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MONITORING TIMES

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COASTLINE VIGIL:

ROCC Defends Our Shores

Extracted from July/August 1984 National Defense

by Marilyn Silcox

The eyes of defense for one-fourth of the continental United States are focused on consoles within the Southeast Region Operations Control Center (ROCC) at Tyndall Air Force Base, Florida.

A network of surveillance systems feeds data through state-of-the-art computers to the consoles showing 3,000 miles of U.S. coastline. The Southeast ROCC is the lead facility in a major modernization of air defense systems supporting the North American Aerospace Defense Command (NORAD) at Colorado Springs, Colorado, and Tactical Air Command (TAC) at Langley AFB, Virgina.

"Our job is deterrence," maintained General Delauter. "We ensure the sovereignty of the U.S. airspace from Maryland, around the Florida Keys, to Texas. Our forces stand ready to intercept unidentified aircraft that enter our Air Defense Identification Zone (ADIZ) to ensure they pose no threat."

ROCC SYSTEM

The Southeast ROCC is one of four centers in the continental United States including the Northwest ROCC at McChord AFB, Washington; the Northeast ROCC at Griffiss AFB, New York; and the Southwest ROCC at March AFB, California.

The concept allows U,S. and Canadian forces to share information with the Federal Aviation Administration (FAA) and the Canadian Ministry of Transport.

Hughes Aircraft Company of Fullerton, California, was the prime contractor for the ROCC system: integrated circuit chips replace the 1950's-era vacuum tubes in the Semi-Automatic Ground Environment (SAGE) system and the transistorized tubes of the 1960's in the Back-Up Interceptor Control system.

Operators can instantly switch to any of the air defense roles: surveillance, identification or airborne interception.

The heart of the Southeast ROCC is the operations room, where operators at 18 consoles keep around-the-clock vigil on the southeastern sector and its coastline.

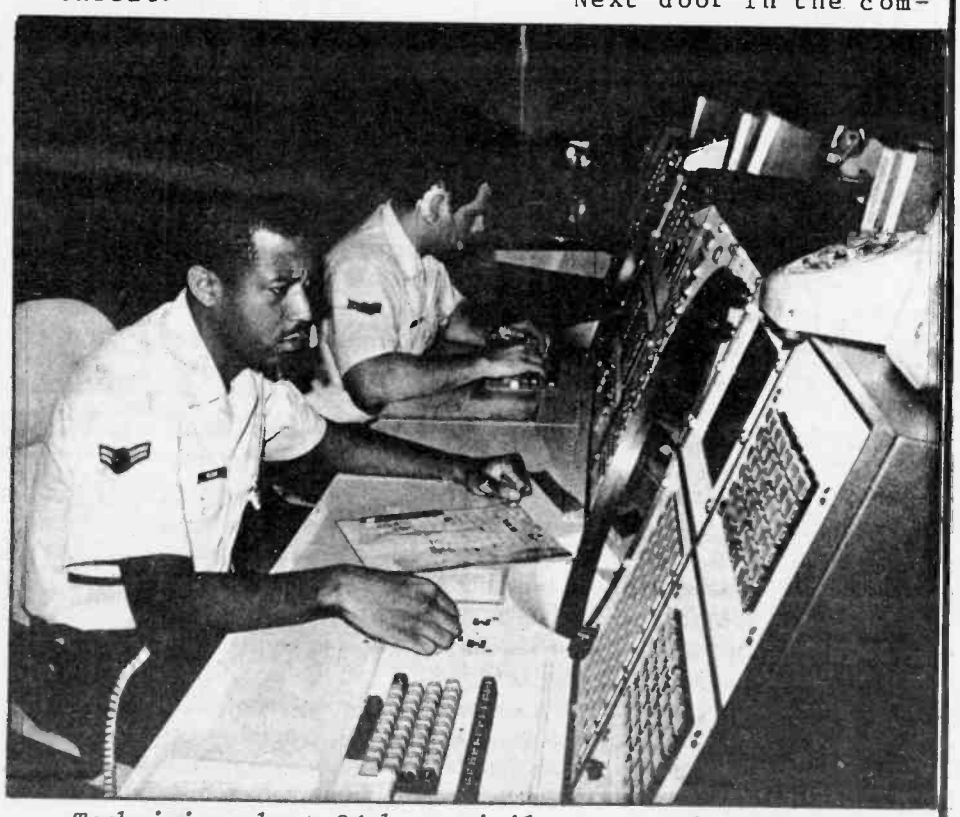
Next door in the computer room, two computers link the center with 17 radar sites throughout the region. The computers compare in size to vending machines, as opposed to the SAGE computers which took about one-half acre of space!

E-3 Airborne Warning and Control System (AWACS) aircraft can be directed to any area in the event a radar site becomes inoperable. The AWACS aircraft can also augment ground-based radars in areas of potential threat.

Stationed on the Florida Keys is a balloon-borne radar system that provides surveillance of low-flying aircraft and surface targets off south Florida, including Cuba. Called the Seek Sky Hook Aerostat balloon, the tethered, unmanned balloon flies at 12,000 feet in restricted airspace above Cudjoe Key.

A second Seek Sky Hook is located on the east coast of Florida near Patrick AFB. The balloons give a new dimension in detecting aircraft or surface vessels traveling too low for other ground-based radar systems

Please turn to p.4



Technicians keep 24-hour vigil over Southeast ROCC.

Get in on the action...

Armed Forces Day Comms

Each year the amateur radio community is allowed to work crossband to military stations operating on their own frequencies in a continuing effort to prepare for any eventuality in which the two services might supplement each other during a national emergency.

This year the test messages will be passed Saturday, May 17, and SWL's as well as hams are eligible to receive special commemorative QSL's or certificates for accurately copying the traffic on any of a variety of frequencies and schedules in several modes including SSB, CW, RTTY, and even SSTV.

Times in UTC for the Armed Forces Day radio exercises are from 1300 on the 17th to 0245 on the 18th and will involve eleven U.S. major military bases representing the Air Force, Army, Navy, and Coast Guard. See page 5 for a list of participating stations.

The text of the messages from the Secretary of Defense will be preceded by a ten minute tuning call. The CW broadcast will be sent at 25 WPM at 0300 UTC on the 18th; the RTTY broadcast will follow at 0345 UTC and will be sent at 60 WPM, 170 Hz shift.

No attempt should be made to correct possible transmission errors; send the message exactly as received along with time, frequency, call sign of the military station copied, along with your own name (and call sign if a ham) and address no later than May 24, 1986, to the command responsible for the specific transmission as shown to be eligible for your certificate or QSL.

Please turn to p.5

MONITORING TIMES

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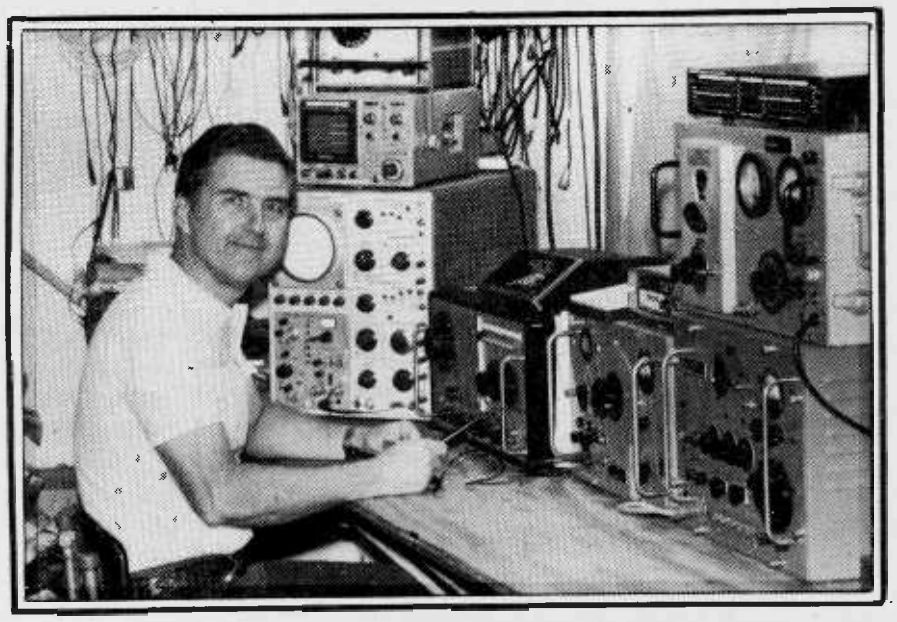
FROM THE EDITOR



BRASSTOWN? DOG BRANCH?

You've Got to Be Kidding!

Hardly a day goes by that some incredulous caller doesn't comment on our location. Yes, there really is a Dog Branch (NOT "Dog Patch"!) Road, and there really is a Brasstown, North Carolina. It is right on the western tip of the state, between Tennessee and Georgia, 100 miles west of Asheville. But the story doesn't stop there.

Over a century ago, the mountainous region of western North Carolina was populated by Cherokee Indians, a proud, industrious and influential nation. They had a written language and published their own newspaper. But the encroachment of white settlers proved an overwhelming set of odds, and the Cherokee were forced from their native land.

Remaining as a legacy to the Cherokees is an endless lexicon of colorful words, phrases and locations. One of these is Brasstown whose name is derived from an improper translation of an Indian name for this picturesque valley in the extreme western end of North Carolina in the Appalachian Mountains.

Nearby communities--Hanging Dog, Granny Squirrel, Chunky Gal, Smackass Gap, Standing Indian, Birdfoot Ridge, Sweetwater Gap--attest to the fact that the more recent white settlers were no more at a loss for novel names than were their Cherokee predecessors.

But what about Dog Branch Road? Believe it or not, the real name of our road as dedicated on early maps was "Jenkins' Branch" but, as legend has it, there were so many dogs on the old road that whenever a certain elderly lady at the head of the road was asked the name of the road she would reply, "Dog Branch"! As tradition would have it, the nickname stuck and the official name has been lost to posterity.

By the way, for those of you who have led sheltered lives in the big city, "branch" is mountaineer for a stream!

New Columns Coming Up

With the enormous increase in size of MT beginning with the July issue, many new columns and features will be presented to our readers, and we need your help.

WORLD RADIO NEWS will be a distillation of topics of interest to the listener; many will be extracted from other sources and your news clippings would be most welcome.

RADIOACTIVITY is a special logging section, both broadcasting and utilities. Broadcasting loggings should be sent to editor Larry Miller (P.O. Box 691, Thorndale, PA 19372) and utilities loggings should be sent to MT (P.O.Box 98, Brasstown, NC 28902).

Broadcast loggings should include time, frequency, country, station name, and program content; ute loggings should include frequency, mode, time, agency, and location. Credit will be given to contributors.

Radioteletype and facsimile are two modes to which we hope to give more space. We are looking for qualified writers and/or experts on these modes to be featured in MT.

Regency Stops MX7000/8000; Bearcats Continue

A spokesman from Regency Electronics has told MT that production of the popular MX7000 scanner has been halted until the highly-publicized Privacy Act (HR3378) has been resolved. "Regency does not want to get stuck with a bunch of them on the shelf if the 800 MHz bill passes," the spokesman went on to say.

Apparently for a similar reason, the eagerly-awaited MX8000, an American version of the popular European AR2002 from the Tokyo-based AOR Company, has been scrapped indefinitely. Whether it may become available in this country as the manufacturer's own version, it is too soon to tell.

Meanwhile, Uniden has taken a conservative marketing approach, expressing intent to soft-sell their personal communications line this spring, increasing their thrust in the fall. No new Bearcat radios will be introduced in the near future.

While Regency has withdrawn from the 800 MHz scanner market Uniden will continue to market the popular BC800XLT. Both companies are lobbying mutually in Washington on behalf of scanner owners to change the wording of HR 3378, the Communications Privacy Act of 1985, still in debate.

INFOTECH M-6000 Owners Take Note

A software error has been found in the M-6000 demodulator from Digital Electronic Systems (1633 Wisteria Court, Englewood, FL 33533; ph. 813-474-9518). The company will correct the error and return your M-6000 with one-day turnaround service.

Contact the factory directly for shipping information.

MT + IR = EXTENDED SUBSCRIPTION

Several callers who subscribe to both Monitoring Times and International Radio have expressed concern that they would lose part of their subscriptions with the merger of the two magazines. With the combined MT/IR beginning with the July issue, present joint subscribers will enjoy an extended subscription equivalent to the time remaining on their individual subscriptions.

WGU20 UPDATE

From time to time we receive inquiries regarding test transmissions heard from a station identifying as WGU20 on 179kHz. We decided to contact the station at this writing to determine its status.

WGU20 was a prototype installation by FEMA (Federal Emergency Management Agency) as part of DIDS (Decision Information Distribution System). It is located at Aberdeen Proving Grounds, Maryland, an installation of the Department of the Army.

Capable of 55 kilowatts output power, the transmitter may be used in either full carrier AM voice mode or frequency shift keying (RTTY). The underground station is fully solid state and may be operated unmanned from a remote control point 60 miles distant. Station parameters are monitored by computers.

The antenna is a single 700 foot vertical tower with 10-foot faces; a ground plane consisting of 180 radials, each 750 feet in length, extends from the base-loaded antenna which is fed by a 3-1/8" diameter transmission line.

The future of WGU20 is uncertain; its schedule is erratic (listed as being in "standby" mode) and the newer Air Force GWEN (Ground Wave Emergency Network) is in an active development stage. It is quite possible that WGU20 will remain an orphan and gradually phase out of operation.

ARRL NET DIRECTORY

In a previous article by Ike Kerschner we mentioned the availability of the ARRL net directory which was formerly free of charge. There is now a $1 charge--still a bargain--which should accompany all orders for the directory from the American Radio Relay League, Club Services Department, Newington, CT 06111.

Viewpoint

DREAM EQUIPMENT

I just finished reading the March issue of Monitoring Times and thought I´d comment on one article in particular.

I particularly liked the review of the IFR-1200 Spectrum Monitor--just the sort of thing that we who will always have Yaesu´s, Kenwoods, or Icoms like to dream about. There is one receiver of a similar caliber I´d like to see reviewed at some future date, if possible. Namely, a Watkins-Johnson 8718. I have a ton of literature and specs on it, but have never seen one in the flesh or known anyone who´s used one. Since it is one of the most commonly used HF receivers by government agencies, I´m certain many other avid SWL´s would like to hear a good SWL´ers report on one.

So if you get the chance, do it to it. (I personally use an FRG-8800 w/FRT7700 and VHF converter, 15 meter long wire, CR-2021 backup.)

Steve Kidd
San Francisco, CA

PLEASANTLY SURPRISED

I read with interest the February article concerning the Info-Tech M-6000 multimode demodulator. At the time I read it, I had ordered but not yet received an M-6000. I was concerned that it would be as complicated to use as the article implies.

I received the unit yesterday, and I was surprised how easy it really is to use. It is easier to tune in signals with the M-6000 than with the M-600A, which is also a great unit. Within minutes of opening the box I was tuning in Baudot and TOR signals, even now with my RTTY scope out of service. Another improvement is that the M-6000 emits a much lower level of RF computer noise (a world of difference from a C-64 plus interface situation!).

The manual I received with the M-6000 seemed easy to read to me. I had no trouble finding the two controls that need to be adjusted before initial use. They are shown in a diagram at the back of the manual.

The only discrepancy I have found in the manual thus far is that the video display switch no.2 should be off for use with 50 Hz.

In my opinion, the M-6000 is an excellent piece of gear with few if any faults.

Charles Signer
FPO New York

SHOOT FOR THE STARS

I want to compliment you on the broad spectral coverage of amateur radio reception appearing in Monitoring Times.

Specifically, I am delighted that you chose to reprint the recent article from RADIO ASTRONOMY, "Getting Started in Radio Astronomy." It is just the kind of broad coverage of this state of the art endeavor that we have been attempting to encourage.

The sensitivity of modern day receivers now permits science oriented listeners to do creditable work in radio astronomy--with the only limitation being large antenna aperture. The large professional observatories cannot monitor the entire sky at once. To remain cost effective, these instruments are usually focused upon deep sky objects, and for very limited time frames. Broad beamed observing, as practiced by amateur radio astronomers has a very useful place.

A serendipitous discovery of a new powerful radio source could denote a supernova, which could enshrine its discoverer´s name in the annals of science for all time. The discovery that a known natural radio source had changed its flux markedly would be of equal scientific importance.

Big government budget radio observatories have only embellished pioneering work of those who had their instrumentation entirely under their own control. The amateur is blessed in that virtually unlimited time may be devoted to a single observing project. I hope that your reprint of our article will encourage some of your readers to "do science" in this unique way.

Bob Sickels, "Radio Astronomy," Society of Amateur Radio Astronomers, 7605 Deland Avenue, Ft. Pierce, FL 33451

A GALACTIC CORRECTION

I have a problem with the photograph appearing on p.19 of the April issue of Monitoring Times. I think the caption must be wrong.

The center of the Milky Way Galaxy is not visible optically. When one looks toward a grouping of stars in Sagittaurus called the Teapot, one is looking toward the center of our galaxy.

However, the center of our galaxy is obscured by opaque cosmic dust. Hence, radio astronomers have been making radio maps of that region of the sky.

The only object I know of similar in appearance to that in the photo called Andromeda is our companion galaxy by the same name. Most galaxies are found in pairs.

David Larson
Harlingen, TX

MT TIPS PAY OFF

I can´t tell you how much I enjoy MT. It really helps me with my utility monitoring. The issue that featured cruise ships has resulted in 9 QSL´s!

Steve Ziegler
So. Portland, ME

COMPARING NUMBERS

On 17 March 1986, at 0010-0045Z, the following was copied by me on 5093 kHz in CW. It is a lot like the cipher on p.9 of the February ´86 issue of Monitoring Times. There are some differences worth noting.

First, from 0010-0014Z, a call was heard of "BT4". Before going into the message, "DN DN" was sent.

Second, this is 5-alphanumeric versus the 4-alphanumeric observed on 24 December ´85.

Third, this message was repeated once immediately following the termination of the first message. The first message ran 0014-0029Z while the second ran 0030-0045Z. "DN DN" was again used to separate the messages.

Fourth, the sign-down was a very distinct "VA", sent once.

Traffic is as follows:

VTTU4 UA6EB UB6E6 V4DBN
ANBVA ABA66 4EVAD T6VNE
EVVVN ABT4B UU6ED 66BN6
E64EB NABTE 66UB6 T6ENT
VBVNN NA4UN BNEVT BVBUT
TD64A 4BUNE ANAUT UVBBB
NTEBN 44DET DNBEB T6TDV
VED66 T6T6T TAAAV AVDBT
B6VVB VDAVN VAE66 4E4TE
T6T6B 4DD4A ENNTD DUNN4
466U4 BDNAA 64T6N NVNTA
UVB4A UVTEB U4TAN NBUVA
DEUTN UAAN6
BUNND VVDTE VVATN UEU4B
E6TVA TDBTV A4TBE BUAVT
UUNE4 TUVAV DDDDT V4BAE
VETU4 BU4DE 4UTTB UT44B
EU66E VTBE6 UDEVU EDVET
D44BU DE6VV DVA44 ND4TB
4E46D TVUE6 B4AAV EVDNE
ANU66 EEAAV NNEUV 6BVNV
TUBUV NAE44 DBUN4 NEUT4
6UABE TA66N

I picked this transmission up like he was in the same room. The transmitter was very raspy and unsteady as if the tape was magnetic and had stretched. The dash length varied from 1/2 to 3/4 of a second in duration. I guess at 6 gpm you can´t be picky.

I live in Manassas, VA (about 30 miles from Warrenton, VA) and was wondering if maybe this transmission originated at the famed Warrenton Training Center?

(name withheld)

More likely, you were copying a test transmission from a FEMA (Federal Emergency Management Agency) VIP relocation site such as Mount Weather, Virginia, or one of the region 3 transmitter sites in Richmond or Charlottesville, Virginia.

READER ECHOES DISGUST

After reading Abe Lewkowicz´s piece in the "Viewpoint" column, I agree and am behind him 150%. I too have invested a lot of money and years of time in monitoring the HF/VHF/UHF bands. I got started in my teens and am now 27 years old.

I can´t believe that some glory-seeking clown would actually call the news media and reveal everything that this idiot did. It turns my stomach too! I´ll fight tooth and nail against HR 3378 and S 1667 to protect my right as a legitimate HF and scanner monitor. I can only hope that mine are not the only letters that were written to the Senate and House of Representatives (and I´m sure that they can´t be). I also hope that clods like described in Abe´s article are very few and far between. If by chance you do publish this Bob, I hope that every monitor out there will realize that we must all be responsible monitors.

Lee Groce
Yadkinville, NC

RIDING WITH SAC...

Tuning in on the Strategic Air Command

On eternal alert and empowered with nuclear retaliation, the Strategic Air Command represents an ominous deterrent to aggression. Ever vigilant, airborne crews constantly broadcast status messages worldwide, intercepted frequently by "utilities" listeners, the monitors of the radio spectrum who enjoy target hunting two-way communicators.

"Giant Talk," the code name for one immense HF single sideband radio system of the U.S. Air Force, is a common stalking ground for the "ute" fans; the following frequencies and schedules provide an up-to-date list of the more productive frequencies and times to listen in on SAC radio communications.

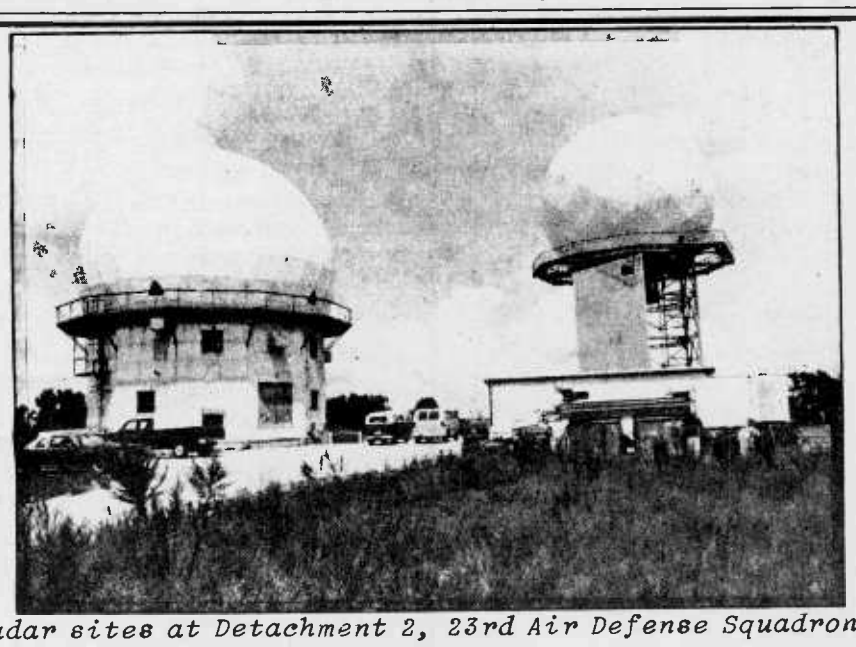
KC-135 refuels SAC E-4A NEACP (National Emergency Airborne Command Post)

RIDING WITH SAC cont'd

Note that there are a few blanks; we invite fellow monitoring enthusiasts to fill in some of the vacant spaces with additional information sent to our attention. ●

UNITED STATES AIR FORCE (STRATEGIC AIR COMMAND)
HF CHANNELIZATION

Channel	Frequency	Channel	Frequency
ALFA	11243	WHISKEY	20631
BRAVO	11220	XRAY	7330
CHARLIE	14955	YANKEE	
DELTA	20890	ZULU	18594
ECHO	4495	ALFA CHARLIE	13907
FOXTROT	5026	ALFA ECHO	5987
GOLF	6826	ALFA MIKE	3295
HOTEL		ALFA PAPA	8101
INDIA	15962	ALFA SIERRA	3369
JULIETTE	18046		
KILO		BRAVO QUEBEC	5700
LIMA	11494	BRAVO UNIFORM	3113
MIKE	15041	BRAVO WHISKEY	13211
NOVEMBER		BRAVO XRAY	15091
OSCAR			
PAPA	9057	CHARLIE QUEBEC	15035
QUEBEC	6761		
ROMEO	9027	ECHO QUEBEC	21815
SIERRA			
TANGO	17975	FOXTROT QUEBEC	5684
UNIFORM	23337		
VICTOR	4725	YANKEE QUEBEC	11408



Radar sites at Detachment 2, 23rd Air Defense Squadron, Naval Air Station, Oceana, VA.

CHANNEL	FREQUENCY	NOTE
(Q)UEBEC	6761.0	AIR REFUELING BACK UP FREQUENCY
(X)RAY	7330.0	
(R)OMEO	9027.0	
(A)LFA	11243.0	HQ SAC WILL MONITOR AT 00-06/15-21/ 30-36/45-51 MINUTES PAST THE HOUR (EACH HOUR)
(M)IKE	15041.0	
(T)ANGO	17975.0	
(W)HISKEY	20631.0	
(U)NIFORM	23337.0	
	All frequencies in kHz (upper side band)	

STATION LOCATION	BROADCAST TIMES	OPERATING TIMES SUMMER	WINTER	CHANNEL/FREQUENCY Q X R A M T W U
CLARK AB	15-17	D 21-13	D 22-11	X - - X - X X X
REP. PHIL.		N 13-21	N 11-22	X X X X - X - -
KADENA AB	49-51	D 21-13	D 22-11	X - - X - X X X
JAPAN		N 13-21	N 11-22	X X X X - X - -
YOKOTA AB	34-36	D 21-13	D 22-11	X - - X - X X X
JAPAN		N 13-21	N 11-22	X X X X - X - -
ANDERSON	04-06	D 19-10	D 20-09	X - - X - - - X
AFB, GUAM		N 10-19	N 09-20	X - X X - - - -
HICKAM AFB	19-21	D 16-07	D 17-06	X - - X - X X X
HAWAII		N 07-16	N 06-17	X X X X - X - -
EIELSON AFB	30-32	D 16-07	D 17-06	X - - X - X X X
ALASKA		N 07-16	N 06-17	X X X X - X - -
McCLELLAN	45-47	D 13-05	D 15-03	X - - X X X X X
AFB, CALIF.		N 05-13	N 03-15	X X X X X X - -
OFFUT AFB	00-02	D 11-02	D 12-24	X - - X X X X X
NEBRASKA		N 02-11	N 24-12	X X X X X X - -
ANDREWS AFB	17-19	D 11-02	D 12-24	X - - X X X X X
MARYLAND		N 02-11	N 24-12	X X X X X X - -
THULE AB	02-04	D 11-02	D 12-24	X - - - - - X -
GREENLAND		N 02-11	N 24-12	X X - - - - - -
MILDENHALL	47-49	D 05-21	D 07-19	X - - X - X X X
ENGLAND		N 21-05	N 19-17	X X X X - X - -
INCIRLIK	32-24	D 03-19	D 04-16	X - - X - X X X
TURKEY		N 19-03	N 16-04	X X X X - X - -

NOTES: Broadcast time is minutes past the hour when EAM messages will be broadcast. D=Daylight hours, N=Nighttime hours, X=Frequency used, and -=Frequency not used. Summer= 1 April through 30 Sept, Winter=1 Oct through 31 March.

COASTLINE VIGIL from p.1

to pick up.

When an aircraft enters the ADIZ (air defense identification zone), the identification technician has two minutes to make an identification using either flight path correlated with radar position or radio contact with the aircrew. When identification cannot be confirmed in this time, the track is classified "unknown," and fighters are scrambled to make visual identification.

The Southeast ROCC Senior director scrambles the jet fighters from the alert squadron nearest the unknown. There are eight locations in the southeast region where aircrews maintain 24-hour alert and are capable of being airborne within five minutes. They are a combination of active-duty Tactical Air Command forces and Air National Guard units under the operational control of NORAD.

"Occasionally, we track Russian Bear reconnaissance aircraft along the eastern coastline," said Brigadier General Donald R. Delauter of NORAD. "We send our fighters up and escort them as they pass through our ADIZ. Sometimes they have come as close as 40 miles from shore, but usually they fly more than 100 miles offshore." In the eastern seaboard area, the ADIZ extends about 150 miles from the coast.

"With Florida and the nearby islands being popular resorts, we track lots of private planes that innocently enter our ADIZ," Colonel Stocks said.

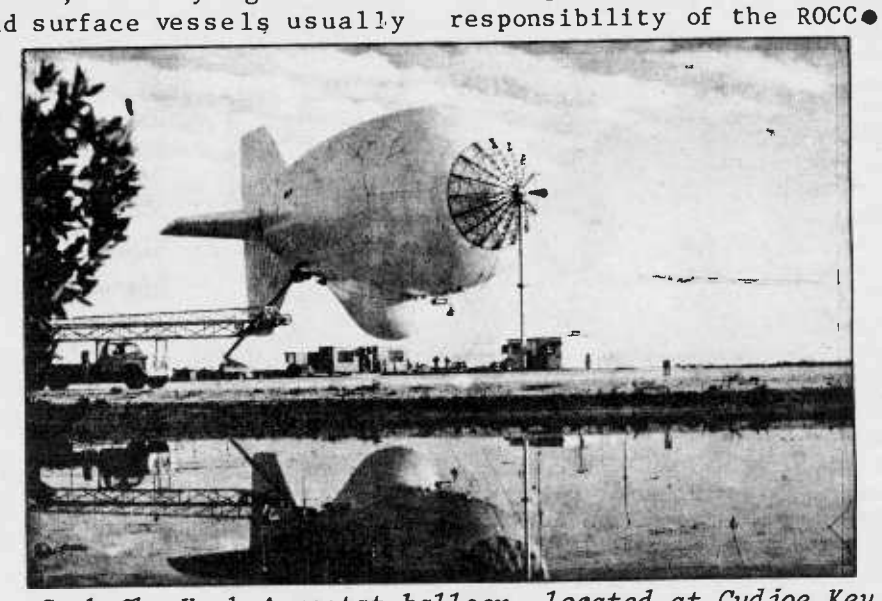
ADDED SURVEILLANCE

These flights are not always innocent, however, and sometimes involve the smuggling of drugs, which adds a new aspect to the ROCC's role. With the enactment of Public Law 97-86, it is permissible for military services to provide equipment, facilities, training, expert advice, and information to civilian law enforcement agencies, as long as this support does not adversely affect military readiness.

Information gathered in the normal course of military operations supplements the assets of federal agencies involved in countering illegal drug smuggling. The Southeast ROCC is in a strategic location, with Florida leading the nation in incoming drug traffic. The Seek Sky Hook radars are effective in spotting the small, low-flying aircraft and surface vessels usually used by drug runners.

The Air Force takes no action other than passing information to law officials including the U.S. Coast Guard, U.S. Customs Service, and state or local law agencies dealing with drug interdiction.

There are about 200,000 flights each day in the United States; 1,500 of those penetrate the ADIZ throughout the U.S.--the responsibility of the ROCC●



The Seek Sky Hook Aerostat balloon, located at Cudjoe Key on the Florida Keys, identifies air or surface vessels traveling too low to be picked up by other radar systems. A second system is located near Patrick AFB, FL.

Listening in on
The News Teams

by Ed Soomre

Tucked in between the public service VHF/UHF spectrum radio bands are chunks of radio spectrum used by radio and television broadcasters. They are defined by the FCC as the Remote Broadcast Pickup Service. Their primary use is to relay programs and/or technical information relating to these programs to the station or persons associated with the program.

Another use is to relay news information to news crews or to the station newsroom. These frequencies are also used for road traffic reports and anything else related to radio and television station operations.

Most radio and television stations use one or more frequencies in simplex or repeater operation. The lowest frequencies allocated to this service are 1606, 1622 and 1646 kHz. Primary use is the relay of radio programs and television audio as a studio feeder. Mode is AM; however, these frequencies are not used very often. Recent programs were relayed from Yonkers, NY, to stations WOZW and WOZI in Monticello, ME, using KPF 941 on 1622 kHz.

The next bank of frequencies are in the VHF low band:
25.87 25.91 25.95 25.99
26.03 26.07 26.09 26.11
26.13 26.15 26.17 26.19
26.21 26.23 26.25 26.27
26.29 26.31 26.33 26.35
26.37 26.39 26.41 26.43
26.45 and 26.47 MHz

These are used more often than the lowest frequencies and for the same purpose. These channels can be heard great distances when the VHF low band is active with skip conditions. One of these frequencies, used by a television station in Los Angeles, CA, has been heard in New Zealand.

A few frequencies in the 153 MHz band are used by broadcasters, but on a limited basis, as the frequencies are shared by other radio services such as the motion picture industry, special industrial radio services, forestry products, petroleum industries, and the manufacturing industry. These frequencies are 152.87, 152.93, 152.99, 153.05, 153.11, 153.17, 153,23, 153.29, and 153.35 MHz.

Mode of operation is FM, mostly simplex, for remote broadcast pickup, feeding an out-of-studio broadcast from a mobile unit to the station or transmitter site. Examples of this type of use are business openings, sports events or parades.

Additional VHF high band frequencies are 161.64, 161.67, 161.70, 161.73, 161.76, 166.25 and 170.15 MHz, all used the same as the 153 MHz frequencies. Occasionally they are also used for news reporters and road traffic reports to the station.

Lastly are the widely used 450-451 and 455-456 MHz frequencies, the most complex assignments. Uses include remote broadcast pickup, news reports, road traffic reports, engineering crews, and daily station operations. What makes these bands so complex is that simplex and repeater operations are both used on any two frequencies for repeater input and output. This does not coordinate with the standard UHF band plan where repeater inputs are 5 MHz above the repeater output.

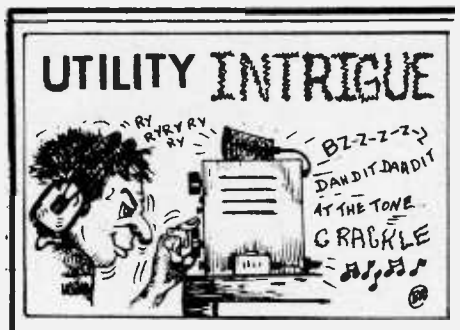
Repeater outputs can be heard at good distances away from the transmitter, but mobile units and portables are usually low power and have a limited range. Simplex operations can take place on the repeater output frequency, too.

Some broadcasters use the business radio and/or general mobile radio services for station operations and news crews. Remote broadcast pickup operations are not allowed in those bands. Stations using these frequencies are a small number, as the majority of them are licensed in the Remote Broadcast Pickup Service.

Because of band crowding conditions, it is also possible for the FCC to allow a broadcaster to use an unused frequency in another radio service for its operations under extreme band crowding.

The Relay Press Radio Service is used by newspapers primarily for news reporters and newspaper delivery. The frequencies used are: 173.225, 173.275, 173.325, 173.375, 452.975 repeater out (457.975 repeater in) and 453.000 MHz repeater out (458.000 repeater in). Like the broadcasters, some newspapers are licensed in the Business or General Mobile Radio Service.

So take a few minutes to scan these frequencies, as exciting live news will be taking place on these frequencies and possibly not on any others elsewhere. It's a whole new world of listening! ●



by
Don Schimmel
516 Kingsley Rd SW
Vienna, VA 22180

MAILBAG

The mailbag brought a number of letters from readers with items relating to activity following the tragic space accident. Here are some portions of a few of the letters:

David Brown in Illinois heard CG Cutter DALLAS in communications with Cape Canaveral Control on 5680 kHz. The conversation was re picking up debris, transfer of debris to another ship. Cape Leader was also involved in transmission as well as several aircraft, Navy 778 and 758.

Another item from David was a phone patch between SAM aircraft and an unidentified office in Houston re seating arrangements for the Memorial Service. This was monitored on 6717 kHz.

Bill Frantz, GA, offered this information: "While monitoring Coast Guard transmissions on 5696, the frequency of 4376 was mentioned concerning recovery of the debris from the space shuttle Challenger. I have since monitored 4376 during all daylight hours and have heard Coast Guard Cutters DALLAS, BEAR, and TAMPA in contact with CG helicopters, airplanes, and with Patrick AFB. Also heard is `Cape Radio.'

"Transmissions included recovery, tagging, and delivery of debris; dropping DMB (data marker buoys), arrival and departure times and locations of other recovery craft. In early February transmissions seem to have shifted to 2622 and there have also been some on 5550 and 5810."

Our thanks to both David and Bill for furnishing these intercepts.

ARMED FORCES DAY from p.1

MILITARY STATION	CW/RTTY FREQUENCIES (kHz)
AAG HF/MARS Radio Facility Presidio of San Fran, CA	4021.5, 7309.5, 13994.5
AAE HF/MARS Radio Facility Fort Sam Houston, TX	4018.5, 698.0, 9990.0
AIR 2045th Info. Systems Group Andrews AFB, Wash. D.C.	6995.5, 13997.5
NAM Naval Comm. Area Master Station LANT Norfolk, VA	4005.0, 7393.0, 14400.0
NAV HQ Navy-Marine Corps/MARS Cheltenham, MD	7372.5, 14389.5
NMH Coast Guard Radio Sta. Alexandria, VA	
NMN Coast Guard Comm.Sta. Portsmouth, VA	
NPG Naval Comm.Sta. Stockton, CA	4010.0, 7365.0, 13975.5
NPL Naval Comm.Sta. San Diego, CA	
NZJ Marine Corps Air Station El Toro, CA	
WAR HQArmy MARS Radio Sta. Fort Meade, MD	4028.5, 6997.5, 14403.5

AAE, AAG, WAR
Armed Forces Day Test
Commander, USAISC
Attn:AS-OPS-OA
Fort Huachuca, AZ 85613-5000

NAM, NAV, NPG
Armed Forces Day Test
Naval Communication Unit
Washington, DC 20390-5161

AIR
Armed Forces Day Test
2045ISG/DOJM
Andrews AFB, DC 20331-6345

UTILITY INTRIGUE cont'd

CUT NUMBERS AND CRYPTO

A weak station was heard on 24 January at 1237Z in CW sending the same four cut-number groups over and over. This particular cut number system has the figures 4 and 6 sent full while the remainder are sent cut. Here are the equivalents:

1 2 3 4 5 6 7 8 9 0
A U V 4 E 6 B D N T

The groups sent were as follows: BVVD 4N64 VVDB NB4V. The station went down as 1241Z and nil more was heard.

I note that this cut number system is the same one used on the message sent to MT by M.L. Gibson, WA, and which appeared in the February 1986 MT on page 9.

Greg Wilson, NJ, reported a cut number transmission and he made the following remarks:

"On February 8, 1986, 0110-0129Z, on 6773 kHz, I intercepted traffic similar to that you reported in the July 1985 edition of Utility Intrigue. The callup, although I came in at the tail-end of it, looked like this:

TA IGG TA TA NUT TA NUT TA NUT TA NUT BT BT

"Immediately after the break for text, this station went into several hundred 5L groups resembling the following:

WMUNT RUAMA WWRDI WMAGT MRWID WWMDT NTRAU MWDUI WWMDT IATTT TDMMD MUWDU DDRD DNWID IGMAR IWRUM IGMTM ITTUI GINGN UNNUN etc.

"At the end of the traffic, and without any repeat or formal sign-off, the station sent AR AR AR SK SK SK and went silent. I have since followed up as much as I could without hearing this station again.

"As to my SWL experience, I have been a ham (WA1YAB2) for 24 years, served with the Air Force 1964-1969, and have SWL'd off and on for 15 years. My equipment includes a reconditioned R-390A and an ICOM IC-745 to a trapped wire vertical at 27 feet."

The cut number system which Greg encountered is probably this one:

1 2 3 4 5 6 7 8 9 0
A U W M I R G D N T

I have been looking over some flyers from Aegean Park Press, PO Box 2837, Laguna Hills, CA 92654. New titles being offered include "Cryptograms in Spanish" by Wayne G. Barker. Not only will you practice your crypto skills but you will improve your Spanish as well. The volume is available in soft cover version for $9.80 and a hard cover binding for $17.80.

Also now available are the declassified books, "Military Cryptanalytics, Part I, Vols 1 & 2" and "Military Cryptanalytics, Part II, Vols 1 & 2." These volumes were authored by Lambros D. Callimahos and William F. Friedman. The Part I volumes are $28.80 apiece for the soft cover books, and $36.80 apiece for the library binding. Part II volumes are $38.80 apiece for soft cover and $46.80

CELLULAR RADIO
STILL A GOOD IDEA?

by Bob Grove

There is growing concern that cellular radio, considered a short time ago as a panacea to relieve mobile radio congestion, may prove to be inadequate.

Several areas of concern have been expressed among land mobile communications authorities. Major metropolitan cellular areas like Chicago and Los Angeles report that they are running short of capacity.

The basic premise of cellular radio is that each major city is divided into a number of small cells, each containing an antenna so that the same frequencies should be used simultaneously over the wider area. But the cities are beginning to see that what works on paper does not always work in practice.

Apparently, cells of less than about two miles radius are difficult to achieve and, ideally, the antenna should sit in the exact middle of that cell. But finding a location may be difficult as experienced by one common carrier who had to purchase a building and tear is down to erect an antenna!

There is often considerable resistance by residents and other interests to erecting the series of antennas required for proper cellular operation. And even if a central building is found, it may be so high that signals propagate favorably over too wide an area and cannot be heard on the ground level near the cell it is supposed to serve.

To further complicate installations, the reflective and absorptive natures of surrounding construction creates a very irregular antenna pattern with varying degrees of efficiency in various directions, making cell-to-cell reliability a serious problem.

Now, in order to offset the shortcomings of cell efficiency, cellular industry spokesmen are actively pursuing more channel allocations to supplement their growing demand. But they are encountering substantial flak from other interests who are looking for 900 MHz channels for such uses as airplane telephone and satellite mobile communications services.

Each additional cell costs over a half- million dollars, and additional frequencies--even 30% more--would provide only a temporary stopgap measure. More than likely, the FCC may opt for the arrival of new technology, such as amplitude compandered sideband (ACSB), before giving away additional large chunks of reserve spectrum.

Ready to pack it in?

FEBRUARY LOGGINGS

kHz	DTOI	MODE/IDENTIFICATION/COMMENTS
1920	110420	CW/K MARKER
3380	150312	MCW/FL GRPS, 6 GRPS TO MSG. FEMA TFC
3391.6	150317	CW/CS ARE LTR F FOLLOWED BY 2 DIGITS, I.E. F20. BELIEVE THIS IS NIGHT FREQ FOR NET HRD ON 13256 KHZ DAYTIME. POSS MEXICAN MILITARY NET.
3485	150321	USB/GANDER RDO WITH WX AT CANADIAN LOC
4068.9	150330	USB/PHONE PATCH FROM SEA LION THROUGH WOM MIAMI HIGH SEAS RADIO
4182	170359	CW/5L GRPS, SPEC CHARAC OT OE AA IM
4196	170404	RTTY 75-850/78QLD/POSS SPAIN NAVY STN
4308	150354	CW/CLA DE EKRB/HAVANA (COJIMAR), CUBA FROM LIBERIAN SHIP
4306	170408	CW/DE CTV-CTU4-28/MONSANTO NAVAL RDO, PORTUGAL
4592	170410	USB/MARS TRAFFIC
4782	180242	MCW/5L GRPS, 6 GRPS TO MSG FEMA TFC
4810	180245	CW/VVV MDA/GREAT BRITAIN ALLOC
5709.8	210254	USB/UNIDEN AIRCRAFT WRKNG ANDREWS AFB WITH ETA AND REQUEST FOR CHARLESTON WX
5869.6	210256	CW/FL GRPS, SENT SLOW, PAUSE AFTER EVERY TEN GROUPS
6285	140319	CW/72WTT DE 77URY/POSS SPAIN NAVAL STATIONS
7755.3	181353	RTTY 50-850/WFB37 ETT WORLD COM TESTING FROM MOBILE ALABAMA/RY'S
10381	180043	RTTY 50-850/5F GRPS/CODED WX
10455	180045	USB/2 OM CONVERSING IN SPANISH, ONE SEZ HE GOING TO COSTA RICA FOR FEW DAYS
11012	180038	RTTY 78-850/PRESS IN SPANISH, ARTICLE RE IRAN/IRAQ WAR
11026	180036	RTTY 50-425/DE ZIRE CENTRE LINE TEST/RY'S
11075	180034	CW/5L GRPS, SPEC CHARACTERS IM OE OT AND AA
12348.2	181338	USB/SYMV (GREEK SHIP) CALLING UNIDEN STATION
12546	181344	CW/PJC DE YXHR/CURACAO FROM VENEZUELAN VESSEL
13100	121337	CW/DE WNU/SLIDELL, LA
13122	121333	USB/WOM HIGH SEAS MIAMI FL GIVING TFC LIST FOLLOWED BY NAT WX SVC FORECAST
13300	171419	USB/2 SS/OM IN CONVERSATION
13388.4	171403	AM/EE-YL CALLS 448, COUNTS 1-0 FOR SEVERAL MINS FOLLOWED BY TONE RPTD 10 TIMES AND INTO 3-2 FIGURE GROUPS, BAD QRM FROM CLP (HAVANA) FEW KHZ AWAY
13390	171414	CW/CLP55 DE CLP1/CUBA EMB GUYANA FROM HAVANA. CLP55 FOUND ON 18035 KHZ
13421	061454	CW/UNIDEN STATION GETTING RPTS OF 5F GROUPS FROM UNHRD STATION
13540	151351	RTTY 50-850/PRESS IN SPANISH, ARTICLE HAD NAMES OF CITIES IN ARGENTINA
13557.5	171352	CW/UNIDEN STN SENDING 33 49874 OVER AND OVER, DOWN AT 1355
13582	171357	CW/DE EC3Y/SPAIN ALLOCATION
13621	172145	RTTY 75-850/CODED WX AND WX IN ENGLISH FOR GULF AREA
13872.7	171341	USB/SEE 13889.6 ENTRY, SAME TAPED MSG
13889.6	171339	USB/PARIS FRANCE-TEST TRANSMISSION FOR CIRCUIT ADJUSTMENT, FEMALE ANNOUNCER, GIVES ANNOUNCEMENT IN FRENCH & ENGLISH
13920	151328	RTTY 50-425/5F GRPS, AFTER APPROX 110 GROUPS, STN CARRIER WENT OFF ABRUPTLY
13923	201349	RTTY 50-425/DE Y3D5/GDR ALLOC/RY'S
13934.6	061920	CW/SPANISH CHATTER, POSS CLP1
13950.1	121309	LSB/YL & OM-EE TALKING ABOUT OFFICE MATTERS AND GETTING SUPPLIES
13954.9	061414	CW/PROB VIETNAMESE DIP/VIET PT WITH 2L, 3L, 4L GRPS/SANDINO AND NICARAGUA APPEAR IN TEXT
14452.2	071321	CW/5L GRPS/SLIGHT ECHO TO SIGNAL
14490	172049	USB/TWO SS-OM IN CONVERSATION
14900	181404	RTTY 50-425/TASS (SOVIET NEWS AGENCY) WITH PRESS IN ENGLISH
19865	151415	RTTY 50-425/PRESS IN SPANISH

UTILITY INTRIGUE cont'd

apiece for the library binding. Add $1.00 per book for postage/handling.

More years ago than I care to mention, I had the privilege of having lunch with Mr. Callimahos (the author mentioned above), and a mutual friend. It was indeed a pleasure to listen to Mr. Callimahos relate various stories and it was particularly amusing to hear him tell how he had used the name of our mutual friend as a keyword of a cipher alphabet for a textbook crypto problem.

UNUSUAL INTERCEPTS

On 3 February at 2110Z on a frequency of 6096 kHz, a MCW marker was heard sending the letters ZM at 30 second intervals. ZM was repeated twice at 5 seconds and at 35 seconds. I watched this transmission for about fifteen minutes and then dropped it.

One of the most unusual signals I have ever heard occurred on 13564.8 kHz on 4 February at 2105Z. Shown in figure 1 are the CW signals as they took place on a time scale from left to right.

The two signals sounded different and the signal strengths were not the same so it certainly seemed that there were two transmitters involved. I monitored these transmissions for quite a while and did not obtain any identification so I dropped them. I do not have any idea as to the purpose of these unusual signals.

DIPLOMATIC ACTIVITY

Unidentified RTTY traffic was monitored on 13538 kHz 16 February at 1354Z. This 50/425 transmission was 5L groups and a typical heading had MEX NO 0114 150209 31 AAA. Another group of messages had headings like this one: HAV NO 4063 150203 55 MAC 100. This is probably Diplomatic traffic, but thus far I have not come up with a firm identification.

If any reader knows of a U.S. outlet for publications of the International Telecommunication Union (ITU) I would appreciate receiving the address. The UN Bookstore does not handle the publications although they will send you a copy of the ITU Catalog. It is a lot of bother to order direct from Geneva so I am hoping someone will come up with a U.S. source.

Another suspected Diplomatic activity was intercepted 15 February at 1354Z on 13538 kHz. The transmission was RTTY 50-425 and was 5L groups. Several messages had MEX in the heading so perhaps the addressee was in Mexico City. Another message had HAV in the heading which would seem to indicate that addressee was in Havana. No further identification data was obtained.

See entry for 3391.6 kHz in this months' loggings: Additional coverage of this frequency has confirmed the activity is the same one which is heard on 13256 kHz during the daytime. The net is believed to be Mexican military (possibly Air Force).

The stations apparently abbreviate their call signs, using just the last letter plus the digits (LFF). When sending figures in a message text, the numbers are always followed by the spelled out version; for example: 1255 (UNO DOS CINCO CINCO). ●

Signal 1: EE EE EE EE EEE EE EE etc.
Signal 2: TMTT MMMM O MKM MMM MMK MT etc.
Figure 1

Ciphers Yield to Computers

by Bob Russ

The radioteletype monitoring SWL who meets up with crypto too often abandons all hope, but the more daring soul can have fun.

The simpler forms of RTTY crypto involve changing the value of several of the "bits" in a RTTY character. This technique is as old as teletype itself and always results in a simple substitution crypto. A little pencil work and a knowledge of the letter/frequency table for the language, and it will open to you.

As this was the least expensive form of RTTY crypto, it was the most commonly used, serving as a very adequate shield for minimum security messages. Many of the Third World nations use it for all but top secret stuff.

Because such teletype codes are binary in nature, a computer nut can play with RTTY cryptos and try to develop methods on analysis that work on computers.

Usually, binary math rules will hold true in such work--at least if the crypto was designed by a computer or RTTY expert. The alphabet characters are points along a number-line, and this line can be treated in normal math ways. Thus, a character must change position on the line by a factor of two. After a little experience with these cryptos, one will recognize at a glance what is being done to the number values.

Because substitution crypto is highly vulnerable, it cannot be used where sensitive material is transmitted. General Motors, for example, will not use it when informing one of its plants of a design change in the J-model chassis. The Secretary of State will not use it when telling his man in Beijing to go to Plan B.

SENSITIVE MATERIAL NEEDS COMPUTER-GENERATED CIPHER

To cover this type of explosive text, IBM developed a different type of crypto which requires a computer. It cannot work on a mechanical teletype.

In this IBM computer-based crypto, the characters are bunched in groups of eight and are treated as one unit. This unit has 64 bits in it; these bits are then scrambled, and specific bits are exchanged with following units of 64.

This method is the basis of the two key technique used in industry and international exchanges at this time. One of the key factors is known to the public; the other is secret.

For about a decade, it was generally believed this was totally invulnerable; then it was seen that there

were a limited number of possible keys and the problem took on finite form. A claim has been made that the "cracking" formula has been found.

A simpler method of encryption has been developed by an IBM man for the PC. The general concept is the same, but it pairs two text characters, making them into one single-number value. This value is then rotated to the left in the register.

The amount of shift depends upon the value of the character in a key phrase. As a key may be up to 64 characters in length, we have a crypto-text that resembles the two key crypto in complexity. It would possibly be open to matrix-analysis methods, but this would take considerable amounts of text in order to work out the absolute length of the key and the content of the key.

This discussion may give the more adventurous of

CIPHERS YIELD cont'd

our readers all kinds of ideas. There are ways available to use the binary logic of your computer, either function key use if you have an IBM PC or equal, or by function simulation, by a math formula sub-program. This would permit you avid programmers to do, from Basic, what the real-life programs do in machine language.

Of course, most Basic programs are terribly slow, at least by computer standards, and could not do complex things with on-line material. But you can play with a sample page of crypto-text and try out ideas.

If you want to speed up a Basic program, you might try to locate where your computer stores the program it is using. This can be copied out and entered as a machine-language program.

"IDLE" CURIOUSITY?

If I may, I'll toss in a comment. There is certain information that it might be better not to have. As a long-time SWL, I have stumbled across channels that were fascinating, but sometimes kept me writhing into the wee hours of the long, dark nights.

Simple encryption is there to keep the idly curious out. Heavy encryption is there because the safety of corporations and even nations is at stake. Solving the challenge of encryption is one thing, window-peeking is something else. I still remember the sobs of a ten-year-old in Tangiers and the loneliness of a man in Thule.

SCANNING

Reader Milan Seifert of Ft. Belvoir, VA, managed to snag the presidential helicopter and has a computer-generated QSL to prove it!

President Reagan was returning to the White House from Andrews AFB following a trip to Grenada.

MARINE 1

WASHINGTON NATIONAL
AIRPORT TOWER
WASHINGTON D.C. 20001

To: Milan Seifert
THIS CONFIRMS YOUR RECEPTION OF WASHINGTON CONTROL TOWER IN CONTACT WITH PRESIDENTIAL HELICOPTER MARINE 1, ON 119.1 MHZ, AT 2135 HRS, ON 2/20 1986.
TRANSMITTER MODEL GRN 21 N22.
ANTENNA TYPE TACO.

BROADCAST CONTENT Air Traffic Advisories/Instructions.

ENGINEER-IN-CHARGE Richard J. King
Plans and Procedures Specialist DCA Tower

SCANNING

with NORM SCHREIN

Fox Marketing, Inc.
4518 Taylorsville Rd.
Dayton, Ohio 45424

BATTER UP!

Radio and the Cincinnati Reds

Most of us are aware that the majority of radio frequencies that can be received by scanners can be easily determined by any number of frequency directories. However we may not be able to determine the specific uses for those frequencies or if they are even active at all. I had an opportunity to try out my theory lately on a project. This involved the active frequencies surrounding the Cincinnati Reds at one of their home games.

CINCINNATI REDS' FREQUENCIES

Tracking down the active frequencies used in any Cincinnati Reds' home game began with some basic research. I knew that Riverfront Stadium was not owned by the Cincinnati Reds, but who did own it? After all, whoever owned the stadium would probably have some two-way communications going on with its operation during a baseball game. A couple of telephone calls located the owner--the city of Cincinnati!

Now to determine what frequencies were used there by the city. I called the Riverfront maintenance office and, after talking to one employee, found out that they used RCA hand-held radios, had no base and that the radios operated on AM. All sounded OK with the exception of the AM operation. Were they using radios in the aircraft band? I didn't think so.

I was given the name of the city's radio technician and contacted him for some further clarification. Yes, indeed, the city did use RCA hand-held radios for maintenance purposes at the stadium; there was no base station; the radios operated on a local government frequency that was used during the day by the sanitation department.

Did the radios operate on FM then? Yes. What was the frequency that the sanitation department used? The reply was 155.760. No other frequencies were used by the city at the stadium. It was now time to check with the Reds.

The Cincinnati Reds have several business radio frequencies assigned to them. Two pairs include 462.175 / 467.175 and 462.212 / 467.212 MHz. The latter carried a mobile call sign. The 462.175 pair appeared to be a repeater operation. Now it was time to go to the game.

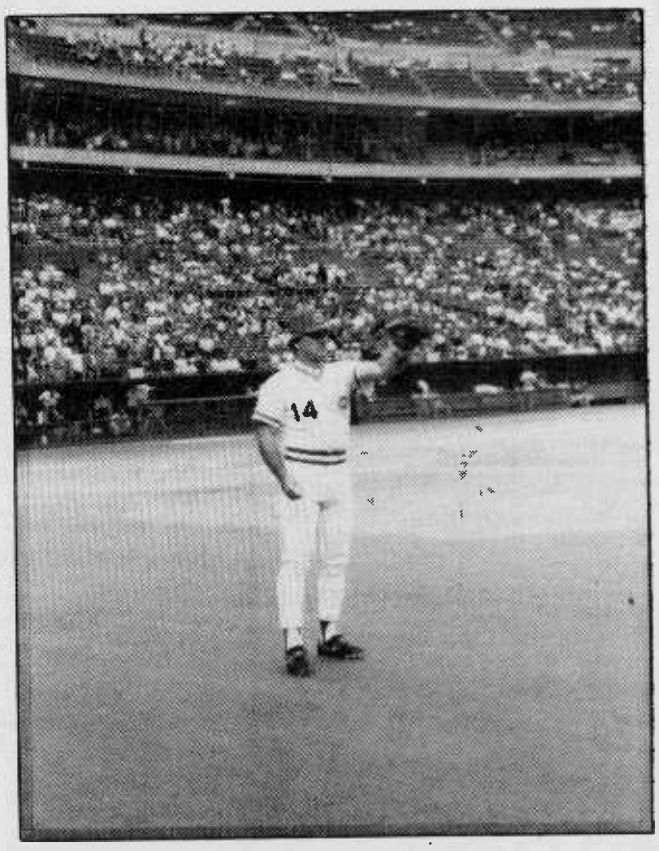
Armed with my list of frequencies, a scanner and a pair of binoculars, I was ready to tune in the Reds. Many of the security guards have radios, as do the maintenance men. The frequency 155.760 was active with pregame activities--someone needed gum remover for one of the seats; another had to report to the gate to assist a special group and so on.

Tuning into the 462.212 and 467.212 MHz frequency revealed that the 467.212 MHz frequency was repeated over the 462.212 MHz frequency; the Reds were using a low-power repeater. Gate guards and field security officers were seen with Motorola UHF radios. Transmissions involved gate activities and, guess what? There was someone there looking for gum remover, too! Apparently the local government and business frequencies were all serving the same purpose.

The other Reds' UHF business frequency (462.175/467.175) was, indeed, a repeater and it could be heard within Riverfront Stadium, but there was no traffic involving the Reds. I did hear a local building contracter. Maybe this frequency is used in the day-to-day routine operations of the Reds, but it is not used before, during or after any of their home games.

Finally, I checked out a couple of other frequencies that are used for low power (usually hand-held) radios. The frequencies were 154.570 and 154.600 MHz. The 154.600 MHz frequency was alive with maintenance activity--guess what--someone was looking for gum remover on this frequency, too! Although there was activity on 154.570 MHz, it did not appear to involve the Reds. It would well have been coming from one of the many buildings that are near Riverfront.

Listening in to the many frequencies was almost as good as having my own personal announcer. Believe me, those maintenance crews keep up on what plays are being made and who is up to bat!



While Reds player/manager Pete Rose warms up on the field many other Reds officials are working diligently in the stands with the fans. (Photo courtesy Norman H. Schrein)

by James R. Hay

Preparing for Expo '86

For those planning to go to Vancouver this year to see Expo '86, I thought it would be in order to provide a look at what might be heard by those of you packing a radio.

Since scanners are quite popular and now quite portable, we will start with the VHF frequencies which are active in the Vancouver area. VAI Vancouver Coast Guard Radio operates on the following frequencies:

MHz	Ch	
156.800	16	Calling
157.100	22A	Working/Non-Coast Guard
157.225	84	Public Correspondence
161.650	21B	Continuous Broadcast
161.900	26	Public Correspondence

Vancouver traffic is active on several frequencies; many of the following can be heard from Vancouver:

MHz	Ch	
156.300	6	Safety
156.550	11	Vessel Traffic Control
156.600	12	"
156.700	14	"
156.725	74	"
156.800	16	Calling

The New Westminster Railway Bridge can be heard on:

158.550 MHz	Ch.11	
156.600	12	
156.725	74	
156.800	16	Calling

The Queensboro Railway Bridge uses the following:

156.300 MHz	Ch.6	
156.725	74	
156.800	16	Calling

Vancouver Radio, operated by BC Tel., uses the following frequencies:

156.800 16	Calling
161.850 25	Public Correspondence

Both Vancouver Radio and Vancouver Coast Guard Radio offer public correspondence services; in addition, Vancouver Coast Guard Radio performs all of the duties of a Coast Guard Radio Station in providing Communications for the Coast Guard. Frequencies include:

156.075 MHz	Ch.61A
156.125	62A
156.200	4
156.850	17
156.950	19
157.050	21A
157.125	82A
157.175	83A

The frequencies usually assigned for pleasure craft can be expected to be busy; try 156.425, 156.475, 156.525, and 156.625 MHz (chs. 68, 69, 70, and 72). Channels 68 and 70 are also used by marinas and yacht clubs; channel 72 is used between boats.

The Pacific Pilotage Authority (VBP 21) has frequencies which are used for arranging for ships' pilots:

156.550 MHz	ch.11
156.600	12
156.725	74
156.800	16 Calling
156.850	17
156.875	77

While there are other channels which are in use, these are the major frequencies most likely to provide interesting listening. Any readers who go to Vancouver and find other channels are invited to send them along to me and I will share them with other readers.

On the medium and high frequencies there is Vancouver Coast Guard Radio (VAI) which provides high seas communications on the following frequencies (kHz):

SSB	CW
2182.0	414.0
2054.0	500.0
4385.3	4235.0
6518.8	6493.0
8737.5	8453.0
13119.4	12876.0
17254.6	17175.2
22654.9	

That's all until next month. As always your comments and suggestions are welcome. Please address your correspondence to: James R. Hay, 141 St. John's Blvd., Pointe Claire, P.Q., Canada H9S 4Z2. Good listening until next month. ●

NORM SCHREIN cont'd

Speaking of radio broadcasts, none of the TV or radio booths use any kind of STL (studio to transmitter link) or remote broadcast sites via radio to get the action back to the studios. All that is done by telephone lines. Even the cameramen have wired intercom head sets. Nothing will travel by radio there.

Finally one other interesting note. My son and I also took along a set of our 49 MHz VOX-operated radios for our own personal communications. We found other Reds' fans with the same idea and on the same frequencies.

The same thing I did can be done at any ballpark or any other facility you want to list to. It is always interesting to listen to what is happening in the background. Remember to do your homework first!

So the next time you are at a sporting event, or on a cruise ship or at an amusement park--do a little research first and take your scanner along! ●

Marconi Memorial Scroll of Honor

Reprinted with permission from the VWOA Yearbook 1977.

Radio Officer Bente Knudson

Bente Knudson was only 24 years old when she went down with her ship, the "Norse Variant," in a storm off Newport News on March 22, 1973.

There was only one survivor of that tragic sinking. Motorman Stein Gabrielsen was picked up from the sea by one of the U.S. Coast Guard's C-130 airplanes on the morning of March 25th.

During the official hearing after the loss of Norse Variant Mr. Gabrielsen told how the wireless operator, Bente Knudson, had remained on duty in the radio room all through the storm. She had not been present on the boatdeck when the crew made preparations to abandon ship.

The M/V Norse Variant was built in Sweden. She had a deadweight tonnage of 20,750 tons and an overall length of 541 feet. She normally carried a cargo of Volkswagon cars from Europe to the U.S.A. During her lifetime, the Norse Variant had crossed the atlantic 112 times in all seasons and in

MARCONI HONOR cont'd

all kinds of weather.

The Norse Variant left Norfolk, Virginia, with a cargo of coal on March 21. The next day she encountered a violent storm. That evening the ship radioed that she was skinking. Five minutes later a message was received that the crew had abandoned ship. Bente Knudson continued to send distress calls, and was not among the crew members who left on the life rafts.

The Marconi Memorial Scroll of Honor (was) presented posthumously to Bente Knudson's mother, Borgny Knudson of Sandefjord, Norway, through the Norwegian Consul General in New York. Radio Oficer Bente Knudson's name (was) inscribed on the Marconi Monument in Battery Park by the Veteran Wireless Operations Association in the spring.

Kari Bergelien

Kari Bergelien was a 27-year old radio officer aboard the Norwegian motorship "Anita," which went down in the same storm that sank the Norse Variant on March 22, 1973.

Miss Bergelien had dispatched a message to Radio Station Halifax indicating that the Anita had left Norfolk within an hour of the Norse Variant's departure. This radio message was the last confirmed word from the Anita.

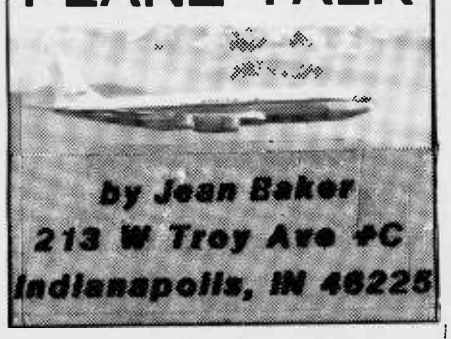
By a strange coincidence, the Anita was identical in length and cargo capacity to the Norse Variant, though it was owned by a different Norwegian shipping company. Also, like the Norse Variant, she was carrying a load of coal to Europe on her last voyage.

On March 26, two life rafts were found by the "USS Kittiwake," a Navy search vessel which had answered the Norse Variant's distress call. One of these life rafts was identified as belonging to the Anita. Subsequently, a radio station on Prince Edward Island reported to the Coast Guard that it had overheard the Anita trying to contact another station three times on March 22.

As no other evidence was ever found on the Anita's fate, it was determined on April 6 that the ship had gone down with all hands during the same storm that claimed the Norse Variant.

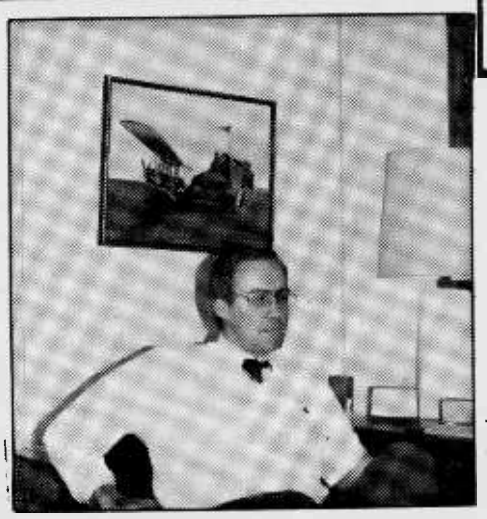
The Marconi Memorial Scroll of Honor (was) presented posthumously to Kari Bergelien's bather, Torstein Bergelien, through the Norwegian Consul General in New York.

PLANE TALK



by Jean Baker
213 W Troy Ave #C
Indianapolis, IN 46225

An inside look at controller training



Thomas Parks, Chief, Indianapolis International Airport Air Traffic Control Tower

Terminal Control Facility

PART I

We continue our series of articles on the modern Air Traffic Control system with a look at a "Terminal Control Facility," a collective term for the Air Traffic Control Tower, Approach Control, Departure Control, Clearance Delivery, Pre-taxi Clearance, and Ground Control facilities of medium-sized to very large airports.

Small to medium-sized airports vary in regard to terminal control facilities from none at all (non-controlled field) to an ATC tower with some of the positions manned that are mentioned above.

Thomas Parks, Manager of the Indianapolis Air Traffic Control Tower Terminal Control Facility at the Indianapolis International Airport, graciously answered questions that many of our readers had asked me in regard to terminology and other subjects related to air traffic control on the terminal control level. He provided me with the frequency list and charts that you see on these pages and permitted us to take photographs of the radar screens and other equipment.

While terminal control facilities vary in size and number of controllers employed who work the various positions involved with ATC on this level, the terminology and protocol used at one will be used at all of these facilities coast-to-coast. You can monitor approach or departure control frequencies in Minneapolis and hear the same terms utilized at Lambert Field in St. Louis, Los Angeles International, and so on.

ARTCC/ATC

PT: Mr. Parks, all of us who monitor aeronautical communications realize that the job demands for those who work at a terminal control facility are quite divergent from those of an enroute center controller. Can you elaborate on this for us in terms of just how different they are?

TP (Thomas Parks): Those of us who work in a Terminal Control Facility control airspace that is much closer to the surface than those who work in an enroute center do; also, we control a smaller amount of airspace. For instance, our airspace is within a 55-mile radius of this airport--from the ground up to 10,000 feet--compared to the air Route Traffic Control Centers which, as you know, can cover an area of several thousand square miles (from 10,000 feet up to the top of controlled airspace).

Also, our facilities include the Air Traffic Control Tower from where we are actually looking out of a window as we give aircraft clearance to land and take off which the controllers at the Centers cannot do. Terminal Control facilities do not normally work aircraft in intermediate or high-level altitudes, which the Centers do handle. So these are the essential differences.

PT: Do many controllers switch from the Centers to the Terminal Control Facilities, and vice-versa?

TP: No, not as a rule; there are a couple of reasons for this: Terminal Controllers normally start in small facilities and then work their way up to larger ones. But when a controller starts his or her career at an Air Route Traffic Control Center, a lot of them start at the highest level that there is--level three--the level of Indianapolis Center, by the way.

Levels of Terminal Control Facilities are based on traffic volume, and there are five levels altogether. Indianapolis is classified as a level four facility; so are Columbus and Dayton, Ohio. Chicago is classified as a level five; likewise Atlanta.

It's possible for a controller to start his career at an Enroute Center as a GS-7, complete his training program, and work there until he is qualified to become a GS-14.

To do the same thing in a Terminal Control Facility, you would have to start at an installation such as O'Hare--and that is quite unrealistic to even contemplate because, as I said previously, most controllers start their careers at a smaller facility. It's not impossible to change from

INDIANAPOLIS INTERNATIONAL AIRPORT COMMUNICATIONS FREQUENCIES

TRAFFIC CONTROL

119.3	Arrival East
121.1	Arrival West
124.65	Departure North
128.6	" (Rptr located at IND VOR serves I14-3SY-I01)
124.95	Departure East
135.45	" (Rptr located at Rushville, IN)
134.85	" (Rptr located at BAK)
119.25	" (Rptr located at 2IN2)
127.15	Departure South
124.15	" (Rptr located at BMG)
377.1	" (")
119.05	Departure West
317.8	UHF (all TRACON positions)

TOWER

128.75	Clearance delivery
121.9	Ground control
121.8	"
120.9	Tower
123.95	"
257.8	UHF tower & ground
125.35	ATIS

MISCELLANEOUS

122.95	UNICOM (Combs Gates & Indiana Beechcraft)

PLANE TALK cont'd

one option (Terminal Control or Center) and then switch to the other; it's just that they are two totally different environments.

MOVING UP

PT: At what stage--or just when during a controller's training--is it decided which way the Developmental (trainee) Controller will go--to a Center or to a Terminal Control Facility? Is it decided for them or do they get a choice?

TP: It used to be that a Developmental did have an option and could make a choice. However, now we use what is referred to as "common" or "generic" screening. What this means is that when a person is accepted for training at the Academy in Oklahoma City, they first go through nine weeks of what we call "common" training. At the end of those nine weeks, they go on into either an En-Route Center or to a Terminal Control Facility.

The determining factor as to which one of these is the grades that they have so far achieved; the developmentals with the highest grades go to the Centers because the training there is more difficult. Seventy-five percent of the class will be assigned to the Centers, and twenty-five percent will go to Terminal Control Facilities.

This does not mean that if a trainee gets low grades he is arbitrarily assigned to a T.C. Facility; in that case he will not be permitted to continue in the training program at all! It is the higher of the highest scores which determine who goes where.

PT: Can you give us some idea of the training that a Developmental goes through at a Terminal Control Facility such as this one?

TP: Certainly. Whether we get people from facilities which are smaller than ours or, less often, someone fresh from the Academy, they still have to undergo a certain amount of both classroom and on-the-job training. Let's take a developmental fresh from the Academy as an example.

Controllers in the tower

He or she will spend anywhere from three to six weeks in the classroom during which time they will learn about our control area including controller charts, airways, altitudes, minimum vectoring altitudes, and a lot of material specific to this area.

Once they have learned these things, they are ready to go on teams with experienced controllers and supervisors and start on-the-job training. A person who comes here from another facility may spend four to six months on OJT, while a developmental from the Academy will probably take up to 18 months to qualify on all of the positions.

PT: What specifically do the positions in a T.C. Facility consist of?

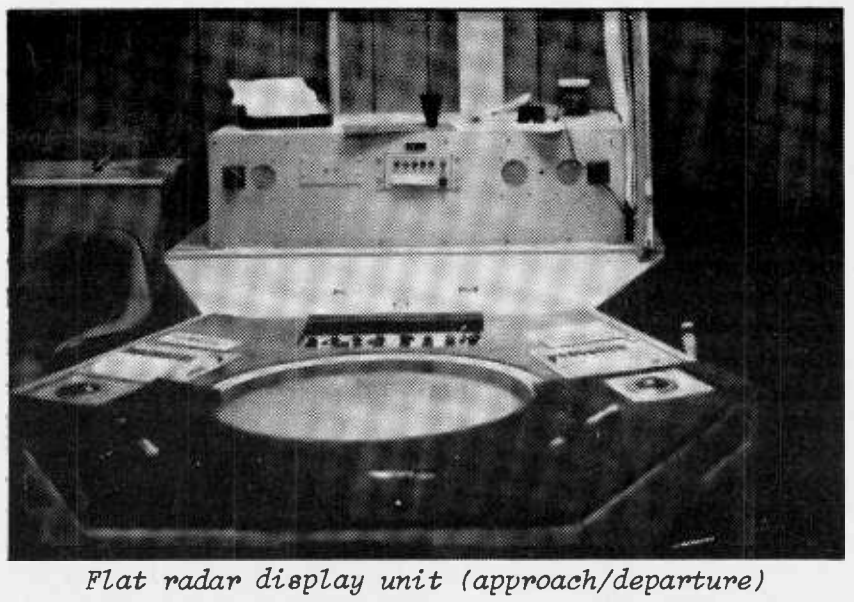
TP: This is what is referred to as a "combined facility," the control tower and radar rooms are close together; in a T.C. such as Log Angeles International, the tower is across the field from the radar control room. When a controller comes to the Indianapolis T.C., he must learn to work the positions in the radar room as well as those in the tower.

After he or she completes the orientation and training, they are normally started out in the tower working what is called Flight Data/Clearance Delivery. This is really an administrative position in that the person working it doesn't actually issue control instructions to pilots.

Working with flight data, the actual task is of taking the flight data strips, marking them, and making sure that the information on them is correct. Clearance delivery is reading clearances to pilots when they are requested and, in turn, having the pilots read the clearance back to you to insure that they are all correctly heard and understood.

After a controller has gone through these two positions and his teammates and supervisor have certified his ability to perform the duties involved, the next step is to Ground Control in the tower. A Ground Controller issues control instructions to all of the aircraft and vehicles on the surface of the airport.

The Ground Controller instructs pilots how to get from their gates to the taxiways, which ones to use to get to the runways, and vice versa. He also directs the drivers of the ground vehicles on and around the runway, taxiway areas, aprons, bays, and other areas. He controls all of the movements of everything on the surface.



Flat radar display unit (approach/departure)

When a controller has been successfully checked out on Ground Control, he will go on to Local Control in the tower. Although it sounds like these steps are performed one at a time, it really isn't the case. A controller is trained on two or three positions at once, starting out slowly and gradually increasing the pace as we think they're able to handle it.

Local Control is the job of actually telling the pilots that they are cleared to take off and land. In general, the Local Controller is also the person who makes the decisions pertaining to what you are going to do in the tower.

Within some of the larger facilities, you have more positions: O'Hare, for instance, works two local controllers--and sometimes even three! Depending on the size of the facility and, in some cases, the physical makeup of the tower itself since they are not all identical, there's a lot of room for variations.

RADAR

Now as far as the radar room positions go, remember that this is an approach and

PLANE TALK cont'd

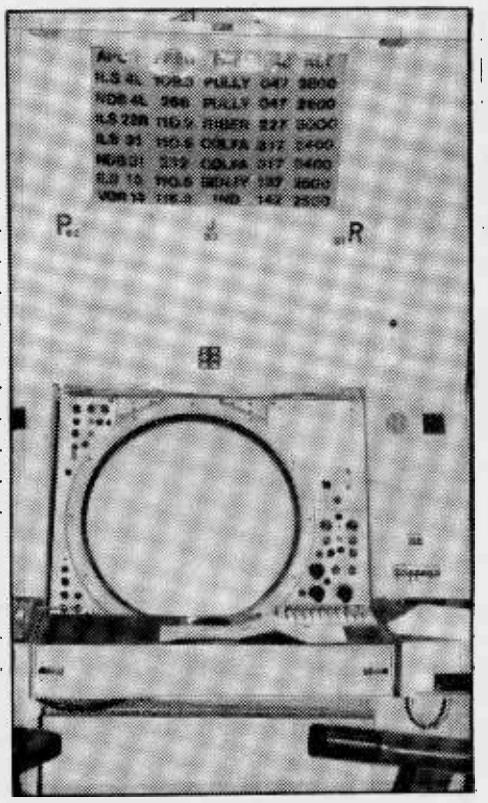
departure facility. We make hand-offs to the Center and accept hand-offs from them. Also, we work approach and departures from other airports in addition to those to and from Indianapolis International; these other area airports are known as satellite airports. In addition, we work over-traffic--that's traffic that is transitioning our control zone.

The Approach and Departure Controllers who work these positions do so from the radar room where they view the traffic as targets on the radar `scopes (see accompanying photos).

(PT's note: The actual duties of these controllers will be described in more detail in the second half of this feature.)

PT: How many controllers do you have on board here at this facility?

TP: We have 36 controller positions here and presently are are up to full manpower; however, this does vary. We move about 12 to 15 people through here a year; that's about average for a facility of this size. ●



Vertical radar screen with reporting points and frequencies posted above.

NEXT MONTH in Part II, Tom Parks will describe how approaches and departures are handled and will explain Terminal Control Facility terminology.

TVRO Glut
Boon to Satellite Listeners

It was inevitable. Congress allowed the monitoring of TV satellites by home viewers and droves of opportunists hopped on the TVRO bandwagon, beating the drum for consumer dish installations and fighting for a share of the market. Then it happened--scrambling!

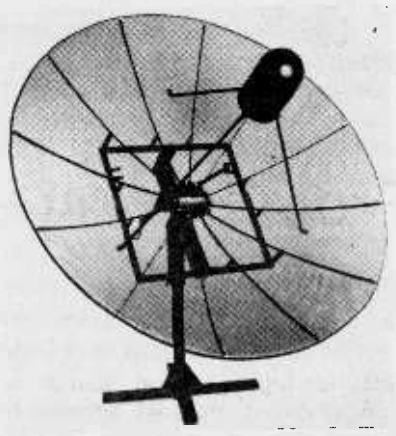
Prospective satellite customers have turned thumbs down on dish systems, fearing that expensive scramblers and exhorbitant monthly fees will prove an unrealistic burden on family recreational budgets when there is already plenty of free TV to be watched.

The result is panic in the TVRO marketplace. Dealers are dropping out like flies, dumping equipment below cost in many cases. Systems that would have cost thousands of dollars just two or three years ago are advertised at $400-$500.

For those of us interested in listening to untrod portions of the spectrum, the C-band satellite frequencies are alive with subscription services and leased channels. Private telephone systems, radio-teletype links, educational and conference networks, and many other users pervade the 3700-4200 MHz satellite band.

Many of these services are readily available to listeners now who already possess a satellite TV installation and either a general coverage short wave receiver or a scanner. The techniques have been mentioned in MT and are studied in detail in "The Hidden Signals on Satellite TV," available from Grove Enterprises and other MT advertisers.

A comprehensive study of communications satellites and their frequencies may be found in Larry Van Horn's "Communications Satellites," now in its expanded 1986 printing and available from Grove Enterprises.



SIGNALS FROM SPACE

by
Larry Van Horn
160 Lester Drive
Orange Park, FL 32073

Tracking the Birds by Computer

"We believe VR85 to be the best satellite tracking program available for any computer," said VR85 author Vic Ruebhausen, W6WNK.

Since I had recently purchased a Commodore 128 computer and was tired of manually tracking satellites, I decided to give VR85 a try. My first experience with AMSAT programs was an AMSAT W3IWI tracking program for the Timex Sinclair. The tracking program was great; the computer...oh, well.

After going to the 64 mode on the 128 a quick check of the disk directory shows that there are two tracking programs, VR85 and QUIKTRAK. The more interesting of the two is VR85. After loading the program into the computer, you should first load in your location information. It will save this data in the computer. Since the write protection notch is uncovered you should make a backup copy of the disk.

After QTH information has been recorded on the disk go to selection B on the main menu; this will let you see the 20 satellite selections available and you can update your Keplerian data for each satellite. Data that are required for a complete Keplerian entry include the following:

Satellite Name: up to 8 char
Data Source: I reference the NASA element set I'm using.
Orbit #:From the element set
Epoch year:From top line of the NASA prediction bulletins
Epoch Time: Same as above
Incl: Orbital inclination
RAAN: Right ascension of ascending node
ECC: Eccentricity
ARP: Argument of perigee
MA: Mean anomaly
MM: Mean motion
Drag: Reflected as a decimal ± number
Frequency: Primary beacon is what I use here.

After all entries have been completed the program will store the information to the disk for further use.

Once current Keplerian data has been entered, you can now select selection "A" for tracking a satellite. You will be given the menu of possible satellites (those you have entered Keplerian data for) and once selected, another menu will appear. You can select either tracking map or data only, and then are required to give a starting date and time.

The program will allow you to track the chosen satellite in the past, real time or setup for future orbits. You can also vary the amount of time between updates. Once the initial parameters have been entered and the system has calculated its data a color map of the world will appear on your screen. At the bottom will be a readout of pertinent tracking information such as time, orbit, azimuth, elevation, range, sub-satellite point-latitude and longitude.

On the screen will appear a bug marking the current position of the satellite you have selected based on the time and date displayed. The program has a handy trace feature that scribes the orbit on the map for added visual enhancement.

Since this is the main feature I enjoy with VR85, I find it very useful to track satellites using this method. If the satellite is out of range of my location, there is an out-of-range indication at the bottom of the screen. Since VR85 uses a lot of sound, you might want to keep your volume on the monitor turned up. When a satellite comes into or out of range, this is announced aurally as well as visually.

I have only begun to describe the interesting features in this powerful program for the Commodore computers. Vic Ruebhausen's VR85 satellite tracking program gets the Signals from Space four star rating. The many features, options, graphics and sound make use of the Commodore computer's finest attributes. The instruction manual is well written and covers just about any information the user needs to know.

The price of the program is $30.00 for non-AMSAT members and $25.00 for AMSAT members. The program is available from the AMSAT Software Exchange, P.O Box 27, Washington, D.C. 20044. They also have a complete list of all other satellite tracking programs available for other computers. Be sure to send them an SASE and

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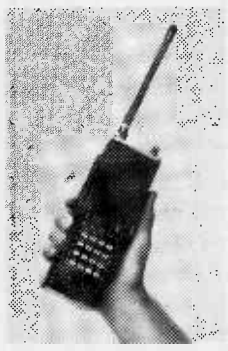

Regency's newest hand-held is the hottest scanner on the market! With 45 memory channels, wide frequency coverage (29-60 MHz FM, 118-136 MHz AM, 136-176 MHz FM, 406-420, and 440-520 MHz FM), rechargeable battery system, rapid search and scan (12 increments per second), selectable scan delay, direct channel access, high sensitivity (0.5 microvolts at VHF, 0.7 microvolts at UHF), sharp selectivity (± 7.5 kHz at -6dB), channel 1 priority, channel lockout, and keyboard lock.

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Dimensions: 7½"H x 2⅞"W x 1⅜"D; Weight: 2 lbs., 10 oz.

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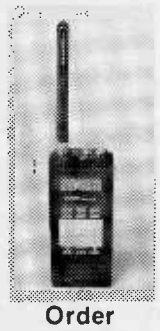

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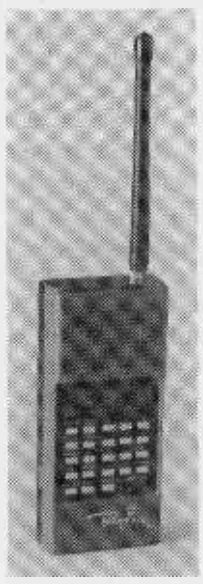
The Only Hand-held Programmable Scanner With the 800 MHz Band!



This compact powerhouse has 20 channels of memory and continuous frequency ranges of: 118.0-174.995, 406.0-525.9875, and 800.0-999.975 MHz, AM or FM. Selectivity is a sharp 15 kHz (-6 dB) on FM and VHF-FM sensitivity is 0.5 microvolts @ 12 dB SINAD. Two screw-in antennas, belt clip, leatherette case, rechargeable batteries, and plug-in wall unit included.

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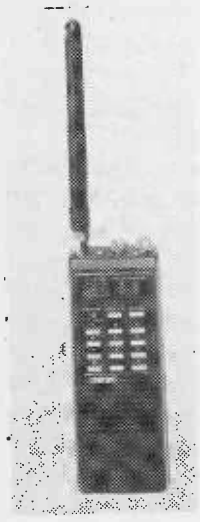
Additional features include three second delay, direct channel access, memory backup, keyboard lock, channel lockout, LCD channel display) frequency readout by pressing "REVIEW" button.



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SIGNALS FROM SPACE cont'd

tell them you heard about it in Signals from Space in MT.

MIR

As of this writing, the Soviets have finally put up their long anticipated permanent manned space station "Mir." The station was launched February 19 at 9:29 pm GMT. The vehicle carries a large round docking device on its nose with six docking ports to which modular station segments can be attached. Five of the six ports are available for use and the sixth holds the structure to the Mir.

The new station has two solar array wings mounted on the middle of the vehicle, unlike the previous Salyut design that used arrays on all three sides. The 50 foot long station has sleeping quarters for separate crews, work desk for up to six cosmonauts, and a kitchen.

On March 14, 1986, at 1233 UTC before a live audience worldwide, the Soviets sent 2 cosmonauts into space aboard Soyuz T-15 to dock with "Mir." Based on NASA tracking data that I had received before T-15's launch, the Mir appeared as though it would be in position to receive either an unmanned vehicle or a two-manned vehicle on space station Mir's 342 orbit.

Using the following formula, I was able to tell the exact launch time within 0.13 of a minute.

TØ(liftoff)=EQX Time(Mir) + 4(347.5 - EQX Longitude Mir)

TØ=1131.59 + 10.8 + 4(347.6 - 334.88)

TØ=1131.59 + 10.8 + 4(12.62)

TØ=1131.59 + 10.8 + 50.48

TØ=1232.87 UTC

Actual liftoff as published by TASS was 1233 UTC. The T-15 mission used the unmanned 48 hour launch to docking profile. During the pre-docking period no transmissions were noted from Soyuz T-15 from my station; however, John Biro's continuously running tape recorder did pick off some transmissions from the crew while they were in Soyuz during the daylight hours on 13 March.

The Soyuz T-15 crew consists of Leonid Kizim, commander, and Vladimir Solvev, flight engineer. These two Soviet space veterans hold the world's record for the longest duration space flight of 237 days in Salyut 7 in 1984. More than likely a crew of three cosmonauts consisting of Anatoly Filipchenko, Yuri Glazkov and Alexander Alexandrov will either relieve the T-15 crew or join them for operations aboard the Mir.

Veteran Soviet space watchers are carefully watching the orbit of the Salyut 7/Cosmos 1686 complex. As of this writing Salyut 7 is four miles above and in trail of the Mir/Soyuz T-15 complex and several opportunities exist for the two complexes to dock and make up the largest space complex ever.

MT readers should watch for Cosmos 1686's telemetry signal on 19.954 MHz to use it as a beacon. If the two station complexes dock, Cosmos 1686's HF signal could be used as a guide to watch for other Russian frequencies coming from the two space stations. The following is a list of frequencies (MHz) to watch for activity:

15.009 Telemetry
18.000 Telemetry
18.060 Voice
19.954 Cosmos 1686 TM's
20.008 Soyuz/Salyut TM's
121.750 Wideband FM voice
121.900 Telemetry reported
127.400 Telemetry reported
142.400 Voice channel
142.417 Salyut 7 voice chan
142.600 Voice channel
143.144 Voice channel
143.625 WBFM voice reported
143.825 Voice channel
166.000 Wideband telemetry
192.040 Telemetry channel
922.0-930.0 Telemetry

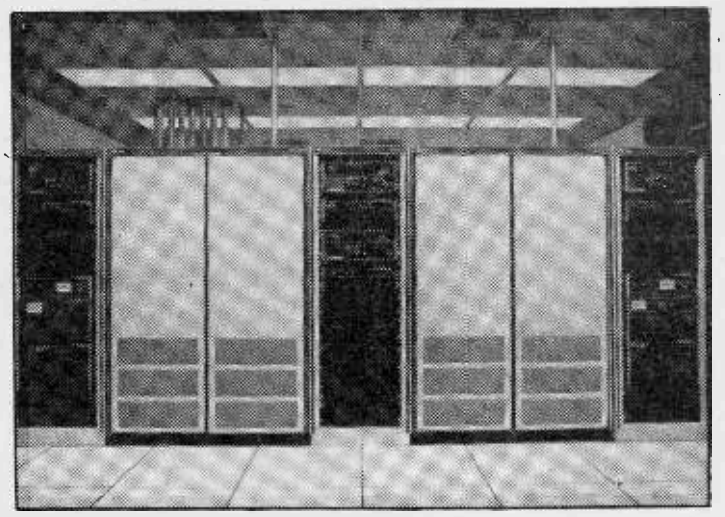
Monitors might want to check a 500 kHz range around the VHF/UHF frequencies for possible new frequencies that could be used. Be sure also to report your results to MT's Signals from Space.

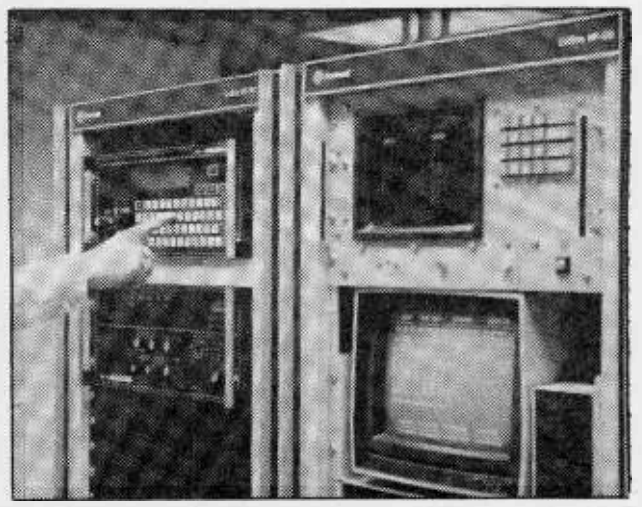
The Soviet space program will be in the spotlight for the next few months now that the Space Shuttle system is grounded. Listeners can expect an increase in the Russian's manned activity now that a new permanent space station has been launched.

● Want to get ahold of the Signals from Space editor fast? Well, there is a way. If you have a computer modem, you can have access via the Data*West computer bulletin board. You can leave me either a message on the general board or E-mail to User No. 15 at 904-772-0912. I will be more than happy to supply you with any information that I can. The board is up 24 hours a day, seven days a week.

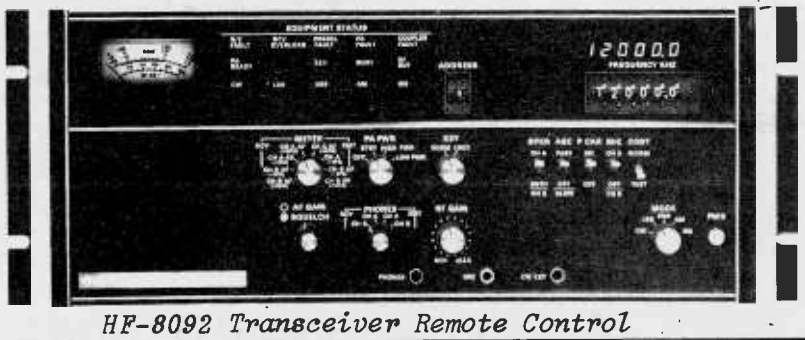
You can also catch me on the Elsinore BBS at 904-725-6175. Go to the Message Board section, subsection "S"-Stars and Planets. We occasionally have some very interesting discussions on both of these boards and if there is enough interest we could get our own subboard to get the latest information on launches, Keplerian elements, frequencies, etc. I hope to see you all on the bbs. 'Til next month, best of 73 and satellite listening to all.●

Hi-Tech Profile...





Collins HF-80 series HF radio equipment is front stage center in the Comm Central Equipment Room.



HF-8092 Transceiver Remote Control

Comm Central:
The Rockwell-Collins HF Network

For decades, the name Collins has been associated with perfection in radio communications systems. Early amateur radio equipment was compared with Collins as a standard. Military contracts were, and still are, awarded to Collins in enormous numbers.

The Collins Telecommunications Products Division in Cedar Rapids, Iowa, operates a wide range short

NEWS MEDIA "SPY" ON NASA COMMS

The news blackout now surrounding the recovery of debris from the Challenger tragedy has forced the major news media to rely on sophisticated electronic espionage.

The major TV networks have brought in special radio gear designed to snoop on NASA, Navy and Coast Guard communications related to the recovery activities off the Florida coast and an array of new antennas has appeared on the news trailers at the Cape.

NASA, in response, has begun encrypting their transmissions and has established a perimeter around the salvage site at sea. Vessels carrying news reporters have resorted to long-range optics, infra-red night-viewing cameras and other extraordinary means to gather information for release to the public.

NASA recovery vessels are bringing their salvage to port under cover of darkness to thwart news photographers and TV cameramen. A Navy spokesman said that while the Navy is aware that monitoring and rebroadcasting of intercepted messages was being done in clear violation of federal law, they weren't concerned because sensitive information was being encoded before transmission.

We would like to thank MT reader Michael Keit of Jackson Heights, New York, for sending us this interesting New York Times clipping.

HI-TECH PROFILE cont'd

wave radio network 24 hours a day, seven days a week. Trained operators at Comm Central man sophisticated consoles in support of commercial and government communications.

A full 2 to 30 MHz capability involves seven independent transmitter/receiver installations and a complex of 13 antennas which include log periodic dipole arrays and billboard arrays as well.

Computer control permits remote stations located at Newport Beach, California, and Richardson, Texas, to be operated from Cedar Rapids.

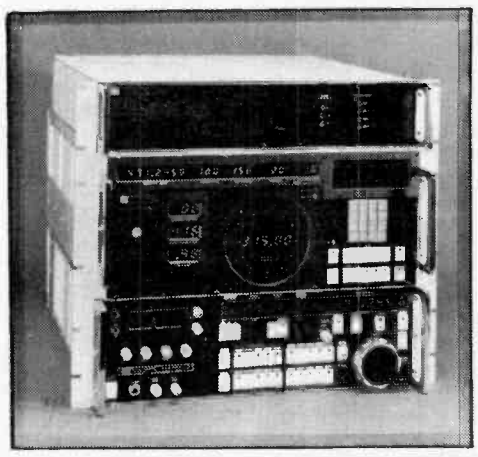
Comm Central operating console

LISTENING IN LUXURY

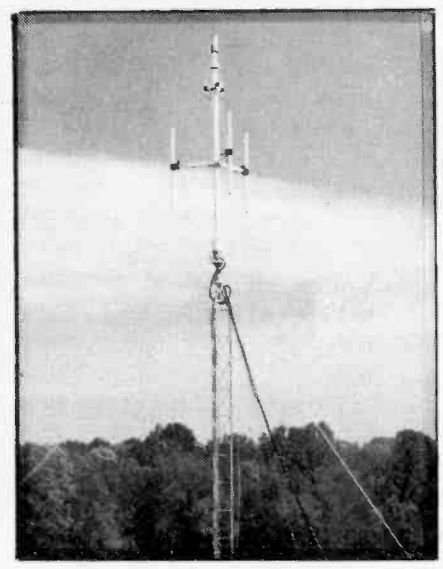
by Bob Grove

While names like Kenwood, Yaesu, Bearcat, Regency, ICOM, Sony, and Panasonic permeate the short wave and scanner scene, there is another world out there: professional monitoring.

Private investigators, surveillance and counter-surveillance personnel, military and federal agents, scientific laboratory researchers, and other inquisitors of the electromagnetic spectrum all utilize sophisticated receiving equipment.



The Watkins-Johnson model 8976 RDF receiver and resolver.



The interferometer antenna system.

One of the most widely reputed names in the industry is Watkins-Johnson, whose former CEI Division name tags are seen on a variety of surplus government and commercial equipment. CEI gear has been used by top secret agencies like the CIA and NSA, and by military commands as well.

Watkins-Johnson continues to pave the way with modern, solid-state, direction-finding surveillance equipment such as the WJ-8976 interferometer shown below. With a total frequency coverage expandable from 2 to 1100 MHz and an accuracy of one degree on bearings, the system is capable of receiving any mode of emission and can capture its direction in only one hundred-thousandth of a second.

If price is a consideration, you probably can't afford it. But to satisfy your curiosity, the system costs approximately $200,000!

BATTLEFIELD TRANSCEIVERS

What frequencies do the military use?

While most of us have at least some familiarity with the types of services covered by our scanners, the locations for military users is a mystery to many scanner listeners.

While federal agencies are assigned discrete frequencies in low band (30-50 MHz), high band (136-174 MHz) and UHF (406-512 MHz), the military are permitted to operate anywhere they want on a non-interference basis.

But a look at the frequencies provided on modern radio communications gear is a giveaway as to the most likely ranges to find military radio users. Keep in mind also that different regions of the world will utilize different band plans.

The radio equipment illustrated here, manufactured by Rockwell-Collins, is typical of modern voice battlefield transceivers. The smaller manpacks and vehicular radios are designed for short range tactical communications, while the AN/ARC-182 gives us the real picture due to its coverage of 30-88, 108-152, 156-174, and 225-400 MHz, AM or FM. It is the standard radio for the U.S Navy.

Vehicular Subsystems

Manpack

AN/ARC-182 Multi-Band, Multi-Mode Transceiver

FCC FIELD OFFICES

Need to contact your local Federal Communications Commission office? Have an interference complaint to register? The list below gives the telephone numbers of FCC offices nationwide.

FCC Field Offices

Anchorage, AK	(910)243-2153
San Diego, CA	(619)293-5478
Long Beach,CA	(213)426-7886
San Fran, CA	(415)556-7702
Denver, CO	(303)236-8026
Miami, FL	(305)350-5542
Tampa, FL	(813)228-2872
Atlanta, GA	(404)347-3084
Honolulu, HI	(808)677-3318
Chicago, IL	(312)353-0196
New Orleans,LA	(504)736-9420
Baltimore,MD	(301)962-2728
Boston, MA	(617)223-6609
Detroit, MI	(313)226-6078
St. Paul, MN	(612)725-7810
Kansas City,MO	(816)926-5111
Grand Is., NB	(308)382-4296
Buffalo, NY	(716)856-5950
New York, NY	(212)620-3437
Portland, OR	(503)221-4114
Phila., PA	(215)752-1324
San Juan, PR	(809)753-4567
Dallas, TX	(214)767-5690
Houston, TX	(713)229-2748
Norfolk, VA	(804)441-6472
Seattle, WA	(206)764-3324

FCC Monitoring Stations

Douglas, AZ	(602)364-8414
Livermore, CA	(415)447-3614
Ft.Lauder.,FL	(305)473-9845
Powder Spgs,GA	(404)943-5420
Belfast, ME	(207)336-4055
Laurel, MD	(301)725-3474
Allegan, MI	(616)673-3055
Grand Is., NB	(308)382-4296
Sabana Seca,PR	(809)784-3772
Kingsville, TX	(512)592-2531
Ferndale, WA	(206)354-4892

Nature's Super-Accurate Cosmic Clock

Scientists have discovered a radio signal coming from the constellation Aquila (the Eagle) in our own Milky Way Constellation that can be used as a cosmic clock. Additionally, the source of the radio waves, a pulsar, can be used as a beacon for detecting gravity waves which may still linger from the birth of the universe billions of years ago.

The pulsar--a pulsating star some 1500 light years distant--has a mass greater than that of our own sun packed into a sphere only ten miles across, and spins on its axis 186 times per second!

BEHIND THE DIALS

Japan Radio NRD-525 General Coverage Receiver

Adapted and excerpted by Larry Magne from RADIO DATABASE INTERNATIONAL White Paper

OVERALL SWL/DX PERFORMANCE: *****

RATINGS OF OVERALL SWL/DX PERFORMANCE

*****	Outstanding, with rare qualities
****	Excellent
***	Very Good
**	Good
*	Fairly Good

PRICES & OPTIONS
(as of 3/86)

Item	List Price, US
Basic NRD-515 receiver	$1,059*
NRD-515 w/optional keypad & memory	$1,469**
NVA-515 speaker	$45
JRC 0.3/0.6/1.8 kHz bandwidth filters	$70 each
NRD-525 w/keypad & memory as standard	$1,095***
NVA-88 outboard speaker	$49
CMH-532 RS-232C computer interface	$99
CMH-530 RTTY demodulator	$139
CMK-165 VHF/UHF converter	$359
JRC 0.3/0.5/1.0 kHz bandwidth filters	$120 each

*In US, sells for $899+
**In US, sells for $1,299+
***In US, scheduled to sell for $995

Japan Radio's stock-in-trade has always been to production of receivers that are tough as tanks, but constructed internally like Swiss watches. So the initial impression of the '525, which is supposed to sell for around $995 in the US, comes as a bit of a surprise. From a distance, it looks more like a Yaesu '8800 than a Japan Radio product. Up close, we find that the front panel is plastic--not cast aluminum as it is on the '515. And some of the chassis metal is pretty thin stuff.

But once you lay hands on the '525, doubts that Japan Radio has "gone the way of all flesh" vanishes. Warts, plastic panel and all...this is one heck of a set. Its controls are almost entirely digitalized and are very flexible. Even an excellent tunable notch filter is included to reject nearby heterodyne interference. And the circuit boards plug - computer style - into a motherboard...an exotic feature usually not found on sets costing less than several thousand dollars.

In these and other respects, the Japan Radio NRD-525 in many ways combines the best performance attributes of a number of other Japan Radio products, such as the NRD-93 professional receiver; the NRD-515 and NRD-515 semi-professional receivers; and various accessories, notably the NDH-93 scanner. To accomplish all this without raising the price beyond the reach of the public, economies were taken in areas--such as that front panel--largely of interest to professional users.

The '525 has many more "bells and whistles" than does the basic '515. With so much operating power placed in the hands of the user, the '525 challenges the operator to tweak the last erg of performance out of the receiver. This is one of the chief differences between the '525 and most professional and semi-professional models, which are designed to be used at utilitarian tools by users who tend to regard operation as a chore, rather than the joy it can be.

In order to provide the user with this degree of operating flexibility, Japan Radio did not take the usual expedient route and clutter up the '525's front panel with miniscule controls. Instead, by eliminating the large MHz knob found on the '515 (tuning MHz is now accomplished, more or less as conveniently, via the keypad), Japan Radio's designers freed up valuable front panel space for many of the '525's new functions.

Creative engineering and design have allowed the '525's roster of controls to perform comfortably and logically; for example, double-function knobs--never really a virtue--are present, but have been well thought out and are quite acceptable, especially when the alternatives are considered.

Many of the '525's functions, including the 12/24-hour clock and digital signal-strength indicator, are read out via a fluorescent display, complemented by light-emitting diodes (LED's)--all of which may be dimmed in steps. The '525 tunes and displays frequencies to the nearest 10 Hz, although the operator can elect to alter the display to read out to the nearest 100 Hz.

To give an idea of just how much Japan Radio engineers have accomplished with the '525, consider that its scanning function performs similarly to that of the NDH-93 scanner we reported on in the 1985-6 RADIO DATABASE INTERNATIONAL (Part I, p.240). That scanner, an accessory for the $5,900 NRD-93 professional receiver, costs $870. The entire NRD-525--scanner and all--costs $995. It's almost like buying the scanner and getting the radio for free! And the '525's dynamic range is better than that of the '93, too.

That scanner is something else. It's the first one we've seen on a non-professional receiver that is other than a marketing gimmick or toy. Among other things, you can program it to give you "hands off" around-the-clock reception of such stations as the BBC World Service.

The '525 is potentially well-suited to light-duty surveillance applications, not to mention whatever computer-controlled applications shortwave listening "hackers" may devise. Indeed, the '525 opens up the possibility of ordinary computer-wise citizens

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CR-64: High Stability Oscillator $56.00
EX-257: FM Unit. FM mode used only 29.5 to 30 MHz by amateurs. Some police. $38.00
EX309: Computer Interface Connector $37.00
EX310: Voice Synthesizer $41.25
FL32A: CW Narrow Filter (500 Hz) $59.50
FL44A: 8 Pole Crystal Filter (2.4 KHz) $159.00
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MEC-Commodore computer control interface System. 705 Memories Auto Log. See our MEC Ads or call for more details.
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7. Spike protection added, no need to spend $30.00 for a wall plug-in spike protector. It's installed right inside where it is most effective ..... COST $25.00
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9. Installation of ICOM options purchased with your NEW R71A ..... COST N/C

TOTAL COST OF THESE OPTIONS IS $315.00
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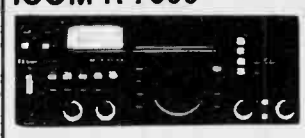
- Plus there's much more, including a 24-hour clock, multiplexed output, LCD readout, signal strength graph, and an AC power adapter.

ICOM R-7000



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Watch for ICOM full page Ads for more details.
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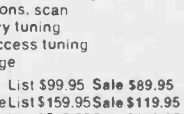

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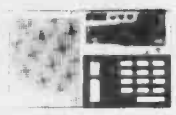

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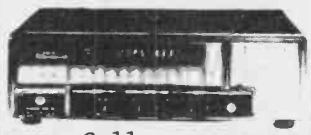

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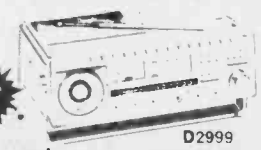

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THE MOST POPULAR RECEIVERS

A year ago, MT conducted a poll of our readership which included questions about their listening equipment. More recently we collected data from several club bulletins listing their contributors' receivers. All sources reported virtually identical results.

The ICOM R-70 and R-71A, Kenwood R2000 and R1000, and Uniden CR2021 Radio Shack DX400, in that order, were far in the lead. Next came the Yaesu FRG-7700, FRG-7 and Kenwood R-600, followed by the JRC NRD515 and Radio Shack DX302. Receivers by Panasonic, Sony and Drake were further down the line followed by the venerable old carcasses from Hallicrafters, Hammarlund and the surplus R390 and R388 (51J3/J4).

If any clear messages can be deciphered from these data it could be that serious listeners are looking for the best quality at each price level, and that the days of hallowed tube-type receivers are numbered.

BEHIND THE DIALS cont'd

becoming miniature National Security Agencies, using homebrew artificial intelligence software, PC's, and '525's to poke about the radio spectrum for all manner of juicy information.

Performance analysis gleaned from "hands-on" and laboratory reports at RADIO DATABASE INTERNATIONAL take up nearly half the "RDI White Paper" report on the '525. Given the receiver's price tag and diverse capabilities, this depth of analysis is necessary in considering an investment of this magnitude. However, we can translate a number of these points into an overview as to how they relate to the major categories of potential '525 users.

First, for "serious" DXing within the longwave, mediumwave AM or international shortwave broadcasting bands, the '525 performs well by any measure, but is generally not equal to the level of performance of the Drake R-7/R-7A/R4245, the Japan Radio NRD-515, or the ICOM IC-R71.

But for most other non-professional applications--shortwave broadcast listening, tropical bands DXing, "utility" DXing--the '525 runs off with the honors. Japan Radio has taken the features shortwave listeners have always sought, plus those aspects--and only those aspects--of professional receiver design of genuine relevance to the needs of the SWL, and packaged the lot into what is unquestionably the best overall shortwave listener's receiver on the market today.

The '525 thus exemplifies, once again, that Japan Radio receivers are for the connoisseur. ●

NRD 525 SPECIFICATIONS

Receiving frequency range: .09-34 MHz
Options: 43-60, 114-174, 423-456 MHz
Receiving modes: RTTY,CW,SSB (USB,LSB), AM, FM, FAX
Memory: 200 channels
Receiving System: Double superheterodyne
First IF: 70.453 MHz
2nd IF: 455 kHz
Sensitivity in microvolts/meter:

Band (MHz)	RTTY-FAX-CW-SSB	AM	FM
0.09-1.6	5.0	15.	--
1.6-34	0.5	2.0	0.7
VHF/UHF options	1.0	3.0	1.5

S/N: 10dB @100 mW
Bandwidth Intermodulation: 400 Hz, 30% AM mode
NQL: 20dB (FM mode)

Selectivity:

Bandwidth	6dB	60dB
Aux.	12 or 240 kHz (option)	
Wide	4 kHz	10 kHz
Inter.	2 kHz	6 kHz
Narrow	1 kHz	3 kHz (option)
(FM)	12 kHz	---

Image and IF rejection rate: 70 dB or more
Frequency stability: ± 3 ppm
Dynamic range: 100dB or more (500 Hz BW)
PBS variation: ±2 kHz or more
Notch Attenuation: -30 dB or more
BFO variation: ±2 kHz or more
Antenna Impedance: 50 or 600 ohms
AF Outputs (10% distortion):
Speaker: 0.5W or more (4 ohms load)
Line: 1 mW or more (600 ohm load)
Antenna input:
HF approx. 20 dB
VHF/UHF approx. 10 dB
AGC: Less than 10dB AF output variation for 20 to 100dB antenna input
Power requirement:
AC 100/120/220/240 V
DC 12-16 V
Function features: Noise blanker, S-meter, Side tone input, Mute input, TX monitor, Squelch, Dimmer, Tone control, RF Gain, Clock, Timer, Scanning receive, Sweeping receive.
Dimensions: 13"W x 5"H x 11"D
Accessories: Instruction manual, AC and DC cables
Options:
Converter CHE-85
CGA-118
RTTY Demodulator CMH-532
RSC-232 Interface
Headphone ST-3
External Speaker NVA-88
Filter YF455DE 1 kHz
YF455FM 240 kHz
Connector pkg 62XJD00018

CLUB CORNER

Paul Swearingen
P.O. Box 4812
Panorama City, CA 91412

Two premier DX'ers whose work in both radio clubs and broadcasting is well-known will be the subject of a special program hosted by ABC Talkradio's Ray Briem Saturday morning, August 2. Arthur Cushen and Ian MacFarland will chat with Ray about their long careers in radio-related pursuits. The Ray Briem show starts at 12:05 am PST and actually runs until 5 am, although some stations cut away before the end. Check with your local Talkradio affiliate for the exact time.

CLUB GATHERINGS

The **AUSTIN (TX) AREA RADIO LISTENERS** meet every 2nd Tuesday at 6:45 pm in the Public Library (4th Floor, Room B) (RCMA)

The **MINNESOTA DX CLUB** meets the second Friday evening of each month at 8 pm at the Hennepin County Government Center, 300 South Sixth St., Minneapolis, MN (Dave Browne, ANARC).

ROCKY MOUNTAIN RADIO LISTENERS gather May 17 in Westminster, CO, 1 pm, at 3031 W. 76th Ave., and June 15, 1:00 pm, at 14949 E. Alameda Dr. in Aurora (Wayne Heinen, RMRL).

SASE's to the following individuals will get you information about their club's meetings: **RCMA-Chicago**, Edward Robert Sirovy, 311 S. Williams St., Westmont, IL 60559 (tentative meeting date - June 7); **Washington Area DX Association**, Arlene Luskin, 606 Forest Glen Road, Silver Spring, MD 20901 (Dave Browne, ANARC); **RCMA for DC, MD, VA, and DE - Capitol Hill Monitors** - Alan Henney, 6912 Prince Georges Ave., Takoma Park, MD 20912; **RCMA-Minneapolis/St. Paul** - Chuck Steier, 4820 Hwy 7, Minneapolis, MN 55416; **RCMA Wisconsin** - Scott W. Miller, 122 Greenbriar Drive, Sun Prairie, WI 53590.

The **ASWLC** will hold two meetings in May, on the 3rd and 31st, at 16182 Ballad Lane in Orange County, CA, at 10 am. Visitors are always welcome.

SCADS will meet May 10 at Golden West College in Huntington Beach, CA, from 10 am to 4 pm.

The upper midwest's largest swapfest and exposition for amateur radio operators on Saturday and Sunday June 7 and 8 will be sponsored by the **NORTH AREA REPEATER ASSOCIATION.** Held at the Minnesota State Fairgrounds in St. Paul, MN, the event will attract both commercial and private dealers. Free overnight parking for self-contained campers is offered June 6 and 7. Admission is $4 in advance, $5 at the gate. For more information, dealer inquiries, and ticket orders, write Amateur Fair, P.O. Box 857, Hopkins, MN 55343 or call (612)566-4000.

The **ANARC** convention will run July 18-20 in Montreal, Quebec, this year, hosted by Ian MacFarland and Radio Canada International. Specific details aren't available as I write his, but by publication time you should be able to read more about it in the bulletin of any ANARC-affiliated club.

Although no date has been set, the 1986 **WTFDA** convention will take place (again) in Jamestown, NY. For more details, send an SASE to host Dr. Michael Lapinski at RD #2, 2478 Palm Road, Jamestown, NY 14701.

Veteran radio club host Ted Fleischaker will take on IRCA members sometime this summer in West Palm Beach, FL. Most recent conventions have been in August.

NRC members will meet Aug.29-Sept.1 in New Castle, DE; an SASE to Dave Schmidt will bring you details - Box 11502, Wilmington, DE 19850.

If you don't see YOUR favorite club's gathering listed above, it's because I didn't find out about it in time! Send meeting notices to me at least two months ahead of the publication date.

HAP'S FINAL DEMISE

A letter from John Kapinos (86 S. Quinsigamond Ave., Shrewsbury, MA 01545) to "The Mailbag" in ADXR's DX REPORTER tells about the end of HAP-USA, and I'll

CLUB CORNER cont'd

quote it verbatim:

"Thought you might like to know that my `save HAP-USA´ campaign went down the tubes. Just not enough serious volunteers out there to help out.

"So, HAP-USA is officially dead. Since there was about $2000 in the treasury and I did not want the Commonwealth of Massachusetts to decide what to do with it, I made the decision to donate the whole ball of wax to the Handi-Hams Courage Center up in Minnesota. They´ve more or less agreed to spread the gospel about SWL´ing along with their ham-related programs.

"I guess the straw that broke the camel´s back as far as I was concerned was finally receiving the material that the previous `director´ of HAP-USA had in his possession: a `busted´ tape duplicator that would have cost about $300 to fix, a bunch of junk, a worthless membership file (a 3-year old computer readout), and unanswered (and in most cases unopened) mail to HAP-USA going back to early 1984.

"For the information of ADXR members the QTH of the Handi-Hams Program is: Courage Handi-Ham System, 3915 Golden Valley Road, Golden Valley, MN 55422."

We´re always sorry to hear of the demise of any club. Thanks for your efforts in keeping it together as long as you did, John.

Let´s follow John to his column in another club´s bulletin, NASWA´s FRENDX. John writes about a German DX Club´s awards program which he says complements NASWA´s program. Two IRC´s to Andreas Schmid, **ADDX** Awards Manager, Rabthaler 13B, 8731 Ramstahl, West Germany, will get you info about ADDX´s program, and an SASE to John at the address in the previous paragraph will fill you in on NASWA´s program.

Another club whose awards are made to non-members is the **INTERNATIONAL SHORT WAVE LEAGUE**. Clifford A. Tooke, 6 Chelmer Avenue, Rayleigh, Essex, SS6 7TB, England, will send you information for two IRC´s.

In an earlier column, I mentioned the **PACIFIC NORTHWEST, BRITISH COLUMBIA DX CLUB**, and founder Phil Bytheway was kind enough to send me information about it. In addition to hosting occasional meetings, the club publishes a bi-monthly bulletin. The price to join the club is right: as many SASE´s as you want to receive it, or $2.50 for six issues. Send your SASE´s to Phil at 9705 Mary North West, Seattle, WA 98117.

WE LIKE...

Richard E. Berg-Andersson´s efforts to bring the dangers of the "Electric Communications Privacy Act of 1985" (S.1667/H.R. 3379) to the forefront of the consciousness of radio club members by sending letters to many radio club bulletins. Others (notably ANARC Executive Secretary Terry Colgan, MT publisher Bob Grove, and Popular Communications editor Tom Kneitel) also have taken an active role in lobbying against this proposed legislation, but Richard was apparently the first and most active in taking the time and effort to send his letters to many radio club bulletins.

I mentioned last issue that my check was "in the mail" (on the same day that I wrote the column) to join the **WORLD DX CLUB**. So of course my first issue of "Contact" arrived on the same day that I wrote this column...and I wish I´d joined earlier. Send for a sample copy by forwarding three IRC´s (or for an entire year of issues airmailed for $14, surface mail/slow boat $9) to Richard A. D´Angelo, 2216 Burkey Drive, Wyomissing, PA 19610. You won´t regret it.

And that´s about it for this issue. We´ll be back next month with news of other international DX clubs. 73. ●

ANARCON '86

Montreal, Canada, July 18-20, 1986 at the Holiday Inn, Place Dupuis, East Montreal (reservations $65 Canadian, single or double). Registration:3 days, $20;1 day, $10.

Wine and cheese reception, cocktail party, awards banquet.

PROGRAM

Friday, July 18

0830	Registration open
1000-1700	Continuous SW & Comm. films
1100-1730	Equipment & club displays
1130&1530	Radio monitoring seminars
1300-1430	ANARC Executive Council Meeting
1300-1430	Recording of RCI Mailbag Program
1500-1800	Bus tour of Montreal
1900-2130	Wine & cheese reception

Saturday, July 19

0830-1430	Registration open
0900-1700	Equipment & club displays
0900-1045	Frequency management seminar
0930-1700	Continuous films
1115-1215	Seminar on SW jamming & Woodpecker
1330-1430	Radio monitoring seminar
1315-1415	WARC 84/87 seminar
1415-1515	ITU Region II MW Conference seminar
1530-1700	Recording Listeners´ Digest Forum
1800-1900	Cocktail party
1900	ANARC awards banquest with Arthur Cushen

(Please note: Concurrent seminars on Saturday afternoon)

Sunday, July 20

1000-1100	Jonathan Marks of Radio Netherlands
1100-1200	World Radio-TV Handbook Quiz with Andy Sennitt
1300-1500	International Broadcasters´Forum
1500	Official closing of the convention
1900	Montreal Harbour sunset cruise

FOR FURTHER INFORMATION, write: Anarcon ´86, Radio Canada International, P.O. Box 6000, Montreal, Canada, H3C 3A8.

MONITORING TIMES WILL BE RUNNING AN EXCLUSIVE TWO-PAGE PHOTOPLAY ON ANARCON ´86 IN THE AUGUST ISSUE. DON´T MISS IT!

BIRMINGHAMFEST ´86

May 17 and 18, 1986, at the Brimingham-Jefferson Civic Center. Doors open 9am.

Flea market, display booths, forums, contests, license exams (Saturday 8 am), activities for ladies and non-hams. Talk-in: 146.28/88.

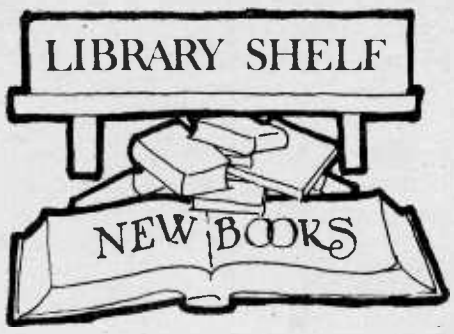
For more information: Hamfest Chairman: Roy Johnson NQ4D (O) 205/321-4863, (H) 205/681-0855; Commercial tables: Jim Cannon WA4PIZ (O) 205/325-5181, (H) 205/956-1576.

KNOXVILLE HAMFEST AND COMPUTERFAIR

May 25th from 8:30 till 5 and Sunday May 26th from 9 till 3 pm at the Kerbela Shrine Temple, 215 Mimosa Avenue near downtown Knoxville. Admission $3.50.

Special ladies´ activities, outdoor flea market, indoor dealer displays, forums, QSL contest, ham tests given, and more! Talk-in on 147.90/30.

For general information and preregistration, send an SASE to Krikor Joradian KB4FCU, P.O. Box 1332, Knoxville, TN 37901. For dealer information contact Rich Slover ND4F, 2700 Waverly St. #4, Knoxville, TN 37921.



COMMUNICATIONS SATELLITES by Larry Van Horn, Second Edition (255 pages, 8-1/2" x 11", paperbound; $14.95 plus $1.50 shipping from Grove Enterprises, P.O. Box 98, Brasstown, NC 28902)

The first edition of Larry Van Horn's COMMUNICATIONS SATELLITES proved to be the fastest seller in our history. Fully sold out in less than a year, it has now been totally updated with 40 additional pages of important new information!

The frequency cross-reference section has been entirely rewritten and expanded enormously, now including NASA, Air Force, Navy and other ground support networks.

Chapters cover spy and surveillance satellites, U.S. and Russian manned space missions, military tactical and scientific satellites, oceanographic and weather satellites, navigational and communications satellites, private and direct broadcast satellites, and a new section on monitoring tips and techniques.

AERO/MARINE BEACON GUIDE by Ken Stryker (83 pages, 8-1/2" x 11", drilled for looseleaf binder; $10 U.S., $15 foreign, postpaid from the author; Ken Stryker, 6350 North Hoyne Avenue, Dept. MT, Chicago, IL 60659)

For years, Ken Stryker's BEACON GUIDE has served as THE reference for listening below the standard broadcast band. Since the 10-540 kHz portion of the spectrum is loaded with automatic navigational beacons (over 6100 are listed in this new edition), that is the service concentrated on in this publication.

Regions listed include North and South America including the Caribbean, Asia including the USSR, and the Pacific. City, airport, geographical coordinates, power, mode of operation, and controlling agencies are listed as well.

A separate and up-to-date list of 160-190 kHz "amateur" beacons and locations is provided. All listings in the book are cross-referenced by frequency and identification.

RADIO STATION TREASURY, 1900-1946 by Tom Kneitel (175 pages, 8-1/2" x 11", paperbound; $12.95 plus$1 postage from CRB Research, P.O. Box 56, Dept MT, Commack, NY 11725)

Tom Kneitel's name is well known among listening hobbyists as editor of Popular Communications magazine. He is also a radio historian whose articles frequently appear in that magazine.

Essentially a reprint of magazine and newspaper listings of early American and foreign medium-wave broadcasting stations, some interesting QSL's and ads for radios and accessories are also reproduced.

An introductory commentary by the author provides interesting insight into the development of radio and the issuance of call signs.

TREASURY develops primarily as a chronology, starting with the first transmissions from ocean-going vessels at the turn of the century to the introduction of FM broadcasting.

Archivists and antique wireless collectors will find Kneitel's book a cogent collection of nostalgic memoirs. It is easy to read with good typeset paper stock and perfect (stitched) binding.

HAM-PAC 4 (Commodore 64 programs on disk) by Glen E. Gardner, Jr. (One 5-14" disk; $12.50 from the author, Glen E. Gardner, Jr., P.O. Box 387 Dept MT, Chillicothe, OH 45601)

The Commodore 64 enjoys the reputation as the leading home computer with incredible amounts of software available. Costs of programs have come down considerably and Gardner's interesting programs are an example.

Seven separate programs are resident in the disk--some quite good, others of questionable use. Let's take a quick look at the package and you can decide what fits your needs.

MORSE 64: A flexible, user-programmable Morse practice program offers challenge with random characters in groups. Speed, weight and dot-dash spacing can be adjusted to your liking.

MORSE TEACHER:A v-e-r-y v-e-r-y slow Morse learning exercise for the beginner.

HAM 64: Approximately 90 blocks of memory are used for 28 different simple electronic design programs for the home experimenter. Includes antennas and feed lines, amplifiers, R/C and L/C calculations, Ohm's law and power equations, transistor biasing networks, and more.

DRAW BABY 1: Your joystick lets you control a slow, low resolution, broad sprite in vertical and horizontal movement only. Not so good.

DRAW BABY 2: High resolution graphics program permits control in a variety of angles along with adjustment of background and foreground colors. Better.

LOG-64: Ham logging program permits 720 file entries per data disk. Fields include call sign, time in/out, frequency, location, power, name, etc. An SWL version is also available on special order.

SNAIL COPY: Requires two hours to nibble and copy another disk in seven passes.

Anything in there you can use? The price is right.

BROADCASTING. . .

Reflections on Radio

by Hank Bennett

Me? A Bootlegger???

PART I

HOW IT ALL STARTED

I'm sure that anyone who has been following any of my columns in the radio clubs for whom I have written will recall my views on pirate stations. To put it in a nutshell for those of you who have not had the misfortune to suffer the agony of knowing those views, simply put, I have never favored the operation of any pirate station regardless of where it was located.

In any of the columns that I have written I have refrained from giving any publicity to any pirate or bootlegger located anywhere within the jurisdiction of the Federal Communications Commission. At the same time I would, on occasion, publicize pirate stations operating in foreign countries since they were not under United States jurisdiction and, in some cases, they just might make for a good DX catch if one were able to hear them and be able to pry a QSL card out of them.

Let me make it clear here, though, that this policy has not been directed to any other editor or publication that desires to publicize pirates. We have our own pirate editor in Monitoring Times and his column is among the first that I read when I receive my copy each month. These views are strictly my own and do not necessarily reflect the opinion of Monitoring Times or any editor therein.

Nevertheless, one little-known fact of my early life in radio was that I, too, at one time was a pirate, of sorts...

This goes all the way back to my days in Junior High School; back to the days of tuned RF receivers and some transmitters having little better than spark gap tones. It goes back to the days of the old well-known (at the time) radio hobbyists magazine which had a cover name of:

R X
A E
D
N I
I O

This was one of the finest magazines available for the broadcast-, shortwave-, and ham-band listener and it had a social column and a column for *mail* from the readers, among others.

It was a newsstand magazine but one could subscribe by mail. No one ever bothered to call it by its proper name. It became, by common usage, simply RADEX, the name to which it is

☞

THE HIDDEN SIGNALS ON SATELLITE TV: Second Edition by Thomas P. Harrington and Bob Cooper, Jr. (234 pages, 8-1/2" x 11", paperbound; $19.95 plus $1.50 shipping from Grove Enterprises, P.O. Box 98 Dept MT, Brasstown, NC 28902)

An instant best seller, the first edition of HIDDEN SIGNALS has become the world's most authoritative and quoted workbook dealing with TV satellite subcarrier services. The second edition is now out, updating and expanding the first edition considerably.

Major categories and headings include understanding satellite signals, locating the hidden signals, users of the subcarrier services, equipment and antennas required for reception, frequencies and bandplans.

☞

ICOM HF Receiver IC-R71A

The World Class World Receiver

ICOM introduces the IC-R71A 100KHz to 30MHz superior-grade general coverage HF receiver with innovative features including keyboard frequency entry and wireless remote control (optional).

This easy-to-use and versatile receiver is ideal for anyone wanting to listen in to worldwide communications. With 32 programmable memory channels, SSB/AM/RTTY/CW/FM (opt.), dual VFO's, scanning, selectable AGC and noise blanker, the IC-R71A's versatility is unmatched by any other commercial grade unit in its price range.

Keyboard Entry. ICOM introduces a unique feature to shortwave receivers...direct keyboard entry for simplified operation. Precise frequencies can be easily selected by pushing the digit keys in sequence of frequency. The frequency will be automatically entered without changing the main tuning control.

Superior Receiver Performance. Passband tuning, wide dynamic range (100dB), a deep IF notch filter, adjustable AGC (Automatic Gain Control) and a noise blanker provide easy-to-adjust clear reception even in the presence of strong interference or high noise levels. A preamplifier allows improved reception of weak signals.

32 Tunable Memories. Thirty-two tunable memories, more than any other general coverage receiver on the market, offer instant recall of your favorite frequencies. Each memory stores frequency, VFO and operating mode, and is backed by an internal lithium memory battery.

Options. FM, RC-11 wireless remote controller, synthesized voice frequency readout, IC-CK70 DC adapter for 12 volt operation, MB-12 mobile mounting bracket, two CW filters, FL32-500Hz and FL63-250Hz, and high-grade 455KHz crystal filter, FL44A.

ICOM

First in Communications

ICOM America, Inc., 2380-116th Ave NE, Bellevue, WA 98004 / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234

REFLECTIONS ON RADIO cont'd

still referred to today even though it hasn't been around for forty years or more. It cost quite a bit in those days--a whole quarter!

I often suspected, in the space of a few years later, that some of the names of the RADEX writers, such as Rod La Rocque and Anne Tenna, were well known among the charter members of the now-defunct Newark News Radio Club. But despite being on the Board of Directors of that once-famous club for over a quarter of a century, I was never able to find out precisely who was behind RADEX. It's a shame that RADEX had to pass on for it was one of the finest hobby magazines of its type in existence.

I would check in at our local news agency day after day with my quarter in my hot little hands hoping that RADEX would be in. And when it finally came in, I knew that it was going to be a poor day at school because RADEX was infinitely more interesting than history, geography, arithmetic, or any other subject. Many was the time that my open study book, held in an upright position, carefully concealed the pages of RADEX!

Back in those days the once proud and famous 201-A vacuum tube was past the peak of its heyday. The crystal set was now a thing of the past, designated to spend any future on a shelf, gathering dust, but ready on just a couple of minutes' notice, to work as well as it ever did. Buffalo nickels were on the way out and the present-day Jefferson five-cent piece was in. New steam locomotives were still being mass-produced in Pennsy's Altoona shops.

The town in which I have lived all my life was in ham radio W3 territory. The third district at that time comprised, in addition to Maryland, Delaware, Washington, D.C., and a portion of Eastern Pennsylvania, the areas of New Jersey consisting of Burlington and Mercer counties and all areas south of those counties. The remainder of the state was in W2-land along with New York City, Long Island and all of the Hudson River counties. The rest of Pennsylvania and New York State were in the eighth district.

Nowadays, New York and all of New Jersey comprise the second district. New district boundaries were formed and the eighth district came no further east than West Virginia and Ohio.

Before going further, I might add that I still own two of those old Westinghouse crystal sets in almost mint condition and a number of 201-A tubes and, somewhere in the archives, a receiver in which they would work.

I can recall that some reporter checked in with his favorite columnist at RADEX with the information that the powerful Mexican border station, XERA in Villa Acuna, a broadcast-band station, had sent him a letter in response to his station report, that at no time did XERA ever operate with 500,000 watts because such a thing was against whatever agreement was in effect at the time between the United States and Mexico.

A couple of issues later, the QSL that I sent in to RADEX that I had received from XERA clearly showed a power output of 500,00 watts! It was little wonder that many times during evening prime time listening periods, our local 50,000 watt KYW in Philadelphia, just about 15 miles away, was often totally blocked out by XERA.

Those were the days of Dr. John R. Brinkley and his famous Brinkley Hospital in Brinkley, Arkansas, the home of a cure for cancer, or so it was advertised.

Others of the old Mexican border stations included XEAW in Reynosa ("for your free sample, send your name and address to Radio Station XEAW, McAllen, Texas"--XERA used a Del Rio, Texas, address) and XEPN in Piedras Negras which, according to some reports, blew up one night. The power output of those stations often ran far above the 50,000 watt limit.

Those stations usually featured country-western music and advertised Peruna, Kolor-bak and other products that are generally no longer available. Nowadays it is no problem to tune in to 800 kHz and hear that big powerhouse from just off the northeast coast of South America, Radio Bonaire, with its 525,000 watts.

Along about this same time I began to find out that there were other things happening--amateur radio, for example. With my little five-tube Emerson receiver which covered--supposedly--only the broadcast band, I found that by careful tuning I could hear local hams around town.

They would come in at the low end of the dial, at the high end of the dial, and most anyplace else where they weren't supposed to be heard. Most of these hams were local 160-meter boys just "rag-chewing." Harmonics, images--whatever you would call them--I was hearing them and this only increased my urge to get in on the activity.

I'd go chasing all over town looking up the hams listed in my callbook) a previous trip to one of the big radio shops in Camden found me in possession of a copy of the RADIO AMATEUR CALLBOOK, which was as good

LIBRARY SHELF cont'd

Liberally illustrated, this second edition is published cooperatively by Universal Electronics and Howard W. Sams, noted electronics publishing house.

EXPERT TECHNIQUES FOR HOME VIDEO PRODUCTION by E. Grayson Mattingly (170 pages, 5" x 8", paperbound; $10.95 from TAB Books, Dept. MT, Blue Ridge Summit, PA 17214)

Home video has become a major avocation in America; with the prices of VCR's and camcorders at an all-time low, virtually every family can afford to do its own production. Home video production is rapidly becoming the documenting medium that 8 mm movies enjoyed just a few short years ago.

Mattingly's new publication embraces ten chapters which cover TV transmission and video basics, audio and lighting techniques, cameras and editing practices, and general production considerations and tips.

Of importance, author Mattingly is a professional TV producer and co-founder of Videoforms, Inc. His experiences provide invaluable insights which he passes on through the pages of this book.

Well illustrated with sharp photos and informative line drawings, and written for the layman to understand easily, HOME VIDEO PRODUCTION should be in your videocam carrying case.

SCANNER RADIO LISTINGS (Detroit/Windsor edition) by Norman Schrein (277 pages, 8-1/2" x 11", paperbound; $9.95 from Fox Marketing, 4518 Taylorsville Rd Dept MT, Dayton, OH 45424)

This latest in an ever-growing series of Fox scanner directories clearly establishes Schrein as the leading author of scanner directories with more than two dozen full directories to his credit.

As with others in the set, this latest edition covers communities bordering Detroit, Michigan, and Windsor, Ontario, and includes virtually all receivable communications scanners cover.

Business and industry, amateur, broadcasters, common carriers, aircraft and railways, marine radio, public safety and emergency --they're all there.

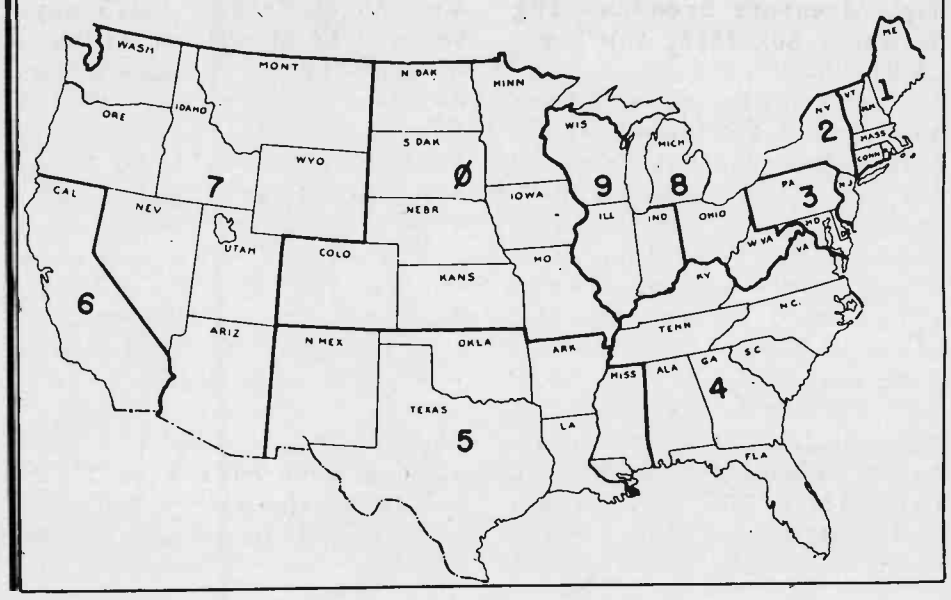
The directory is cross-referenced by frequency, licensee and call sign. ●

Amateur Call Sign Areas

Early in the history of radio, it became clear to lawmakers worldwide that some means of keeping track of communicators and broadcasters would be necessary. A system of issuing call signs or call letters was proposed and adopted.

In the United States, the letters A, K, N, and W are permissible prefixes by international agreement. In the amateur radio service, further breakdown by districts is given a numerical designator, ten possible numbers running one through zero (as ten).

The accompanying map shows the distribution of call sign districts used in the U.S. amateur radio service only. We would like to thank Spec-Com Journal from which this map is reprinted.



REFLECTIONS ON RADIO cont'd

--or better--than a telephone book for local addresses). No one with a ham ticket in Collingswood or Westmont would ever be safe anymore from a visit by Hank Bennett.

I was shown transmitters and receivers, modulators, buffers, finals, and everything else that made up a ham station, including the newly-arrived electron-couple oscillator which was in the process of putting frequency crystals out of business. I'd watch in fascination as W3BSX worked someone on 40 meters but this was in Morse code which I couldn't understand at that time.

Another local operator got on 20 meter 'phone--in Spanish. Great! I'd still be watching with big eyes when someone tuned up an antenna with a small neon bulb (that's still a good gimmick when demonstrating a ham station!). Only one of those guys ever took me seriously because I was an SWL, or a BCL (shortwave listener or broadcast listener--dirty words in ham radio--the big reason why WDX came along!).

That one gentleman was George Leck, W3BWI ("Three Big Wild Indians") and he spent many hours teaching me the code, finding W1AW or other code practice stations, and helping me with theory and regulations. He did everything except take the exam for me. My dear old dad even conned George into explaining all about the birds and bees to me--or at least he tried.

On nights when the Westmont Net was in operation on 160 meters, George would hand me the mike and I'd chat with W3IAS, W3IZP, W3AEJ, W3HND, and numerous others. Talking on someone else's ham station was great fun but it would be more fun if I had my own station. The big problem was with the code. I just couldn't get it over 10 words per minute. The FCC exam required a test at 13 words per minute.

One fine afternoon, after failing the exam for the third time, I was placed by Mr. Leck in front of a code practice oscillator with Morse code on reels and he literally forced me (with the knowledge, approval, and abettment of my folks) to copy code for several hours and before that session was over I was up to close to 15 w.p.m.

You can bet that the next time I went over to the Philadelphia Custom House I passed that 13 words per minute test along with the theory and regulations, much to the delight of the examiner, who was tired of seeing me, George Leck, my parents ("He FINALLY MADE IT!") and certain school officials whose duty it seemed to be to mark my absences for examinations as non-valid.

Of course, no one with any authority in school would believe that a mere 14-year old kid would be applying to the government for anything. But it wasn't long before there were several of us in the closing days of high school that were licensed radio operators holding Class B amateur licenses, or third-class radiotelephone permits, or both.

Before getting that precious license, however, there was a period of time that I found that it really was possible to communicate with another person without the use of telephone lines or any other visible means of contact other than an outside antenna and some secret equipment inside my corner in the house. We used the airwaves. That made us bootleggers, sort of. ●

Tune in next month for the concluding portion of this tale.

SWL WORLD WATCH

by Ken Wood

Jeeves and I are still awaiting the initial broadcasts from the new High Adventure Ministries station, KVOH, at Rancho Simi in California. If it has come on the air by the time you read this, it should be using the following schedule: 0000-0300 UTC on 11.930; 0300-0500 on 9.852; 0500-0600 on 9.525; 0600-0800 on 6.005; 1400-1600 on 9.525; 1600-2200 on 17.775; and 2200-0000 on 15.120 MHz.

Regular broadcasts were scheduled to have started on Easter with test broadcasts from KVOH's 50 kilowatt transmitter beginning in late February. Reception reports can be sent to KVOH, High Adventure Broadcasting Network, Box 7466, Van Nuys, CA 91409.

A couple of readers have asked if Jeeves and I have received a QSL from the (as of now) newest U.S. station, WHRI in Indiana. The answer is, "no", even though it has been some three months since the station began its regular programming.

Reader Bob Studley in Massachusetts wonders if he might be one of the first to receive a QSL card from Radio Marti. I guess that depends on how you look at it. Radio Marti QSL cards have been received by DX'ers over the past three or four months so, from that standpoint, Bob, I'm afraid you're not one of the first. But over the long haul, and with the number of QSLs Radio Marti will eventually issue, I guess you can say you were!

Giorgio Romanin of Udine, Italy, sends us the full schedule of AWR-Forli. It's far too long and complicated to include here but we can, at least, pass along the English language portions. Those are at 0800-0730 on 7.295, preceded by German at 0630 and at 0730 by Serbian on Saturdays, Albanian on Sundays. Also at 1900 to 1930 on 6.205, which is preceded by German each day and followed by Romanian on Saturday, Hungarian on Sunday.

On weekdays both English transmissions are followed by Albanian on Monday, Macedonian on Tuesday, Romanian on Wednesday, Hungarian on Thursday, and Russian on Friday. 6.215 may be used in the event either of the other frequencies become unusable. Many thanks, Giorgio! Giorgio, incidentally, tells me he's been a Monitoring Times subscriber since issue one!

Caracol Cucuta is a new outlet in Colombia which recently showed up on 3.270 and is being heard around 1000. The address is Apartado 519, Cucuta, Norte de Santdander, Colombia. The medium wave outlet on 1090 kHz is on the air 24 hours a day according to the WRTH listing, but I'm not sure of the shortwave schedule and we haven't been able to log it in the evenings, perhaps due to the utility QRM on that frequency.

If you are monitoring the shortwave broadcast bands, why not make some notes on what you're hearing and send them to us for use in the column? We're interested in everything from Albania to Zanzibar, half million watt stations down to those that barely tickle the ether. Just type or print plainly and send your observations to us in care of Monitoring Times.

Here's what Jeeves and I have picked up over the last few weeks.

AFRICA

KENYA - The Voice of Kenya 250 kilowatt transmitter at Koma Rock, tentatively heard on 11.740 to 2115 sign-off, with high life music, unknown language. This one isn't being heard very well considering the high power being used!

MAURITANIA - Radio Mauritania in Arabic with local music at 0611 on 4.845.

MOROCCO - Radiodiffusion Television Moroccaine at 1623 in Arabic on 17.595.

MOZAMBIQUE - Radio Mozambique on 9.618 at 1756 with xylophone-type interval signal, identification in both Portuguese and English and into English newscast.

SOUTH AFRICA - Radio RSA on 9.615 with bird interval signal at 0157, ID and opening, into Africa Today at 0200. Internal Radio Orion service heard on 3.250 in English and Afrikaans with apparent request program.

SOUTHWEST AFRICA/NAMIBIA -Southwest Africa Broadcasting Corporation on 3.270 and parallel 3.295 with all night service.

ZAMBIA - Zambia Broadcasting Service on 4.910 from 0348 with interval signal and anthem and sign-on at 0400.

ASIA

AFGHANISTAN - Radio Afghanistan on 4.740 with domestic service first program. Mid/near east music and talks in Pusto or Dari. Transmitter in Turkmen SSR, USSR. Noted around 0130.

CHINA - Radio Beijing to North America in English at 0130 on 9.820.

INDONESIA - RRI Ujung Pandang, Sulawesi on 4.753 at 1243. All Indonesian, music and talk.

ISRAEL - Voice of Israel to USSR/Eastern Europe on 12.080 at 1705 in Hebrew.

SINGAPORE - Radio Singapore in English at 1225 on 5.025, but only fair at best.

SYRIA - Radio Damascus on 9.635 at 1910 in French with news and commentary by woman.

USSR - Petropavlovsk-Kamchatsky in Russian at 1215 on 4.485.

EUROPE

ALBANIA - Radio Tirana on 7.120 in English at 0243, news, Albanian history.

BULGARIA - Radio Sofia, at 2245 in English with a newscast on 6.070.

CZECHOSLOVAKIA - Radio

ENGLISH LANGUAGE BROADCASTS

by Tom Williamson

News Broadcasts Worldwide

Greetings to all readers. This month we will take a look at NEWS broadcasting of the local or regional type, where one can obtain news of current events in individual countries or areas, as distinct from major stories of events which make the international news media.

One of the problems here is that such data may be sandwiched between the big stories in a major broadcaster; other problems are that the news may be in a local language only, coupled to the fact that many of the best sources of a small country's news are often on the air from a low-power station. Let us look at some of the available broadcasts in English, by continent:

OCEANIA

Radio Australia, of course, is a powerful channel for such area news, especially if it has political or economic impact in the Pacific. Look for "Australian News" at 01 04 08 12 16 18 20 and 2330 (always on the HALF hour). These are ten minute bulletins. Also on Saturdays/Sundays there is "Report from Asia" (Sat. 14-17-20-23-, Sun. 0110 always at TEN PAST the hour).

Other sources are weak in signal reliability, but include Radio New Zealand, the ABC shortwave station at Perth (VLW-9) heard mornings often around 12-1400, on 9610 kHz. Other stations in the 49/60 meter bands are sometimes audible. New transmitters in Northern Australia are just beginning to come on the air in the 60 meter band, but reception reports are scanty.

The Solomon Islands on 5010 and Port Moresby, Papua, may be heard on 4890 kHz, both in our mornings; but neither has a regular, readable signal.

ASIA

The main problem here is the difficulty of repeatedly good signals--unless you reside in the western part of North America. Trans-polar signal paths are never the best! Hence, we have problems with Radio Beijing, the best current source of Asian news, except for the Voice of Free China, Taiwan, which is heard with good reliability via its relay station WYFR in Florida.

Both of these broadcasters have very definite political slants and the two present quite a contrast in the news! WYFR is well heard on 5985/6065 at 02/03/0700 UTC (only 5985 at the latter hour). Beijing is very erratic here, with 9820 at 0000 the best bet.

Radio Japan used to be the best source of Asian news but seems to have almost disappeared from the dial! The best bet seems to be the Gabon relay from 0400 on 9570 kHz. Direct reception may be possible if propagation permits on 15420, 15195, 17755 kHz.

The other reliable source from this area is Kol Israel which is well heard (see chart), but their news broadcasts are naturally somewhat restricted in coverage of Middle East events.

Radio Kuwait on 11675 from 1800; South Korea 15575 from 2200; Damascus, Syria, on 7455/12085 from 2000; and the Voice of Turkey 9560 at 0400/2300 may also be heard irregularly in English broadcasts.

INTERNATIONAL BROADCASTERS: Selected English Broadcasts

RADIO AUSTRALIA	12-1500	6060 9580
BBC BRITAIN	1100	11775
	1300	9510
	2200	9915
	2300	9590
	22-0700	5975 6175
RADIO NEDERLAND	0130	9895
	0230	6165 9590
	0530	6165 9715
ISRAEL	1800	9385 11585
	2000 0001 0200	5885 7410 9435 9815
RADIO RSA	0200	5980 6010 9615
U.S.A. (VOA)	00-0400	5995 6130 9455 9650 9690 11580 11675 (11740) 15205
	17-1800	15185 15315 15415 17740 17870 21545

AFRICA

Only Radio RSA can claim any reliability of reception from this region; their broadcasts may add some information of events on the continent but, as you are aware, they are the official government voice, and so that news is somewhat a focus of that interest (see chart).

Most of the other countries are on the air in foreign languages or have sunk into an economic recession evidenced by their weak/poor quality signals. About the only partial exceptions are Liberia (you may hear ELWA sometimes from 2200 on 4760 kHz in the 60 meter band with news bulletins) and Ghana (I hear quite regular sign as from Accra on 4915 kHz, news at 2100).

Other poor bets are: Algeria 9685 at 2000, Egypt 9805 at 2100, and Nigeria 15120 at 2100. All these used to be quite good signals but today are erratic.

EUROPE

There are too few stations presenting national-flavored news! The bone of contention that I have is that each is obsessed with copying one another in presenting international events. I had the chance to complain about this a few years ago on Radio Nederland in an open line program! I got an interesting answer from the Radio Finland representative (this station

cont'd

SWL WORLD WATCH cont'd

Prague at 0311 on 5.930 with English.

GERMAN DEMOCRATIC REPUBLIC - Radio Berlin International in Spanish at 0220 on 6.050 with classical Spanish music.

GREECE - Voice of Greece in Greek at 1808 on 11.645, beamed to Africa.

NORWAY - Radio Norway International from 2157 with interval signal, ID and news in Norwegian.

POLAND - Radio Polonia on 9.525 at 0255 in English.

PORTUGAL - Radio Portugal to Latin America at 2218 on 9.745 in Portuguese with music.

ROMANIA - Radio Bucharest on 9.570 at 0418 in Spanish to Latin America.

SPAIN - Radio Exterior de Espana to Latin America in Spanish on 9.360 at 0122, talk and music.

SWITZERLAND - Swiss Radio International on 9.725, in German at 0440, parallel 6.135.

NORTH AND CENTRAL AMERICA

CANADA - CFVP Calgary, relaying local CFCN on 6.030 at 1322 tune, all English, ID "AM 106", time checks, commercials.

CUBA - Radio Rebelde, 5.025 all Spanish with lots of music at 0400 tune-in.

GREENLAND - Gronland's Radio, 3.999 in presumed Greenlandic, mostly talk at 2350 tune-in.

GUATEMALA - TGWA on 6.180 in Spanish with marimba music at 1315.

TGNA on 3.300 at 0312 with English religious program.

HONDURAS - HRVC, La Voz Evangelica with Spanish language religious program at 0340 on 4.820.

La Voz del Junco in Spanish on 6.075 with talk, music, IDs from 1108.

MEXICO - Radio Universidad de Sonora, 6.115, from Hermosillo. All Spanish program of music, talks, IDs.

SOUTH AMERICA

ARGENTINA - RAE in Spanish on 11.710 at 0345, in parallel to 9.690.

BOLIVIA - Radio Illimani, 6.025 in Spanish at 0230, Latin music and soft rock, man with IDs in Spanish.

ECUADOR - HCJB's domestic service with man reading letters or something at 0220 on 3.220.

La Voz de Upano, 5.039 at 0210 with talks and local music in Spanish.

FRENCH GUYANA - RFI relay on 9.800 with news in English at 0318.

PERU - Radio Eco, 5.010 with ads, music, IDs all in Spanish at 0235 tune.

Radio Norandina, 4.460 in Spanish with huayno music at 0230.

JEEVES SAYS -

It's beginning to sound like spring on the bands. The static level is inching its way upwards in volume and frequency, as are the major stations. We'll accept the static so long as that sunspot count starts to rise as well!

The spring months should bring with them several new stations coming on the air - including perhaps one or two surprises - and we can also anticipate some good openings to the Papua/New Guinea and Indonesian areas as well as continued off and on shots into South America. So, there's a lot out there that represent good targets for your hunt. Let us know what you pick out of the airwaves and we'll see you again next month.

'Til then, 73 from Ken and me. ●

***ENGLISH LANGUAGE** cont'd*

is the least offender!) who said it was much cheaper to take items from a news wire service rather than employ special correspondents in one's own country! Now that's a sad state of affairs, but I suppose one can understand it.

Well, what do we have here? Some occasional good programs from giants like the BBC--"News about Britain" 9 minutes past the hour, at 00-03-11; "About Britain" a weekly summary, Friday/Saturday originating at 1945 Friday and repeated 0030, 0530, 1115 on Saturdays; press reviews, "People and Politics" and the "Outlook" program all give special angles on the country.

Germany presents good comments over Deutsche Welle on different angles on local news and events, but I find it a bit difficult to know what to expect! Try them! Best reception between 01-0400 and at 0500 on 49 meters. Try 6040/6085/6145 from 0100; and 5960/6120/6130 at 0500.

Austria (6155 at 0330; 5945 at 0630) has "The week in Austria" on Saturdays and other mixed items during the week. Belgium Radio has good local items mixed up in their regular 0030 5910 kHz and 1300 15590 kHz broadcasts; the higher channel is the better if propagation permits reception.

SOUTH AMERICA

We still have to rely on very few broadcasts from here, namely:

ARGENTINA-RAE Buenos Aires has regular English at 0100 on 9690/11710 with the 31 meter channel the (variable) best signal; also on 15345 at 1800/2100 with poor signals here. The programming is erratic in interest with some dull politics or economic news, but sometimes very interesting background cultural items.

BRAZIL-Radio Nacional Brasilia continues to struggle on with 11745 at 0200, their only reliable channel; programs seem to infuriate some listeners, but they can be fascinating with lots of local events including weather!

ECUADOR-HCJB Voice of the Andes is our final consideration with "Passport," a program featuring Latin American news, at 0100, 0530 and to other areas at 1000 and 1900. The first two times for North America are best heard over 6230/9870/15155, and 6230/9870/11910 kHz respectively. Good listening! ●

Voices out of China

by Ken Wood

Shortwave listeners did a doubletake recently when it was announced that Radio Beijing and Radio France International would devote transmitter time to airing each other's services.

As a result, RFI will be better heard in Asia and Radio Beijing, often difficult to receive with clarity even with a high sunspot count, will get the benefit of RFI's 500 kW transmitters in French Guiana. Beijing's programming for listeners in North and South America should, as a result, be heard with the same ease as RFI's programs are.

All that is very good news for the shortwave broadcast program listener and those with a particular interest in Chinese events. But the overseas programs of Radio Beijing represent only a small portion of the overall Chinese broadcasting picture; a few rice sprouts out of the entire paddy. Beneath the surface there's a whole lot more to explore.

There are several hundred medium wave stations in China, ranging from very low power transmitters to those running to multi-hundred kilowatts. Some of the latter are picked up by West Coast medium wave DX'ers but, by and large, reception of Chinese medium wave outlets is out of the question for most listeners in North America. Medium wave usage runs from very powerful stations which serve all or part of an entire province to low power relays which are used to fill in coverage gaps.

Like many countries with a large geographical area, China uses shortwave for its domestic broadcasts and it is thanks to this fact that the shortwave broadcast DX'er is served any number of listening targets.

Domestically, Beijing produces two services over its Central People's Broadcasting Station (CPBS)--Program One and Program Two, usually designated as CPBS-1 and CPBS-2 in shortwave listings. Another two services produced by CPBS are aimed at an audience in Taiwan.

Those four program services are relayed by the Chinese regionals along with their own regional or provincial programming.

A second broadcast service, if it has not undergone two or three official name changes in the past decade, has at least had that many unofficial names evolve over the past ten years or so. First it was called People's Liberation Army Radio and then became more commonly known as the Fujian Front Service and is now frequently called the Voice of the Strait.

That service also offers two programs or networks which are, in large part, also aimed at Taiwan. Broadcasts are also intended for members of the People's Liberation Army, offering entertainment, instruction and political education.

Most of the transmitters for the Voice of the Strait are believed located at or near Fuzhou, in Fujian Province. Two dialects are used--Putonghua and Amoy.

Frequency usage for the various Chinese outlets has been remarkably stable over the years, although there is some usage variance from winter to summer. Few of the outlets run a 24-hour-a-day schedule but, fortunately for DX'ers living in North America, the stations are on the air at prime Asian listening times here--early in the morning.

Depending upon the season, outlets which offer the best chance to log in the U.S. are those in the 90 and 60 meter bands along with the "out-of-band" stations in the 6 and 7 megahertz areas.

The QSL picture in China has undergone considerable improvement since the death of Chairman Mao. CPBS outlets can usually be verified via Radio Beijing and, with a little persistence, most can be confirmed directly. The Fujian Front Outlet, once a firm non-verifier, now issues its own QSL card.

Here's a listing for China bands:

NAME	CITY	FREQUENCIES
Chifeng PBS	Chifeng	3.930
Fujian PBS	Fuzhou	2.340/4.975/5040
Gannan PBS	Hezuozhen	5.971
Gansu PBS	Lanzhou	4.865/6.005/6.155/9.710
Guangxi PBS	Beihai	8.677 variable
Guangxi PBS	Nanning	4.915/5.010
Guizhou PBS	Guiyan	3.260/7.275
Heilongjan PBS	Harbin	4.80/4.925/5.950
Hubei PBS	Wuhan	3.940
Hulunbei'er PBS	Hailar	3.900/4.750/6.080
Hunan PBS	Changsha	4.990
Jiangxi PBS	Nanchang	2.445/5.020
Jilin PBS	Changchun	3.310/6.070
Liaoning PBS	Shenyan	4.830
Nei Menggu PBS	Hohhot	3.970/4.525/6.045/6.974/9.750
Qinghai PBS	Xining	3.950/4.940/6.260/6.500/9.780
Shaanxi PBS	Xian	6.176
Sichuan PBS	Chengdu	5.900/6.058/7.225
Wenzhou PBS	Wenzhou	2.415
Xilinhot PBS	Xilinhot	4.950
Xinjiang PBS	Urumqi	3.960/3.990/4.220/4.330 4.500/4.735/4.970/4.980 5.060/5.440/5.800/6.120 7.050/7.385/9.560
Xizang PBS	Lhasa	4.035/4.750/5.935/5.950 5.995/7.110/7.170/9.490
Yunan PBS	Kunming	2.310/2.460/4.760/5.960 6.937/7.210
Zhejian PBS	Hangzhou	2.475/4.785
Fujian Front/Voice of the Straits	Fuzhou	2.430/2.490/2.600/2.800 3.000/3.200/3.300/3.400 3.535/3.640/3.900/4.045 4.130/4.330/4.380/4.840 5.170/5.240/5.265/5.770 5.900/6.000/6.400/6.765 7.025/7.280/7.850/9.540

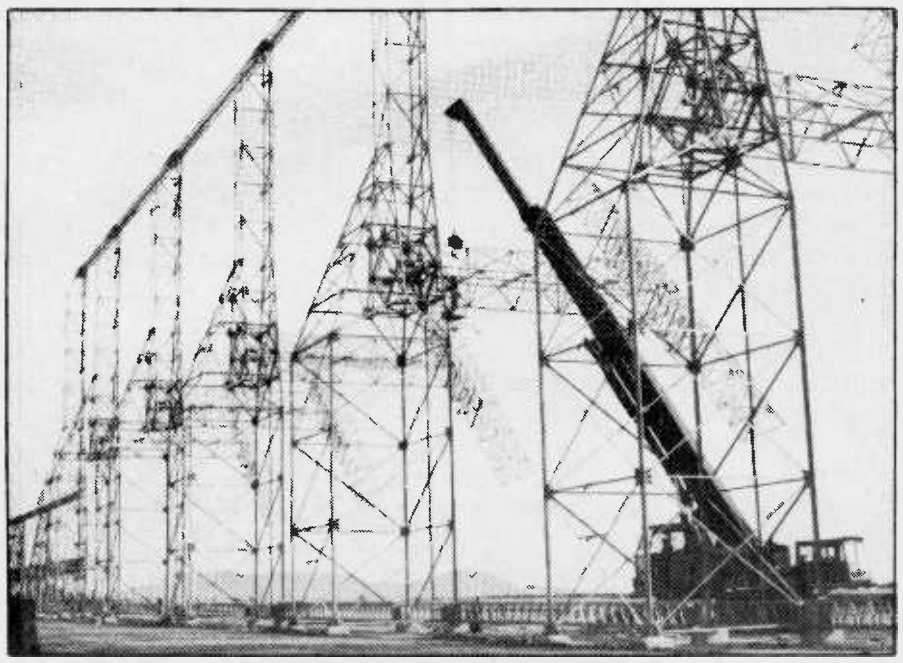
*PBS = People's Broadcasting Station

"American Woodpecker" Gets Ready to Fly

The raucous irritation of the "Russian Woodpecker" rat-a-tat sounds on the short wave bands is enough to drive even the hardiest SWL into thoughts of considering another hobby. And now the U.S. Air Force is about to join the foray.

But unlike its Russian counterpart, the American version, properly known as an "over the horizon backscatter radar system," will be more discreet (and discrete), using specific frequencies with an emphasis on non-interference with licensed users of the HF spectrum.

The prime contractor for the antenna, the Dielectric Field Service and Project Implementation Group, is constructing the antenna array shown here for General Electric, prime contractor for the major OTH system in Moscow, Maine. Another major antenna system is the NAVSPASUR space surveillance installation in Greenville, Mississippi.



"Over the Horizon," Moscow, Maine

"How About a Little Game?"

by Bert Huneault
380 Watson Ave.
Windsor, Ontario
N8S 3S4 Canada

Did you ever share any of your medium frequency monitoring results with another SWL? If not, here's your big chance!

What I have in mind is a sort of learning game with five objectives:

a) Doing a little DX monitoring of marine band signals on 115 meters, thus putting your receiver and antenna system to the test;
b) Sending your log entries to an SWL from the Great Lakes area (yours truly);
c) having your data tabulated and compared with other reception reports from the USA and Canada;
d) seeing the results of this project published in an upcoming issue of Monitoring Times;
e) and possibly winning a prize!

From my QTH in extreme Southwestern Ontario (near Detroit, Michigan), I often monitor single sideband marine weather broadcasts on 2598 kHz from the Canadian Coast Guard radio stations located in Newfoundland, Nova Scotia and the Gulf of St. Lawrence (see accompanying map). And, being keenly interested in skywave propagation, I wonder how far over the continent these MF signals from Atlantic Canada can actually be read on a typical winter evening. (At those wavelengths, DX reception in the summer months is plagued with atmospheric static.)

So, I thought I would try and get some ideas by seeking the help of any Monitoring Times readers who would care to participate in this little research project. The game plan is very simple: all you have to do is tune your receiver to 2598 kHz--upper sideband--during any of the daily evening broadcasts listed in the accompanying table and record the following:

1. Date and time of intercept
2. Signal strength (QSA) as indicated on your S-meter; and
3. Readability (QRK) on a scale of 1 to 5 (5 being perfectly readable).

If you would care to add any remarks on interference (QRM), atmospheric static (QRN) or fading (QSB), your comments would be appreciated. If you prefer using the standard SINPO reporting code, that's also fine and dandy.

Your monitoring should be done this month, but whether you monitor a single broadcast, several broadcasts during a single evening, or numerous broadcasts on several evenings during the month, your reception reports would be most welcome and appreciated in all cases. Please mail your reports to me at the above address.

The results of this survey will be published in MT the month after next, so please send in your reports by the end of this month at the latest.

The names of all the SWLs who respond with reports will be put in a hat out of which a winner's name will be drawn. The name will be published in MT and the winner will receive an interesting book: RADIO AIDS TO MARINE NAVIGATION (current issue of the Atlantic and Great Lakes edition).

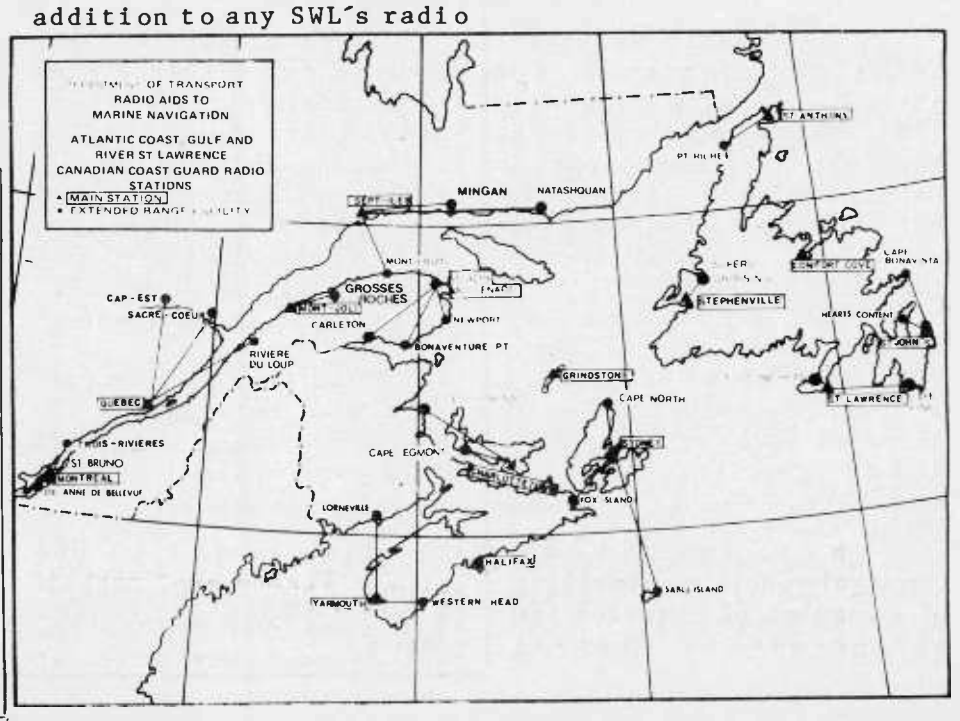
This 200-page manual is loaded with LF, MF, HF and VHF data--SW and radiotelephone communication frequencies, weather broadcast schedules, maps, LORAN and radiobeacon information, full details on AMVER messages, and all kinds of other goodies...a great addition to any SWL's radio shack!

Good luck to all participants...and let's get started! ●

DAILY WEATHER BROADCASTS ON 2598 kHz (USB)

Time (GMT)	Station
0010	Comfort Cove, Nfld
0035	*Riviere-au-Renard, Que.
0050	St. Lawrence, Nfld
0110	St. Anthony, Nfld
0133	St. John's, Nfld
0140	Sydney, N.S.
0203	Halifax, N.S.
0220	Yarmouth, N.S.
0335	Stephenville, Nfld

*Wx broadcast in French and English on this station



PIRATE RADIO

by
John Santosuosso
P.O. Box 1116
Highland City, FL 33846

Spotlight on Nicaragua

THE NICARAGUAN REPORT: Here are some late-breaking developments on the Nicaraguan situation. First of all, we were able to obtain verification of reception for two clandestine stations which have been operated by the Contra organization Alianza Revolucionaria Democratica or, as it is better known, ARDE. These are La Voz de Sandino and La Voz de Nicaragua Libre.

Two cards which we had prepared were returned after being rubber-stamped with the signatures of ARDE's Comandante Fernando Chamorro and also the Miskito Indian leader, Comandante Steadman Fagoth. The verifications were for reception in January and February of 1983.

Instrumental in obtaining the QSLs for us was an ARDE-sponsored organization with an office in the United States known simply as Nicaraguan Freedom Fighters. Should you happen

PIRATE RADIO cont'd

to hear either of the above stations, both of which make only infrequent broadcasts, reception reports sent to this group might be verified.

English is fine for your report, but a prepared verification card is essential, since ARDE has none of its own. Return postage, or better yet an SASE, will also probably help.

Reports for other Nicaraguan clandestine stations which are not operated by ARDE should not be sent here. The address is Nicaraguan Freedom Fighters, P.O. Box 4000-#62, New Orleans, LA 70178.

During 1983, when the above clandestines were monitored, it was widely believed they were operating from just inside Costa Rica near the Nicaraguan border. According to Nicaraguan Freedom Fighters, the stations now operate from inside Honduras and are using the frequencies of 5564 and 5572 kHz; however, there is some question in my mind as to whether this information really refers to the ARDE stations or to the better known Contra clandestine radio Quince de Septiembre, which is under the control of the Fuerza Democratica Nicaraguense (FDN).

Radio Quince has been heard around 4470. This writer knows of no loggings of the ARDE stations on either 5564 or 5572. There is now some cooperation between ARDE and the FDN (a reliable source says the two still do not really trust each other, but 20 percent of the money the FDN receives is turned over to ARDE), and there have been some vague reports that the FDN was assisting ARDE with its broadcasting activities or had even taken control of them. In any case, it appears there are no longer any clandestine transmitters operating in the Costa Rican border area.

In addition to Nicaraguan Freedom Fighters, another group with close ARDE ties is the Caribbean Commission, which was incorporated in Louisiana in February, 1982. Its announced purpose is "to maintain, promote and strengthen the free enterprise system in the western hemisphere as a means of preventing totalitarian infiltration in this part of the world."

The Caribbean Commission acts as something of a chamber of commerce for businesses in Central America and the Caribbean who are looking for American customers. It has also funneled aid to ARDE-sponsored Contras and to Miskito Indians fighting the Sandinista Nicaraguan government.

In addition to dues of $25 per year, it raises money through various projects. One of these, the "Adopt a Contra" program, has attracted considerable attention. For $100 a month an individual or corporation supports a Contra family. For $50 you "adopt" a Contra soldier.

At a price of $50 you can also obtain a copy of the "Freedom Fighter Poster," which is done in the style of the Latin American mural artists. It depicts in the words of the Commission, "a young Nicaraguan being blessed by a priest as he takes leave of his family to join in the fight against the atheistic totalitarian Sandinistas."

The Caribbean Commission can be contacted at International House, Room 807, New Orleans, LA 70130.

In other developments surrounding the Contra situation, a source with contacts at the highest levels of Reagan administration advises me that the administration sees the next years as a very critical one for the Contras.

Growing Sandinista strength is beginning to take its toll; further, if the Contras are not able to launch at least some limited offensives, they will find it very difficult to retain the men they now have.

The administration is now hoping to get about half the aid it is requesting and would probably be willing to accept some limitations on its use. These might include a provision that it could not be used for direct military purposes (as opposed to "humanitarian" aid) unless the Andinistas in Managua refused to negotiate by a specified date.

Another source with good contacts in the military has informed me that his visits to Contra base camps inside Honduras reveal still other problems for the Contra cause. While commanders are often capable and highly motivated men, many of the troops they are expected to lead are not. Some are drifters, at least a few are "undesirables," and many are undisciplined, to say the least. Commanders are often forced to use rather "strong arm" methods to keep their men under control.

Still another source reports that, should the Sandinistas decide that a permanent solution to the "Contra menace" calls for attacks on the camps inside Honduras, the sending of American combat troops to help defend those camps is a distinct possibility if not a probability. No one knows exactly what the Nicaraguan situation will produce in the next few months, but events there could change rapidly.

The shortwave listener has the unusual opportunity to stay up to date as the situation develops. Check the frequencies mentioned above and also around 6210 to 6230 for clandestine broadcasters. VOA broadcasts as well as those of the Sandinista-controlled La Voz de Nicaragua (try around 6018 and 6100) should also prove most interesting.

RADIO CAIMAN: Over the past several months I have had numerous requests for the address of clandestine Radio Caiman, which is operated by Pro Libertad de Cuba. While it is true that I have been contacted by this organization several times, they have not provided me with an address. In the event that at some time in the future they furnish one, and if they authorize publication of it, be assured we will print it. In the meantime, we have absolutely no way to forward reception reports or other correspondence, so please do not send such items.

We have had some fine loggings of Radio Caiman. From New York, Ruth Hesch reports logging it on February 10 at 0020 GMT on the frequency of 7470. Among the programs she heard was "Panorama Economica."

North Carolina's Mel Smith sent us a tape of a morning transmission of Radio Caiman made on February 6 until sign-off at 1334 GMT. The frequency was 9960.

The quality of the tape indicates the station puts a solid signal into North Carolina. Since Radio Caiman does read this column, your loggings may be of interest to them. Keep them coming.

Monitoring of numerous Radio Caiman broadcasts causes me to conclude that this is not simply one more anti-Castro broadcaster. While programs do contain commentary professionally delivered, and technical quality is high, the station continues to broadcast extensive amounts of music. This is not too unlike its original "Radio Nat King Cole" days when it transmitted nothing but music and with no identifications.

I still remember the first communication I ever received from Pro Libertad de Cuba. It advised that the frequencies were being kept open for use in the event that something did happen in Nicaragua or Cuba. You just never know what you might hear eventually one day on Radio Caiman. I would advise staying tuned.

OTHER NEWS: Florida's Terry Krueger sends word that on February 25th Radio Australia announced that a joint Thai and Malaysian military border sweep netted them the transmitter of clandestine Voice of the People of Malaysia near the Thai town of Betong.

Terry also hear anti-Zimbabwe clandestine Radio Truth on 5015 kHz February 25 from 0442 to sign-off at 0501. This one broadcasts in

☞

WIRELESS MIKES?

by Bob Grove

The lights fade and the audience quietens with expectation. The stage lights come on and from behind the curtain steps the star, microphone in hand. But wait a minute...where's the cord? How can anyone hear his voice if the mike isn't connected?

The microphone is, of course, a radio transmitting device--not a new idea to be sure. Many of us "kids" remember singing into a wireless microphone or pretending that we were announcers years ago, but technology has made this toy into a useful commercial device.

The toy varieties are still available; formerly tunable throughout the 540-1600 kHz AM broadcast band, most now operate in the 88-108 MHz FM band. And it's all perfectly legal.

The FCC has authorized wireless microphone operation on a number of frequency bands besides the two aforementioned including 40.66-40.70, and just about anywhere else above 70 MHz! But there are a few prime spots that manufacturers seem to favor.

Look for the professional entertainment microphones in the 174-216 MHz range--scattered about between local TV channels 7 through 13. Occasionally, others will surface in the 72-76, 455 and 950 MHz bands as well.

PIRATE RADIO cont'd

English from South Africa.

In addition, Terry sends word on a most unusual pirate operation. During February a pirate interfered with radio channels used in St. Petersburg and Hillsborough County (Tampa area), Florida. The broadcasts continued over a three day period, and at times forced law enforcement personnel to switch frequencies. The pirate, a tourist from Ohio, was later caught doing the same thing in Brevard County (Melbourne-Cocoa Beach area). Many of you know of my sympathy for pirate broadcasters, but I have none for this kind. His activity is dangerous and gives all pirates a bad name.

From his Pennsylvania location John Demmitt writes that he has been hearing two pirates around 1620 kHz; so far, however, no identifications have been heard.

John's loggings are a good reminder: Do not forget the medium wave, FM and even the TV frequencies when looking for pirates--you just may come across something most unusual. And, of course, be sure to send us the logging!

Several Pennsylvanians were kind enough to send us newspaper clippings of the FCC's closing of FM pirate WDIA-FM last December. The latest arrived from Larry Gotts. Larry says, unfortunately, he never was able to hear the station operated by David Laudenslager from his mother's house in Emmaus.

The 29-year-old Laudenslager managed to broadcast for only about two weeks on 88.3 MHz before being shut down. He broadcast stereo rock but was fined $750 fr his unlicensed efforts.

That is it for another month. Because of the lengthy report on Nicaragua, we are holding the promised material on unlicensed Irish and Italian stations until next month. Thanks for your continued excellent support. ●

MONITORING POST

Mark Richtig of Bemer, Nebraska, merges both hobby and time with an assortment of electronics which include a Hallicrafters S-85 receiver, Commodore 64 computer, J.I.L. SX-200 scanner, and a World War II ARC-5 ("Command") transmitter.

DX Shack belonging to Frank Capacetti, Franklin Lakes, NJ. (Below)
Main receivers: DX-300
SW-4-A
Backups: HRO 500 &
600 National
G-133(51S1)
Collins
R-7-A Drake
R-71A Icom
SPR4A Drake
Other: Onkyo AM/FM tuner
Autek QF-1 Audio filter
3 Panadapters
2 DA-100 McKay Dymek antennas

TUNE IN WITH Ed Noll

Graveyard Listening

DXing on the six local channels--1230, 1240, 1340, 1400, 1450 and 1490 kHz--is a challenge to both the novice and the advanced MW listener. You will find that many of the most skilled DXers of all are entranced by the strange goings-on. All you need to do is to take a look at the listing of names given in the "Graveyard DX Achievements" column of the National Radio Club publication, "DX News."*

The novice, grasping for an ID as the tomb-stations intermingle, can acquire operating skill and develop the perseverance and patience needed by a capable DXer. Far distant stations dance in and then quickly out again like ghouls during the bewitching hours after the local yokels fade out or sign off. You strain to hear the call letters and locations in those few seconds knowing you may never have the same opportunity again. That's graveyard listening!

You can begin simply enough by tuning to each graveyard frequency at high noon or thereabouts. Record call letters, locations, times, and dates. You might call these your "alpha" stations. One or two might be very near and, consequently, very strong.

On other local channels you may hear two stations, one of them reasonably strong and the other faint. By switching antennas, using a loop or rotating the entire radio itself if it has a built-in ferrite rod antenna, you maybe able to identify the weak station. You can set this down as the "beta" station on the frequency.

These are the easily-captured foundation stations upon which you can build and, later on, can even give you some problems in reaching out for some more distant stations.

Sunrise and, especially, sunset hours are excellent hours for building up your score. Often these stations come in well for rather long time intervals as the locals go into extended fades, except for the strong "local locals." Later, during the evening hours, locals often disappear completely except for the stations almost in your backyard.

There is bedlam on most of the local frequencies except for those brief intervals when one station overrides the background cackle. Have your concentration sharpened for that moment. As propagation conditions change so do ranges and directions of the overrides.

There is an abundance of local stations to ferret out. Assignments on each local channel exceed 150 stations. If you have a local in your backyard that no outside stations can penetrate, go for a car ride. Take along a good portable. Perhaps your car radio may also be of use.

Consult your NRC domestic log* and you will probably find another local station on the same frequency not too far away. Instead of waiting for it to contact you, go out and get it. There may be other stations you can pick up on the other local frequencies as well, different from those you receive in your radio room.

Five days of spotty sunrise, day, sunset, and evening listening this week produced the accompanying starter stations from my location. Evening propagation favored the northeast over this period. But for those who can find the time, it is the bewitching graveyard hours that produce the unusual. For this activity you are now officially on your own!

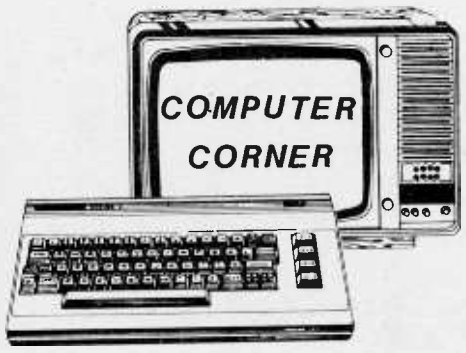
● Here are ten tips for more effective graveyard listening. A selective and reasonably sensitive receiver is assumed because of the low power used by local stations.

1. If your receiver has a tone or tone control, reduce the bass and give the highs ("treble") a moderate boost. Turn off the receiver AVC, if you can, to give emphasis to an override when it occurs.

2. A headset is a big help to you and provides some peace and quiet for the rest of the family.

3. Plug in your cassette recorder. It can help you ID a tough one you might lose because of an interruption or momentary concentration lapse.

4. Use of a rotatable loop antenna can do wonders in reducing the level of some relatively strong



by
C.W. Ellis
P.O. Box 202
Ulster, PA 18850

What to Do Until the Doctor Arrives

In past columns I covered such subjects as how to get started in computing, the equipment needed; what were frills and what were necessities. This month I'd like to make a pass at getting started with your new equipment, and try to point out some of the traps awaiting the unwary!

If you are just getting started and have access to back issues of MT, early articles dealt with installing your computer in the ham shack or listening room and making it more immune to RFI, power line noise, etc. So if you experience any interference problems, go back through the past issues for help in this area.

The type of installation help this column will cover is what to do when you get the computer home. Naturally, I cannot give step by step instructions for every home computer on the market; what I intend is a general guideline for any machine.

With that in mind, Rule #1 is, "READ THE MANUAL"! I know that sounds a bit trite, but make it your rule. No piece of equipment, electronic or otherwise, was ever damaged by someone reading the manual.

As you unpack your new delight, put the paperwork in a convenient place until all unpacking is done. Resist the urge to "plug it in and turn it on..." until after everything is unpacked and all the paperwork reviewed.

I know of at least one home computer that can sustain damage if accessory cables are interchanged. It's not a very desirable situation mechanically and the manufacturer corrected the problem on newer models.

There was a large prominent warning in the manual and anyone who bothered to read the installation instructions was forewarned against misplugging the accessory. The unfortunate soul who didn't bother with the manual had a 50-50 chance for a disaster which obviously isn't covered by warranty!

Once everything is unpacked and the manuals perused, decide where the unit is to be placed. Following the installation instructions, connect all the units together and double check all AC power cables. Make sure that a three-wire outlet is utilized if the instructions call one out.

"BEDSIDE MANNER"?

Every personal computer comes with an operating system--a program or group of programs intended to be loaded when the machine is powered on and provide a way for the user to "talk" to the computer. These programs range from primitive to exotic in nature, and may be all resident in the machine in hardware or be partly in hardware and partly loaded from tape or disk.

These programs are not to be confused with the programs you as the user want to run. The operating system consists of the programs that make sense out of the commands that you type on the display, such as LOAD "TANKZAP". The operating system deciphers the LOAD command, makes note of the program title, and attempts to load the requested program.

I say "attempts" because there are many reasons your request may not be loaded. The program may not exist on the tape or diskette in the machine. The tape or diskette may have been damaged; the tape or diskette drive may not be functional; or the cable may have fallen out or come loose.

Most operating systems provide what is called an "error return code" which is presented on screen when a failure is encountered. The return code varies from machine type to type. One machine may say, "File not found"; another may say "Unable to locate TANKZAP".

Even more frustrating is a return code that really is a code - "RC 12003". What this obscure number means is: Go look in the manual for a list of return codes and find this code to tell what went wrong!

You have just had your first taste of something in computer jargon called "user friendliness" or, in this case, the lack of it. Many lines have been written about what constitutes a user friendly system. As you start into computing, everything will look unfriendly. The more you study that manual, though, the fewer surprises are headed your way.

The next point about operating systems is what makes or breaks a particular system for an individual. There are two ways for an operating system to communicate with you: You can type your command in a specific place on the display (this is referred to as a "command driven" system), or the system can display a list of command choices and ask you to press a key corresponding to the command you want (this is called a "menu driven system").

Usually, if you like one, you tolerate the other, but just barely. There are a few systems on the market that allow either choice, but they are not common.

I prefer a command driven system, but it does require memorizing the commands. However, once the commands are committed to memory, giving instructions to the computer is much faster. When you are doing a lot of file hopping and changing from program to program, you will appreciate the speed difference. So Rule #2 is to know the operating system. This indirectly brings us right back to Rule #1!

Another word you will run across as you start getting your system fired up is "default." This refers to what system parameters are going to be set automatically if you don't specify what to set them to.

For example, your system may have available two display modes such as 40 characters or 80 characters to be displayed on one line. If you don't specify that you want 80 characters per line, you get 40, the default value. To change it, refer to RULE #2!

DIAGNOSING ON YOUR OWN

Recently Bob Grove forwarded to me a letter which asked for help getting a Commodore 128 to print correctly. Unfortunately, I had no idea what program was in use, or how to reach the writer. If you a have a question about computers in general, or the IBM PC in particular, drop me a line, but please include as much information as possible. An SASE doesn't hurt either!

In looking over the printout included with the letter, the printer printed 30 characters, then skipped about 4 spaces before continuing to print. This looks at first glance like a tab problem. Remember the default settings? Are the printer defaults spelled out in the manual? Is a tab default given? Are there switches WITHIN THE PRINTER to set spacings, tabs, etc? Again, the manual could be invaluable.

Another possibility is

***ED NOLL** cont'd*

stations that persist.

5. Have a means of quick-switching between two or more antennas. The quick action often helps you make an ID you may have missed with but a single antenna.

6. Don't be a stay-at-home. You need not drive many miles to open up a new set of tombstations. Park on a mountain top or a rise and get out your portable.

7. Bring along your portable and your domestic log on business trips and vacations. Do so even when you only visit Aunt Matilda in the next state.

8. DXing in the car can be rewarding if you are traveling. A selective car radio is required and some means of accurately tuning local channels easily. Punch them up on your pushbuttons before you leave. If your car radio has digital frequency readout, all the better.

9. When you travel prepare a chart before you leave with the help of your domestic log. Remember, you open a new packet every 50-100 miles even if you travel in daylight. You can rack up a log full of new locals in a five hundred mile trip.

10. Target your listening about the sunset hours for many pleasant surprises. Life's activities are usually such that one can't do much after-midnight listening. Send in your logging to your MW radio club. Keep looking for local reception reports and also for new locals coming on the air, particularly in your general area. ●

* NATIONAL RADIO CLUB
P. O. Box 118
Poquonock, CT 06064

SAMPLE LOG

1230		WEEX	Easton, PA
		WERI	Westerly, RI
		WKHT	Manchester, CT
		WCMC	Wildwood, NJ
		WITH	Baltimore, MD
1240	A	WHUM	Reading, PA
	B	WSNJ	Bridgeton, NJ
		WWCO	Waterbury, CT
	?	WTVD	Nassau Co, LINY
1340	A	WHAT	Phila,PA
	B	WRAW	Reading, PA
		WHNC	New Haven, CT
		WDCR	Hanover, NH
1400	A	WEST	Easton, PA
	B	WHGB	Harrisburg, PA
		WWIN	Baltimore, MD
1450		WCTC	NewBrunswick,NJ
		WILM	Wilmington, DE
1490		WBCB	Levittown, PA

COMPUTER CORNER cont'd

the software program used to send data to the printer. The operating system usually has support for a system printer and it usually winds up being the manufacturer's own printer. Another brand may interpret commands differently.

As an example, one printer might recognize a CONTROL-Z as a tab command and the computer manufacturer's printer might use a CONTROL-Z as a line feed. Guess what happens when the non-computer manufacturer's printer is used.

Suppose you load and run a word processing program with its own print facilities. Do they correspond to the printer you're using? Again, the manual is the first place to turn to for help.

But let's say you read the manual through and through, to no avail--try the dealer. If you bought your unit mail order, the dealer may provide a toll free service number, otherwise, it will take some time to get an answer. In the meantime, your computer can't print or whatever it is that it's hung up on. Now where?

All is not lost--yet. Does a friend have a machine like yours? Two heads really are better than one, especially if your friend has already solved the problem! O.K., so you don't know anyone with a machine like yours. Check to see if the manufacturer has a service number or hotline.

Last but not least, see if you can locate a user's group or micro-computer club. It doesn't have to be a club dedicated to your type of machine; perhaps a club member has a different machine but the same printer. A number of different machines use the same operating system.

If you can find someone using the same operating system on a different brand of machine, you can solve some problems despite the difference in machines.

A WORD OF EXPLANATION

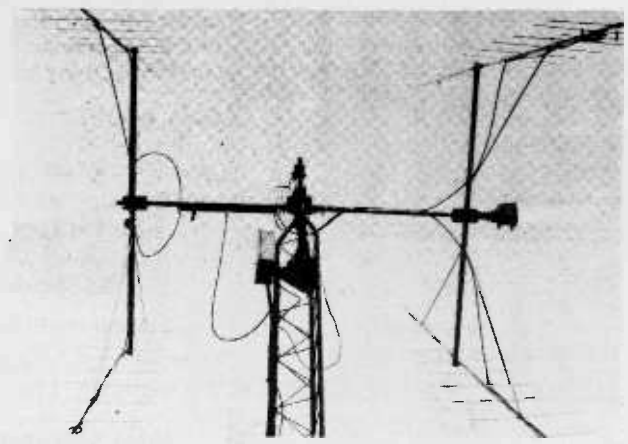
In closing for this month, I'd like to relate a couple of comments I hear at times about the column. Sometimes the comment is, "Why not keep to the subject of monitoring?" Another is, "What good is all this computer information--all I want to know is what computer to buy and how do I hook it to my receiver?".

In a nutshell, you can't use a computer in your ham shack or listening post without knowing how to run it. Anyone can turn it on, but what do you do next? Let's say you are a knowledgeable hardware type and building receivers is your hobby. Now you want to control one with a computer. How do you take that analog signal strength indicator circuit output and hook it to the computer?

These are the kinds of answers I try to bring you each month, along with explanations of how things work and, more important, why they work the way they do.

The more you know about the workings, the more knowledgeable decisions you make when you start laying that hard-earned cash on the line for computer equipment. ●

A Basic Approach to Moonbounce



Is moonbounce an esoteric mode beyond the reach of most amateurs? No! Recent advances in amateur equipment have brought EME even closer to the mainstream of Amateur Radio.

Reprinted with permission from QST

A simple but effective earth-moon-earth (EME or moonbounce) station is now within the reach of most amateur experimenters. With the advent of very sensitive GaAsFET receiving preamplifiers and commercially available high-gain Yagis, many VHF operators are enjoying successful EME QSOs with commercial equipment and relatively small antenna arrays. VHF DX via other modes, such as meteor scatter, sporadic E, troposcatter or ducting, is usually limited to around 1600 miles, and you must wait for Mother Nature to provide a band opening. Worldwide DX contacts via moonbounce, still affected by certain conditions of nature, are limited only by mutual moon visibility.

I'm not going to present an exhaustive "how-to" article on building your own station. Rather, I want to whet your appetite and show you, in general, what is involved. There's more to getting on EME than putting an antenna on your roof and calling "CQ Moonbounce," but I hope to remove some of the mystery that shrouds this mode. Specific information may be found in the reference material listed at the end of this article. I'll also tell you how to get in touch with active EME operators. Contact them for advice. You'll find that most are anxious to attract new blood into the facet of Amateur Radio that they enjoy so much, and will be exceptionally generous in sharing their experiences with you.

What Kind of Equipment Do I Need?

A block diagram of an EME station is presented in Fig. 1. There are as many different arrangements as there are operators, but most follow the format shown. The station can be as simple or as elaborate as you wish. A lot depends on your technical ability and on how much time and money you're willing to invest. I believe that 2 meters is the best band for a beginner to try, so this article is slanted in that direction. Much of the information, however, applies to any band.

The basic station might consist of a VHF multimode rig or an HF transceiver with transmit and receive converters (transverters). Both methods have been used successfully. A good-quality HF receiver with passband tuning, several IF CW filters and an audio filter are desirable. Many EME operators prefer the HF transceiver/transverter route to take advantage of these features. Multimode transceivers are available from the major manufacturers, such as Yaesu, Kenwood and ICOM. Sources of commercial VHF transverters and converters are listed in Table 1. Construction articles detailing transmitting and receiving converters are listed in the references at the end of this article.

A high-power amplifier is necessary for EME operation. Although the legal limit of 1500-W output is desirable, many QSOs have been made with amplifiers operating in the 500- to 1000-W range. There are few high-power amplifiers available commercially or surplus (see Table 1), so many operators "roll their own."

Good transmission lines are a must at VHF and above. EME signals are extremely weak, and every watt of RF delivered to the antenna really counts. Most operators locate their EME arrays on short towers, as close to the shack as practical, to minimize line loss (more on antennas later). Hardline, preferably with a corrugated jacket for improved flexibility, is desirable for the transmit line, especially above 2 meters. Surplus ¾-inch, 75-Ω CATV Hardline has excellent characteristics and can be used. Thoroughly check surplus transmission lines before use. Type-N connectors are recommended for use on 144 MHz and up. Leave the "UHF" connectors on your low-band gear.

You'll need at least one high-power RF relay to switch your antenna from transmit to receive. A suitable relay will have Type-N connectors and will be rated for at least the output of your power amplifier. Beware: Relays are usually de-rated as frequency increases. A relay rated for 1 kW at 30 MHz may be rated for only half that power at 144 MHz. These relays may prove difficult to find. Surplus relays with Type-N fittings are often available at flea markets, in ham ads, or from other amateurs interested in VHF/UHF work. It pays to get to know other amateurs interested in EME; they often know where to find hard-to-get station components. Transco, Amphenol and Dow Key are three popular manufacturers of high-power VHF relays.

Received EME signals are extremely weak, so a tower-mounted preamplifier is recommended to reduce the system noise figure to a minimum. Many EME operators find it convenient to mount the preamplifier and antenna relays in a weatherproof box near the top of the tower. The basic arrangement is shown in Fig. 2. Full construction details may be found in the references, and some manufacturers listed in Table 1 can provide ready-to-go remote preamplifier/switching boxes.

Table 1
Suppliers of Equipment of Interest to EME Operators

Receive and Transmit Converters

Advanced Receiver Research, Box 1242, Burlington, CT 06013.
Microwave Modules, imported by Hans Peters, VE3CRU, Box 6826, Station A, Toronto, ON M5W 1P3, Canada.
Spectrum International, P.O. Box 1084, Concord, MA 01742
The VHF Shop, 16 S. Mountain Blvd., Rte. 309, Mountaintop, PA 18707.
SSB Electronics, imported by The VHF Shop.

High-Power Amplifiers

Henry Radio, 2050 S. Bundy Dr., Los Angeles, CA 90025.
Fred Merry, W2GN, 35 Highland Dr., East Greenbush, NY 12061.

Mast-Mounted Preamps and TR Sequencers

Advanced Receiver Research.
Angle Linear, P.O. Box 35, Lomita, CA 90717.
Landwehr, imported by Henry Radio.
Mutek Ltd., imported by The VHF Shop.
SSB Electronics, imported by The VHF Shop.

Note: This is a partial list. The ARRL and *QST* do not endorse specific products.

*20 Country Club Dr., Greer, SC 29651

Jim Stewart, WA4MVI, an Extra Class amateur, was first licensed in 1962. He holds a BS in chemistry and is currently employed by FAA. Jim holds 50- and 144-MHz WAS, as well as 50, 144 and 432-MHz WAC awards. He is an ARRL Technical Advisor, specializing in propagation and EME.

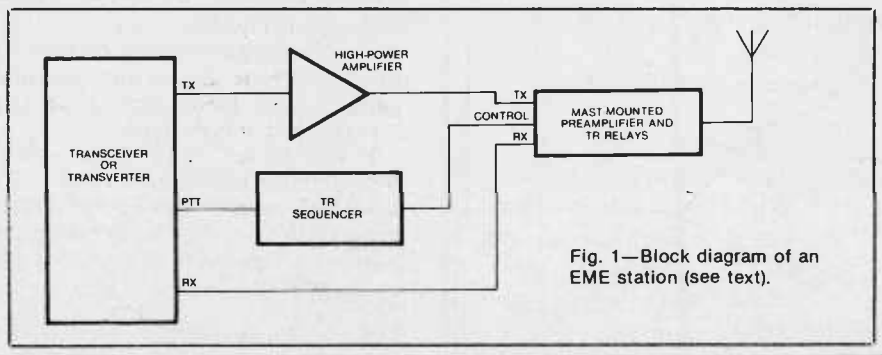


Fig. 1—Block diagram of an EME station (see text).

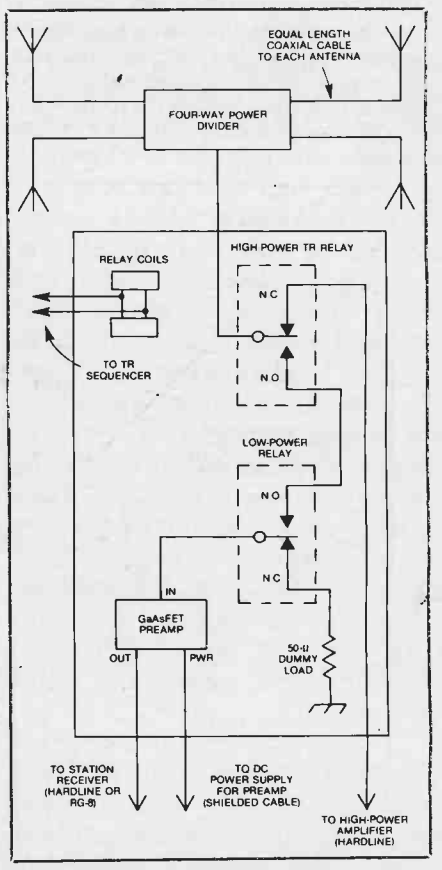


Fig. 2—A weatherproof tower-mounted preamplifier is important in EME work. Usually, the station TR switching is also mounted at the tower.

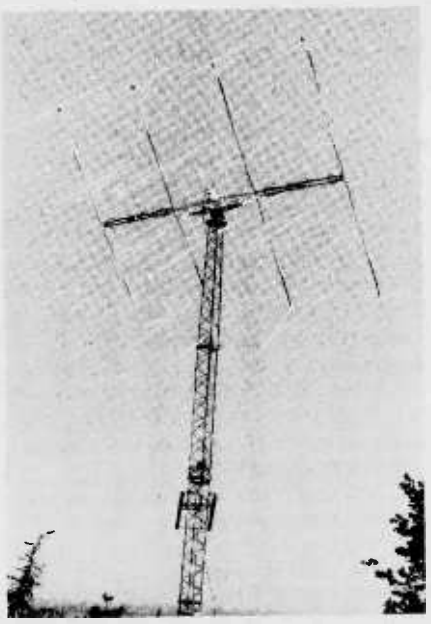


Fig. 3—This 2-meter EME array at I2ODI is built from 16 long-boom Yagis. Arrays like this are great to have, but smaller antennas can work, too.

MOONBOUNCE cont'd

Most authorities recommend that two transmission lines be run to the antenna—separate lines for transmit and receive. The transmit line should be Hardline, as discussed before, but the receive line may be RG-8 coaxial cable, or Belden 9913. The relays should be arranged so that they must be energized to receive. This method provides good isolation between the preamplifier and the transmitter, makes it impossible to transmit into the preamplifier if a relay or control line fails and offers some assurance that the final amplifier will transmit into a load if a relay or control line fails.

The remote preamplifier that we have been discussing should be a low-noise GaAsFET type. Generally, the lowest noise figure available will mean the best sensitivity, but in practice, a noise figure of 1 to 1.5 dB is good on the 2-meter band.

GaAsFETs are susceptible to damage from RF and stray pulses, so care must be taken to protect them. The 12-V dc line powering the preamp can be made from RG-58 or other shielded cable to prevent unwanted voltages from entering on the power input line. A separate power supply should be used to power the relays to prevent transient spikes from reaching the GaAsFET line. Many multimode transceivers transmit briefly when they are first turned on, so you must be sure that you can never, however briefly, transmit into your preamp and receiver.

TR switching must be accomplished in the proper order to avoid equipment failures. The station switching control box should be set up so the antenna relays are switched before transmitter power is applied to avoid "hot switching" the relays or transmitting into no load. Similarly, RF should be removed before the relays return to the receive position.

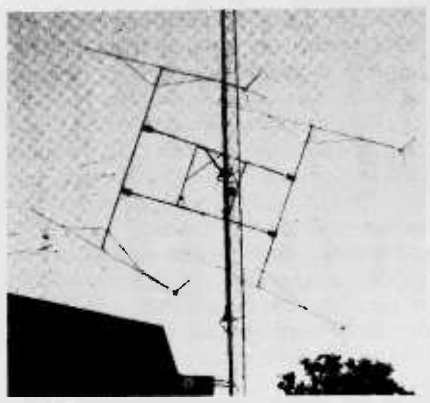


Fig. 4—K7KOT has incorporated his EME array into his existing antenna system by side mounting it on a tower.

What Kind of Antenna Will Work?

A simple array of four Yagis, aimed visually at the moon, is a good way to begin. If you keep the array on a short tower near the operating position, you will be able to aim the antenna visually. You can even use an "arm-strong" method for pointing.

Antenna arrays can be as simple or as elaborate as the builder desires. The dish antennas often associated with EME work are generally used at 432 MHz and above; a dish of adequate gain would be 35 to 40 feet in diameter at 144 MHz. Yagis are the most popular antennas at 144 MHz, but quads, collinear arrays and quagis are also used. Fig. 3 shows a 2-meter EME array carried to extremes, but many successful contacts have been made with antennas like that shown in Fig. 4.

Fig. 5 shows the details of a simple but effective EME antenna system. The minimum recommended antenna array gain for 144-MHz EME work is about 20 dB. You may use commercial antennas such as the long-boom, high-performance Yagis manufactured by Cushcraft and KLM, or you may build your own. You will probably save yourself some disappointment if you ask knowledgeable EMEers for antenna recommendations before you begin. The antenna array is often the most difficult part of the system to assemble, so take advantage of other amateurs' experiences and do the job right the first time.

How Do I Find the Moon?

Antenna-aiming accuracy is essential for successful QSOs with a small system. With a multiple-antenna array, beamwidth is narrow, and you need to know exactly where your antenna is pointed if you are to work anybody. This isn't like using a three-element tribander on 20 meters, where you can point anywhere between north and south and still hear a station to the east.

For starters, you can visually sight the moon and point your array by hand; motors for azimuth and elevation can be added later. As you become more sophisticated, you can use a home computer to track the moon or learn how to use *The Nautical Almanac* to predict its location.[1] This is necessary during periods when the moon is hidden by clouds, or when the sun and moon are close enough together that the sunlight obscures the moon.

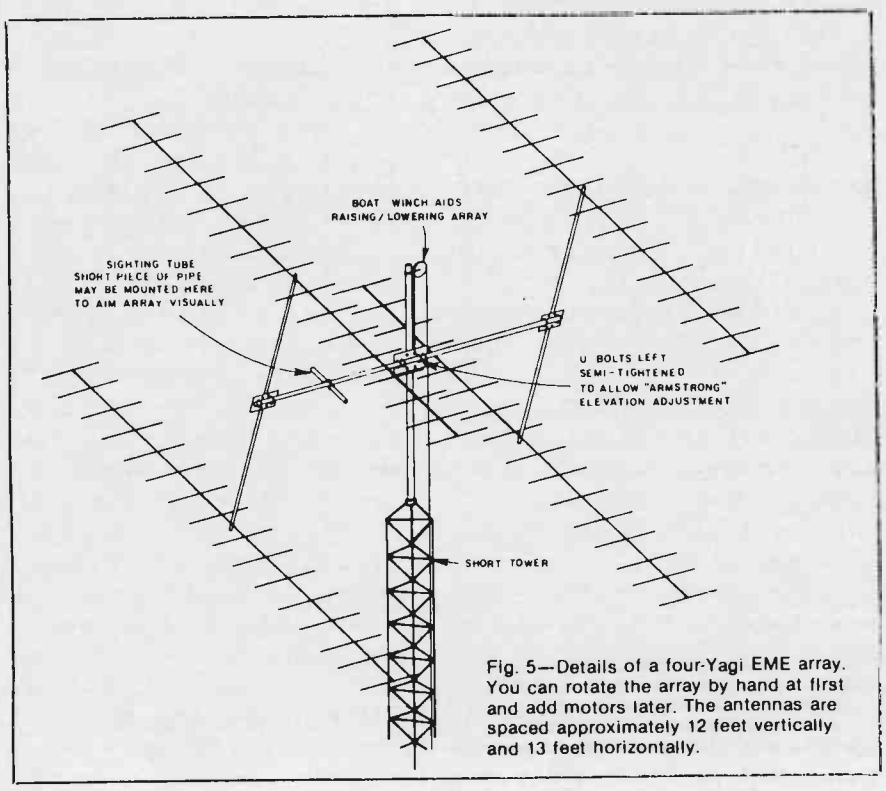


Fig. 5—Details of a four-Yagi EME array. You can rotate the array by hand at first and add motors later. The antennas are spaced approximately 12 feet vertically and 13 feet horizontally.

The array can be tested and calibrated and the complete receive system "tweaked" by aiming first at the sun. (Caution: Never look directly at the sun!) The sun radiates radio noise, which can be readily received and used for testing. This noise varies from time to time, but the level usually stays constant for short periods.

Aim the completed EME array at the sun. With the receiver AGC off, rock the array from side to side and up and down until the signal peaks on the S meter or on a VOM connected across the speaker output terminals. The main electrical lobe of the antenna isn't always the same as the mechanical center of the array, so peaking the antenna on sun noise will help you to determine where your antenna is actually pointed.

Once this is done, the position of the sun can be noted with respect to one of the antenna booms, or you can use a 2-inch-OD pipe, about 2 feet long, for a "boresight tube" to line up the array (just like a telescopic sight on a rifle). With the array peaked for maximum sun noise, hold a piece of paper near the rear end of the tube and move the boresight around until the sun casts a symmetrical spot of light on this paper. When the spot is symmetrical, the boresight is aligned with the main antenna lobe. Never look at the sun through the boresight tube!

If you can see the moon through the boresight, then your array is zeroed-in. The moon will appear to move very quickly because of the earth's rotation, and reaiming will probably be needed every 15 to 20 minutes, depending on the array beamwidth.

For several days each month, the moon is at perigee, the part of its orbit that places it closest to the earth. At this time, path loss is lowest and you may hear your signal echo off the moon about 2.5 seconds after releasing your key. It is not necessary to hear your own echoes to have a QSO. Often the suggested antenna gain of about 20 dB will not be quite enough to hear your own echoes, although many stations with larger arrays can copy you. You should be able to hear many of the larger stations with an array of four Yagis with about 20 dB of gain. Listen for activity, especially on those days listed in Table 2. If you can hear stations, chances are good that your system is working.

[1] *The Nautical Almanac for the Year 1985,* available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Price: $10.

Getting In Touch

EME enthusiasts have a well-developed system of exchanging information, and you can tap into this network to get in touch with active operators who can help you get started.

Nets

Every Saturday and Sunday, EME operators gather on 14.345 MHz to exchange information and arrange schedules to work each other. The 432-MHz-and-above EME Net meets at 1600 UTC each day, while the 144-MHz group meets at 1700 UTC.

The Central States VHF Society conducts a net each Sunday evening on 3.818 MHz at 9:30 P.M. CST (0330 UTC). Although this net is a general-interest VHF net, many active EMEers attend. In addition, active VHFers gather informally on 3.818 most nights of the week.

Newsletters

Several monthly newsletters cater to the EME operator. You can find a lot of good information in these newsletters, and it would be worth your while to subscribe if you are interested in EME. They are

2-Meter EME Bulletin, c/o Gene Shea, KB7Q, 417 Stadhauer, Bozeman, MT 59715.

VHF/UHF And Above Information Exchange, c/o Rusty Landes, KAØHPK, P.O. Box 270, West Terre Haute, IN 47885.

KCØW's VHF + Update, P.O. Box 11023, Reno, NV 89510-1023.

Terms Commonly Used by EME Operators

apogee—that point in the moon's orbit where it is farthest from the earth.
az-el mount—an antenna mount that allows adjustment of both azimuth and elevation.
declination—refers to the moon's position, north or south of the earth's equator. Northern declinations occur for several weeks each month and are usually good periods to operate because of reduced background noise radiation from sources in space. These sources often mask the low-level signals returning from the moon.
Faraday rotation—a rotation of the polarization plane of radio waves when the waves travel through the ionosphere. Echoes will often return out of polarization with the receiving array. The polarization of a returning signal slowly rotates and will line up with the receiving array after some period.
perigee—that point in the moon's orbit where it is closest to the earth.
polar mount—a type of antenna mount whereby the axis of rotation is aligned with the North Star. Used by some operators, primarily those with dish antennas.
sked weekend—when most operators tend to operate each month because conditions are favorable (see Table 4).
sun noise—radio noise from the sun, which varies with solar activity. This noise can be used to test EME systems, but it can also mask echoes from the moon when the sun is close enough to the moon to be in the main lobe of your antenna.
universal window—a common aiming point in the sky, where stations can see the moon at the same time.

Operating Techniques

Almost all EME work is done on CW. Like most of the specialized areas in Amateur Radio, EME has its unique problems, so a unique operating style has been established to enhance communications. I'll present the basics here. EME is an extremely weak-signal mode, so experience first with meteor scatter and SSB/CW DX modes on VHF is very helpful. Patience is required above all; such

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Table 2
Suggested Times for EME Operations for July-Dec., 1985

Date		Time (UTC)	Date		Time (UTC)
July	13	1200	Nov.	2	0700
	14	1300		3	0800
	20	1800		9	1300
	21	1900		10	1400
Aug.	10	1100		23	0100
	11	1100		24	0100
	17	1700		25	0100
	18	1800		30	0600
Sept.	1	0600	Dec.	1	0700
	7	1000		7	1200
	8	1100		20	2300
	28	0400		21	2400
	29	0400		22	0000
Oct.	5	0800		23	0100
	6	0900		28	0500
	12	1400		29	0600
	13	1500			
	26	0200			
	27	0200			

Good Times for Echo Testing (Moon near Perigee)

Date		Time (UTC)
June	29	0200
July	27	0000
Aug.	18	1900
Sept.	19	2100
Oct.	16	1900
Dec.	14	2000

Several days either side of date given should also be good.
These periods were selected to provide windows of mutual visibility between stations in the U.S. and Europe, low noise and when activity will probably be highest. Times are beginning times, and activity should continue for 4 to 5 hours after time shown.
Suggested frequencies: 144.000-144.020 MHz and 432.000-432.020 MHz.

MOONBOUNCE cont'd

factors as Faraday rotation can cause signals to return out of polarization and nothing will be received for long periods. Faraday rotation usually changes, so some reception will be possible during a one-hour test on 2 meters.

When you have checked your system and completed some receiving tests, it's time to contact an experienced EME operator and attempt a QSO. You can usually find someone who will attempt a QSO if you check into the EME net (see sidebar). If you can't operate HF, look in The World Above 50 MHz column in *QST*, check the results of the ARRL EME Contest, or obtain a copy of one of the EME newsletters for an idea of who is active with a big signal, and write a letter asking for a schedule. These sources are explained elsewhere in this article.

Table 3
Signal Reports Used on 144 MHz

T—Signal just detectable.
M—Portions of call copied.
O—Complete call set has been received.
R—Both "O" report and call sets have been received.
SK—End of contact.

Operating times and procedure must be agreed upon in advance and a frequency selected. The usual procedure on 144 MHz is for each station to transmit for two minutes and listen for the next two minutes; the easternmost station begins by transmitting the first two minutes of the hour. This sequence continues for one hour or until the QSO is completed. Clocks must be calibrated carefully with WWV or at least with each other.

Two-meter EME QSOs follow a set procedure. See Tables 3 and 4. Call signs of the stations are repeated during the first minute and a half of each two-minute sequence. Once an operator hears his call sign, he will send a signal report during the last half minute. If he hears nothing, then nothing is sent during the last half minute.

Table 4
144-MHz Procedure—2-Minute Sequence

Period	*1½ Minutes*	*30 Seconds*
1	Calls (W6XXX DE W1XXX)	
2	W1XXX DE W6XXX	M M M M
3	W6XXX DE W1XXX	O O O O
4	RO RO RO RO	DE W1XXX K
5	R R R R R	DE W6XXX K
6	QRZ? EME	DE W1XXX K

If complete call signs are copied, an O is sent as the report; if portions of calls are heard, an M is sent. Experienced operators sometimes use the RST system if signals are very strong. Once you hear your report from the other station, discontinue sending call signs (except as required by FCC for identification) and begin filling the first 1½ minutes of your 2-minute transmit periods with RO RO RO RO. This indicates "Roger my report. Your report is O." Send O until you hear an RRR from the other station. Many finish a QSO by sending 73 73 73 SK SK SK. Discussion with the other operator prior to beginning the test should help clarify QSO procedure.

That's the end of our overview of EME operation. If you think you would enjoy putting together a station, read the referenced articles and books for more information. Most important, contact active EME operators and ask for help. Don't be bashful! Most would jump at the chance to help you get on the air "off the moon." With some work, you can join that exclusive club of operators who have QSOed via the ultimate long path!

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Lightning Protection for Your Equipment

Don't Blow It!

by W. Clem Small, KR6A

In the August 1985 issue of Monitoring Times, reader Kal White suggested that an article on lightning protection, both for electronic items and for antennas, would be of interest to our readers. And from quite another source, the Radio Communication Handbook(1), the same concern is voiced: "In order to achieve the most efficient radiation from an aerial, it should in general be erected in the clear and as high as possible. In such conditions it then becomes a potential hazard since it represents a very good lightning conductor.

"A strike to an unguarded aerial can have disastrous results in the radio room, causing damage which may be serious or even fatal. It is therefore prudent to give some thought to the question of lightning protection when erecting an antenna system."

I agree with both reader White and the handbook just quoted, so let's be "prudent" and "give some thought" to various points of interest in respect to lightning and protection from its effects.

If you live in an area such as the San Francisco Bay Area where I live, you might choose to forget about lightning protection. Lightning damage is so infrequent here that most radio enthusiasts I know do not include lightning protection at their stations.

That doesn't mean there are no strikes by lightning around here--there are occasional reports of lightning damage. Usually, they are to tall tower-mounted antennas and the associated equipment, located on high hilltops. Still, most of the people that I know in this area do not utilize lightning protection and are generally none the worse for it.

Back in the midwest as a kid, however, it was a different story! Thunderstorms were frequent and severe. I recall an antenna one of my friends had which was not grounded and, luckily, was not connected to his receiver at the moment that lightning struck it. He was in his house at the time, and was startled to behold "electrical fire" shoot off the end of the antenna lead-in and bounce around the room like a ball!

My friend's experience was not unique and there are many radio enthusiasts like reader White who are not so lucky as to have only harmless "balls of fire" result from the lightning strike. There are many areas of the U.S.A., and of the world in general, where these "bolts from the blue" are not too uncommon. So, for many MT readers, lightning protection is a factor to consider.

Past studies have shown that, in the U.S. alone, lightning may cause up to 400 deaths, 1000 injuries and millions of dollars in damage annually.(2) Danger to persons is minimal, however, when they are indoors in a substantial building such as the average home.

Danger is maximum in outdoor exposed areas on high places such as hills or tall buildings. Taking cover under a single isolated tree is not safe, either, as the tree may attract a lightning strike and the current thus passes down its trunk to the area beneath, perhaps exploding the tree trunk and sending chunks of wood flying as this happens.

And don't believe that old adage that "lightning never strikes twice in the same place." It does strike repeatedly in the same place in some locations. Tall towers on high hills in areas where lightning is common are hit repeatedly by lightning bolts.

Underground caves, low ground and dense woods are safer areas. Much useful information on protecting buildings, towers and even trees from lightning damage is contained in reference (2).

BEN FRANKLIN FOUND THE "KEY"

Let's take a look at the history of the problem. Most MT readers are probably familiar with Benjamin Franklin's famous key experiment in which he showed that lightning was electrical in nature. Not so well known is Franklin's "sentry box" experiment(3) which actually preceded the kite experiment.

In the sentry box experiment a tall metal rod with sharpened end was extended over a small enclosure. The rod extended through the box to an insulated platform on which a man could stand to test whether there was electrification, via the rod, of the platform.

Several experimenters were actually killed by lightning while trying Franklin's experiments!

The rod of the sentry box was the first lightning rod for which Franklin is now famous. Lightning rods help protect against lightning by draining atmospheric electricity off to ground slowly through their sharp point, or by attracting and conducting to ground some lightning bolts which might otherwise cause damage to a structure. Lightning rods are currently found on houses, barns and other tall buildings the world over.

To begin your lightning protection program, you might consider installing lightning rods on high exposed buildings or trees. A lightning rod must extend at least 10 inches above the building or tree it protects and be connected to the ground by a heavy electrical conductor. Wire size recommendations vary from 10 gauge to 17 gauge, with one source suggesting that 13 gauge should be adequate for the largest discharge one might expect.(2)

The grounding wire should run from the lightning rod to the ground with as little bending as possible: sharp bends in the wire may make it ineffective. Rods used for the ground connection are usually at least eight feet long, driven vertically down into the earth. The use of water pipes, especially newer ones which may utilize plastic-pipe sections, is discouraged. Gas pipes are never utilized for ground connections for obvious reasons.

As explained below, adding lightning protection to tall buildings and trees

LIGHTNING PROTECTION cont'd

surrounding your station can be an important part of the overall lightning-damage prevention-and-minimization program for your station.

PROTECTING THE ANTENNA AND FEEDLINE

OK now, so much for the general protection, what about the protection of antennas and communication gear? Metal antenna towers are fine lightning rods if they are grounded at the lower end, but ungrounded, they can lead to problems. For instance, a lightning strike on an ungrounded tower can follow the tower into its base and explode the base as it seeks the ground beneath.

If your tower is such that it must be left ungrounded in order to function as a base-fed antenna, you might want to consider using a lightning arrestor of some sort at the base of the antenna. One type of arrestor which is used on vertical antennas is shown in figure one.

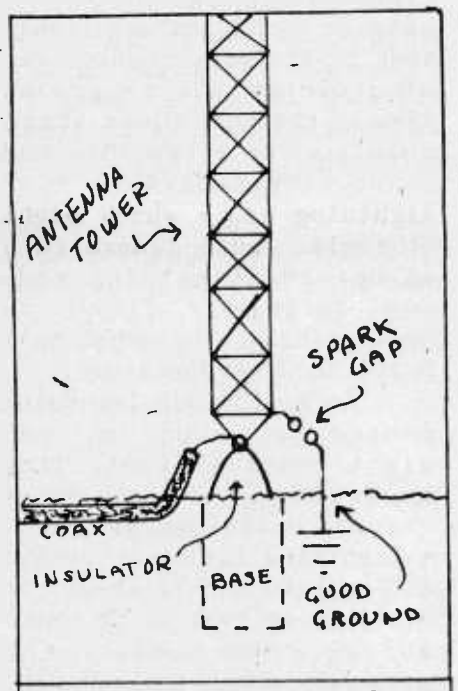

FIGURE 1. SPARK-GAP TYPE LIGHTNING ARRESTOR USED ON UNGROUNDED TOWER. COAXIAL CABLE BRAID CONNECTS TO BURIED RADIALS [NOT SHOWN]

A switch which grounds the antenna at the base when the antenna is not used is also a protection, but must not be accidentally left shorted during antenna use, especially during transmission.

The shield or outer braid of coaxial cable feedlines which leave the tower should be grounded as they enter the house. Running them underground for their outside length is a good idea also. Antenna rotor cables and transmission lines would have some protection if threaded down through the center of the tower rather than coming down alongside it.

These sorts of precautions are valuable for protection against near-miss strikes. If you sustain a direct hit from a sizable lightning bolt, it is likely you will sustain equipment damage and possibly tower damage, even with the precautions suggested. That's one argument for using lightning rods of various nearby buildings and tall trees. If you get the lightning bolt to leap to ground through these rods before it gets near to your antenna or tower, then your equipment won't get the direct strike, and you have won half the battle. The other precautions suggested in this article will help with the other half.

INSIDE THE STATION

What can you do to minimize damage to equipment once the strike has gotten past the defenses you have provided outside? First, for your own safety as well as for the welfare of your equipment, you should never operate your equipment during weather likely to

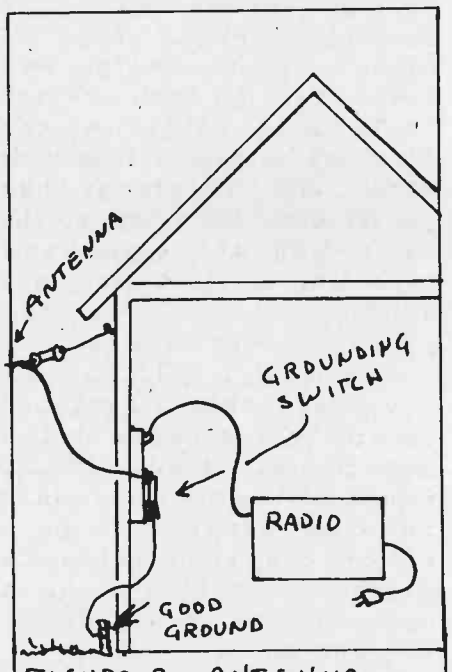

FIGURE 2. ANTENNA GROUNDING CIRCUIT.

produce lightning. Secondly, there is only one sure way to protect your equipment from lightning: Disconnect it from the antenna and power line after you use it. The disconnected antenna should be grounded (see-fig. 2).

These precautions are admittedly a nuisance, but one that I have lived with during the thunderstorm season. After seeing the "well-fried front end" of a friend's rig, I became a believer. This approach admittedly takes a few extra seconds each time you operate, but it is fool proof.

Some old timers use an automatic set-up such as that shown in figure three, although as you go higher in frequency into the UHF

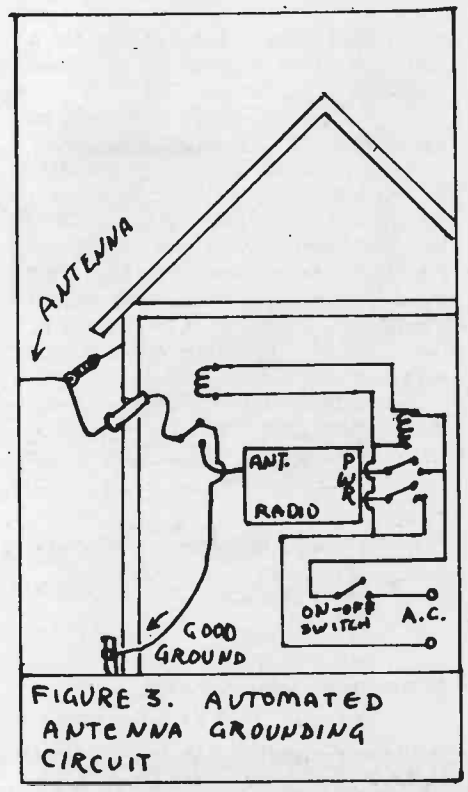

FIGURE 3. AUTOMATED ANTENNA GROUNDING CIRCUIT

region, the switching of the antenna by this system may cause some loss in signal strength. Good quality antenna relays will help here. For open wire lead-ins use an open frame type relay; for coaxial lead-in, there are coaxial relays available. A good source of information on lightning protection for antennas and towers is Radio Communication Handbook(1), referenced above.

There are also various types of lightning arrestors available from electronic parts houses which may be attached to your antenna as illustrated in figure four. Some radio enthusiasts even make their own spark-gap type arrestors from scratch using an automotive spark-plug. The gap is usually set as close as the situation will allow without shorting out the antenna to ground.

(Ed.Note: While spark gap lightning protection may be adequate for tube-type radios, the amount of voltage present jumping an air gap is enough to spell doom for most solid-state receivers and scanners.)

When there is transmission involved as well as reception, be careful not to set the gaps so close that they arc during transmission. Also for transmitting antennas, if you have sizable SWR on your transmission line (who doesn't at times?) you would probably profit from finding a voltage node for the place of attachment for the lightning arrestor.

There are in-line lightning arrestors available for coaxial cable lead-ins, too. For receive-only antennas, a neon bulb or special gas tube protector connected between antenna and ground will afford a degree of protection by discharging some low level electrical pulses and static charges(4).

In planning for equipment protection, there is another lightning-conduction path to consider besides the antenna-ground system. This is the power line. Nearby or direct strikes to power lines may cause massive surges to propagate along the power lines and enter your equipment, destroying as they surge. Various surge protectors are available from electronic supply houses.

If you live in "thunderstorm country," give some consideration to a few precautions and protect your equipment. It's a small price to pay for a bit of insurance that your station will continue to serve you faithfully as you pursue your interests in the fascinating field of radio communications. ●

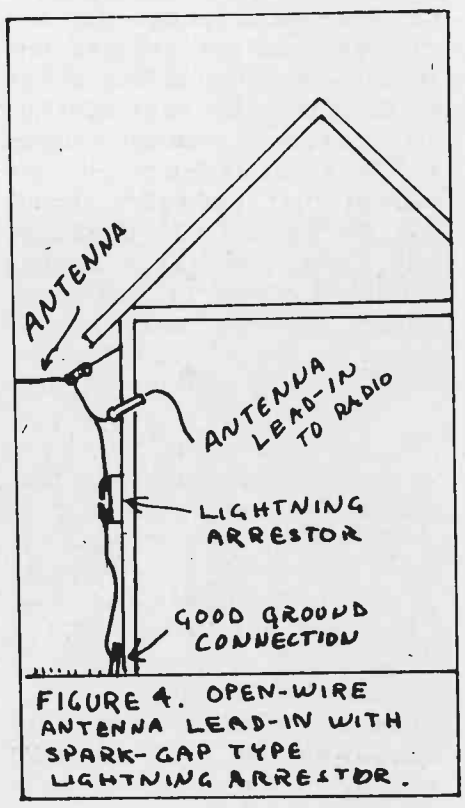

FIGURE 4. OPEN-WIRE ANTENNA LEAD-IN WITH SPARK-GAP TYPE LIGHTNING ARRESTOR.

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GETTING STARTED

by

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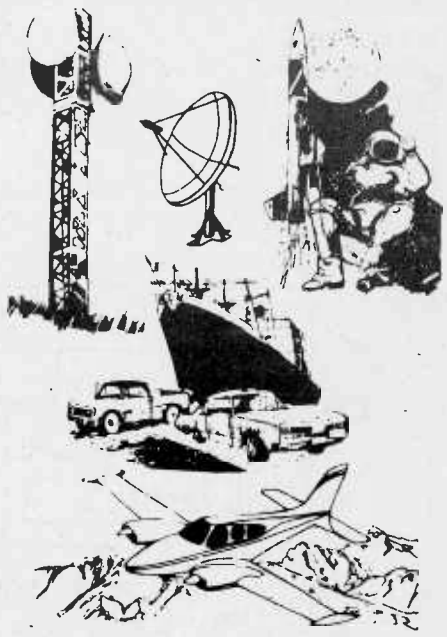
From foot patrols to outer space...

30 MHZ AND ABOVE: VHF/UHF Mobile Radio

Above 30 MHz radio waves are not reflected back to earth as easily as the lower frequency waves are. They follow line of sight paths and are most suitable for short range work of under one hundred miles or so. At times these VHF/UHF signals can be heard at ranges of a thousand miles or more due to unusual conditions.

As the frequency goes higher the waves easily pass through the layers of the atmosphere that reflect lower frequency signals. For this reason VHF and UHF are used for space communications with both manned and unmanned spacecraft.



As a VHF/UHF radio monitor you can hear your local public safety services, tune in amateur radio satellites, hear hams attempt to bounce their signals off the moon or the tails of meteors that pass through the atmosphere, receive photos from orbiting satellites, hear the space shuttle, or a multitude of other communications that are going on in these wide open spaces. The local FM and TV signals come to you via these bands also.

Every mode possible is used on VHF/UHF from CW to super sophisticated computer modes. The majority of radiotelephone operation is on FM except on the aeronautical bands where AM is used exclusively.

Equipment on these bands ranges from simple, low power handheld transceivers to modern high-powered communication systems. Base station antennas are usually located at some high location to maximize their range. Many public safety and business stations use what is called a remote base--this is a system where the transmitter/receiver is located at some high point in the center of the coverage area and the signals are relayed over telephone lines to and from the main office.

Another system popular on the VHF/UHF bands is the repeater; located at a high site, signals are sent to it on one radio frequency and it retransmits these signals on another frequency. This system makes it possible for one- or two-watt handi-talkie units to communicate over ranges of thirty to fifty miles with ease.

One thing you should keep in mind when planning your monitoring station for VHF/UHF is that as frequency increases the signal acts more like light waves and buildings, hills and even vehicles can block and reflect signals easily. If you use a portable monitor, it is often possible to improve reception simply by moving the antenna a few inches. It is a good idea to erect an outside antenna as high as possible and use good grade coax cable for optimum reception at these frequencies.

30 to 50 MHz

On this end of the VHF range--"low band"--signals sometimes behave more like the lower frequencies and it is not unusual to hear stations skipping in from several thousand miles away; in fact at times these DX signals may override the local station! This band is less bothered by shadow effect (blocking of signals by hills and buildings) than the higher frequencies are.

Communications on low band are primarily land mobile, base stations in contact with mobile or portable units. These mobile units can be foot patrolmen, car or truck units, construction equipment; or even railroad trains. Users of this band vary from public safety to business and government agencies.

50 to 54 MHz

This is the six meter amateur band, where CW, SSB, AM, RTTY and ASCII modes may be heard from 50 to 51 MHz, and FM above. Range on six meters will be 100 to 300 miles for a well-equipped station. Hams send signals halfway around the world on this band when conditions are optimum, but this is not common.

54 to 72 MHz

Television chan. 2-4.

72 to 76 MHz

Reserved for low power industrial communications, signals may be fork lifts, remote control, paging, plant patrol, telemetry, and signalling. The military also has some high power (250 watt) units in this frequency range. FM is the dominant mode on this band.

76 to 108 MHz

TV channels 5-6 and FM broadcasting. Range on this band is about 50 to 70 miles, although some FM DX'ers are regularly tuning stations 200+ miles away by using high-gain directional antennas.

108 to 118 MHz

Aeronautical radio beacons (VOR) to guide aircraft to their destinations. Signals are amplitude modulated Morse code (MCW) with some AM radio-telephone messages.

118 to 136 MHz

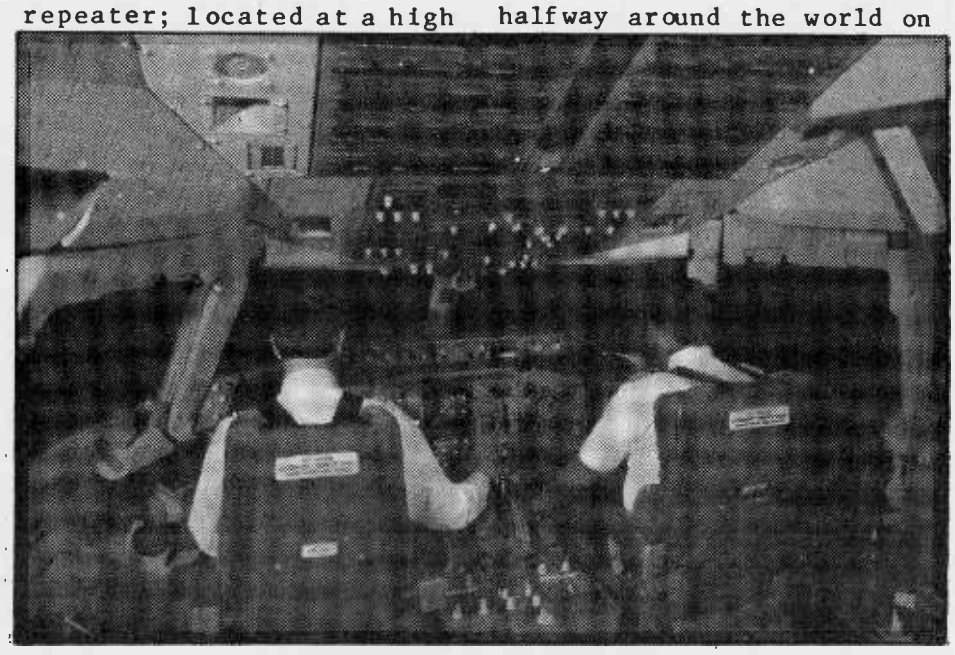
Aircraft communications, both air-to-air and ground-to-air. All communications on this band are AM; there are two reasons for this. VHF-AM was adopted for aircraft communications several years before FM became standard on the VHF bands; thus, it was too difficult to adapt the newer and better FM mode.

Additionally, when two AM signals transmit on the same frequency simultaneously, they can both be heard; but, due to the "capture effect," only one FM station would be heard.

Range on this band depends upon what you are trying to listen to. Aircraft in flight can be heard for several hundred miles but ground stations (the towers) may have a 20 to 30 mile range at best.

136 to 138 MHz

Earth satellites, mostly FM telemetry. This is the home of the weather satellites. With a modest investment, monitors can receive



Beacons on 160 Meters

The hams have recently lost out exclusive rights to the 1900-2000 kHz portion of the radio spectrum. Although not scheduled to begin until May, a number of coastal direction-finding beacons have already turned up in the band.

Recently observed were constant bursts of four-dot groups on 1912.4, 1916 and 1919.5 kHz. These and other automatic transmitters join in the foray in the 1620-1800 kHz maritime radio-navigation band.

As the AM broadcast band, presently 540-1600 kHz, gains an additional swath of frequencies (up to 1700 kHz) in the next few years, the navigational beacons have had to move to accommodate the broadcasters.

The hams who inhabit the 160 meter band (1800-2000 kHz) will have to accommodate, in turn, the navigational aids just as the hams had to endure the earsplitting LORAN-A transmissions, now obsolete in this hemisphere, in years past.

GETTING STARTED cont'd

photographs from these high-flying birds.

138 to 144 MHz

This is a government band and the only stations communicating in this range will be affiliated with the U.S. government. Military agencies are most active in this segment. Some CAP and MARS stations can be heard here also. Most communications will be on FM except for military aircraft and some signals will be scrambled.

144 to 148 MHz

The two meter ham band. The segment from 144 to 144.5 is reserved for CW, RTTY, SSB, and AM modes. You can also hear hams using the OSCAR and Russian RS satellites to talk to each other in this segment. The area above 144.5 MHz is dominated by FM communications. Many repeaters will be encountered on the higher end of this band, and it is not unusual to hear two hams chatting with each other using handi-talkies at ranges of 50 to 100 miles through a repeater.

Amateur radio emergency communications nets (networks) use 146 to 148 MHz, and many repeater stations have "autopatch" that allows an amateur to make phone calls through the repeater. All the ham needs is a two meter transceiver and a touchtone pad similar to the one on your telephone.

148 to 150.8 MHz

Another exclusive government band. The same agencies that use 138 to 144 MHz are found here.

150.8 to 162 MHz

VHF "high band"; land mobile, maritime mobile and public safety stations dominate this band.

162 to 173.4 MHz

Government and military communications found here include FBI, FCC, Customs, VA, USAF, USN, US Army, NASA--just about every government entity with a radio.

173.4 to 174 MHz

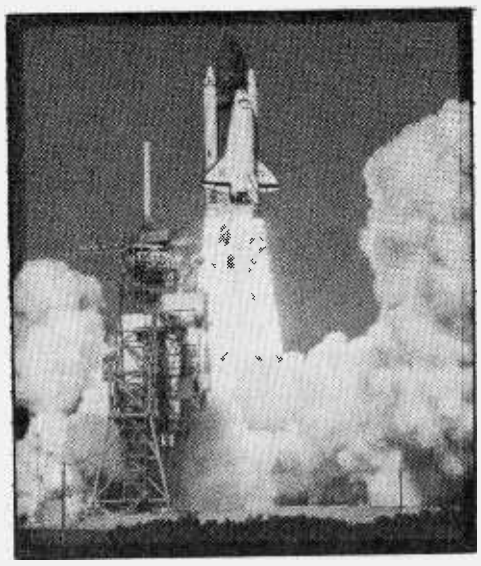
This is a business band and major users are oil companies, news media, taxi cabs, trucks, and other radio dispatched services.

174 to 218 MHz

Television chan. 7-13.

216 to 220 MHz

Navigation band with signals mostly of the beacon type sending coded (data) information for boaters.



220 to 225 MHz

Amateur radio 1-1/4 meter band. Similar to 2 meters in use and modes but not as popular since there in an ongoing possibility that this band will be taken from the amateurs and transferred to the land mobile service. Amateurs are not anxious to invest in equipment that they may not be able to use.

225 to 400 MHz

Military aeronautical and satellite communications. If you are lucky you can catch AM voice communications between the Space Shuttle and ground tracking stations on 259.7 or 296.8 MHz, backup for the primary S-band link on all space flights. Military aircraft use this band on AM mode, while ground and satellite links will be FM--usually scrambled.

400 to 406 MHz

Telemetry from weather probes, balloons and remote weather sensing stations.

420 to 450 MHz

3/4 meter amateur band--CW, AM, SSB, RTTY, ASCII and TV--yes, hams send live television on this band and equipment to see their transmissions is fairly simple and inexpensive. A simple converter can be purchased for about fifty dollars. Range of the TV signals is about 50 miles if you use a good antenna and are in a decent location. FM is also popular on this band with ranges being similar to two meters.

450 to 512 MHz

UHF land mobile band with the same types of stations heard on 150.8-174 MHz.

512 to 806 MHz

UHF television channels 14-83 share some of their band edges with UHF land mobile since TV allocations may be from 470-890 MHz.

806-960 MHz

This rapidly-emerging "cellular mobile" band is a hotly-contested part of the spectrum. More and more scanners are now being made to listen to this newest area of radio communications. ●

Audiovox cellular phone

ANTENNA TALK

W. Clem Small KR6A

PROPAGATION:

What happens after the signal leaves the transmitting antenna?

Last month this column considered a variety of factors concerned with antenna performance. It is, of course, very useful to understand the basics of antenna functioning in order to select and utilize an effective antenna system for your particular needs. Interestingly enough, however, there is also considerable value in knowing something about the factors which are likely to affect the signal on its route from the transmitting antenna to the receiving antenna. What I'm referring to here is commonly called "propagation," "wave propagation" or "signal propagation."

If you understand the basics of radio wave propagation reasonably well, it will give you an edge in such things as knowing when to listen for signals from a particular country or geographic location, and which bands are likely to have stronger signals in daytime while others are best at night.

PROPAGATION MODES

There are three basic ways, or "modes," in which waves travel between the transmitting antenna and the receiving antenna.

1. Waves may leave the transmitting antenna and move along the surface of the ground, actually in contact with the ground. These waves are known both as "surface waves" and "ground waves" (fig. 1).

2. Waves may go from the transmitting antenna directly through space to the receiving antenna, having no contact with the ground. These waves are known both as "space waves" and as "direct waves" (fig. 2).

3. Waves may leave the transmitting antenna and travel upward to various layers of the ionosphere where they reflect back to earth on their way to the receiving antenna. These waves are known as "sky waves" or, occasionally, as "skip waves" (fig. 3).

Although figures 1, 2 and 3 each show only one mode of propagation, an antenna may well produce two or all three modes of propagation simultaneously. The figures show only one mode each in order to keep things simple in the drawings.

SURFACE, OR GROUND WAVES

In the early days of radio, ground wave propagation was essentially the only mode of propagation used. The popular Marconi antenna provided the vertical polarization necessary for this type of

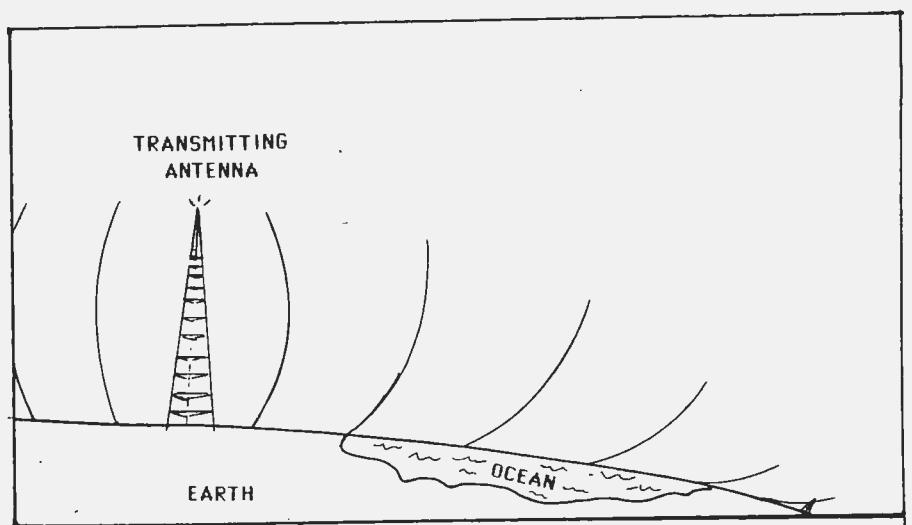


FIGURE 1. GROUND WAVE PROPAGATION.

***ANTENNA TALK** cont'd*

signal. Vertically polarized signals, with their electric field vertical to the earth, are said to travel with "their foot on the ground," whereas horizontally-polarized ground waves are quickly short-circuited in the ground (their whole body length lies along the ground!). Thus, no ground wave propagation is accomplished via horizontal polarization.

Sky-wave propagation was not utilized in the early days of radio because the low frequencies which were employed then are usually absorbed by the ionosphere, as discussed below.

Back in those days, the 1920's and 30's, high power transmitters at very low frequencies (18 kHz, for instance) provided trans-oceanic communication with ground waves "walking" with their "feet in the ground" (or water!) for thousands and thousands of miles. There is a tendency for these waves to tilt forward as they travel forward, due to the dragging of the bottom of the wave in the resistance of the ground (or water) through which it is "dragged" (see fig. 1). As they cover more and more ground, they will finally tilt so much that they topple into the ground and, thus, they too ultimately have their "whole body short-circuited into the ground."

High power VLF and ELF waves can go tremendous distances and provide world-wide communication before they topple into the ground so close to the antenna that they provide no really useful communication. This frequency effect is the reason why the large governments of the world use VLF and ELF for their world-wide naval communication systems.

Using super-power transmitters at such really low frequencies (some of them below the audio range), these communications systems maintain 24-hour contact with ships and submarines around the world. Submarines can even receive these signals when submerged, via the leakage currents generated beneath the surface of the ocean as these signals "walk" by overhead with their "feet" in the water.

Last, but not least, most AM-broadcast band coverage is accomplished via the ground wave mode. It is true, however, that sky wave propagation is responsible for some of the coverage of this service, particularly at night on the higher frequency end of the band.

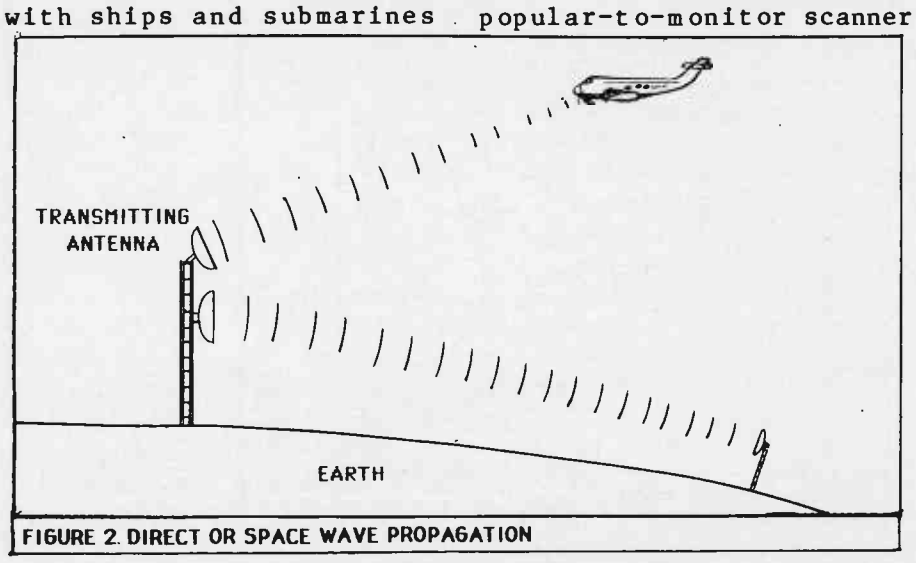


FIGURE 2. DIRECT OR SPACE WAVE PROPAGATION

DIRECT, OR SPACE, WAVES

A very large portion of all radio-type (electromagnetic wave) communications depend upon direct wave propagation. For starters, consider the FM and TV broadcasting services. These broadcasting services are located in the VHF and UHF bands where ground-waves and sky-wave skip are essentially non-existent. At such high frequencies, ground waves "fall on their faces," as described above, before they really get started. Signals this high in frequency, when directed skyward, penetrate the ionosphere completely and have no chance for the reflection necessary for sky-wave communication.

Satellite communication, a source of programming for the FM and TV broadcasting services, also utilizes the direct-wave or space-wave mode of propagation. In view of the fact that satellites are located in space, the term "space wave" seems a particularly appropriate name for this mode of communication.

Two other services which utilize the direct-wave propagation mode are ground-to-air VHF or UHF communications, and microwave repeater systems. Direct-wave propagation is the obvious result of the line-of-sight relationship between stations in these services, and of the frequency range employed. And, certainly, we should not forget that most of the very popular-to-monitor scanner signals are in the frequency range which depends on direct-wave propagation. What would we do without this extremely useful mode? We'd be in trouble, to say the least!

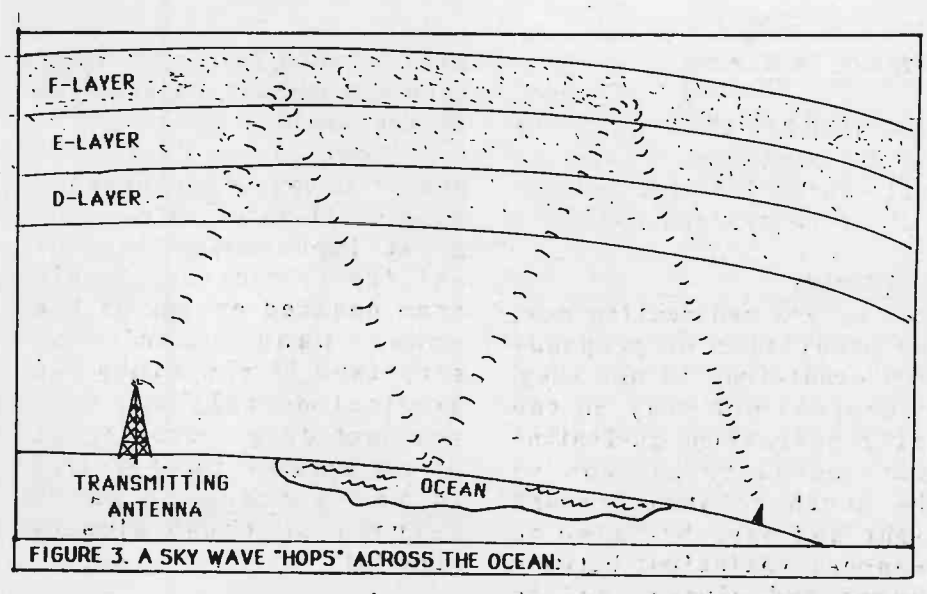


FIGURE 3. A SKY WAVE "HOPS" ACROSS THE OCEAN.

SKY WAVES

The phenomenal ability of short waves to provide world-wide communication is based directly on the sky-wave mode of propagation. As shown in fig. 3, these waves may reflect ("hop" or "skip") one or more times between earth and an ionized layer of our atmosphere (the ionosphere). The various layers of the ionosphere can, depending on conditions, either absorb or reflect these HF signals. With this mode of communication, power levels of less than one watt can sometimes produce contacts with the opposite side of the world.

As you might guess, communication on this mode is not completely reliable, due to the variable nature of the ionosphere. The ions which produce the absorptive and reflective qualities of the ionosphere are created by sunlight interacting with the thin atmosphere high above the earth. When your portion of the world is in sunlight, the thin air of the ionosphere is becoming more highly ionized. When night comes to your location, the ionosphere above you begins to lose its ions.

The higher, thinner regions of the ionosphere produce what is called the F-layer which, during the day, may break into the F1 and F2 layers. As a memory device, you might call the F-layers the "F-for-fine" layers, because they provide a large part of the "fine" DX communications accomplished by sky waves. There is some reflection by the other layers at times, too, particularly the E-layer, but the bulk of HF sky wave communication is due to these "fine" F-layers.

As indicated earlier, the higher the frequency of a signal, the more likely it is that the signal will go on through the ionosphere without reflecting back to earth. Density of ionization is also important; the greater the density, the higher the frequency which the layer will reflect back to earth. Thus, the relatively lightly-ionized nighttime F-layers are adequate reflectors for the lower HF signals up to perhaps 10 MHz while, during the day, when the F-layer is more dense, signals up to 20--sometimes to 30 or rarely even up to 50 MHz--will reflect from the F-layers.

The lower HF frequencies would also reflect from the daytime F-layers if they could reach them; however, they are prevented from this due to their being absorbed so heavily by the daytime D-layer. As a memory device, let's call this the "D-for-degrading" layer, as it degrades or attenuates signals passing through it.

The lower the frequency, the more degrading effect the D-layer has on the signal. This is why you will hear very little DX on the lower HF bands during the daylight hours when the D-layer is more densely ionized.

Now, with the above concepts in mind, consider that you will often notice excellent reception of DX stations at the higher frequencies during daylight hours. The D-layer does not attenuate these higher frequencies much, and the F-layer is highly ionized in daylight so it reflects them back to earth well. Later, at night, the F-layer may be too thin to reflect these higher HF signals and they may pass on into space rather than return to earth. Consequently, you will often find great DX pounding-in during the night on the lower HF bands, say 3 to 10 MHz, during the time when nothing is to be heard on the higher frequencies. This is possible because the D-layer is less ionized at night and attenuates the lower frequency signals

***ANTENNA TALK** cont'd*

less, but the lightly ionized nighttime F-layer is still sufficient for reflection at these frequencies.

IN SUMMARY

As you can realize now, the prediction of propagation conditions is not easy. It depends not only on the daily variations in ionization caused by the sun as the earth rotates through night and day, but also on seasonal variations between summer and winter, and on the 11-year sun-spot cycle.

There are also other less predictable but important factors including solar flares and ionospheric storms. These can cause radio "blackouts," which are periods of total disruption of communications on the bands involved. Obviously, predicting propagation conditions is a highly sophisticated skill.

Nevertheless, you can do a fair job of predicting the action on the short wave bands, in a general way, with the information we've just covered. Professionals can even do a pretty good job of telling us when a particular band will be open between our location and any other geographic location on earth.

If you want to become more adept at the prediction of propagation on the short wave bands, you may want to consult some of the sources listed below (1-10). Don't forget to listen to the propagation factor information on WWV at 18 minutes past any hour. A source like the ARRL RADIO AMATEUR'S HANDBOOK (7) gives descriptions of what WWV's propagation indexes mean.

W1AW also transmits daily propagation forecasts are various times and frequencies via voice, CW and several forms of RTTY--check QST for time, mode and frequency of these reports. And, if we want to make matters even more complicated, there is even some speculation that such factors as alignment of the planets of our solar system may be used to predict special propagation conditions (10)!

The easier path which most of us take in improving our ability to predict propagation conditions between our location and other specific parts of the world is to read the propagation charts which appear monthly in such periodicals as CQ, HAM RADIO, QST, 73, and WORLDRADIO. There are also some useful computer programs available which are designed to predict propagation between your home location and various major areas of the world.

However you do it, the use of propagation predictions will surely give you a great improvement in your ability to receive signals from desired areas. On the other hand, don't be surprised if sometimes the predictions tell you that you must drag yourself out of the sack at three o'clock in the morning to catch certain of those elusive signals!

LAST MONTH'S RADIO RIDDLE

What popular beam antenna of today was developed in response to a need for an antenna which could, without arcing and destroying itself, be used to transmit high power shortwave signals from the moist tropical atmosphere of a certain South American missionary broadcast station?

Answer: The continual failure of ordinary beam antennas at station HCJB, high in the Andes mountains of Ecuador, led Clarence Moore, W9LZX, to design a new antenna configuration: the cubical quad. He did this in order to escape the corona problem which was melting his antenna elements!

By pulling out the midpoints of the flat loop which makes a folded dipole antenna, he changed its shape into a square. This simple change created the shape so familiar to us today in the elements of the cubical-quad beam antenna (11,12). This efficient and popular beam is used today by thousands of stations around the globe for shortwave DX communications.

This Month's Radio Riddle: An important mode of propagation which depends on the troposphere was not covered by this month's column. It provides highly reliable communications, and is of considerable importance in military communications. What is that mode? Answer next month!

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TECHNICAL TOPICS *by Bob Grove*

Q *I am interested in getting into listening to the long wave spectrum. Can you tell me how to find out more about this aspect of the hobby? (John Pantera, Venice, CA)*

A Low frequency monitoring is a specialty that many enjoy pursuing. You may wish to write to the Long Wave Club of America, Box 33188, Granada Hills, CA, for that information; be sure to send a self-addressed, stamped envelope.

An excellent book on the techniques for listening and building specialized equipment for that range is Ken Cornell's LOW AND MEDIUM FREQUENCY SCRAPBOOK, $10 from the author (225 Baltimore Avenue, Point Pleasant Beach, NJ 08742).

The most common way to hear that part of the spectrum is to build or buy a converter which shifts the 0-500 kHz range up to 4 MHz where it can be easily tuned on your present short wave receiver.

Converters are advertised in the ham magazines and are available from LF Engineering, Palomar Engineers, MFJ, and Heathkit.

Antennas may be a simple longwire or, better yet, an indoor loop antenna which can be rotated for best reception from a particular direction or to null out electrical noise. Good luck!

◆◆◆◆◆

Q *Can you recommend a small short wave portable radio that gives good performance? (Beth Frye, Walcarusa, IN)*

A There are no small, inexpensive portables that do a really good job on short wave reception. Nonetheless, some are less bad than others!

The Sony ICF7600 is very popular, as is the Panasonic RF11. I would give these first choice. If you are near a discount store that features short wave portable receivers, try them side by side for:

Sensitivity (weak signals come in well)
Selectivity (strong adjacent frequencies remain separated)
Image rejection (you don't hear whistles that change pitch as you tune)
Distortion (audio remains crisp, unmuffled, even at higher volume)

◆◆◆◆◆

Q *I want to erect a resonant dipole for the AM broadcast band. Using the proper formula, a half wavelength would be 468 feet at 1 MHz. Is this correct? (R.W.Demick, Woodsville, NH)*

A While the answer is correct, there are other considerations. First, a horizontal antenna should be at least 1/2 wavelength high to avoid ground reflections which make the antenna poor for low angle reception; thus, your antenna should be at least 468 feet high! This is a good argument for ground-mounted vertical antennas!

Secondly, with modern high-sensitivity receivers, antennas need not be so long to capture plenty of signal above the background noise. Fifty to one hundred feet in length is plenty.

Thirdly, I wouldn't worry too much about impedance matching at these frequencies; if your received signal is strong, that's all you need to worry about. If signals are quite weak, then a tuner is recommended, however.

◆◆◆◆◆

Q *Can I use a voice descrambler like the Grove DSC-1 with a hand-held scanner?*

A No problem. Simply plug it into the earphone jack. Naturally, you will need a source of 12 volts power and this may limit the portability.

EXPERIMENTER'S WORKSHOP

Broadcast Band Need a Boost? BUILD THIS PREAMP

by Pete Haas

This BCB preamplifier will add 20 dB of gain to the front end of a BCB receiver. It's especially useful for apartment dwellers when outside dipoles are out of the question.

The transistors aren't critical because trimpots were used for key bias resistors so any number of replacement transistors can be used. The preamp runs on a 9 volt battery and consumes about 4 milliamps of current so battery life will be quite long.

CONSTRUCTION

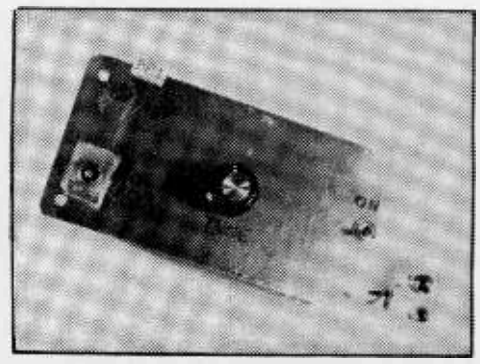
The author's model was built on perf board. Mount C1 on the side of the board opposite of the rest of the components using stiff wire. You can then mount the circuit board to the front metal panel of the project box through C1's threaded shaft without using the usual standoffs.

L1 is a standard slug-tuned loopstick antenna (such as a Miller 6300) coil. They are harder to find these days as hobbyists move on to higher tech projects so here's how to make one in case you have difficulty finding one:

Obtain a slug tuned coil form with a 5/16" O.D. (Look in old tube type TV's and radios.) Wind 11'2" of 36 AWG litz wire (stripped from an old AM radio's ferrite bar antenna) on the form. The coil should be 3/4" long and the turns of wire don't need to be close-wound--just tightly wound.

Give the finished coil a coat of clear nail polish to keep it from unraveling. L2 is made by winding 12 turns of insulated hookup wire over L1 and securing it with a few wraps of black tape. The gauge of wire isn't critical.

In order to easily mount a pointer knob on C1 you may need to epoxy a 1/2" or 3/4" standoff on its short shaft.



Once construction is complete and you've double checked your wiring, set the trimpots to midrange, L1's slug to midposition and C1 to half mesh. Hook up a 3'-5' piece of wire to BP1 and

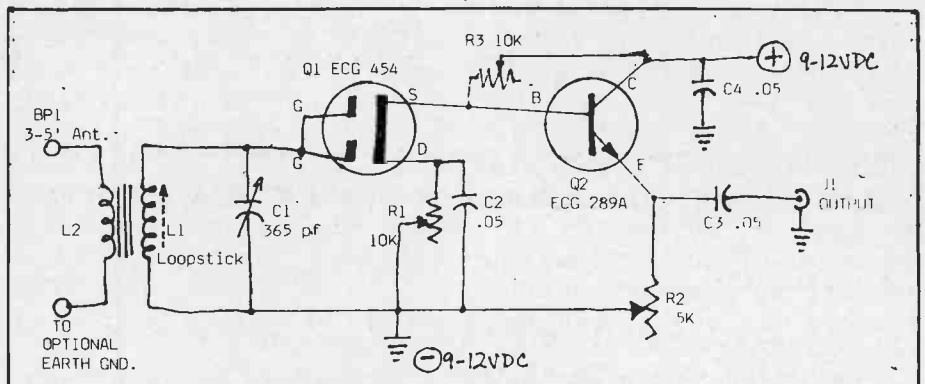
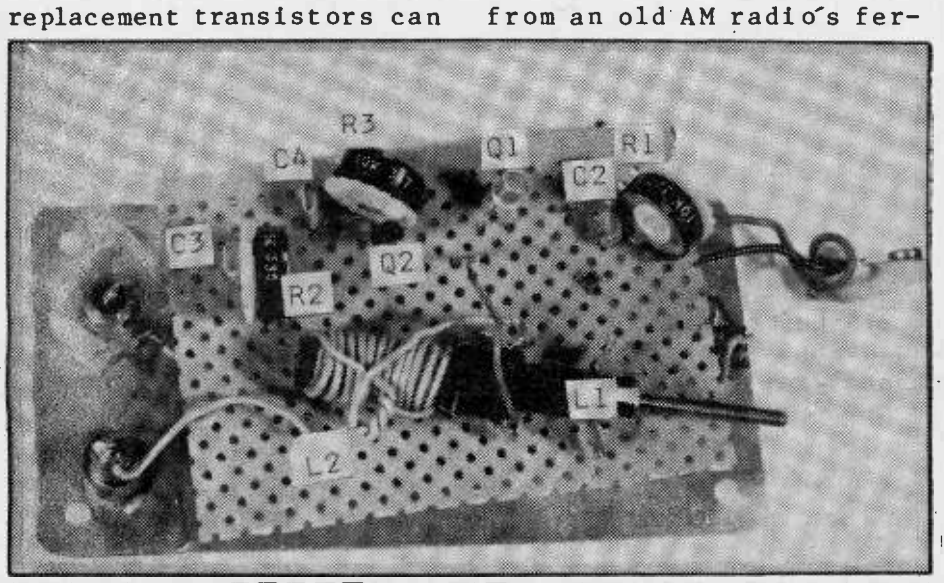
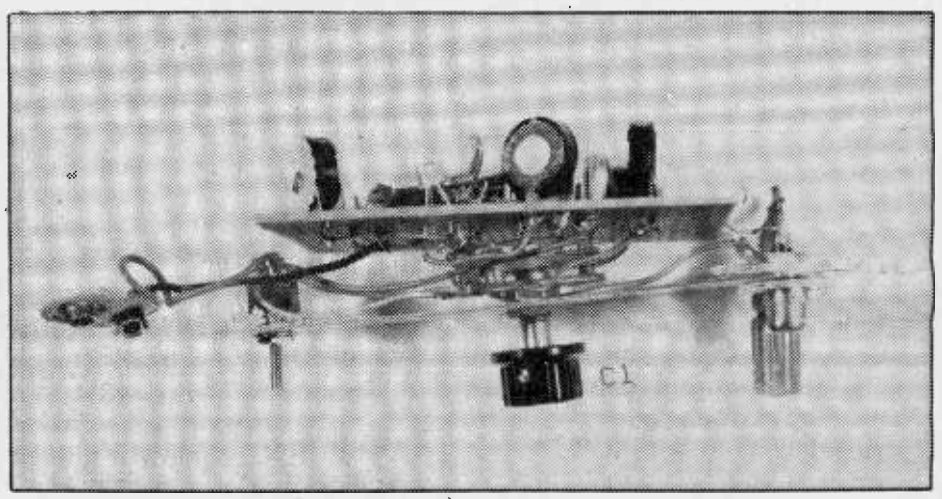


Figure 1- Circuit Schematic





HELPFUL HINTS

Short Wave Ham and BC Bands

The following computerized list, contributed by Jim Dantin, shows the relative placement of amateur and broadcasting bands throughout the short wave spectrum.

0.5265-	1.6065	AM broadcast
1.8000-	2.0000	160 m HAM
2.3000-	2.5000	125 m SWBC
3.2000-	3.4000	90 m SWBC
3.5000-	4.0000	80 m HAM
3.9000-	4.1000	75 m SWBC
4.6000-	5.1000	60 m SWBC
5.8750-	6.2000	49 m SWBC
7.0000-	7.3000	40 m HAM
7.0000-	7.5000	41 m SWBC
9.3500-	10.0000	31 m SWBC
11.6000-	12.1000	25 m SWBC
14.0000-	14.3500	20 m HAM
15.0000-	15.5000	19 m SWBC
17.6000-	18.0800	16 m SWBC
18.0680-	18.1680	17 m HAM
21.0000-	21.4500	15 m HAM
21.4500-	21.7500	13 m SWBC
24.8900-	24.9900	12 m HAM
25.6000-	26.1000	11 m SWBC
28.0000-	29.7000	10 m HAM

SIMPLE TIME ZONE CLOCK

Recently there were several articles on "time" in Monitoring Times. One had a chart to find the time in places around the world. Years ago I simplified this by cutting a circle of heavy paper and writing in cities around the world as below (this is just a short sample).

I stuck the circle to the hour hand of a clock so that it rotates and gives me the time around the world. I use a twelve-hour clock, so I have the same time for London as for New Zealand, which is opposite on the world sphere. A twenty-four hour clock would give a separate place for New Zealand.

Ben Parmele
Virginia Beach, VA

Great idea, Ben! Thanks for sharing it with fellow MT readers....Bob

The HX-1000/1200 as a Signal Generator

Owners of the Regency HX-1000 will be pleased to learn the -1000 makes a good signal generator for checking Bearcat crystal type scanners. Just punch up the same frequency as the crystal you want to check. Remove the antenna from the 1000 for close range service as the oscillation is strong.

Taxi Pirates or Intermod?

Reports from Florida on telephone and taxi pirates in the low band range are apparently coming from persons using Regency HX-1000/1200 scanners. These scanners have an intermod hi/lo conversion of 108.515 MHz. Search from 43 to 47 MHz and high band stations will be heard. Add 108.515 to the frequency on the readout to find the frequency of the spurious signal.

Locked out of the Dog House

Bearcat owners using the Dog House 1000 channel expander have complained about the LOCKOUT mode not working properly. The LOCKOUT mode is retained by the scanner when you switch from one bank to another and the operator has to reset the LOCKOUT either by turning the scanner off then back on or resetting the LOCKOUT positions from the previous bank monitored.

The solution is to program a "clear" frequency into the unused positions rather than lock them out. I selected a frequency on the lower end of low band VHF and have had no further problems.

Larry E. Williams
Radio Research

EX.WORKSHOP cont'd

connect the preamp to a receiver with a midband BCB station tuned in that's of moderate strength. Adjust the three trimpots for loudest reception.

Adjust L1's slug and C1's tuning for best signal. Go through this process at least twice because the adjustments tend to interact with each other somewhat.

MODS:

If you like to DX signals just above the AM band (personally, I like to listen in on the neighborhood cordless phones!) unwind 15" from L1 to kick up the coverage a couple hundred kHz. Conversely, if signals just below the band are your forte, add a 100pf capacitor--or better yet a 100pf trimmer across L1. That should easily give you coverage down to about 400 kHz or so. For a little more gain you can safely run the circuit on 12 VDC.

If you are using a clock radio or other receiver that doesn't have external antenna terminals use figure 2. After soldering a 12-18" length of coax to a loopstick antenna coil attach the cable to the booster. Then physically place the loopstick near the radio's ferrite bar antenna for inductive coupling. Reception should improve immediately.

Nothing beats a full size antenna cut to resonance, but this little booster is the next best thing if you can't put up a long wire antenna. It's also great for portable listening. ●

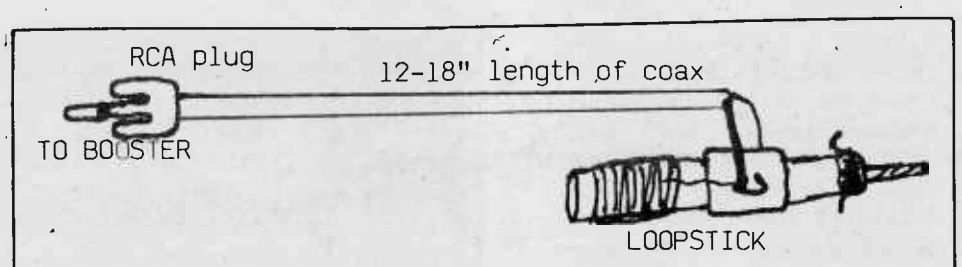


Figure 2-If you have an AM radio w/o external antenna terminals use this coupling setup. Position loopstick alongside radio's internal ferrite bar antenna--vary position slightly until best reception is achieved.

PARTS LIST

C1: 365pf variable cap
C2,C3,C4: .05 MFD
R3,R1: 10K trimpot
R2: 5K trimpot
Q1: ECG 454 or equiv. (FET)
Q2: ECG 289A or equiv.(NPN)
L1: Loopstick antenna coil (see text)
L2: 12 turns of hookup wire closewound over L1

Bug Your Own Phone with this FM TRANSMITTER!

by Pete Haas

Here's a nice little FM transmitter that obtains its power from the telephone line (that's OK, now, with the breakup of AT&T!), transmits only when the phone is off the hook and has a usable range of 100 feet. Its uses include conference monitoring, but it should not be used as a bug without legal permission.

Since we're dealing with VHF frequencies, be sure to follow the diagram for proper parts placement. The entire circuit can be assembled on a 1-1/2" x 1-1/2" piece of perf board using short, direct wiring techniques. A 4" length of wire serves as an antenna.

The ferrite slug for L1 is not particularly critical; it measured 1/8" dia. x 3/8" length when I removed it from an old CB circuit board containing lots of synthesizer coils. AM/FM radios manufactured in the past six or seven years also have similar IF cans with suitable cores.

The diameter is the critical dimension--on a micrometer it should measure about 125 thousandths of an inch. Slugs longer than 3/8" should work OK, too.

The value of C1 (the tuning cap) was chosen to cover a fairly wide variety of inductances produced by cores of slightly different composition.

After winding four turns of #28 enameled wire on the slug, leave 1/2" protruding, scrape them and tin them carefully. The turns of wire fit into the threads of the slug.

Once the circuit board is completed double check your wiring. Take the phone off the hook and, with a dial tone, check polarity of the incoming wires. The voltage should be around 50 volts.

Point A on the circuit goes to the negative phone wire. Cut the positive side of the phone line (or disconnect it from the phone's internal connections and attach point C of the circuit into the telephone. Connect point B to the incoming positive side of the phone line.

Tune an FM radio to a quiet spot on the dial; take the phone off the hook and, using a plastic screwdriver or alignment tool, tweak C1 slowly until the dial tone is heard on the radio. If you can't get a signal and you are sure the circuit is OK adjust the ferrite slug in or out of the coil and try again.

Eventually you'll get the transmitter within the FM band range. Call up the time and temperature to make sure the audio signal is clean.

The transmitter may produce a weaker second harmonic signal; if you adjust the primary signal below the bottom of the FM band (say, 85 MHz) you can hear the second harmonic at 170 MHz on a scanner. Just put the scanner in the search mode and it'll lock on. It may even be more convenient to monitor this transmitter using the second harmonic signal.

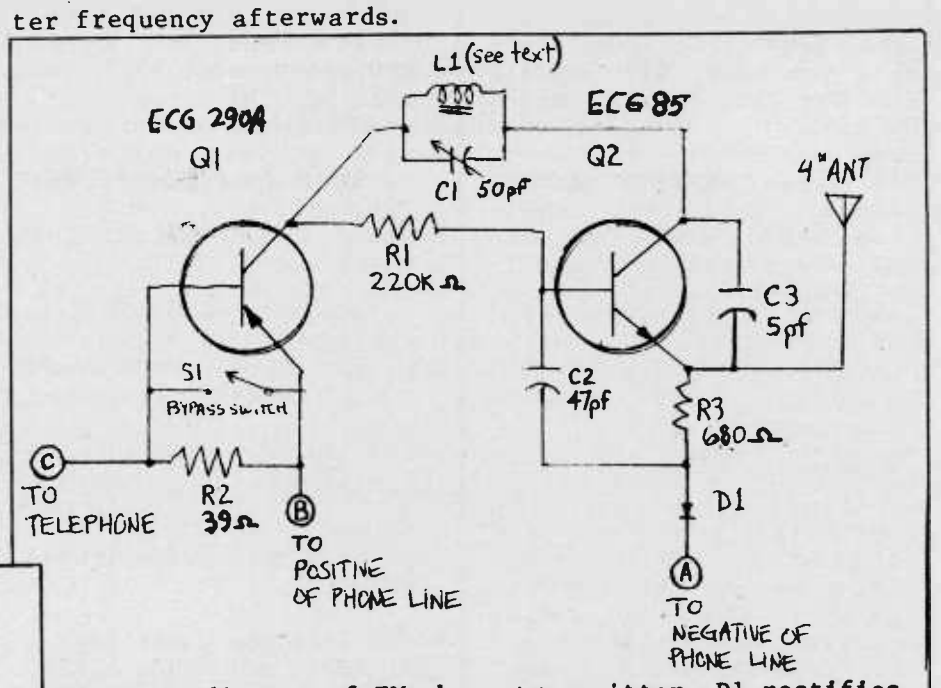
If you mount the circuit board inside a phone it will only transmit when that particular phone is in use. If you have multiple extension phones and want it to work on all of them, install it where the telephone line first enters the premises.

To increase the range of the transmitter, change antenna length to about 6" and wrap it around the pair of phone lines. This inductively couples the radio signal to the phone line going out to pole. You may have to retune the transmitter frequency afterwards.

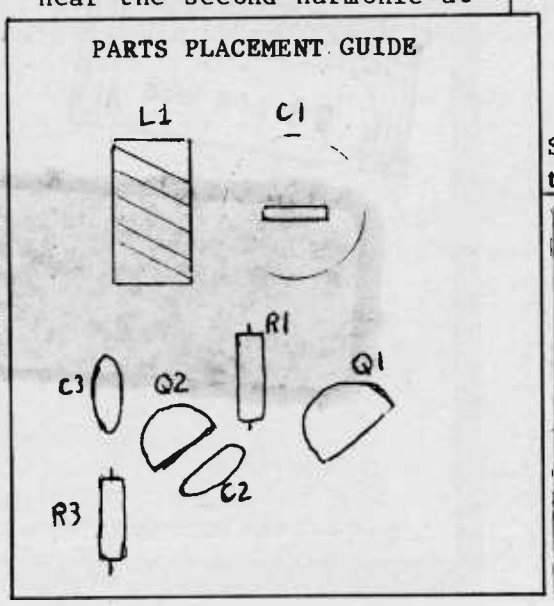
But remember--your neighbors might accidentally start hearing your conversations! A sensitive scanner with an outdoor antenna will hear the second harmonic farther than you think, so use an antenna just long enough to do the job. And use the bypass switch when you want to insure total privacy. ●

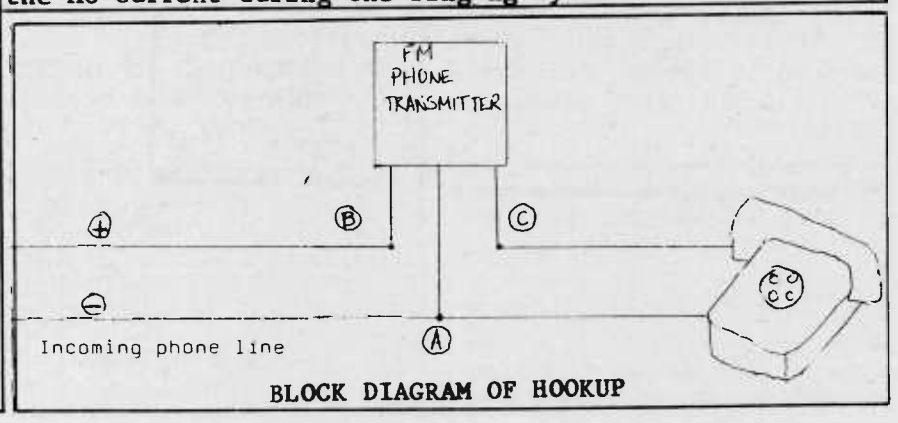
PARTS LIST

Q1	ECG 290A
Q2	ECG 85
R1	220K
R2	39 ohm
R3	680 ohm
C1	50 pf trimmer
C2	47 pf
C3	5 pf
D1	200 PIV 1 amp diode
S1	SPST switch



Schematic diagram of FM phone transmitter. D1 rectifies the AC current during the ringing cycle.





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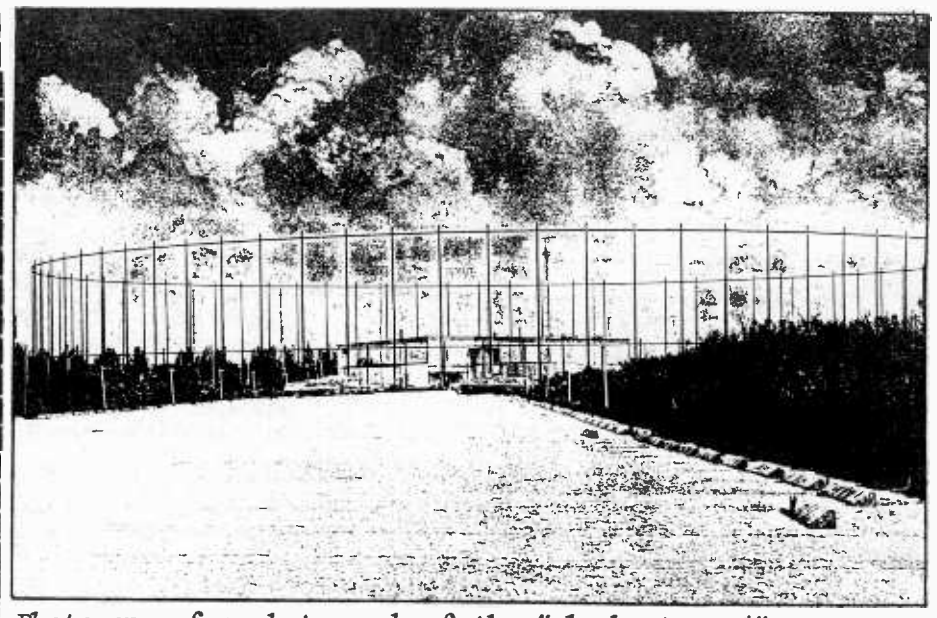

Photocopy of a photograph of the "elephant pen" at Homestead AFB and operated by the Naval Security Group.*
**RDF array*

INFORMATION PLEASE

Monitoring Times will print at no charge (as space permits) announcements and questions of a non-commercial service nature.

WANTED: Canadian scanner frequency information for B.C., Alberta, & Sask. RCMP frequencies. Indicate the area of the province if possible. Will share info from Pacific N.W. area if desired. Anyone with D.O.C. fiche that could give info or loan fiche? Also, anyone with radar detector test gun or radar signal transmitter kit information that would tx for 100 yards. Bob Morehouse, 2437 Allen St., Kelso, WA 98626.

Information, memories (pleasant or not), manuals, or instructions for military surplus radio sets: AN/FRR40 or AN/FRR41 and Navy model RBP diversity radio receiving equipment circa 1942. John H. Rose II, 26015 Thomas, Warren, Mich. 48091.

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