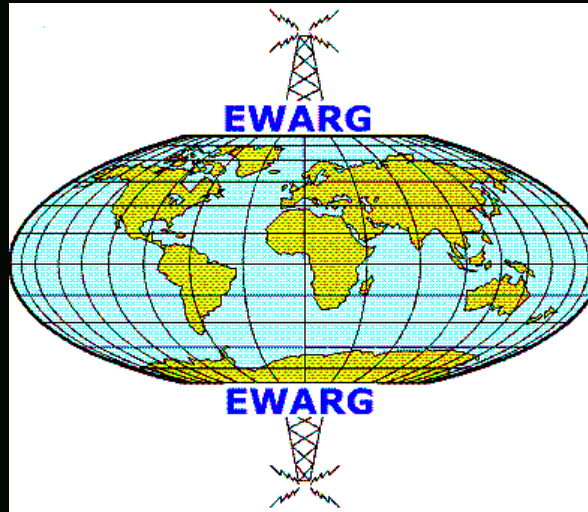


RTTY Introduction

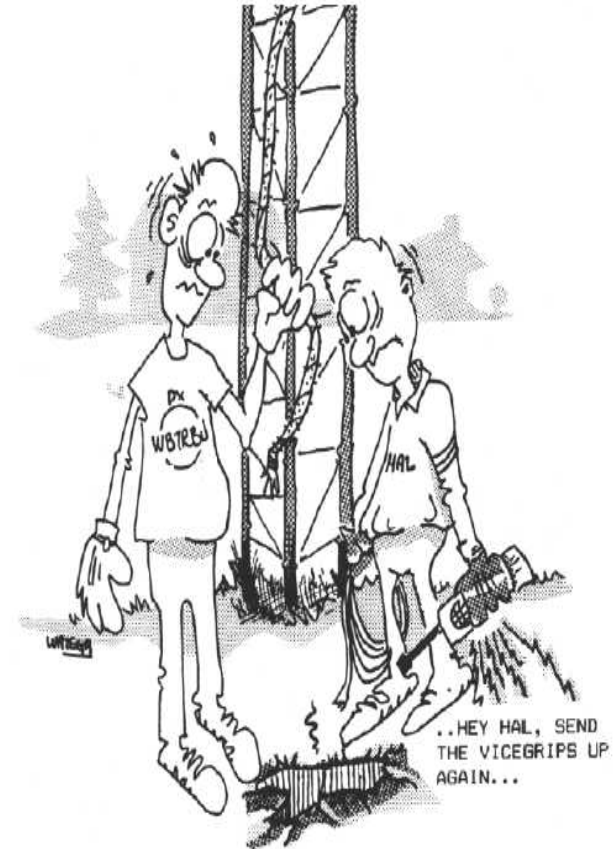
Spokane County ARES / RACES



Jay Townsend, WS7I July 2009

Good operators improve through planning, learning, working and practicing. They also have fun. Good RTTY Operators are made not born.

EWARG



RTTY Introduction

Outline of topics

Basics

Hardware

Interface

Dxing

Contesting

Classic RTTY Setup



WAØRMH -- Dec, 1971 Model 28-ASR TTY, Collins 75A4 rcvr, URA-8A T.U., Hallicrafters HT-37 transmitter (with VFO modified for FSK), homebrew amp, test equipment.

Modern RTTY Setup



Don, AA5AU New Orleans, LA

RTTY Basics

- Basic concepts and terms
 - RTTY Activity on the Bands
 - Mark and Space
 - AFSK and FSK
 - Letters and Figures
 - Tuning Aids

RTTY Activity on the Bands

- 10 : 28080-28100 KHz, during contests 28060-28150 KHz
- 15 : 21080-21100 KHz, during contests 21060-21150 KHz
- 20 : 14080-14100 KHz, during contests 14060-14140 KHz
- 40 : 7025-7050 and 7080-7100 KHz, contests 7025-7100 KHz
- 80 : 3580-3600 KHz, during contests 3570 (or lower)-3600 KHz
- 160 : 1.820-1.850, No RTTY contesting
- Avoid 14.100 plus minus 500 Hz.

Mark and Space

- RTTY transmission is a continuous carrier which shifts frequency between two distinct frequencies
 - The lower RF frequency is known as the SPACE
 - The upper RF frequency is known as the MARK
 - The difference between the two is known as the SHIFT
 - Mark 14090 KHz
 - Space 14089.830 KHz
 - Shift is 170 Hz
- Characters sent at 45 baud "LSMFT"

Mark and Space

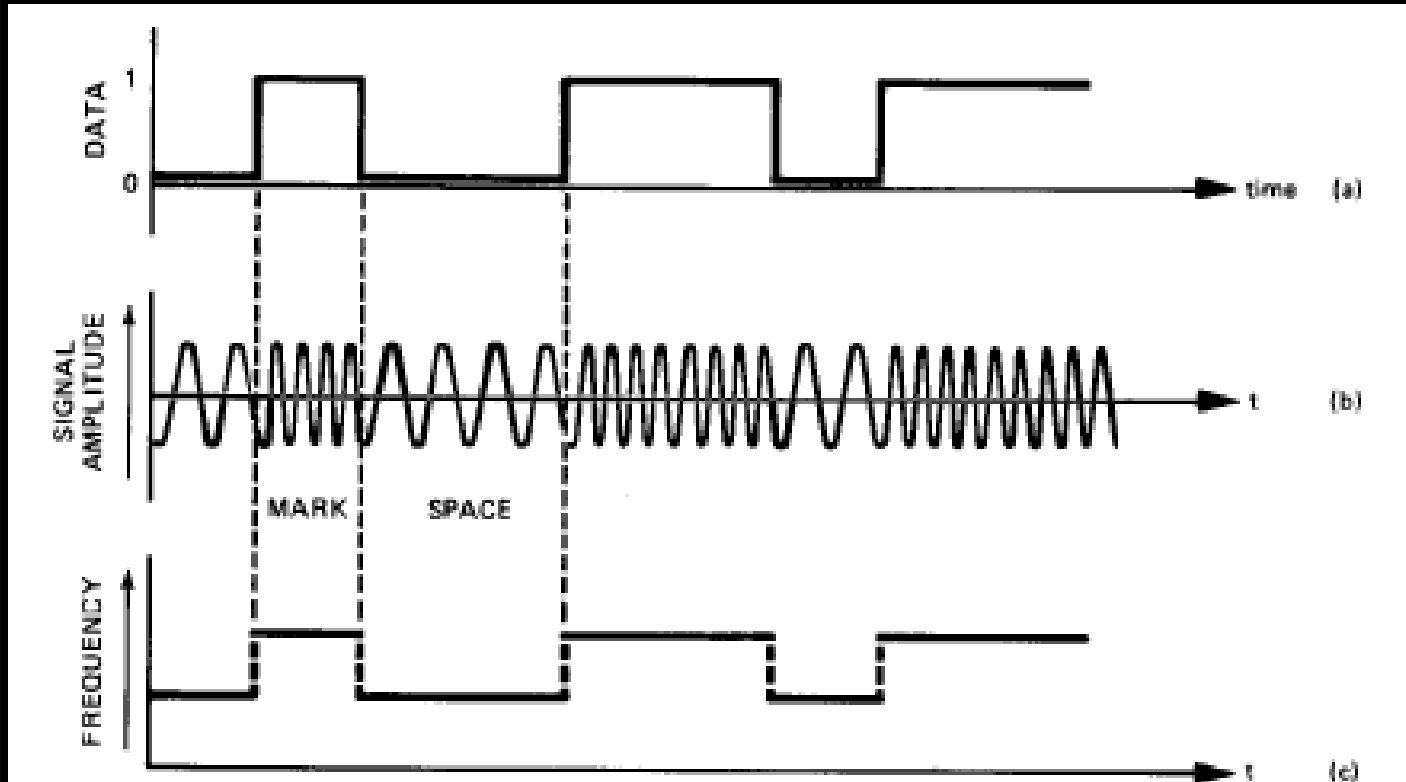


Figure 1. FSK modulation. Binary data (a) frequency modulates the carrier to produce the FSK signal (b) which has the frequency characteristic (c).

RTTY - Letters and Figures

- RTTY uses the 5-bit baudot code
 - 5 bits means only 32 characters can be represented
 - To get around this there are two “sets”, Letters and Figures
- Letters mode
 - “A” through “Z” (26 CAPITAL letters)
 - Ltrs shift, Figs shift, null, space, carriage return, line feed
- Figures mode
 - “0” through “9”, various punctuation (26 characters)
 - Ltrs shift, Figs shift, null, space, carriage return, line feed

RTTY Tip

- If numbers are sent in Letters mode you can translate
 - “TOO” is “599”, “PPQ” is “001” (note that “-” is “A”)
- In some programs a “right-click” will translate the word

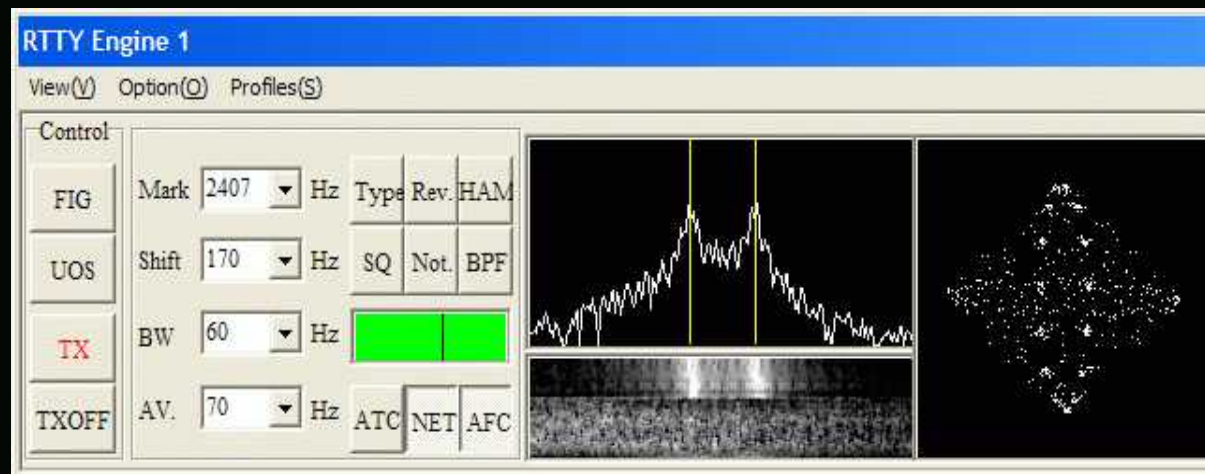


RTTY -Tuning Aids

- Accurate frequency tuning is important
 - Listen to the audio signal to help yourself tune
 - Listen to the audio to detect transmission starts and stops
 - Use FSK and a 500 Hz filter (when using AFSK some radios only allow you to use the wide SSB filters)
 - Initially, turn off distractions like AFC and NET in your software
- If you are having trouble tuning then let others come to you
- Many Xcvr's – you need to set radio menu setting “reverse” so that your RTTY signal is really “normal”

RTTY -Tuning Aids

- Visual indicators



RTTY - Macros

- Macros
 - CQ Call
 - CQ Exchange
 - CQ Close
 - S&P Call
 - S&P Exchange

CW/RTTY/SSB Memory Setup

| | | |
|---------|------------------------------|--|
| F2: | %RCQ RU DE AA5AU AA5AU CQ %E | Browse... |
| F3: | %R%C 599 LA LA %E | OK |
| F4: | %RTU DE AA5AU QRZ %O%E | Cancel |
| F5: | DE AA5AU AA5AU %E | Help |
| F6: | QRZ? DE AA5AU %E | <input checked="" type="radio"/> Normal keys |
| F7: | %RDE AA5AU %E | <input type="radio"/> Shifted keys |
| F8: | %R*P1 TU NOW %C 599 LA %E | <input type="radio"/> SSB |
| F9: | %B | <input type="radio"/> Shifted SSB |
| F10: | %RSTATE? %E | |
| F1&F11: | %RLA LA LA %E | |

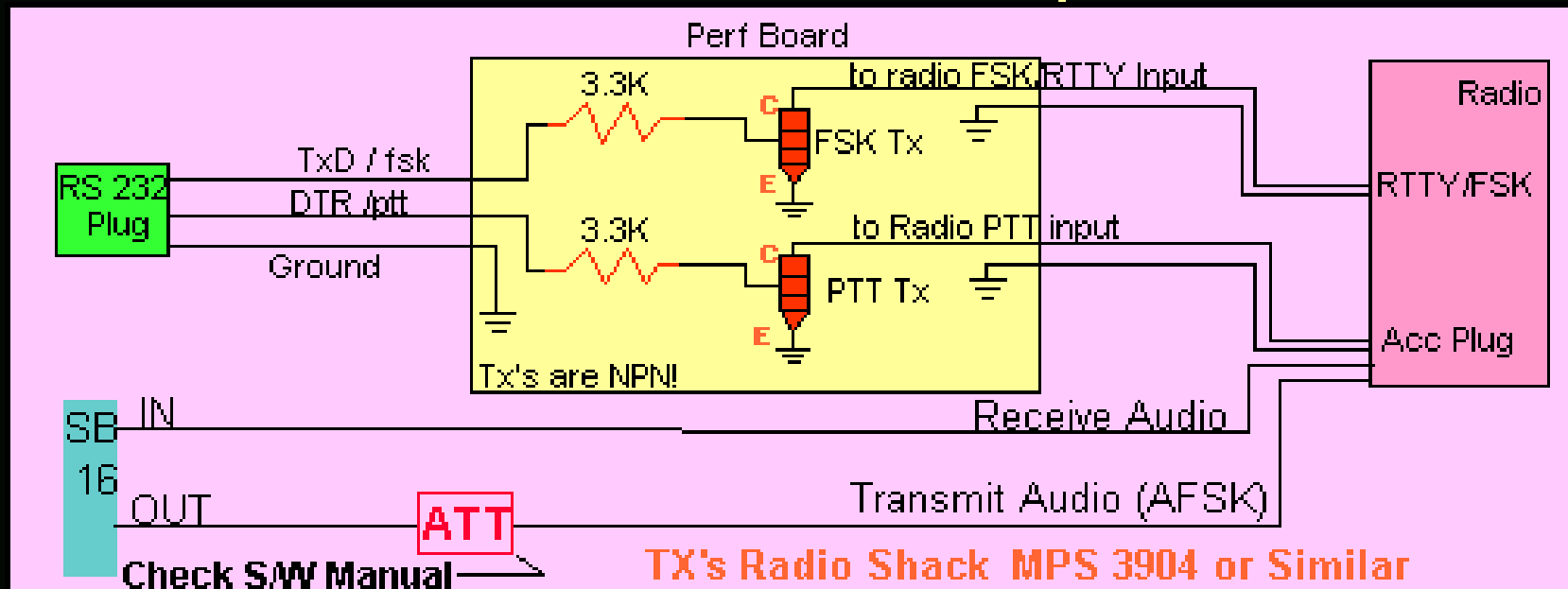
CW/RTTY/SSB Memory Setup

| | | |
|---------|-------------------------------------|---|
| F2: | | Browse... |
| F3: | %R%C 599 LA LA DE AA5AU %E | OK |
| F4: | | Cancel |
| F5: | DE AA5AU AA5AU AA5AU AA5AU AA5AU %E | Help |
| F6: | | <input type="radio"/> Normal keys |
| F7: | DE AA5AU AA5AU AA5AU %E | <input checked="" type="radio"/> Shifted keys |
| F8: | | <input type="radio"/> SSB |
| F9: | | <input type="radio"/> Shifted SSB |
| F10: | NR? NR? %E | |
| F1&F11: | STATE? %E | |

WriteLog Function Keys

RTTY Setup

Cable Schematic Example



- Isolation transformers to remove ground loops
- DTR/RTS for PTT could use opto-isolator

RTTY Setup

Potential Issues

- Transmit signal is reversed (upside down) from received signals
 - Solutions differ for AFSK and FSK
 - Adjust with rig menu command or software
 - See MMTTY help manual (troubleshooting section)
- Frequency offset
 - Frequency display does not match DX spots or frequency of the op you are working
 - Usually requires setting adjustment on rig or in logging software
- RTTY polarity
 - No common FSK input polarity standard by rig manufacturers across product lines
 - Adjust with rig menu command, interface, or software

RTTY Setup

Potential Issues

- TX signal problems with AFSK
 - RF, ground loops: isolation transformers
 - Turn OFF speech compression
 - Check sound card audio levels, mute unnecessary channels
 - Watch MIC gain, ALC
- Complex interactions among diverse system components
 - Make sure settings across all components are consistent
 - MMTTY
 - Logging software
 - Computer/soundcard
 - Interface

RTTY Introduction - Getting Started

- Depending on your station setup, experience with digital modes, and persistence, getting your hardware and software configured for RTTY operating can take anywhere from 15 minutes to infinity.
 - If you have trouble getting started, it may be worthwhile to take a step back and follow the sequence below
- Recommended sequence for getting started
 - Install and setup MMTTY on stand-alone basis (i.e. without contest logger such as Writelog or N1MM)
 - Get MMTTY receiving signals properly
 - If you have a complex computer interface (e.g. microHAM), it may be worthwhile to get MMTTY receiving properly with just a direct audio connection from radio to soundcard
 - Next step is to get MMTTY working properly on transmit
 - Some ops prefer to start with FSK but I prefer AFSK since I operated PSK-31 prior to RTTY
 - In either case, make sure that PTT is working properly
 - With AFSK, you can often use VOX initially to simplify the setup (make sure you attenuate the sound card signal if you use your radio's microphone input)

RTTY Operations

Software



Selecting the software is the first decision
There are three inter-dependant choices

An Operating System

A DIGITAL Decoder

A DX and/or Contest Logger

RTTY Introduction

Operating System

Best choice today

Windows XP Pro or Home Edition

Second best choice

Windows Vista

Last best choice

Windows 2000 or DOS

RTTY Introduction

DIGITAL Decoder

The most popular decoder -- Sound Card

MMTTY

JE3HHT (Makoto Mori)

Other soundcard decoders

MixW

UT1UZ & UU9JDR

Digital Master 780

HB9DRV (Ham Radio Deluxe)

HAL DXP38, PK232, KAM -- Hardware based

RTTY Introduction

[A DX and/or Contest Logger](#)

Top two choices

N1MM Logger

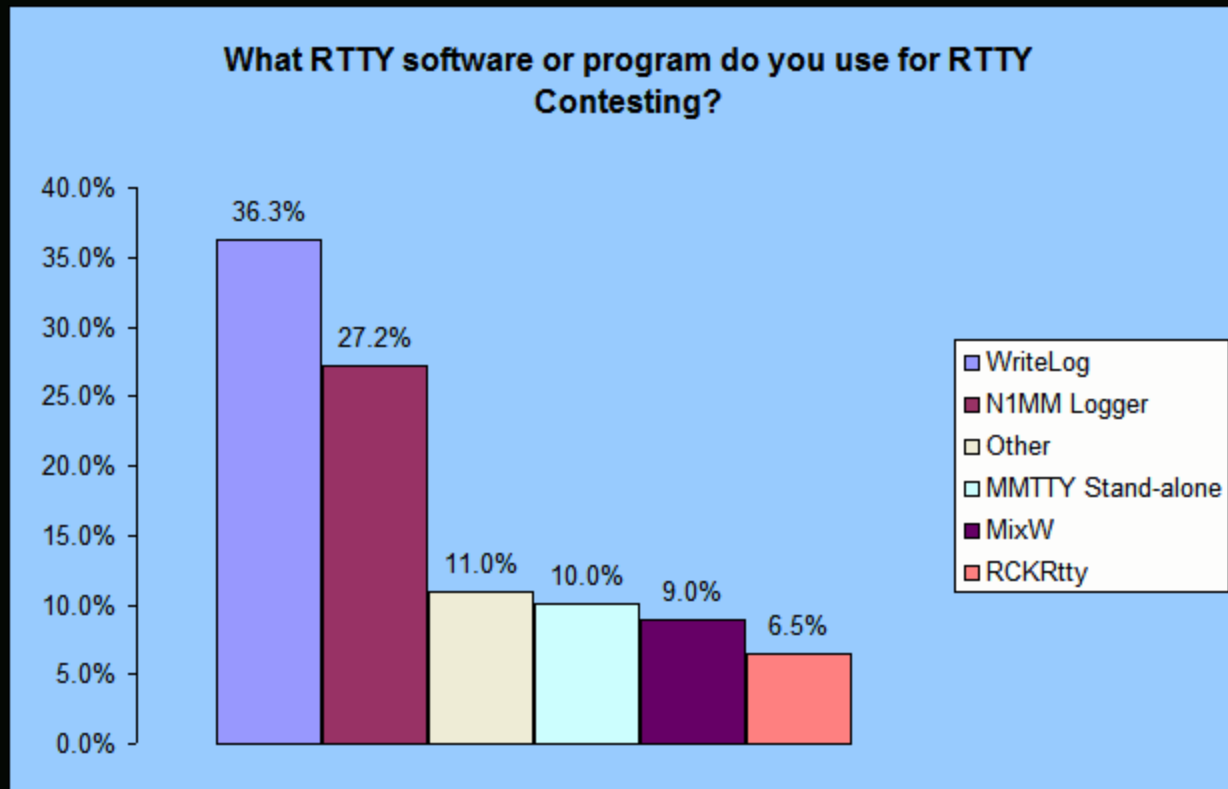
WriteLog

Casual Dxing

Ham Radio Deluxe (DM780)

MMTTY

RTTY Contesting & DXing



RTTY Introduction

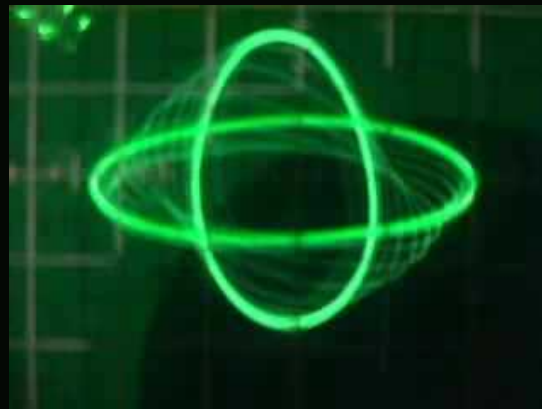
Hardware

PC system. Seems everyone has several computers in the ham shack these days.

Search on  or visit your local computer resellers!

RTTY Introduction

Digital Interface



FSK or AFSK ???

RTTY Introduction

Type of Interface



RTTY Introduction

Interface

FSK - pros

- Basic on/off keying, no TX adjustments required
- Simple single transistor keyer can be homebrewed
- Narrow CW filters are typically available in FSK mode
- Narrow filtering is a requisite for serious DIGITAL contesting

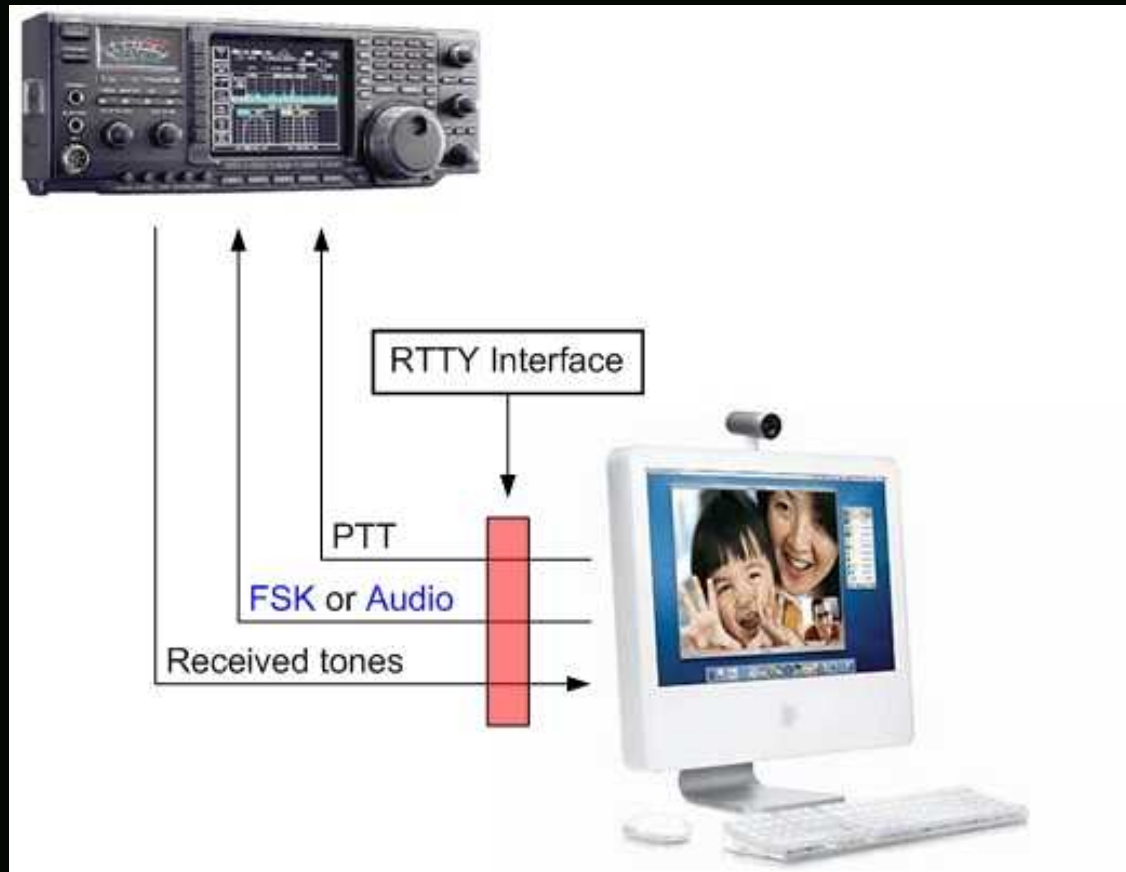
FSK - cons

- Not all transceivers have an FSK mode
- Does not support PSK31, SSTV, or some other modes
- Manufacturers have not standardized the keying polarity

RTTY Introduction

Interface

Connections



RTTY Introduction

Interface

AFSK - pros

- The PC soundcard generates two audio tones
- Provides DIGITAL mode for transceivers without FSK mode
- PSK31, SSTV and other modes are 'ready to go'
- Wideband receiving mode is possible (simultaneous RX)

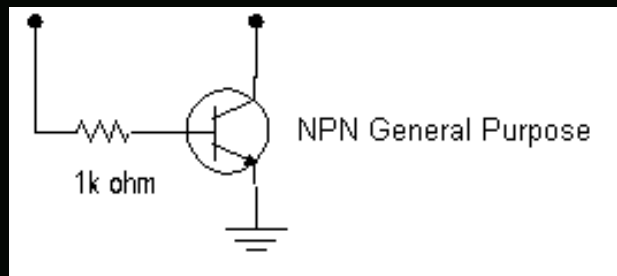
AFSK - cons

- Narrow filters might not be selectable in LSB mode
- Requires attention to details for a quality TX signal
- Windows and applications sounds can TX over the air

RTTY Introduction

Interface

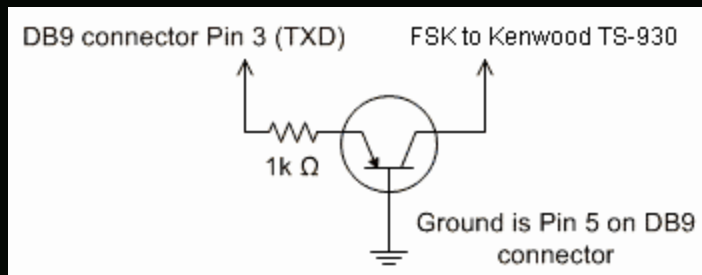
A simple homebrew FSK keyer for most transceivers.
Same circuit for PTT, CW, FSK. Pins 7, 4, 3, on DB9.



RTTY Introduction

Interface

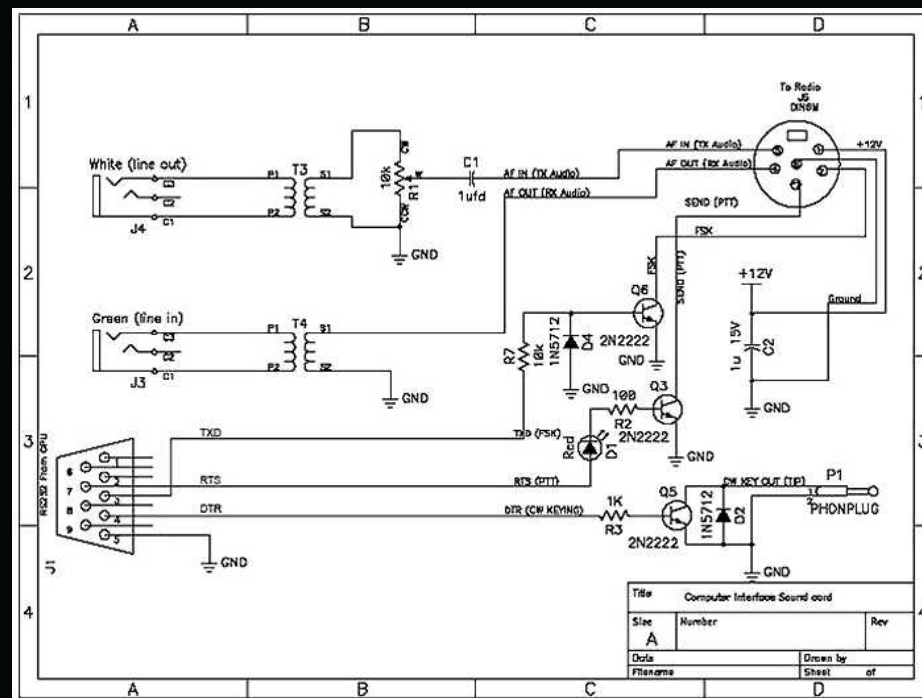
A simple homebrew FSK keyer for older transceivers



RTTY Introduction

Interface

A basic Serial homebrew FSK & PTT & CW keyer



RTTY Introduction

Interface

There are many commercial interfaces with many options

Buxcomm – Rascal

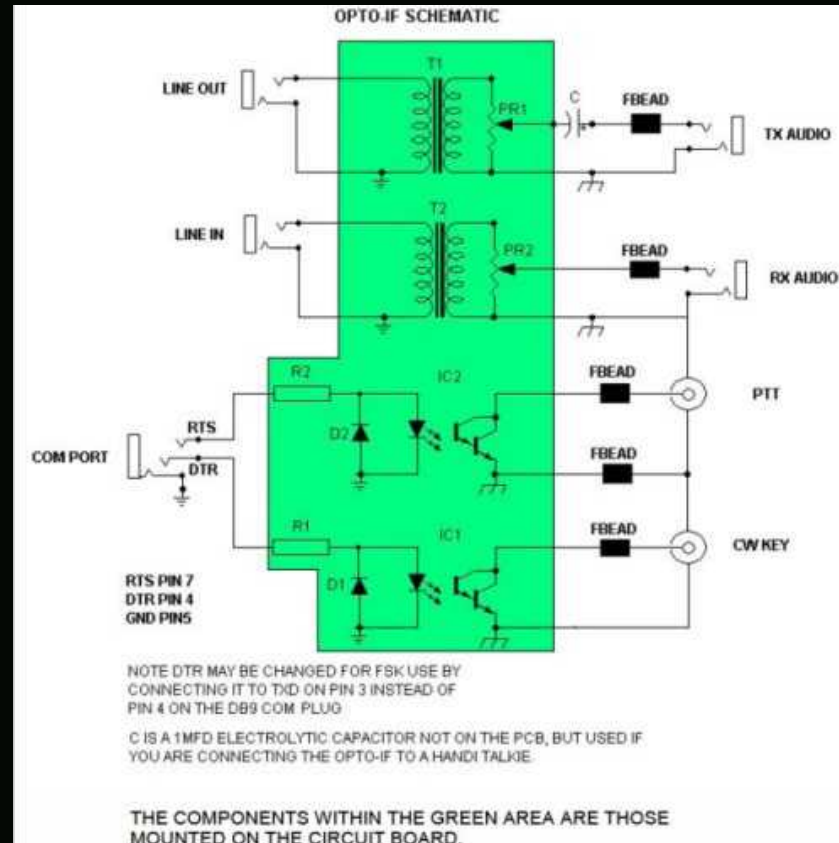
MicroHAM – USB Interface II

RigExpert – Navigator

Tigertronics – Signal Link USB **** Will do Winmore \$99

West Mountain Radio – RigBlaster

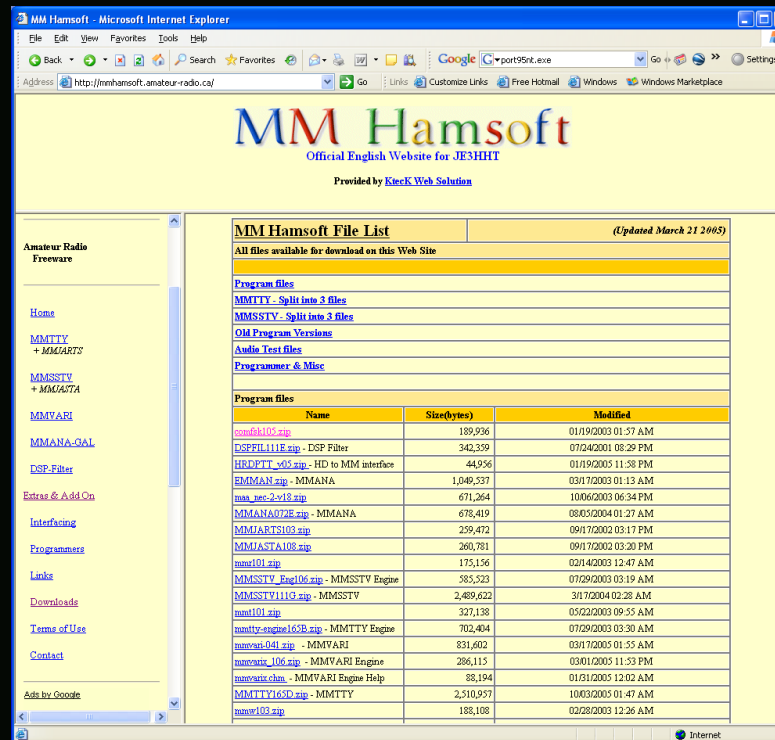
Full Interface Isolation Xformers and Opto-Isolators



RTTY MMTTY

Setup

Go to <http://mmhamsoft.amateur-radio.ca>



MM Hamsoft
Official English Website for JE3HHT
Provided by Keek Web Solution

MM Hamsoft File List (Updated March 21 2005)
All files available for download on this Web Site

Program files

- [MMTTY - Split into 3 files](#)
- [MMSSTV - Split into 3 files](#)
- [Old Program Versions](#)
- [Audio Test files](#)
- [Programmer & Misc](#)

Program files

| Name | Size(bytes) | Modified |
|--|-------------|---------------------|
| cond04105.zip | 189,936 | 01/19/2003 01:57 AM |
| DSFFIL11E.zip - DSP Filter | 342,359 | 07/24/2001 08:29 PM |
| HROPTT_v05.zip - HD to MM interface | 44,956 | 01/19/2005 11:58 PM |
| EMMAN.zip - MMANA | 1,049,537 | 03/17/2003 01:13 AM |
| mas_ver-2-v18.zip | 671,264 | 10/06/2003 06:34 PM |
| MMANAO72E.zip - MMANA | 678,419 | 08/05/2004 01:27 AM |
| MMJASTA103.zip | 259,472 | 09/17/2002 03:17 PM |
| MMJASTA108.zip | 260,781 | 09/17/2002 03:20 PM |
| mmst101.zip | 175,156 | 02/14/2003 12:47 AM |
| MMSSTV_Eng104.zip - MMSSTV Engine | 585,523 | 07/29/2003 03:19 AM |
| MMSSTV1110.zip - MMSSTV | 2,489,622 | 3/17/2004 02:28 AM |
| mmst101.zip | 327,138 | 05/22/2003 09:55 AM |
| mmstty-engine165B.zip - MMTTY Engine | 702,404 | 07/29/2003 03:30 AM |
| mmstty-041.zip - MMVARI | 831,602 | 03/17/2005 01:55 AM |
| mmstty-106.zip - MMVARI Engine | 286,115 | 03/01/2005 11:53 PM |
| mmstty-help.zip - MMTTY Engine Help | 88,194 | 01/31/2005 12:02 AM |
| MMTTY1630.zip - MMTTY | 2,510,957 | 10/03/2005 01:47 AM |
| mmst102.zip | 188,108 | 02/28/2003 12:26 AM |

RTTY MMTTY

Setup

DIGITAL Receiving

Download **MMTTY166G.ZIP** (2.51 Mb) and extract the files

Execute the **MMTTY166G.EXE** program

Accept the license agreement

Accept the program default values

RTTY MMTTY

Setup



RTTY MMTTY

Setup

DIGITAL Receiving

The **MMTTY** application will launch

Register your callsign

(This creates a log file and puts your callsign into the default macros)

Connect an RX audio cable

(The transceiver audio output goes to the computer soundcard line input)

MMTTY is now ready to receive DIGITAL!

RTTY MMTTY

Setup

The screenshot shows the MMTTY Ver1.65D software interface. The window title is "KORC (KORC.MDT) - MMTTY Ver1.65D". The menu bar includes File(E), Edit(E), View(V), Option(O), Profiles(S), Program(P), and Help(H).

The interface is divided into several sections:

- Control Panel:** Contains buttons for FIG, UOS, TX (highlighted in red), and TXOFF.
- Demodulator (FIR):** Includes settings for Mark (2125 Hz), Shift (170 Hz), Tap (72), and AV (70 Hz). It also has checkboxes for Type, Rev., HAM, SQ, Not., BPF, ATC, NET, and AFC.
- Macro Table:** A grid of macro names and their corresponding characters:

| | | | |
|-------|------|-----|-----|
| 1X2 | QANS | SK | RY |
| 2X3 | M6 | EE | M14 |
| DE3 | M7 | M11 | CQ2 |
| UR599 | M8 | M12 | CQ1 |
- Visuals:** Two small windows on the right show a waveform and a scatter plot.
- Search and Call:** A section with buttons for QSD, Data, Init, Call, and a Find Name field. Below it, a dropdown menu is set to "My", with "His 599" and "14" also visible.
- Main Display:** A large text area showing the command "<070228 03:14:02 TX>" and a hyphen "-" below it.
- Bottom Panel:** Includes a "Clear" button, a dropdown menu set to "1X1", buttons for DEAR, ANS, and BTU, an "Edit" button, and a "Both wait" dropdown menu.

RTTY Dxing

Unregistered HyperCam 2

File Edit Mode Options View Configure Help

| QSO | Mode | Freq | Date | UTC | Call | Name | QTH | RST |
|-----|------|-----------|------------|----------|------|------|-----|-----|
| QSO | | | | | | | | |
| QSO | | | | | | | | |
| QSO | | | | | | | | |
| QSO | | | | | | | | |
| 1 | RTTY | 10140.700 | 13/02/2008 | 07:26:33 | | | | 599 |

KKKQJWZDUUUDLEBYXWYYBBAFUHNJYBQHXF
) ?6+ 14''64,4,0#672):-?-2+)???,/'(//!&24
7668&2!2610=!'\$-\$8/\$7&6/10:1S54E 599 **S54E**
QWUFXZMDCUCCFXAZFDFEOT
DTWBCJHDLYAHJAYMUAWAOFJWDDWYDJYLKUTU DE **VP6DX**
DN7 #04:,!:#&471#,.'56)'2&&'&26=##)5!!+

AutoCQ DE x2 DE x3 DE x4 Name Shack 73 599rtty TX R

RX Sq AFC Lock Snap 888,0 Hz 45 bd, 170 Hz RTTY 13/02/2008 07:26:33 z

RTTY Operations

Setup

DIGITAL Receiving

Receiver tuning

Select a low tuning rate - 1 ~ 5 KHz per knob revolution

Receiver AGC

Set to FAST to follow signal fading

Receiver bandwidth

500 Hz is just fine, 250 Hz is better for contesting

Cascaded filters are best

filters are ideal

Receiver audio processing

External audio filters or DSP provide minimal RX benefit

RTTY Introduction

Digital

DIGITAL *Really stresses your hardware!*

DIGITAL is 100% duty cycle

Verify the duty cycle of your

Power Supplies

Transceiver

Amplifier

Antenna and Baluns

Tuner and Feedlines

Consider using auxillary cooling fans

For your transceiver and amplifier

For your room!

RTTY Introduction

Contesting

DIGITAL Station considerations

AFSK mode

- Turn off audio compression
- Beware of a live microphone
- Beware of Windows system sounds
- Beware of applications sounds



RTTY Introduction

DXing

DIGITAL Station considerations

FSK and AFSK mode

Be aware of potential RFI issues, especially when running HP

Erratic operation of mouse or keyboard

A latching TX - the PTT won't release

Your computer hangs or reboots

Directional antennas

Remember ERP is higher in front of a yagi

Consider RF exposure levels

Enlist another operator to check your tones, shift, and polarity

Monitor your TX signal

RTTY Introduction

[DXing](#)

DIGITAL [Macro recommendations](#)

Keep them short!

Change them to match band conditions

Start a new line in each macro

End each line with a space

End your CQ macro with 'CQ'

```
cq dx cq dx de ws7i ws7i <sp>
```

Receive for 3 to 5 seconds then CQ again

Use hyphens between numbers to increase speed

```
tu aa5au 599 WA ws7i<sp>
```

Visit www.rttycontesting.com for additional tips

RTTY Introduction

[DXing](#)

The screenshot shows a Microsoft Internet Explorer browser window displaying the homepage of rttycontesting.com. The browser's address bar shows the URL http://www.rttycontesting.com/. The page features a black header with the site name in white. Below the header, a navigation menu includes links for RTTY Records & Rules, Tutorial Page, RTTY Contest Messages, Downloads Page, and Lagnippe. A search page link is also present. The main content area highlights the 2007 RTTY Contesting Survey Results and provides information about upcoming contests: the CIS RTTY Contest (September 22-23, 2007) and the CQ WW RTTY DX Contest (September 29-30, 2007). A prominent logo for CQ Amateur Radio, 'THE RADIO AMATEUR'S JOURNAL', is displayed. A list of news items includes updates on log files, propagation, and website moves. The page concludes with contact information for Don AA5AU and a personal RTTY page link. A large number, 139723, is centered at the bottom of the page.

rttycontesting.com home page - Microsoft Internet Explorer

http://www.rttycontesting.com/

Google
ebay

Passageorb.com · Wenzig ... rttycontesting.com home ...

rttycontesting.com

This site is dedicated to RTTY mode contesting using *WriteLog for Windows™*
Updated September 02, 2007 by Don AA5AU

RTTY Records & Rules Tutorial Page RTTY Contest Messages Downloads Page Lagnippe

[rttycontesting.com Search Page](#)

2007 RTTY Contesting Survey Results!

The CIS RTTY Contest is September 22-23, 2007. Rules [here](#).
The next major RTTY contest is the CQ WW RTTY DX Contest September 29-30, 2007. Rules [here](#).

CQ Amateur Radio
THE RADIO AMATEUR'S JOURNAL

- What you need to know about your log "After the Contest" by Paolo, QJUY [here](#).
- AA5AU RTTY Callsign Database files updated February 7, 2007 on the [Downloads Page](#).
 - Check current propagation [here](#).
- Submit your RTTY Contest Scores on the [3830 Reflector](#).
- The MWTTY website has moved again, this time to <http://mmhamsoft.amateur-radio.ca/>
 - AA5AU Contest Notes - See the [Lagnippe](#) page.

73, Don AA5AU (E-mail)

Visit my personal [RTTY Page](#) on www.aa5au.com

139723

Internet 100%

RTTY DXing



FR_T

Date: 02/22/08
Views: 3



FT4WD

Date: 02/22/08
Views: 3



FT5XO

Date: 02/22/08
Views: 3



HK0TU

Date: 02/22/08
Views: 7



K7C

Date: 02/22/08
Views: 3



KH5

Date: 02/22/08
Views: 2



KH6K

Date: 02/22/08
Views: 2



KPI

Date: 02/22/08
Views: 2



KP5

Date: 02/22/08



P5

Date: 02/22/08
Views: 6



SV2ASP_A

Date: 02/22/08



TI9M

Date: 02/22/08
Views: 4

RTTY Dxing



3C0V

Date: 02/23/04
Views: 0



3D2CU

Date: 02/22/04
Views: 1



3Y0X

Date: 02/22/04
Views: 41



3Y5X

Date: 02/22/04
Views: 9



4W

Date: 02/22/04
Views: 1



7Q7CE

Date: 02/22/04
Views: 3



A15AC

Date: 02/22/04
Views: 9



AH3A

Date: 02/22/04
Views: 0



AH3B

Date: 02/22/04
Views: 1



CE0YEH



FO0CI



FR_J

Date: 02/22/04
Views: 4

RTTY Dxing



T04E

Date: 02/22/04
Version: 2



TX0DX

Date: 01/13/04
Version: 1



TX0DX

Date: 02/07/04
Version: 2



VK0MT

Date: 02/12/04
Version: 1



XF4IH

Date: 02/15/04
Version: 1



XQ0X

Date: 02/22/04
Version: 4



YV0AA

Date: 02/22/04
Version: 2



ZL8R

Date: 02/27/04
Version: 1



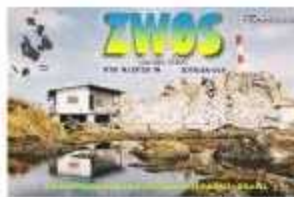
ZL9CI

Date: 02/22/04
Version: 2



ZS8MI

Date: 01/22/04
Version: 2



ZW0S

Date: 02/22/04
Version: 1

RTTY Introduction

Contesting

DIGITAL Contest calander

| | |
|-----------|---|
| January | ARRL DIGITAL Roundup |
| February | CQ WPX, NA QSO Party |
| March | NA Sprint, BARTG HF |
| April | EA (Spain), SP (Poland) |
| May | ARI (Italy), Volta (Italy) |
| June | Ukranian |
| July | NA QSO Party |
| August | SARTG (Scandinavian), SCC (Slovenia) |
| September | CQWW DX DIGITAL |
| October | TARA, Makrothen, NA Sprint, JARTS (Japan) |
| November | WAEDC (QTCs) |
| December | TARA |

RTTY Introduction

Contesting

DIGITAL ARRL RTTY Roundup

A very popular DX DIGITAL contest

In 2009 EWARG placed **2nd** in the world club category!

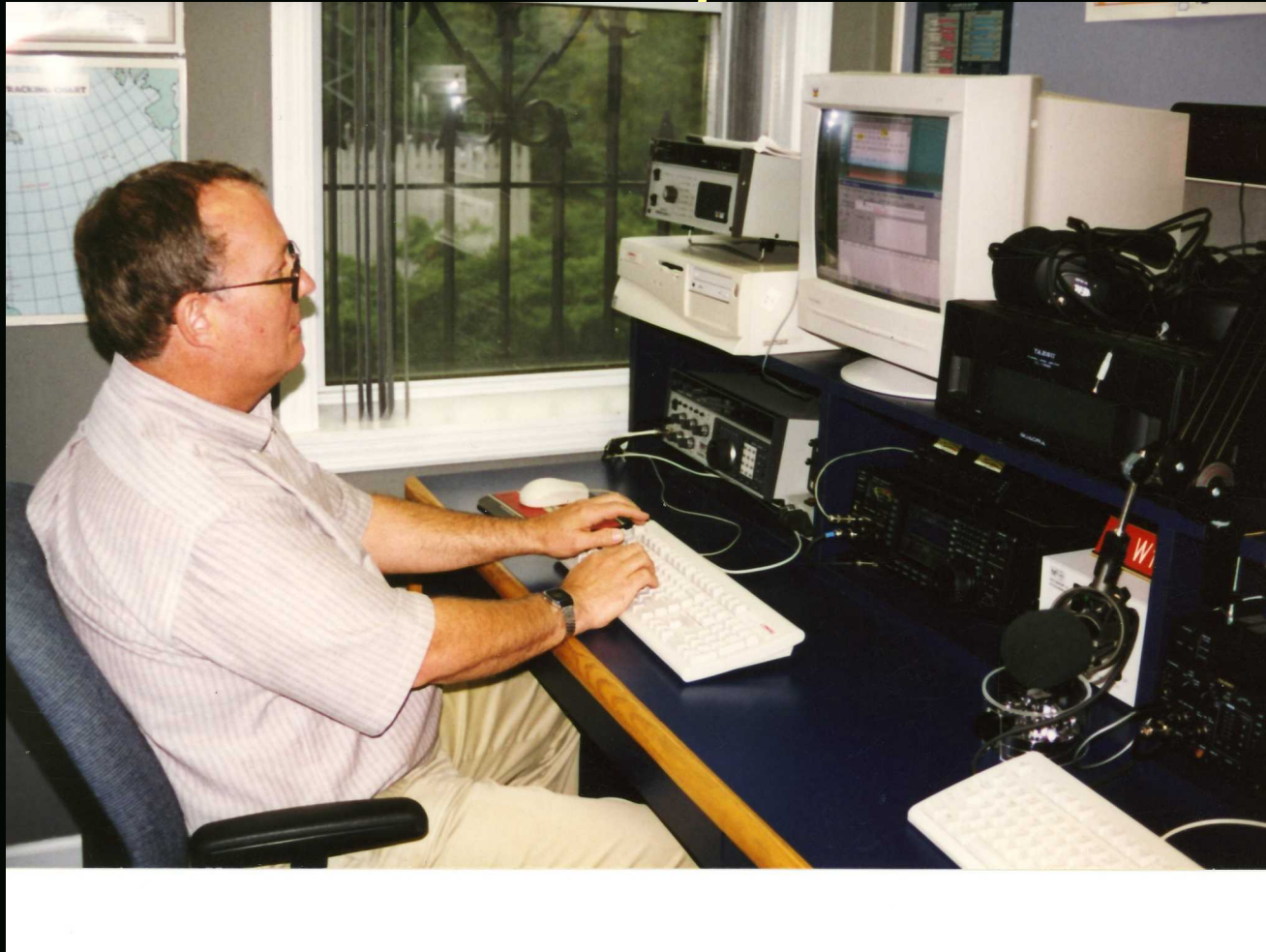
The 30-hour contest begins at **1800Z on Saturday**

The exchange is RST + State/Prov **599 WA**

There are separate categories for Single Op and Single Op Assisted

Set a personal goal - 100 contacts, WAS, WAC, DXCC, ???

RTTY Contesting



RTTY Introduction

73

Material by WS7I, K0RC,
K4CZ