

WJ9J DTMF Controller

PIC Based DTMF Remote Controller

Version 2008-06-30

This manual

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Warranty

- 1 year from date of purchase against hardware failure or major bugs.
- Hardware failure includes any failure to components (except from lightning damage).
- Warranty does not give rights to any future feature enhancements.
- Shipping the product back is the customer's responsibility.
- Upgrades and customer firmware can also be purchased. Upgrades (to any future version) are \$10 + \$3 Shipping. Contact via email below to check for any enhancements in future versions.

WJ9J Repeater Group

For support email:

WJ9JRG@JUNO.COM

Specifications

Hardware Features

- Up to 8 Logical outputs capable of sinking 100 mA for controlling external relays
- LED Status Indicators are provided for each Logical output (Choice of Red or Green)
- LED Status Indicators are switchable for solar powered applications and stealth mode.
- The power is on/off switchable in case you are hardwired and need to power off without unwiring.
- LED Power Indication
- LED DTMF Digit Valid Indicator
- Screw Block Terminals or solder pads for all output connections
- Screw Block Terminals or coaxial plug / jack for power supply
- Screw Block Terminals or 1/8" audio jack for audio connection (plug not included)
- Power supply must be >7 and < 24 Volts. Current < 25 mA

Software Features

- All of the features can be programmed and changed via DTMF.
- All changes are saved to EEPROM and do not disappear during a power failure.
- A 2 digit password can be created and assigned as active.
- A 4 digit password can be created and assigned as active.
- Security can be turned on / off remotely. No reprogramming is required.
- Output #8 can be assigned to provide audio status messages.
- Output #7 can be assigned to provide PTT (push to talk) for transmitting those status messages.
- All outputs can be latched or pulsed.
- Multiple outputs can be changed in one DTMF sequence, with the change happening simultaneously.
- ON / OFF state can be remembered for same state as before on a power up or can be set to a specific state.
- CW identifier can be programmed with DTMF.
- CW identifier can be turned on or off.
- Outputs can be queried and their status read back. Additionally, the status of outputs can be read back when changed. A high tone means on and a low tone means off. The state of all outputs can be determined this way in about 3 seconds.
- The security password can be reset (via a back door) in case you forget the password. Note – this feature can be disabled upon ordering.

Introduction

This device will take audio from a receiver, telephone answering machine, etc; and decode the DTMF digits in a way that enabled you to remotely control electrical and electronic devices. Responsibility for an enclosure is up to the user.

This DTMF controller was derived from a device offered from www.foxdelta.com. Obviously, lots of features have been added (and some bugs removed) and the hardware has been changed a little. The PIC is a 16F628A instead of 16F84A. If you have one of their devices, it can be upgraded to these capabilities for a small fee.

Hooking it up

The power supply needs to be between 7 and 24 Volts. Use the diagram in this manual for reference. When using the coaxial plug, the positive connection is the center conductor.

The audio is not critical. A 1 K Ohm pot is used to set volume in case you have no other way to do that. It comes set to mid range by default. Clockwise increases the audio level and counterclockwise decreases the audio level to the DTMF decoder. An easy way to calibrate would be to turn down all the way and then send a digit and turn the level up about a little past the point when the digit valid LED comes on.

One of the first things you want to do is to set your 2 digit or 4 digit passwords. The default condition of these is "99" and "9999". But security is also off by default (meaning you need no password).

Operations

The outputs will pull to ground when on; therefore, you need to hook each external relay coil from your + supply (also available on the screw terminal block) to whatever output you want to control with it. Diagrams are presented later in this manual to help you through the process.

Output 8 **can** be assigned as an audio output. As such, it will always power up in an off condition. If you are driving a transmitter, use a capacitor to isolate (.01 uF). You may also have to add resistance (try 100 K) depending on the level required by your transmitter.

Output 7 **can** be assigned to use as a PTT line. As such, it pulls to ground when PTT should be active (as most transmitters require). It will PTT when there is a message to send on Output 8. No other output setting command affects it when it is assigned to use as a PTT line.

The pulse output command takes an existing off output and pulses it ON for .5 second and then turns it off. If the state were already ON, it would just turn it off.

Output Commands

Where (PW) is the optional password: none, 2 or 4 digits.

Where X is the output(s) you want on.

Note, on these commands, the command completion timer is set to 12 seconds, which means that is how much time you have to complete these commands. Upon timeout before, the command buffer is cleared and you can start again. Additionally, pressing a # early will also cancel the command.

DTMF to Turn Outputs ON

*** (PW) 1 X (s) #**

The 1 indicates you want the output(s) ON

Example: My Password is 88 and I want Outputs 6 and 3 on. I would enter

* 88 1 6 3 #

The action occurs on #

DTMF to Turn All Outputs ON

*** (PW) 1 0 #**

The action occurs on #

DTMF to Turn Outputs OFF

*** (PW) 0 X (s) #**

The 0 indicates you want the output(s) OFF

Example: My Password is 7542 and I want Outputs 1 and 8 OFF. I would enter

* 7542 0 1 8 #

The action occurs on #

DTMF to Turn All Outputs OFF

*** (PW) 0 0 #**

The action occurs on #

DTMF to Pulse Output ON

*** (PW) 2 X**

The 2 indicates you want to pulse an output

Example: I have security off (No password) and I want to pulse Output 2. I would enter

* 2 2

The action occurs on the output number itself

Configuration Commands

Output Status Readback

- * (PW)90 0 Turn OFF the output status (Default).
- * (PW)90 1 Turn ON the output status.
- * (PW) # Plays the current status without changing it.

Note: When turned on, this also automatically assigns Output 8 for this function.

The status is sent back in the state of audio tones. A high pitched tone means the state is high (ON), a low pitched tone means the state is low (OFF). The tones are sent sequentially; output 1, 2, etc. Only status for 1-7 is sent, because obviously, output 8 is being used to send the status (if enabled).

I used tones instead of CW in this design because:

1. It is easier to instantly recognize a state.
2. It is quicker.
3. Not everyone knows CW.
4. It is a better way to communicate state.

CW Identifier

- * (PW)91 0 Turn OFF the CW ID after the tone status back (Default) .
- * (PW)91 1 Turn ON the CW ID after the tone status back.
- * (PW)91 2 Plays the version build date in CW.

The CW identifier also plays through output 8. They will play without status if they are turned on. Status and CW are independent of each other. How to program the CW identifier is discussed later.

Security Password Enable

- * (PW)92 0 Disable the use of a Password (Default).
- * (PW)92 1 Enable the use of a Password.

Security Use 2 or 4 Digit Password

- * (PW)93 0 When password is enabled, uses the 2 digit password (Default).
- * (PW)93 1 When password is enabled, uses the 4 digit password.

Security Reset

- * 369888 disables the security.

Notes:

1. The “security disable” code only works if the security is enabled (password turned on).
2. This feature can be removed, but if it is, there is no way to make it do anything if the password is forgotten. The PIC chip would then have to be replaced.

Save Output State Automatically

* (PW)94 0 Disabled so power up will be in the state it was when the state was saved last. The save last occurred when a state was changed while enabled.

* (PW)94 1 Enabled so power up will be in the state it was in when power was removed. (Default)

Dedicate Output 7 to PTT

* (PW)95 0 Disabled – Output 7 used as a normal output. (Default)

* (PW)95 1 Enabled - Output 7 is dedicated to PTT, and will NOT be used as a normal output.

LED and OUTPUT test

* (PW)96 LED Test. Each LED is cycled through for .5 second.

Set Passwords

* (PW)97 XX Set the 2 Digit Password. By default, it is set to 99.

* (PW)98 XXXX Set the 4 Digit Password. By default, it is set to 9999.

Program CW Identifier

* (PW)99 # Program the CW ID using the table below.

The last character should be an End Of Message (EOM) character. You can program up to 50 characters. Example: To Program WJ9J / A * PW 99 32 19 09 19 38 10 37 #

DTMF	CW	Character	DTMF	CW	Character
00	0		20		K
01	1		21		L
02	2		22		M
03	3		23		N
04	4		24		O
05	5		25		P
06	6		26		Q
07	7		27		R
08	8		28		S
09	9		29		T
10	A		30		U
11	B		31		V
12	C		32		W
13	D		33		X
14	E		34		Y
15	F		35		Z
16	G		37		End of Message Character
17	H		38		/
18	I		39		Word Space
19	J				

Ordering

Please specify the following when ordering:

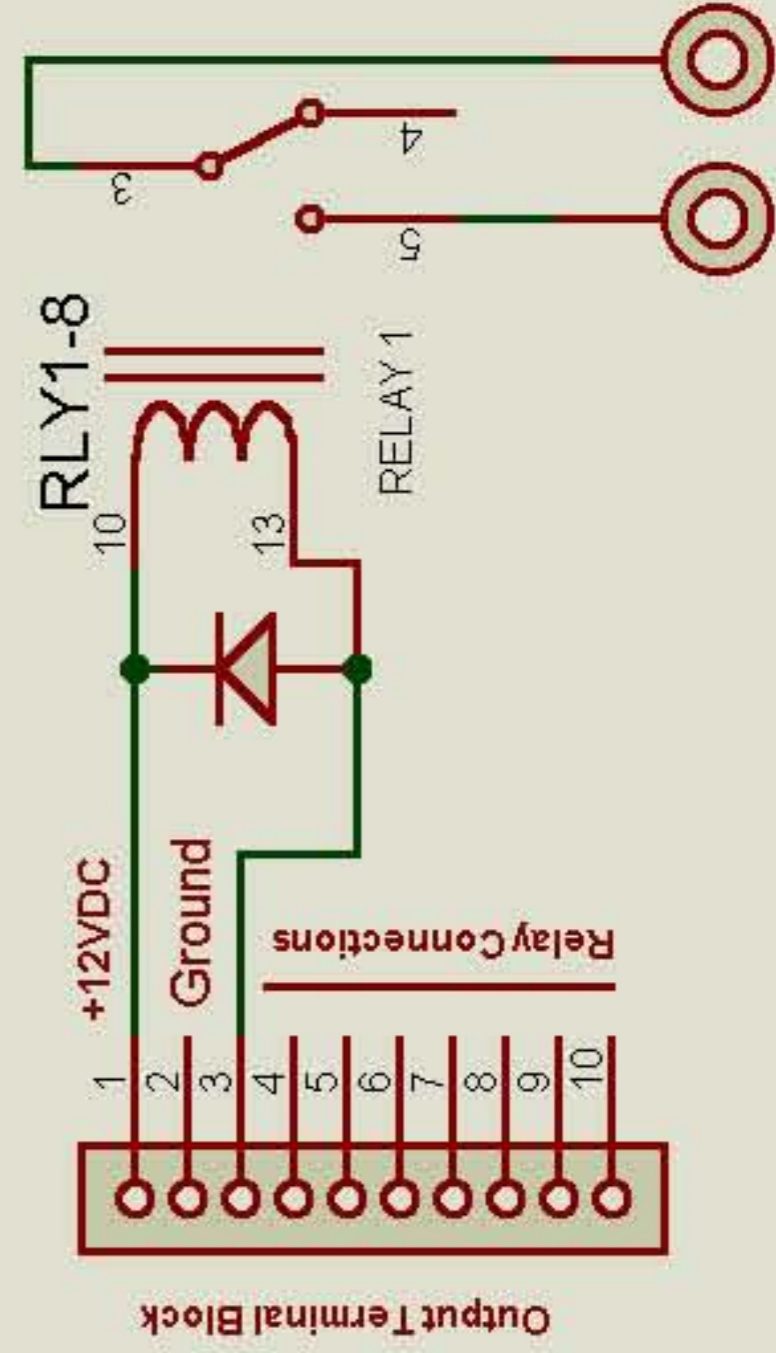
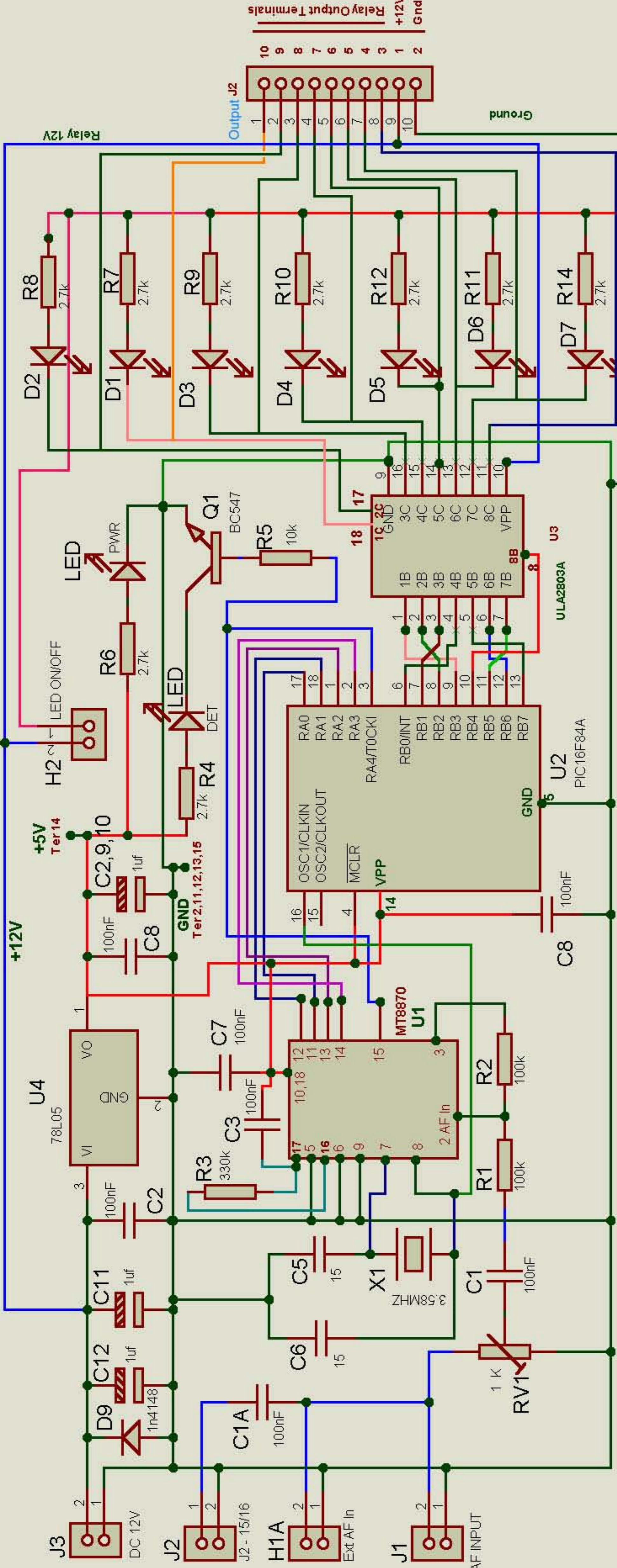
Color of LED's desired Red or Green (see pictures)

Whether or not you want the Security "back door" password enabled.

Also if you wish to just order the preprogrammed PIC chip, it is \$10 plus \$3 shipping.

Thanks,

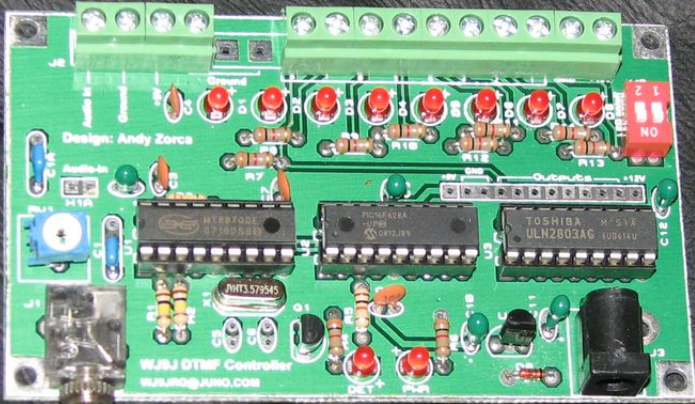
Andy
WJ9J



Notes: Output numbers do not correspond to screw term
 Output 1 is on Screw Terminal 10
 Output 2 is on Screw Terminal 9
 Output 3 is on Screw Terminal 8
 Output 4 is on Screw Terminal 7
 Output 5 is on Screw Terminal 6
 Output 6 is on Screw Terminal 5
 Output 7 is on Screw Terminal 4
 Output 8 is on Screw Terminal 3
 Ground is Screw Terminal 2
 +12V is Screw Terminal 1

WJ9J DTMF Controller

SAMPLE EXTERNAL CONNECTIONS



Design: Andy Zorca

Audio-In

H1A

AT89C01
H1A
0710D580

PIC16F628A
-UPB
0812J89

TOSHIBA M51A
ULN2803AG
SUD614V

WJ9J DTMF Controller
www.jro@juno.com

Audio In
Ground
+12V

Ground

DET

PSM

DET

PSM

DET

PSM

DET

PSM

DET

PSM

Outputs +12V

1
2
NO

1000µF
50V
MKT3.579545

DET

PSM

DET

PSM

DET

PSM

10k

100k

R7

R8

R9

R10

R11

R12

R13

100k

100k

R1

R2

R3

R4

R5

R6

R10

R11

R12

R13

100k

100k

R1

R2

R3

R4

R5

R6

R10

R11

R12

R13

100k

100k

R1

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R4

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R10

R11

R12

R13

100k

100k

R1

R2

R3

R4

R5

R6

R10

R11

R12

R13

C1

C2

C3

C4

1

2

NO

C1

C2

C3

C4

C5

1

2

NO

C1

C2

C3

C4

C5

J8

Audio In
Ground

Design: Andy Zorca

Audio In

H1A

WJBJ DTMF Controller
WJBJRD@JUNO.COM

Ground

R7

R8

R9

R10

R11

R12

R13

R14

R15

R16

R17

R18

R19

R20

R21

R22

R23

R24

R25

R26

R27

R28

R29

R30

R31

R32

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R298

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R301

R302

R303

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R305

R306

R307

R308

R309

R310

R311

R312

R313

R