

RTTY

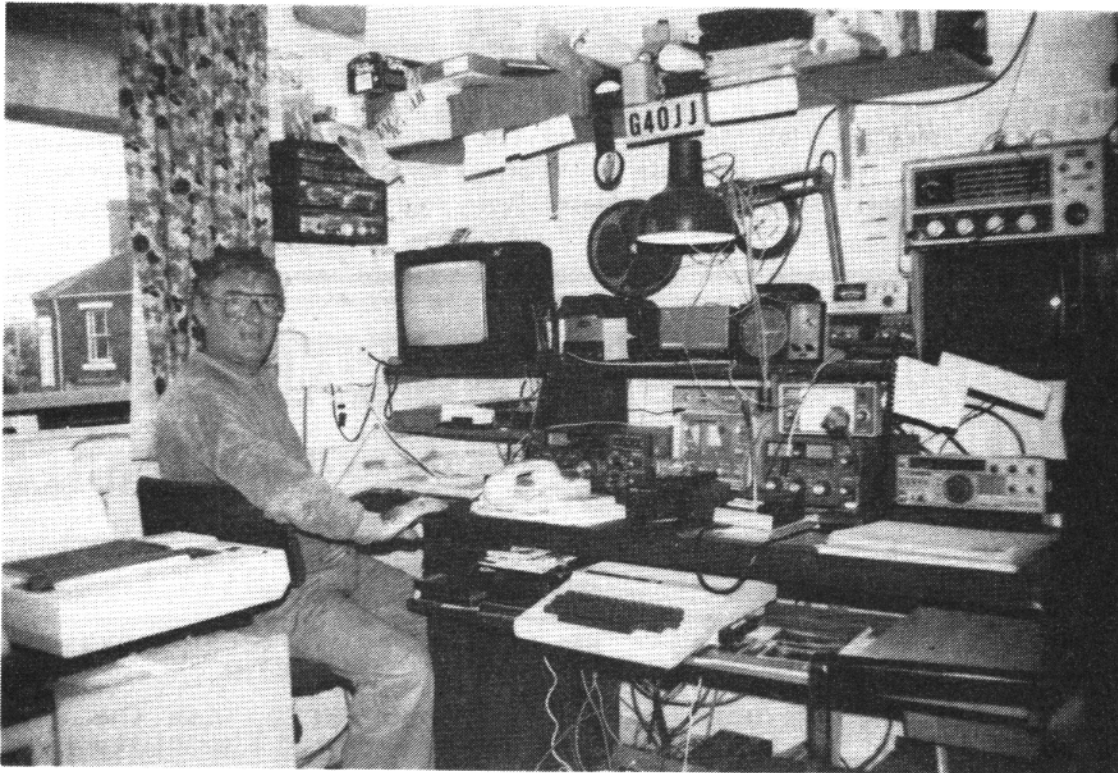
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HAM SHACK OF ARCHIE, G4OJJ

CONTENTS

COCO RTTY - PART II

A CHEAP AND EASY TUNING SCOPE

RTTY TONES, SHIFT, AND SSB EQUIPMENT

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RTTY TONES, SHIFT, AND SSB EQUIPMENT

BY: BILL HENRY, K9GWT,
P.O.B. 365
URBANA, IL 61801

A lot of us transmit HF RTTY by using SSB transmitters in LSB mode. AFSK tones are fed into the microphone jack and we adjust power output with the mike gain control. Is this AFSK? Only FSK is legal on the HF bands---What gives? Also, how come we use the audio tones we do and why LSB instead of USB? This article will try to clear up some of the confusion and give historical and technical reasons why and how RTTY works with SSB transmitters.

INDIRECT AFSK

Actually, the confusion stems from the "AFSK" label. When you put a single tone into a SSB transmitter, all you get out to the antenna is a single radio frequency carrier - not an audio tone. If you change the pitch (frequency) of the audio tone into the SSB transmitter, what goes to the antenna is a Different radio frequency, again NOT an audio tone. However, the difference between the two transmitted radio frequencies at the antenna is the same as the difference between the frequencies of the two audio tones. Thus, the SHIFT of the transmitted RF RTTY signal is the same as the shift between RTTY tones at the mike jack. Since all we are radiating is either one radio frequency for Mark or another for Space, this is indeed true FSK, or type F1 emission. I advocate use of the term "Indirect FSK" instead of "AFSK" to describe use of RTTY tones with a SSB transmitter.

Okay, this sounds good, but why use 2125 HZ as Mark and LSB instead of USB as on CW? The answers to these questions requires a little research of the history of Amateur RTTY. After many chats with the true "old timers" of Amateur RTTY, I find that tone choice and polarity are related as follows:

TONE FREQUENCY

The choice of 2125 HZ for Mark and 2975 Hz for Space goes back to some choices made by ATT/Western Union/Bell Laboratories engineers slightly before World War II. These tones fit already defined "standard" phone company filters and were compatible with long-lines bandwidths, particularly for the transoceanic cables. When the Army Signal Corps asked Bell Laboratory to

figure out a way to send RTTY on radio, the engineers chose 2125/2975. These tones (and all other "standard" RTTY tones) are related to harmonics or sub-harmonics of the "RTTY standard" 425 Hz tuning fork - another strong consideration. When WWII ended, U.S. Hams took-up operation using the 2125/2975 Hz tones on VHF, maintaining Mark as the lower tone (2125). To this day, the U.S. Mark standard is the lower tone of 2125 Hz, regardless of shift. All demodulators built in the U.S. since WWII have set Mark for the lower tone.

POLARITY

When HF FSK RTTY was first used in the early 50's, we all used AM/CW transmitters with FSK diode keyers. The shifts and polarity were totally unpredictable! The RTTY JOURNAL, led by first Merrill Swan (W6AEE) and then Dusty Dunn (WBQCQ) started campaigns for standardized RTTY polarity and shift. Also, new international regulations were then being defined by the CCIR for HF RTTY. The upshot is that "it was decreed" that when transmitting HF FSK RTTY, the higher radio frequency would represent the Mark (machine rest) state. Therefore, Space is represented by the lower radio frequency transmitted. For years, the RTTY JOURNAL ran the acronym "LSMFT- Low Space Means Fine Teletype". This was obviously then "borrowed" by Madison Avenue types for other commercial purposes - HI!

SSB EQUIPMENT

The introduction of the Collins S-Line and other very stable HF equipment caused a further revolution in Amateur HF RTTY. Most of us wanted to use this fine equipment and were understandably reluctant to mess with adding shift diodes, etc. to the "unbelievably" stable VFO's. So, the use of AFSK tones into the mike jack was adopted by most of us and still reigns today as the simplest way to send HF RTTY. It was desirable to use the same demodulator for VHF and HF so the 2125 Hz Mark, 2975 Hz Space standards were retained. To get the RTTY signal "rightside-up" we used LSB because of the sideband inversion; the lower audio tone (2125) became the higher transmitted radio frequency.

The greater stability of the SSB equipment also allowed us to reduce our demodulator filter bandwidth (signals didn't drift around as much) and it wasn't long before Dusty at the RTTY JOURNAL had a new slogan- "Broad Minds Use Narrow Shift" (no acronym that I know of). We all then

RTTY TONES, SHIFTS, AND SSB EQUIPMENT CONTINUED

converted to our present standard of 170 Hz shift
--- 2125 Mark and 2295 Hz Space---

OTHER RTTY STANDARDS

The "LSB on HF" standard is by no means universal and gets downright "muddy" when you look at commercial and international practice. The U.S. and international standard for marine radio teleprinter (SITOR and RTTY) REQUIRE use of USB and Mark is still represented by the lower audio tone frequency - upside down by U.S. Amateur standards. Thus, Amateur AMTOR copies upside down on commercial SITOR equipment. There is also a standard in Europe in which the tone sets are defined in reverse to the convention in the United States. According to a recent BARTG Journal, the Space tone is considered to be the constant tone and the Mark tone varies frequency with the shift. They also use USB so it all works out in the wash if you think about it (except for dial calibration, of course).

WHICH TONE FREQUENCIES SHOULD I USE?

As I said earlier, the U.S. convention of 2125 Hz Mark dates clear back to WWII and U.S. Amateur RTTY equipment has always been built for 2125 Hz Mark with Space at 2295 (170 shift), 2550 (425 shift), or 2975 (850 shift). This is NOT the international CCIR standard. The CCIR standards were set AFTER stable and narrow-bandwidth SSB equipment was introduced in the 1950's and 1960's (S-Line, etc.). This equipment positions the narrow filters in the transmitter and receiver for optimum voice communications frequencies - 300 to 2400 for the usual 2.1 kHz filter bandwidth. Obviously, the U.S. "High-tone" 2975 Hz Space for 850 shift will not go through such a radio. Therefore, CCIR standards defined a new set of RTTY audio tones that are lower in frequency. The CCIR standard tones are 1275 Hz Mark and 1445 Hz (170), 1700 (425), or 2125 (850) Space frequencies. These are virtually the only tones used for European RTTY.

At times you may see an article or a firm advocating adoption of the CCIR tone standard for U.S. Amateur RTTY. This makes a lot of technical sense but is impractical because of the very large number of existing high-tone RTTY demodulators already in use by U.S. Hams. The low-tone demodulator will work fine on HF RTTY (just turn the receiver dial to tune the other guy in, regardless of tones used), but low-tone

and high-tone demodulators are incompatible on VHF (no BFO to change the tone pitch). To prevent having to buy or build separate demodulators for VHF and HF, the high-tone U.S. standard is likely to continue. Some equipment such as the CT2200 and CWR 6850 include demodulators for both sets of tones.

There are many other tone standards used by commercial and military systems. 850 Hz shift is common for U.S. military as are multiplexed multiple tone sets. ALL marine services (U.S. and international) use 1685 Hz Mark and 1785 Hz Space (170 shift, and centered on 1700 Hz). This is decreed in parts 81 and 83 of the FCC Rules and Regs., following CCIR recommendations for marine services. These tones are used for marine RTTY, SITOR, and sometimes FSK-CW.

CONCLUSIONS

So, there it is - not so complicated after all. We use LSB instead of USB to maintain compatibility between HF FSK RTTY standard of "LSMFT" and the demodulator 2125/2295 Hz standard. Low tones may be a lot more logical, but U.S. Hams will not be able to talk to their buddies on VHF unless they use high-tones. Besides, all Amateur RTTY today uses 170 shift and 425 and 850 shift are only needed when you want to listen to short-wave broadcasts. Buy a receiver or transceiver with Pass-Band Tuning (PBT) and use all three shifts with high-tones. The PBT feature is one of those features a RTTY station really needs anyway!

BIBLIOGRAPHY:

"HIGH TONES, LOW TONES, MODEM TONES," by G.W. Henry, Jr., CQ, November, 1982, pp 42-48.

"LET'S GET ON FREQUENCY! HOW TO TUNE IN RTTY SIGNALS," by G.W. Henry, Jr., CQ, November, 1983, pp 78-80.

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The RTTY JOURNAL still has copies of the RTTY JOURNAL BEGINNERS HANDBOOK at \$8.00 PPD. Contact the JOURNAL office (address on inside front cover).

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DX

JOE WOOD, AJ6X

POB 84

LAUREL, MS 39440

Howdy fellow DXers! September is behind us and with that comes the cool mornings of a new season. DX paths and station activity appears to be improving and none to soon. DX input improved somewhat this time, but still is falling short of what it could be. Keep the information flowing and be assured that it will be reported here!

RTTY DXING

This activity is entertaining and challenging but misunderstood by many. Often there appears suggestions for good operating techniques. I believe that this is well and good but the information reaches far too few to be effective. So how do we reach the masses and what can "I" as a DXer do about educating RTTY DXers?

I venture to say that most of us are members of a local Amateur Radio Club, and this is where you will find your platform to carry the message to the serious, casual and prospective RTTY DXer. Most clubs have a problem coming up with enough programs to fill out the club schedule and, I guarantee, will welcome a well thought program on this subject. Good operating techniques are mostly common sense and have been well documented over the years. Go back and pick these lists, put together a short program and volunteer your time to deliver it to the club. You can be of great help doing this and it will, more than likely, take less energy than is expended complaining about the shortcomings of todays operators. Do it now!

DX REPORTS

A1, KT1N, Passed along a few tidbits....9K2EC active on RTTY and AMTOR from Kuwait has returned to England. OA4ZV active most nites on Baudot at 0030 UTC. SV9AC/SV9 will be at SV9 for two years. He is new to RTTY so be patient and after working Mike, QSL via WB4GCP. T30AT and T31AT, Alan, has been active from both and is believed to be back

at T30. QSL G4GED.

Steve, AE5H, grabbed me the other nite on 75 meter SSB and said that KX60I (Kwajalein) was worked on September 2nd, at 0338 UTC, 14090. QSL Terry, C/O KX6BU, Kwajalein ARC, POB 444, APO San Francisco, CA 96555.

A1, W6MI, writes: "Wake Island should be active on RTTY when Tom, AH9AC, gets settled. I worked him 2 August on 14095 at 0438 UTC. That was his first contact on RTTY and then he worked a JA but no one else. He was only xmitting one tone and that was inverted. I'm sure he will get things sorted out in time. I understand he will be there permanently. Also, I got the info on the ZK2WL as I worked Warwick from ZK1WL the 5th of August on 14091 at 0413 UTC and he gave his correct address as 168 Mackenzie Avenue, Opawa, Christchurch, NZ. For some reason ZL3AFH is not in the 1985 Callbook. He also said he had mailed out the ZK2WL cards."

DX HEARD AND/OR WORKED

Call	Meters	Time	QSL VIA
FK8FL	14	0330	POB 4561, New Caledonia.
9K2LA	14	2135	POB 3534, Safat, Kuwait.
IV3DZL/5N-14		2130	Via IV3DZL.
UR1RX0	14	1300	POB 88, Moscow, USSR.
EA9JE	14	0130	CBA (Callbook address)
Y04KCA	14	1300	CBA
SP9VU	14	1400	Buro
A4XJQ	14	1625	Via G4YTI or CBA
DL8EH	14	1235	CBA
NP4CD	14	1310	POB 3861, Bayamon, PR 00620
GU4YMV	14	1330	CBA
OZ2X	14	1424	CBA
FE6BJY	14	1430	CBA
OX3PL	14	1220	CBA
ZL1BXW	14	0335	CBA
VK3COP	14	0358	CBA
EA5RQ	14	1333	CBA
IS0IGV	14	1340	CBA
AB5K/KX6-14		2100	CBA
CN8BX	14	1830	Dr. Guy, Aladiesh des Yeux Ave., Mohamed 5, Marrakech.
OE3HGB/YK-14		2100	PUB 999 AAA, 1014 Vienna, Austria.
C30LCS	14	1100	EA3TJ (Inverted Signal).
JA3EGE	14	1136	CBA or JARL (50 baud).
YU2CRS	14	1121	CBA

Lee, W5D0Z, writes that he is having difficulty in locating a QSL route for 5V7JS. Does anyone have any info on this station and if so, send it to Lee at his CBA or to me and I will see

To page 8 please

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THAT Lee gets it.

ABOVE 14.100

I have received a number of commentaries from those that read last months coluIn. I am very happy in that only one negative response was recorded. I have also been in touch with my ARRL Division Director who has contacted the members of the Executive Committee regarding the 'Gentlemen's Agreement'. Look for action on this in the future. For the time being, I will put this item on the back burner.

HURRICANE ELENA, A CLOSE CALL

With the change of tropical storm Elena to hurricane status, this station on Thursday August 29th, 1985, assumed its' duties as District Emergency Co-ordinator for four Mississippi counties.

The RTTY gear was assigned the task of monitoring the National Hurricane Center in Miami. Advisories were received every three hours with updates every one and one-half hours. These were reported to the North Florida, Central Gulf Coast Hurricane and Mississippi SSB nets that were in emergency session. The SEL CAL feature of the HAL DSK 3100 was very useful in that it allowed the insertion of the National Weather Services call sign "KMIA" in the callup memory, and upon receipt of that character sequence turned on the printer to hard copy the hurricane status advisories. Each message is terminated with 4N's which turns off the printer and saves a lot of printer paper.

The hurricane, in its final hours, entered the state of Mississippi at the port town of Pascagoula, paralleled the coast turning inland west of Gulfport leaving much damage in its path. This route is 90 miles south of this station and gale force winds were forecast for this area. This never developed, however, 35 miles per hour winds were experienced for several hours as the hurricane reaked havoc across the coastal counties of the state.

Two operators manned this station, one on the HF rig and the other on the VHF bands. RTTY once again proved itself a valuable contributor to the Amateur Radio Emergency Service. This effort continued throughout the entire life of hurricane Elena, ceasing with the last and final advisory from the National Weather Service on Tuesday

morning, September 3rd.

In closing, my thanks go out to these contributors: W2JGR, W1DA, KT1N, W6MI, AE5H and W5DOZ. Please take a moment to drop me a card. Let me know who you are working and, if possible, the QSL address. This information is valuable to all of us. Good luck to each of you and see you next month.

73 es gud dx de Joe, AJØX.....

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DO DUST BUNNIES MATE?

Cleanliness may be next to godliness, but it takes a lot of time away from Radio. Remember these simple hints when the XYL/OM is away:

Anyone who runs his fingers across the top of your radios isn't worth cleaning for.

If you never plug in the vacuum cleaner, you never run out of vacuum cleaner bags.

A dust ruffle can hide a lot.

Putting a lock on the closet door is a lot easier than cleaning the closet.

Chocolate chip cookies are okay if you're eating them in the bathtub, but fig newtons will get fewer crumbs in the bed.

Lying is always faster than cleaning. Tell your friends the place was ransacked and you can't touch a thing until the police dust for finger prints.

There is no such thing as one cockroach.

Candlelight is romantic-and you don't have to dust-remember to buy candles though.

Many cleaning problems can be solved by moving.

If God had meant you to dry the dishes he wouldn't have invented air.

No matter what you read in magazines, you will not be able to whip up a gourmet meal for your friend in minutes from what's in your cupboard. There are only so many things you can do with a can of anchovies, three saltines, four green olives and a jar of marshmallow fluff.

As long as you have something in the freezer, you are not alone.

If you make twice the rice you need, you don't have to worry if the bottom half sticks to the pot.

Leftover cream sauces can be used to caulk around windows.

No matter how good your intentions are, you will never be able to eat a whole head of lettuce by yourself. It will turn brown, then develop

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BY: Dick Uhrmacher, KØVKH
212-48th Street
Rapid City, SD 57702

MSO'S

AMATEUR RADIO LOSES A FRIEND!

It is with a great sense of personal loss and regret that I inform you that V. "Red" Irwin, K9KUW, of Kenney, Illinois, became a silent key on July 20, 1985. Red and I started the "National Autostart Frequency" on 20 Meters in the Summer of 1978. He pioneered the MSO systems as we know them today, and he and I had become very close friends over the years. Red was an exceptionally talented, resourceful, kind and benevolent person. In short, he was a gentleman! Red was a retired Vice President of Aviation for Gulf Oil Corporation worldwide. He was a pioneer in aviation, learning to fly in Bloomington, Illinois, in 1928. His career in flying extended over four decades, including charting and opening the course from Miami, Florida to Caracas, Venezuela. He has been nominated to the Illinois Aviation Hall of Fame, and during World War II he was involved in anti-submarine work in South America. We'll all miss Red and his booming MSO! TAKEUMCARE RED!!

COMPLAINT DEPARTMENT

Several stations have noted the startup of the "LU4EGE" CBMS (computer based mailbox system), located in Buenos Aires, Argentina, on 20 meters. Unfortunately its SYSOP has chosen a "mark" frequency of 14 085 775 Hertz, which places it within 150 Hertz of the "National Autostart Frequency", ('mark' is 14 085 625 Hertz). The present declining band conditions will most likely prevent undue interference between these frequencies, but when the sunspot activity starts improving band conditions, interference will certainly be a problem. LU4EGE, Juan, may want to consider sliding down 150 Hertz and joining the fourteen other MSO's parked there, some of which have been there for over six years now.

And, coincidentally with the LU4EGE CBMS activity, I am again in receipt of several vociferous letters that bitterly complain about CBMS's that are being operated in "beacon mode",

to automatically draw attention to their presence. When these CBMS' are left unattended, and automatically transmit their call sign, or "log in" information, every few minutes, they very often interfere with already established QSO's on or near their operating frequencies. The spectrum allocated to RTTY operations is quite small, and digital communications has grown by leaps and bounds in the past few years. These stations in beacon mode do not ask, "Is the frequency in use?", they just step on anyone who is unfortunate enough to start a QSO on or near their operating frequency. Let's cooperate a bit and stop unattended beacon mode activity!

MSO HINTS

I've had some recent correspondence from MSO/CBMS SYSOP's, asking that I stress good common sense by MSO remote users when reading long files from the MSO's. Remember that almost without exception, the MSO/CBMS transmitter is "Amateur" radio equipment, which means that it is not commercially rated, and requires a little cooling off period between long files. It's not unusual to see a remote user call for several long files at one time, and the RTTY duty cycle does cause quite a bit of transmitter heating. Instead of trying to read all of the files at one time, give the MSO transmitter a break and read a few, then shut it down, and come back later to read additional files. One of the neat things about MSO/CBMS operation is that the MSO will always be there at a later time.

STANDING ON THE SOAPBOX

Recently there has been a noted increase in intentional interference on several different MSO/CBMS frequencies. This is not "CW" interference, but active attempts by other RTTY stations to interfere with already established RTTY transmissions. All stations should be aware that the FCC Motoring Stations at Grand Island, Nebraska, and Powder Springs, Georgia, have been alerted, and are monitoring this activity. As can be evidenced by recent articles in QST and other Ham radio magazines, the FCC takes an extremely dim view of this type of interference, and has been handing out some stiff fines and license revocations. I certainly would think twice about putting my license in jeopardy, just to satisfy some inner need to interfere with another station! And, while we're on the subject of RTTY operating techniques, I think it's a good time to reinforce one of Ham radio's oldest traditions. Ham radio is a "mixed bag". Its' wide variety of transmission modes, personal interest

MSO CONTINUED

and equipment styles, provide something for every one. But, one thing reigns supreme-your interests within Ham radio are no more, or no less, important than anyone elses interests. Whether it be chasing DX stations, handling RTTY traffic, oerating or utilizing a MSO/CBMS, or just plain "rag chewing", none of us should feel that "our mode" of operation is any more important or satisfying than anyone elses. Seeing that smile on someones face when you deliver a RTTY message, or catching that rare DX station through QRM, QRN, etc., is certainly a worthy experience, but it must be remembered that the MSO/CBMS user/operator derives the very same satisfaction from their mailbox activities. The secret to success with varying interests and operating modes is nothing less than cooperation! And, if we all apply two Amateur Radio's oldest operating techniques, interference to the various modes can be minimized. First and foremost, L-I-S-T-E-N on the frequency before activating that MSO, calling that DX station, or calling CQ. It's amazing how many times you'll find the frequency is already occupied if you'll just take the time to listen. And, secondly, A-S-K if the frequency is in use!! Even if you're on a different baud rate or shift, you'll find that most of the RTTY stations will recognize a short transmission as someone asking if the frequency is in use. And, whatever you do, N-E-V-E-R intentionally interfere with anyone elses transmissions, no matter how offended you feel. Receiver sensitivity and selectivity, wave propagation (skip) antenna direction and efficiency, and a dozen other items effect what you hear, and what a distant station hears. If you are accidentally interfered with, wait until the offending station stops transmitting and simply state that the frequency was (is) in use. Childish attempts to out-gun the other station are seldom effective, just cause additional interference, and worst of all, present an image of Amateur Radio to others who may be listening that we cannot afford. Let's cooperate and all enjoy RTTY!

MSO RAMBLINGS

For those of you using the "HAL" Communication Disk MSO System, and are thinking about interfacing a packet radio controller to your equipment, the HAL folks have information available about a disk "speed up" modification, that will prevent data loss on longer packet files. --Don, W5QXK, reports that his MSO will be off the air until he and Marie finish building and occupying their new home near Dallas. ---John, TG9VT,

reports that his MSO will be out of service until the lightning season is over in Guatemala, (approximately November 1st). -- The AJØX MSO has returned to service after a long absence. Joe has been rebuilding his antenna system after a severe wind storm early this Spring. ---Frank, K4K0Z, and Clark, W9CD, are now both in the 'packet' radio business with their HAL equipment. Good hunting guys!

GENTLEMAN'S AGREEMENT

This author also agrees with the position taken by Joe, AJØX, on the expansion of the "Gentleman's Agreement" with respect to 20 Meters. The current allotment from 14080 to 14100 KHz, is certainly not adequate to support the great influx of newcomers to digital communications. When room is given for the DX beacons on 14100 KHz, there is less than 20 KHz for all RTTY operations. I fully support Joe's thoughts on utilizing the area from 14075 to 14125 KHz for general RTTY operations, and also with his thoughts on positioning of currently operating MSU/CBMS, plus newly established MSO activity.

That's it for this month gang! Hope that each and every one of you are enjoying a fine Summer and Fall season. Have fun on RTTY!

DE: Dick, KØVKH

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DO DUST BUNNIES MATE? CONTINUED

into something resembling algae and you will have to bribe a neighborhood kid to come in and haul it away. the plastic bowl it lived in will have to be humanely destroyed.

Leftover pasta makes fine ballast.
Try to make friends with people who say those five magic words:Care to stay for dinner?

Try to buy food that is so filled with preservatives it would have to be strained through a charcoal filter before it could become industrial waste. This is the only way to combat Leftover-phobia, the chronic dread of rotting food.

If you can't cook it in the toaster oven it's not worth eating.

Bread is just a place waiting for mold to happen.

Next time the XYL goes visiting or to the hospital for a stay, hang these tips up where you can be sure to keep them in mind. You never know when they will come in handy. de Dee, N6ELP.....

by GEORGE

HITS &

MISSES

GEORGE HARRON, WA6CQW
14215 Pecan Park Lane Space 33
El Cajon, CA 92021

COMPUTER PROGRAMS



I was recently checking out a new computer store. The store had a book sale, 20% off on all items. The book that caught my eye was a book on computer programs for Amateur Radio. This book was written by Wayne Overbeck, N6NB and James Steffen, KC6A and is published by Hayden Book Company.

The two authors point out that computers are good for Morse and RTTY and can also be very useful in the Ham shack for record keeping and radio calculations. Let's take a look at the contents of the book.

1. A Gallery of Programs for Amateur Radio
 - A. The Sunrise Chart
 - B. The Gray Line
 - C. The Beam Heading
 - D. The DX Display
 - E. The DX Checker
 - F. The Sunrise Calculator
 - G. The Dupe Checker
 - H. The Dupe Print Checker
 - I. The Contest Logger
 - J. The Field Day Logger
 - K. The Sweepstakes Logger
 - L. The Log Print Program
 - M. The Antenna Scaler
 - N. Antenna Matching Evaluator
 - O. Phased Vertical Pattern Plotter
 - P. EME System Analyzer
 - Q. The Moon Tracker
 - R. The Sky Locator

These are the programs you will find in this book. All are listed for the following computers: TRS-80, CP/M, Apple, Commodore 64 and Timex-Sinclair.

The next several chapters are devoted to an overview of computers, hardware and software, with a slant towards newcomers.

The most comprehensive collection of Basic programs ever published to help radio Amateurs.

This book was written by two Radio Amateurs with nearly fifty years of combined experience. The amount of time you spend or don't spend (get organized) on Amateur Radio can be greatly enhanced by your purchase of this book. The data base management programs to keep records for five band DXCC, W.A.S. or general purpose logging is well worth the price. However, while thousands of Radio Amateurs count personal computing among their hobbies, very few, myself included, list typing and proof reading as hobbies. Therefore, almost all of the programs in this book are available from the publisher on a floppy disk that is ready to run on the Apple II. Contact Wayne Overbeck, N6NB for price and further details.

CALIFORNIA

California State Senate Bill 1431, introduced by State Senator Hershel Rosenthal, Democrat-Los Angeles, is designed to make cellular telephone transmissions private. The legislation, if passed, would outlaw the manufacture, importation, sale, use or ownership of any piece of receiving equipment (including scanning receivers) capable of listening to the 800-900 MHz cellular telephone frequencies.

A minimum fine of \$2,500 for a first offense and up to a \$10,000 fine, one year in jail or both for additional violations are being proposed, with NO EXCEPTIONS for services with nearby frequencies or for radio experimentors. Los Angeles Attorney, Joe Merdler, N6AHU is leading the opposition to SB1431. I hope you will contact him to express your support.

Another month has slipped by and so I will close my column.

So long for now, George, WA6CQW.....

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HAMS OF NOTE

Did you know that Francesco Giuseppe Cossiga, IØFCG is now President of the Republic of Italy? The Italian "RADIO RIVISTA" magazine recently featured him on its' cover, when he was 'Presidente del Senato'. Francesco resides in Rome and is as active on RTTY and Packet Radio as his presidential duties allows him to be.

Look for Francesco on 20 meters and Packet in the 23cm band.

COCO RTTY PART II

By Spencer, WABSME/DA10Y
 POB 5889
 APO New York, NY 09012

After last month's introduction to the CoCo RTTY demodulator/interface. I will present the first installment covering the circuit. This part, covering the amplifier and limiter stages, and the following part covering the active filters, will cover material that is not new nor innovative but is well documented in various electronic books. I mainly want to show how I adapted the circuits to this demodulator (see figure 2).

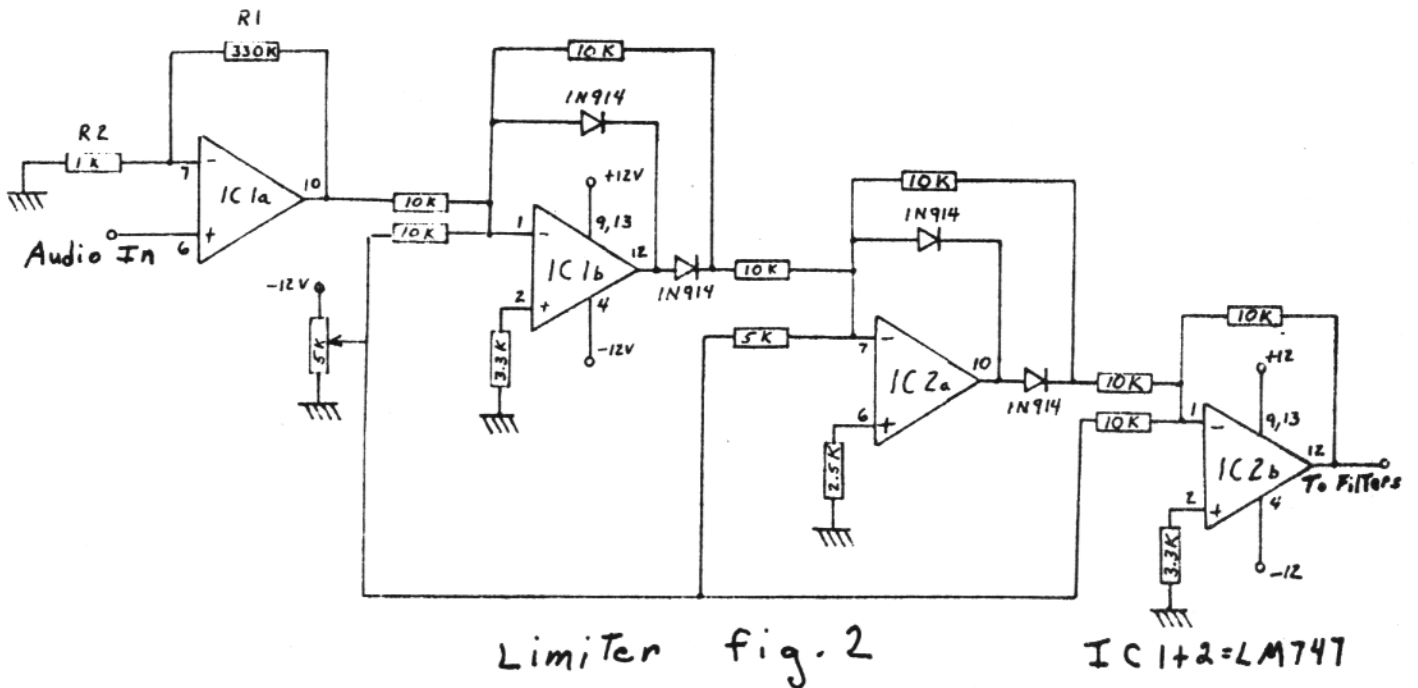
The first question that came to me when putting pencil to paper while preparing to build this circuit was, "Why amplify, then limit?"

The input amplifier, IC1a (LM 747), serves two purposes. First it acts as a buffer between the demodulator and the rig so that regardless of the rig's output impedance, the limiter stages see the same impedance even from different rigs. Second, I like to hear the signals during a QSO, and to develop sufficient voltages to drive the following stages required ear splitting volume. Consequently the non inverting OP AMP input circuit.

The gain of this circuit is equal to $1+(R1/R2)$ up to the saturation point where the voltage output equals the DC voltage powering the OP AMP. This circuit provides enough gain even for the weakest audio. At high input levels, the amplifier is maxed out and the wave form becomes squared off.

The purpose of the limiter is to minimize the effects of fading and variations in signal strength. The limiter provides signals of constant strength to the filters regardless of the input signal variation. IC1b and IC2a and b (both LM 747's) form a series limiter using dead space and inverting amplifier circuits. Signals within the dead space setting of IC1b and IC2a are passed unaffected to IC2b for amplification. The dead space or limit voltage is set by the 5K variable resistor (discussed in part IV). If the signals are peaking above the dead space value, then either IC1b or IC2a feeds a signal of opposite polarity to the amplifier IC2b to provide clipping, i.e. limiting of the input signal. The result is an even level, square wave signal being fed to the active filters.

Now with uniform signals, the mark and space filters can do their thing; next month. CUL..



**CLASSIFIED ADS-30 words \$3.00 additional words
5 cents each. Cash with copy.**

FREE TO GOOD HOME-Antique RTTY machine, Morkum-Kleinschmidt, circa Chicago late 20's, early 30's (?). Contact Jay, W6EJJ. 818/790-1725.

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HAL COMMUNICATIONS STRIKES AGAIN! If you have an IBM-PC, then you want to utilize the new HAL PCI-2000 interface and software to turn it into the ultimate in a computer based RTTY system! Morse, Baudot and ASCII, 103/202 modems, all speeds/shifts, split screen and a host of other features. Write or call Dick, KOVKH, DIALTA Amateur Radio Supply, 212-48th St., Rapid City, SD 57702. 602/343-6127. Our Prices can't be beat!

NEWS-NEWS-NEWS Amateur Radio's Newspaper "WORLDRADIO". 1 year subscription is \$9.00. Send to: worldradio, 2128-28th St,Sacramento, CA 95818

HAL DS-3000 KSR, New condx with monitor and manual \$325. Model 32 new condx \$135. Many other items, list for SASE. G. Churpek, N6FL, 839 Cambon Circle, Ojai, CA 93023. Tel: 805/646-5296.

WANTED: TECHNICAL MANUAL FOR TELETYPE Model 28ASR (theory of operation maintenance). Also for Kleinschmidt Model TT-117A/FG, or info leading thereto. Huntley, W6RNC, POB 478, Nevada City, CA 95959.

KENWOOD TS-830S late model very good for RTTY. \$850. VIC-20 - \$50. Heath mu-matic keyer \$75. Heath ET3400 computer/trainer with memory I/O accessories,all manuals and etc. \$150. John, KA6NYK, 619/753-5647.

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CHEAP AND EASY TUNING SCOPE

BY: Carl C. Steavenson, K6WZ
13638 Sproule Avenue
Sylmar, CA 91342

For many years now the ARRL HANDBOOKS have given scope designs intended for modulation monitoring. The same scope can be used for RTTY tuning with little or no adaptation. The advantages of a scope were learned some 20 years ago when I added a 3AP1 to the home brew Mainline demodulator, and it is still in use. After going computer with a Commodore 64 and AEA CP-1 interface, the next logical step was to add a scope to complete the system.

"Fair Radio Sales" listed a 'scope foundation' that provided socket, housing, shroud and a 2AP1 that filled the bill (they hope to have more) for most of the mechanical necessities. The divider string and other components are mounted on the left side of the CRT housing. Two toroids serve as tuned transformers in effect and are the venerable and once ubiquitous 88mH telephone surplus units having about 35 turns of 30 AWG insulated wire added as a primary. Resonating capacitors across the secondary for mark and space are .067 uF and .057 uF, respectively. The capacitance values were arrived at by paralleling .047 and .01 polystrene units. Single .056 and .068 capacitors should work as well. The power supply is located under the operating table to keep the magnetic field away from the 2AP1 and the monitor. It supplies about 350 VDC and heater voltage.

A modification was made to the CP-1 to increase the scope output voltages and deflection of the mark and space traces. Another scope user told me of a design printed in the September, 1977 issue of 73 Magazine, that uses two 741 op amps and two high voltage transistors to increase gain. Alternatively, something more than 35 turns in the toroidal primary windings may have given adequate deflection. AEA (Advanced Electronic Applications, Inc.) reports that about 6V p-p is normally available at the CP-1 scope outputs. Source impedance is 4700 ohms.

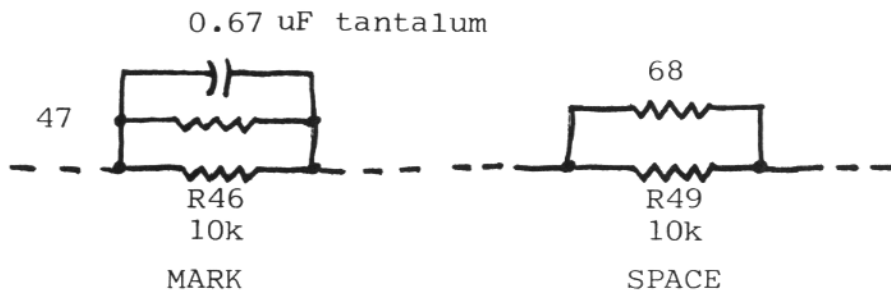
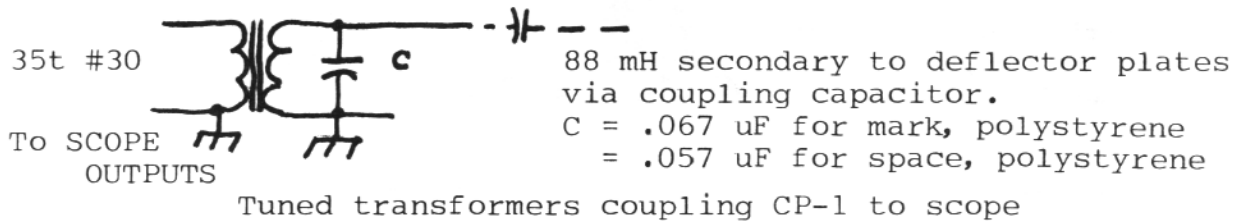
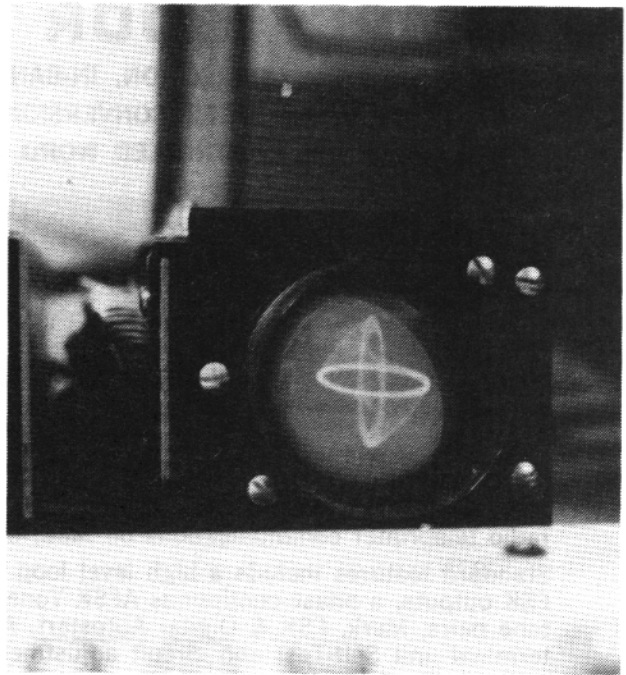
There is a 10k resistor in series with each scope output, R46 and R49. My contact at AEA said that the mark and space patterns would not be 90 degrees apart as desired, but more like 60-70 degrees. The small ellipses were displaced as stated. The two resistors were jumpered and deflection was about right, but displacement was still considerably short of 90 degrees. Experimentation with resistance and capacitance across R46 and R49 yielded the final configuration as shown in the sketches. R46 (mark) is bridged with 47 ohms and 0.67 uF (0.47 plus two 0.1 tantalum). R49 is shunted with 68 ohms. There is no adverse effect on the CP-1 operation or the LED tuning indicators.

The LED indicators work very well but respond to anything in the passband in the same manner including noise. The scope lets you know what is there and at times will aid in notching out an interfering signal. When a station is tuned properly, the pattern appears as two elongated ellipses of nearly equal form--width and length. Tuning across RTTY or AMTOR signals causes the forms to change and also to tilt to the right or

CHEAP AND EASY TUNING SCOPE CONTINUED

Left, depending on whether the receiver is tuned higher or lower than optimum. Additionally, if the shift is more or less than 170 Hz, the angular displacement of the two traces will be greater, or less than 90 degrees. With shifts of much greater or less than 170 Hz, the scope aids in adjusting the VAR SHIFT control on the CP-1. Deflection is somewhat reduced at wide shifts, particularly at 850 Hz, but tuning is more accurate.

The toroids are mounted with brass screws and beveled faucet washers. The four pots needed for the divider string are junk box specials and not even the correct values as given in various ARRL Handbooks. I found that by increasing the CRT voltage beyond 300 or 350 VDC decreased deflection. The opposite was true of the old 3AP1. The assembly is secured to the CP-1 with two brackets and the two screws for the right hand rubber feet.



Modifications at R46 and R49 in CP-1

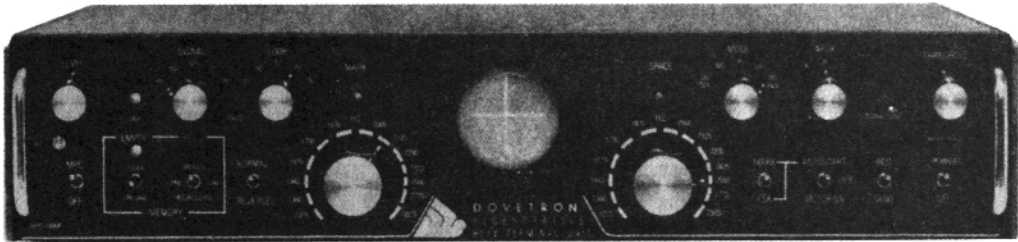
ADDITIONALLY FROM CARL, K6WZ - "I don't suppose there will be a rush to 160 for RTTY operations in the very near future, but you may have seen the article in August 1985 QST. The author solicited comments and I doubt many RTTYers will respond, so, I decided to drop a note to you to see if you wanted to ask for a few inputs."

The article suggests 1800-1810 as a possible

spot for RTTY. In the tradition, however I would look for gravitation to the vicinity of 1890. The author cautions that this is a WIAW bulletin freq but we have those in RTTY segments on other bands...I don't have room for a dipole but I have a transmatch almost finished. It will be housed in an SB220/221 cabinet so it will look good, even if I never use it. The 75A-4 covers 160 but with no TX. I'm working on that.....

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