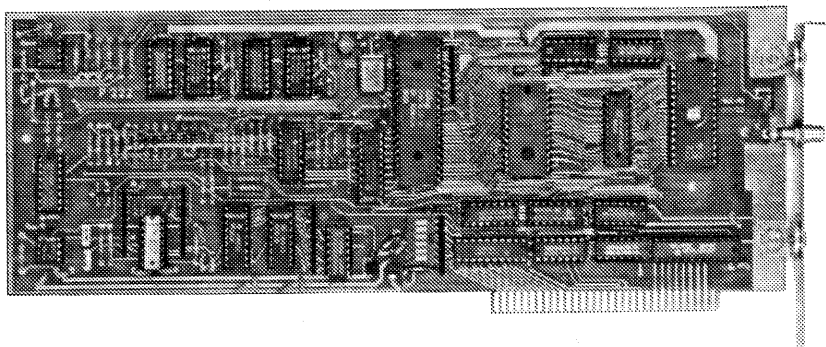


# DX-ING QRM: A USER REVIEW OF THE UNIVERSAL M-1000

Chuck Yarbrough



In a recent batch of loggings for my monthly utility column SPEEDX Utility World, one of my reporters submitted voice aeronautical loggings and apologized for "calling this stuff QRM and now reporting it." He went on to complain, "Voice and SSB are okay, its the CW and FAX that are QRM!"

Most SWLs and DXers would agree with my reporter's definition of QRM. There is nothing more annoying than having that 'once-in-a-decade' DX catch from Outer Slobovia interrupted by radioteletype!

For a minority of shortwave listeners, however, the SW broadcast station would be the QRM. Armed with the appropriate technology it is possible to DX beyond the usual broadcast signals.

This article reviews the newest addition to the line of Universal multi-mode decoders, the M-1000. It will also tell you what you might expect to 'hear' on your IBM-compatible personal computer if you decided to lay out the dollars for the '1000. You might say this is a primer for utility listening.

## AN INTRODUCTION TO UTILITY LISTENING

I assume that most readers of Proceedings are not avid digital mode utility listeners, so lets get a basic definition out of the way. First, there are two broad classes of utility listening. My reporter showed us this difference when he defined QRM in the introduction. Voice (SSB) transmissions can be deciphered by anyone with that capability in their receiver. Typical transmissions in this class would be aeronautical communications, amateur radio broadcasts, ship-to-shore broadcasts, and radio broadcaster feeder transmissions. Most of the loggings which come to me each month are of this variety, because they are more accessible to the average radio listener.

The second class of utility transmissions are non-voice, or digital transmissions. These typically include radioteletype, facsimile, non-directional beacons, and morse code. I will discuss what you are likely to hear on each of these types of digital transmissions later in this review, but for now it is important to realize that these stations are assigned approximately 78 percent of the entire shortwave radio spectrum.

Listening to this 78 percent of the high frequency spectrum is different than listening to your favorite SW broadcasting station or even DXing Radio Nibi-Nibi. Sure, you might know the 'hot spots' on the dial, but that does not guarantee your success. When listening to the digital communication modes tuning in the signal is only half (or less) of the battle. You also must know what protocol the transmission is using. Is it a radioteletype station or is it a facsimile station? When you listen to a shortwave radio broadcast from, say the BBC, you can usually count on a regular schedule because you are the Beeb's intended audience. This is not the case when you listen to utility stations. Utility stations are there in order to provide two stations with the capability to communicate with each other. These two stations can be two embassies, or a ship and a shore station, or an airplane and an airport, or any number of other combinations.

There are, however, several major functions which might allow you some listening pleasure in the

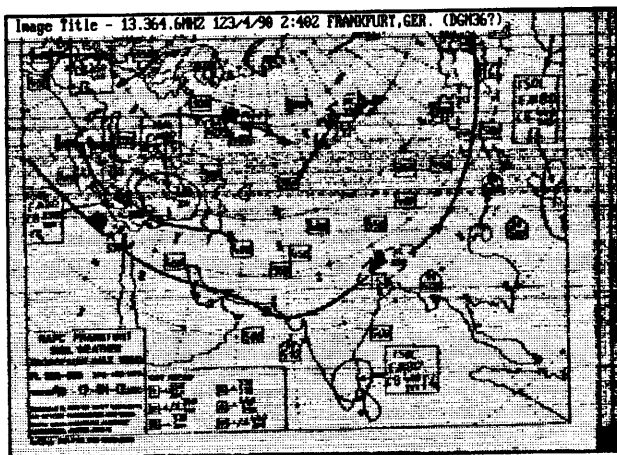
digital utility category. One of my favorite types of stations is a radioteletype press service. In the past both the Associated Press and United Press International were on shortwave, but with the exception of some radio facsimile pictures coming out of Buenos Aires, Argentina, these services have moved to satellite. In fact, these Argentinian AP Photo stations have not been logged in almost a year, so press photos may be a thing of the past on SW as well. What you will hear will be many of the 'third world' news agencies and some Soviet and ex-Soviet bloc news agencies. Examples of these are TASS and NOVOSTI from the Soviet Union, TANJUG from Yugoslavia, Middle East News Agency (MENA) from Cairo, Egypt, the Pan African News Agency out of Dakar, Senegal, and the Islamic Republic News Agency out of Teheran, Iran. News agencies based in the People's Republic of China (XINHUA) and on the island of Taiwan (Central News Agency) can also be heard, although these are more easily "caught" in the areas surrounding the Pacific Ocean. These are sources of information which are not ordinarily available to people in North America, but they provide useful perspectives on world events. All of these news sources broadcast in English either to Europe or to North America. In either case you usually can tune them in and understand what they are saying.

Don't feel left out if you listen to SW in order to improve your foreign language skills. There are also many stations which broadcast in French (ie. MENA), German (ie. Informationsfunk der Bundesregierung Fuer Europa), and Spanish (ie. Prensa Latina). Arabic stations can also be decoded, but the nature of the Arabic alphabet makes decoding much more difficult. In fact, since most people learn to read a second language before they can speak it, radioteletype can be a very useful learning tool. I know that my French has improved immeasurably since I started "reading" MENA. They broadcast stories in both English and French in the same transmission, so you can compare the translations.

Another type of digital station you will probably pick up will be maritime stations. These stations communicate with ships at sea for a number of reasons. I have received Associated Press news summaries, ship docking instructions, weather reports, various communications between shipping companies and their ships at sea, as well as the contents and delivery dates for a particular ship. Many people would ask, why would I want to listen to this? Simple, bunky. Many times political events in the world will influence whether ships put into port or not. There were not many ships being advised to pass through the Panama Canal during the Panamanian Invasion of 1989. Indeed, maritime stations were issuing advisories against visiting Panama during that time.

If any of you enjoy listening to voice aeronautical communications of either military or commercial flights, then you would probably enjoy decoding meteorological information found on shortwave in digital form. These data generally take two forms. The first type is radioteletype transmissions from airports around the world. These transmissions are intended primarily for other airports, but planes can also receive the data. The second form of meteorological information comes in the form of radio facsimile transmissions. These transmissions provide many of the weather maps and satellite photos of the earth that you see on the evening news on television. These FAX transmissions are also a great help to boaters, yachtsmen, and commercial shipping all over the world. With the M-1000 satellite photos and facsimile images usually take on a three-dimensional aspect, especially when displayed on a VGA monitor. The artwork to the right shows what one of these weather facsimile images looks like as decoded on the M-1000. During the Persian Gulf War in early 1991, when CNN was not broadcasting weather maps and forecasts from the Arabian Peninsula for 'security' reasons, these data were readily available every evening on radio facsimile. The ironic thing about this was that most of these images were provided by the U.S. Navy!

A final area of interest for many people on shortwave radio is what Harry Helms has called, "The Secret Shortwave Spectrum". Spy stations, embassy broadcasts, and many other mysterious transmissions can all be found in the world of digital utility stations. Much diplomatic traffic is encoded or uses exotic modes of transmission, but



occasionally uncoded messages can be received. If you are a voice numbers station fan, then you will love radioteletype and morse code. With either the M-7000 or M-1000 you can decode either mode and print out the number combinations for analysis later on. Law enforcement agencies also frequent the digital utility scene as well. INTERPOL, the FBI, the CIA, the GRU, as well as other less well known agencies all use digital modes to communicate with each other.

One advantage of monitoring radioteletype or CW over monitoring SSB "numbers stations" is that you do not have to be present to get your results. If you are seeking a station identification on a numbers station you simply set your receiver on the frequency you wish to monitor then turn the printer control on automatic and then check back in a few hours. If anything has come across on that frequency then you have a "hard copy" and you can then sit down at your leisure and attempt to decode the number or letter groups. You do not have to sit for hours listening to CW. The machine does it for you! In case you were wondering, there are numerous numbers stations which use the digital modes. If spy transmissions are your bag, then you will love the digital modes.

In conclusion, these are just a few of the major things you can find each day when tuning digital utility stations. There are many other types of stations which I did not mention. There is always something going on in the utilities. Personally, I enjoy listening to shortwave broadcasts during the morning and evening, but during the day when the broadcast traffic dies down, the utility stations are at their peak, since they are conducting business rather than trying to get you when you are home after work. Also, if you are a 'country counter', you will be able to log many countries which do not broadcast programming on shortwave. Most utility stations will verify reception reports as well.

## UNIVERSAL'S NEWEST DECODER

The Universal M-1000 decoder card for IBM-compatible personal computers was introduced in October 1990 as a low-end alternative to its pricey M-7000 stand-alone decoder unit. When I bought my M-1000 I thought I was taking a big risk. At \$399.00 I only prayed that it would be a good second decoder, since I already owned the M-7000 (\$1200.00). After using the M-1000 alongside the M-7000 for almost a year, I now prefer the M-1000! It is important to note that both machines are "receive only", so you cannot transmit in RTTY with them.

Why the price difference between the two models? With the M-7000 you are buying the computer to go along with the decoder. Since many shortwave radio buffs have access to a personal computer, this purchase seems a bit redundant. With the M-1000, you are purchasing only the decoder.

There are a few limitations to the M-1000, however. First, your computer must be an IBM-PC compatible. As of this writing there is no Apple version. Second, while the decoder will work on a monochrome, bare-bones PC, you will not be able to display facsimile intercepts on that type of machine. EGA or VGA adapters are necessary for high quality fax displays. Third, you will need at least 512Kb of RAM in your computer, but 640Kb is recommended. Finally, the interface programs which enable you to interact with the decoder run more smoothly and quickly off of a hard disk. You do not have to use a hard disk, but it is recommended.

As for the actual performance of the M-1000 versus the M-7000, I have found the '1000 to be more sensitive and flexible than the higher priced machine. One problem anyone who has ever used a computer within 50 feet of a shortwave radio is that of QRM from the computer. The M-7000 is an exceptionally noisy beast. In my application, the M-1000 plugged into my Tandy 1000TX computer, I have not experienced much noise at all. In fact, I can be decoding with the '1000 and then turn on the '7000 and the signal that I was getting flawless copy from suddenly turns to hash. If you can't hear it, you can't decode it!

Many of you are probably asking, what about Radio Frequency Interference (RFI)? Obviously any machine you turn on while attempting to listen to the radio will introduce RFI. It is also true that every monitoring station will exhibit unique RFI "problems". Obviously I cannot tell you how much RFI will be introduced into your particular station if you use a decoder. If you are concerned, see how much RFI is introduced when you turn your computer on. I have found that the M-1000 does not introduce any additional RFI into my shack since my Tandy is fairly well shielded. All of my equipment is also well grounded. Both of these factors are critical in reducing RFI. On the other hand, I can hear my M-7000's microprocessor buzzing and humming from 10 MHz on up. Yes, you will have increased RFI, but of all the options the M-1000 seems to be the quietest serious demodulator on the market. One quick bit of advice,



## THE M-1000 VS. THE M-7000

What are the biggest differences between the M-1000 and the M-7000? For a complete listing of the features found on all of the different Universal machines, see the most recent Universal Radio catalogue. For a direct comparison between the '1000 and the '7000, I include a list of features:

### M-7000/M-1000 Model Comparison Chart

<u>Reception Modes</u>	<u>M-7000(v.7)</u>	<u>M-1000(v.1.02)</u>
Morse Code (CW) 5-120 wpm	X	X
RTTY Baudot Standard 45,50,57,75,100 baud	X	X
RTTY Non-Standard Variable 40-250 Baud	X	X
RTTY Bit-Inversion	X	
RTTY ASCII Low Speed Standard 75,110 baud	X	X
RTTY ASCII High Speed Standard 150,300,600,1200 baud	X	X
RTTY ASCII High Speed Non-Standard 1050,1800 baud	X	
Sitor A (ARQ) & Sitor B (FEC), Autor (selective & synchronous)	X	X
ARQ-Moore (TDM) 2 channel 86,96,100 baud	X	X
ARQ-Moore (TDM) 4 channel 172, 192, 200 baud	X	X
ARQ-E 48, 64, 72, 86, 96, 144, 192 baud	X	X
ARQ-E3 48, 64, 72, 86, 96, 100, 192, 200 baud	X	X
Packet 300 and 1200 baud (AX.25)	X	X
Facsimile AM/FM 60, 90, 120, 240 LPM 288, 440, 576 IOC	X	X
VFT (FDM) 8, 12, 16, 24 channel	X	
FEC-A	X	
FEC-S	X	
ARQ-S (4,5,6,7 character groups)	X	
SWED-ARQ	X	
<u>Reception Shifts</u>		
Standard Baudot Shifts 170, 425, 850, Variable	X	X
Extended Baudot Shifts 85, 1200 Hz	X	
Microprocessor Controlled Shifts	X	X
Auto. Shift Select and Display	X	X
Auto. Shift Select w/ Automatic baud/polarity	X	X
Standard ASCII High Speed Shift (BEL)	X	
Expanded ASCII Shifts (103A, 103o, 202, CCITT v21 O/A, CCITT v.23 mode 1 & 2)	X	
Selectable Low and High Tone Pairs	X	X
Morse Code Dual Tones 750 and 1000 Hz	X	
<u>Printer Control</u>		
Serial RS-232, MIL288, Loop Driver-7 baud rates	X	N/A
Digital Auto-Start Output	X	X
Parallel (Centronics) Printer Port	X	N/A
Screen Print (Retro)	X	X
User Programmable Selcals	X	X*
Serial ASCII 7th Bit Selectable	X	N/A
Parallel ASCII 8th Databit Selectable	X	N/A

### Additional Features

Microprocessor Controlled Switch Capacitor Filters	X	X
Unshift-On-Space	X	X
Multiple Scroll Inhibit	X	X
Status Line	X	X
Speed Readout to Nearest Standard Baud	X	X
Speed Readout to Nearest Baud (+/-2 baud)	X	
Ten User Programmable Memories	X	X
Status Line Dump to Printer	X	X
High Resolution Facsimile Display		X
Automatic Gain Control (AGC)	X	X
Automatic Threshold Control (ATC)	X	X
On-Screen Graph Tuning Indication	X	X
Scope Output	X	N/A**
Facsimile Video Zoom Function		X
Facsimile Reception in 5 Palettes (color)		X
Storage of Data on hard or floppy disk		X
3 User Selectable TTY Alphabets (ITA2,MIL,TELEX)	X	X
Russian 3rd Shift Cyrillic Alphabet	X	
Literal Display Mode	X	X
Databit Code Analysis	X	X
Video Squelch	X	X
Tuning, Tuning Error, Data, Data Error, Idle, and Squelch Indicators	X	X
Diversity Reception	X	
Parity Select on ASCII Receive	X	X
Datascope		X
Built-In Diagnostics	X	X
Video Scrolling	X	X
Intelligent Peripheral Port (IPI)	X	
Audio Input Gain Control	X	
Direct Keyboard Input of Baud Rate	X	X
Help Screens	X	X
Real Time 24 Hour Clock on Status Line	Opt.	X
Video Fax Screen Editor Function		X

\*The M-7000 contains 4 User Programmable Selcals (String Search on Incoming text), while the M-1000 contains 5.

\*\*The M-1000 needs no scope output since a Datascope (simulated multi-trace oscilloscope display of demodulated RTTY signal) is included as a standard function of the program.

For our purposes here, there are several key differences which are not evident upon first glance. First, the M-1000 provides a much better video display of all modes. The M-7000 only provides low-resolution graphics, especially in FAX mode, while the M-1000 is only limited by the resolution of your computer. However, the M-7000 is far superior to the M-1000 when it comes to printing out your data. It almost seems that the two models flip-flop the video and print quality. Since I do not really like to "burn" a lot of paper, nor do I like the noise printers introduce into the monitoring environment, I still prefer the '1000 over the '7000.

A second major difference between the two models is that with the '1000 you can save everything to either floppy or harddisk. This is nice if you want to import say, a fax image, into a desktop publishing package. With WordPerfect 5.0 or higher, fax images can be directly imported into your document just like any clip art with an extension of .PCX. Text files you receive over the radio can also be saved in the standard DOS .TXT format and then be imported into whatever program you wish. If you are wanting to archive your intercepts, be prepared to use some memory. The typical facsimile image will require 150Kb of memory and the text files will require however much text you recorded.

A third difference which can be quite useful is the datascope function on the '1000. This is a simulated display of a multi-trace oscilloscope provided on your computer screen. With the '7000 you have to provide an external oscilloscope to tune tricky radioteletype signals. The datascope allows you to more accurately tune signals in various modes in real time. It also allows you to identify what type of signal you are listening to by showing you the "signature" of that particular mode.

A fourth difference is in the amount of deskpace each unit requires. The '7000 requires as much deskpace as my personal computer. If you already have a personal computer, then the '1000 will not require ANY additional space in your shack. If your wife, husband, or significant other does not like the Starship Enterprise control panel look in the family room, then the internal decoder card can be quite convenient! My dream setup is to have a laptop personal computer with VGA display and the M-1000 mounted internally so that I can go on DXpeditions with only my radio and my laptop. Just think of the freedom! I cannot imagine lugging around the M-7000 and its external monitor as well.

A fifth and most telling difference between the two units is ease of use. I have been quite impressed with the user friendliness of the '1000. Despite the fact that I have owned an M-7000 for over three years, I was never able to tune in an ARQ-E3 signal. ARQ-E3 signals are primarily used by the French Military and quite often are broadcast "in the clear". On the '7000 I attempted to master this mode for over a year, with no results. Only two months after installing my '1000, I logged my first ARQ-E3 station primarily because of the simpler interface. This difference could be only in my head. Since everyone reacts differently to things, your results may not be like mine, but I consider myself a rather ordinary shortwave listener.

## THE DOWNSIDE OF THE M-1000

Despite all of the excellent features and abilities the M-1000 has, there are a few "warts" which any prospective buyer should know about. I will focus on three major problems. First, the printing function within the DECFAX program is abysmal. Despite the fact that the version 1.02 was supposed to enhance the laser printer functions, how many of us can spring for a \$1500 printer? There are only two print options with this board--"DOT" (dot matrix) and "LASER". Since I use a HP Deskjet Plus printer, I cannot use the laser option. However, the dot matrix function does not work with the DJ Plus either. Even on my old EPSON RX-80 dot matrix printer, the fax image output is at best "low-res". Universal really needs to go back to the drawing board on their printer function. The only way that I can get any resolution at all while printing is to import my FAX images into WordPerfect and then print them. You can judge the results for yourself since the image several pages ago was manipulated in this manner.

A second "wart" is that the AUTOTUNE, SPEED READOUT, and TUNE functions in the RTTY decoder mode sometimes will not work. Usually this happens after the machine has been on for a while. Perhaps it gets tired, but it should work ALL of the time. The only fix I have found for this is to exit the DECODER program and then reenter it. This has always cleared up the problem. Perhaps this is my machine's way of telling me that I have been DXing too long! This is only a minor inconvenience, but it is something that needs to be fixed.

A third problem which I have found with the '1000 is not in its performance as such, but rather in the way the computer interface programs are programmed and marketed. There is no way to modify or customize either the DECODER or the DECFAX programs. Granted Universal has the right to keep its codes secret, but it would be nice to be able to create my own macros and to customize the default settings within the programs. If Universal would make their codes known, then perhaps third-party software developers could create a "complete" SWL computer package. This package could include greyline indicators, a mapmaking utility, integrated database for loggings, a forms package for multi-lingual reception reports, and many other functions. After all, personal computers are very good at doing a wide variety of tasks, why limit the user?

## IN CONCLUSION

Despite the doom and gloom of the previous section, the M-1000 is a quality peripheral device. If you are interested in giving the digital utility stations a try I would heartily recommend that you start with the Universal M-1000 decoder card. If you do not own an IBM compatible computer, I would invest in a low-end PC clone and the M-1000 instead of buying the expensive stand alone units like the M-7000. This

may sound a bit ridiculous at first, but consider that when you upgrade to another computer you can switch the M-1000 board as well as your EGA/VGA monitor to your new computer. However, if you have a computer already, then you are ahead of the game. If you already have a decoder, I would consider giving the '1000 a try as a second decoder. If you are like me, you will not regret it.

I have a feeling that the shortwave hobby is on the verge of a "utility revolution". Until the past five years, digital modes of emission were out of the financial grasp of the vast majority of shortwave listeners. With the M-1000 even many of the most exotic digital modes are readily available for the average shortwave listener. Armed with a good shortwave receiver and the M-1000, anyone can receive and decode information which previously has been available only to governments and professional news agencies. Gone is the day of noisy, oily, heavy mechanical teletype machines. With the dawning of the utility revolution, I look forward to the day when there will be no distinction between Utility DXer and Broadcast DXer. EVERYONE will listen to ALL modes! Pipe dream? Maybe. But with these new technologies the barriers keeping people away from "exotic" modes have evaporated.

Who knows, maybe one day you will suddenly realize that you are chasing signals you used to call QRM. I know I am. With the M-1000 you can start out with a decoder which will enable you to do almost everything you can do with the high-end commercial products, with the exception of displaying Russian Cyrillic characters on your screen and decoding a few of the specialty modes! As the boundaries of shortwave listening move, maybe even my skeptical SPEEDX reporter will eventually even consider CW and FAX as desirable DX--Well, perhaps we can't expect miracles!

The Universal M-1000 decoder board may be purchased for \$399.95 (plus \$5.00 shipping) from Universal Radio, 1280 Aida Drive, Reynoldsburg, Ohio 43068, USA. They can be reached by telephone at (614)866-4267.

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The following references will provide you with much of the information you will need to tune and identify utility signals.

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SPEEDX, The SPEEDX Utility Station List, SPEEDX Special Publications, See SPEEDX address below.  
Daryll Symington and John Henault, Utility OSL Address Guide, Volumes 1 & 2, Radio InfoSystems, 1987.

In addition to these bibliographical sources, there are several North American SWL clubs and publications which provide timely news and loggings of utility stations. These include:

- Monitoring Times, Grove Publications, P.O. Box 98, Brasstown, NC, 28902 (monthly, several columns)  
Popular Communications, 76 N. Broadway, Hicksville, NY 11801. (monthly, RTTY column)  
Shortwave Magazine, PW Publishing Ltd., Enefco House, The Quay, Poole Dorset BH15 1PP England (monthly, Decode column)  
SPEEDX, P.O. Box 196, DuBois, PA., 15801-0196 (monthly, Utility World column)  
DX Ontario, Ontario DX Assoc., P.O. Box 161, Station A, Willowdale, Ont. M2N 5S8, Canada (monthly, Monitoring Services column)  
North American Shortwave Assoc., 45 Wildflower Road, Levittown, PA. 19057(monthly)  
Association of DX Reporters, 7008 Plymouth Road, Baltimore, MD 21208. (monthly, Utilidits column)