slave mode is selected, synchronization connections and proper toggle switch position should be set up.

3.3 Adjustments

- * Turn on the power.
- * Check the light is working or not on the transformer., if the light is red LED which means OK, if the light have no shine, please check the plug of power supply and the connections. You can use the multimeter to test the output; the normal output should be DC24V.
- * Test the input in transmitter by multimeter, the normal input should be DC24V.
 - If the input voltage is higher than 25V, or lower than 23V, please check the input of power supply carefully.
 - The error of input DC24V should be within 2%.
 - If no voltage input to TX board, please replace the TX board.
- * Using the oscilloscope to check the parameters of transmitter as follows (you can choose the high speed oscilloscope Tektronix TDS30328 / 300MHz):
 - Center Frequency: 8.2 MHz
 - Modulation Frequency: Default is 180 Hz (150Hz/160Hz/170Hz is available)
 - Frequency range: 7.7 MHz ~8.7MHz, actual test signal vary within this range.
 - (*Or put the EAS tester on the top of the TX, press the switch of EAS tester and make it show 8.2MHz /180Hz /1000±50KHz.)

* Adjust the TX output signal as follows:

-Test TP1, normal signal should be rectangular wave, the peak peak value(Vp-p) is 15.6V±5% and the amplitude is 14.8V±5%. The frequency can be adjusted as following:

Switch open and shut valve JP5 to output modulation frequency.

Different value of switch 1 and 2 correspond different output frequency (on→1, the other

end→0):

Switch1	Switch2	Output frequency
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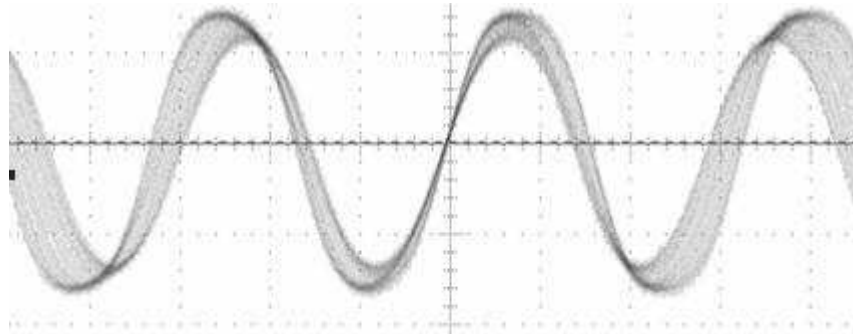
0	0	150Hz
0	1	160Hz
1	0	170Hz
1	1	180Hz

In actual operation, the modulation frequency is defaulted 180Hz.

-Test TP4, normal signal should be sine wave, the frequency corresponds the adjustable frequency as above mentioned. The potentiometer R14 is for adjusting peak value of TP4 voltage. Peak peak value (VPP) is $0.7\text{ V}\pm 5\%$.

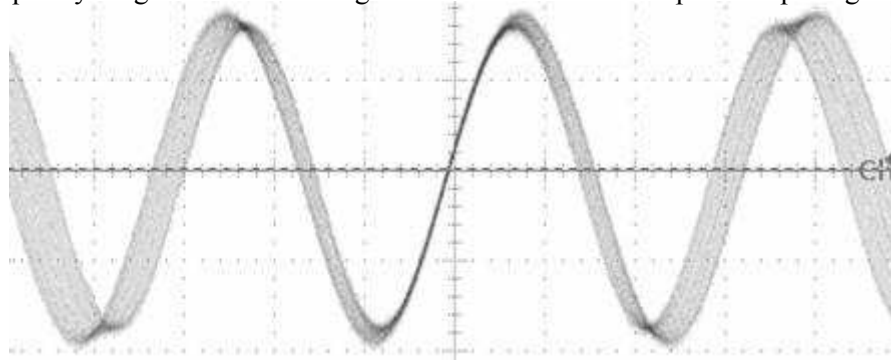
-Test TP3, normal signal should be sine wave; the frequency corresponds the adjustable frequency as above mentioned. The potential is correspondingly stable. Peak peak value (VPP) is $3.8\text{ V}\pm 5\%$.

-Test TP6, this is the test point of sweeping signal. Connect your oscilloscope probe to TP6 and connect ground to GND on TX board. The shape of signal is below:



Center Frequency: 8.2MHz, V_{p-p} : $24.6\text{ V}\pm 5\%$

-Test TP7, this is the test point of transmitter output sweeping signal. Connect your oscilloscope probe to TP7 and connect ground to GND TX board. Adjust potentiometer R15 to center frequency 8.2MHz, and adjust potentiometer VR23, the amplitude should be between 40V~70V. The shape of signal can change slightly depending on the antenna type; and the amplitude of the entire frequency range should not change more than 20%. The shape of output signal is below:



Center Frequency: 8.2MHz, V_{p-p} : 40~70V

Potentiometer R15 is for TP7 to adjust center frequency.
Potentiometer VR23 is for TP7 to adjust output power.

-Simple tuning procedures:

Turn power on and make oscilloscope ready.

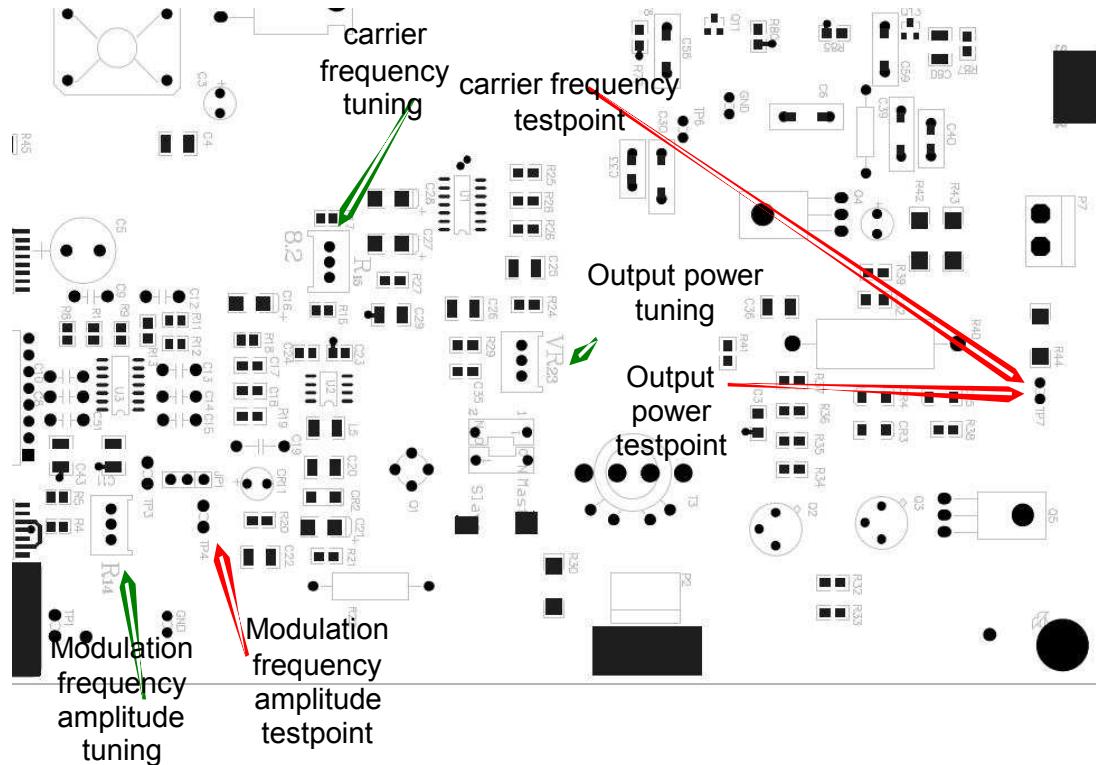
Test TP4, adjust R14, check oscilloscope and make V_{p-p} to $0.7\text{ V}\pm 5\%$

Test TP7, adjust R15, check oscilloscope and make center frequency to 8.2MHz

Test TP7, adjust VR23, check oscilloscope and make Vp-p to 40~70V

Note: During tuning, open and shut valve is at Master and JP1 on 1 and 2.

The diagram of electronic component is as follows:



4. Appendix

4.1 Simple Tuning Manual

- * Set up the jumper according to the Jumper Setting Table below.
- * Make the cable connections
- * Adjust potentiometer VR23 clockwise to approx. 90% of full power
- * Turn on power
- * Check the red LED (P8) light shines or not
- * Check the parameters of transmitter by using an EAS tester:
 - * Center Frequency: 8.2 MHz
 - * Modulation Frequency: 180 Hz (select by open and shut valve JP5)
 - * Frequency Range: 7.7 MHz ~8.7MHz
- * Check the output signal at TP7 (ground to GND)
- * Tune the receiver board.
- * Test the detection.

4.2 Setting Overview

(1) Jumper Setting Table

Jumper	Function	Master	Slave
Open and shut valve	Master mode (using internal oscillator)	Master	

	Slave mode (using input P2 (SYNC IN))		Slave
JP5	180Hz Modulation Frequency	1 ON 2 ON	dc
	170Hz Modulation Frequency	1 ON 2 OFF	dc
	160Hz Modulation Frequency	1 OFF 2 ON	dc
	150Hz Modulation Frequency	1 OFF 2 OFF	dc
JP1	Using internal oscillator to generate modulation frequency under Master mode	1-2	dc

Legend:

dc Random (can be connected or not connected)
 Default

(2) Connectors

Connectors	Name	Pin	Function
P1	DCinput	1	24VDC input (-)
		2	24VDC input (+)
		3	Not used
		GND 4	
P2	Synchronization signal input	1	Synchronization signal input (SYNC)
		2	Synchronization signal input (IN)
P3	Synchronization signal output	1	Synchronization signal output (SYNC)
		2	Synchronization signal output (OUT)
P4		1	Synchronization signal output (SYNC)
		2	Synchronization signal output (OUT)
P6	Synchronization power output	1	24VDC output (-)
		2	24VDC output (+)
		3	24VDC output (-)
		4	24VDC output (+)
P7	antenna (OUT)	1	Transmitter signal output
		GND 2	

(3) Test point:

Test point	Signal
GND	Ground
TP1	Modulation frequency rectangular wave signal
TP3	Modulation frequency sine wave signal
TP4	Modulation signal
TP6	Carrier wave signal
TP7	Output signal

4.3 Diagram of transmitter

