

WX-200

Digital Weather Receiver

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Chapter 1 - Introduction and Specifications

WX-200 Weather Receiver

The WX-200 is a highly sensitive, quality receiver, with good front-end protection designed to function in the high RF environment typical of many repeater sites. A digital decoder responds to Specific Area Message Encoded (SAME) alerts transmitted by the NOAA weather station located in your geographic area. Select your county code and the type of alert. Select warnings and or watches. During a weather alert, a relay in the WX-200 will disconnect the transmitter from the controller and connect it to the weather receiver. The relay provides a ground for the transmitter PTT line. Weather audio will be transmitted for the period of the alert announcement. A programmable alert timer provides back-up protection.

Weather Alert Log

As alerts are received the WX-200 stores the date, time and type of alert in non- volatile memory. Storage space is provided for forty alerts. Use the RS-232 port and the WX-200 configuration program to down load the data. A print driver is also provided.

Alert Start Logic Output (J3-7)

An ALERT START output provides a TTL logic high two second pulse when a weather alert is received. This output can be used to set off an external alarm or trigger the controller to execute a macro or load a "SEVERE WEATHER ALERT" memory save.

Alert Stop Logic Output (J3-6)

Included in the digital packet is the length of the severe weather alert. The WX-200 stores this information and generates a stop logic output when the time period has expired. An ALERT STOP output provides a TTL logic high for one second. This output can be used to trigger the controller to reload the "NORMAL" memory save.

Weather Enable Input (J3-9)

When this input is grounded the weather receiver will activate. When connected to a controller's user function output switch, weather reports on demand are available.

Weather Disable Input (J3-4)

When this input is grounded the WX-200 will not respond to weather alerts issued by the NOAA weather station. Once a "Sky Warn Net" is activated, it may be desirable to stop any additional alerts. When this input is momentary grounded, the WX-200 will reset, canceling an alert.

Alert Message Timer Selection

At the conclusion of an alert message the weather station send a digital termination packet. The WX-200 decodes this packet and turns the transmitter off. If the weather station fails to send the termination packet the alert message timer will take over. Select this time with the WX-200 configuration program.

Specifications

Available NOAA Channels:	162.400 MHz, 162.425 MHz, 162.450 MHz, 162.475 MHz 162.500 MHz, 162.525 MHz, 162.550 MHz
Sensitivity Receive:	0.5 microvolts for 20 dB quieting
Sensitivity Decoder:	1.0 microvolts for 95% decoder accuracy
Image Rejection:	-55dB
I.F. Rejection:	-60dB
Modulation:	Narrow Band FM, 5KHz Deviation
Antenna:	50 Ohm, Type BNC Connector
L.O. Emissions:	Fully complaint with FCC Rules, Part 15
Relay Closure:	2 Form C (DPDT) by Digital Alert Packet
Power:	+12VDC @ 100 ma, DC Power Type 2.5mm
Dimensions:	1.75" H x 19" W x 5" D
Operating Temperature:	-15 to +55 C

FCC Part 15 RF Interference

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

User changes or modifications to the WX-200 not expressly approved by Computer Automation Technology could void the user's authority to operate the equipment.

FCC Part 97.113.e Prohibited transmissions.

No station shall retransmit programs or signals emanating from any type of radio station other than an amateur station, except propagation and weather forecast information intended for use by the general public and originated from United States Government stations.

Chapter 2 - Interfacing to Repeater

CAT-1000 Controller Interface

Connect the WX-200 to the CAT-1000B and the repeater as shown in Figure 2-1A. PTT and transmit audio from the CAT-1000B are connected to the repeater's transmitter through the normally closed contacts of the double pole double throw relay located in the WX-200. Set the power switch to on, the WX-200 will announce the firmware version. When a weather alert is received, the relay will switch the weather alert audio to the TX audio input and provide a PTT signal to key the transmitter.

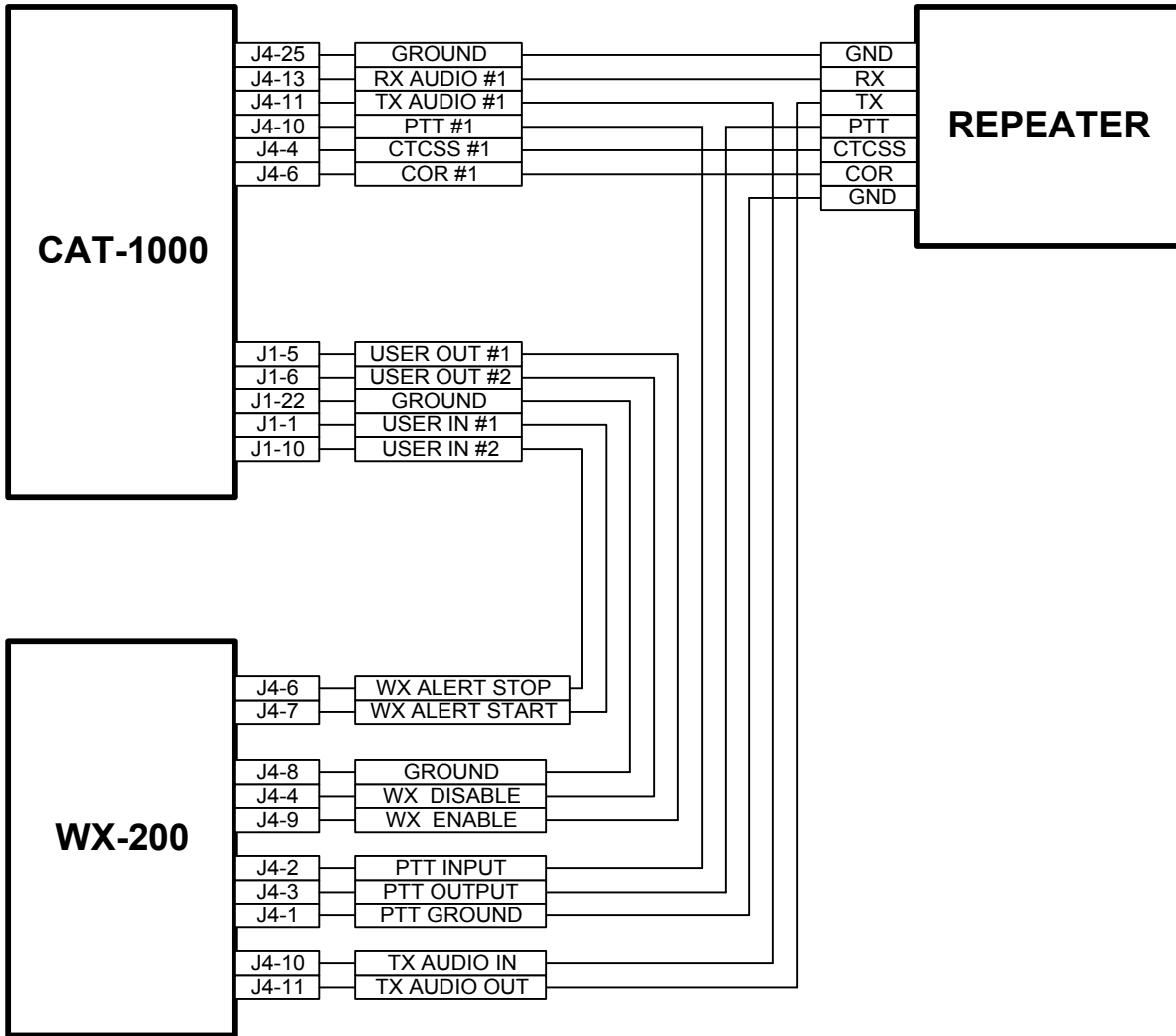


Figure 2-1A

Controller Interface

Connect the WX-200 to the controller and repeater as shown in Figure 2-1B. PTT and transmit audio from the controller are connected to the repeater's transmitter through the normally closed contacts of the double pole double throw relay located in the WX-200. Set the power switch to on, the WX-200 will announce the firmware version. When a weather alert is received, the relay will switch the weather alert audio to the TX audio input and provide a PTT signal to key the transmitter.

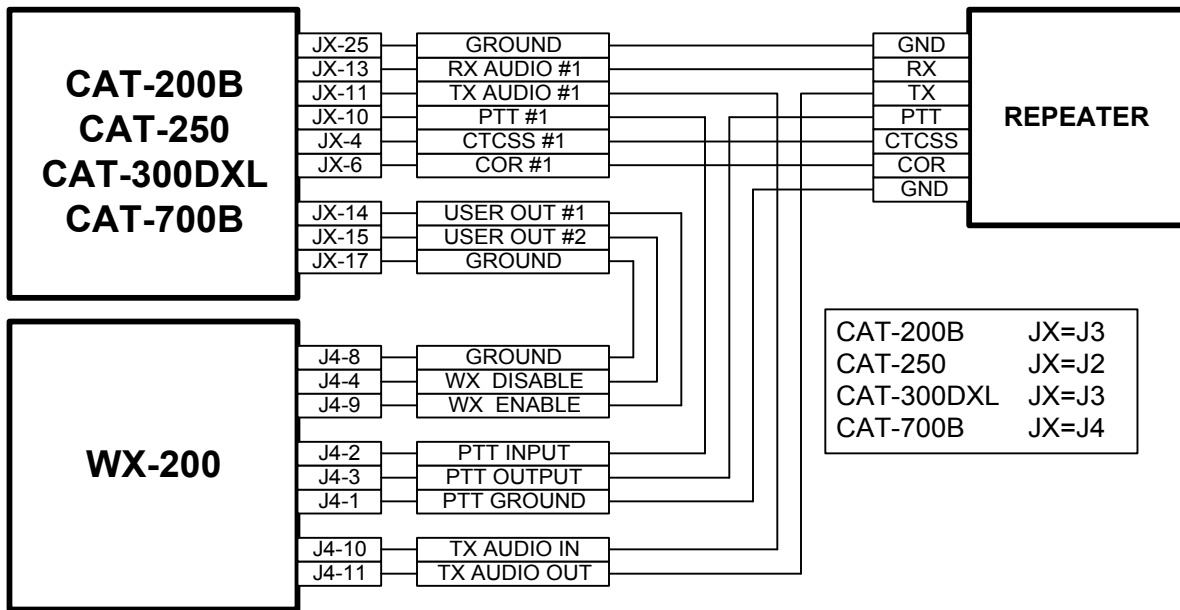


Figure 2-1B

The WX-200 receiver can be activated anytime, by turning on user function switch output #1 which grounds the WX ENABLE pin (J4-14) on the WX-200 receiver.

It may be desirable to stop additional alerts when a sky-warn net is activated. Turn on user function switch output #2. This grounds the WX DISABLE pin (J4-4) on the WX-200.

When a weather alert is received, the WX ALERT START OUTPUT (J4-7) will provide a one second positive DC voltage [TTL] level to be used to activate other equipment at the repeater site.

Included in the alert packet is the length of the alert. When the alert time has expired, the WX ALERT STOP OUTPUT (J4-6) will provide a one second positive DC voltage [TTL] level to be used to activate other equipment at the repeater site.

Headphone Interface J1

Plug a set of stereo headphones into J1 to monitor the NOAA weather station.

Computer Interface J2

Connect your computer's serial port to the WX-200 receiver at connector J1. Use Radio Shack shielded RS-232 cable (cat No. 26-117B) or equivalent. This cable is a DB-9 male to DB-9 female with pins 2-2 and 3-3.

12VDC Interface J3

Connect a 12VDC power supply to the WX-200 receiver through the 2.5mm power jack J2. The center pin is positive. In stand-by mode the WX-200 requires 100 ma.

Repeater Interface PTT Ground [J4-1]

Connect this pin to the transmitter chassis ground. This will insure that during an alert the PTT line will be returned to transmitter chassis ground.

Repeater Interface PTT Input [J4-2]

Connect this pin to the controller PTT output.

Repeater Interface PTT Output [J4-3]

Connect this pin to the transmitter PTT input.

Repeater Interface Weather Alert Disable Input [J4-4]

Connect this pin to a user function switch on the controller. When this input is grounded, the receiver will not respond to alerts issued by the weather station. NOTE: When this input is momentary grounded, the WX-200 will reset, canceling the alert.

Repeater Interface Weather Alert Stop Output [J4-6]

When a weather alert is received, embedded in the digital message is the length of the alert. When this time period has expired, this output will go active high (TTL) for one second.

Repeater Interface Weather Alert Start Output [J4-7]

When a weather alert is received, this output goes active high (TTL) for one second.

Repeater Interface Ground [J4-8]

Connect this pin to controller ground. This provides a common ground between the controller and WX-200 receiver.

Repeater Interface Weather Alert Enable Input [J4-9]

Connect this input to a user function switch on the controller. When this input is grounded, the weather receiver will activate.

Repeater Interface TX Audio Input [J4-10]

Connect this input to the controller transmit audio output.

Repeater Interface TX Audio Output [J4-11]

Connect this output to the repeater transmit audio input.

Antenna Interface J5

Connect a VHF antenna to the BNC connector J5. If the WX-200 is located in the fringe area of the NOAA transmitter an external antenna is recommended. Do not locate the antenna near any transmitting antennas.

WX-200 Controls

Test Switch [SW1]

Press [SW1] to initiate a test sequence of the logic functions of the WX-200. NOTE: This test does not verify the operation of the receiver or FSK decoder circuitry.

Read FIP Code Switch [SW2]

Press [SW2] to initiate a read back of the FIP codes programmed into the WX-200. Perform this test after the WX-200 has been programmed to verify the correct county codes have been entered into the WX-200 memory.

Monitor Switch [SW3]

Press [SW3] to activate the headphone audio. Press the switch a second time to deactivate headphone audio. NOTE: This switch does not activate the transmitter.

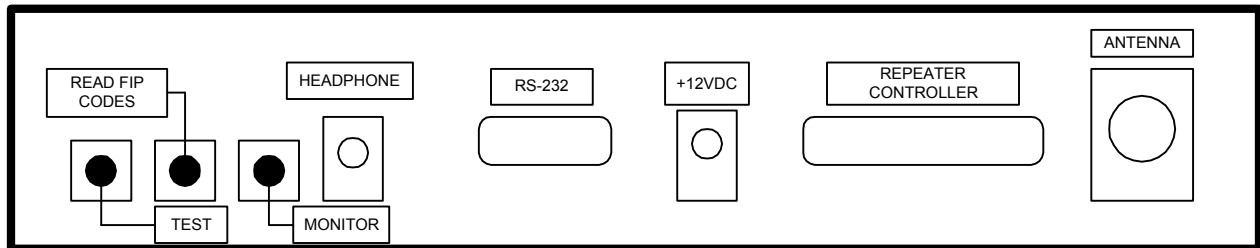


Figure 2-2

WX-200 Frequency Adjustments

The WX-200 is shipped with its frequency set to 162.550 MHz. To change to a different NOAA frequency, change the settings of dipswitch SW1.

SW1-1	SW1-2	SW1-3	FREQUENCY
OFF	OFF	OFF	162.400 MHz
ON	OFF	OFF	162.425 MHz
OFF	ON	OFF	162.450 MHz
ON	ON	OFF	162.475 MHz
OFF	OFF	ON	162.500 MHz
ON	OFF	ON	162.525 MHz
OFF	ON	ON	162.550 MHz

Figure 2-3

WX-200 Audio Adjustments

Transmit audio from the controller has a direct connection to the transmitter through the WX-200. There is no need to readjust transmitter deviation. Press the MONITOR switch [SW3] on the rear panel. Monitor the transmitter output. Adjust the LINE LEVEL audio control R25 for the desired level of NOAA weather station audio.

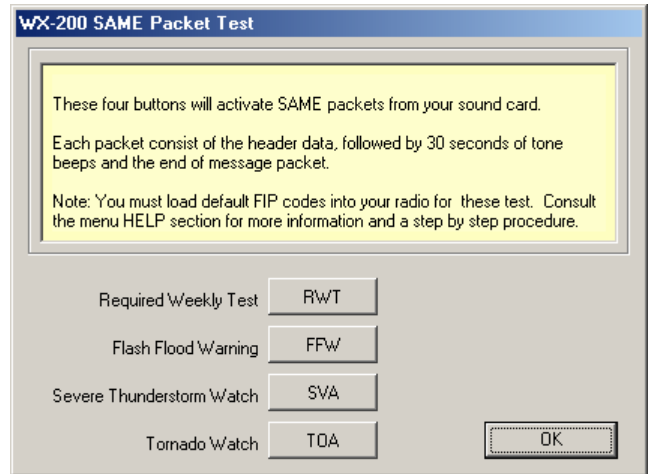
Press the FIP CODE switch [SW2]. The voice synthesizer will announce the selected FIP codes and voice the station ID if activated. Continue to press [SW2] as required until the VOC LEVEL audio control R24 is adjusted for the desired voice synthesizer level. The Headphone audio output has been factory set.

Play Test Packets

You can generate test packets with your computer's sound card to test the WX-200. NOTE: Insure that during the test sequence the sound card is not configured to apply "special effects" to the sound files.

Connect the output of the sound card to the modulation input of a RF signal generator. Set the frequency to 162.XXX MHz at 3KHz deviation. If a signal generator is not available connect a cable from the output of the sound card to WX-200 at TP1.

Set dipswitch #4 to ON and cycle power to reset the WX-200 to default values. Return dipswitch #4 to the OFF position.



Start the WX-200 program, click on the "HELP" menu and select "Play Test Packets".

TEST	PREDEFINED DATE	PREDEFINED LENGTH
Required Weekly Test	July 31	15 Minutes
Flash Flood Warning	July 31	1 Hour
Severe Thunderstorm Watch	July 31	1 Hour
Tornado Watch	July 31	1 Hour

Figure 2-4

NOTE: After completion of the test remember to upload your local parameters and codes.

Federal Information Processing Codes

From the WX-200 Digital Weather Receiver window click the [U.S. FLAG] button to display the [WX-200 FIPS Codes] window. Click the [SELECT STATE / TRANSMITTER CITY] button to display the [WX-200 STATE / TRANSMITTER LOCATION] window.

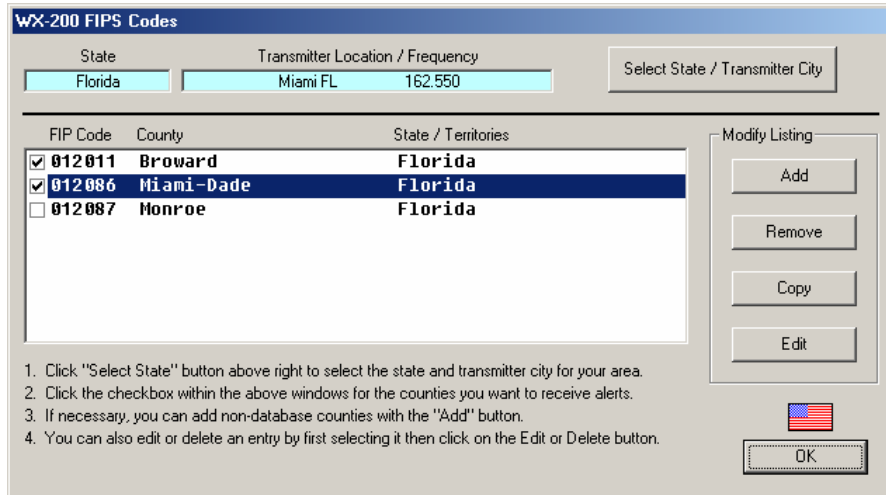


Figure 3-3

WX-200 State / Transmitter Entry

Select the state and frequency from the drop down boxes. Select the transmitter location and Click [OK].

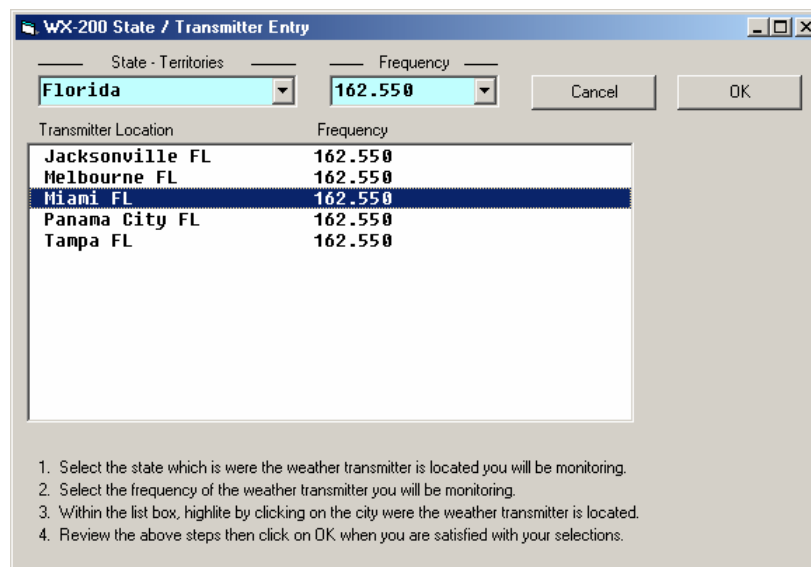


Figure 3-4

The WX-200 FIPS Codes window will display the counties serviced by the selected transmitter. Select the desired county or counties by checking the boxes along the left column. Up to 24 counties can be selected. When the selections are complete, click [OK] to return to the WX-200 FIPS Code window.

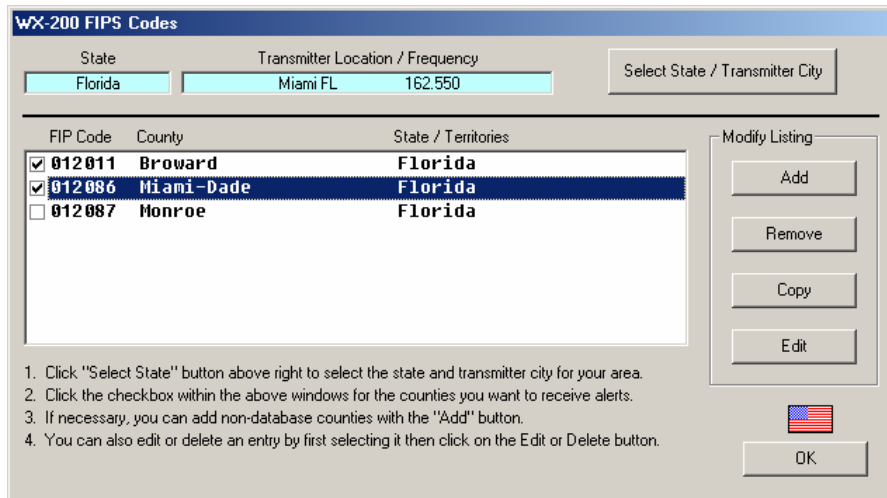


Figure 3-5

FIPS Code Editor

The WX-200 editor program includes an all states database derived from the database of the NOAA weather service at www.noaa.org. As changes are made by the weather service the all states data file for the WX-200 editor is up-dated and available on the computer automation web site at www.catauto.com. The WX-200 FIPS Editor window permits the addition of codes that do not appear on the current published lists. See Figure 3-6.

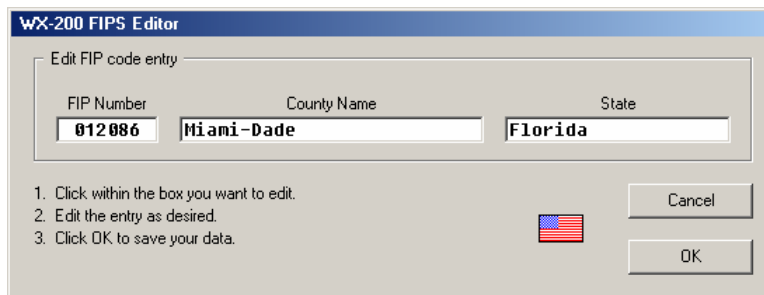


Figure 3-6

WX-200 Event Codes

Click the [STORM CLOUD] button to display the [WX-200 EVENT CODES] Window. Select up to twenty-four events by checking the box next to each event. When the selections are complete check OK.

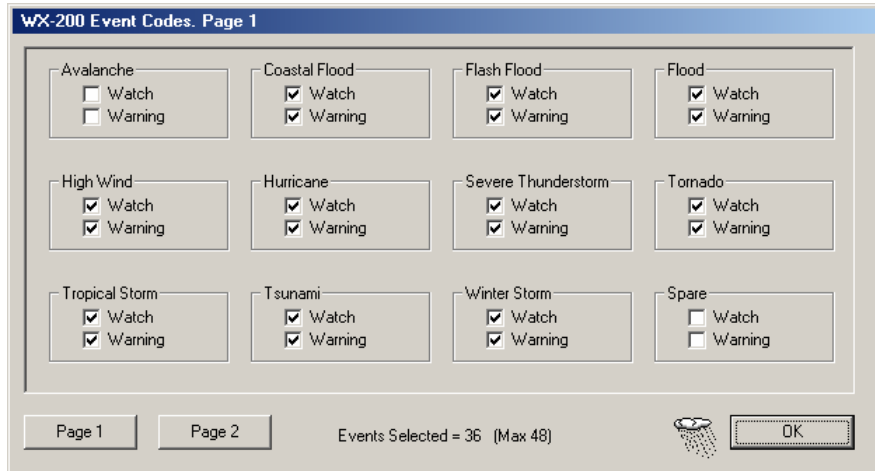


Figure 3-7

WX-200 Options Settings

Click the [TOOLS] button to display the [WX-200 OPTIONS SELECT] Window. Options include Accept all FIP Codes, Accept all Event Codes, and Ignore the Termination Data Packet (Use Line Time Out). Select the desired options and click [OK].

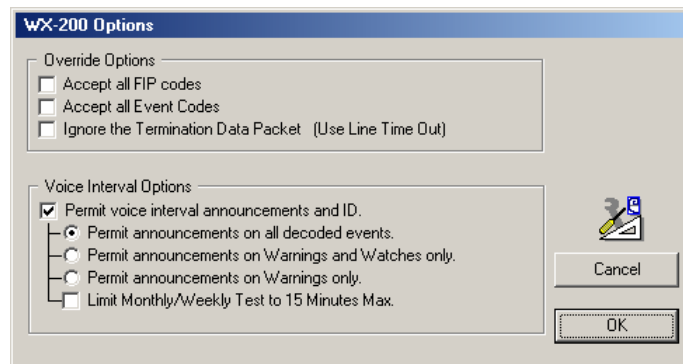


Figure 3-8

Override Options

If the accept all FIP and Event Codes boxes are checked, the WX-200 will respond to all alerts issued by the weather station. Operation is similar to a receiver with 1050Hz decoder only.

Voice Interval Options

When the alert message is finished the weather station sends a termination data packet. Upon receipt of this packet the WX-200 will turn off the speaker, line audio and repeater transmitter. The voice synthesizer will continue to announce the alert until the time period has expired. Select the desired voice alert options and click OK.

WX-200 Timer Settings

Click the [CLOCK] button to display the [WX-200 TIMER SELECT] Window. Timers include: Line Time-out, Pre Voice Delay Timer, Voice Interval Timer and Relay Activation Delay Timer. Select the desired times and click [OK].

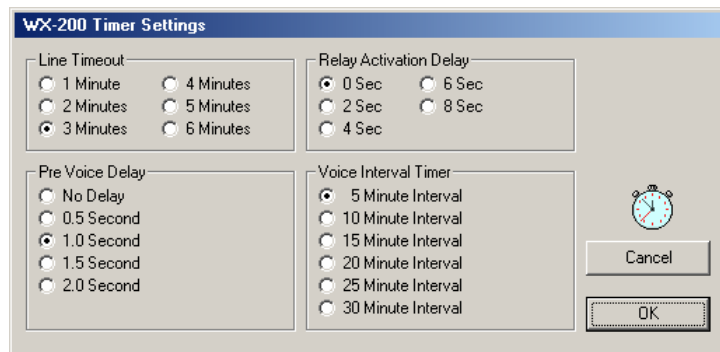


Figure 3-9

Line Time-out Option

This timer selects the time the line audio and PTT outputs are active when an alert message is sent by the weather station. A termination data packet is sent at the end of the alert message. Should the weather station fail to send the termination data packet this timer will limit the alert transmission time.

Pre Voice Delay

This timer selects the delay between activation of the control relay and when the voice synthesizer begins to speak.

Voice Interval Timer Option

Imbedded in the alert information packet is the time the warning or watch is in effect. The time is sent in fifteen-minute increments for the first hour and thirty minute increments for the remaining time of the alert. Once the alert message is finished, the red alert led on the front panel will continue to flash and the WX-200 voice synthesizer will periodically key-up the repeater transmitter and announce the nature of the alert. This timer sets the time between voice synthesizer announcements.

Relay Activation Delay

When the digital packet is decoded the relay disconnects the transmitter from the controller. If you want to use the features of your repeater's controller to send paging tones, alert tones or a custom voice message announcement this disconnect must be delayed. Use this feature to select the delay.

Test County FIP Codes

After a data transfer, press the FIP code switch. The voice synthesizer will read out the county FIP codes stored in memory. Example: The voice will say: "TEST FIP CODES 013067 013089 013121." The voice synthesizer will also announce the station ID if programmed and enabled.

Reset WX-200 Memory

Remove +12VDC power from the WX-200 receiver. Set dipswitch #4 to the ON position. The WX-200 will reset and the voice synthesizer will say: "WX-200 VERSION 1.00 RESET DATA LOAD COMPLETE". Set dipswitch #4 to the OFF position.

Print History

To print the alert history, click the [PRINT HISTORY] button.

Chapter 4 - Drawings

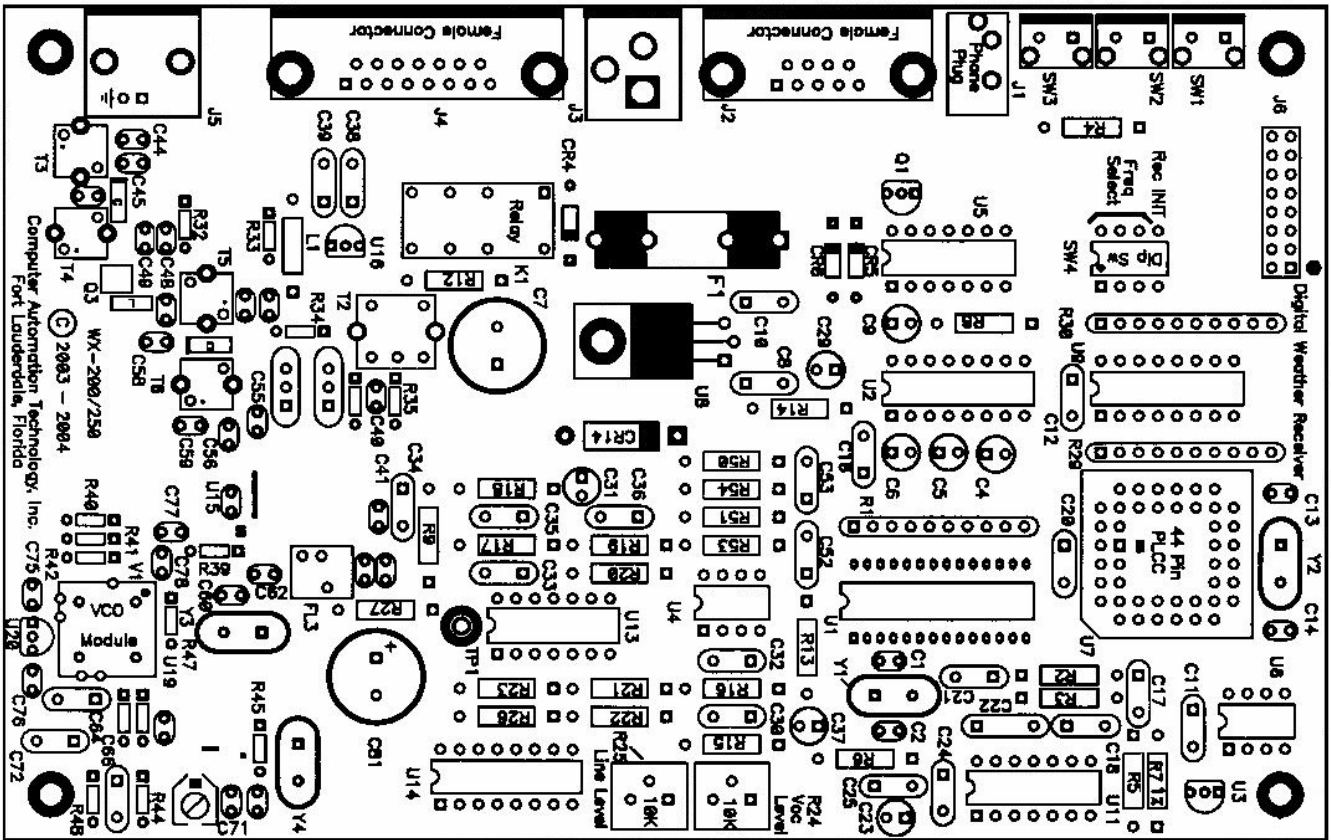


Figure 4-1

Chapter 5 - Schematics

WX-200 Schematic

Sheet 1 of 3

WX-200 Schematic

Sheet 2 of 3

WX-200 Schematic

Sheet 3 of 3

Chapter 6 - Part List

1	Bead Inductor	P9810	L3
1	Capacitor	470pf	C64
3	Capacitor	.001uf	C24,C32,C33
1	Capacitor	.0015uf	C66
1	Capacitor	.0047uf	C17
1	Capacitor	.0082uf	C21
3	Capacitor	.015uf	C30,C34,C35
1	Capacitor	.027uf Film Cap	C22
16	Capacitor	.1uf 50V	C8,C10,C11,C12,C16,C18,C20,C25 C36,C38,C39,C52,C53,C72,C79,C80
1	Capacitor	4.7uf 16V	C23
7	Capacitor	10uf 16V	C4,C5,C6,C9,C29,C31,C37
2	Capacitor	470uf 25V	C7,C81
2	Capacitor (SM)	0.5pf	C47,C57
4	Capacitor	10pf	C46,C54,C59,C69
1	Capacitor	15pf	C45
7	Capacitor	33pf	C1,C2,C13,C14,C56,C70,C77
2	Capacitor	47pf	C44,C62
2	Capacitor	150pf	C60,C78
1	Capacitor	470pf	C49
2	Capacitor	.001uf	C51,C75
3	Capacitor	.01uf	C48,C55,C58
8	Capacitor	.1uf	C40,C41,C42,C43,C50,C61,C63,C76
1	Capacitor (VAR)	.7-20pf	C71
1	Connector	9D (F)	J2
1	Connector	15D (F)	J4
1	Connector	DC Power	J3
1	Connector	Antenna	J5
1	Connector	Headphone	J1
1	Crystal	3.27MHz	Y1
1	Crystal	12MHz	Y2
1	Crystal	10.245 MHz	Y3

1	Crystal	16MHz	Y4
3	Diode	1N4148	CR4,CR5,CR6
1	Diode	1.5KE20A	CR14
2	Filter	10.7 MHz	FL1,FL2
1	Filter	455 KHz	FL3
1	Fuse	0.5 Amp	F1
1	Header	2X8	J6
1	I.C.	25C320	U6
1	I.C.	74HC14	U5
1	I.C.	74HC157	U9
1	I.C.	74HC4053	U14
2	I.C.	78L05	U16,U20
1	I.C.	LM340-T5.0	U8
1	I.C.	LM348M	U13
1	I.C.	LM1458M	U4
1	I.C.	MC13135	U15
1	I.C.	MC145170-2	U19
1	I.C.	MCP101	U3
1	I.C.	P89C51RD2	U7
1	I.C.	TC232CPE	U2
1	I.C.	TSP53C30AN2L	U1
1	I.C.	XR2211	U11
1	Inductor	100uh	L1
1	Relay	12V DPDT	K1
2	Resistor	1.0K	R4
3	Resistor	10K Network 10P	R1,R29,R30
2	Resistor	10K Var	R24,R25
1	Resistor	20.5K 1%	R7
3	Resistor	22K	R18,R19,R23
6	Resistor	10K	R9,R20,R22,R26,R53,R54
2	Resistor	18K	R15,R16
3	Resistor	47K	R21,R50,R51
1	Resistor	33K	R17
1	Resistor	68K	R2

4	Resistor	100	R8,R13,R14,R27
1	Resistor	100K	R3
1	Resistor	470K	R6
1	Resistor	510K	R5
1	Resistor	620	R12
1	Resistor	4.7K 1/8W	R39
5	Resistor	10K 1/8W	R36,R43,R44,R46,R48
1	Resistor	3.9K 1/8W	R34
1	Resistor	68K 1/8W	R35
3	Resistor	100 1/8W	R32,R33,R47
2	Resistor	150 1/8W	R40,R42
1	Resistor	39 1/8W	R41
1	Resistor	470K 1/8W	R45
1	Switch	4 Position Dip	SW4
3	Switch	Push Button	SW1,SW2,SW3
1	Test Point		TP1
5	Transformer	.065uh	T3,T4,T5,T6,T7
1	Transformer	Quad Coil	T2
1	Transistor	FET NE25139	Q3
1	Transistor	2N7000	Q1
1	Module	VCO Module	V1