

RTTY

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ONE DOLLAR



Serg Remy F6ALL

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RTTY THEORY AND APPLICATIONS - PART 1

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PACKET RADIO PART 1

RTTY JOURNAL

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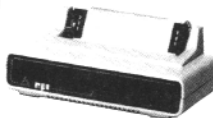


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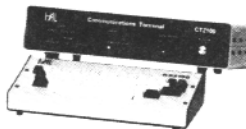
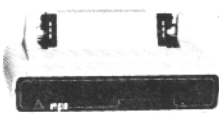
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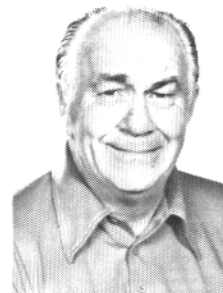
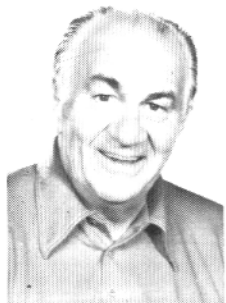
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DX RTTY



BY BILL

WØLHS SNYDER, 1514 S. 12th Street, Fargo, ND 58103

"I WORKED CEØCEW/Z!"

Writing this column for the past year has been a real source of fun for me. It has generated a lot of new friendships and made my Ham radio hobby more rewarding than ever before. So I am really glad I volunteered to take on the job.

But why did I have to draw declining band conditions for my term as DX editor? It's the luck of the draw, I guess. I don't think we can blame Reagan for lousy HF propagation, although there are those who might wish to do so.

Recently I read an article in HAM RADIO which helped me understand all I know about propagation. Back in my Signal Corps radio days I had to select frequencies for a number of net operations, so I gained a smattering of knowledge about long-distance radio communications. Later, when I was operating DX from Africa, I hit the peak of cycle 18, so DXing then was a breeze. Ten meters was like land-line to the states. But now, we are faced with a down-slide of solar activity for the next few years, so the HAM RADIO article gave me a better picture of what to expect. I suggest all DXer's read it.

Solar cycles are measured from low point back to low. The eleven year cycle we are now in is #21, and from what I can gather, the rise from low to high takes four years, while the declining period extends for seven. So, kiddies, five more years of decline and then a couple of rise (seven years in all) and we'll be back to where propagation is today. and that is lousy!

But cheer up gang, here's one I eavesdropped recently (just as the 10 meter band was opening for the day): "Band conditions are getting better every minute and worse every day!"

Poor as the northern latitudes have been, the north-south paths have not been all bad. Worked VKØCW on CW when he was transmitting on 14020 and listening on 14090. This caused a CW pile-up in the RTTY section of the band, to say the least. I went after the VKØ so I could comment on his choice of frequencies for the listening end; but alas, he gave me a snappy 599 and went QRZ before I could snap my fingers!

CE3FCF. Carlos, is spending the summer outside of the city of Santiago. Look for him on 20 meters at around 2245Z.

ZS6BWO can be QSL'd to Norm Smith, 76 Landau St., Morehill, Benoni 1500, South Africa.

TU2GA, Alain, is operating RTTY from Abijan. He tells us that he can usually be found on 14095 at 0700Z, and on 21090 at 1700Z. Alain's home call is F6BCL and he has previously held 5U7AZ. QSL is via K9KXA.

T32AB, Lamarr, is perennial favorite DX find. He has been worked/heard on 15 meters around 0030Z. He is located on Christmas Island of the Kiribati group.

ZP9CW boomed through on 21MHz at 2300Z. He can be QSL'd via Box 1777, Asuncion, Paraguay.

For years I have been using an old oscilloscope for a tuning indicator. Recently I helped WØØHXQ, a newcomer to RTTY, get on the air by giving him directions over our two meter link. I couldn't understand why he was having trouble copying DX stations with very good signals. I suspected it might be his tuning read-out, so I talked Arlin into getting a used 'scope and hooking that to his homebrew tuning unit. He did as I said and was elated with the results. "Now there is nothing to it!" he exclaimed

after he had tuned in four DX stations.

I suggest getting a scope to all of the newcomers who ask. It will give you quick and positive tuning, tell you whether the incoming shift is upside-down or not, give you an idea if the other guy's shift is proper, and help you keep tuned if the RX or TX is drifting. Good used scopes abound at flea markets, and you won't have to make a big investment. Led's and meters will work, but you can't beat a scope for my money.

T42AMC in Havana, Cuba is the club station which usually operates with the call CØ2FRC. The special call sign is commemorating the World Year of Communications. A unique QSL is being offered through Box 1, Havana.

Watched a three-way QSO between EA7-CLH, HR1RC and WB6AFJ on 20 meters at 0130Z. Reminded me of a three way I had with F8XT, Jean, and CE3CEW, Carmen, just prior to Carmen and her husband going on the recent CEO DX-pedition to Juan Fernandez. RTTY certainly makes rag chewing a multi-continental hobby. Jean reports working Carmen recently from Spain where she is visiting.

The other night I had a nightmare. I dreamed I had been assigned the callsign WØUP (my apology to the rightful owner). There I was with a powerful one watter going crazy in a huge CW pile-up caused by a rare zone 23 station. The DX op was working the USA by call districts and he was tuning higher than he was transmitting. Like most hot shot DXers his spacing was sort of random. He kept calling QRZ WØUP and I kept sending back "HERE I AM!" but he didn't answer me!

At last year's ARRL Cedar Rapids convention I heard a DXer say he

"I MISSED 9N1VLV!"

DX column continued

wished he had a call with the suffix letters "ND", so he could use North Dakota for phonetics. Well, Having lived off and on in North Dakota all of my life, I know what he meant. I created my own little CW pile-up in the recent North Dakota QSO party. Worked 65 stations on one CQ. And every signal was 599! (Even the ones I had trouble getting their call signs straight.)

Heard YS70B working OH2PN on 21 MHz at 1450Z. Other activity heard on 20 meters: XE1LL, Arthur at 1430Z; 9Y4VU at 0130Z; HK1KU at 2300Z. Worked on 20:TI2JFP at 0140Z; CX7BY at 0050Z. On 10 meters worked GW2HCJ at 1745Z.

Eavesdroppings:"the warranty runs out next week--then I can pry off the cover and get my hands in there!!....
"the Lord will forgive you if you leave the rig and go bowling tonight"
..."I hate to go out in this storm, but I need some cancer sticks.".....
"I used to have good hi-fi stuff until my kids got into rock n roll"....
"I got RF in the VIC-20 and the program stopped"....."I have a very tight needle at this end"....."sure like RTTY, gets away from all that QRM"....."was going to go on SSTV, but decided to go RTTY after looking in the mirror"....."the RTTY tuning indicator is by LIZZY JOE"....."Good night, will let you catch some Z Z Z Z Z's"....."show me a happy chef, and I'll show you a pot-smoking cook!"...
"Thank you for the FB QSB!"....."you asked me if I knew about AMTOR. No, what happened to her?"....."the rig here is a HEATH-KNIT"....."today the American Farmer feeds nearly 78 people--but hardly his own family!".....
"use all two fingers to type on this thing"....."If RTTY ops typed like a lot of hot dog CW operators send, they could eliminate the space bar!..
"I could use more memory, not in the computer, but in my skull."....."time on tone will be 1846 GMT"....."DE (K) (P) (4) (B) (B) (U)"....."unfortunately most health clubs are detrimental to your fiscal health!".....
"please give my regards to your wife and dogs"....."how do they type in Chinese RTTY?"

I finally got my QSL from Dima, UT-5RP. According to the note enclosed

with the card, his first card to me must have been lost in the mails. I have been asking DX stations around the world if they would send a black and white picture so we could perhaps run a page or two of shack pictures. Dima's response was this:"Sorry about the picture for the RTTY JOURNAL. I have so big equipment here and it will be not so good to print this photo in your JOURNAL. Then I will build new good equipment I will send you my foto with the new small, good rig." We'll be looking for it, Dima.

Many stations have now reached the grand total of 100 countries and are applying for DXCC both to ARRL and the JOURNAL. The ARRL does not endorse RTTY certificates like the JOURNAL does, But I think we should petition the League to make 160 and RTTY DXCC awards the same as the others. The JOURNAL offers endorsements in increments of ten countries.

KB9IS, Dick, is one of those applying to the League for DXCC. Among the cards Dick submitted were:UT5RP, UA3HR, UR2FU, KG4AH, HC8KA, KC4USV, PJ8UG, VE1SPI, TR8WR and VP2MJL. Dick also says the nine digit zip code works. Yes, it does, Dick. I have a friend who addresses his mail to me simply:58108-3215. That is our Ham Club POB zip code number.

Dick also lists those QSL's that got away from him:YS2RU, ZP2AA, ZP9-CW, OA4BR, OD5MN and TU2CV. He wonders if he sent them to the right address.

K4VDM, John, sends a note with news of his activities on the 30 meter band. While recuperating from a recent illness, John says he worked six states and Australia on the new band using a dipole and about 140 watts. On 20 John found 5T5RY and 5T5TO between the hours of 2300 and 0100Z.

JABADQ, Shige, is one of the hard-working Dxers in Japan. Last fall Shige missed a lot of new ones due to antenna troubles, but he writes that he is now back at it. His newest ones are 9N1VLV and CT2AK. He was one of the lucky ones to work Nepal when Nana, JI1VLV, was there in December. However, Shige missed working CEØCEW/Z because he was very busy from January 1st to 4th with a New Year days (sic) party. That must have been one great party Shige!

W6J0X, Chuck, tells of working GU5TU on 21 MHz at 1730 for a new one. Chuck needs QSL cards from CT2AK, YS70B, DJ-6QT/CT3, HZ1AB, HL5HD, KA2MT/JD1, HC8-KA and GU5UT. Sounds like he has been doing right well in recent DXing.

Rick, WDØFSJ, is a newcomer to the DX chase. Rick suggests all MSO operations be put on 80 meters. After listening to about 30 minutes of uninterrupted "diddle" from one popular MSO (while I was putting this column together), I am inclined to agree with you Rick.

N4FJL, Tom, who you also know as J87BT, sends a lot of interesting info by letter. He notes that many of the people on RTTY who join in the pile-ups and try so hard for J87BT never send for a card. About 60% of them are no shows, but on CW only about 5% of the contacts pass up asking for a QSL.

Tom also notes that the garden variety of DX, like G, I, etc. say they will answer 100%, then never do--even with IRC's and green stamps. Whereas the tough ones, like T32, 5B4 and 3A2 come through like clock work. You're right Tom, I wonder how many YV stations have told me they QSL 100% and I still have not received a return on any of my cards. Maybe I have it wrong, they really mean they don't QSL 100%. Could that be?

Tom now has a 130S, SB221 and a tri-bander up 40 feet at his QTH in Antigua; a 130S, SB221 and a miniquad up 36 feet at St. Vincent; and a Robot 800 and 400 at home in Florida. So on his periodic visits to those DX locations he should be heard round the world. Tom also indicates that when he is home at N4FJL each card received is answered before he goes to bed that day! Besides his own three calls, he is the manager for J88AM-J88AA, 8P6JB and J87BD.

Tom also reports a QSO with the Juan Fernandez DXpedition and ZS3B, Gerd, in Namibia. Gerd was testing a new antenna for the first time. I worked Gerd a year or more ago, but never did get a card.

EA8Z0, Hal, is an American living in the Canary Islands. Hal has been on SSB from there for years, but now he is having new thrills on RTTY. Look for him on 20 meters around 1930Z. Hal

DX COLUMN CONTINUED

indicates his QTH is okay in the 1983 callbook. Speaking of thrills, W2ATC made his first DX contact on RTTY with Hal.

I watched with interest a QSO between 5T5TO, Marc, and TI3DJT, Carlos. Carlos is active with AMTOR from Costa Rica. The QSO took place on 15 meters at 2230Z. 5T5TO QSL is via F6BUM.

K4JAF, Jim, votes for the HF's as being the worst group of QSLers. Jim says he has sent money, stamps, and IRCs to at least ten HK stations with no answers whatsoever. I have tried 20 times to Venezuela, without any luck, so I envy you Jim, for that single YV card you received. Bravo! I'm still waiting for that YV station who needs North Dakota and will send his card first! I can't complain about all the HK stations, only a few of them.

Jim also sent along a list of goodies and a few QSL addresses: TU2JD, 21 MHz at 1500Z, via Box 01 BP V 245, Abidjan, Ivory Coast; 5T5TO, 14 MHz at 0030, direct; GU5TU, 21 MHz at 1550Z; GU4NYT, 28 MHz at 1400Z, QSL via Nigel, Box 100, Guernsey Islands; and HR1RC, 14 MHz at 0315Z, via Avenida Rep. de Chile #212, Tegucigalpa.

W8JIN. Jim, lists his latest contacts and QSLs. 5T5RY on 20 at 1330Z, 5T5TO on 15 at 1430Z, 9Y4VU on 20 at 2330Z and YS7OB on 20 at 0100Z were worked recently. New QSL confirmations were received from A2CBW, CT2AK CEØGBG/Z and VE2SPI on St. Paul Isle.

WA3ZKZ, Crawford, lists new ones worked: TI2JFP on 20 at 0130Z, GW2HCJ on 10 at 1730 and CX7BY on 20 at 0100 Z. For you WAS fans, Crawford is in the rare state of Delaware.

In the last issue of the JOURNAL there is reference to a frequency 145.15 in the last paragraph of the column. This should read 147.15 instead. Thanks to Jim, WA9FPT, for pointing this out to us. He said the former frequency did not work out too well.

K1LPS, Larry, Sends a long interesting letter dealing with demodulators for RTTY. Larry's chief concern is the appearance of single tone demodulators on the market. He feels these

will be purchased by newcomers to the mode, and because of their inexperience will not realize how poorly they operate, and perhaps become disenchanted with RTTY in general. Larry also has a new Kenwood TS430S, and he says he really is in love with it. FRØGGGL, was reported first by JA1ACB, Gin, in Tokyo. He has been heard in the states long path on 20 around 1300Z. He is located in St. Pierre on Reunion Island and his name is Jen.

Last call for the honor roll. Due to poor band conditions, couldn't make sheds to get some of them. So please write to me your scores and we'll postpone it until next month. There has been quite a number of changes since last time, so we'd like to be as up-to-date as possible.

Nothing heard from HEARD...

This is your column, and I solicit your input and suggestions. I enjoy your letters and also chewing the rag with you on the air. Good hunting and "dit dit." 73 Bill WØLHS.....

CONTESTS*CONTESTS*CONTESTS*CONTESTS*

S.A.R.T.G. CONTEST RESULTS

Single Operator Top Five Class A

ON4UN	455,655
OH2NP/OHØ	179,280
DJ6JC	173,160
DK8NG	173,130
YU2CDS	165,900

Multi Operator Top Five Class B

OH2AA	187,920
Y21BB/A	74,025
OK1OAZ	60,300
OK3KGI	44,345
HA6KVD	14,580

Short Wave Listeners Top Five Class C

DE4TTY	208,350
OZDR-2135	157,465
Y2-2814/M	117,375
OK1-12880	79,040
OK1-23185	73,710

Top scorer from the USA was WB5HBR in #7 spot with 135,415 points. Check logs were from: HA7KLP, W6JOX, LZ5A, Y56YF, Y2-8861/0, K2BSM, SM6CQV, W3-FJY and OZ4IJ.

The above results were from the 12th SARTG contest. The 13th SARTG contest will be August 20 and 21, 1983. Look for rules in later issue.

6.Y25DL	455,655	31.OZ9GA	15,540
7.WB5HBR	135,415	32.ON7EU	15,150
8.KB2VO	117,180	33.Y46RF	14,985
9.I2DJX	109,500	34.VE2QO	12,240
10.WD5ELJ	104,220	35.SM3EZO	11,880
11.I4JXE	103,500	36.WA6WGL	11,570
12.UT5RP	85,200	37.SM5AAY	10,200
13.ON6NA	68,145	38.DF6ZY	8,625
14.LU5DFH	65,170	39.PAØKFF	8,300
15.I8JRA	65,170	40.KJ4Z	6,555
16.Y79XN	59,125	41.WB4CKY	6,120
17.SM6AEN	49,215	42.Y55ZF	5,500
18.GW3EHN	48,510	43.KOJH	5,440
19.VE7YB	43,050	44.W2KHQ	4,200
20.HA5KBM	41,990	45.TI2DO	2,730
21.G4FUT	41,625	46.Y33UO	2,250
22.SM7ABL	36,895	47.Y32ZF	1,740
23.JA1BYL	33,930	48.YU2CB	1,650
24.WØLHS	31,635	49.WB4TDB	1,360
25.WB4UBD	25,160	50.OZ1AKD	1,125
26.WDØSFJ	24,150	51.OZ3UL	1,100
27.N8AKF	22,440	52.OHØNA	750
28.OZ4FF	19,065	53.JR6AG	540
29.Y47YM	18,190	54.OK2SPS	320
30.Y23VB	16,895	55.W8TCO	180

ED NOTE: I found out quite by accident that one of the contestants in the above contest was only 14 years. Stig Kahr is a short wave listener in Sweden. He is OZ-DR2135. Stig placed second in the SWL standings. Not bad at all.

Next year the contest period will be:

1. 0000-0800 GMT Sat. Aug 20, 1983
2. 1600-2400 GMT Sat. Aug 20, 1983
3. 0800-1600 GMT Sun. Aug 21, 1983.

HAM HELPS

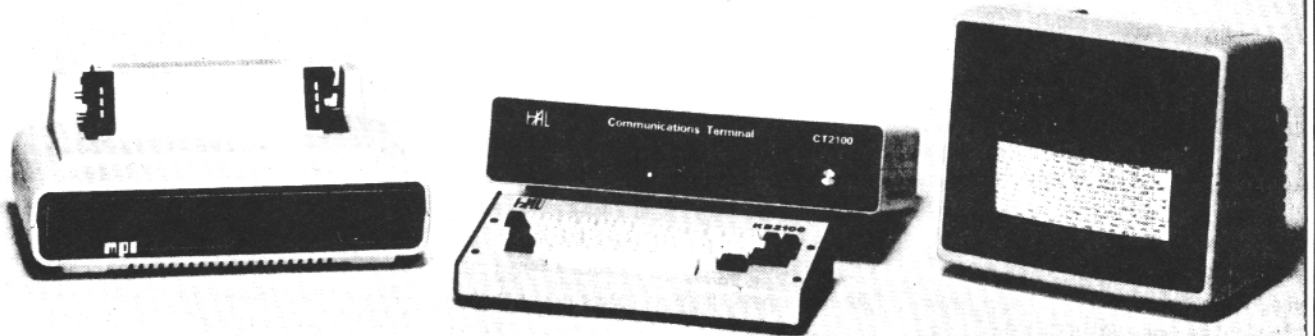
From THE BLACKSBURG GROUP, comes the information that they are offering all "slinky Dipole" owners can send to them for a free tuning chart for 10 MHz band. Their address is: P.O. Box 242, Blacksburg, VA 24060. Please send them A SASE.

WB6SKV, Harold Donaldson, 8850 Phoenix Ave., Fair Oaks, CA 95628 needs info on ways to interface the ASR 33 to his HAL CT2100, also needs an interface for the TRS-80 color computer with the HAL 2100.

Hajime Suzuki, 33-12 Inokashira 2-Chome, Mitaka-SH, Tokyo 181, Japan is a SWL with 92 countries confirmed has some problems and needs info on where to get manuals for his model 28 KSR (or ASR) and his Mite UGC-41.

Manuals for Teletype machines are very scarce I believe, so if anyone knows of a source let the JOURNAL know and we will spread the word around.

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HITS & MISSES

by **GEORGE**

GEORGE HAMMON, WA6CQW
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SAROC 1983

The 1983 SAROC Convention was held in Las Vegas on January 13th thru 16th. I made my annual trip this year in style. I normally drive over in my motorhome but this year my wife Jeanne and I stayed at the Convention site (Aladdin Hotel).

A lot of familiar faces didn't make the trip this year. Dee, N6ELP and John, KAGNYK were down with terrible colds. One of the interesting new items was Heaths HW 5400. Heath choose the SAROC Convention to show off the first microprocessor controlled transceiver in kit form. Heath also had the SS-9000 Delux (non-kit) and other Heath products on display.

I found a large crowd around the Dick Bash (of Bash Books fame) booth. I chatted with Dick about the possibilities of using the Apple computer as an aid to both theory and CW preparation for exams. I have felt for some time that the computer is an ideal media to use for the written examination and CW test.

I stopped and chatted with Len, W6FU (spider antenna) and noticed his name badge (flashing LED's.) Len introduced me to the owner of Ace Leather & Engraving. I was promptly fixed up with a call badge with "RTTY JOURNAL" flashing LED's etc. The cost was \$10.00. Ace Leather & Engraving is located at 740 Mark Ave. #2, Las Vegas, NV 89109. The badges are super fun and low cost. A battery lasts about 200 hours; more than enough for a convention.

QCWA

QCWA Awards went to Bert Ayers, W6CL and Alvino Ray, W6UK for their sixty years of dedication to Amateur Radio.

The Dusprint booth was fun to stop

and drool over the QSL cards and the numerous items this fine company sells. I discussed with them the possibility of QSL cards with all the data except the space for QSL data, blank. They would then print on sprocket feed computer labels call, date, time, mode, band, signal report. Then let your computer printer print the info on the label peel off and paste on your QSL cards. I think it would be great to let your fingers do the walking.

DAYTON HAMVENTION

Dayton will be held on April 29, 30th and May 1, 1983. The featured speaker will be Leonard Wzske. A full schedule of activities from technical forums to special achievement awards will be offered. Dee and John will be looking for you. Dee tells me that they will be stopping in Chicago, Minneapolis, Fargo, Spokane and a lot of points in between on their way home from Dayton. Wish I had lots of sons to house sit while I motored around the country! HI HI!

1984 OLYMPIC GAMES

Los Angeles Amateurs may be called on to provide communications for the 1984 Olympic Games. This is a perfect media for Amateur RTTY. The 1980 Winter games filled a big communications gap with Amateur radio. The Olympic organizers are very interested; no doubt the fine credits given Amateur Radio nationwide by the Rose Parade officials didn't hurt.

INTERNATIONAL DX CONVENTION

The 34th Annual International DX Convention will be held April 22th thru 24th. Jay, W6GO and Jan, K6HHD are handling the program. They can be contacted at: NCDXC, P.O. Box 608, Menlo Park, CA 94025. Look for Dee and myself to be in attendance.

I will cut my column short this month due to the following problem; I lost my entire system on February 2, 1983. The weather here in California finally got me. I have removed what was left and literally poured water out of my rotator. I have purchased a new tower and it is resting proudly beside my house. I have removed the old base and dig a little of the new hole each night after work. I hope to be back on the air by May (we will miss you in the RTTY JOURNAL contest.) Such is life in sunny California.

So long for now, George, WA6CQW.

VIC-20 RTTY INTERFACE

BY Harold Thurlow, K8CV
939 Kaypat DRIVE R. #1
Hope, MI 48628

Here is some dope on the VIC-20. I have a 16K extension for it. Now to get it on RTTY the first requirement is a program. After you "load" it into the VIC-20, you turn to the back of the instruction book and find "users port" (The double-sided 24 edge connector.) The top row is #'s and the bottom row is Ltrs. Note the four corner outputs are all grounds. On your female connector solder all four to ground. Now with your program you can, or should get serial data (I/O logic) out of pin "M" and it should read serial data in with B & C connector tied together. So now comes the interface. This can be at the plug in unit or in your home brew T.U. I am building a new T.U. with Xtal AFSK (See QST December 1980.)

See schematic on facing page.

Note this group of components are powered by a small separate power supply. Do not use a common ground between this unit to any other unit.

VIC-20 RTTY INTERFACE CONTINUED

On transmit "J" goes hi and stays high (1 logic) until 4 Ns are received. (shift "T" on VIC to transmit.) On receive "K" goes hi (logic 1) on shift "T" and low on receive (shift "R".)

If you make the last transmission your J relay will remain closed. You can reset by hitting the runstop and typing -RUN- this takes about two or three seconds to do.

This information should be sufficient for designing your own set HP.

The main advantage to having a computer is that you can shut off the printer (my 28) and save paper, ribbons and clatter while in ordinary QSO. I do all the typing and control at the VIC-20 keyboard.

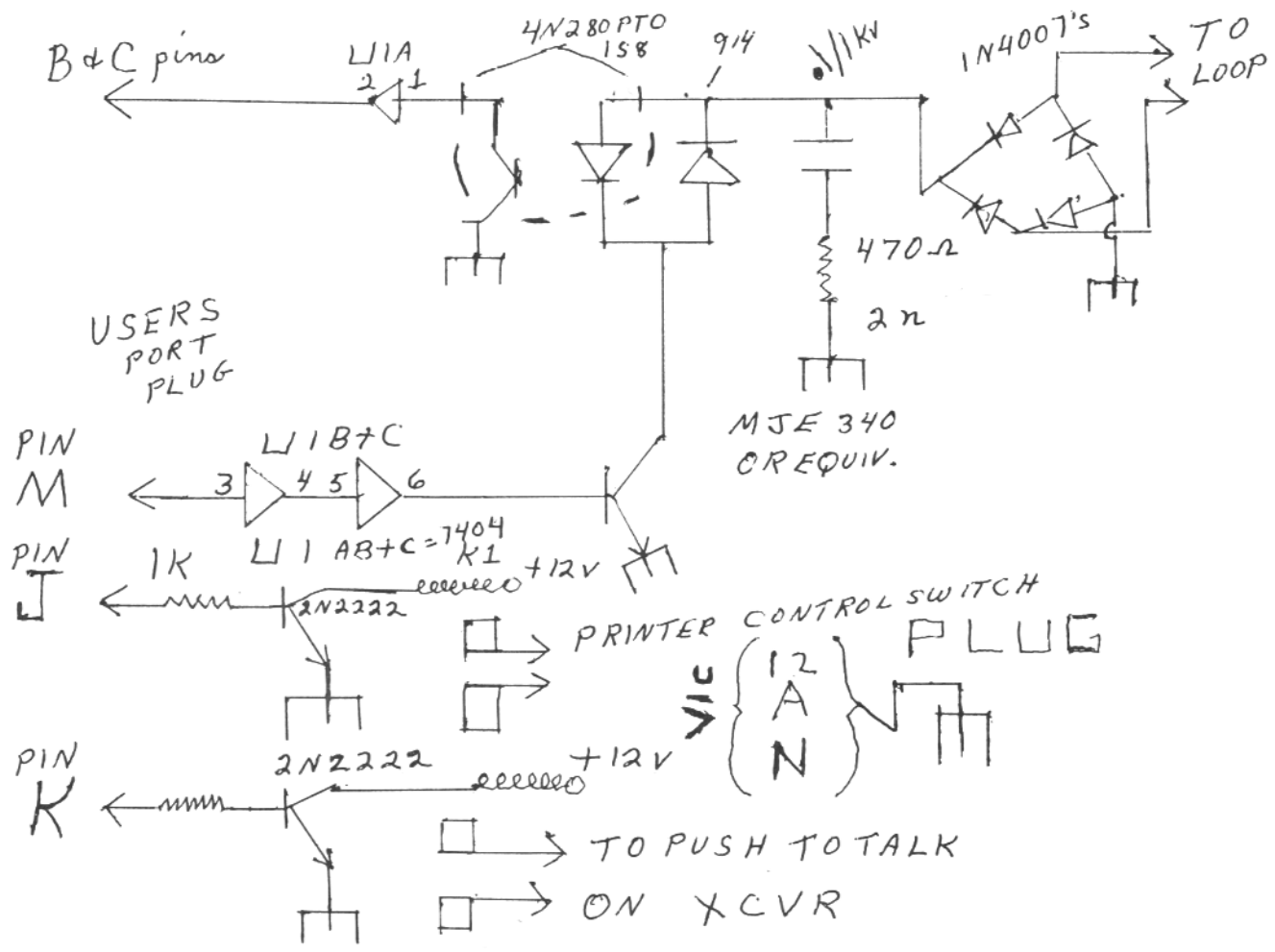
I am 73 years old and not in too good shape but I can still solder and hand wire and dream. [Hope we are all able to do the same when we arrive at 73 years young.] ED.

NEW ELECTRONIC KITS

ALL IN ONE RTTY DEMODULATOR KIT FEATURES: ON BOARD POWER SUPPLY AFSK GENERATOR, PROVISIONS FOR LOOP SUPPLY, ACTIVE FILTERS, OR OPTIONAL TORROID FILTER, AUTOSTART, ANTISPACER PCB KIT NO. 23-1729 \$89.95		ONE AMP POWER SUPPLY KITS BELOW 3 KITS: 22 EDGE CONN 4 1/2X6 TU/LOOP SUPPLY PCB 23-1725 \$57.99 6 1/2X6 15 PCB 23-2125 \$35.99 LOOP SUPPLY PCB 23-2025 \$33.99 BELOW 2 KITS: NOT ABOVE FORMAT 1, 6 1/2X6 2V & 5 1/2X6 5 FOR PLL TU 12 PIN EDGE CONN. PCB 23-1716 \$29.95 1, OR 5 TO 24V (SPECIFY POLARITY AND VOLTAGE) PCB 23-0512 2X6 3/8 \$14.95	
RTTY SPEED CONVERTER CONVERTS 40, 75 & 100 WPM BAUDOT CODE TO 100 WPM CODE. FOR BAUDOT MACHINES REVERSES SAME FOR SENDING. FEATURES: SERIAL BUFFERING AND INTERFACE FOR BAUDOT PTR. PCB KIT 23-1816 \$59.95		RTTY DEMODULATORS DM 80 ACTIVE OR OPTIONAL TORROID FILTER, AUTOSTART, ANTISPACER, SINGLE SHIFT (UP DATED DT & ON ONE BOARD.) PCB KIT NO. 23-1712 \$59.95 DM 30 PLL TU DESIGN WITH ACTIVE FILTER FRONT END. PCB 23-1719 \$29.95	
BAUDOT/ASCII CONVERTER MICRO BASED RTTY CONVERTER CONVERTS BAUDOT TO ASCII FOR RECEIVE, ASCII TO BAUDOT FOR TRANSMITTING. FEATURES: SERIAL BUFFERING AND INTERFACE FOR 110 BAUD PTR. PCB KIT 23-1815 \$59.95		AFSK GENERATOR FOR RTTY ROCK SOLID CRYSTAL CONTROLLED AFSK GENERATOR, VIRTUALLY DRIFT FREE TWO POPULAR SIZES. SPECIFY SIZE PCB KIT NO. 23-1717 2 1/2X6 \$29.95 PCB KIT NO. 23-1710 4 1/2X6 \$31.95	
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TU BANDPASS FILTER ACTIVE FILTER AP80 PCB 23-1718 \$ 9.95 TORROID FILTER BP60 PCB 23-1704 \$12.95	LOGIC/GLITCH PROBE FREEZES HIGH SPEED PULSE OR LOGIC LVL PCB 23-1706 \$15.95	RS232 LINE MONITOR MONITORS 9 COMMON RS232 LINES W/LED PCB 23-1707 \$19.95	DRY TRANSFER DATAMARK SETS TV AND HI FI 21-0058 \$2.50 HAM RADIO & CB 21-0059 \$2.50 EXPERIMENTAL 21-0060 \$2.50 TEST & INDUSTRIAL 21-0061 \$2.50 MARK & SWITCH 21-0062 \$2.50 ALPH & NUMBERS 21-0063 \$2.50 1/2 IN ALPHABET 21-0064 \$2.50 1/2 IN ALPHABET 21-0065 \$2.50 TITLES FOR ELECTRONIC EQUIP. 21-3581 BLACK TITLED \$9.95 METER DIAL KIT 21-0968 \$9.95 DATAMARK SPRAY SEALER 21-4177 \$4.25 MATTE 21-4178 \$4.25

QUALITY LOW PRICED COMPONENTS

CABINETS  <table border="1"> <tr><th>SIZE</th><th>W</th><th>D</th><th>H</th><th>PRICE</th></tr> <tr><td>10-1524</td><td>4.0</td><td>2.5</td><td>2.0</td><td>\$2.95</td></tr> <tr><td>10-1525</td><td>4.0</td><td>3.0</td><td>2.0</td><td>3.95</td></tr> <tr><td>10-1526</td><td>4.0</td><td>3.5</td><td>2.0</td><td>4.95</td></tr> <tr><td>10-1527</td><td>4.0</td><td>4.0</td><td>2.0</td><td>5.95</td></tr> <tr><td>10-1528</td><td>4.0</td><td>4.5</td><td>2.0</td><td>6.95</td></tr> <tr><td>10-1529</td><td>4.0</td><td>5.0</td><td>2.0</td><td>7.95</td></tr> <tr><td>10-1530</td><td>4.0</td><td>5.5</td><td>2.0</td><td>8.95</td></tr> <tr><td>10-1531</td><td>4.0</td><td>6.0</td><td>2.0</td><td>9.95</td></tr> <tr><td>10-1532</td><td>4.0</td><td>6.5</td><td>2.0</td><td>10.95</td></tr> <tr><td>10-1533</td><td>4.0</td><td>7.0</td><td>2.0</td><td>11.95</td></tr> <tr><td>10-1534</td><td>4.0</td><td>7.5</td><td>2.0</td><td>12.95</td></tr> <tr><td>10-1535</td><td>4.0</td><td>8.0</td><td>2.0</td><td>13.95</td></tr> <tr><td>10-1536</td><td>4.0</td><td>8.5</td><td>2.0</td><td>14.95</td></tr> <tr><td>10-1537</td><td>4.0</td><td>9.0</td><td>2.0</td><td>15.95</td></tr> <tr><td>10-1538</td><td>4.0</td><td>9.5</td><td>2.0</td><td>16.95</td></tr> <tr><td>10-1539</td><td>4.0</td><td>10.0</td><td>2.0</td><td>17.95</td></tr> <tr><td>10-1540</td><td>4.0</td><td>10.5</td><td>2.0</td><td>18.95</td></tr> <tr><td>10-1541</td><td>4.0</td><td>11.0</td><td>2.0</td><td>19.95</td></tr> </table>	SIZE	W	D	H	PRICE	10-1524	4.0	2.5	2.0	\$2.95	10-1525	4.0	3.0	2.0	3.95	10-1526	4.0	3.5	2.0	4.95	10-1527	4.0	4.0	2.0	5.95	10-1528	4.0	4.5	2.0	6.95	10-1529	4.0	5.0	2.0	7.95	10-1530	4.0	5.5	2.0	8.95	10-1531	4.0	6.0	2.0	9.95	10-1532	4.0	6.5	2.0	10.95	10-1533	4.0	7.0	2.0	11.95	10-1534	4.0	7.5	2.0	12.95	10-1535	4.0	8.0	2.0	13.95	10-1536	4.0	8.5	2.0	14.95	10-1537	4.0	9.0	2.0	15.95	10-1538	4.0	9.5	2.0	16.95	10-1539	4.0	10.0	2.0	17.95	10-1540	4.0	10.5	2.0	18.95	10-1541	4.0	11.0	2.0	19.95	UNIVERSAL CIRCUIT BOARDS THREE SIZES AVAILABLE AS SHOWN FOR ONE IC 11-1709 \$ 8.99 FOR 3 IC'S NOT SHOWN 11-1702 \$1 39 HORIZ. LAYOUT UP TO 4-14PIN IC'S \$1 29 11-1703 \$1 99
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FK8DJ, JA1BK, FK8DH, FK8CL, JA1MIN



VK2SG, VS6EK, VS6HF, VS6MW



Hans DJ8BT



DF7FB, DJ1QT, HB9AVK, DJ8BT, DF6ZY



9M2CR VK2SG



Dan Fabrici I3FUE



Jim W8JLN



JR2TZL Jun



N5ADK CFMS:
 QSO WITH:
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REMARKS.....

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G. BURNETT



VE3AYL

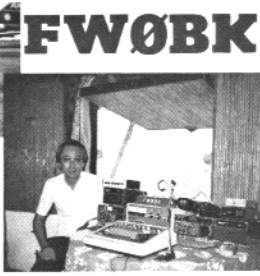
"A YOUNG LADY"



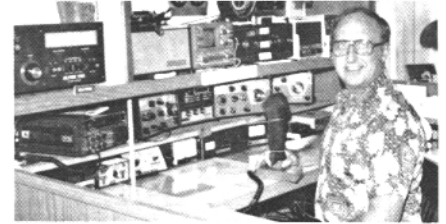
Anton Munich



Tanoa,
Wallis

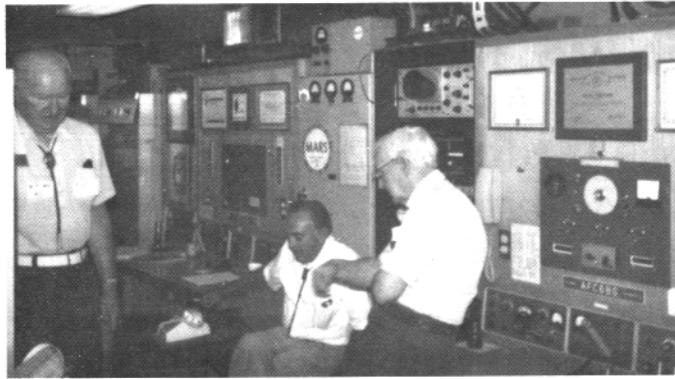


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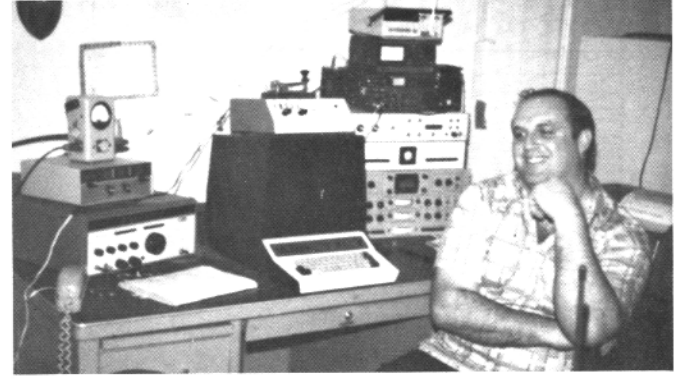


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WILLIS W. PETZER

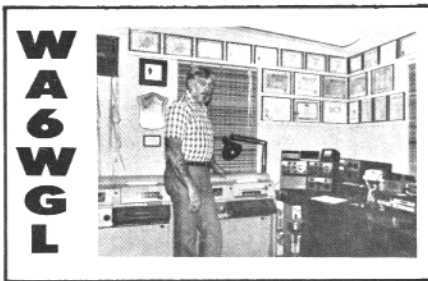
315 Van Amberg Road
Brighton, Michigan 48116
U.S.A., Livingston County



Senator Goldwaters "Shack"



Ben KR6E



WA6WGL

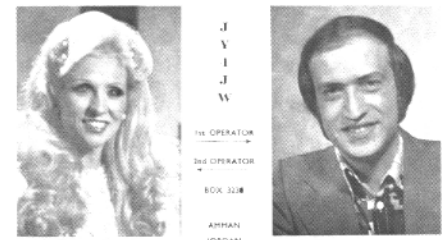
ZONE 25 JAPAN
JA3EOP
YOSHIE MURAKAMI
998-1 ZUO-MACHI
NAHA-CITY NAHA
630 JAPAN

Confirming QUR QSO No. QSL PSE TNX

TO RADIO	DATE	TIME	FREQ	MODE	RST
				2 WAY	
		JST (GMT)	MHz		

Rq. _____ Input _____ W Ant _____

Remarks: _____ TNX FB QSO



JVIJW
1st OPERATOR
2nd OPERATOR
BOX 328
AMMAN
JORDAN



WILLIAM "BILL" HEMINGWAY

KZ5BH

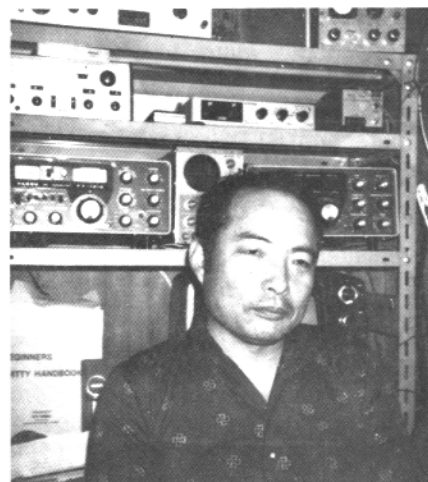
BOX 724, CURUNDU, CANAL ZONE



WA6MJZ Don



ED W4FQM



JH2FHX



AAA3DSN

DRAKE

COMMUNICATIONS TERMINALS



Microprocessor Controlled

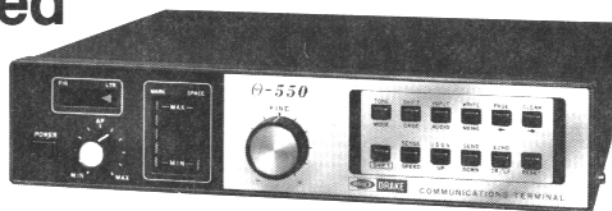
DRAKE
Theta 9000E

The ultimate in communications versatility, the **Drake Theta 9000E** provides complete transceive capability of CW (Morse Code), RTTY (Baudot), and ASCII. A full computer RS232 interface, cassette tape storage port, selective calling feature with answer-back, light pen graphics, printer interface and word processing software are all standard.

Seven large 256 character memories are backed up with battery power so there is no need to reload information with each use. Memories may also be partitioned providing up to 29 separate storage locations. A type-ahead buffer of 3120 characters makes it easy to compose your response while still receiving. Operator controlled scrolling permits review of up to 10,720 previously received characters. Line length is selectable at 40 or 80 characters, your choice, and all mode and speed indicators are displayed on the screen for instant status recognition. The 9000E has 3 tone groups and 3 shifts which are all keyboard selected.



You won't buy any other communications terminal once you have studied all the advanced operating convenience built into the **Drake Theta 9000E**. It's complete.



DRAKE
Theta 550

The **Drake Theta 550** is a compact receive-only communications terminal and is designed to demodulate and display the three most popular over-the-air modes of data communications: CW (Morse Code), RTTY (Baudot), and ASCII. Any standard TV monitor can be used.

A full-featured microprocessor controlled unit, the Drake Theta 550 has selective calling, battery backed-up memory, audio monitor, and informative L.E.D. tuning indicators. There is also interfacing to permit the addition of a dot matrix printer for "hard" copy and a keyer paddle input to permit CW transmission with full iambic operation.

CW automatically tracks over a speed range of 5 to 50 words per minute and RTTY modes offer nine selectable standard speeds of transmission. 12 volts DC is required.

This unit is ideal for shortwave listeners and hams who have been missing the increasing volume of data communications over the air.



LA7 Line Amplifier

Line output, input levels as low as 15 mV rms (47 kilohm) will result in an output of 1 mW nominal into a 600 ohm balanced line. Output level adjustable by internal preset level control. Interfaces low level audio to RTTY terminal unit or phone line that requires a 600 ohm balanced/unbalanced input. One 36" phono to phono cable supplied.

R. L. DRAKE COMPANY



540 Richard St., Miamisburg, Ohio 45342. USA
Phone: (513) 866-2421 • Telex: 288-017

RTTY APPLICATION AND THEORY

PART 1- FSK vs AFSK

Because operation on the HF bands is limited to FSK operation in the CW portions of the bands, it seems to be the natural method of operation on the VHF bands. However, as the carrier frequency is increased, the ratio of the shift to the carrier frequency becomes smaller; this ratio can be used as a "figure of merit" for comparing the relative transmitter and receiver frequency stability required for successful FSK operation. The larger the number, the less stability required. For example, at 3.6 MHz, a shift of 850 Hz is $850/3,600,000 \times 100 = 0.235\%$ of the carrier frequency; if the same 850 Hz shift is used on 146.700 MHz, the required stability is 0.00058%! This is getting pretty tight. In fact, it means the carrier frequency stability has to be 40 times better on 2 meters than it has to be on 80 meters.

We do not mean to imply that it is not possible to run FSK on VHF, however, for ordinary work, the stability problems are such that FSK is generally not recommended.

With AFSK things are better. When using AFSK, it is the audio output from the receiver that is useful. This output is not directly proportional to the carrier frequency as it is with FSK, therefore, more instability can be tolerated. Most AM receivers can be detuned by 1 kHz if they are running with a 6 kHz bandwidth, and, unless there is severe QRM or QRN, output is still usable by a TU. With wideband FM receivers the amount of allowable tuning error is even greater. We do not mean to imply that it is desirable to not accurately tune your receiver, we mean the wider the system bandwidth, the greater is the tolerance to frequency errors. Therefore, on the VHF bands, AFSK is easier to use successfully than FSK.

AM vs FM

The index of modulation for FM is defined as the peak carrier deviation divided by the highest modulation frequency. For example: if the carrier deviation is set at 15 kHz peak, and the modulating frequency is 3 kHz, then the index of modulation M is 5.

Using the same definition of modulation index gives $M=1$ for AM.

With AM receivers the S/N (signal to noise) ratio at the output of the receiver is directly proportional to the S/N ratio at the input. (this assumes that the receiver is close to having a noise figure of 1.) In an FM receiver the S/N characteristics are quite different from that of AM. There is an improvement of the S/N ratio in an FM receiver so long as the input S/N ratio is above a critical amount known as the "FM Improvement Threshold"; this means that when operating above the improvement threshold, the S/N ratio at the output is greater than the S/N ratio at the input. This is not a case of getting something for nothing as the amount of S/N improvement when passing thru the receiver is proportional to the square of the index of modulation. This is an example of the concept of exchanging bandwidth for noise. So long as the S/N ratio within the IF amplifiers is greater than the FM improvement threshold, the FM receiver will perform better than the AM receiver. However, when the S/N ratio drops below the threshold of improvement, the output from the receiver deteriorates very rapidly.

The practical result is: as the index of modulation is increased, the output S/N ratio increases giving a quieter signal; however, for very weak signals, AM is better. Therefore when trying to work over the absolute maximum distance AM is preferred, but when less than absolute maximum distance is desired, FM is the better medium.

Crystal vs VFO

When a large portion of a band is used for general contacts, VFO control of a transmitter and a tunable receiver are the most practical modes of operation. Also, if a band is crowded, survival is dependent upon being able to move about into clear spots. However, in the relatively uncrowded VHF bands, the ability to move around may actually be a detriment, especially if the band is very wide.

Since it is relatively easy to drift off frequency it becomes a problem, once tuning off a given fre-

quency to get back on frequency. Therefore, crystal control of both receivers and transmitters is considered desirable because with crystals it is possible to be reasonably sure you are where you think you are.

Autostart

Autostart is a convenience for traffic handling, setting up operating schedules, and for knowing what is going on. In order to successfully employ autostart, it is necessary to pick a frequency to be used and be able to transmit and receive on that frequency. A system with some built in tolerance for slight frequency errors is desirable. This indicates that AFSK is better for autostart than is FSK.

As long as the amount of traffic on a frequency is small, a simple means of activating the autostart is desirable. A simple mark-start, mark-hold arrangement is adequate. If the amount of traffic becomes too great, selective calling schemes can be devised.

One might object to using crystal control because it makes the chance of working "DX" well nigh impossible. There is one simple solution to this problem: have everyone using a particular mode of operation on the same frequency. Of course this may be impossible to do in your area. Certain operating standards should be established such as the shift for FSK and the audio frequencies for AFSK. Antenna polarization is also important.

Terminal Units

For FSK or VHF, the prime concern is frequency stability. Crystal control is no longer necessary nor perhaps, even desirable since the advent of the solid state transceiver, but perhaps it would be wise to mention it as some of us still have rigs requiring crystals. Automatic frequency control should also be available if it is not built in.

For AFSK the opposite appears to be true. Because the receiver output audio frequencies are determined by the transmitting stations, it is necessary only to have the receiver and transmitter reasonably stable.

NEXT MONTH AFSK KEYERS ETC.

VHF COLUMN

by JOHN

JOHN CUNNINGHAM, WA9WJG
POST OFFICE BOX RY
PERRYSVILLE, IN 47974

Is it really almost spring? Let's all resolve now not to forget to operate at least a little VHF RTTY each evening all summer. The activity seems to drop off during the summer normally, but this year will be different, right? It doesn't take long to check the local MSO, read a message or two and then put in an answer. This would sure keep things alive during the "off season."

The news from the Eastern Illinois RTTY group is very good; their RTTY repeater is on the air and doing fine. It sure has helped the signal here in Western Indiana. I have heard real DX getting into the machine, WB9QMO, Bill, from Lincoln, IL and KB9MR, Bill from Decatur, IL (more Bills than the first of the month). The weather system should be ready to put back on before too long. The MSO machines (5 of them) make activity readily available.

From David Chapman, W9DPY, came a nice letter stating that his station is all machines, no video, and he has several of the original Selcals to turn his machines on. His friend W9-HHP has much the same. They both use a bridge rectifier with 1N4001's followed by an opto coupler, Motorola 4N26, keying the Selcal. This can be patched directly into the 170 volt loop, + or -, any current from 15 to 85 ma. David and his friend both use 30 mil loops, because of the lower noise level. He has a 28 with a stunt box which can be set up for answer back and also remote tape turn on. Another way to do the fob is with a Selcom. This device decodes every character and can be set up for almost limitless combinations. David found all this info from the JOURNAL by Irv Hoff, W6FFC a few years back.

I just received the ARRL letter today and read about the NPRM on the no code license. The FCC says, "we

are doing this in the belief that there are intelligent, disciplined persons who can make a valuable contribution to the Amateur radio service without such proficiency."

It all boils down to: no-code technician—simply delete the code requirement from current technician class licensing requirements. A code test, 5 WPM, would be optional and would give the licensee the current privileges, without the code they would be restricted to freqs. above 30 MHz. The FCC rationalizes that computer enthusiasts newly licensed as no-code technicians would initially use radio-teleprinter modes. Well, that don't make 'em bad boys, huh?

The experimenter, the second possibility, is much like the Canadian digital Amateur class certificate. This would require a test in radio theory and digital techniques. There is still not a decision on just what this would cover. The FCC is open to suggestions on this. This class may have a 144 MHz lower limit.

I am not totally in favor of a no-code license, I kinda agree with the idea that, although I don't use it much, it is a good idea to know the code. If it helps some people get started and a good percentage of them upgrade later, maybe it will be okay. It is one way to get more VHF RTTY operators.

The following is pretty cute, hope you enjoy it:

"MY GREEN THING FULL OF SPRINGS"

One day I took it in the house
My green thing full of springs
My wife would cringe at three A.M.
When the auto-start bell rings

With greatest care I'd clean the keys
the buttons, knobs, and things
And stand and look, just full of pride
At my green thing full of springs

The wife just hates my little joy

And all the noise it brings
That cursed thing that rattles loud
My green thing full of springs

I'm leaving you, she screamed one day
The next time that darn bell rings
We hope she has a pleasant trip
Me and green thing full of springs

But just our luck, she missed the bus
Now my castle is void of kings
I was soon ejected from the house
With the green thing full of springs

Was Klienschmit's wife the same as mine?

When "his invention rings"
Was he forced into exile to "his" basement
With "his" green thing full of springs?

The CARRS RTTY repeater in north-west Chicago is now holding a RTTY only net each Tuesday at 7PM (CDT). A bulletin and then net check-in is the program. Repeater is on 145.31 MHz. Newcomers are welcome.

Radio Club W4BFB has recently activated a RTTY repeater on two meters in Charlotte, North Carolina. They forgot to let us know where to find them on the airways, but, if you are in the neighborhood of Charlotte, NC March 19-20, 1983 you could probably find someone at the Charlotte Civic Center where a Hamfest and Computer-fair will be going on.

Mark on your calendar September 2 to 4th 1983. The Southwestern Division will hold its' convention at the Marriott hotel in Anaheim (that's Disneyland country remember?) SCATS and SDTS (of Los Angeles and San Diego respectively) will be there, along with the RTTY JOURNAL and gang.

A SCATS information net is conducted at 2000 (PDT) on Wednesdays and a picture net on Thursday at 2000. The club owns and operates on 146.10/146.70 and 223.12/224.72 MHz. Both are open repeaters open to all Amateurs.

AN INTRODUCTION TO PACKET RADIO

BY: Tuscon Amateur Packet Radio Club

Radio Amateurs in Canada, Sweden and the United States have experimenting with packet radio, a system of computer-based communications. This new mode can provide high speed communication with efficient use of the spectrum, and is resistant to interference due to other stations and to signals degradation due to adverse band conditions. Not only can packet radio be used for informal Amateur QSOs and traffic handling, but it has additional possibilities for exchange of data between Hams with computers, "bulletin boards", message systems and remote computer programming.

WHAT IS PACKET RADIO?

Packet radio is a communication system in which information is digitally encoded. In this respect it is similar to RTTY or ASCII, but with important differences. These same differences are the key to insuring error-free reception and at the same time allowing maximum use of the spectrum through shared frequency use.

Data integrity is provided by packet radio through a "handshaking" technique and error detection. Along with each transmission, a computed value called a "frame check sequence" (FCS) is sent, which allows the receiving station to check for errors. The receiving station acknowledges an error-free packet with a special acknowledge (ACK) signal. If the sending station does not receive such a signal within a certain period of time, it automatically retransmits the packet.

A packet, also contains identification of the destination station, permitting several QSOs to take place on the same frequency. A packet radio station can automatically ignore any packets which are not addressed to it. Due to the fact that the duration of most packet radio transmissions is very short, a user does not need the channel most of the time. The time between transmissions is available to other users on frequency. This system is called time-domain

multiplexing. On a very busy channel, the user will notice an increased delay time before getting replies to transmissions, but the packet radio equipment will take care of automatic retransmissions and sorting out replies meant for the station. The user never "hears" the QRM.

WHAT IS A PACKET RADIO STATION?

Packet radio requires the use of a microprocessor-based controller at each station, and it will obviously appeal to the Ham who already has a computer in his shack. However, it does not require that the operator be a programmer, or even that the station have a personal computer. All that is really necessary is a terminal, a terminal node controller (TNC) and an Amateur radio transceiver.

The terminal can be a simple display (CRT) or typewriter terminal that produces ASCII characters, a personal computer, or even a commercial mainframe computer. What you need is a terminal with a keyboard to allow you to talk and a screen or printer to allow you to read incoming information. You can even get an inexpensive terminal that uses a TV set for the display.

The way in which most terminals encode ASCII characters is in an "asynchronous" format. Since characters are encoded as they are typed, there is a flag consisting of one or more "mark" (binary 1) values to make the beginning and end of each character. The device decoding the characters expects a specific "baud rate", or number of transitions from "mark" to "space" (binary 0) per second during the character, but no particular time interval between characters themselves.

The terminal node controller is the heart of the packet radio system. It has one port that is connected to the terminal or computer, and communicates through it by asynchronous ASCII format at the baud rate required by the terminal. The TNC converts the data stream from the terminal to a packet by attaching a "header" showing the destination of the packet & control information for the network, a "tail" containing the result of the FCS calculation for error detection,

and flags to mark the beginning and end of the packet.

The second port of the TNC connects it to the transceiver microphone and speaker audio lines, and the PPT line. Ordinarily, the TNC will produce AFSK modulation by putting one of two tones into the microphone input, corresponding to a "mark" or "space." In this fashion, the packet is sent out on the air at the packet channel baud rate, which is unrelated to the terminal baud rate at the other port of the TNC.

The receiving TNC reverses this procedure, decoding the audio tones from the speaker audio line of the radio, removing and reading the header and tail information, and passing a successfully received packet to the terminal at the terminal baud rate.

The part of the TNC that does the translation between the sequence of tone levels and the characters is called a "modem" short for MODulator-DEModulator. This device may or may not be built into the TNC board. Most packet radio modems operate at 1200 baud, which corresponds to about 1200 WPM, although the FCC now authorizes much higher baud rates on some Amateur bands. The audio tones used are 1200 Hz and 2200 Hz. This choice of frequencies is that of the Bell 202 modem, which is available as surplus.

The final component of a packet radio station is an Amateur radio transceiver. Most packet radio activity so far has been in the 2 meter band. The only important requirement of the radio is that its' audio frequency response at 220 Hz be adequate. In other words, the 2 meter FM rig you already have is probably just fine.

WHAT THE TNC DOES

The TNC consists of a special purpose microcomputer, containing all the necessary software and hardware to communicate with your terminal, assemble a packet, operate your transmitter and receiver to send and receive a packet, and decode a packet. The special functions of the TNC which would be difficult to implement with an ordinary personal computer are the use of protocol to communicate with other TNCs and real-time

packet radio continued

control.

The encoding and decoding of packets involves a carefully standardized set of procedures called "protocol." The protocol basically determines the exact form of the header and tail parts of the packet. The header allows receiving TNCs to automatically determine the purpose of the packet, e.g. net check-in, part of a QSO, or ACK to a previous transmission. The tail contains the FCS, which allows the TNC to automatically determine whether the packet was received correctly, and if so, to automatically acknowledge it. Since the protocol is programmed into the TNC, the operator does not need to know exactly what his packet "looks" like. In particular, he does not need to know how the destination of his packet is indicated. The operator communicates with other Amateurs by callsign, and the TNC translates the callsign into the identification required by the protocol.

The TNC is required to perform a number of tasks simultaneously, including responding to events such as the receipt of a packet or instructions from the operator in "real time", in other words, as they happen. This makes programming in BASIC, the common language of personal computers undesirable. This is because BASIC uses an "interpreter" which reads each line of the program and translates it into machine-type instructions every time the line is executed. The time required for the translation would prevent a program from responding rapidly enough in a packet radio environment. In order to meet the speed requirement, an assembly-language program or equivalent is required. While BASIC looks pretty much the same on any computer, assembly language is different for every machine. If the TNC were replaced by personal computers, program development would have to be redone for each variety of computer. In addition to maintaining the right pace, the TNC also must be constantly "listening" at both ports simultaneously while putting packets together or taking them apart. The

hardware of personal computers may not even be capable of this sort of multi-task application.

Programming of individual TNCs must be as easy as possible, since there will inevitably be unforeseen problems in the initial software. In addition, hardware changes may necessitate software changes. For this reason, TNCs are designed around erasable programmable read-only memories (EPROMS), which normally function like the ROM of a personal computer, where the vital software is stored in an indestructible form. However, if the need arises, they can be reprogrammed by "burning in" the new program using special equipment.

WHAT IS A PACKET?

A packet is the basic message unit in packet radio. It ordinarily consists of a text message typed in by the operator, sandwiched between the header and the tail, information required by the protocol. In a typical QSO, a packet would be encoded and sent out by the TNC when the operator ends a line of typing by hitting the RETURN or ENTER key. In any event, the length of a packet is limited usually, to 128 characters. This helps to prevent a single user from "hogging" the channel, as well as making sure that the sending and receiving TNCs don't get swamped with information.

A packet need not consist of ASCII or Baudot character strings, however. It could contain information in other coding systems, such as BCD or EBCDIC, or even binary data such as a compiled computer program. The TNC, which uses a "bit oriented protocol" based on a standard called High-level Data Link Control (HDLC) can encode any of these equally easy. An advantage to this type of protocol is that the functions it requires are available on a single large-scale integration (LSI) chip, which simplifies the TNC hardware and software. A second advantage of HDLC protocol is that the beginning and end of the entire message are flagged, making the "start" and "stop" bits for each character unnecessary when the packet is transmitted in "synchronous" format.

The "frame of an HDLC is represented below. Each field of the packet is encoded as a sequence of 1s and 0s (bits) to be transmitted as "mark" and "space" tones. With the exception of the DATA field, all these fields are generated by the TNC as it assembles the packet for transmission. The operator is concerned only with the contents of the DATA field.

The FLAG is a unique bit sequence which identifies the beginning of a packet to the HDLC controller. This pattern corresponds to no sequence which would be encountered in any of the other fields, except possibly in the transmission of binary data. Even in this case, there are provisions for distinguishing data from the flag sequence.

The ADDRESS field contains routing information for the packet. This information may include the destination station, the originating station, and possible intermediate routing information if the packet will be relayed to the destination. The destination and originating stations might be identified by a network address number or by Amateur callsign, depending on the exact form of protocol being used.

The CONTROL field describes the purpose of the packet to the network. It identifies packets with such functions as network check-in or check-out request, packet acknowledgement, or request for information from net control. It may also contain a sequence number for a multi-packet message which must be received in the correct order.

The DATA field contains the message being sent, which will ordinarily be the text typed in by the user, converted into an ASCII data string. In the case of a packet identified in the control field as performing a control function, the DATA field may be absent.

The FCS allows the receiving station to verify that the packet has been received correctly. If the FCS calculated by the receiving TNC matches the FCS of the packet, an acknowledgment is sent; otherwise the packet is ignored. SEE NEXT MONTH

FLAG	ADDRESS	CONTROL	DATA	FCS	FLAG
------	---------	---------	------	-----	------

NEW UNIVERSAL M-600 MULTI-MODE, CRYPTO-DECODER



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USED AND ABUSED TELETYPE machines and parts. Junking 28, 33, 35 and 43 models. Aaron Dickey K7GCP, 51 N. 850 West, Orem, UT 84057. 801-225-0678.

FRED SAYS, "CASH IN those teletype-writer parts." Send list or UPS them for offer. Ask about a personal visit to pick up. Send SASE for list of Teletype parts, supplies, paper, tape gears, for sale or trade. TYPETRONICS Box 8873, Ft. Lauderdale, FL 33310. Fred Schmidt N4TT.305-583-1340.

WANTED: SOFTWARE and HOOKUP for IBM personal computer to handle RTTY from HAL ST-6000 demodulator. Robert Milligan KA4PNG, 6608 N. 18th St, Arlington, VA 22205. 703-533-0650.

FOR SALE: KNWD VFO-520, \$100. Kantronics FD-2 CW/ASCII/RTTY reader \$250. MFJ 496 super 496 super kybd with AFSK \$200. John, N6EGY. 805-964-8340. Make offer.

WANTED: SIEMENS T-100 60Hz, 60WPM gear UOS auto CR/LF option kits. 3-12-6 Ohgi-cho Iwakuni-shi, Yamaguchi-ken, 740 Japan. Ioru, JA4ONZ.

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NEWS-NEWS-NEWS Amateur Radio's Newspaper "WORLD RADIO". Year subscription is \$9.00. Send to WORLD RADIO, 2509 F Donner Way, Sacramento, CA 95818.

HAM RADIO MAGAZINE. The no nonsense state-of-the-art technical magazine. Subscribe now and see for yourself. 1 year \$19.50 US, Canada and foreign surface \$21.50. Europe, Africa & Japan \$28.00. Ham Publishing Group, Greenville, NH 03048.

RTTY-MARS-RTTY-MARS-RTTY-MARS-RTTY- Have you heard about the new HAL "Message Processing Terminal" software for the DS-3100ASR? Throw away your paper tape and roll paper! Complete in-memory message and traffic handling. Call or write Dick, KØVKH, DIALTA Amateur Radio Supply. 212 - 48th St., Rapid City, SD 57701. 605-343-6127. All of your HAL and INFO-TECH equipment needs. Our prices can't be beat!

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RTTY PC BOARD SPECIAL- Some quantities limited. The famous UT4D speed converter PC board was \$22.95 now \$12.95 The UT2 Regen/Speed converter board was \$14.95 now \$10.95. XB6 Xtal clock PC board for above was \$8.95 now \$4.95. RTTY ID PC board was \$6.95 now \$1.95. Send 2 stamps for our free flyer of over 1200 items or send \$1 for our catalog (refundable on purchase). Add \$1.75 shipping to orders. DATAPRO ELECTRONICS 3029 N. Wilshire Ln., Arlington Hts, IL 60004.

INFO-TECH MODEL 150 Keyboard; Model 60 De-modulator and video unit; 9 inch Black & white Video Monitor. All speeds 60-100 WPM. 170-425-850 shifts built-in AFSK gen. Loop or TTL compatible. Like new cond. \$225. Jim Stucker, KC9DC, RR1, Box 240, Genoa, IL 60135. Phone 815-784-5348.

HAM HELPS

Harry Pasquaye, W7KKJ, a newcomer to the RTTY JOURNAL is looking to interface his 33 to his TRS-80 C for hard copy. His address is: 4525 W. Twain #245, Las Vegas, NV 89103.

RESULTS OF D.A.R.C. RTTY 3/82 CONTEST

Single/multi-operator

Call	QSO's	POINTS
1. I8IRA	23	161
2. G3UUP	20	140
3. DH2HAU	9	45
4. DL9MBZ	4	9
5. DK4IZ	3	4
6. DL1VR	3	3

SWLs

1. Ballenberger	13	91
1. Wuestner	13	91
2. Oostenbrugge	9	72
3. Dedic	4	12
4. Kahr	2	4

Dave Earnest, W7KJJ/HZ1AB tells the JOURNAL that he ordered two HAL Tele-readers for contesting purposes. He says that Walt, W7SE has received his HAL Telereader and will take it with him on the VK9JS Heard Island trip. Those Telereaders sure get around. Ours at the RTTY JOURNAL sure does. Dave says he will be at the DX convention for the start of his vacation from Dhahran, Saudi Arabia.

220 RTTY REPEATERS IN SO. CAL.

222.24/3.84 K6SMM Victorville
223.12/4.72 W6IWO Palos Verdes
223.22/4.82 NOAOT San Diego (SDTS)
223.10/4.70 W6XT Laguna Hills



FIRST PLACE
PORTRAIT OF A GIRL
Originated by AD4M
Winky, Hollywood, FL

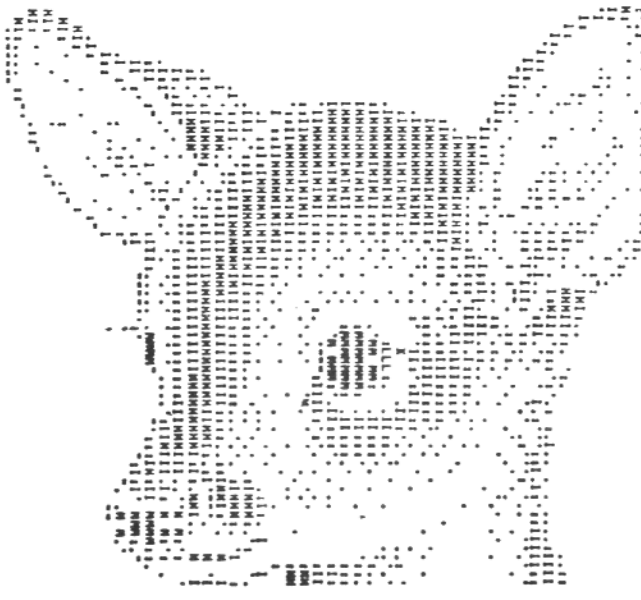
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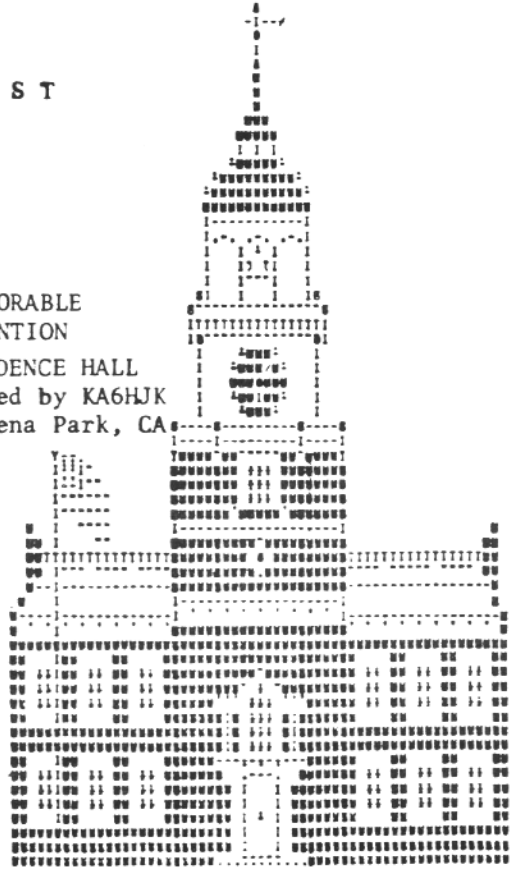
THIRD PLACE
CABIN IN THE WOODS
Originated by WB4TEU
Sandi, Hurt, VA

1982
WORLDWIDE
RTTY ART CONTEST
WINNERS



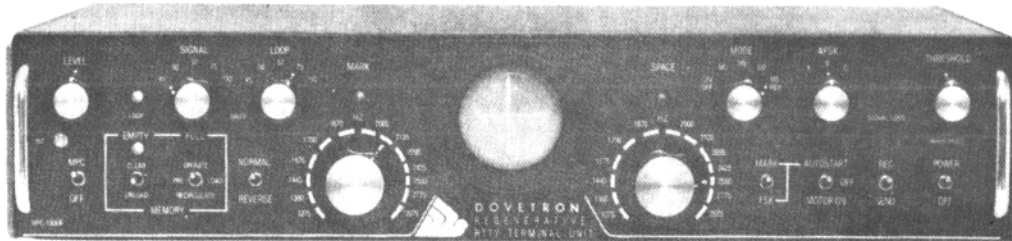
SECOND PLACE
LITTLE FAWN
Originated by K700W
Dennis, Bothell, WA

HONORABLE
MENTION
INDEPENDENCE HALL
Originated by KA6HJK
Jean, Buena Park, CA



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