WD-100
Digital Weather Decoder

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REVISED 02/05/04 (V1.00)

Chapter 1 - Introduction and Specifications

WD-100 Weather Receiver

The WD-100 is a digital decoder that 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 WD-100 will disconnect your repeater's 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 WD-100 stores the date, time and type of alert in non- volatile memory. Storage space is provided for ten alerts. Use the RS-232 port on the WD-100 to down load the data.

Weather Enable Input

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

When this input is grounded the WD-100 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.

Alert Start Logic Output

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

Included in the digital packet is the length of the severe weather alert. The WD-100 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.

Alert Message Timer Selection

At the conclusion of an alert message the weather station send a digital termination packet. The WD-100 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.

Specifications

Sensitivity Decoder:	0.05 to 0.5VAC for 95% decoder accuracy
Relay Closure:	2 Form C (DPDT) by Digital Alert Packet
Power:	+12VDC @ 100 ma, DC Power Type 2.5mm
Dimensions:	4.25" L x 3.0" W x 0.6" H
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.

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

WD-100 Repeater Interface

Connect a 162MHz receiver to the WD-100, controller and repeater. PTT and transmit audio from the controller are connected to the repeater's transmitter through the normally closed contacts of a double pole double throw relay located in the WD-100. 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.

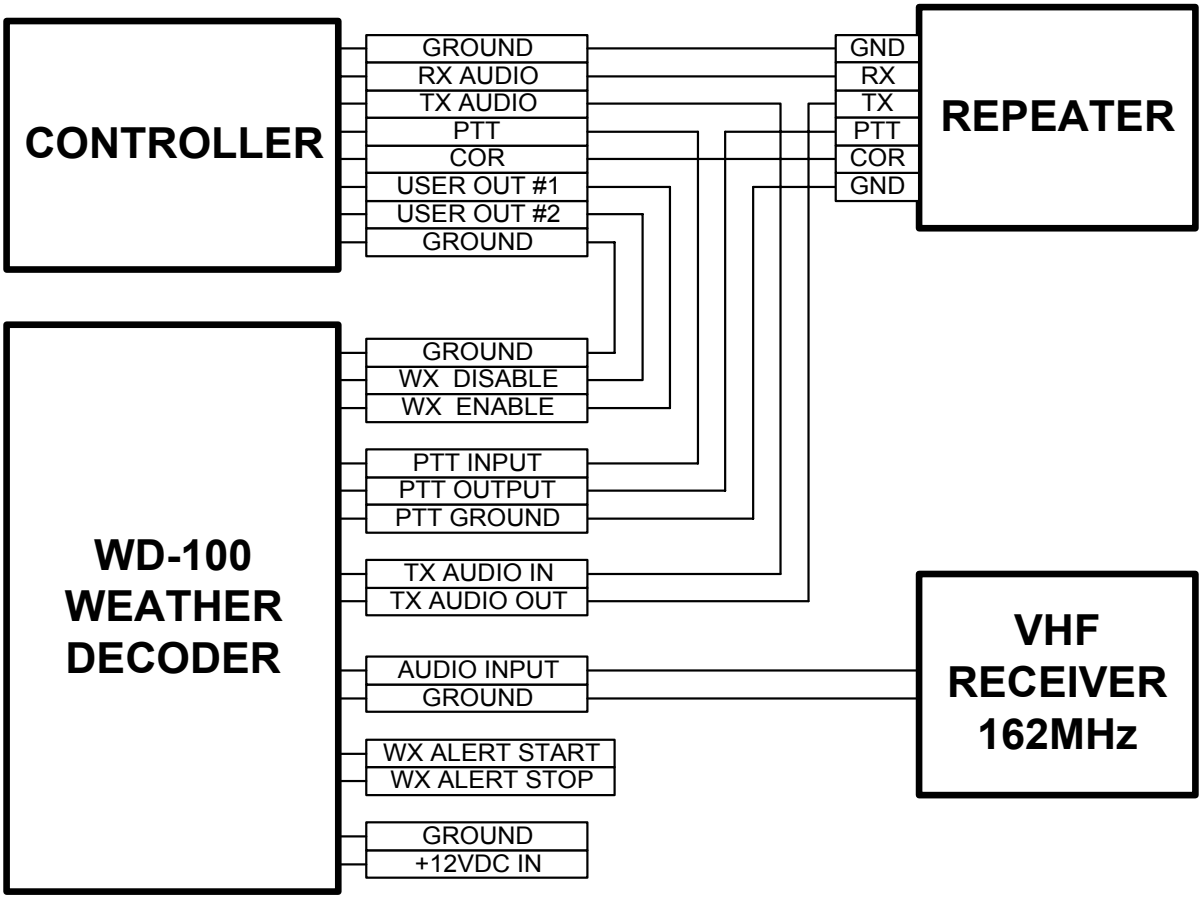


Figure 2-1

Repeater Interface PTT Ground [J1-1]
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 [J1-2]
Connect this pin to the controller PTT output.

Repeater Interface PTT Output [J1-3]
Connect this pin to the transmitter PTT input.

Repeater Interface Weather Alert Disable Input [J1-4]
It may be desirable to stop additional alerts when a skywarn net is activated. Connect this pin to a user function switch on the controller. When this input is grounded, the WD-100 will not respond to alerts issued by the weather station.

Weather Decoder Ground [J1-5]
Use this pin as an optional ground connection.

Weather Alert Stop [J1-6]
Included in the alert packet is the length of the alert. When the alert time has expired, the WX ALERT STOP OUTPUT (J1-6) will provide a one second positive DC voltage [TTL] level to be used to activate other equipment at the repeater site.

Weather Alert Start [J1-7]
When a weather alert is received, the WX ALERT START OUTPUT (J1-7) will provide a one second positive DC voltage [TTL] level to be used to activate other equipment at the repeater site.

Repeater Interface Ground [J1-8]
Connect this pin to controller ground. This provides a common ground between the controller and WD-100 decoder board.

Repeater Interface Weather Alert Enable Input [J1-9]
The weather receiver can be activated at anytime, by grounding the WX ENABLE pin. Connect this input to a user function switch on the controller. When this input is grounded, the WD-100 will activate.

Repeater Interface TX Audio Input [J1-10]
Connect this input to the controller transmit audio output.

Repeater Interface TX Audio Output [J1-11]
Connect this output to the repeater transmit audio input.

Alternate DC Power Input [J1-12]
J1-12 provides an alternate method of connecting a +12VDC power supply to the WD-100.

Alternate DC Power Ground [J1-13]
J1-13 provides an alternate method of connecting a +12VDC power supply ground to the WD-100.

Receiver Audio Input Ground [J1-14]
Connect the weather receiver's audio output ground to J1-14.

Receiver Audio Input [J1-15]
Connect the weather receiver audio output to J1-15.

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

Computer Interface J3
Connect your computer's serial port to the WD-100 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 to 2, 3 to 3 and 5 to 5.

WD-100 Controls

Test Switch [SW1]

Press [SW1] to initiate a test sequence of the logic functions of the WD-100. The WX Alert Start output will pulse. The relay will switch connecting the weather receiver audio to the TX Audio Output for thirty seconds followed by a WX Alert Stop output pulse. NOTE: This test does not verify the operation of the FSK decoder circuitry.

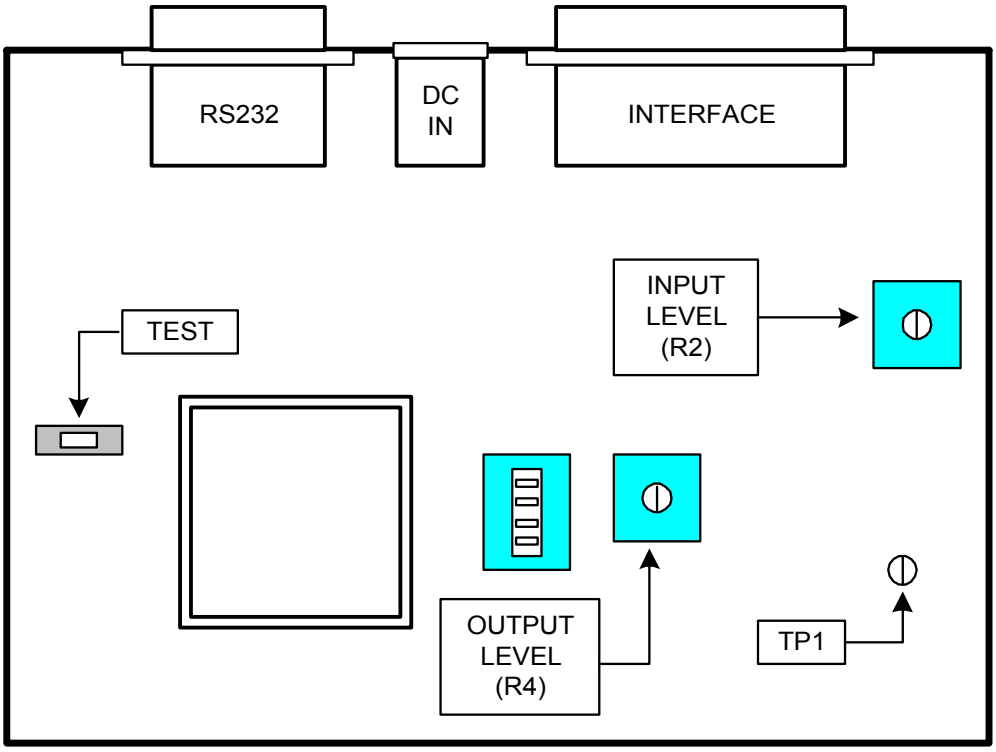


Figure 2-2

WD-100 Audio Adjustments

Transmit audio from the controller has a direct connection to the transmitter through the WD-100. There is no need to readjust transmitter deviation. Press the TEST switch [SW2]. Monitor the weather receiver audio input at TP1. Adjust R2 to assure a minimum of 100mVAC. Monitor the transmitter output. Adjust the OUTPUT LEVEL (R4) for the desired level of weather station audio.

Chapter 3 – WD-100 Programming

Command	Function
Dbaud	Display baud rate setting
Dbuffer	Display the raw data buffer
Devents	Display all stored event codes
Dfip	Display all
Dhistory	Display last 10 decoded events
Dmenu	Display menu of commands
Doptions	Display option settings
Drs232baud	Display the RS232 Baud Rate
Dtimers	Display timer settings
Dversion	Display firmware version
Eevent	Erase a event code
Eeventall	Erase all event codes
Efip	Erase a FIP code
Efipall	Erase all FIP codes
Sbaud	Set baud rate to 1=1200, 2=2400, 3=4800, 4=9600
Soptions	Set options
Srelaytime	Set the relay delay time
Srs232baud	Set the baud rate
Srs232options	Set options for the data packet
Stimeout	Set the timeout timer
Wevent	Write an event code
Wfip	Write a FIP code
Exit	Save data and exit Programming Mode

WD-100 Setup

Connect your computer's COMM port to the J3 connector of the WD-100. From the windows start open hyperterminal. Configure hyper terminal for the proper COM port and set the baud rate for 9600 8N1. Press the ENTER key to display the WD-100 menu of commands.

Federal Information Processing System Codes

The National Weather Service divides the United States into states and counties. Each county is assigned a six digit county code. For example, the code for Broward county Florida is 012099. The first digit in the code [0] identifies the county subdivision, the next two digits [12] identify the state FLORIDA and the last three digits [099]identify the county BROWARD.

WD-100 FIPS Codes

Use the [dfips] command to display a list of selected county codes. Use the [efips] command to erase selected county codes. Use the [wfips] command to write new county codes.

```
Command: dfips
    1-012099    7-          13-         19-
    2-012011    8-          14-         20-
    3-012025    9-          15-         21-
    4-012086   10-          16-         22-
    5-         11-          17-         23-
    6-         12-          18-         24-

Command:
```

WD-100 Event Codes

Use the [devents] command to display a list of selected event codes. Use the [event] command to erase selected event codes. Use the [wevent] command to write new event codes.

```
Command: devents
     1-CFA      9-SVA     17-         25-         33-         41-
     2-CFW     10-SVW     18-         26-         34-         42-
     3-FFA     11-TOA     19-         27-         35-         43-
     4-FFW     12-TOR     20-         28-         36-         44-
     5-FLA     13-RMT     21-         29-         37-         45-
     6-FLW     14-RWT     22-         30-         38-         46-
     7-HUA     15-SMW     23-         31-         39-         47-
     8-HUW     16-SVR     24-         32-         40-         48-
```

WD-100 Options Settings

Use the [doptions] command to display a list of options. Use the [event] command to erase selected event codes. Use the [wevent] command to write new event codes.

```
Command: doptions

N  Accept all FIP codes
N  Accept all Event codes
N  Ignore the termination data packet (Use timeout timer)
N  Send data packet out RS232 port


Command:
```

WD-100 Timer Settings

Time-out Timer

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.

Relay Timer

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.

```
Command: dtimers

    Timeout timer = 4 minutes
      Relay timer = 0 seconds

Command:
```

Reset WD-100 Memory

Remove +12VDC power from the WD-100 receiver. Set dipswitch #4 to the ON position and apply DC power. The WD-100 will reset loading default codes for South Florida. Set dipswitch #4 to the OFF position.

EAS Event (NWR-SAME) Codes

WEATHER RELATED EVENTS	CODE	NON-WEATHER RELATED EVENTS	CODE
BLIZZARD WARNING	BZW	EMERGENCY ACTION NOTIFICATION	EAN
COASTAL FLOOD WATCH	CFA	EMERGENCY ACTION TERMINATION	EAT
COASTAL FLOOD WARNING	CFW	NATIONAL INFORMATION CENTER	NIC
DUST STORM WARNING	DSW		
FLASH FLOOD WATCH	FFA	**STATE AND LOCAL CODES**	
FLASH FLOOD WARNING	FFW	AVALANCHE WATCH	AVA
FLASH FLOOF STATEMENT	FFS	AVALANCHE WARNING	AVW
FLOOF WATCH	FLA	CHILD ABDUCTION EMERGENCY	CAE
FLOOD WARNING	FLW	CIVIL DANGER WARNING	CDW
FLOOD STATEMENT	FLS	CIVIL EMERGENCY MESSAGE	CEM
HIGH WIND WATCH	HWA	EARTHQUAKE WARNING	EWQ
HIGH WIND WARNING	HWW	EVACUATION IMMEDIATE	EVI
HURRICANE WATCH	HUA	FIRE WARNING	FRW
HURRICANE WARNING	HUW	HAZARDOUS MATERIAL WARNING	HMW
HURRICAN STATEMENT	HLS	LAW ENFORCEMENT WARNING	LEW
SEVERE THUNDERSTORM WATCH	SVA	LOCAL AREA EMERGENCY	LAE
SEVERE THUNDERSTORM WARNING	SVR	911 TELEPHONE OUTAGE EMERGENCY	TOE
SEVERE WEATHER STATEMENT	SVS	NUCLEAR POWER PLANT WARNING	NUW
SPECIAL MARINE WARNING	SMW	RADIOLOGICAL HAZARD WARNING	RHW
SPECIAL WEATHER STATEMENT	SPS	SHELTER IN PLACE WARNING	SPW
TORNADO WATCH	TOA	VOLCANO WARNING	VOW
TORNADO WARNING	TOR	**ADMINISTRATION EVENTS**	
TROPICAL STORM WATCH	TRA	ADMINISTRATIVE MESSAGE	ADR
TROPICAL STORM WARNING	TRW	NATIONAL PERIODIC TEST	NPT
TSUNAMI WATCH	TSA	NETWORK MESSAGE NOTIFICATION	NMN
TSUNAMI WARNING	TSW	PRACTICE DEMO WARNING	DMO
WINTER STORM WATCH	WSA	REQUIRED MONTHLY TEST	RMT
WINTER STORM WARNING	WSW	REQUIRED WEEKLY TEST	RWT

Chapter 4 - Drawings

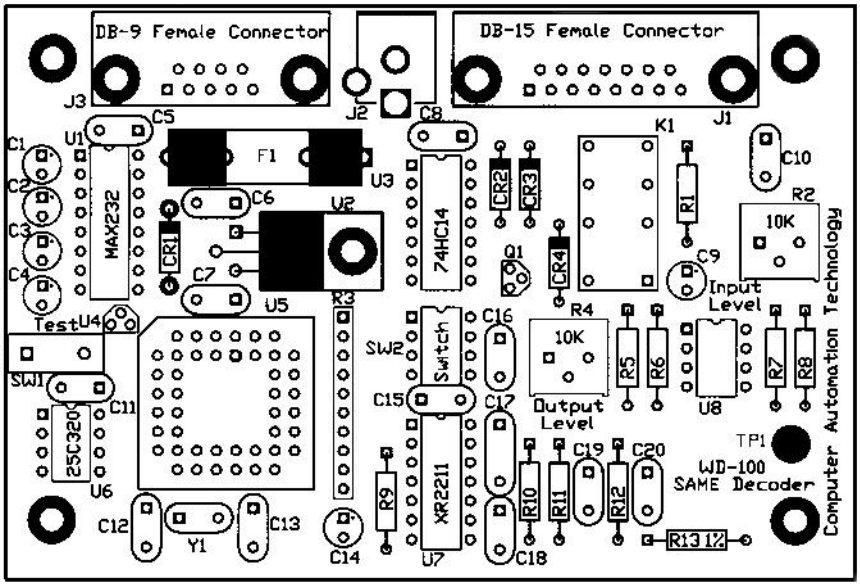
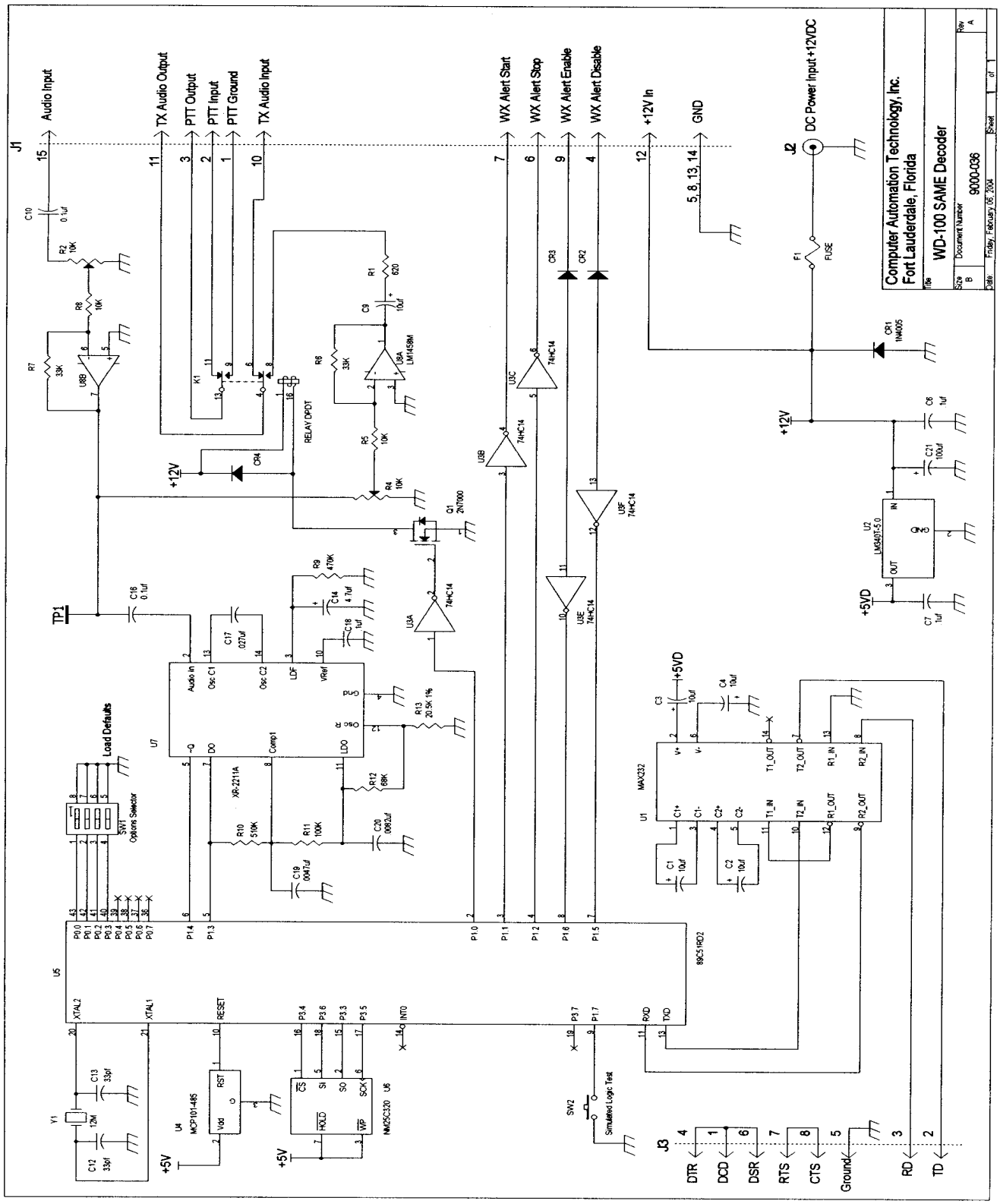


Figure 4-1

Chapter 5 - Schematics

WD-100 Schematic Sheet 1 of 1


Computer Automation Technology, Inc.
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WD-100 SAME Decoder
9000-036
Audio Input
TX Audio Output
PTT Output
PTT Input
PTT Ground
TX Audio Input
WX Alert Start
WX Alert Stop
WX Alert Enable
WX Alert Disable
+12V In
GND
DC Power Input +12VDC
Load Defaults
Options Selector
RELAY DPDT
Simulated Logic Test
DTR
DCD
DSR
RTS
CTS
Ground
RD
TD

Chapter 6 - Part List

2	Capacitor	33pf	C12,C13
1	Capacitor	.0047uf	C19
1	Capacitor	.0082uf	C20
1	Capacitor	.027uf Film Cap	C17
9	Capacitor	.1uf 50V	C5,C6,C7,C8,C10,C11,C15,C16,C18
1	Capacitor	4.7uf 16V	C14
5	Capacitor	10uf 16V	C1,C2,C3,C4,C9,C14
1	Connector	9D (F)	J3
1	Connector	15D (F)	J1
1	Connector	DC Power	J2
1	Crystal	12MHz	Y1
3	Diode	1N4148	CR2,CR3,CR4
1	Diode	1N4005	CR1
1	Fuse	0.5 Amp	F1
1	I.C.	25C320	U6
1	I.C.	74HC14	U3
1	I.C.	LM340-T5.0	U2
1	I.C.	LM1458M	U8
1	I.C.	MCP101-485	U4
1	I.C.	P89C51RD2	U5
1	I.C.	TC232CPE	U1
1	I.C.	XR2211	U7
1	Relay	12V DPDT	K1
1	Resistor	4.7K Network 10P	R1
2	Resistor	10K Variable	R4,R4
1	Resistor	20.5K 1%	R13
2	Resistor	10K	R5,R8
2	Resistor	33K	R6,R7
1	Resistor	68K	R12
1	Resistor	100K	R11
1	Resistor	470K	R9
1	Resistor	510K	R10
1	Resistor	620	R1
1	Switch	4 Position Dip	SW2
1	Switch	Push Button	SW1
1	Test Point		TP1
1	Transistor	2N7000	Q1