Fifty Years of RTTY

$5.00 VOL. 50, NO. 4

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Nick Smith, W4GKM, writes about his trip to Honduras on page 10.

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The New
RTTY *Journal*©

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The New RTTY Journal is a continuation of the magazine formerly known as RTTY, RTTY Journal, RTTY Digital Journal, Digital RTTY Journal, and Digital Journal.

Hits & Misses

Bill Henry, K9GWT
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Once again it's time to be heading to the annual gathering at Dayton, Ohio. You'll find a map and a list of the weekend's activities in the center-fold of this issue. Jay Townsend, WS7I, has been managing the hotel room and banquet sales this year and he reports that sales are good. By the time this magazine gets to you, advance sales will have been closed but give the hotel a call if you make a last minute decision to join us. Once again, Frank Fallon, N2FF, has organized the RTTY Forum for us. I hope that all of you can come and join us on May 15 through 18.

This issue includes a nice article by Nick Smith, W4GKM, about his DXpedition to Honduras this year. You no doubt remember Nick as the guy at the Amateur Radio Trader magazine booth at just about every hamfest for 4 or 5 years. Nick retired from hamfesting to pursue his first love — driving airplanes. If you get the urge to charter a biz-jet, call Nick. He'll get you there!

I find that I am frequently answering questions about which product HAL made when. Dating products can be a problem as new products evolve from old ones and the lifetime of a given device or family of devices can be indefinite. Several times, we have revived a "retired product" when volume orders are offered. But, in answer to those requests, I have tried to make a list of products in the order they were first introduced — by HAL Devices and by HAL Communications Corp. For me, it was an interesting exercise and brought back a lot of memories. I hope this helps the collectors in the group.

Finally, I have revised and updated the RTTY Dictionary that we've run from time-to-time. This edition includes new terms and acronyms and a few of the old ones have been excised (like selector magnets, stunt box, etc.).

Silent Keys: Once again, it is my sad duty to report the loss of two leaders of our amateur radio group.

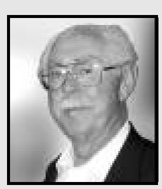
VE3UR: Ray Hunter, VE3UR — "Uncle Ray" to many of us — passed away on Friday, March 28, 2003. Ray was a long time and regular attendee at the Dayton Hamvention. Dale Sinner reported Ray's biography in the Fall, 2001 (V49, #3) issue of The New RTTY Journal and we featured Ray's 90th birthday party on the front cover of the June, 1999 issue (V47, #2). Ray had quite a long and colorful career, manufacturing model airplanes, selling model planes and trains, as well as selling amateur radio equipment.

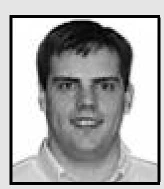
W2LZX: Jack Gutzeit was not an active RTTY operator but he was well known to many of us who have gone to ham shows over the past years. Jack was advertising manager for CQ Magazine for many years and could always be counted on for a good story, help in making show arrangements, or solid advice. Jack was a CW DX operator of the "old school". His KWM-2 went with him everywhere and Jack was always chasing the "new ones". Jack was a WWII B17 pilot and offered much good advice when I caught the "airplane disease" in 1978. He was also among the first to applaud when I sold the '210 in 1983! I worked on him to get on RTTY for many years and almost won him over. I used to kid him that he'd worked all the DX on the "1st Data Mode" (CW) and now he needed to try "Modern Data" (RTTY). But then he retired and moved to Florida where he didn't have space for RTTY gear or a real antenna system. Jack passed away on February 1, 2003.

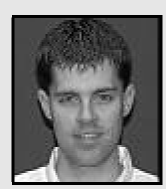
The New
RTTY *Journal*
Staff


George W. Henry, K9GWT


Linda Henry

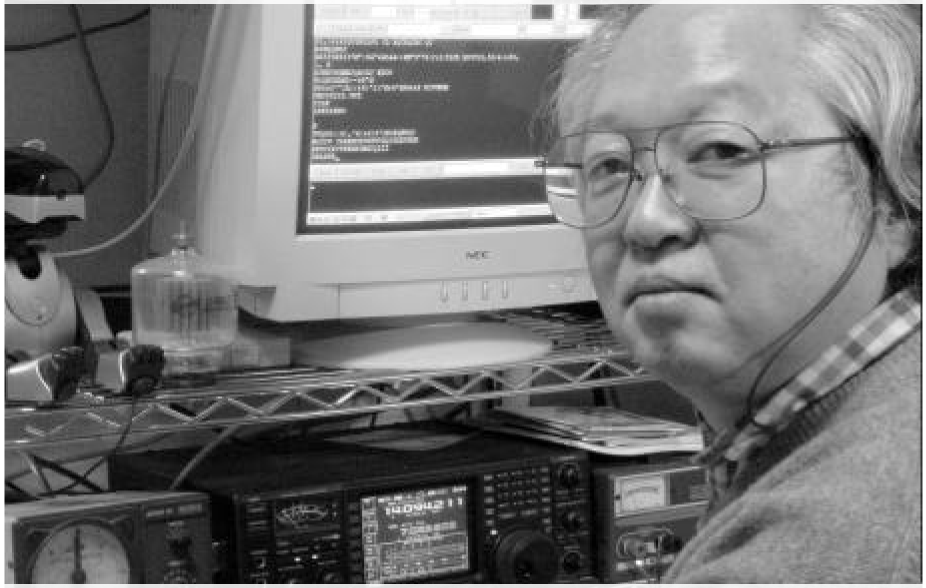

Dale Sinner, W6IWO


Joe Wittmer, K9SZ


Jason Allen

Biography
by Dale Sinner, W6IWO

JH1BIH



Hiroshi Aihara, JH1BIH

Hiroshi Aihara, who goes by Hiro, is known to most RTTYers as JH1BIH. He is fifty years old, and is the only ham in his family. He started operating in 1967, and recalls getting a Kleinschmidt machine in 1972. His main interests lie in contesting, DXing, and software. He is currently a software programmer, and used to be a high school teacher. Aside from ham radio, Hiro enjoys offshore fishing.

2003 DL-DX RTTY Contest

July 5, 1100 UTC
to July 6, 1059 UTC

1) Object: Contact and exchange QSO information with as many stations as possible using RTTY only. Any station may work any other station.

2) Contest Period: July 5, 2003 (Saturday) from: 11:00 UTC until 10:59 UTC July 6 2003 (Sunday), 24 h.

3) Modes: RTTY only!

4) Bands: All amateur bands 3.5-30 MHz (excluding 10,18 and 24MHz).

5) Entry Categories: (A) Single Operator, multiband — One person performs all operating and logging functions. The use of spotting nets (operating arrangements involving assistance through DX-alerting nets, etc.) is permitted. Single operator stations are allowed only one transmitted signal at any given time. **(B)** As 5A, but operating time is only six hours — off-time must be greater than 60 minutes. **(C)** As 5A, but only Dipol-antenna or Groundplane is permitted. **(D)** As 5C, Operating time is only six hours — off-time must be greater than 60 minutes. **(E)** Multi operator, single transmitter only - More than one person operates, checks for duplicates, keeps the log, etc. Multi operator stations are allowed only one transmitted signal at any given time. The use of spotting nets (operating arrangements involving assistance through DX-alerting nets, etc.) is permitted.

6) Exchange: RST + QSO number, starting with 001.

7) QSO Points: QSO with own country, 5 points. QSO with other countries in own continent 10 points. QSO with other continents 15 points. QSO with DL-Station from EU: +3 points. QSO with DL-Station from other continent: +5 points. Same station can be worked once on each band.

8) Multiplier: Each DXCC country on each band, including first contact with Australia, Canada, Japan and USA. Additionally, each call area in VK, VE, JA and W will count as one multiplier on each band (W1, WA4, JA2, VK4). NOTE: Stations operating from call areas other than their call ID, are asked to use '/x' for their actual call area. i.e. K5DJ/1

9) Logs: All stations must submit an electronic log. All computer-generated "electronic logs" should be submitted as a file either by E-Mail. The log must be in ASCII format. All QSOs must be in chronological sequence. Log must show date and time in UTC, band, call of station worked, RST and exchange sent, RST and exchange received, points per QSO and multipliers. The files should be named after the participant's call sign, so for example XX0YY.ALL and XX0YY.SUM. Cabrillo-Files are preferred.

10) Deadline: Logs must be received by August, 10 2003 to qualify.
Mail logs to: LOGS@DL-DX.DE
Homepage: http://www.dl-dx.de

11) Awards: Certificates for the first op ten stations in each class. The JUDGES decision will be final and no correspondence will be entered into. By submitting their logs contesters agree to be bound by these rules.

HAL Products Over the Years

Bill Henry, K9GWT
k9gwt@rttyjournal.com

Many of you have asked me about old HAL products. Below is a list of radio data products we have made and sold over the years. Items in italics are still active as of May 1, 2003.

HAL Devices:

DBM-1 Double-Balanced Modulator Kit 1967
111/211/311 RTL Morse Code Keyer 1967

ST-6

RT-1 RTTY Demodulator 1967
MKB-1 Morse Keyboard 1968
RKB-1 RTTY Keyboard 1968
ST-6 High-performance Solid-State RTTY Demodulator 1968
AK-1 AFSK Oscillator 1968
XTK-100 Crystal-Controlled AFSK Oscillator 1969
1550 Morse Code Iambic Keyer 1969
ST-5 Low Cost RTTY Demodulator 1970
ID-1A Morse Code Repeater Identifier 1970
RVD-1002 Receive terminal for Baudot RTTY 1970

HAL Communications Corp:

RVD-1005 Receive Terminal for Baudot RTTY 1972
RVD-1005A Receive Terminal for ASCII RTTY 1972
2550 Morse Code Iambic Keyer 1972

ST-6000

DKB-2010 Morse & Baudot electronic keyboard 1973
ID-1000A Morse Code Repeater Identifier 1973
FYO Morse Code Key 1973
DS-3000 Microprocessor controlled RTTY Terminal 1976
DS-3280 Poll-select Bank Data Terminal 1976
MCEM-8080 Hobby Computer System 1976
ST-6000 High Performance RTTY Demodulator 1976
DS-3281 Data Terminal 1977
AQS-RO Agriculture Commodities Data Terminal 1977

DS-3100 ASR

DS-3282 Data Terminal 1977
DS-3100ASR Split-screen Baudot/ASCII/Morse Terminal 1977
ST-5000 Low-cost Solid-state RTTY Demodulator 1977
PS-3100 Printer Controller 1977
8000 Personal Computer System 1978
DS-3285 Bank Data Terminal 1978
DS-2000 Low cost RTTY terminals 1978
8200 Computer System 1978

CT-2100

MSU-4 Modem Sharing Unit 1979
DS-2050 Low cost RTTY terminals 1979
MPT-3100 Message Storage Option (MSO) RTTY Terminal 1979
Super Duper Contest Dupe Computer 1979
PS-3800 Controller 1979

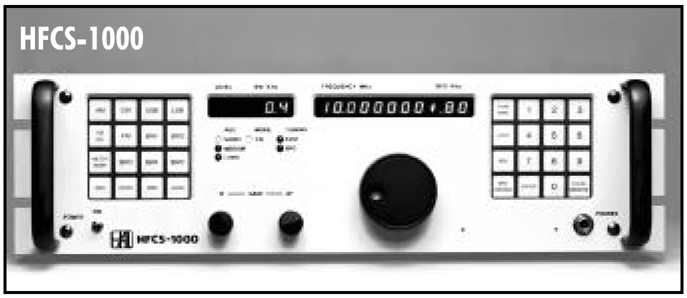
CWR-6850

PS-3900 Controller 1980
DSK-3100 Diskette storage for MPT-3100 1981
CT-2100 Low-cost Communications Terminal with modem 1982
KB-2100 Keyboard for CT-2100/CT-2200 1981
CWR-685 Portable RTTY Terminal 1981
CWR-670 Receive Only Telereader 1982

CWR-6850 Portable RTTY Terminal 1982
CWR-6700 Receive Only Telereader 1982
RS-2100 RTTY Tuning Scope 1982

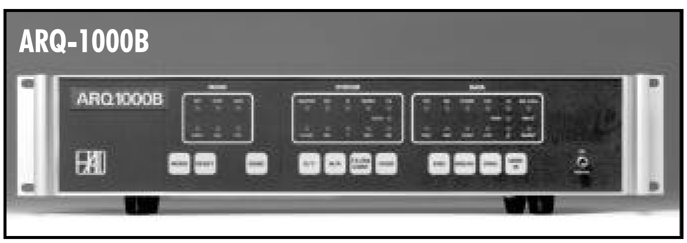
ST-8000

CT-2200 Low-cost Communications Terminal with modem 1983
ARQ-1000 Error Correcting Terminal for SITOR & AMTOR . .1983
M-1700 FSK Modem for ARQ-1000 1983
CRI-100 Computer RTTY Interface 1983



HFCS-1000

CRI-200 Computer RTTY Interface 1983
PS-3910 Printer Controller 1983
PCI-2000 Personal Computer Interface 1984
SPT-1 Spectra-Tune Tuning Indicator .1984
DS-RTTY RTTY Terminal Software for IBM-PC 1984



ARQ-1000B

LP-120 Loop Power Supply 1984
IF-600 PC-Jr. Data Interface 1984
ST-8000 High performance HF RTTY Modem 1985
ARQ-1000A Error Correcting Terminal 1985
WX-1000 Weather Box message storage terminal 1985
ARQ-200 Radio Telex Modem for Shipboard Use 1986
HFCS-1000 High Frequency Communications Simulator 1986
LP-1200A Polar / Neutral Loop Power Supply 1987
ARQ-1000B Error Correcting Terminal 1987
DS-3200 Data Communications Terminal 1987
ST-7000 HF Packet Radio Modem 1988
STI-1000/8 8-Channel Morse Code Receiver 1988
LP-1210 High Reliability 10-channel Loop Power Supply 1989
PCI-3000 PC-Amtor Multi-mode HF Data Modem 1989
SPT-2 Spectra-Tune Tuning Indicator .1989
ST-8000A High Reliability HF Radio Modem 1990
EMAD Emergency Message Alert Device (NMC-MARS) 1990
ALERT-1 Message Alert Device 1990
RMX-3100 2-Port Radio Mail Box Switch 1990

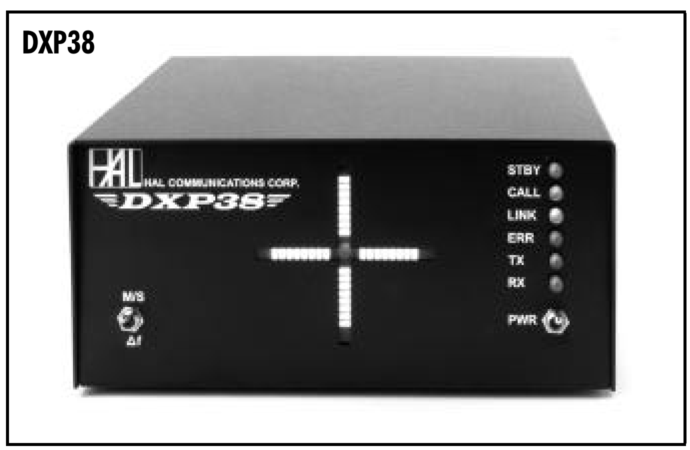
RPC-1000 Radio Packet Controller 1990
MRI-1000 More Receiver Interface 1990

ST-8000A

RPC-2000 Radio Packet Controller 1991
SCM-1000 Split Channel Modem 1991
Summer CLOVER Modem 1992
PCI-4000 DSP Modem for CLOVER .1993
DS-3486 Data Communications Terminal 1994
PCI-4000/M Multi-mode DSP Modem 1994
P38 Low-cost DSP Modem 1994
RVM-100 Radio Voice Mail 1994
ARQ-1000B/DSC Digital Selective Call Modem 1995
PCI-4000/2K CLOVER-2000 Modem 1995
ST-8000A/DBIN Dual Binary Modem .1996

DSP-4100/2K

DSP-4100 Portable DSP Modem 1996
DSP-4100/2K CLOVER-2000 Modem .1996
FAX-4100 FAX-Over-Radio Interface .1997
DXP-38 Low-cost DSP Modem 1998
RTTY-1 RTTY Tuning Indicator 1998
HFCS-2000 High Frequency Communications Simulator 1999



DXP38

LP1203 3-Channel Loop Power Supply 2000
DSPWin / DXPWin DSP Modem Software for Windows 2001
DSRTTY-Win RTTY Software for Windows 2002

2002 CQ/RJ WW RTTY DX Contest Results

Boldface represents a plaque winner; italics indicate a certificate winner.

Sponsored by *CQ Magazine* and *The New RTTY Journal*

SINGLE OPERATOR ALL BAND HIGH POWER

Call	QSOs	Pts.	Z	C	US/VE	Final Score
AA5AU	2416	5620	116	309	228	3,669,860
RK4FF	2323	5480	113	341	142	3,266,080
KH7X	1925	5731	114	225	212	3,157,781
UP5P	1918	5441	112	322	116	2,992,550
M0SDX	1864	4718	109	316	179	2,849,672
P3F	1836	5386	90	273	139	2,703,772
IK0YVV	1609	4165	114	304	167	2,436,525
AH0B	1937	5766	90	222	109	2,427,486
UW5Q	1813	4375	102	294	157	2,419,375
EA3NY	1716	4352	95	278	177	2,393,600
W1ZT	1694	4247	95	274	193	2,386,814
K4GMH	1737	4368	100	275	167	2,367,456
RZ3AZ	1706	4011	106	318	136	2,246,160
ZW5B	1536	4518	94	239	144	2,155,086
OH2BP	1549	3833	107	299	145	2,111,983
W3FV	1580	4237	87	268	141	2,101,552
VA3DX	1360	3682	99	281	167	2,014,054
DK0EE	1392	3473	102	308	156	1,965,718
LY3BH	1375	3534	104	273	145	1,844,748
WW7OR	1564	3761	100	228	161	1,839,129
WX4TM	1511	3661	89	238	171	1,823,178
SM4RGD	1378	3465	91	273	153	1,791,405
DL5WW	1349	3235	98	298	140	1,733,960
SM5FUG	1311	3222	98	295	144	1,730,214
HA3LI	1415	3473	85	264	147	1,722,608
YU7YG	1390	3331	96	285	130	1,702,141
IT9GSF	1257	3132	101	281	155	1,681,884
K5AM	1568	3653	85	213	158	1,665,768
W4GKM	1411	3231	89	242	176	1,638,117
EA1AKS	1391	3444	82	227	156	1,601,460
OK2BXW	1301	3372	83	240	148	1,588,212
EA1BD	1295	3282	81	244	153	1,568,796
YO9HP	1321	3144	90	273	121	1,521,696
I1COB	1326	3346	75	222	156	1,515,738
RV9FQ	1273	3657	79	247	88	1,513,998
IK2RZP	1306	3225	85	251	131	1,506,075
JA1BWA	1091	3078	115	261	112	1,502,064
W0ETC	1219	2897	91	244	154	1,416,633
UA6AHF	1443	3275	81	257	82	1,375,500
LO7H	1277	3772	67	181	111	1,354,148
IK6SNQ	1063	2625	96	256	126	1,254,750
RV9BB	1037	2918	83	272	75	1,254,740
LN1HQ	1125	2771	91	242	116	1,244,179
DL6JZ	1060	2519	90	261	125	1,199,044
EA5DFV	1177	2884	74	209	131	1,193,976
ZL2AMI	1067	3167	78	183	110	1,174,957
W4UK	1151	2681	85	207	133	1,139,425
VE7CF	1089	2724	82	179	153	1,127,736
DA0BH	989	2479	87	236	129	1,120,508
OM8A	1018	2648	74	209	138	1,114,808
VE6YR	1033	2675	83	184	140	1,088,725
RU0LL	1062	2986	79	203	82	1,086,904
K3SV	1029	2665	73	215	114	1,071,330
K5ZD	904	2336	83	241	111	1,016,160
VE3GLA	876	2299	80	221	126	981,673
N8KM	923	2383	82	215	110	969,881
GI4KSH	1135	2781	59	180	106	959,445
LA7CL	976	2327	76	228	103	947,089
KB3TS	917	2497	72	213	89	933,878
UT4HZ	994	2294	80	238	89	933,658
W8LU	911	2365	82	212	92	912,890
NN6XX	916	2108	86	187	146	883,252
YL2GC	953	2252	68	230	93	880,532
GW4KHQ	986	2220	73	248	58	841,380
HB9DCM	801	2067	81	199	127	841,269
DL2HYH	786	1908	84	241	94	799,452
LN1V	954	2288	63	188	93	787,072
SP9LJD	797	2008	64	178	128	742,960
OK2SG	664	1654	85	255	107	739,338
W6IHG/4	716	1800	85	217	108	738,000
RD4M	770	1823	81	216	97	718,262
DF3GY	631	1641	82	202	130	679,374
RN1AO	832	1976	70	187	80	665,912
OK1OX	664	1635	79	212	80	606,585
OH2GI	680	1698	67	186	88	579,018
N2FF	618	1555	74	192	92	556,690
W0HW	658	1588	72	173	96	541,508
DL1YD	576	1455	76	196	98	538,350
AD6KA	688	1513	69	152	130	531,063
NW6S/4	603	1457	72	184	104	524,520
G3UFY	587	1499	65	177	95	505,163
N9QQK	586	1527	70	184	75	502,383
JA2FSM	581	1653	69	149	83	497,553
K9DJ	643	1650	58	149	87	485,100
G3XTT	553	1356	70	192	92	480,024
RW3LB	605	1379	70	209	59	466,102
JA2ZJW	515	1478	74	147	91	461,760
WD4DDU	531	1360	71	188	80	461,040
W6OAT	595	1453	62	151	101	456,242
OK1FAV	604	1470	66	172	64	443,940
K1US	599	1601	54	164	57	440,275
DF3IS	616	1442	60	171	72	436,926
N6EU	572	1214	70	139	133	415,188
I2SVA	500	1214	70	170	93	404,262
K6RIM	529	1190	68	150	118	399,840
NA2M	526	1233	67	155	97	393,327
KY7M	541	1283	61	139	93	375,919
W0TY	494	1143	76	155	95	372,618
K4LQ	445	1207	73	178	54	368,135
DL9NDV	442	1060	66	175	63	322,240
KE5K	375	971	75	165	63	294,213
WA3AAN	423	962	53	141	108	290,524
LU1BJW	423	1207	57	117	63	286,059
W4TTY	387	1024	62	155	52	275,456
IK0CNA	447	1056	51	129	73	267,168
DL4MFP	372	974	61	131	80	264,928
N2ED	381	989	63	143	59	262,085
TA9J	482	1409	41	128	17	262,074
SQ4CTS	570	1233	35	133	39	255,231
DJ1TU	363	858	66	167	52	244,530
ES4RD	589	1354	39	116	24	242,366
TF3AO	433	1064	37	93	69	211,736
JN1BMX	375	1081	43	116	16	189,175
SP4EEZ	294	737	61	140	50	184,987
W5BBR	284	697	68	134	61	183,311
K0JPL	323	704	66	104	77	173,888
N5PA	352	848	43	113	47	172,144
N4GI	304	741	52	117	62	171,171
DK7ZT	314	739	47	116	57	162,580
HL3AMO	246	670	68	113	44	150,750
N5LYG	358	631	52	87	91	145,130
W1NR	244	673	51	126	23	134,600
W6JOX	259	765	51	123	0	133,110
N5KR	263	633	46	100	51	124,701
W7DPW	268	568	53	78	85	122,688
W9SE	264	509	54	91	84	116,561
N6VH	215	498	55	86	57	98,604
PA3EVY	237	561	43	95	24	90,882
K5CM	219	559	38	81	30	83,291
AD6WL	196	407	58	68	72	80,586
K7JJ	206	491	41	74	42	77,087
KY5G	172	397	43	83	52	70666
KC7V	165	448	45	83	18	65,408
RN2FA	175	425	38	88	18	61,200
RX9TX	161	460	28	76	12	53,360
DK4RL	149	381	39	68	15	46,482
AC0M	145	392	19	63	18	39,200
AI6A	101	297	36	80	0	34,452
W4UW	114	320	34	52	6	29,440
W0MN	95	228	27	53	27	24,396
4W6MM	95	279	16	20	2	10,602
CP1FF	48	133	16	29	6	6,783
YL2KF	21	47	13	18	2	1,551

KH7X: KH6ND, UP5P: UN5PR, P3F: 5B4AGN, AH0B: JA2VUP, UW5Q: UR3QCW, ZW5B: DJ6QT, DK0EE: DL4MDO, WW7OR: W7GG, LN1HQ: LA6FJA, DA0BH: DL3GA, OM8A: OM3RM, LN1V: LA4LN, RD4M: UA4LU, JA2ZJW: JH2CMI, 4W6MM: TF3MM.

SINGLE OPERATOR ALL BAND LOW POWER

Call	QSOs	Pts.	Z	C	US/VE	Final Score
P43P	2725	8110	105	277	217	4,857,890
W2UP	2015	5141	112	325	190	3,223,407
ZX2B	1683	4961	85	230	155	2,331,670
UA9CDV	1618	4672	93	280	103	2,223,872
RU3QW	1714	3967	106	322	127	2,201,685
UW5U	1454	3475	99	296	140	1,859,125
ZC4DW	1402	4108	88	257	90	1,786,980
LX5A	1520	3745	84	254	118	1,707,720
UY8IF	1495	3497	83	269	123	1,661,075
EU1MM	1335	3163	96	296	124	1,632,108
ON4ADZ	1237	3059	102	275	144	1,593,739
VP5JM	1325	3548	69	198	142	1,451,132
VE3IAY	1073	2822	86	236	165	1374,314
W0YR/4	1155	3077	79	239	114	1,329,264
G4RS	1164	2834	87	252	129	1,326,312
UR5MID	1182	2821	89	249	118	1,286,376
WB8K	1174	2907	87	229	125	1,281,987
EU1AZ	1187	2780	83	255	102	1,223,200
4Z5CP	1115	3196	82	234	62	1,208,088
EA7FTR	1181	2901	73	205	137	1,203,915
9M6LSC	1103	3270	87	187	87	1,180,470
PS7TKS	1047	3086	72	189	113	1,154,164
KI6DY	1159	2586	72	200	168	1,137,840
PA3EMN	968	2339	86	251	129	1,089,974
DL7VOG	937	2310	83	263	124	1,085,700
UA3SAQ	1026	2382	90	266	99	1,083,810
UR7EU	1090	2583	76	223	107	1,048,698
S56A	886	2224	89	247	130	1,036,384
VE2AXO	982	2710	73	205	101	1,027,090
OK2PMS	936	2261	85	239	128	1,021,972
OK2VWB	873	2171	89	250	130	1,018,199
WA1EHK	912	2318	82	234	123	1,017,602
F6AUS	932	2332	80	219	133	1,007,424
H2E	974	2810	69	228	57	994,740
AH6OZ	893	2645	74	146	155	991,875
4Z5AV	895	2613	77	212	85	977,262
J49XB	989	2289	85	230	96	940,779
YU7AM	858	2154	78	231	120	924,066
9A3ZI	935	2345	70	205	116	916,895
VE3BUC	862	2253	77	199	119	889,935
OK2WH	882	2124	70	229	106	860,220
K7SV	768	1924	92	236	119	860,028
YO3JF	990	2457	68	175	103	850,122
W3SE	892	2000	86	162	168	832,000
SM5UFB	949	2265	60	197	102	813,135
W8UL	803	2050	82	210	97	797,450
N4DSL	821	2013	74	187	135	797,148
YO3APJ	727	1838	86	231	108	781,150
JS1OYN	797	2208	86	177	89	777,216
UA4FX	970	2171	69	211	76	772,876
DL2FAG	777	1883	81	221	100	756,966
RA9FRD	782	2247	73	209	54	754,992
N6OJ	848	1992	69	163	133	727,080
MM0BQI/P	856	1974	79	215	74	726,432
PA0WRS	709	1830	81	200	114	722,850
UA3PW	830	1922	78	225	69	714,984
JI1RXQ	715	2029	86	167	95	706,092
OK2RU	687	1689	83	235	99	704,313
RA9XF	724	2046	71	210	55	687,456
DK3VN	725	1785	64	192	110	653,310
F6IRF	659	1619	76	206	120	650,838
SP6IHE	701	1652	79	221	86	637,672
SP6EKS	682	1803	69	170	112	632,853
WD4GBW	785	2179	55	173	61	629,731
W1VET	704	1771	67	183	98	616,308
KL7AC	799	2003	60	111	131	604,906
JK1IQK	642	1753	84	170	90	603,032
F6FTB	621	1546	81	200	105	596,756
OK2PCL	663	1781	72	162	101	596,635
SM6BSK	606	1514	75	212	106	595,002
Z31MM	706	1693	69	197	85	594,243
W6RLL	678	1547	81	172	130	593,267
OK1FHI	626	1528	83	211	93	591,336
DJ3NG	700	1661	69	189	91	579,689
DL4RCK	714	1622	68	207	74	566,078
GW4MVA	679	1613	66	188	84	545,194
KK6T	597	1390	85	174	129	539,320
PA0EHF	600	1505	73	183	97	531,265
DM5GI	635	1458	74	210	79	529,254
EA7AJR	688	1665	54	157	103	522,810
W2WB	563	1372	75	197	105	517,244
DL8NFU	614	1458	65	198	85	507,384
WW3S	608	1631	71	175	62	502,348
VE9DX	551	1396	71	171	116	499,768
UN6G	667	1855	63	174	30	495,285
DF7ZS	579	1388	67	200	82	484,412
GU0SUP	541	1338	71	194	97	484,356
4X6UU	622	1784	60	183	28	483,464
K2PS	566	1471	70	169	84	475,133
AC6JT	682	1304	72	140	149	470,744
UX1IL	640	1481	69	198	50	469,477
WG7Y	619	1382	75	159	105	468,498
UW7F	646	1437	67	214	45	468,462
DL8NBE	581	1381	70	195	74	468,159
DL3PS	760	1664	55	184	42	467,584
VA6MM	603	1520	54	124	123	457,520
DL2YCA	606	1390	70	191	68	457,310
UA4FCO	682	1479	70	235	0	451,095
ZL3JT	563	1660	60	127	83	448,200
VE3GSI	519	1386	70	171	80	444,906
K0CIE	608	1362	65	153	101	434,478
IU1DCI	630	1579	48	124	102	432,646
DK3WN	573	1348	64	183	71	428,664
UA9CR	509	1441	63	184	49	426,536
RA9AU	611	1770	45	157	38	424,800
S52U	572	1348	66	185	63	423,272
RA3BB	585	1470	62	132	86	411,600
RW6BN	587	1307	63	199	50	407,784
K6HGF	586	1271	61	137	118	401,636
SV5/G4OBK	618	1440	58	151	68	398,880
K6EP	501	1105	76	135	147	395,590
WF3M	501	1272	69	165	75	393,048
SP3OL	473	1181	70	186	73	388,549
PA3FGJ	535	1306	60	171	66	387,882
IZ8DVD	557	1289	65	172	55	376,388
OM5XX	472	1297	70	134	85	374,833
UT5UML	488	1178	72	184	62	374,604
VU2WAP	530	1466	64	137	53	372,364
JR1NHD	448	1280	62	157	68	367,360
PY7ZY	483	1407	54	123	84	367,227
AY4DX	474	1367	58	130	77	362,255
T93Y	414	1124	71	156	95	361,928
6J1YYD	571	1363	51	103	110	359,832
9H9PA	682	1563	45	125	57	354,801
JO3JYE	529	1434	63	134	50	354,198
IZ4DZD	524	1208	64	183	42	349,112
EA6DD	508	1202	55	153	74	338,964
DL1ZU	426	1090	69	158	79	333,540
VE1AOE	611	1625	37	106	60	329,875

UN4PG	458	1264	62	165	31	326,112
VE3AGC	435	1074	60	139	103	324,348
K3ZV	440	1071	69	153	79	322,371
HB9CAL	*502*	*1228*	*55*	*143*	*62*	*319,280*
HA3VAM	*453*	*1103*	*60*	*148*	*79*	*316,561*
OM5JA	499	1167	55	167	42	308,088
SM3ETC	527	1211	53	149	50	305,172
RA0FN	453	1287	53	132	51	303,732
W1BYH	423	951	59	153	107	303,369
M0BEX	456	1096	49	139	87	301,400
N7UJJ	463	1078	60	123	95	299,684
WN1OTV	436	1051	57	148	78	297,433
KC4SAW	409	1034	66	150	70	295,724
W3MEL	540	1615	35	148	0	295,545
SP8FHJ	425	1020	71	164	54	294,780
LY1CT	*525*	*1181*	*51*	*161*	*37*	*294,069*
YU1LM/QRP	458	1088	57	153	57	290,496
W6ZL	419	1014	72	135	77	287,976
WM7A	411	880	72	136	119	287,760
YU1KT	462	1079	58	159	48	285,935
M0COP	438	1039	55	148	72	285,725
6F1LM	413	1050	52	125	91	281,400
SW2A	*435*	*991*	*61*	*158*	*64*	*280,453*
JA1XUY	386	1051	71	138	56	278,515
DL5PW	379	955	66	151	72	275,995
HB9AWS	444	1047	56	155	52	275,361
SM7BJW	399	1017	56	136	68	264,420
GM0JHF	443	1041	52	139	62	263,373
DJ5IR	448	1006	57	164	40	262,566
N6TQS	428	965	63	116	90	259,585
4K6DI	*400*	*1099*	*57*	*151*	*28*	*259,364*
OK2PAD	367	937	68	150	57	257,675
SQ4CTS	570	1233	35	133	39	255,231
K6UM	355	873	69	132	85	249,678
VE7ASK	*383*	*910*	*61*	*101*	*111*	*248,430*
W5MK	408	954	53	127	78	246,132
DL2AL	396	927	61	155	45	241,947
LA5TFA	*620*	*1330*	*40*	*140*	*1*	*240,730*
ON4KGL	404	980	55	131	59	240,100
6J2AUB	435	1087	49	91	80	239,140
F5UTN	470	1046	58	170	0	238,488
K1HTV	361	917	62	138	56	234,752
SN8R	429	971	58	181	0	232,069
6J2AC	399	998	33	90	92	214,570
VE9FX	327	854	56	119	76	214,354
K6TA	383	863	63	99	86	214,024
SP2EWQ/2	360	841	55	147	49	211,091
JA1BHK	363	985	53	122	38	209,805
PA3BFH	363	848	56	152	38	208,608
DH9SB	328	814	58	129	59	200,244
N7DB	348	803	58	103	86	198,341
JA3HBF	293	840	60	125	49	196,560
UN7JX	405	1121	38	106	31	196,175
OH0JV	*383*	*865*	*46*	*148*	*29*	*192,895*
W4BCG	307	694	63	137	74	190,156
IK2WYI	330	800	53	132	52	189,600
WA7YAZ	345	806	63	105	67	189,410
W0SM	388	953	46	99	52	187,741
DJ1OJ	290	762	57	110	79	187,452
K9RT	293	792	61	139	32	183,744
RN4SS	407	870	43	140	27	182,700
RZ6AEW	440	926	42	150	0	177,792
TF3VS	*369*	*847*	*43*	*120*	*44*	*175,329*
N3WT	299	834	54	133	23	175,140
TA1BM	*349*	*787*	*59*	*160*	*0*	*172,353*
JH4BTI	*289*	*835*	*54*	*112*	*36*	*168,670*
KR4U	321	719	47	112	75	168,246
N1MGO	283	682	58	117	71	167,772
RA3TT	305	767	54	118	44	165,672
RW4HIF	365	799	43	145	19	165,393
N7PWZ	306	672	51	110	83	163,968
DL6ZNG	314	746	54	127	37	162,628
W7GTO	318	651	57	97	95	162,099
W4TIJ	311	750	46	115	54	161,250
VA3PL	269	711	50	118	58	160,686
SP9FT	287	700	55	131	39	157,500
K8HF	277	662	55	125	57	156,894
OH2LO	*308*	*741*	*47*	*132*	*32*	*156,351*
L54EU	331	957	41	94	27	155,034
SP7FBQ	347	772	41	128	31	154,400
FO5PS	*306*	*895*	*45*	*54*	*72*	*153,045*
JA1XRH	248	669	66	98	58	148,518
VA3XRZ	256	655	47	114	65	148,030
K6OWL	293	697	53	98	61	147,764
KS0M	262	652	56	123	46	146,700
WA6BOB	303	644	58	75	88	142,324
JA7KM	*246*	*719*	*51*	*102*	*43*	*140,924*
JA2QVP	*253*	*726*	*51*	*102*	*40*	*140,118*
PS7ZZ	238	670	45	110	54	140,030
UA1AFZ	318	689	46	128	26	137,800
SM3AF	241	607	46	133	43	134,754
PY3OL	244	695	49	102	42	134,135
DK6CQ	243	647	53	100	53	133,282
N6PC	281	583	50	90	88	132,924
KS5V	265	611	51	97	68	131,976
KT4U	233	638	57	126	21	130,152
UA3UCD	280	633	48	156	1	129,765
G0/N9LYE	288	653	40	114	44	129,294
K3IU	236	575	55	111	55	127,075
N7ON	246	562	59	99	67	126,450
SV1CAX	327	700	42	137	1	126,000
SP9CQ	250	616	57	120	23	123,200
KH6GMP	259	771	39	54	65	121,818
SV1BDO	326	699	38	134	0	120,228
HB9CRV	279	627	43	127	21	119,757
ON7SS	281	643	44	112	29	118,955
N7GVV	238	549	53	99	57	114,741
CT4DX	*246*	*586*	*41*	*103*	*49*	*113,098*
W6KY	232	536	55	88	66	112,024
S59AA	222	551	44	101	55	110,200
KJ6RA	219	549	50	105	44	109,251
SP4BOS	249	585	51	115	19	108,225
W7WHY	229	505	53	97	63	107,565
DK7FP	207	539	48	84	66	106,722
RZ4AG	213	526	43	115	44	106,252
WB6BWZ	246	452	47	81	102	103,960
WA2HFI	231	490	51	91	66	101,920
LY2FN	226	566	41	91	48	101,880
SP2MKI	220	562	41	85	54	101,160
JA2KCY	201	577	49	97	28	100,398
AG4TJ	211	531	46	101	42	100,359
EA4BT	249	570	41	112	22	99,750
DK3RA	205	511	50	108	37	99,645
IV3KSE	212	524	46	98	43	97,988
CT1BNW	215	531	41	98	41	95,580
JF2IGP	210	605	41	81	31	92,565
OH2LZI	278	620	31	101	17	92,380
OH3YM	263	590	36	106	13	91,450
DL1DTL	258	582	38	86	30	89,628
NN5T	190	441	53	95	53	88,641
G3URA	244	564	36	88	33	88,548
KL7WP	*220*	*553*	*38*	*66*	*56*	*88,480*
DL1ARJ	178	497	48	65	63	87,472
EA8AKQ	**228**	**684**	**29**	**67**	**30**	**86,184**
WB0YRQ	215	461	38	87	59	84,824
K6BIR	193	448	50	83	56	84,672
JA1BNW	192	559	37	95	18	83,850
DL2DBS	240	540	37	92	24	82,620
EX2U	*245*	*653*	*29*	*85*	*9*	*80,319*
KA2D	182	531	41	104	6	80,181
YU1AB	192	460	47	115	10	79,120
SP4MPH	191	482	47	84	33	79,048
SP6NVK	223	500	36	99	23	79,000
RU3WR	227	492	32	118	9	78,228
DL1NUB	194	469	44	91	28	76,447
IV3KAS	188	442	43	89	40	76,024
WD0BNC	192	490	36	88	29	74,970
K1JN	166	440	43	100	24	73,480
SP8NFF	207	472	37	95	20	71,744
N0YKN	167	426	45	92	30	71,142
N3NZ	176	447	45	85	29	71,073
SP9NH	167	445	44	73	42	70,755
DL9ST	192	453	42	94	18	69,762
IK3ASM	161	411	49	84	35	69,048
N0UX	204	443	35	66	52	67,779
KC2FBK	176	400	36	76	49	64,400
DL8HCO	184	423	41	95	15	63,873
K9PY	156	406	48	89	20	63,742
ZS1JY	*163*	*487*	*33*	*69*	*28*	*63,310*
RA0ANO	155	430	37	82	23	61,060
N9KO	164	376	42	84	35	60,536
KF2XF	148	381	42	85	25	57,912
NI4S	162	428	34	78	21	56,924
LU8CM	140	398	40	67	32	55,322
WN3C	152	431	31	86	10	54,737
RZ9IB	170	456	34	78	7	54,264
DL8SDC	136	366	39	60	48	53,802
VE2OWL	139	351	42	71	40	53,703
RX3DTN	155	403	36	69	28	53,599
W3DSX	152	446	33	87	0	53,520
F5RD	180	409	32	87	10	52,761
NE0P	143	326	44	65	48	51,182
W4JH	136	379	39	81	13	50,407
M3OKU	180	393	26	83	19	50,304
F5PHW	154	359	41	89	8	49,542
IK2WFN	146	356	39	69	30	49,128
PA3CDN	161	358	40	93	0	47,614
PA0LSK	182	410	32	84	0	47,560
DL5YAS	146	352	36	75	23	47,168
WB0ULX	134	352	37	78	18	46,816
PY7IQ	121	338	39	70	25	45,292
UA3RW	134	332	30	78	28	45,152
IK3CST	160	353	29	73	25	44,831
K9SZ	142	303	34	67	43	43,632
ER3ZZ	*169*	*371*	*29*	*87*	*0*	*43,036*
K8RT	125	361	35	80	3	42,598
AK6DV	108	300	45	82	13	42,000
YO5TP	140	374	29	49	31	40,766
JA8AGI/1	*116*	*316*	*47*	*71*	*11*	*40,764*
JG3NKP/1	124	362	30	61	19	39820
WB9BSH	133	331	29	66	25	39,720
K6RFM	136	307	32	54	43	39,603
KB3IEO	111	302	38	76	15	38,958
K1JE	109	267	46	73	26	38,715
SM6BUV	114	300	34	53	42	38,700
DK3WI	171	393	21	60	17	38,514
WA4FXX	123	364	27	77	0	37,856
AA8EN	119	297	38	65	21	36,828
N2LEB	114	284	33	68	23	35,216
SQ7FSM	134	311	24	65	23	34,832
WB9NOV	120	332	28	74	1	34,196
YO2NAA	116	283	32	61	27	33,960
VE2FFE	106	277	30	60	31	33,517
EW1EA	112	285	36	63	18	33,345
EA1AHA	120	277	28	65	26	32,963
OM7JG	129	288	33	80	0	32,544
DL1DRD	100	258	37	64	21	31,476
SM4XIH	131	299	32	72	0	31,096
VE5SF	*102*	*268*	*35*	*55*	*24*	*30,552*
UT4ZX	98	262	34	49	30	29,606
KA0EIC	107	258	31	58	25	29,412
OE1KTS	*103*	*266*	*33*	*46*	*31*	*29,260*
K0RY	95	266	39	62	9	29,260
HS0/VK3DXI	*119*	*325*	*29*	*60*	*1*	*29,250*
LW9ETQ	110	299	25	42	29	28,704
KE6QR	110	235	30	50	41	28,435
K9BJM	100	240	28	59	24	26,640
N4GXP/8	108	271	31	50	14	25,745
JQ1AHZ/2	94	273	28	53	11	25,116
F6ACC	115	251	24	64	9	24,347
JA2UJ	91	271	24	39	26	24,119
M3OKT	120	257	19	61	4	21,588
KB2EOQ	102	194	28	38	43	21,146
W5WZ	96	207	28	43	30	20,907
W1TW	90	207	29	46	25	20,700
DL6ABB	90	214	26	55	15	20,544
EU6TV	94	220	29	58	5	20,240
N5ZC	80	196	33	48	22	20,188
DL7BW	81	224	36	42	12	20,160
SM4RLD	117	248	23	51	4	19,344
IZ8DWH	106	227	21	52	2	19,295
K3MZ	71	193	34	54	8	18,528
T95DVD	93	206	26	56	5	17,922
DJ6TK	92	201	22	60	0	16,482
IZ0BXZ	100	168	28	54	12	15,792
SP6RGC	71	188	27	35	18	15,040
PA1VC	100	218	12	39	10	13,298
K3FH	58	171	24	48	0	12,312
K2SD	67	196	20	37	0	11,172
JH1TUX	53	141	30	34	14	10,998
CX4SS	*76*	*223*	*14*	*16*	*17*	*10,481*
W3FQE	61	158	19	35	12	10,428
6J3OYJ	56	163	20	38	3	9,943
KE5OG	62	125	20	28	21	8,625
M5DND	60	135	22	36	5	8,505
JA1IZZ	53	150	18	36	0	8,100
W2QQ	50	117	15	30	17	7,254
M3GOJ	45	108	13	29	9	5,508
N0LZ	29	69	20	22	9	3,519
KV4CN	29	76	13	23	6	3,192
RA9FTM	47	132	5	19	0	3,168
N1EO	24	70	16	24	0	2,800
DL5CX	20	60	15	14	4	1,980
AE4EC	21	57	13	18	3	1,938
VE7MOB	21	47	13	16	11	1,880
WP2S	*14*	*32*	*13*	*14*	*2*	*928*
KC7WUE	12	29	11	12	4	783
UT5UGQ	10	25	9	9	2	500
RA2FW	*9*	*23*	*7*	*8*	*0*	*345*
KB2Z	5	15	3	5	0	120
HP1ALX	*4*	*8*	*4*	*3*	*2*	*72*

ZX2B: PY2MNL, UW5U: UY2UA, G4RS: G0URR, 9M6LSC: JH7IMX, H2E: 5B4AGE, J49XB: DJ9XB, YO3APJ: 1, UW7F: UR5FEO, IU1DCI: IK1GPG 6J1YYD: XE1YYD, 9H9PA: PA7PTR/9H3TE, HA3VAM: HA3FPL, SW2A: SV2AEL, 6J2AUB: XE2AUB, SN8R: SP8ONZ, 6J2AC: XE2AC.

SINGLE OPERATOR 10 METERS

Call	QSOs	Pts.	Z	C	US/VE	Final Score
LU1HF	*1429*	*4228*	*31*	*96*	*54*	*765,268*
PJ2EL	*1109*	*3291*	*25*	*76*	*53*	*506,814*
9A5Y	*1007*	*2620*	*34*	*95*	*52*	*474,220*
CX5BW	*986*	*2924*	*25*	*77*	*49*	*441,524*
9A5E	*949*	*2494*	*34*	*88*	*53*	*436,450*
LT1A	*855*	*2511*	*27*	*88*	*51*	*416,826*
N4BP	*939*	*2471*	*30*	*86*	*46*	*400,302*
M0TTT	*912*	*2398*	*31*	*84*	*49*	*393,272*
HA1WD	*840*	*2225*	*34*	*88*	*50*	*382,700*
KK5OQ	*834*	*2197*	*30*	*84*	*45*	*349,323*
S50R	*795*	*2094*	*31*	*82*	*52*	*345,510*
6J1KK	*875*	*2249*	*27*	*74*	*51*	*341,848*
K4EA	*787*	*2099*	*29*	*90*	*42*	*337,939*
HC1JQ	*774*	*2285*	*23*	*74*	*49*	*333,610*
IY4W	*747*	*1970*	*33*	*82*	*52*	*328,990*
DL1LH	*729*	*1907*	*33*	*86*	*50*	*322,283*
5B4AHA	*754*	*2156*	*25*	*67*	*34*	*271,656*
YO6BHN	*473*	*1234*	*32*	*81*	*37*	*185,100*
SP8NR	*439*	*1211*	*30*	*72*	*46*	*179,228*
US9QA	*525*	*1286*	*22*	*68*	*38*	*164,608*
ES7AAZ	*406*	*1059*	*30*	*85*	*38*	*162,027*
KE6YTT	*475*	*1154*	*25*	*73*	*39*	*158,098*
LZ2JA	*398*	*1025*	*26*	*72*	*45*	*146,575*
K0MP	*498*	*1258*	*22*	*59*	*35*	*145,928*
UT2UZ	375	992	30	76	38	142,848
LT1D	426	1250	18	54	41	141,250
AB8K	*396*	*1070*	*25*	*76*	*22*	*131,610*
F5IJT	*413*	*1030*	*28*	*68*	*28*	*127,720*
ON6NL	*354*	*929*	*26*	*67*	*43*	*126,344*
JA7EMH	*308*	*888*	*30*	*72*	*30*	*117,216*
EU1SA	*307*	*825*	*27*	*69*	*42*	*113,850*
OH0HEY	*281*	*742*	*30*	*75*	*36*	*104,622*
F6IRG	313	819	23	57	41	99,099
OK1DDO	*277*	*763*	*22*	*52*	*47*	*92,323*
JA1SJV	*258*	*734*	*27*	*64*	*33*	*91,016*
W9ILY	*287*	*759*	*21*	*66*	*13*	*75,900*
RF4R	*297*	*692*	*20*	*59*	*25*	*71,968*
RV3APM	212	536	26	64	26	62,176
SN2X	151	419	20	43	33	40,224
RU3XB	149	373	21	44	25	33,570
LU7DNN	131	377	18	39	29	32,422
JA5ATN	*131*	*383*	*16*	*46*	*16*	*29,874*
OH7JJT	*157*	*361*	*19*	*48*	*13*	*28,880*
LW1HDJ	110	322	18	44	21	26,726

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OH5KUY	157	362	16	44	10	25,340
OK1ACF	98	283	22	32	28	23,206
TA1EQ	125	307	18	31	19	20,876
UR5FCM	110	274	13	29	23	17,810
CT2GRF	100	239	14	39	18	16,969
4J9NM	124	357	6	32	0	13,566
SP8MI	73	201	11	27	18	11,256
EW6OO	60	160	16	31	15	9,920
LW5DR	61	172	19	30	8	9,804
SP3PL	73	197	17	31	0	9,456
PY4PW	62	164	15	25	12	8,528
KG4FSN	62	144	16	27	12	7,920
K80SF	51	123	17	20	8	5,535
JG3WCZ	2	6	1	2	0	18

9A5Y: 9A3NM, LT1A: LU3CT, 6J1KK: XE1KK, IY4W: IK4MHB, LT1D: LU4DJC, OH0HEY: OH3TY, RF4R: UA4RC, SN2X: SP2DWG.

SINGLE OPERATOR 15 METERS

Call	QSOs	Pts.	Z	C	US/VE	Final Score
9A5W	**1245**	**3260**	**37**	**106**	**56**	**648,740**
UX0FF	1192	3013	33	100	55	566,444
S55W	1089	2846	36	98	55	537,894
SP5GRM	1008	2709	36	102	56	525,546
T94MZ	978	2512	33	92	54	449,648
DL4MCF	971	2494	32	92	56	448,920
LV5V	883	2589	31	91	51	447,897
W1AW	**1060**	**2677**	**30**	**85**	**48**	**436,351**
UK9AA	964	2698	32	88	38	426,284
S51FB	872	2287	32	84	54	388,790
UA0CA	847	2331	29	83	50	377,622
UT5UGR	817	2012	34	94	46	350,088
JK3DGX/3	747	2103	31	88	47	349,098
RU0AM	798	2198	28	82	45	340,690
VR2BG	785	2135	32	74	51	335,195
IK2FIL	753	1970	32	83	54	332,930
L44DX	667	1956	29	77	50	305,136
GW4SKA	705	1769	30	83	52	291,885
OH7N	731	1818	29	81	46	283,608
JG1GGU	518	1464	28	78	48	225,456
OZ9GA	574	1494	28	73	49	224,100
JR3RIY	524	1479	26	78	43	217,413
CX4AAJ	491	1449	28	75	43	211,554
RN6AL	598	1415	26	76	40	200,930
LU8ADX	440	1292	28	74	40	183,464
UT4EO	517	1211	30	83	37	181,650
SP8AQA	478	1193	28	77	44	177,757
JE1GMM	408	1152	30	76	44	172,800
5N0NHD	453	1359	19	62	36	159,003
JA2BY	372	1068	25	66	47	147,384
HA3JB	373	943	33	77	43	144,279
VK2KM	347	1022	30	74	29	135,926
JH3SIF	333	928	27	73	35	125,280
EC2AFA	475	1099	22	55	34	121,989
OM1AXO	390	1019	21	56	42	121,261
ON4VV	336	866	27	67	45	120,374
RA3BT	351	890	27	62	44	118,370
YB5QZ	345	1018	25	76	13	116,052
YB0ECT	273	806	30	71	23	99,944
SM7JUR	302	750	26	68	35	96,750
W4LC	313	876	23	65	18	92,856
OH8MWD	310	739	23	68	30	89,419
DH5WB	261	648	29	63	35	82,296
YO8FZ	290	693	27	69	21	81,081
W6IWO	283	651	20	53	38	72,261
UA0CW	212	611	27	68	23	72,098
JA7DNO	211	601	23	59	29	66,711
EA6/DL8NBY	243	575	20	58	33	63,825
AG4W	207	534	21	59	23	55,002
UW0F	212	515	21	56	28	54,075
UA0FZ	196	543	20	59	12	49,413
YO2BEH	195	456	19	54	27	45,600
UR5QU	166	408	26	63	20	44,472
HB9DTM	183	461	15	40	33	40,568
AY5DT	140	410	25	61	10	39,360
OK2PTC	157	393	18	52	25	37,335
JL3SBE	111	320	24	48	26	31,360
JA1EMQ	125	359	21	44	19	30,156
VK5LA	119	343	22	52	13	29,841
SP9UH	100	248	20	49	16	21,080
WA1FCN	107	287	17	41	15	20,951
SP3CCT	113	278	22	53	0	20,850
UA3UBT	95	227	15	42	16	16,571
K5WW	103	199	16	28	29	14,527
K3PP	98	276	10	34	8	14,352
JR1NKN	85	233	18	37	0	12,815
UN9FD	84	227	15	34	4	12,031
OK2SJI	47	122	14	22	15	6,222
JA1XPU	32	89	14	19	9	3,738
SP3MY	40	106	9	17	9	3,710

S55W: S57IIO, LV5V: LU5VV, W1AW: WS7I, L44DX: LW1DTZ, OH7N: OH7MN, AY5DT: LU5DT.

SINGLE OPERATOR 20 METERS

Call	QSOs	Pts.	Z	C	US/VE	Final Score
S50U	1270	3293	32	92	55	589,447
9A2DQ	1191	3014	32	93	55	542,520
CK6WQ	1131	2956	32	87	53	508,432
M0BEW	971	2352	31	85	50	390,432
SP4TXI	787	1933	29	85	47	311,213
YU7AE	777	1896	28	83	48	301,464
K9JY	789	1914	30	78	45	292,842
UA9CKP	645	1871	26	79	44	278,779
IT9STX	777	1837	25	75	51	277,387
DH6LS	697	1718	27	85	43	266,290
SV1CQN	764	1829	24	71	46	257,889
P43W	575	1697	24	70	47	239,277
LP7H	510	1489	27	70	44	209,949
F6FJE	564	1290	26	81	38	187,050
UX6F	616	1414	23	67	36	178,164
RW4PL	511	1216	29	74	42	176,320
RZ6AUL	530	1181	26	74	37	161,797
UV8M	443	1073	24	72	41	147,001
UA3LEO	444	1032	26	78	37	145,512
UT7FP	497	1152	21	66	38	144,000
7K4QOK	322	882	28	78	25	115,542
RU3DNN	437	970	23	72	24	115,430
DJ2XC	368	860	26	76	29	112,660
SV1FJN	447	1014	17	60	30	108,498
PT2BW	314	910	21	59	37	106,470
RK3DQK	345	780	18	67	26	86,580
SP8KAF	309	756	20	58	36	86,184
UT2AU	322	741	23	68	23	84,474
SV1EPX	375	844	18	54	28	84,400
RA3DRA	339	760	21	66	19	80,560
UN4PD	241	685	24	58	23	71,925
DL4JYT	280	650	19	62	24	68,250
DK2GZ	244	572	19	57	34	62,920
UA9FGJ	219	622	20	56	23	61,578
JH1RFM	213	598	21	60	17	58,604
UR5ZMK	207	519	22	58	31	57,609
TA1DX	296	639	14	54	12	51,120
UA6ADC	218	477	19	60	22	48,177
DL6EDD	202	478	16	58	26	47,800
EA3AJW	214	486	17	58	18	45,198
RW3DIA	246	526	11	52	17	42,080
RA1OK	199	440	19	55	17	40,040
TA2FT	210	597	12	49	6	39,999
PY7XC	152	451	16	40	24	36,080
HP1KZ	150	370	11	34	32	28,490
DL9MBZ	164	369	17	49	11	28,413
I4DOO	130	291	16	54	14	24,444
K1UG	107	245	16	44	29	21,805
W4XDX	111	227	15	33	32	18,160
SP3JHR	123	260	17	31	15	16,380
YO4CVV	135	296	7	43	3	15,688
K0COP/4	73	173	12	34	18	11,072
SP7DQR/5	97	210	8	37	2	9,870
JH2OJS	60	167	19	31	8	9,686
YO3III	59	158	14	25	20	9,322
VU3DJQ	46	129	12	32	1	5,805
EA4WC	42	107	10	20	11	4,387
K0SRW	66	81	9	8	25	3,402
PA5PR	24	53	7	19	2	1,484
RK3DOV	23	42	4	17	0	882
E21EIC	15	42	10	10	0	840
RA4LK	9	24	7	8	1	384

CK6WQ: VE6WQ, LP7H: LU9HS, UV8M: UX3MR, 7K4QOK: JR2BNF, SP8KAF: SQ8GHY.

SINGLE OPERATOR 40 METERS

Call	QSOs	Points	Zones	Countries	US/VE	Final Score
S50A	710	1701	23	71	49	243,243
UT2II	552	1270	24	73	27	157,480
IK1HXN	484	1110	18	64	38	133,200
DF8QB	503	1059	18	68	28	120,726
4Z8EE	384	1123	17	58	18	104,439
UR5FFC	382	802	15	61	11	69,774
SP9ODY	351	745	14	57	17	65,560
UA3LID	275	596	20	59	22	60,196
T94DO	308	646	9	50	12	45,866
UA3RF	276	567	15	53	6	41,958
UR5NX	273	574	11	50	11	41,328
TA1GS	279	587	12	52	3	39,329
F5KSE	133	292	10	39	17	19,272
NT1V	107	213	15	35	30	17,040
JH1APZ	63	172	19	24	11	9,288
4Z8EE	29	39	6	6	20	1,248

4Z8EE: KI7T.

SINGLE OPERATOR 80 METERS

Call	QSOs	Points	Zones	Countries	US/VE	Final Score
S57AW	471	1007	15	62	22	99,693
S54E	383	823	11	52	23	70,778
9A7R	403	829	12	55	8	62,175
OK2CLW	333	653	9	50	4	41,139
SP7IIT	329	652	8	48	5	39,772
OK2ZC	274	540	8	45	6	31,860
T95A	246	498	6	42	0	23,904
UT0H	181	363	9	40	3	18,876
RK6BZ	167	333	7	40	0	15,651

SINGLE OPERATOR ASSISTED

Call	QSOs	Points	Zones	Countries	US/VE	Final Score
DL5AXX	**2212**	**5730**	**127**	**331**	**200**	**3,770,340**
JH4UYB	1856	5275	115	290	154	2,948,725
RN6BN	1886	4613	113	312	158	2,689,379
RW9WA	1755	5048	93	302	131	2,655,248
ON4UN	1617	4237	110	305	179	2,516,778
ND5S	**1449**	**3508**	**102**	**275**	**174**	**1,932,908**
DF3IAL	1291	3240	112	320	161	1,921,320
KU1CW	1443	3564	94	238	152	1,724,976
RA3WA	1338	3146	104	293	118	1,620,190
NO2T	1191	2939	87	248	152	1,431,293
VE4COZ	1068	2755	82	208	163	1,248,015
K4WW	1049	2589	86	231	142	1,188,351
SM7BHM	1000	2432	77	251	125	1,101,696
VA7SW	1064	2694	79	157	147	1,031,802
N5JR	977	2490	83	214	104	998,490
OH2LU	844	2017	94	277	77	903,616C
LU8EKC	**850**	**2450**	**71**	**175**	**96**	**837,900**
DK3GI	727	1916	82	189	133	774,064
VK6GOM	**809**	**2391**	**75**	**176**	**63**	**750,774**
7L4IOU	692	1870	89	181	86	665,720
N2BJ	723	1926	63	173	68	585,504
UA0AGI	671	1827	73	182	53	562,716
8P6SH	596	1590	61	171	111	545,370
JA8JCR	623	1735	81	177	50	534,380
VA3PC	571	1518	70	181	101	534,336
W0BR	499	1198	72	175	91	404,924
JA1WSK	455	1284	65	167	76	395,472
KU4J	488	1213	75	177	73	394,225
G0MTN	491	1195	59	155	87	359,695
JH5OXF	458	1265	73	154	55	356,730
DJ4PI	473	1153	67	161	66	338,982
KD6NA	398	1001	67	171	74	312,312
OK2ZJ	451	1059	61	156	56	289,107
K0BX	427	1098	53	140	54	271,206
EA3GIP	293	737	67	155	58	206,360
JR1BAS	265	769	61	112	50	171,487
JS3CTQ	306	803	55	122	28	164,615
DL7VEE	238	587	81	170	26	162,599
RU4LM	278	651	44	133	39	140,616
DL6LAU	216	519	66	127	23	112,104
K4RVH	199	499	52	119	35	102,794
WA0SXV/5	267	496	51	60	92	100,688
DL4RU	206	467	49	111	12	80,324
RU3AT	163	410	54	97	43	79,540
NA4M	205	494	42	61	44	72,618
SV1XV	152	406	53	83	40	71,456
JY9QJ	177	515	38	75	20	68,495
N3JIX	137	378	31	80	14	47,250
PY1NX	140	406	25	54	27	43,036
7Z1SJ	226	675	11	43	8	41,850
K6XT	103	284	37	65	11	32,092
N5ZM	119	227	37	52	45	30,418
W8WEJ	94	247	39	63	16	29,146
KA8PTT	98	290	25	65	0	26,100
7N2DAB	86	249	29	52	16	24,153

OE1TKW	72	204	33	39	21	18,972
JJ1BDX/3	51	124	27	30	14	8,804

MULTI-OPERATOR TWO TRANSMITTER

Call	QSOs	Points	Zones	Countries	US/VE	Final Score
HC8N	**4576**	**13609**	**137**	**381**	**264**	**10,642,238**
RU1A	3518	8793	134	399	211	6,541,992
RW2F	3254	8319	143	395	221	6,314,121
KI1G	**3131**	**7895**	**127**	**379**	**237**	**5,865,985**
3Z7TTY	2975	7645	125	363	211	5,343,855
W5KFT	2555	5863	114	295	233	3,764,046
RO4M	2600	6059	116	330	127	3,471,807
VE5RI	1411	3647	84	190	155	1,564,563

HC8N: N5KO, K6AW, AD1C; RU1A: RA1ACJ, RA1AR, RN1AM, RW1AC, UA1AKC, UA1ARX, YURI; RW2F: UA2FZ, UA2FF, UA2FB, RN2FA; KI1G: KI1G, WF1B, K1AM; 3Z7TTY: SP7GIQ, SP7PS, SP5UAF, SP5HNK, SQ5BPM, SQ5EBJ; W5KFT: K5PI, W7WW, K5DJ, K7WM; RO4M: RA4LW, RA4LZ, RN4LP, RU4HP, RU4HU, RW4LE, UA4LDP; VE5RI: VE5CMA, VE5FF, VE5FN, VE5WI, VE6EZ, VE6SF.

MULTI-OPERATOR SINGLE TRANSMITTER HIGH POWER

Call	QSOs	Points	Zones	Countries	US/VE	Final Score
HP1XVH	**3127**	**8235**	**127**	**353**	**249**	**6,003,315**
OM5M	2353	6132	130	361	206	4,274,004
RW9C	2099	5991	127	375	134	3,810,276
MW2I	2365	5833	117	341	195	3,808,949
W2FU	2235	5722	116	343	203	3,787,964
OH5Z	2077	5359	117	347	168	3,386,888
UT9F	1883	4544	112	335	157	2,744,576
T77CD	2124	5456	88	257	143	2,662,528
OL5Q	1776	4558	95	269	178	2,470,436
W0DC	1717	4121	102	281	198	2,394,301
N0NI	1653	3946	115	288	191	2,343,924
LR0N	1573	4625	99	233	160	2,275,500
JJ3YBB	1572	4468	90	227	131	2,001,664
OK1KSL	1378	3422	100	296	146	1,854,724
KJ7TH	1524	3585	99	222	176	1,781,745
TK/OM5RW/P	1563	3693	87	269	126	1,780,026
KI5XP	1333	3213	99	266	168	1,712,529
K7ZUM	1300	3026	89	202	166	1,382,882
KE7AJ	1188	2783	88	199	145	1,202,256
OA4O	961	2832	70	163	126	1,016,688
VE3FJB	909	2473	72	200	90	895,226
RK9JWZ	955	2655	72	214	49	889,425
PA0VHA	946	2266	61	176	96	754,578
VE7GL	651	1742	65	136	96	517,374
LW8EXF	651	1861	64	166	42	506,192

HP1XVH: DJ7AA, DL4LQM, DL5LYM, HP1XVH; OM5M: OM3RG, OM2RA, OM2KW, OM4DW; RW9C: UA9CGA, RW9CF, RU9CK, RA9DK; MW2I: GW4JBQ, GW5NF, G4VXE, WW2R; W2FU: W2FU, N2WK, W1TY, K1PY, K2CS, N1OKL, K2ZS, N2OPW, NG2P; OH5Z: OH5CW, OH5HCK; UT9F: UT9FJ, UR0FO, UT4FJ, UT0FT, UR5FEO, UT5UGW; OL5Q: OK1HRA, OK1VSL, OK1FLC; W0DC: W0BV, W0DC, N0KE, W0LSD; N0NI: N0NI, N0AC, N0HR, WO0V, K0WHV, K0KD; LR0N: LU2NI, LU1NDC, LU8NA, LW7EIC; JJ3YBB: JA3PJL, JA3FHL, JH3FQF, JS3VEX; KJ7TH: KJ7TH, KW7N; TK/OM5RW/P: OM5RW, OM3PC; KI5XP: KI5XP, WA5CHX, N5RLM, W5WMU; K7ZUM: K7ZUM, AC7LX, KI7Y; KE7AJ: KE7AJ, K7OX; OA4O: OA4DJW, OA4AHW, OA4CZO, 9A6DX; VE3FJB: VE3FJB, VE3IJM, VA3NX, VA3FN, VA3CW, VA3DG, VA3YC; RK9JWZ: RX9JM, UA9JIJ, UA9JLO, UA9JMD; PA0VHA: PA0VHA, PA3BSQ; VE7GL: VE7GL, VE7TTQ, VA7OO; LW8EXF: LU1AEE, LU2BA, LU7DW, LW7DQW, LW8EXF.

MULTI-OPERATOR SINGLE TRANSMITTER LOW POWER

Call	QSOs	Points	Zones	Countries	US/VE	Final Score
HG1S	**2062**	**5371**	**121**	**334**	**189**	**3,458,924**
Z37M	**2127**	**5340**	**101**	**312**	**185**	**3,193,320**
KP2D	**1962**	**5124**	**89**	**242**	**187**	**2,654,232**
K1TTT	**1664**	**4108**	**110**	**322**	**199**	**2,592,148**
YL7C	1480	3615	90	278	141	1,840,035
9A7P	1430	3552	88	260	162	1,811,520
YU7AL	1312	3282	89	265	143	1,631,154
9A7T	979	2435	95	252	134	1,171,235
EA2RY	894	2161	85	237	122	959,484
LU7FJ	937	2749	69	174	101	945,656
WA1Z	769	1848	86	231	134	833,448
3Z1V	679	1726	89	255	117	795,686
ES1U	838	1980	75	227	75	746,460
OK6A	780	1827	70	209	75	646,758
RZ9SWP	535	1505	48	138	35	332,605
KL7IWC	486	1185	58	104	109	321,135
9H3HG	477	1109	54	154	58	297,122
F8KFN/P	402	943	55	141	62	243,294
RK3DZD	368	857	39	98	26	139,691
AE5DL	174	416	32	76	43	62,816

HG1S: HA1TJ, HA1DAE, HA1DAC, HA1DAI, HA1AG; Z37M: Z31GX, Z32PT, Z33F, Z36W, ZORAN; KP2D: KP2N, NP2W, NP2DJ, NP2DZ, KP2VI, W5TTY; K1TTT: K1TTT, W1TO, WM1K, K1MK, KE1FO, N1XS, KM1P; YL7C: YL2MD, YL2GQT; 9A7P: 9A6XX, 9A5AEI; YU7AL: YZ7EM, YU7AL; 9A7T: 9A2EU, 9A4KJ, 9A5MR; EA2RY: EA2RY, EA2RU; LU7FJ: LU3FLV, LU4FXI, LU5FF, LU5FII, LU7FNI, LU8FAH; WA1Z: WA1Z, NE1I; 3Z1V: SP1MHV, SQ1FTD; ES1U: ES1QV, ES2DJ; OK6A: OK2MTW, OK2ACM, OK2PSE; RZ9SWP: RA9SUS, RA9STH, RA9STT, UA9SH; KL7IWC: KL7IWC, WL7CQA; 9H3HG: 9H3HG, GISELA, 9H3HG/DK9GG, 9H3SG/DJ4KW; F8KFN/P: F5TEF, F8DPP, F8CHR; RK3DZD: RK3DSL, RZ3DAN, RK3DPL, RK3DUF; AE5DL: AE5DL, AE5NL.

MULTI-OPERATOR MULTI-TRANSMITTER

Call	QSOs	Points	Zones	Countries	US/VE	Final Score
LY5A	**4052**	**10227**	**139**	**413**	**212**	**7,813,428**
YL8M	2969	7429	116	363	199	5,036,862
KA4RRU	2763	6670	113	328	220	4,408,870
JE4VVM	2503	7006	133	330	156	4,336,714
EN7Z	2729	6634	109	337	176	4,126,348
IV3TMV	1948	4936	112	326	167	2,986,280
YV4A	1826	5415	89	248	179	2,794,140
LZ9R	1812	4344	93	315	140	2,380,512
WA9ALS	1740	4107	105	269	186	2,299,920
OH2K	485	1106	50	157	0	228,942

LY5A: LY2PAJ, LY1BA, LY2BIG, LY2GV, LY2TA, LY2IJ, LY3MM; YL8M: YL2KL, YL3GDJ, YL1ZF, YL2KF; KA4RRU: KA4RRU, W4DC, N4DXS, W4MGM, W4DAV, WA4TK, WB4ZNH, KR4KF, N3YBY, N8CIA, KG4QWQ, KG4JDL; JE4VVM: JI3OPA, JE4VVM, JG4CLV, JN4FEU; EN7Z: UT0ZZ, UR7ZZ, UX2HO (EM1HO), UW0ZZ, UT4ZO; YV4A: YV4A, YV4GLD, YV4GME, YV4YC, YV5KAJ, YV5AMH, YV5NSF; LZ9R: LZ1QV, LZ1ZM, LZ3YY, LZ5XQ; WA9ALS: WA9ALS, KB9YTW, WD9GMK; OH2K: OH2LRE, OH2LNH, OH2KNU.

CHECKLOGS: DE1DGD, SP3CUG, K3SWZ, 4N7TA, 6J2ML, AA9RR, AY6DTS, DL1ALD, DL6GV, DM3BJ, EA3RH, EO1I, ER3KS, G3NXT, G4EMT, GW7X, A5AF, HK3DDD, I2OKW, IK2QCF, IK8SCR, IT9CHU, IV3HAX, JK2VOC, K0IDT, LU1EC, MU0FBO, N4GJ, N5PU, N8KR, OE1WEU, OK1AXB, OK1DXK, OK2PCL, OZ6TL, PS7PIO, PY2YU, PY5KD, RA0AN, RK0AXX, RU3XX, RV1CC, RV4LS, RW4LQ, SM0CCM, SO2EWQ, SP2EXE, SP2JHJ, SP3FAR, SP6BEN, SP6EIY, SP7HQ, SP9SOU, UA9AX, W1LZ, W2YR, WB8YJF.

Dayton 2003 RTTY Schedule

Thursday, May 16, Evening — Casual RTTY get-together in the Howard Johnson bar and lounge. Location: Howard Johnson at 7575 Poe Avenue, Dayton, OH.

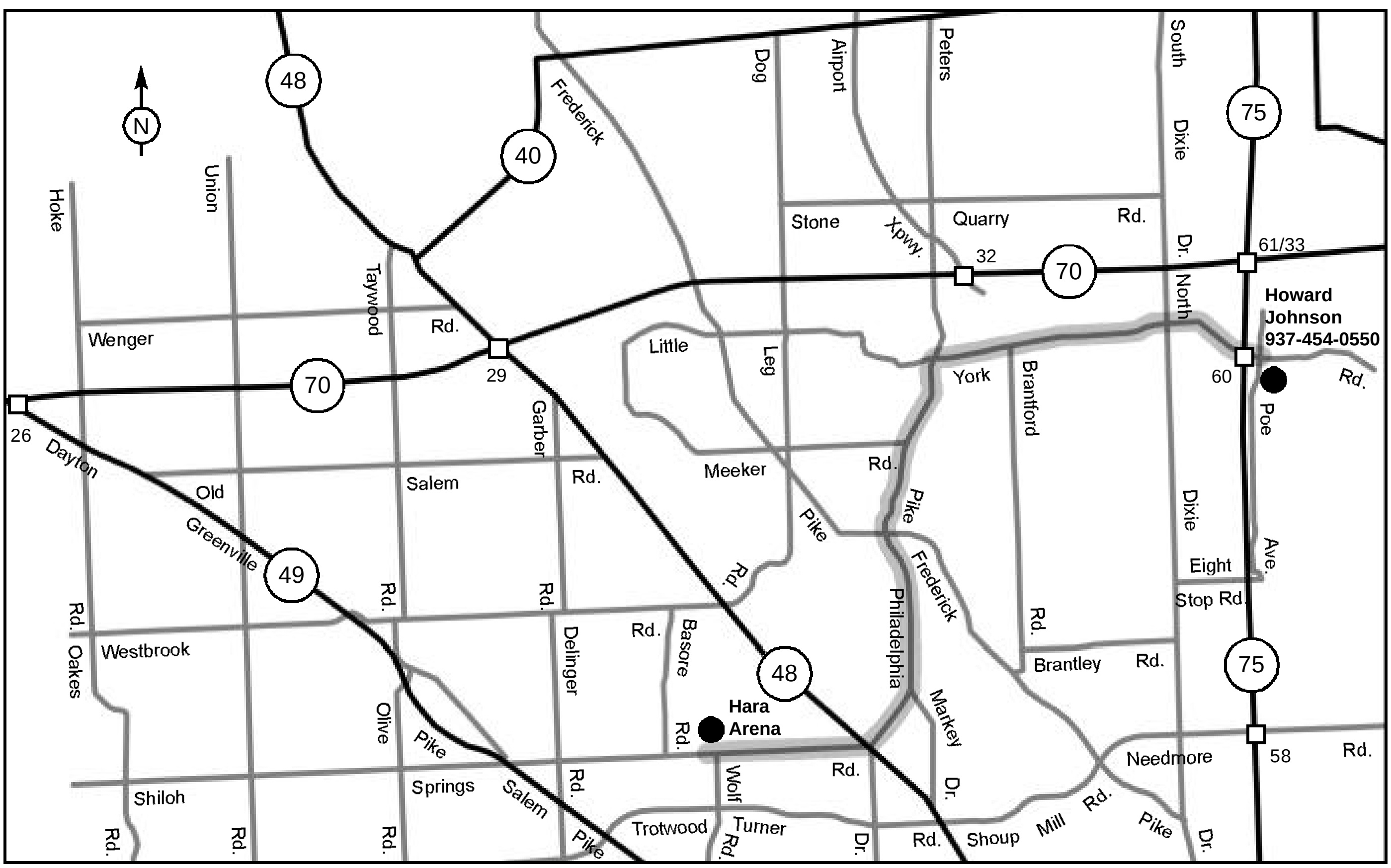
Saturday, May 17, 9:30 A.M. — RTTY Forum: *Ten Sure Fire Ways to Improve QSO Counts in RTTY Contests*. Hear from three top contesters who know how to get more QSOs in a RTTY contest. They have done it time and again. We plan to torture them into revealing the secrets of their high scores during the thirty minute tutorial from three top gun contesters: Don Hill, AA5AU; George Johnson, W1ZT, and Jay Townsend, WS7I. Location: Hara Arena.

Saturday, May 17, 7:00 P.M. — Join other RTTY enthusiasts at the annual dinner hosted by the RTTY Journal. Tickets are $19.00 each, and may be purchased at the door. The menu: sliced roast beef, sliced baked ham, boneless chicken breast, stuffed baked manicotti, twice baked potatoes, green bean almondine, and Japanese vegetable blend. Drinks will also be available. Location: Howard Johnson at 7575 Poe Avenue, Dayton, OH.

Hamvention Schedule

Inside Exhibitors:
Friday — 9:00 A.M. to 6:00 P.M.
Saturday — 8:00 A.M. to 5:00 P.M.
Saturday — 8:00 A.M. to 1:00 P.M.

Outside Vendors (Flea Market):
Friday — 8:00 A.M. to 6:00 P.M.
Saturday — 8:00 A.M. to 5:00 P.M.
Sunday — 8:00 A.M. to 1:00 P.M.



Summer/Fall 2003 RTTY Contest Schedule

- **Alessandro Volta RTTY DX**
  May 10 to May 11
- **Anatolian WW RTTY**
  May 17 to May 18
- **Great Lakes QSO Party**
  May 31 to June 1
- **ANARTS RTTY**
  June 14 to June 15
- **Spanish Islands (DIE)**
  June 15
- **ARRL Field Day**
  June 28 to June 29
- **DL-DX RTTY**
  July 5 to July 6
- **DARC 10m Digital "Corona"**
  July 6
- **Colombian Independence Day Contest**
  July 19
- **NCJ North American QSO Party**
  July 19 to July 20
- **Russian WW RTTY**
  July 26 to July 27
- **SARTG WW RTTY**
  August 16 to August 17
- **SCC RTTY Championship**
  August 30 to August 31
- **DARC 10m Digital "Corona"**
  September 7
- **CQ/RJ WW DX**
  September 27 to September 28
- **North American Sprint**
  October 12
- **JARTS WW RTTY**
  October 18 to October 19

More contest information available at http://www.rttyjournal.com/contests

Contesting on the Go

Nick Smith, W4GKM

For sometime now I have wanted to operate from a different country during either a RTTY contest or just to give out some QSOs. However, it seems each time I try and schedule such an adventure something prevents such an occurrence. Last January I went on a 10 day cruise in the Caribbean and South America and packed all my equipment, and shipped it via the airlines with me. But as luck would have it, the airlines lost all my equipment but my luggage was sent to the ship. I had planned to operate from the ship for the 10 days at sea using a ship antenna. I had packed a couple of portable antennas just in case but of course that was all for naught. When I finally arrived back at Ft. Lauderdale the airline had found the large box of equipment and wanted a pat on the back, but didn't get one from me.

So work and other obligations have prevented me from doing a planned operation from another country. It finally occurred to me that I would have to plan this in more detail and take some vacation time off from work in order to be assured that the trip would go as intended. This year I planned to do just that and take some time off but so far had not decided when and where I would go. Since my work requires me to be on call and ready to go on a short notice I thought that getting ready for such an adventure would be difficult.

Recently, I received a call from our dispatcher advising me of a trip to Tegucigalpa, Honduras. I had planned to work the BARTG contest and really did not want to go but since it was a QTH that I had not been to, I really started thinking about some possibilities that just might work out.

The first thing I did was to check with the Honduran Telecommunications office to see if a license could be acquired in such a short time. The answer was yes and they said that they would have it waiting for me at my hotel. Wow, such nice people and very efficient. I was very impressed, to say the least. Now if I could just get my equipment together in time, everything would fall into place.

I put an MFJ switching power supply in my suitcase along with a few tools, a soldering gun and a few PL259 connectors — just in case. There was an old windom antenna in my work shop and I figured I could use that. I had used it for all bands several years ago and it seemed to work okay for that as long as I used a tuner. I found my old MFJ very light weight 941C tuner and put it in with the power supply. Now all I needed was some coax, which I found right away. It was only about 20 feet long, but I knew I would not need much as I planned to put the windom close to a window and use it as an inverted V. Next would be a transceiver and my Kenwood TS 450S fit the bill, so it went in the bag, too. My laptop had gone QRT so that meant I would have to borrow one or go buy another. I asked my son about his and he said okay. But I didn't have time to pick it up from him. You see, I fly for an air charter company and since this trip was to Honduras, I had to take a quick four hour course on terrorism.

So, during lunch I stopped by the Staples store picked up a nice laptop. But it didn't have a serial port. I then went up to Radio Shack and got an adapter USB to Serial. I had no idea whether this would work but I had packed my old PK232MBX and hoped it would be OK with this setup. When I arrived back at the office, I loaded Writelog on and was ready to go. My passengers were scheduled to arrive in about an hour and, so far, things seemed to be working out.

Since 9/11, when we leave the country we have to clear customs outbound as well as on the return. So we left Nashville and stopped at Mobile, AL, went through customs and finally we were on our way to Honduras. The flight was smooth and uneventful, and in 2 hours and 33 minutes we landed in Tegucigalpa. I had the Lear at only 37,000 feet but that seemed to be the best altitude for the fastest time. We were cruising around 500 knots most of the trip and were able to make a visual approach to the runway which, by the way, is not very long and is surrounded by mountains on all sides.

When I was with Eastern Airlines we went into many of the Central and South American cities. I was used to flying the B757 into them as I had done it many times. But that was a while ago and, going into a new airport made me and my 1st officer, Leo DeAngelo, pay close attention to what we were doing. I greased it on and went through customs with a breeze because our handler — Universal, out of Houston — takes care of all the details. Our ride to the hotel was quick and we checked to the Intercontinental. Soon I went to work getting ready for my new adventure of operating in a foreign country from a hotel room with limited equipment and antennas. (At home I have 11 antennas, three radios, two amps and three computers, so this was different.)

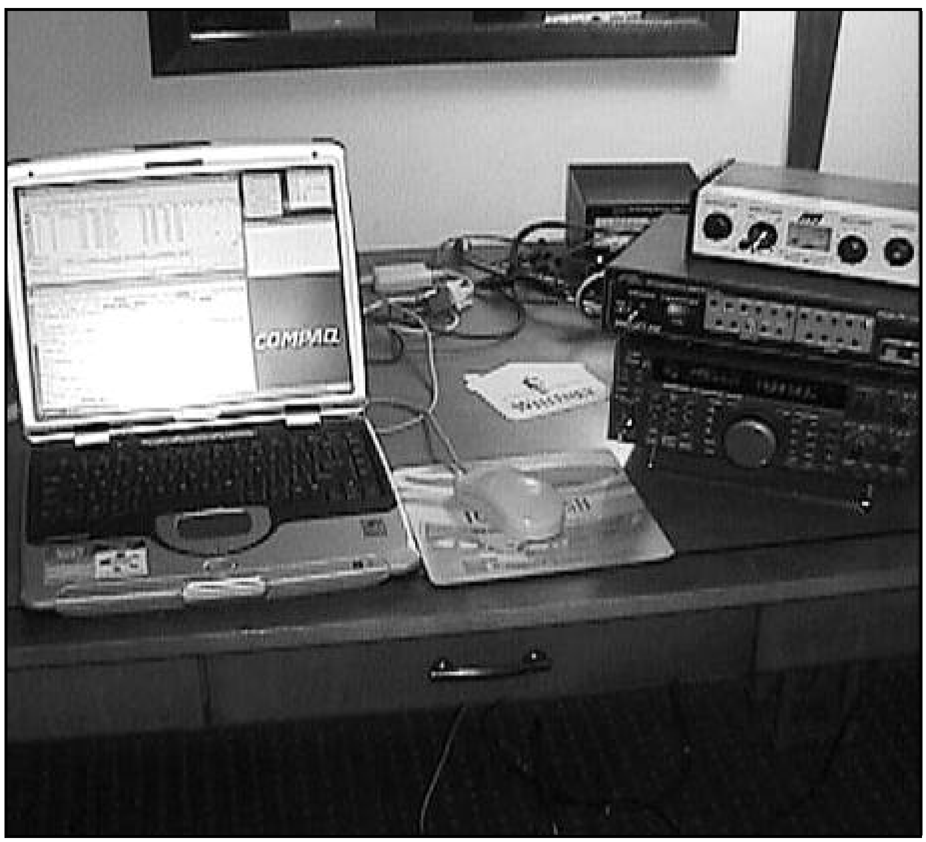
Leo and I had a quick lunch and soon I was back up to the 6th floor facing away from the busy streets down below, at work planning my antenna location. The window opened. Great! (In lots of hotels they're sealed shut.) Down below on the 2nd floor there was a tile roof that would be great for securing my antenna ends to make an inverted V. I was excited, but I had no way of getting on the roof. Time to call the manager, I thought, so I went down and asked if I could speak with him and he came right out. I explained what I wanted to do and he called his maintenance person and we went right to work on stringing wire from my room to the lower roof. I had brought a balun with me and put it at the apex location and so everything was in place now. These folks were really nice and helpful. I certainly was not expecting such cooperation and willingness to help.

Now came a few problems. The east side was completely blocked by the hotel, so I thought that might not work. I seemed to do better to the north but found it wasn't so bad in any direction. When the contest started I had a few problems with the radio not shutting off after it got through with transmitting a buffer. I thought at first it was the TNC, then the computer, but it turned out that I was getting RF in the radio and for some reason it would not stop transmitting on 14 and 75 meters. So I had to turn the power down (from 50 watts to 0) to get it to stop. On 15 and 10 it worked fine, but the SWR was very high on those bands and I had to use the tuner to get any power at all. I was able to get the SWR down to 1.5 to 1.0 on 15 and not near that on 10 meters. On 14 meters I had a 1:0 to 1:0 without the tuner but it would not stop transmitting unless I turned the power completely down to minimum. So when operating on 20 meters I would have to send a message, then grab the power and turn it down to listen for the reply. No problem. Just a nuisance.
I had a slow start and tried to see which band would be the easiest for me to begin on. I decided that 15 would be best but it soon went dead. 14 was very noisy and I couldn't understand why until I realized that the hotel was holding a wedding and had turned on lights right outside my window. On top of that, they were using lots of electrical equipment for musical instruments and a PA system. I called Leo and we went out to eat.

As we entered the restaurant, there was a big sign on the door that read, "No guns allowed." There were police inside and out. I figured if a gun fight broke out, I had my cover and a get away route and Leo did the same. We ate quickly and left. (It was hard to order because the servers spoke no English and we spoke no Spanish. Fortunately, they had pictures on the menu and I just pointed.) My dinner cost 292.00 lempurs, which is about $12.00 U.S.

The next day, Saturday, I worked the contest on and off during the day and some that night. Sunday was about the same and I had a little run going there once, which was quite a thrill with 50 watts and a wire antenna hung out the window. I finally called in the dogs at about 7:30 and quit. I must say that Writelog worked as it always does for me, flawlessly and with ease.
This was a really fun contest, although I didn't make a high score or many contacts. Yet it seemed to redirect my thoughts about future contests and to help me be a better operator and contester. I must say it was the most fun I have had in a long time during a contest. Without all the help of Marco at the Telecommunications office and the hotel manager, I would not have been able to accomplish any of this.

I left the next day for Nashville and took off the next morning to Nassau, Bahamas, for five days. My equipment was already packed so I took it with me to see how it would work out in the Caribbean. There wasn't any contest but, since I already had a Bahamian license, I figured I'd just rag chew a little and try to enjoy that location, too. It really is a tough life but someone has to do it….hi hi.



W4GKM/HR Station

RTTY Dictionary

Bill Henry, K9GWT
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We in RTTY have devised a language all of our own. As our hobby has grown we've added new words, abbreviations, and acronyms to our discussions. Interest in amateur RTTY is growing and we add new enthusiasts every year. Here is hopefully some help for old and new RTTY'ers.

AFSK: Audio Frequency Shift Keying. One audio tone represents the MARK state and a different audio frequency represents the SPACE state.

AMTOR: AMateur Teleprinter Over Radio. The error-correcting code and ARQ protocol used by radio amateurs. Same as SITOR except that certain features such as Selective Forward Error Correction (SFEC) are not included. Also, AMTOR includes a LISTEN mode that is not supported by either TOR or SITOR. Modifications of CCIR-476 SITOR first described by Peter Martinez, G3PLX in 1980.

ARQ: Automatic Repeat reQuest. A radio protocol that can sense receive errors and the receiver may then request that the transmitting station repeat transmission of flawed data bits, bytes, or characters. This is generally a chirp or burst type of two-way emission, one station to a second station. Typical ARQ modes are TOR, SITOR, AMTOR, AX.25 Packet Radio, Pactor, CLOVER, and G-TOR.

ASCII RTTY: American National Standard for Communications Information Interchange. The standard 8-bit data code used for computer data. Often pronounced "as-key". Normally transmitted via radio using simple two-tone frequency shift keying (FSK) or audio frequency shift keying (AFSK) modulation.

ASM: Amplitude Shift Modulation used in CLOVER. Amplitude levels are shifted to send data. For example, 2A mode has two levels and sends information for 1 data bit; 4A sends data for 2 data bits. In CLOVER, 8P2A mode sends information for 4 data bits and 16P4A sends data for 6 data bits.

Asynchronous: A sequential (serial) data bit format that includes a control "Start Bit" to signal the beginning of the data character and a "Stop Bit" to signal the end of the character. The bits sent between the Start and Stop bits represent the data. In common amateur use, the Baudot code has one start bit, 5 data bits, and one or more stop bits.

AX.25: First offered by Tucson Amateur Packet Radio (TAPR) club in 1982. Based on the commercial X.25 protocol but tailored for VHF/UHF amateur radio use. Terminal Node Controller (TNC) offered AX.25 error correction protocol and FSK modem for 300 and 1200 baud operation. The 1200 baud option is used with VHF FM equipment and has enjoyed strong popularity. 300 baud FSK has been used on HF radio with limited success.

Baudot RTTY: The five-level code commonly used by radio amateurs for HF radio communications. The actual code used today most closely follows that devised by Murray but "Baudot" is the common name. Also known as CCIR / ITA #2 code. Since the 5-unit code has only 32 (2^5) combinations, code combinations must be used twice to represent all 26 letters, 10 numbers and assorted symbols. Special case-control characters — LTRS and FIGS — are sent to signal a case change to the receiving device. Normally transmitted via radio using simple two-tone frequency shift keying (FSK) or audio frequency shift keying (AFSK) modulation.

Baud: The signaling rate in "Baud" (named after Baudot). Baud is the reciprocal of the time width of shortest pulse in the data stream. Baud = 1/T. Common baud rates for HF RTTY are 45.45, 50, 57, 75, 100,and 110 Baud. Common VHF/UHF rates are 300, 1200, 2400, 4800, 9,600, and 19,200 Baud.

Bias Distortion: Distortion that increases the time length of one state at the expense of the other. For example, if all Space pulses are 10% longer than normal and all Mark pulses are 10% shorter than normal. May be caused by incorrectly tuned radio receiver or by interference. In a loop circuit, may be caused by a loop voltage that is too low.

Bit Error Rate (BER): A performance test that may be performed on a demodulator. In its simplest form, a "BERT" (Bit Error Rate Tester) mixes a RTTY signal of known amplitude with a random noise source. The S/N (Signal/Noise) ratio is varied and a tally is made of the number of bit errors found on the demodulator data output. The BER is lowest for high S/N (strong signal) and highest for low S/N (weak signal). The lower the BER, the less the distortion caused by the demodulator and the better the reception A good 45 baud RTTY demodulator may have a BER of the order of 1 error bit per 100,000 bits at a S/N of 0 dB or lower.

Bit-rate: The rate at which bits are sent, measured in bits-per-second. In a simple two-tone FSK or AFSK modulation, one bit is sent per Mark or Space pulse and the bit rate and baud are the same. In the case of complex modulation such as CLOVER, more than one bit may be sent per tone pulse. For example, in CLOVER QPSM mode, the phase may be set to 0, 90, 180, or 270 degrees on each tone pulse. Thus 4 data states or the information in two binary bits may be sent with each CLOVER tone pulse. In CLOVER-II QPSM mode, the signaling rate is 31.25 baud but the data rate is 62.5 bits-per-second.

BMUNS: "Broad Minds Use Narrow Shift" — an acronym to remind hams to use narrow shift on HF RTTY. Coined by Dusty Dunn, editor of the RTTY Journal (1967 - 1977).

B/Y: Mark/Space bit states of a TOR, SITOR, or AMTOR data signal.

Characteristic Distortion: Repetitive and consistent distortion of one or more bit elements of a signal. For example, a start bit that was noticeably shorter or longer than the following data bits.

CLOVER: An error-correction protocol and waveform invented by Ray Petit, W7GHM, and sold by HAL Communications Corp. Uses Reed-Solomon error-correction coding and selective block repeat ARQ. CLOVER-II has a 500 Hz bandwidth and will pass data at rates up to 70 bytes/second (560 bits/sec). CLOVER-2000 has a 2000 Hz bandwidth and will pass error-corrected data at rates up to 250 bytes/sec (2000 bits/sec). Four audio tones, spaced 125 Hz apart are used in CLOVER-II; CLOVER-2000 uses 8 tones, spaced 250 Hz apart. Both CLOVER-II and CLOVER-2000 provide five modulation levels that use Phase Shift Modulation (PSM) and Audio Shift Modulation (ASM). Modulation levels are automatically adjusted to fit measured received signal conditions. The base symbol rate of CLOVER-II is 31.25 baud; of CLOVER-2000, 62.5 baud.

Code: The method used to represent letters, numbers, and symbols by a sequence of bits. Common amateur radio digital codes include Baudot, ASCII, and Morse codes.

Data Bits: The Mark or Space pulses that follow the start bit. All are one unit bit period long, the same time length as the start bit. Five data bits are sent in the Baudot code and 8 bits in the ASCII code.

Demodulator: The device that accepts audio data from the receiver output, detects the Mark and Space signals, and passes a digital pulse stream to the terminal device — PC or teleprinter.

Duplex: In an ARQ communications system, use of different radio frequencies for reception and transmission. Normally used for ship-to-shore ARQ (TOR) communications.

EOL: End Of Line sequence. For amateur Baudot RTTY, the correct end of line sequence should be CR LF LTRS. For MARS circuits, send CR LF. For ASCII, send CR LF.

FDX: Full duplex. Communications between two stations pass simultaneously in both directions. Requires two radio frequency links for RTTY.

FEC: Forward Error Correction. A mode often included in an ARQ modem. This is a "broadcast mode" in which one station may send data to several other stations. Error detection coding is used and the data may be sent multiple times, the receiver choosing which received version is correct. This may not result in error-free and/or gap-free data transmission but is useful when a one-to-many mode is required.

FIGS: The special Baudot character sent to signal the receiving device that the following characters are figures and not letters.

Flat Fading: A signal amplitude change on an FSK signal that has equal (or near equal) affect on the amplitude of both the Mark and Space FSK signals. A good receiver AGC system will usually compensate for this form of amplitude change.

Fortuitous Distortion: A random "jitter" of the Mark/Space transition time. Maybe caused by defective sending equipment (dirty contacts), clock frequency instability, or random noise.

Free Signal: Alternate Mark/Space (B/Y) bit sequence sent by shore stations using TOR. Signals to ship stations that the coast station and frequency channel are available to link and pass traffic. Usually sent in 2 to 5 second bursts of B/Y followed by CW identification of the shore station.

FSK: Frequency Shift Keying: One radio frequency represents the MARK state and a different radio frequency represents the SPACE state.

G-TOR: An error-correction protocol invented by Phil Anderson, W0XI, and sold by the Kantronics company. Uses Golay error-correction coding and 300 baud FSK modulation.

HDX: Half duplex. Communications between two stations pass one direction at a time. Stations take turns sending. Some ARQ systems such as AMTOR and Pactor require an "OVER" command to change the direction of data flow. Other systems such as AX.25 and CLOVER do not require a special command to change direction.

HERE IS: A pre-programmed identification message that can be sent manually or automatically. May also be called "Answer-back Message".

High Tones: RTTY modem tones used in the United States: Mark = 2125 Hz; Space (170) = 2295 Hz, Space (425) = 2250 Hz, Space (850) = 2975 Hz.

Ionosphere Simulator: Test equipment that simulates the distortion and signal variations that can be caused by ionospheric propagation. A typical simulator output may include multi-path time-smearing distortion, selective fading, flat fading, and Doppler frequency shifts, all at varying S/N levels. The BER vs S/N is tallied for each of these conditions; a low BER at low S/N ratios is the goal.

IRS: Information Receiving Station. In TOR, SITOR, AMTOR, and Pactor, the ARQ station that is receiving information from the other station. May be either the Master or Slave station, depending upon the use of the OVER command. Does not apply to CLOVER as either station may send at any time and OVER is not required.

ISS: Information Sending Station. In TOR, SITOR, AMTOR, and Pactor, the ARQ station that is sending information to the other station. May be either the Master or Slave station, depending upon the use of the OVER command. Does not apply to CLOVER as either station may send at any time and OVER is not required.

Line Length: 72 characters for normal amateur Baudot RTTY; 69 characters for MARS Baudot RTTY, 80 characters for ASCII and most computer applications.

Loop: The original serial data voltage and current interface. All data equipment is wired in a series connection (the RTTY "loop"). The current in the loop is set to a standard value, 60 ma and 20 ma being common values. The voltage generator in the loop circuit is usually a high voltage power supply; 60V, 100V, 150V, and 200V supplies are common.

Low Tones: RTTY modem tones used outside the United States: Mark = 1275 Hz; Space (170) = 1445 Hz, Space (425) = 1700 Hz, Space (850) = 2125 Hz.

LTRS: The special Baudot character sent to signal the receiving device that the following characters are letters and not figures characters.

LSMFT: "Low Space Means Fine Teletype" — an acronym to remind hams about the correct Mark/Space polarity to use on HF RTTY. Coined by Dusty Dunn, editor of the RTTY Journal (1967 - 1977).

Marine Tones: RTTY modem tones used for TOR and SITOR; Mark (B) = 1615 Hz; Space (Y) = 1785 Hz.

MARK: "ON" state of a RTTY data signal; the "1" logical state of the digital RTTY signal; the "rest" state on a mechanical teleprinter.

Master: In TOR, SITOR, AMTOR, and Pactor, the ARQ station that makes the original call and initiates the data link connection. The Master station sets the timing for both stations. The originating station remains "Master" for the duration of the ARQ link regardless of the use of the OVER command.

MCP: ARRL acronym for "Multi-mode Communications Processor" (also known as "TNC").

MIL-188C: A Military data voltage and control protocol. Mark = +6V, Space = -6V. Data Connectors are not standardized. Also called "MIL-188-114".

MODEM: Acronym to describe the RTTY MOdulator-DEModulator.

Modulator: The device that accepts digital data from the terminal device and converts it into an FSK or AFSK signal where one signal frequency is sent to represent the Mark data state and another frequency to represent the Space state.

Multi-path Distortion: Distortion caused by splitting of the radio signal into two or more rays, each taking a different path to the receiver. This can be caused on HF signals by ionospheric propagation or by reflection from large buildings in a large city for VHF and UHF signals. In either case, multiple signal components that travel different path lengths arrive at the receiving antenna and are summed vectorially. Due to the difference in path lengths, the Mark/Space transition times are different and when the components are summed, the transition is smeared, making exact determination of bit timing difficult or impossible. Multi-path propagation may also cause cancellation of one radio frequency of an FSK signal, leading to selective fading.

Narrow Shift: Commonly accepted to be 170 Hz for radio amateur use, but 85 and 42.5 Hz have also been used in military FSK applications.

NBDPT: Narrow Bandwidth Direct Printing Telegraph

Neutral Loop: A loop circuit in which the loop current is keyed ON/OFF by the data signal. The polarity standard is that Mark = loop current ON and Space = loop current off (open circuit). Typical neutral loops use +100 to +200V @ 20 ma or 60 ma.

OVER: In TOR, SITOR, AMTOR, and Pactor, the command that causes the direction of data flow to reverse. When sent and acknowledged, the former Information Sending Station (ISS) becomes the Information Receiving Station (IRS) and vice-versa. This does not affect Master/Slave status that remains fixed for the duration of the ARQ link. Does not apply to CLOVER as either station may send at any time without the use of OVER.

Pactor: An error-correction protocol invented by the SCS firm in Germany. This protocol is a cross between CCIR-476 and AX.25, including features of each. The symbol rate may be 100 or 200 baud. Uses Huffman error-correction coding. Three versions have been offered by SCS: Pactor-I, Pactor-II, and Pactor-III, each providing faster data throughput than its predecessor. Two-tone FSK modulation is used for Pactor-I, and multi-tone PSK for Pactor-II and Pactor-III. Also called "P-Mode".

Polarity: The MARK and SPACE sense of the signal. On HF radio teletype, "normal polarity" is when the MARK radio frequency is higher than the SPACE radio frequency. For AFSK systems used for VHF/UHF and with HF SSB equipment, normal polarity is when MARK has the lower audio tone frequency and SPACE has the higher audio tone frequency. Either RTTY polarity is "legal" but common practice is to observe these standards. Note that when AFSK tones with normal polarity (MARK = low) are applied to the audio input of an SSB transmitter set to lower sideband (LSB), the radio frequency order is reversed and this inverts the RTTY signal to match the HF polarity standard (MARK = higher radio frequency).

Polar Loop: A loop circuit in which the loop current is keyed from positive to negative by the data signal. Either polarity may be used but Mark = + current is more common. The typical polar loop power supply furnishes +60V or -60V @ 20 ma or 60 ma.

PSM: Phase Shift Modulation used in CLOVER. Similar to PSK but uses amplitude controlled pulse shapes so that data state changes occur only at zero-amplitude of the waveform, preventing wide bandwidth switching transients.

PSK: Phase Shift Keying. Data is sent by changing the phase of the radio or audio signal. May be used for multi-level signaling — BPSK for 1 bit, QPSK for 2 bits, 8PSK for 3 bits, 16PSK for 4 bits. Requires wide bandwidth due to switching transients. Used by Pactor.

QBF: Test message that sends each letter in the alphabet. Most common format is "THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG 0123456789".

RATT: RAdio TeleType — the military version of "RTTY".

RS-232: The data voltage and control protocol used by most computers for serial data. Mark = -25 to -3 V and Space = +3 to +25V. The normal data connectors are the DB-25 and DE-9, but the RJ-45 is also used. The current standard is called "TIA/EIA-232F"

RTTY: Radio TeleTYpe — what we hams call the mode

RTTY FSK Tone Frequencies: By common practice, RTTY audio filters and tones are usually set to odd multiples of 85 Hz. This evolved from use of a 425 Hz tuning fork as the frequency standard in the 1940s and 1950s. For example: USA high tones: 2125 = 85x25, 2295 = 85x27 etc.

RYRYRY...: Test sequence that sends alternate Mark/Space bit patterns in the Baudot code. R = (01010), Y = (10101).

SEL-CAL: Selective Call. A unique identification character sequence whereby the receiving station will only respond if the message includes the station SEL-CAL at the start. Used with Baudot RTTY, TOR, SITOR, Pactor, CLOVER, and G-TOR.

Selective Fading: The signal distortion condition in which multi-path propagation causes cancellation of one FSK signal frequency without affecting the other. A selective fade may be very deep, the amplitude change often exceeding 60 dB in depth from the normal level. Such fades are usually of short duration but long enough to obscure one or more bits of RTTY data, particularly at high rates. Normal receiver AGC will not compensate for the effects of selective fading. Hard-limiting "FM" demodulators and AM demodulators that have very wide dynamic-range detectors may offset the effects of selective fading.
In addition, demodulators that have automatic "Mark-only" and "Space-only" detection will provide superior protection against selective fading.

SFEC: Selective FEC. This is a broadcast mode that can be customized to send a message only to a selected group of receiving stations. This mode is included in TOR and SITOR but not in other ARQ protocols.

SHIFT: The frequency difference between the MARK and SPACE frequencies. Applies to either FSK or AFSK modulation.

Simplex: In an ARQ communications system, the use of the same radio frequencies for reception and transmission. Used for amateur communications on RTTY and ARQ modes.

SITOR: SImplex Teleprinter Over Radio. The error-correcting code and ARQ protocol used for ship-to-shore radio teletype. Same as TOR except that the transmit and receive radio frequencies are the same rather than split as for TOR.

Slave: In TOR, SITOR, AMTOR, and Pactor, the ARQ station that is called and links to the Master station. All link timing is synchronized to the Master station's signal.

SPACE: The "OFF" state of a RTTY data signal; the "0" logical state of the digital RTTY signal; the "pulse" or "open" state on a mechanical teleprinter.

Speed: The average Baudot speed at which characters can be printed in words per minute. Common Baudot speeds used by amateurs are 60 wpm, 67 wpm, 75 wpm, and 100 wpm.

Start Bit: The control bit in a serial asynchronous data stream that signals the start of a character. On a normal Baudot or ASCII data circuit, the data line is in the Mark or "rest" state when data is not being sent. When data is sent, the start of the character is signaled when the data line transitions from Mark to Space and remains in Space condition for one unit pulse time. Data bits follow the completion of the start bit.

Stop Bit: The control bit in a serial asynchronous data stream that signals the end of a character. In a normal Baudot or ASCII serial data stream, upon completion of the last data bit, the data line is set to the Mark state and remains in Mark for the duration of the stop pulse. The stop pulse length is not standard. It may be the same length as the unit pulse or longer. Common stop pulse lengths are : 1.0 unit (300 baud and higher ASCII), 1.43 units (standard 45.45 baud Baudot, 1.5 units (Western Union 50 baud), 2.0 units, or longer. Note that any stop pulse length greater than 1.0 unit is valid. If only one character is sent, the stop pulse length is essentially infinite. All asynchronous receiving devices should be able to synchronize with and decode data streams using different stop pulse lengths.

Synchronous: A sequential (serial) data bit format that does not include control start or stop bits. Special bit sequences are sent to synchronize the transmitter and receiver devices. AMTOR, AX.25, and CLOVER use synchronous data streams.

Sync Idle: Synchronous Idle, also called "diddle". In Baudot RTTY, characters are sent as typed. If the typist is slow and has not pre-typed text into a buffer, the transmitted data will be sent in a "jerky", start-stop manner, with Mark-state pauses between each data burst. Sync Idle sense when typed input is slower than the output rate and automatically inserts non-printing characters to fill the gap. The "blank" character (00000) is usually sent to fill these gaps but LTRS (11111) has also been used. Use of Sync Idle on an HF RTTY link may result in remarkably improved reception.

Throughput: A measure of the actual rate of information transfer that includes all overhead. For example, the symbol rate of CLOVER-2000 is 62.5 Baud and the maximum bit rate is 3000 bits-per-second. However, because of the use of error correction coding, and the time that the transmitter must pause for acknowledgement from the receiver, the actual measured data throughput is 2000 bits-per-second. Throughput is easily computed by timing how many characters, bytes, or bits are passed error-free in a fixed time interval.

TNC: Terminal Node Controller. The name originally given to the modem and data processing device used for AX.25 Packet Radio. However, most AX.25 TNC's include RTTY and other data modes. By popular use, "TNC" often refers to a RTTY modem device.

TOR: Teleprinter Over Radio. The error-correcting code and ARQ protocol used for ship-to-shore radio teletype. Also called "NBDPT" in US Federal Communications Commission (FCC) regulations. Uses a special 7-bit error correction code that allows each receive character to be inspected and re-transmitted if a parity error is detected. Full details of the coding and protocol are given in CCIR 476 and CCIR 625 documents. Normally transmitted via radio using simple two-tone frequency shift keying (FSK) or audio frequency shift keying (AFSK) modulation. The symbol rate is 100 baud and the FSK signal has 170 Hz shift. Normal AFSK modem tone frequencies are 1615 Hz and 1785 Hz, (170 Hz shift, centered at 1700 Hz). The transmit and receiver radio frequencies are split by 400 to 800 kHz.

TU: Terminal Unit — original name for the RTTY demodulator and modulator.

U*U*U*...: Test sequence that sends alternate Mark/Space bit patterns in the ASCII code. U = (1010101), * = (0101010).

Unit Pulse: The basic minimum width pulse in the serial data stream. The width is always equal to the reciprocal of the Baud rate. The start and data pulses always have a time duration equal to one unit pulse. For example, 50 baud => 20 ms unit pulse.

USOS: UnShift On Space. When receiving Baudot RTTY, noise may accidentally be interpreted as the Baudot FIGS character. If so, all following characters will be displayed in the FIGS case until a LTRS character is decoded. USOS causes the receive printer/terminal to change to LTRS case after reception of a space character. This reduces the problem.

Wide Shift: A shift that is greater than 170 Hz. 850 Hz and 425 Hz shifts are the most commonly used wide FSK shifts for commercial and government applications.

WRU: Who aRe yoU. A control/command character or sequence of characters that can be sent from one RTTY station to another. Upon reception of the WRU character(s), the receiving station changes to transmit, sends the pre-programmed HERE IS message, and returns to receive state. Optional and rarely used with Baudot RTTY, but standard for advanced ARQ modes such as Pactor and CLOVER.

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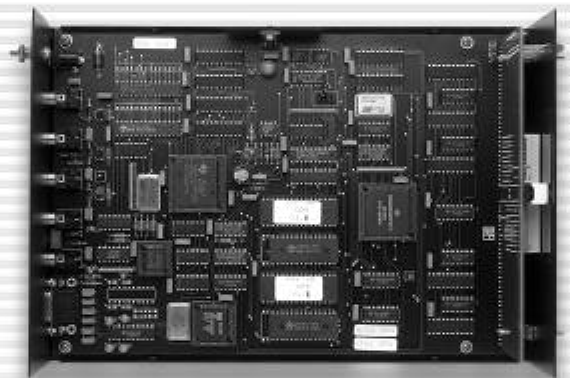

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