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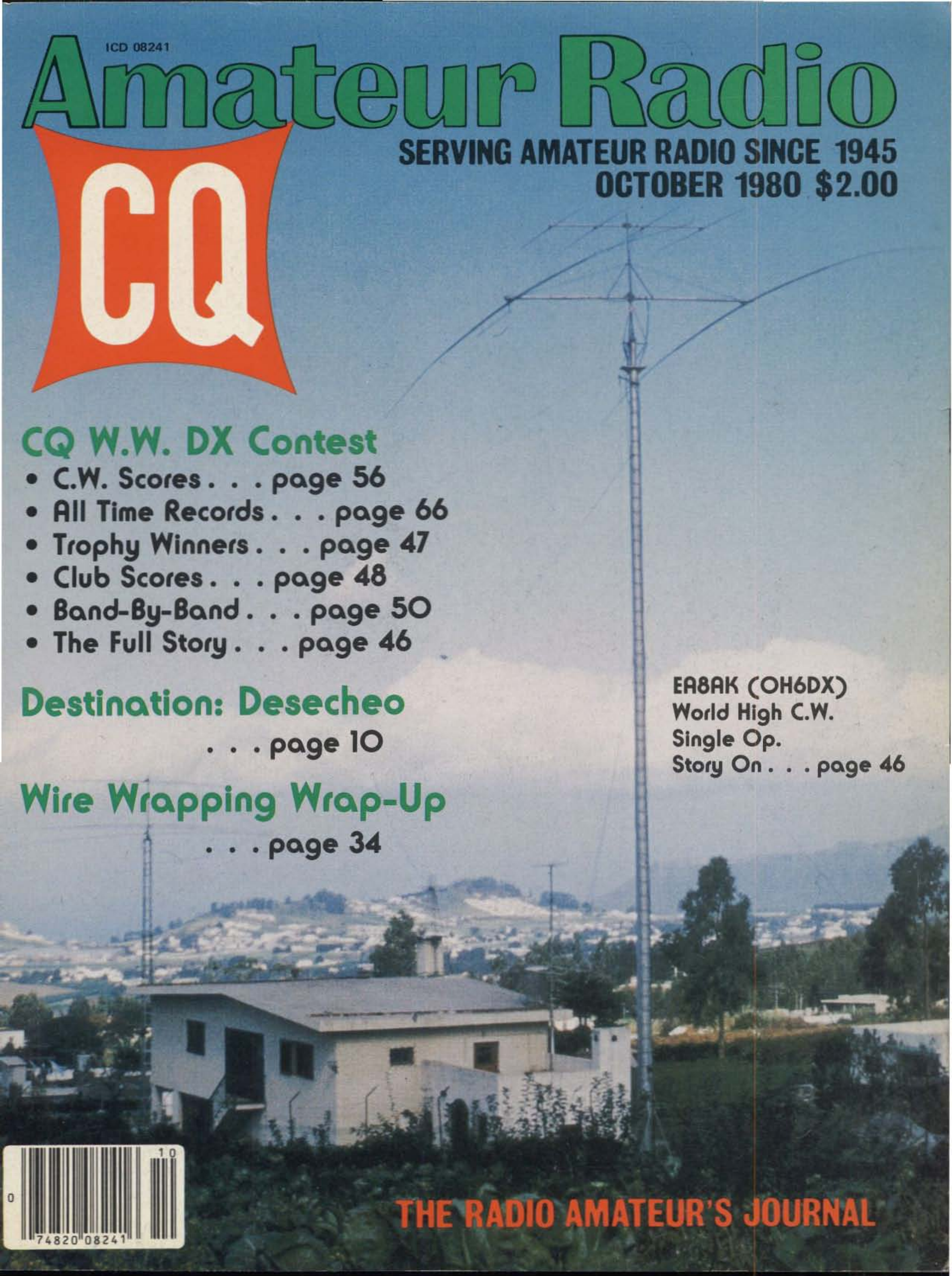
EA8AK (OH6DX)
World High C.W.
Single Op.
Story On . . . page 46



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THE RADIO AMATEUR'S JOURNAL

Rack Attack from DenTron

Components are the latest in communication systems adapting to your stations' needs. The DTR-3KA and DTR-1200L are equipped with heavy-duty handles for easy rack mounting and rack brackets that can be easily removed. The DTR-1200L linear amplifier provides 1200 watts SSB and 1000 watts CW input continuous duty. It features large 3½" shadow box, back lit meters for easy reading, and tuned input for compatibility with solid state or tube transceivers. The DTR-3KA antenna tuner handles a full 3KW PEP. It features a built in 2KW dry dummy load with thermostatically controlled forced air cooling, a remote sensor box to insure meter accuracy and 50 OHM impedance. Component racks available at your DenTron Dealer.

DTR-1200L Linear Amplifier

Frequency Ranges:

80 Meter Band	3.45 - 4.6 MHz
40 Meter Band	6.00 - 9.0 MHz
20 Meter Band	10.00 - 16.00 MHz
15 Meter Band	20.95 - 23.50 MHz
10 Meter Band	Export Model

Modes: USB, LSB, CW, RTTY, SSTV
Power Input: 1200W - SSB, 1000W - CW
Power Requirements: 234/117 VAC 50/60 Hz
RF Drive Power: 150 Watts maximum and 65 watts minimum for 1 KW DC input.
DC Plate voltage: Idle + 2300V approximate
Duty Cycle: 100% SSB, CW, RTTY, SSTV
Input Impedance: 50 Ohms nominal
Input VSWR: 1.5 to 1 average
Output Impedance: 50 Ohms nominal
Antenna load VSWR: 2 to 1 maximum
ALC: negative going, adjustable from front panel
Spurious Emissions: IMD - greater than 30 db down
Harmonics - greater than 40 db down
FCC Type Accepted
Size: 5¼" H x 17" W x 13" D (19" W with rack brackets)
Weight: 46 pounds
Switchable 12VDC accessory output voltage
Multimeter:

Plate Voltage	0 - 3000VDC
Plate Current	0 - 500ma
Relative Output	Adjustable

Front Panel Plate Voltage Switching

DTR-3KA Antenna Tuner

Frequency Coverage: 1.8 - 30 MHz continuous
Built in 2 KW PEP Dummy Load - Forced Air Cooled
Input Impedance: 50 ohms (Resistive) to transmitter
Antenna Inputs
- Coax 1, 2 & 3 - unbalanced—may range from a few ohms to a high impedance
- Long wire - low to high impedance
- Balanced line - 75-660 ohms

Power Capability: 3000 watts P.E.P.
Wattmeter: 200 watts forward
2000 watts forward
200 watts reflected
Accuracy: ± 5%
Remote sensor box
3½" backlit meters
Dummy Load: with manual or automatic forced air cooling.
Integral 3KW Balun

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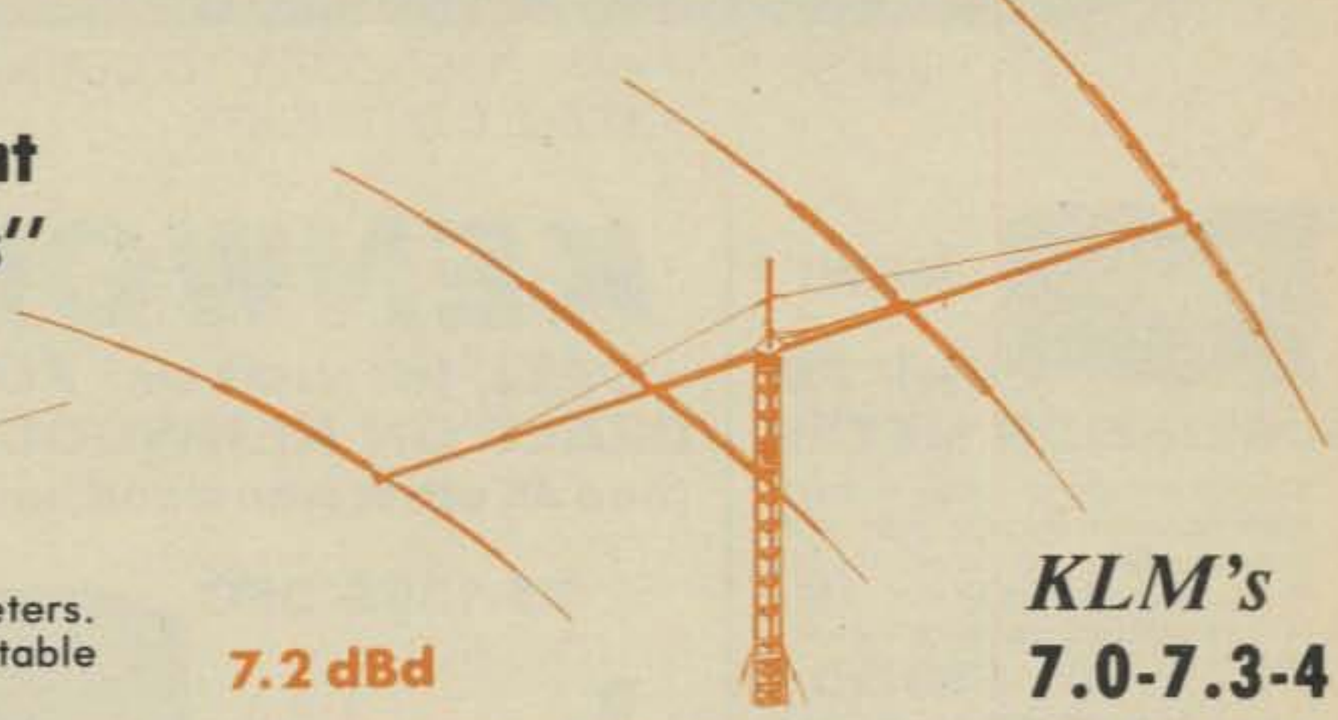

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KLM's 7.0-7.3-4

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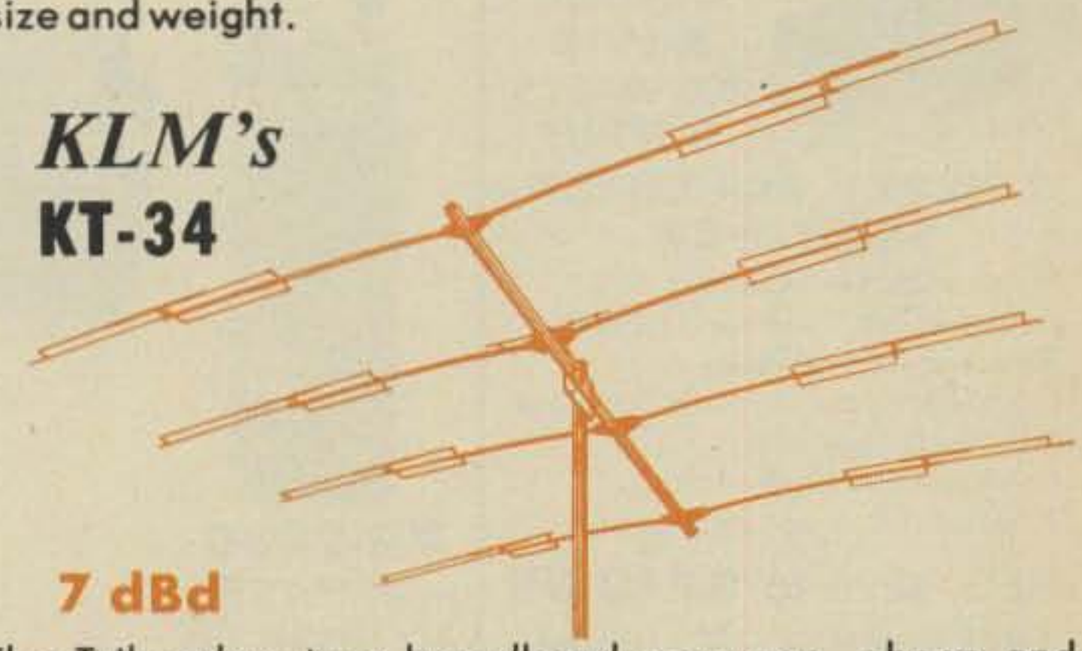

KLM's KT-34

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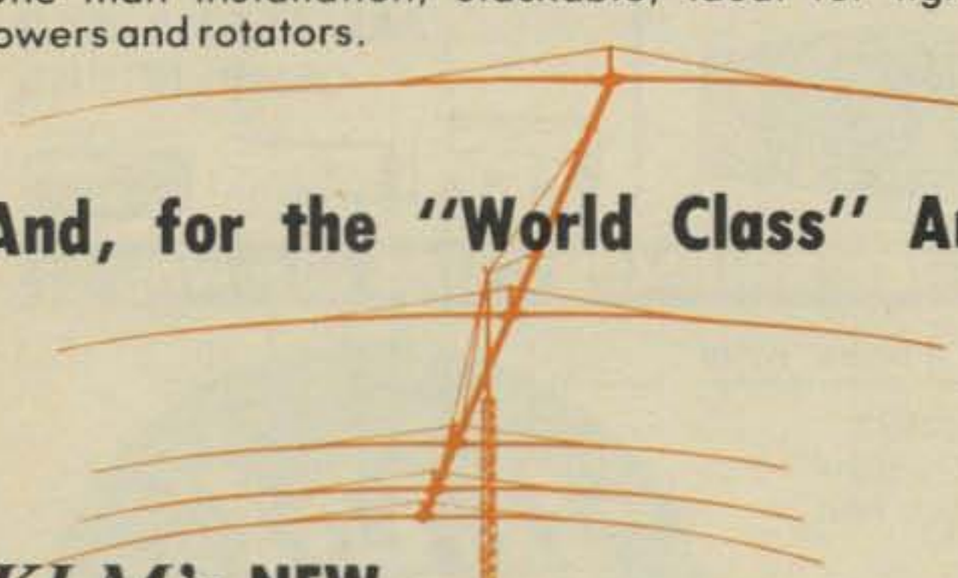
And, for the "World Class" Amateur who insists on the ultimate:



KLM's NEW 7.0-7.3-5*

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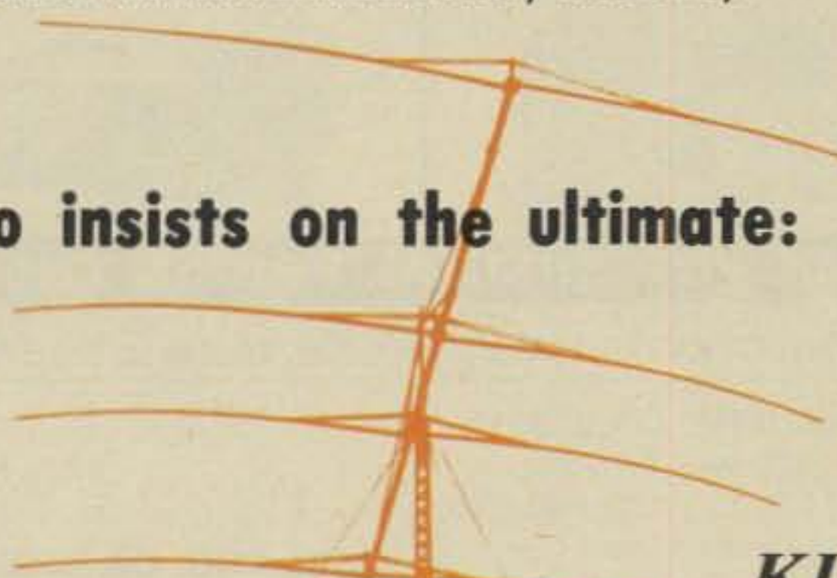
Brings the world famous gain and F/B of KLM's 20 meter, 5 element "Big Sticker" to 40 meters; delivers unchallenged performance all across the band.



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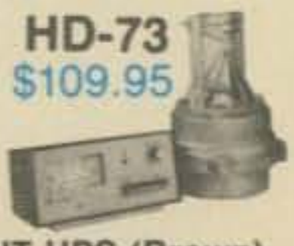

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CQ The Radio Amateur's Journal

ON THE COVER: Operating from this Canary Islands QTH as EA8AK, Erkki Korhoner, OH6DX racked up 25,000,000 points in the c.w. section of the 1979 CQ World Wide DX Contest to take the World High Single Op honors.

OCTOBER, 1980 VOL. 36, NO. 10

FEATURES

DEPARTMENTS

Zero Bias

AN EDITORIAL

One of the biggest issues in amateur radio today involves a subject that most people only give lip service to. No, it really doesn't have anything to do with WARC, DX, contests or even awards. The hot potato within amateur radio involves simple basic economics. It's the understated conflict between the American domestic market and what is euphemistically called the foreign or import market. In simple English it is the American manufacturer who feels that he is getting a raw deal at the hands of the Japanese manufacturer and especially the Japanese government.

The Japanese have a relatively free market in the United States, while at the same time, American goods face very restrictive tariffs in a Japanese market. Obviously, it is a one-sided market designed to have goods flow one way. It is very protective of their industry, whereby only the well-to-do can afford to buy our products. Is it fair? No. Is it right? I don't know.

For the most part, the Japanese did not take away a market from the Americans. It simply just wasn't there. We all occasionally reminisce about the great old names in amateur radio that used to be, and the wonderful times we had with equipment that can only be found in a flea market these days. The Japanese didn't put these folks out of business or cut their sales. Those revered names we recall today were already gone by the time the Japanese could marshall enough industry to seek out the American market. Most of the companies that fell by the wayside didn't even fall out to the CB boom. That came some time afterwards. The reliable, old, solid names that have continued through the years serving amateur radio in the United States primarily made a living serving both commercial and military interests. There simply wasn't enough money to support an amateur market.

The reasons why a declining market existed in the United States vary from the Leagues push for Incentive Licensing and more and more regulation to simply changing economic times. Anyway, during the early 1960's the bottom dropped out of the American amateur market, and the number of people who wanted to become amateurs declined drastically.

The Japanese, however, deregulated amateur radio to the tune of over 500,000 *new* licensed amateurs during our decline. These hams all needed a first rig to get on the air, let alone a second or mobile rig. They all needed just about everything from scratch. They could build of course and many did, but just like in this country, when a need arises there is some entrepreneur out there willing to take a chance on satisfying that need. Those marvelous old names we miss today all started out the very same way.

Well, once you've paid for tooling and R&D, it doesn't cost that much to make a few more units or to begin thinking of expanding your market. It's a universal concept. The only additional expense in increasing your market is more advertising and a larger sales force, both of which pay for themselves. So, into the relative American void comes the Japanese entrepreneur seeking to increase his market by filling that void.

The Japanese entrepreneur comes from a relatively new tradition, if that isn't too much of a contradiction in terms. Japanese industry itself is relatively brand new since the war, and manufacturing techniques and marketing know-how were imported during post war years. They learned the value of bells and whistles and just how much modern packaging is worth in the hi-fi/stero industry, and they transferred that knowledge to the amateur industry.

When the CB boom hit, they were right there with the same bells and whistles, extruded and die-cast panel design and miniaturized equipment. The gear looked like a million dollars and exuded a richness of quality that some of our equipment lacked and still lacks. Through the use of "cottage industry" it is assumed that they could manufacture and assemble products relatively cheaply and manage to be competitive in this country. The only thing that we have here that can sort of compare with "cottage industry" is the concept of migrant workers or piece workers in the garment industry. The cost of labor is somewhat lower, but the overhead is nonexistent.

Unlike the auto industry, however, the Japanese amateur industry is not on the verge of creating mass layoffs in the American amateur industry. None of the tooling or manufacturing equipment used in today's amateur industry dates back to Henry Ford. All of the tooling, R&D and manufacturing equipment used to produce what you see in ads in any of the amateur journals is probably less than 10 to 15 years old. A great deal is most likely newer than that. We can assume that most, if not all, of what is produced in Japan today is produced from designs and equipment manufactured since 1945. The thinking and techniques available to manufacturers in both countries should be comparable.

Using the auto industry as a paradigm may make more sense when you consider the following example. When TV reporters went to the auto plant in New Jersey to get workers' reactions to the plant closing, most were upset with the inroads the Japanese have created in our automobile market. Here indeed was a sizable American market producing millions of new cars each year being undercut and outsold by foreign competition. The American workers wanted legislation restricting imports and more control over what was sold here. Sounds righteous and good so far. Well, when the TV camera panned the employee parking lot, it seemed that almost three-quarters of the cars were either Japanese or German. The workers were not buying their own product. This leads me to ponder on how many people within the American amateur radio industry from management to assembly worker are actually using some Japanese gear.

This leads to arguments of quality and technology. While a lot of these statements can be subjective, their gear is pretty good. It does what they say it'll do. It's packaged to look like it's worth the asking price, and it certainly has all of the bells and whistles to satisfy any ego.

Japanese equipment has been the irritant or thorn needed to stimulate some of our manufacturers to modernize their thinking and equipment. Their advertising campaigns are designed to move merchandise and make the product look impressive, desirable and a worthwhile addition to any shack. It is a truly professional approach to marketing that is starting to catch on here.

With few exceptions, Japanese equipment is imported through American firms run in this country by Americans. On the other hand, most of the sales revenue collected for this equipment does indeed find its way back to Japan. But all through the process of importing, distribution, direct or two-step sales, money exchanges hands and stays within this country.

Where does the furor lie? Well, in one big part it lies within the fact that none of this is reciprocal. As I said earlier, the Japanese do have pretty high restrictive tariffs on American gear coming in. This makes it almost impossible for Americans to get much of a piece of the pie in Japan. Also, through their licensing structure, some of our gear is not applicable to their needs nor does it comply with their licensing privileges. However, I do feel that their government would indeed restructure their licensing scheme appreciably if they saw enough business in it. It is obvious that within the past year the Japanese have started to produce equipment for a mode that most of their licensees cannot use. I'm sure that if sales warrant or could represent a couple of hundred thousand potential sales in the homeland, then they would consider changing their licensing structure.

(continued on page 102)

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OMNI-C 9 Band Transceiver + HERCULES Solid-State KW Linear

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Super Design. *All Solid-State and Broadbanded*—from the pioneer, Ten-Tec. *Modular* plug-in circuit boards. *Functional Styling* with convenient controls, full shielding, easy-to-use size (5¾"h x 14¼"w x 14"d).

Super Hercules Companion. Styled to match, plus separate receiving antenna capability, plus transceiver front panel control of linear's bandswitching (one knob does it all).

Full Accessory Line including filters, remote VFO, power supplies, keyers, microphones, speech processors, antenna tuners—all in matching color.

Model 546 OMNI-Series C.... $1189.

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Broadband Design. No knobs, no tuning. From the pioneer, TEN-TEC. For fast, effortless changing of bands. Super easy.

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Full Break-In. HERCULES puts the conversation back into high power CW operation—you can hear between every character you send.

Full Coverage. 160 through 15 meters plus four "AUX" positions for 10-meter conversion by owner and future band additions.

Full Gallon. 1000 watts input on *all* bands, 600 watts output, typical. Built-in forced-air cooling. Driving power: 50 watts, typical. Adjustable negative ALC voltage. 100% duty cycle for SSB voice modulation; 50% duty cycle for CW/RTTY (keydown time: 5 minutes max.) Continuous carrier operation at reduced output.

Full Protection. *Six LED status indicators* continuously monitor operating conditions and shut down the amplifier whenever any one exceeds set limits (the exciter automatically bypasses the amplifier under amplifier shut-down for barefoot operation). The six parameters monitored are: 1) overdrive; 2) improper control switch setting; 3) heat sink temp.; 4) SWR; 5) overvoltage/overcurrent; 6) rf output balance. *Two meters* monitor collector current, voltage, and forward/reverse power. And a highly efficient *automatic line voltage correction* circuit (patent applied for) eliminates the need for selecting transformer taps, prevents applying too high a voltage to final amplifier devices, becomes operative under low line conditions.

Super Power Supply. Provides approximately 45 VDC @ 24 amperes, operates on 105/125 VAC or 210/250 VAC. Tape wound transformer and choke reduce weight (50 lbs.) and size (7½"h x 15¾"w x 13½"d). Separate enclosure.

Super Styling. Designed to match OMNI, the HERCULES has the same height as OMNI, plus matching bail and matching colors. The front panel is simplicity in itself with two push-button switches (power and mode) plus two knobs (meter and bandswitch), and a "black-out" monitor panel (when unit is off, meters are unobtrusive). Amplifier size is 5¾"h x 16"w x 15½"d.

Model 444, HERCULES amplifier & power supply.... $1575.

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ANSWERS TO OFTEN-ASKEI

"WHY WORK RTTY?"

RTTY is one of those quickly growing "specialized" forms of amateur communications. The attraction to its devotees is probably a mixture of the magic of modern digital communications coupled with the convenience of written rather than coded or voice communications. If you participate in the popular autostart nets, it's not even necessary to be home when receiving a RTTY message—the printer or display will record the text for you to read at your convenience. RTTY is very popular among "rag-chewers" and "engineers" alike; in fact, you get to do a bit of both. The rapid growth of digital electronics has carried over to both RTTY and the new home computer hobby. ASCII communications between ham computers lacks only final FCC approval. If your "bag" is chasing DX, what could be more satisfying than a DXCC certificate for all RTTY? There are several DX RTTY contests sponsored every year with heavy participation. So, rather than ask "Why?" ask "How?"

"WHAT DO I NEED TO WORK RTTY?"

A ham RTTY station needs a transmitter, receiver, and antenna just like any RF communications system, in addition to some "special boxes" to make the RTTY part work. Some considerations for the equipment are outlined below:

1. RECEIVER-TRANSMITTER

The RTTY receiver and transmitter (or transceiver) should be stable, well calibrated, and capable of *EXTENDED TRANSMITTER OPERATION*. When you are transmitting RTTY, the full carrier is on for longer periods of time than for CW or SSB voice. So, check your manual and manufacturer for RTTY specifications and, if in doubt, reduce transmitter power somewhat. For HF work, a good SSB rig in LSB mode works well with RTTY tones (more on tones, later). Most VHF-FM transmitters work with RTTY, but avoid overloading the transmitter as mentioned above.

2. ANTENNA

A good antenna will buy you the same benefits in RTTY as it does in other modes. One caution though, the traps on some antennas may not handle as much power in continuous RTTY operation as they do for CW or SSB voice. This can especially be true of trap yagi antennas for the HF bands.

3. RTTY DEMODULATOR

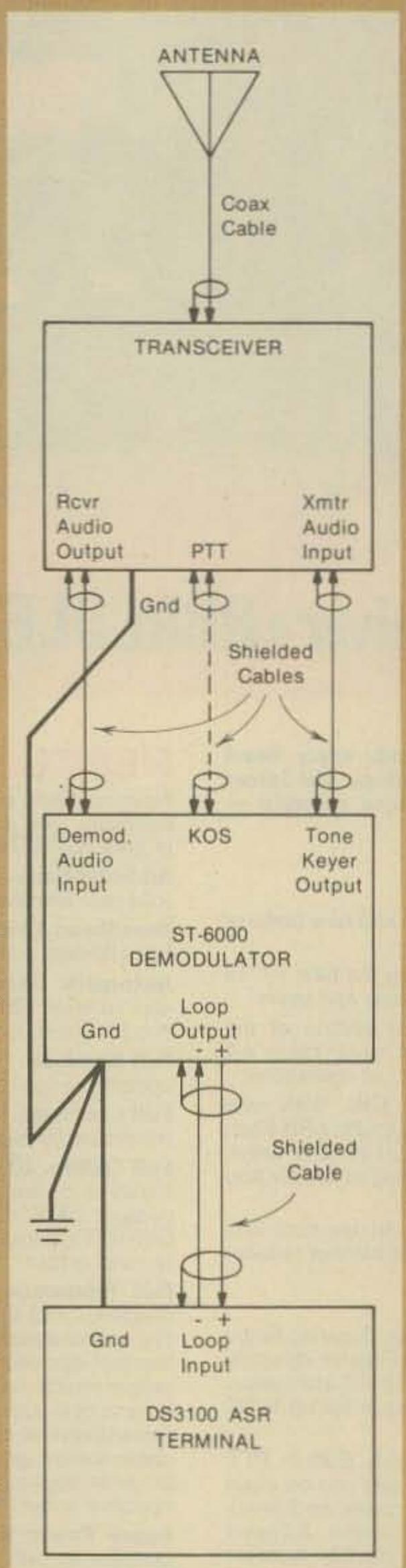
The demodulator connects to the receiver audio output and converts the RTTY tones to keying pulses. The quality of your printed signal is determined more by demodulator performance than by any other portion of the system. Demodulators come in all shapes, sizes, and prices. HAL offers the feature-packed ST-6000 with active filters, scope, autostart, anti-space, ATC, DTH, and KOS, as well as the lower cost ST-5000. The popular ST-5 and ST-6 parts kits are also still available for the skilled technician.

4. TONE KEYER

The tone keyer circuitry converts the keying pulses from your keyboard into audio tones to drive the transmitter. Since this circuitry is closely related to that of the demodulator, both are supplied in the same cabinet in all HAL demodulators.

5. TERMINAL

The terminal is the device that prints or displays the received signals while allowing you to type your transmitted message. The terminal is sometimes divided into a keyboard and a printer or display section. The terminal can be as simple as an old surplus TTY machine or as exotic as the microprocessor controlled HAL DS3100 ASR terminal. An important feature of HAL Communications terminals is that ALL HAL RTTY EQUIPMENT IS LOOP COMPATIBLE WITH TTY MACHINES. This means that you can add HAL electronic equipment to your RTTY system at any time. The advantages of the HAL electronic terminals are many; ranging from lack of noise and oil (keeps the XYL happy and your nerves soothed) to automatic operator features such as real-time editing of typing errors, programmable identification message, and automatic carriage return/line feed operations. Also, the speed of the electronic terminal is easily changed with a front-panel switch. Machines require an expensive gear box or a manual change of gears to change speed. HAL offers the DS3100 ASR and the new DS2000 KSR terminals as well as the popular DS-3000 KSR, RVD-1005, and the DKB-2010. The DS3100 ASR, DS2000 KSR, and the DS-3000 KSR all work the standard ASCII computer code as well as the normal amateur BAUDOT code.



"HOW DO I HOOK IT UP?"

Probably the most frightening thing to the RTTY beginner is the thought of all those wires that must be connected to make it work. A particularly complicated RTTY station can have a real "rats-nest" of wires, but it didn't start that way. Make connections in a logical and step-by-step manner and all will work well. All transceivers are slightly different, but, in general, you will have to make these connections:

1. GROUNDING

Before making any other connections, decide approximately where your equipment will be located and run short, low-inductance ground wires (shield braid recommended) between the cabinet grounds of all equipment AND MACHINES. Do not defeat the AC safety ground on the HAL power cords; run separate RF grounds in addition to the AC safety ground. *LACK OF ADEQUATE RF AND SAFETY GROUNDS CAUSES MORE PROBLEMS IN RTTY INSTALLATION THAN ANY OTHER SOURCE.*

2. RECEIVER TO DEMODULATOR

Use shielded cable to connect a 500 ohm audio output of the receiver to the demodulator audio input jack. If you do not have a 500 ohm output, the 4-8 ohm speaker output will work, but not as well; a speaker to 500 ohm line transformer would be a good part to add when possible.

3. TONE KEYER TO TRANSMITTER

Use shielded cable to connect the tone keyer output of the demodulator to the transmitter audio input. Often, a rear-panel "phone-patch" or "auxiliary" input is provided. If not, connect directly to the microphone connector.

4. DEMODULATOR TO TERMINAL

Use shielded cable to connect the terminal to the demodulator. Use the current loop connection for each. When connecting to a solid-state terminal, be sure to observe the proper polarity as indicated in the operator's manuals. Be extremely careful when wiring the loop circuit—potentially lethal voltages are present when the equipment is turned on (200 VDC @ 60 ma). Also, be sure that no part of the loop circuit is connected to chassis ground in machines or other equipment. All RTTY equipment is connected in series when the current loop output is used.

5. CONTROL CIRCUITS

Since the control requirements differ with manufacturer, study your transceiver manual carefully to determine how to control the transmit-receiver function. Usually, you can control the push-to-talk (PTT) line through a pin on the microphone connector, a front-panel switch, or a rear panel accessory connector. Initially, try to manually switch between transmit and receive until you are familiar with RTTY operation. Eventually, you will probably want to take advantage of the automatic Keyboard Operated Switch (KOS) feature of the DS3100 ASR and ST-6000. KOS is the RTTY equivalent to VOX; typing on the keyboard puts you into transmit mode. If you pause long enough, the KOS "drops-out" putting you back into receive mode. KOS is particularly convenient for short exchanges.

"WHAT IS THIS MARK AND SPACE BUSINESS?"

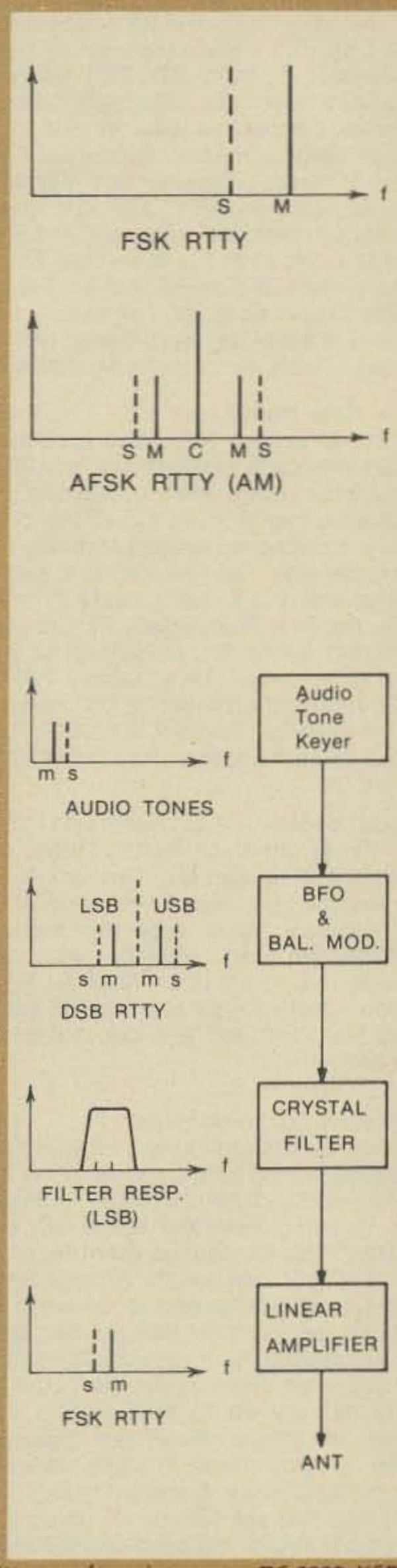
The RTTY signal from the terminal is a series of pulses. The amateur BAUDOT RTTY signal has 7 possible pulses for each character typed or printed, each transmitted one-after-another (serial). Each pulse can be either "ON" (current flow in the RTTY loop) which is called "MARK" or "OFF" (no current flow), the "SPACE" condition. To keep decoders synchronized, the first pulse of a character, the START pulse, is always a SPACE (current off); the last pulse, the STOP pulse, is always a MARK (current on). The 2nd through the 6th pulses can be either MARK or SPACE, depending upon the coding required for a character. The START and all 5 data pulses are the same length; the STOP pulse may be either equal to or longer than the others. The so-called computer ASCII code uses START and STOP pulses but has eight instead of five intermediate data pulses, thus allowing a greater number of characters to be encoded. Although all machines and HAL electronic terminals use pulses, the MARK and SPACE pulse conditions are converted into MARK and SPACE audio tones for easy radio transmission.

QUESTIONS ABOUT RTTY

"WHAT IS THE DIFFERENCE BETWEEN FSK AND AFSK?"

Transmitting RTTY signals via radio could be done like Morse code with on-off keying of the transmitter carrier. However, the interference received during off-times would give badly distorted printout. Rather, HF RTTY is transmitted with Frequency Shift Keying (FSK) so that the mark pulse condition corresponds to one radio frequency and the space to another. Amateur radio convention has it that the mark radio frequency is higher than space and that the separation or "shift" of the signal is standardized at 170 Hz or 850 Hz. (425 Hz shift is also used by commercial RTTY stations.) Most present-day amateur RTTY stations use 170 Hz shift exclusively. The FSK signal is received with the BFO turned on, giving two audio frequency tones for the mark and space conditions. The audio tones are, in turn, detected in the demodulator and the resulting pulses drive the display or printer. Note that changing the transmitter or receiver frequency (on purpose or through frequency drift) will change the audio output frequency to the demodulator. The HF system is therefore quite drift sensitive. Present HF equipment frequency stabilities are quite adequate for FSK RTTY, but it is only very recently that VHF equipment was available with similar stability. Therefore, VHF RTTY has traditionally been transmitted by first keying audio tones with the RTTY pulses and then using these tones as the audio modulation of an AM or FM VHF transmitter. This is called AFSK for Audio Frequency Shift Keying. Current amateur convention is to make the mark audio frequency lower than the space frequency by the amount of the shift. Since the RTTY data is audio modulation of the carrier, frequency drift of either transmitter or receiver is a lot less critical. The audio frequency of the tones transmitted is set to be the same as those in the receive demodulator.

The required radio frequency shift keying can be done in two different ways: shift the frequency of a transmitter oscillator directly with the RTTY pulses or use a SSB transmitter with audio tones. Direct FSK keying circuits are described in most amateur journals and are generally simple, but require modification of the equipment; generation of FSK with a SSB transmitter is as follows: If a Lower Sideband Transmitter (LSB) is driven with a 2125 Hz audio tone, the RF output of the transmitter will be at a frequency 2125 Hz *BELOW* the suppressed carrier frequency. A properly adjusted LSB transmitter will have *NO OTHER* output frequencies. If the input tone is changed to 2295 Hz (170 Hz shift), the RF frequency is now 2295 Hz BELOW the carrier frequency. Thus, audio tones into the LSB transmitter have produced FSK carriers out of the transmitter. Note that, because the LSB mode was used, the 2125 Hz standard mark tone for VHF AFSK has become the higher radio frequency. Thus, the same demodulator and tone keyer can be used for both VHF AFSK and HF FSK operation. Often, this use of audio tones with a SSB transmitter is mistakenly called "HF AFSK"—actually the resulting output is true FSK, IF the SSB transmitter has so spurious outputs (such as carrier or unwanted side-band). Most HF RTTY amateur radio stations use audio tones with a SSB transmitter. Although "standard" audio tones for VHF amateur operation have long been 2125 Hz for mark and 2975 Hz for space (850 Hz shift), limited audio frequency response of HF SSB transmitters and receivers has recently given rise to a second set of "standard" tones at lower frequencies ("Low-tones").



"HOW ABOUT HIGH- VS LOW-TONES?"

Historically, demodulator tones were set to 2125 Hz for mark and 2975 Hz for space reception of 850 Hz shift. When transmitter stability improved, 170 Hz shift was used and the space frequency changed to 2295 Hz (mark remained at 2125 Hz). These three tones were, and still are, a standard for U.S. Amateur RTTY. However, in the early 1960's, virtually all commercially available transmitters and receivers became filter-type SSB equipment with audio pass-band limited to speech frequencies, sometimes as narrow as 2.1 kHz (300 to 2400 Hz). Obviously, the 2975 Hz (850 Hz shift Space) tone will not pass-through such a filter and 850 Hz shift with these tones is not possible (although the 170 Hz shift is). Therefore, either the SSB equipment must be modified or different, lower-frequency tones must be used if 850 Hz RTTY shift is desired. Both approaches have their advantages and both are currently in use. The so-called "LOW-TONE" standard sets mark at 1275 Hz and space at 1475 Hz (170 Hz shift) or 2125 Hz (850 Hz shift), conforming to the European IARU standard. So, there are now two sets of "standard" tones, LOW and HIGH (as well as a myriad of others), all of which work *INTERCHANGEABLY* on HF RTTY. However, since the actual audio tone is transmitted for VHF AFSK operation, the two sets are *NOT COMPATIBLE IN VHF AFSK* applications. Current U.S. Amateur operation uses the HIGH TONES for VHF. Thus, to use a demodulator and keyer for both HF and VHF operation, it should be set-up for HIGH-TONE operation. Conversely, you may wish to have separate stations for HF and VHF, simplifying the cabling, and providing simultaneous monitor/operation capability, as well as resolving the tone problem. The HAL ST-6000 and ST-5000 Demodulators are available for either HIGH or LOW-TONE operation.

"WHAT FREQUENCIES DO I USE FOR RTTY?"

HF RTTY Operation has evolved to heavy operation on the 80 and 20 meter bands (CW segments) with sporadic operation on other HF bands. 80 meter RTTY stations tend to operate between 3600 and 3650 kHz and 20 meter stations between 14.075 and 14.100 MHz. 170 Hz shift is used almost exclusively with mark being the higher radio frequency. 60 wpm (45 baud) is the most popular RTTY speed, but 100 wpm (74 baud) is gaining in popularity.

VHF RTTY operation in most areas is concentrated on 2 meter FM with 146.700 MHz being the popular operating frequency. Virtually all stations are now using the "High-tones," usually with 170 Hz shift. As with HF RTTY, 60 wpm (45 baud) is most popular on VHF. Some areas now have RTTY-only repeaters on 146.10/146.70 MHz.

"WHO DO I TALK TO ON RTTY?"

RTTY enthusiasts run the full range of ages and interests, but tend to be technically inclined. The typical RTTY'er is always modifying his station, likes to talk, and usually has more ideas than you have printer paper (or display screen)! Some operators are good typists; most aren't. The DS3100 ASR letters-fill and editing modes make even a poor typist look good. Recently, the home computer hobby has become quite popular with RTTY people and you may find a lot of help in debugging your programs if that's your interest. There are an increasing number of DX stations on RTTY.

"HOW MUCH DOES IT COST?"

RTTY is like any other hobby—it can cost as much or as little as you want it to. If you buy used machines and build kits or your own designs, the total RTTY cost can be quite low. Conversely, the DS3100 ASR and ST-6000 offer an *ULTIMATE* RTTY station that is expensive. Because all of the HAL RTTY products are current loop compatible, you can add devices as your interests (and pocketbook) indicate. For the beginner, HAL has the following recommendations:

1. DEMODULATOR

Assuming you already have a good transceiver and antenna, your first major RTTY purchase should be a good demodulator. The HAL ST-5000 makes a particularly good, cost-effective unit. If you select a high-tone ST-5000, it will be usable for either VHF or HF (170 Shift) RTTY operation; if you are only interested in HF RTTY (for short-wave-listening to press stations, for example), the low-tone unit may be a better choice. Conversely, you may wish to "jump-in" and get the ST-6000 from the first. Either way, put high priority on a *GOOD* demodulator.

2. TERMINAL

You can spend very little or a lot on the terminal. A surplus machine can often be acquired at a hamfest for little cash investment. However, by the time you figure out how it works, fix it, and buy parts and manuals the total cost may not be so low. If you do, you'd better be prepared with tools, oil, and patience. Newer machines require less work, but also cost more. On a feature-for-feature basis, either the new DS2000 KSR, DS3100 ASR, or DS-3000 KSR are more cost effective than other terminals presently available. Certainly a "solid" beginner's RTTY station would be the DS2000 KSR and ST-5000.

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Announcing

● **C.V.F.M. Hamfest** - The C.V.F.M. Hamfest will be held on September 28th from 9 a.m. to 5 p.m. at the King Ridge Ski Area, exit 11 off I-89 in Sutton, New Hampshire. There will be a giant flea market, florist exhibit, frisbee toss, horseshoe competition, dealers' exhibits, refreshments, and overnight camping available. Door prizes plus grand prize raffle. Admission is $3 per person over 16. For further information contact C.A. Breuning, 54 Myrtle Street, Newport, NH 03773.

● **Rock Hill, SC Hamfest** - The York County Amateur Radio Society will hold its 29th annual hamfest on October 5 at Joslin Park in Rock Hill. Barbeque dinner, snack bar and drink stand will be in the park. For registration/prize info, write to: Y.C.A.R.S., P.O. Box 4141CRS, Rock Hill, SC 29730.

● **Mini-DXpedition** - The Berthoud Amateur Radio Society and the Arc of the Covenant Contest Group plan a mini-DXpedition to the four corners area of the Ute Indian reservation scheduled for late September, early October. A single contact will enable stations to work the states of Colorado, New Mexico, Utah and Arizona simultaneously. A special call-sign may be used. Handsome hand-lettered certificate will be available for $1.00 and large s.a.s.e. to BARS, BOX 101, Berthoud, CO 80513.

● **ARRL Virginia State Convention and Hamfest** - The Fifth Annual Tidewater Hamfest, Computer Show, and Flea Market will be held in the great new Virginia Beach, Virginia, Arts and Conference Center on October 4 and 5. Take Highway 64 to Highway 44, which passes right by the door and also into the beach resort area. Featured are ARRL, Traffic, DX, Technical Forums, XYL free bingo and lounge. Admission $3.50. Advance ticket drawing for Kenwood FM transceiver. Flea market spaces $3 day. Ticket and information send s.a.s.e. to: TRC, P.O. Box 7101, Portsmouth, VA 23707.

● **Joliet A.R.S. 40th Anniversary** - The Joliet Amateur Radio Society, one of America's oldest amateur radio clubs, is celebrating its 40th anniversary with a special commemorative operation from 15:00Z Saturday, October 18th to 21:00Z Sunday, October 19th. Look for W9OFR, the call sign of the R. Melvin Whitaker Memorial Station, which is the official call sign of the club, on the following frequencies: 3.975, 7.275, 14.275, 21.375 and 146.52 simplex. A special certificate will be sent to each station sending a QSL card and an s.a.s.e. to the callbook address. On October 4th, the club is having its Anniversary Dinner. All former members and friends are invited to attend. For further information, contact W9UCW, Barry Boothe, 705 May St., Channahon, IL 60410, 815-467-6912.

● **Blossomland A.R.A. Hamfest** - The Blossomland Amateur Radio Association will hold its 15th annual Hamfest on Sunday, October 5 from 8:00-3:30 Eastern Time at the new Lake Michigan College Convention Center one mile off exit 30 of I-94 near Benton Harbor, Michigan. Flea market, film tour of Heathkit Factory, demos, lectures on SSTV, QRP, DX, Brass Pounders Contest. XYL program. Pre-paid tickets $2 each; $3 at the door. YL's, XYL's and Harmonics under age 16 Free. Tables $3 each. Talk-in on 22/82. For tickets and info send s.a.s.e. to Matt Beha, N8BPI, 3752 Lane Court, St. Joseph, MI 49085.

● **Pack Rats Hamarama '80** - The Pack Rats fourth annual Mid-Atlantic States VHF Conference is October 4 at the Warrington Motor Lodge, Rte 611, Warrington, PA. Advance registration $3, at the door $4. Price includes admission to ninth annual Hamarama flea market October 5 from 8 to 4 at the Bucks County Drive-in Theatre, Rte 611, Warrington, PA. Cost for flea market alone $2, tailgating $2 per space. Bring your own table. Talk-in W3CCX on 52. Information for both events available from Ron Whitsel, WA3AXV, P.O. Box 353, Southampton, PA 18966. Tel. 215-355-5730.

● **Cedar Valley A.R.C. Hamfest** - The Cedar Valley Amateur Radio Club's annual hamfest is Sunday, October 5, in Cedar Rapids, Hawkeye Downs Exhibition Hall. Technical talks, large flea market, manufacturers and dealers welcome. Talk-in on 146.16/.76, .52, 223.34/.94 MHz. Advance tickets $2, $3 at the door. Write CVARC Hamfest, Box 994, Cedar Rapids, Iowa 52406.

● **Houston Com-Vention 80** - The Southwest's largest annual amateur radio convention will be held October 3-5 at the new Marriott Brookhollow Hotel, Houston, Texas. Drawing from the entire 5th call area, the ARRL sanctioned event features at least 40 commercial exhibitor booths as well as technical sessions, DX and contest activities, covered flea market, banquet, transmitter hunt, hospitality suites and much more. Once again, the Texas DX Society has agreed to host the DX and contest activities. Featured banquet speaker is Roy Neal, K6DUE, science editor for NBC news. A special hotel room rate of only $30 per day per room (up to 4 persons per room) will be made available to convention attendees, and plenty of parking is available. Houston Com-Vention 80 is sponsored by Houston Ham Conventions, Inc., a non-profit organization. For further information write to HHC, P.O. Box 79252, Houston, TX 77024.

● **Amacom '80** - The annual New Orleans hamfest-computerfest, under its new name, Amacom '80, will return this year for one of the largest gathering of electronics hobbyists in the Deep South. The Jefferson Amateur Radio Club is scheduling Amacom '80 for Saturday and Sunday, Oct. 11-12, at the Airport Hilton Inn, Kenner, Louisiana. There will be a schedule of forums and demonstrations on the latest electronics trends. Exhibitors of amateur radio and computer equipment will display their wares inside the hotel, while hobbyists will offer their used gear at the flea market outside. Besides having an ARRL forum, officers will schedule FCC amateur radio tests, if the FCC is willing. For those not interested in the convention's program, there will be games and other events both days. Attendance prizes and other awards will be offered throughout the meeting. Admission will be $3 for head-of-household and $1 for each family member. Other tickets will be six for $5. Details may be obtained from Wayne Knabb, publicity Chairman, at 943-5889, home; 586-3560, work.

● **Plymouth Indiana Swap and Shop** -This Swap and Shop will be held on October 12. Tickets are $2 advance $2.50 at door. Inside floor space available. $200 cash main door prize. 5th annual gathering, doors open 7 a.m. Talk-in on 146.07/.67 and 146.52 or follow the signs to National Guard Armory in west part of Plymouth. Snacks and electronic goodies for sale or trade. Info at MCARC, P.O. Box 151, Plymouth, IN 46563.

● **Greater Delaware Valley-80 Hamfest** -The Moorestown Severe Watch ARC will hold its 2nd annual GDV-80 hamfest on Sunday, October 19, at Nashville East "Cotillion Ballroom" on Rt. 73, Pennsauken, New Jersey. Exhibits indoors open at 2 a.m. for dealers and 8 a.m. for the public. Plenty of outdoor tailgating and parking for all. Door prizes, seminars, YL/XYL activities and films. RV parking and camping on Saturday night. Tickets are $2.50 at the door and $2 in advance. Indoor exhibit space is $5 a table and tailgating is $3 for 10′ of space. Talk-in on 146.22/82. For reservations, map, tickets or more information write GDC-80, 15 East Camden Avenue, Moorestown, NJ 08057 or call 609-234-3926. A special telephone number will be set up at the hamfest for 11 am Saturday Oct. 18 to 5 pm Sunday Oct. 19, call 609-663-2323.

● **Michigan (Ontario, Ohio, Indiana, and Illinois)** - The 26th Annual VHF Conference will be held on October 25 at Western Michigan University from 2:00 p.m. through 9:00 p.m. Microprocessor Control of VHF Transceivers, Plotting Antenna Settings, and other VHF topics. For more information write to Dr. Glade Wilcox, Professor E.E., Western Michigan University, Kalamazoo, MI 49008.

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CIRCLE 90 ON READER SERVICE CARD

Desecheo Island is a remote, rugged, 360-acre island that lies in the Mona passage between Puerto Rico and the Dominican Republic. The operating positions of KP4AM were set up on and near the helicopter pad in the lower left. The highest elevation on the island is approximately 700 feet.

This DXpedition planning session included (left to right) Alvin, KP4D, Bill, KP4DSD, Dave, KP4AM, Pedro, KP4Q and Louie, KP4WI.

After nearly two years of planning and preparations, KP4AM finally made it to Desecheo Island and completed 21,108 QSO's with a country total of 131 in five days.

Desecheo Island DXpedition

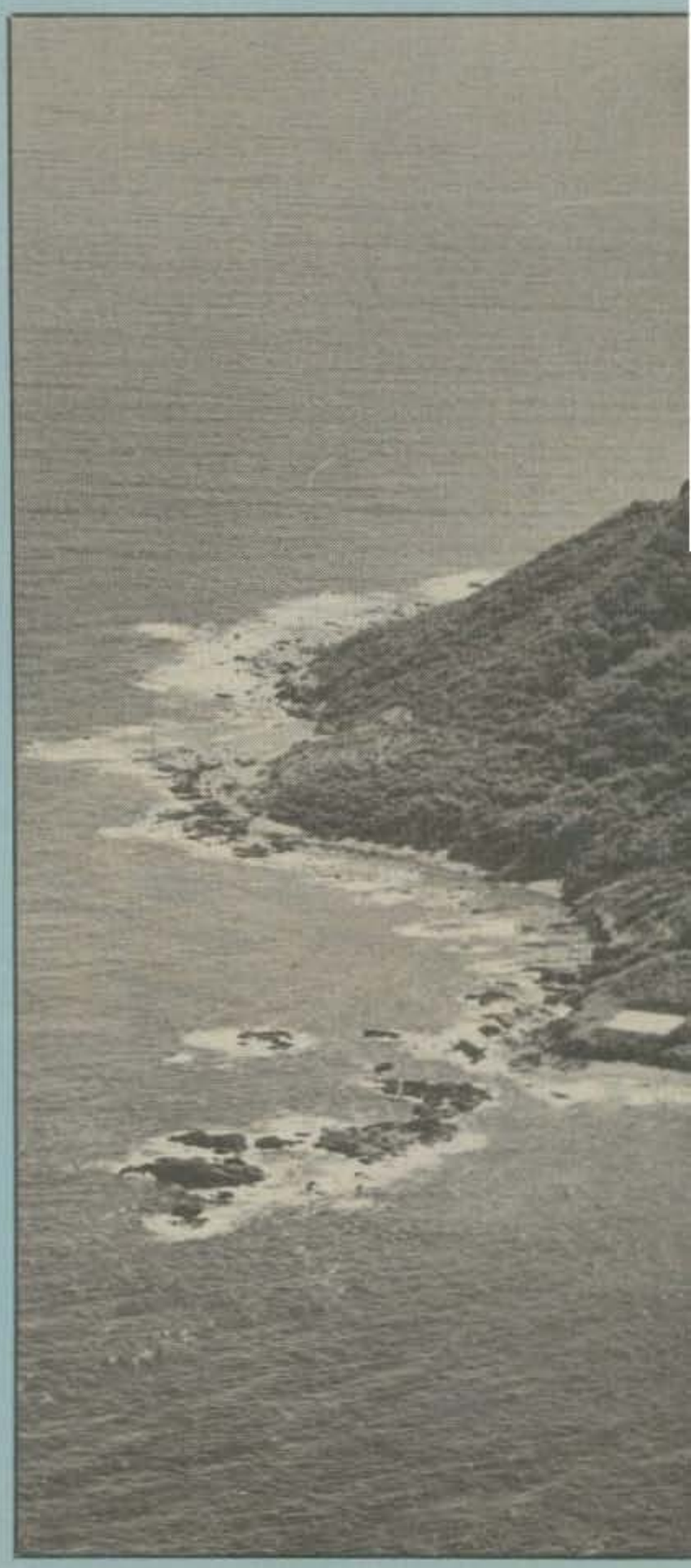
Part I

BY BILL KERBER*, KP4DSD/K4AQQ

To many people Desecheo is simply a remote, rugged, uninhabited (except for a few goats and monkeys) 360-acre island lying in the Mona passage between Puerto Rico and the Dominican Republic. To others, such as KP4AM and myself, it represented the potential dream of a lifetime: finding a new one and, once having obtained separate country status, enjoying the thrills of a DXpedition.

Dave, KP4AM, when not practicing law, seems to spend the majority of his time chasing DX, or, when not on the air, pouring over detailed maps hunting for those elusive new ones. In 1976 he found one: Desecheo, just 70 miles from his Levittown, Puerto Rico home. Before long, he had his new country request and documentation prepared and forwarded to the ARRL.

*213 Rhoden Cove Road, Tallahassee, FL 32312



He began planning for a DXpedition.

In 1972, I accepted a position as a staff veterinarian with the Caribbean Primate Research Center. Upon arriving in Puerto Rico, I found among the center's "possesions" several offshore islands on which free-ranging rhesus monkeys had been introduced for scientific study. Desecheo was one of these islands. The monkeys on the island had been studied very little because of the expense and difficulties of getting to and from Desecheo. The talk in 1972 involved surplusing the island and removing the monkeys.

Prior to World War II, Desecheo belonged to the Commonwealth of Puerto Rico. During the war it was transferred to the U.S. Department of Defense. For several years it was used as a bombing range, and even today unexploded bombs are occasionally found on the island. In the mid-sixties, Desecheo was transferred to the U.S. Department of Health, Education and Welfare, and the monkeys were introduced on the island for research purposes.

Following my promotion to Director of the Center, one of my first concerns was getting rid of the island, since it was of little value to the Center. The necessary papers were submitted and I promptly forgot about Desecheo until October 1976. During that month *CQ* magazine carried a comprehensive article outlining criteria used by the ARRL DXCC advisory committee in evaluating petitions for new country status. My interest was aroused and after careful perusal of the article I was certain I had found a new one right under my nose.

During the next several days I discussed my finding and the possibility of a DXpedition with several of the locals, including KP4EAJ, KP4EKI, KP4EAS and KP4ECH. All were active contesters, first-class operators, and eager to go. A separate country status request was quickly drafted and mailed to the league.

Within a few months word leaked out, and KP4AM and I realized that each had submitted separate country requests for Desecheo. Dave and I were terribly dissappointed, since both of us felt we had exclusive rights to the island. We realized, however, that neither group had the required resources to mount a major DXpedition. As a result, we joined forces and began planning. Little did we know that nearly two years would pass before we would be able to set foot on Desecheo.

Plans and Gathering Gear

Early in our planning we agreed that the call used for the DXpedition should be KP4AM. Dave's two-letter call and extra class license offered definite advantages over the three-

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CIRCLE 61 ON READER SERVICE CARD

After much consideration, transportation to the island was via this Korean War vintage helicopter.

letter call and advanced class license of myself. We also felt that a dipole and 200-watt-type DXpedition would be inadequate to meet the needs of the DX community. Beams, towers, and small linears would be required, particularly for the more difficult Asian paths.

Our plans included establishing two or three complete stations for a week long DXpedition that would operate around the clock with both c.w. and s.s.b. capabilities on all bands 160 through 10 meters. Not all of these objectives were met.

We projected that a minimum of six and a maximum of eight operators would be required. Although only six eventually made it to Desecheo, some ten to fifteen others were at one time or another scheduled to be part of the activity. Diminishing interest, pressures of work or being transferred to new QTH's in other parts of the world required that many drop or be dropped from the group.

Meetings were held at least monthly and later at weekly intervals to coordinate our plans, assemble the necessary gear or to discuss how to deal with the latest crisis relating to new country status or gaining permission to operate on the island. Pedro, KP4Q (alias KP4AST, KP4RF) quickly came up with two 30 foot sections of tower from his antenna farm. Wilson Electronics Corporation donated two System-Two Triband beams, and Newtronics Corporation supplied two 4BTV all band trap verticals. Long wires and slopers would supplement our low band capabilities. A major manufacturer of transceivers expressed the willingness to loan us four rigs for the DXpedition. However, because of the uncertain timing of our operation, we were unable to make the necessary arrangements for their use. In the end, the rigs and linears were provided from the home stations of the DXpedition crew.

Obtaining the necessary antennas, towers, rigs, and multitude of supplies presented few problems, and we quickly turned our attention to determining where on the island we would set up operation.

Selecting an Operating Site

I had in my files several black-and-white aerial photographs of Desecheo taken some 15 years previously and a topographical map. These were supplemented by beautiful color aerial photos taken more recently by KP4D, a professional photographer. Clearly, only two areas appeared suitable for locating the tents and antennas: at the top of the highest peak on the island or near the northwest corner adjacent to an old helicopter pad. The latter site is some 50 feet above sea level, while the former is about 700 feet above sea level. The high elevation provided a clear shot in all directions, while the lower meant going directly through the hill to Africa and southern Europe.

Since a closeup look would be required to determine the best location, a small boat was located, and KP4AM, KP4Q and KP4D were soon on their way to Desecheo. Luck was with them! When they arrived, they found the seas calm enough to enter a small lagoon and anchor their boat. They waded to shore in three feet of water, and within two to three hours, they had surveyed the possible operating sites.

KP4Q was convinced that to be successful in working the JA's and other Asians, the hilltop location would be needed, while KP4AM favored the site near the helicopter pad as being more practical. There was room at the most for only a single small tent at the summit of the hill. This meant splitting the group, having two operating positions at the lower level and the third a very difficult hour and a half hike up the hill. The hilltop was mostly solid rock, which would have presented problems in anchoring the guy wires for the tower and tent. Also, it was obviously impossible to transport the gear by hand to the peak of the hill.

KP4Q only looked at these problems as a challenge. He talked to a local helicopter pilot and soon had a solution, he thought, to the problem. The pilot warned us that there was inadequate space at the top to land the chopper safely. Upon Pedro's urging, however, he agreed to transport two operators and the necessary gear to the top of the hill, and then while hovering there, lower them and the equipment to the ground by a cable suspended under the chopper. KP4Q asked for a volunteer to operate with him on the hilltop. There weren't any! We then agreed we would operate as a group at the more accesssible lower position.

While arguing the relative merits of the upper and lower operating sites, Louis, KP4WI, came up with a unique idea to facilitate the transfer of equipment to the hilltop. KP4WI, who earns his living as an engineer, designed a portable ham shack/equipment carrier that could be slung under a chopper, transported to Desecheo and lowered to the hilltop. The idea was terrific! He drew up plans for a large, heavy, reinforced plywood box that incorporated doors, prop open windows, 110 and 220 volt wiring and lighting, fold-down operating tables and the base of a vertical attached to the side. The only things missing were bunk beds, running water and a john. When transporting the portable shack to Desecheo, it could be "buttoned-up" and completely filled with generators, gas drums, rigs, antennas and other supplies. Upon arrival at the island it was to be lowered into position on the hilltop. It could have been quickly unloaded, the table leaves dropped into position, the rig plugged in and the starter rope to the generator pulled. Desecheo could have been on the air minutes after arrival! Unfortunately, none of this was to happen.

Transportation

We now turned our attention to a major area of concern. How were we going to get three tons of gear and operators safely to and from Desecheo? During the war, a helicopter pad had been constructed on the island, and we felt that using a chopper would be the easiest, safest and most dependable mode of transportation. The rental cost of nearly $600 per hour for a large helicopter was out of reach, and it became obvious that we needed to consider boat transportation.

During much of the year, the seas around Desecheo are very rough. This is especially true during the winter months. The island is virtually surrounded by coral reefs, and there are no sandy beaches that one could easily land a boat on. There is, however, a small, deep inlet located about one-quarter mile away from our selected operating site. Between the inlet and the operating site is a very rough beach covered with numerous sharp rocks and tidal pools. Transporting two and a half tons of gear over this terrain would be no easy task.

The skipper of a 40 foot fishing boat agreed to take us to the island and remain anchored offshore during the DXpedition. He even agreed that his crew would be available to help with the physical labor. He cautioned us, however, that because of the frequent severe seas, he could not guarantee getting us on or off the island on specific dates. In addition, we would be required to transfer our gear from his fishing boat to a smaller boat and then row to shore. On occasion, personnel of my laboratory had used boat transportation to Desecheo. They had horror stories to tell of their small boat being overturned with the subsequent loss of equipment and their personal struggles to get safely to shore. Some refused to ever return to the island. KP4AM and KP4Q mentioned that they were not swimmers. They didn't seem concerned, however. Apparently, their confidence in life-jackets overcame any concern about having to swim the last few feet to Desecheo. Anything for a new one!

KP4WI, a pilot in the Air National Guard, frequently flew over the island during training flights. His reports on the conditions of the seas were not encouraging. We had visions of never getting on the island, or once having gotten there, never getting off. About this time, the captain of our vessel said his boat would not be available for a period of several months. Our thoughts once again turned to the helicopter and its high costs.

An inquiry with detailing of our plans made to the Northern California DX Foundation brought us the financial help we needed. Not only would they help us with the helicopter costs, but they volunteered to print the QSL cards and assume the responsibility of distributing them. Needless to say, we accepted their generous offer of help. Our group relaxed a little, feeling that many of our major problems were out of the way.

More Problems

In January of 1977, title to Desecheo was transferred to the U.S. Department of the Interior. They planned to use the island as a refuge for nesting sea birds. The transfer did not concern us as to the validity of our separate country status claim with the ARRL. Desecheo was simply being passed from one U.S. government agency to another. True...but how wrong we were about not being concerned.

Many DXpeditions have problems related to getting the proper licensing for their operation. Fortunately, this was of no concern to us, since any amateur license issued by the FCC would be valid for operation of Desecheo. Our problems were concentrated in two areas: 1) obtaining separate country status from ARRL, and 2) obtaining permission from the Department of the Interior for a DXpedition on the island.

After nearly two years of waiting, we were elated in November of 1978 to receive notice from the ARRL that Desecheo would be counted as a new one. Many times previously we had heard rumors that the Desecheo request had passed with a successful vote of the DXCC advisory committee. Just as frequently we heard that it was being re-submitted because the composition of the committee had changed or because the committee wanted to have another look at Desecheo and Water Island, a potential new one in the Virgin Island area.

Our enthusiasm, however, was dampened due to our never-ending problems of attempting to gain permission for the operation from the Department of Interior. Written requests, numerous phone calls and eyeball QSO's with representatives of the Department produced a response from the Interior that seemed to say "We might let you go...we need more details and time to study your request." Our cautious optimism turned to temporary dispair when they notified us that"...while they recognized the unique value of ham radio to society, their plans for the

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development of Desecheo as a game refuge for sea birds did not include ham radio operation from the island." They remained "Sincerely Yours," and we remained even more determined to gain the necessary permission for the expedition.

Good friends of amateur radio enlisted in our cause, and following more phone calls, letters and eyeball QSO's, a small crack began to appear in the stubborn federal bureacracy. They now announced that a DXpedition might be possible, providing the group confined their activities to three days, took no more than four operators, conducted no night-time operations, used no generators and did not use helicopters. We could not have competed in the "Novice Roundup" with these restrictions, and therefore we developed a strategy of push hard, gain a small concession, back up for awhile and push again to gain another.

Very slowly the restrictions began to fall by the wayside, and we were confident once again that in the end we would receive permission to mount a major DXpedition that would meet the needs of the world-wide DX community.

Suddenly in December of 1978 two amateurs from the Virgin Islands appeared on the air from Desecheo and completed a few thousand QSO's. Since they did not have the required permission from the Department of Interior, all hell broke loose. The Department, in writing, reverted to their *NO AMATEUR RADIO OPERATION* stand! At the time we felt and still feel that their premature, unauthorized operation from Desecheo exceeded the "norms" of the competitive spirit of amateur radio. In their eagerness to scoop the KP4's well-known, long-planned operation, these operators nearly destroyed any opportunity for an authorized, large DXpedition that would have provide the maximum benefit to the multitude of DXers. The fact that their operation was not accepted by the League offered us some satisfaction.

Just two months prior to our actual operation, we were faced with the reality of having an ARRL authorized new one within "2 meter distance" of our home QTH's but no permission to operate from the island. KP4Q, KP4AM and several friends redoubled their efforts and attempted to repair the damage that had been done. After little initial success, once again the crack opened slightly and finally nearly all the way. Permission was eventually granted with only a minimum of restrictions, including one which stipulated that the operation take place almost immediately, and the second that no helicopter be used for transportation.

We quickly rounded up another boat. The captain, however, said that there was no way he could stay anchored off Desecheo during our operation. The seas were too rough and the dangers too great. The captain was recommended to us as being the most knowledgeable of the waters surrounding Desecheo. We wondered once again if we would be able to get on the island by boat. Concerns of getting off the island were forgotten. During this period, personnel from my laboratory were on the island and were engaged in removing the monkeys. They had used helicopter transportation. Their reports were not encouraging. During 12 days of their 14-day stay on the island, the seas would not have allowed any type of boat to land regardless of size. Fortunately, almost simultaneously with this discouraging report, the Department of Interior eliminated their restrictions regarding helicopter transportation.

The Department of Interior, however, continued to insist that our DXpedition take place almost immediately. This caused us severe headaches. Three of our stateside operators, Chet, N6ZO (Ex KP4EAJ), Dick, W4VN and Pete, N6CJ could not rearrange their work schedules to include the DXpedition in such short time, less than a week. These three were expected to carry the entire c.w. part of the operation. Chet quickly arranged for Roger, N4ZC and Don, N4EA to be repalcements, and the c.w. operations were salvaged. KP4WI, who had been with the group from the inception, also had to drop out at the last minute due to work pressures. John, KV4KV had previously arranged to accompany us to Desecheo, and this brought us to six operators, the absolute minimum we thought needed for the DXpedition.

The final group of six operators was pulled together from the States, the Virgin Islands and two areas of Puerto Rico. Planning and preparations for the operation suffered because of our geographical separation, but somehow at the last minute everything seemed to fall into place. KP4AM, KP4Q, KV4KV, N4EA, N4ZC and I were ready for lift off!

(To Be Continued)

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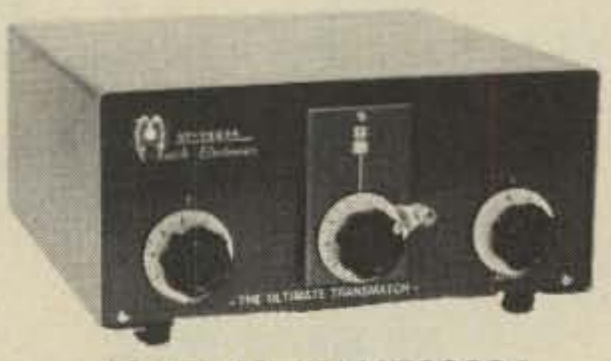

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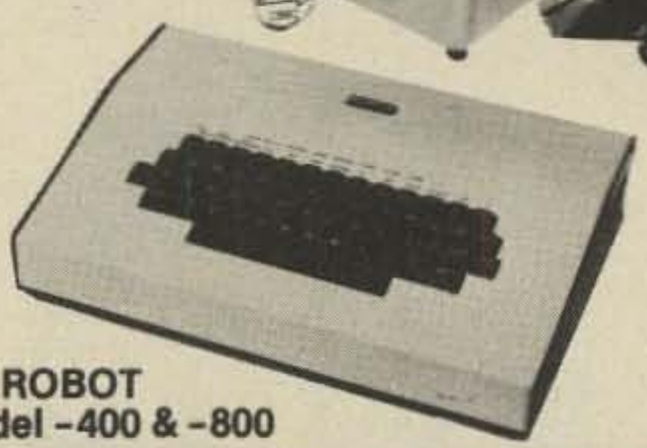

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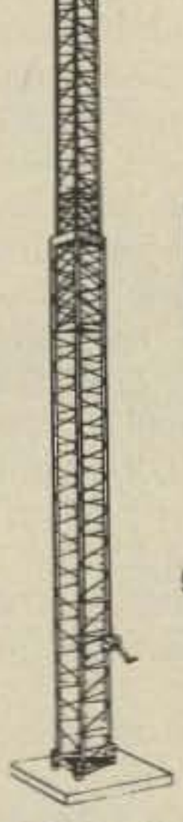

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a monthly feature by
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DX

NEWS OF COMMUNICATIONS AROUND THE WORLD

Time rushes by!!! It's hard to believe that almost a year has passed since the record-setting 1979 CQ Worldwide DX Contests, the last of the major operating events of the 70's. Now October and November are just around the corner with the first CQ Worldwide Contests of the 80's.

Again this year, we are trying to provide you with a list of Contestpedition stations (Contest DXpeditions) which will be active in the *CQ* Worldwide Phone Test; Oct. 25-26, 1980 and the *CQ* Worldwide C.W. Test, Nov. 29-30, 1980. However, as this column is written in July and many DXers are just beginning to make plans for the Tests, our list necessarily will be incomplete. The only information we have is from those confirmed contest expeditioners who plan well ahead, and, who knowing our early deadline, have been thoughtful enough to send their QTH's, dates, QSL Managers and other necessary data. Undoubtedly there will be many more Contestpedition stations active, so we advise you to read the *Long Island DX Bulletin* (W2IYX)[1], *QRZ DX* (K5FUV), *The DX Bulletin* (K1TN), the *DXers Magazine* (W4BPD), *DX 'Press* (PAØTO), the *DX News-Sheet* (Geoff Watts), the *DX News Letter* (DL3RK), *Long Skip* (VE3FRA) or one of the other DX or DX club bulletins as the contest weekends approach.

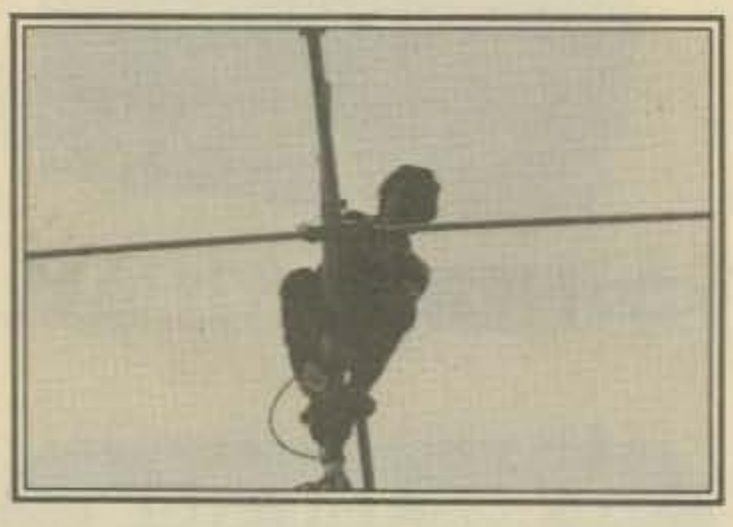
Here is what we have received through mid-July:

LLoyd, W6KG and Iris, W6QL, Colvin will definitely be active overseas during both the phone and c.w. weekends. Likely spots include Greece, Crete or the Dodecanese Islands. As usual, QSLs for operations by Lloyd and Iris go to the YASME Foundation, Box 2025, Castro Valley, CA 94546.

The Potomac Valley Radio Club plans a Contestpedition to Curacao again this year for the phone weekend. The callsign will be PJ2CC. Based on past performance this station will compete for world high.

The Frankford Radio Club will be fighting for top club score again also and has several possible irons in the fire, including 9Y4, described as 50-50, and 6Y5 in the Phone Test, plus a probable multi/single at ZF2AD during the c.w. weekend.

P.O. Box 205 Winter Haven, FL 33880



Torros, A7XM, has given many DXers a new one from his QTH in Doha, Qatar. In this photo he is installing a new TH6DXX at 45 meters. QSL A7AM via DJ9ZB. (Photo courtesy DJ9ZB)

The Northern Ohio DX Association will ensure a Guatemala contact for everyone during the November C.W. Test. Five members, K8CW, K8HV, W8QWI, WB8CSH and WD8MOV, plan to use the call TG4NX, with QSLs to go to WD8MOV.

The Noriomagum DX Group from the Netherlands will be active from Jersey Island from Oct. 22-27 on the 5 bands 80-10 meters, c.w. and s.s.b., except all s.s.b. during the contest weekend. There will be 5 separate GJ5 calls plus GJ4IFE.

The Red Dragon DXers plan to shoot for the top European phone score from GW6GW using monoband beams on 7, 14, 21 and 28 MHz, plus wires for 80 and 160 meters. Operators will be GW3GHC, GW3KYA, GW3NJW, GW3NWS, GW3NYY, GW4BKG and GW4BLE in the multi-operator, single transmitter class. QSLs to GW4BLE.

The North Florida Group of HH2 and VP5 fame is expected to be back on Providenciales again for the Phone Test, but plans are not yet firm at presstime.

[1]*The callsign in parentheses after each bulletin title is that of the bulletin's editor.*

The WAZ Program

10 M Phone

57...M6AWD
58...JH8GWW
59...W7OK
60...PA2TMS
61...K9RF
62...VE1AUK
63...RA3AKX
64...JA2FDC

20 M Phone

309...W7WHB
310...XE1OW
311...TF3SV
312...YU1AG
313...UAØCCW
314...N6AW

15 M Phone

52...JA5PUL
53...PA2TMS
54...JH2SUV
55...K9RF
56...I6ZJC
57...JE3SRS

15 M C.W.

32...JA8SPZ

20 M C.W.

113...I8WY
114...W6RGQ

All Band WAZ

S.S.B.

1937...WD8LJX
1938...IØYKN
1939...I8WY
1940...ISØBYR
1941...PAØMA
1942...AA2Z
1943...KB2DE
1944...K6JAD
1945...WA4UBM
1946...K5WSC
1947...KBØHJ
1948...AA4BA
1949...I2HHE
1950...WA1RGP
1951...ACØM
1952...W9TC
1953...EZ3OD
1954...WA4BIM
1955...JA9NLE
1956...K2EYJ
1957...AJ6A
1958...I2WTY
1959...WB2HPP
1960...KB5SFU
1961...WB8MOV
1962...LA1ND
1963...LA3WV
1964...SV1EX
1965...EA3AOC
1966...PA2VDZ
1967...K7AII
1968...UR2FQ
1969...UA6RB
1970...RA3AKX
1971...K6AXC
1972...OK1IQ
1973...K4BYK
1974...WB4KCL

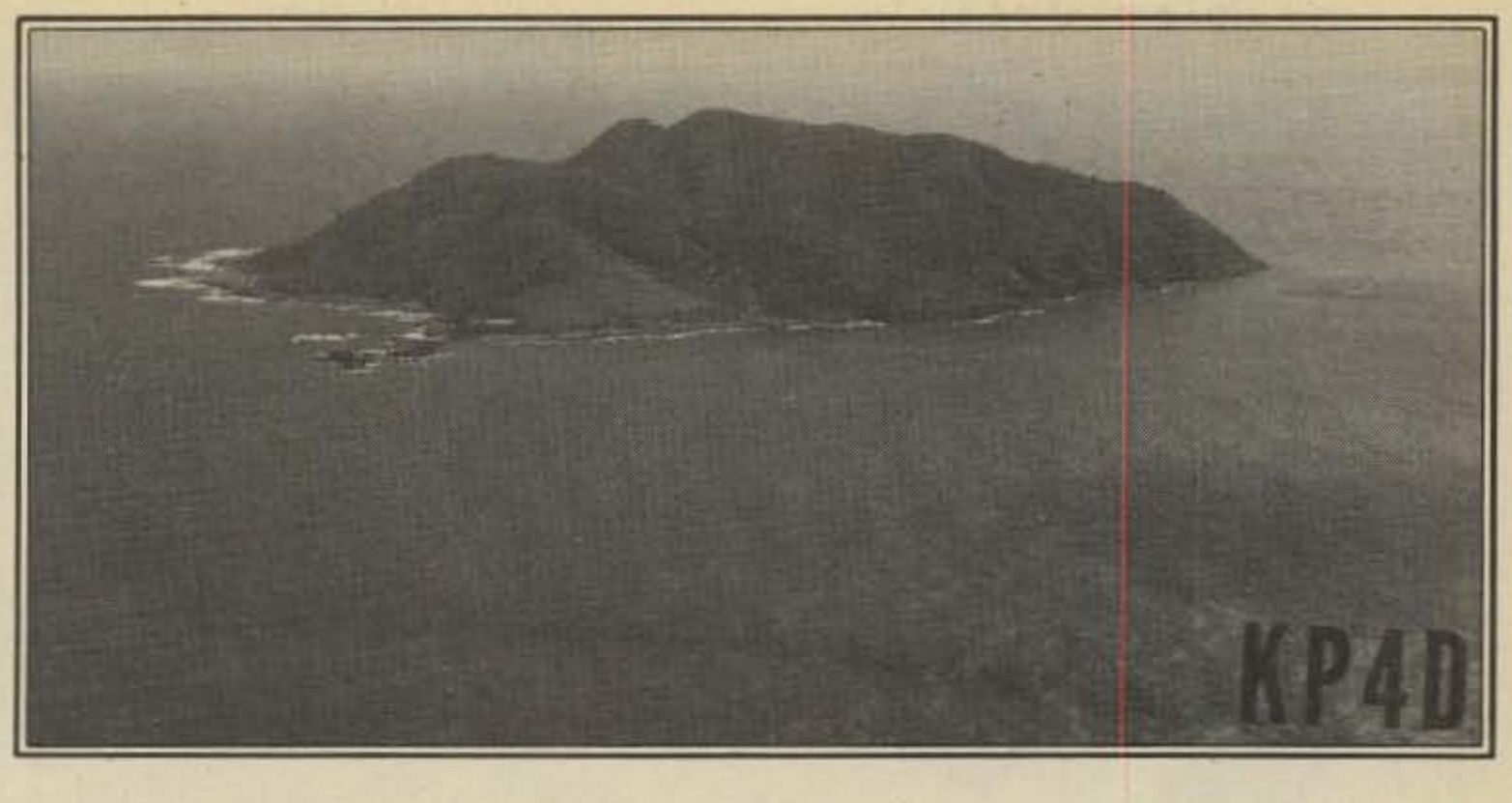
C.W. and Phone

4835...YU3TKT
4836...WBØYMR
4837...WB7RUV
4838...W5SG
4839...PAØKZ
4840...HA7-517
4841...WB6SHL
4842...JA7OJW
4843...N7ASZ
4844...W6ETR
4845...AF7M
4846...VE2AGP
4847...W2EMM
4848...JA9GPA
4849...DJ9WB
4850...DF2NE
4851...K5OGX
4852...UA2DP
4853...UA4NM
4854...UB5IAM
4855...UK5JAO
4856...UA9MAX
4857...UA9PP
4858...WD9EPG
4859...WB7TJC

All Phone

562...SM2AHP
563...DJ6VH
564...K4SE
565...W6NDS

Application and reprints of the latest rules may be obtained by sending a self addressed stamped envelope (30 cents) size 4½ × 9½ to the WAZ Manager, Leo Haijsman, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the QSL Manager or to a check point should include sufficient postage for the safe return of their QSL cards. The processing fee for all C.Q. Awards is $5.00.



Remember the famous (and controversial) DXpedition to famous (and controversial) Desecheo Island back in March 1979? Thanks to Roger Burt, N4ZC (ex-KP4AOO back when the world was young), we are now able to provide photos of both the group and the island. Left to right are Roger, N4ZC himself, Don, N4EA, Pete, KP4Q, Bill, KP4DSD, Dave, KP4AM, and John, KV4KV.

This is a long shot of Desecheo looking east with Puerto Rico dimly seen on the horizon.

This picture shows the operating area around the helicopter pad. The tent for the upper operating position can be dimly seen up the hill about 200 ft. above the sea. The tent beside the pad was the sleeping tent for the first night, but the generator noise was so bad it was necessary to move down to the beach the second night. The lower position was toward the beach to the right of the mid-tent.

Carl and Martha Henson have scheduled their vacations for a 2 week period before and after the October phone weekend, but at deadline time their destination is unknown. Carl says they will definitely be DX for the contest.

Woody, K9EF/8R1 writes that Guyana will be on for sure during both the phone and the c.w. weekends. Plans are still in flux, but Dave, WD4RCO, hopes to come down from Atlanta during the phone weekend and may operate as K9EF/8R1. N4BPP and one other operator from Kentucky plan to be on as WB4LRB/8R1. These operations will cover 80-10 meters with 160 a possibility.

Les, W8ATK and Dave, K8BPX will operate 5 bands from Bonaire during the Phone Test, arriving the evening of Oct. 23 and setting up on Oct. 24. They are not trying for score but will be on the air as much as possible. Their callsigns probably will be /PJ4.

Terry, N6CW, and Group will be back to the British Virgin Islands in October, so everyone should be able to make their VP2V contacts again with ease.

Bill Parker, W4YKH will make Grand Cayman available again this year as ZF2BP, along with N4AJU as ZF2DA and WD4AEX as ZF2DL. They will be active from Oct. 22-Oct. 29.

Perry, W5STI advises that he and the XYL will operate VP2MPB from Montserrat during the Phone Test. They

THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ Master Prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be up-dated annually by addition to, or to confirm present total. If no up-date, file will be placed into "inactive" until next up-date. No fee required for addition to Honor Roll.

MIXED

1920	F9RM	1575	W2NUT	1295	N2AC	1129	N6FX	902	K6DT
1902	YU2DX	1536	W7LLC	1287	N4NO	1126	K5DB	855	YU2CBK
1842	K6XP	1525	N4MM	1286	AA4A	1114	WA1JMP	852	SM3EVR
1814	K6JG	1514	W9DWQ	1275	N6AV	1109	I6SF	851	K8CH
1805	W4WV	1512	W4BQY	1260	I2PHN	1095	I0JX	782	YU4EBL
1656	W2NC	1485	K5UR	1179	YU7ODS	1048	JH1VRQ	758	UA3FT
1653	W3PVZ	1462	DJ7CX	1179	YU1AG	1010	IN3ANE	700	I2MQP
1626	N4UU	1424	N6CW	1155	W8CNL	1008	WA2AUB	666	N8II
1610	ON4QX	1401	PA0SNG	1151	UK3AAO	950	PY4OD	644	DK7XX
1609	VE3GCO	1350	KE4I	1146	DL1MD	950	K8LJG	602	WB8ZRL
1600	K2VV	1335	N6JV	1139	K6ZDL	918	W6ANB		
1577	YU7BCD	1332	W9FD	1130	W0SFU	914	N6JM		

S.S.B.

1828	F9RM	1300	K2VV	1102	AA4A	957	W6RKP	841	YU1AG
1708	I0ZV	1268	YU7BCD	1050	N2SS	932	W6YMV	821	CT1UA
1684	I0AMU	1262	K5UR	1017	DL1MD	909	PY3BXW	804	WA2AUB
1637	K6XP	1225	ZL3NS	992	W0YDB	908	I0MBX	770	N2AC
1600	W4UG	1207	W9DWQ	989	DJ7CX	900	JH1VRQ	759	ZP5RS
1548	K6JG	1200	I4ZSQ	989	OE2EGL	888	W4BQY	718	I6NOA
1502	K2POA	1193	PA0SNG	967	PA2TMS	881	N4NO	706	WA2FKF
1440	I8KDB	1176	N4UU	962	OZ5EV	854	N6FX	657	I5AFC
1350	N4MM	1105	WB2NYM	962	YU7ODS	851	W2NC	602	YU3APR

C.W.

1535	W8KPL	1288	YU7BCD	1123	N4NO	851	KH6HC	709	DL1MD
1459	W2NC	1234	W9FD	1067	VO1AW	834	VK4SS	679	I1YRL
1434	DL1QT	1217	G2GM	1062	WA0KDI	833	LZ1XL	658	EA2OP
1432	ON4QX	1165	W4BQY	1013	K6ZDL	808	I5IZ	650	K8LJG
1418	K6JG	1150	W3ARK	978	N4MM	802	OY4OD	628	W1WLW
1346	K6XP	1150	K2VV	966	YU1AG	777	YU3APR	612	WA2AUB
1344	N4UU	1146	N2AC	925	YU7ODS	756	SM0GMG	607	I1TLA
1336	WA2HZR	1140	K5UR	912	N6FX	750	JH1VRQ		
1301	N6JV	1124	DJ7CX	877	I6SF	745	DJ3LR		

Dr. John W. Reasoner, WA4QMQ, of Bowling Green, Kentucky has a complete set of basic CQ prefix awards. He earned VPX certificate #21 in March 1970 under his SWL callsign W4-10646, followed by WPNX #86 in February 1976 as WN4QMQ. Then in rapid order John qualified USA-WPX-76 in April 1976 on c.w. and in December 1976 on s.s.b., followed by S.S.B. WPX #987 in 1977, C.W. WPX #1749 in 1978, and Mixed WPX #697 in 1978. To our knowledge Dr. Reasoner is the only person to progress from VPX as an SWL, to WPNX as a Novice, on to the full amateur prefix awards. If there are others out there please let us know.

plan to be active for 10 days prior to the contest weekend. Montserrat will also be available in the C.W. Test as *K5BDX* and will be operating on all bands, including Novice frequencies, as VP2MFL. QSL's for the latter operation go to K5BDX.

Dave Gardner, K6LPL has 2 possibilities for the phone weekend. He will be /KH3 if plans for a much more exotic location in another part of the world do not materialize.

Milton, KB5AS and Group plan to be in VP1, Belize for the Phone Test. Operators will include K5LU, W5XZ and K3JT. A 10 day stay is anticipated.

Bob, VE3FCU and Friends will be QRV from 8P6MI, Barbados for the c.w. weekend. They hope to arrive a week before the Test to operate strictly c.w. on 15, 20, 40 and 80 meters. QSLs for this operation should be directed to Mike, VE3JTQ.

Chuck, W7FP advises that 3 or 4 operators, probably all from the Willamette Valley DX Club, plan a multi-operator, single-transmitter station from Saipan for the Phone Test. They will probably use Len's call, KH0AC.

Dick Norton, N6AA has tentative plans to be back at 9Y4 but it isn't definite, so he asks that this not be regarded as a formal announcement. We hope that he makes it, as Dick's operations are always first class.

The WPX Program

Mixed

846...JH2SUV
847...GU5CIA
848...WB0LXM
849...WD9DCL
850...WD9IIC
851...UA3LX
852...UD6DLJ
853...JA7RPC

S.S.B.

1277...WA7YBN
1278...KB8OQ
1279...YU3APR
1280...WA2JAS
1281...I8FTF
1282...WB4VQO
1283...AJ6A
1284...I8HDN
1285...HM1SX
1286...W5TJQ
1287...DA1MV
1288...UA3PBY
1289...UA4CZ
1290...RA9OEU
1291...UK3MAX
1292...UK6AAF
1293...UK6AJS
1294...UV3CS
1295...UW3HN
1296...UB5ABK
1297...UP2PAD
1298...VK2VAB

C.W.

1946...YU3APR
1947...K4AMC
1948...OK1AES
1949...DJ0BC
1950...GU5CIA
1951...OZ1BII
1952...WA2EYA
1953...WB7QEL
1954...UK3DAZ
1955...UK5UAC
1956...UA2FCB
1957...UA3ACJ
1958...UA3ADO
1959...UA3AGL
1960...UA3AIT
1961...UA3NAH
1962...UA3NG
1963...UA3QBE
1964...UA4ACA
1965...UA4PGE
1966...UA4WPX
1967...UA6AAK
1968...UA6AXX
1969...UA6AYR
1970...UA6AYX
1971...UA6HGV
1972...UA6PAM
1973...UA9PP
1974...UA0JAY
1975...UA0OAG
1976...UA0SGJ
1977...UB5HBH
1978...UB5JFX
1979...UB5JIQ
1980...UB5ZBF
1981...UC2LAS
1982...UD6DLJ
1983...UL7VAI
1984...UT5LF
1985...UW1ZO
1986...UW6DM
1987...K7WA

VPX

190...OK1JSU
191...ONL-4003
192...UA1-169-756
193...UA2-125-57
194...UA3-142-736
195...UA3-168-7
196...UA3-170-857
197...UA6-150-900
198...UA9-099-85
199...UA0-139-76
200...UB5-062-302
201...UB5-065-480
202...UB5-081-15
203...UO5-039-173
204...UQ2-037-152

Endorsements

Mixed: 400 WB0LXM, WD9IIC, UA3LX, JA7RPC. 450 JH2SUV, I5JFG, WD9DCL. 550 W0JIE. 600 WB8YQX, GU5CIA. 800 IT9HLO. 900 N6JM, W6ANB. 1000 WA4QMQ. 1650 W2NUT. 1700 I0ZV.

SSB: 300 WA7YBN, KB8OQ, WA2JAS, UB5ABK, I8FTF, WB4VQO, UW3HN, UV3CS, HM1SX, W5TJQ, DA1MV, UK6AJS, UK6AAF, UK3MAX, RA9OEU, UA3PBY. 350 I8HDN, UP1PAD. 450 AJ6A, DK5WQ. 500 12OMF, W6BCQ. 550 WB8YQX, UA4CZ. 600 YU3APR, KB8JF. 750 I6ZJC. 800 W7KOI. 850 W2NC. 950 WA4QMQ. 1000 OE2EGL. 1550 K2POA.

CW: 300 UA0OAG, UA0SGJ, UB5HBH, UB5JFX, U5JIQ, K4AMC, OK1AES, DJ0BC, WA2EYA, UK5UAC, UA3ACJ, UA3ADO, UA3AGL, UA3AIT, UA3NAH, UA3QBE, UA4PGE, UA6AAK, UA6AXX, UA6AYR, UA6AYX, UA6HGV, UA6PAM, UA0JAY, UB5ZBF, UC2LAS, UD6DLJ, UL7VAI, UW1ZO, UW6DM, K7WA. 350 UK3DAZ, UA2FCB. 400 VE2BP, F6CWA, UA4WPX. 450 GU5CIA, OZ1BII, UA4ACA. 500 GW3SB. 600 DJ1YH, UT5LF. 700 UA9PP. 750 YU3APR, JH1VRQ. 1000 K4RDU.

20 meters: UK3DAZ.
40 meters: W0JIE

Asia: UK3DAZ, W7KOI, UV3CS.
Europe: OE1-109976, WB8YQX, W3GXK, GU5CIA, KB8JF, UK3DAZ, UV3CS.
No. America: W0JIE, GU5CIA, F6CWA.
Oceania: KL7AF.
So. America: WA4QMQ.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to "CQ WPX AWARDS", 5014 Mindora Dr., Torrance, Calif. 90505. U.S.A.

Fred Fraley, AA4FF, is the newest CQ DX Award's Checkpoint, representing the Lynchburg Amateur Radio Club. Fred was first licensed in 1953 at the age of 15. His amateur career includes a tour at KL7WAF where he was president of the Wildwood Station Radio Club and Custodian of the All Alaska Counties Award. He holds the WPX-CW Award and USA-CA at the 3000 county level.

Robert Wanderer, WB2MCB is considering a trip either to the Caribbean, where he might operate from VP2K or VP2M, or north to activate rare Zone 2.

The Finland DX Group hopes to activate both EA8, Canary Islands and CT3, Madeira again this year.

Bill Hatcher, DU2KK/KP4KK plans to operate from Macao during the Phone Test using equipment left by John Ackley, KP2A/CR9A. Bill hopes to have the callsign CR9B.

John, K4IIF enjoyed operating from the home QTH in '79, but looks forward to being DX again in 1980.

Special Recognitions

Your attention is called to major accomplishments in the *CQ* DX Awards Program by the following 3 DXers:

1. Gary Dixon, K4MQG, of Charlotte, N.C., who is the first U.S. amateur to earn 5-Band WAZ. Gary is #2 in the world.

2. Kent Svensson, SM4CAN, of Laxa, Sweden, who is the third amateur worldwide to qualify for 5-Band WAZ.

3. Ron Moorefield, W8ILC, of Dayton, Ohio, who is the first amateur in the world to achieve the *CQ* DX Award Honor Roll using less than 5 watts power, QRPp.

We hope to have photographs of each of these 3 amateurs for use in the DX column of a later issue.

DX Club News

The Western Washington DX Club has petitioned the FCC to expand U.S. phone bands to include 3750-4000 kHz, 7050-7300 kHz, 14100-14350 kHz, 21200-21450 kHz and 28400-29700 kHz. This petition has touched off a lively controversy within the club, as many members disagree with the position. When you're the world's largest DX club with over 500 members there is bound to be a variety of opinions.

The Utah DX Association was reorganized this past spring with the following officers; Curt Wilbur, K7CU, President; Mike Fulcher, KB7JE, Vice President; Doug Hendricks, N7UT, Secretary/Treasurer and Jim Oliver, W7BPS, Awards Manager.

The Lynchburg Amateur Radio Club has formed a High Frequency Operators Group (HFOG, pronounced Hi Fog) to encourage DX and Contest activities by its membership. Fred, AA4FF, serves as chairman.

Long Island DX Association new officers are Carl Lindenman, W2TDQ, President; Allen Singer, N2KW, Vice President; Charles Wagner, WA2YUH, Treasurer; Arthur Bernstein, N2KA, Secretary; and Robert Jacobson, K2YGM, Corresponding Secretary. Contacts with the club should be made through N2KA at 387 Avenue "S", Apt. 6D, Brooklyn, NY 11223.

The Northern California DX Club has elected Bob Thompson, K6SSJ, as chairman for the 1981 International DX Convention to be held May 1, 2 and 3, 1981 at the Airport Holiday Inn, Visalia, California. Facilities at this location are so outstanding that the "Fresno Convention" may locate permanently in Visalia. This is reminiscent of the famous Pittsburg Conference for analytical chemists, which is usually held in Cleveland.

New club officers are Bruno Biehenfeld, AA6AD, President; Ted Park, K6XN, Vice President; Ron Panton, W6VG, Secretary, and Gene Spinelli, WD6DLK, Treasurer.

The Southern California DX Club is offering a new certificate for anyone working 35 club members on any of the 6 lower bands, 160-10 meters. To apply, contact Norm Friedman, W6ORD.

The Southern California Club's DXer of the Year Award went to Dr. David Gardner, K6LPL.

That's the club news for this month. If your DX club has newsworthy items please drop a line to DX Editor, K4IIF, at P.O. Box 205, Winter Haven, FL 33880.

CQ DX Awards Program

S.S.B.

869	WB5SVV	880	W1CRL
870	KB0C	881	K2CL
871	W5SG	882	KB5FU
872	WA2JAS	883	UV9DT
873	KB8OQ	884	UA6HDD
874	VE2QO	885	UQ2MU
875	K1GSK	886	UA3CS
876	KB4BW	887	UA0CCW
877	AJ6A	888	UA9ODK
878	W5TJQ	889	UP2PAD
879	WB5TXP	890	UK3MAX

C.W.

437	W4BD	444	UA9PP
438	WB4PRU	445	UA3IBH
439	W0YBV	446	UA6LBX
440	UA3RM	447	UB5ZDF
441	UQ2MU	448	UA3AGL
442	UA4WWS	449	UA0CAC
443	UA9YAQ		

S.S.B. Endorsements

310	VE3MJ/317	275	JA5PUL/284
310	N4WF/314	250	K1GSK/260
310	W4DPS/314	250	WB0SNG/250
310	DJ9ZB/312	200	KB5FU/213
300	W9SS/309	200	W6TPC/211
300	K9RF/309	200	WB5SVV/200
300	N6AV/309	200	KB8O/200
300	N6AW/305	200	AJ6A/204
300	OE3WWB/300	28 MHz	WB5TXP
275	W7OM/292	28 MHz	KB8O
275	I0MBX/290	28 MHz	AJ6A
275	LA7JO/284	28 MHz	UP2PAD

C.W. Endorsements

310	N6AV/312	200	UA9PP/226
300	K4CEB/307	200	WB4PRU/203
275	DL3RK/299	175	W7OM/189
250	W4BD/252	150	WA2EYA/150

The total number of active countries as of deadline was 319. Complete rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, 911 Rio St. Johns Dr., Jacksonville, FL 32211 USA.

Atlanta Hamfestival

For the first time ever, the Atlanta Hamfestival, held June 21-22, 1980 at the Atlanta Marriot, featured a special forum on the *CQ* DX Awards Program. A slide show was presented by K4IIF illustrating the different awards and

QSL Information

Correct your QSL Bureau addresses to show the following new Bureau managers, thanks *QRX DX*.

Northern Ireland—R. Parsons, GI3HXV, 45 Erinvale Belfast, Finaghy Belfast, Northern Ireland, BT10 OFP

HL9—American Amateur Radio Club of Korea, Dependent Mail Section, API San Francisco, CA 96301

Panama—L.P.R.A., Box 9a-175, Panama 9A, Republic of Panama

The Netherlands—V.E.R.O.N., Box 330, 6800 AH-Arnhem, Rotterdam, The Netherlands

VE2—A.G. Daemen, VE2IJ, 2960 Douglas Ave., Montreal, OVE H3R-2E3, Canada

VE6—G.D. Holton, VE6AGV, 4003 1st., N.W., Calgary, T2K 0X2, Canada

VE8—Rolf Ziemann, VE8RZ, 2888 Lanky Court, Yellowknife, Northwest Territories, X1A 2G4, Canada

Thanks to our good friend Jarmo J. Jaakola OH2BN, for furnishing the following QSL Managers and addresses:

A22GD-Via SM3CXS
A4XVK-To G4BVH
A7XD-c/o Box 4747, Doha Qatar
AO2F-Via Box 115, San Sebastian, Spain
AP5HQ-To N0RR
C31TQ-c/o EA2TV
C5ACW-Via OZ5QU
CR9A-To WB2KXA
CX7XU-c/o CX3AN
DA1WA/HB0-Via DJ0LC
FH0FLP-To DK9KD
FK0CQ-c/o DJ5CQ
FK8DO-Via N4TN
FM7BM-To Box 618, Fort de France, Martinque
FM7ITU-c/o F6BFH
FR0ACB/G-Via DK9KD
FW0DD-To VE3ODX
FY0BE-c/o F6AOU
G3JKI/5A-Via F6CYL
HH2PW-c/o WD9GSO, Rt. 1, Box 242, Knightstown, IN 46148
HH2VP-To N4XR
HM5PB-c/o Box 586, Pusan, Korea
J5AG-To SM3CXS
J6LNP-Via 9Y4NP
J28CB-c/o I8JN
K1FMP/9K2KA-Via. P.O. Box 30, Kuwait
N5VV(New Mexico)-To DF2RG
N6YK/VP2A-c/o N6NK
OD5RX-Via WA3HUP
PJ8UQ-To W3HNK
S79MC-c/o N4NW
SM0AGD/3D6-Via SM3CXS
ST2FF/ST0—To OH2MM
SV1IW/A-c/o Box 3751, Athens, Greece
SV0AT-To AF4B
SV0AU-Via W3FYT
TA2FM-To VE1BBS
TG9ML-c/o K5BDX
TL8JM-Via W5RU
TZ4AQS-To ON6BC
VK9NS-c/o P29JS
VK9NV-Via Box 27, Norfolk Island, South Pacific
VK9XW-To VK6RU
VP2AJ-c/o WB2TSL
VP2EES-Via K4TVE
VP2MU-To VE3HD
VP2VGF-c/o WA1GXE
VP5AA-Via W4ZR
VP5JAX-c/o JA2VUP
VP8AI-To WD4AHZ
VP8ZR-c/o G3KTJ
VQ9TR-Via N2IT
VS5RP-To Box 43, Tutong, Brunei
VS5OO-c/o N2OO
W7LDF/DU2-Via N2CW
ZD8HR-To N6HR
ZD8TC-c/o N2CW
3B6CF-Via 3B8CF
4S7DX-c/o WB2VFT
4S7MX-To SM3CXS
4S7RS-c/o DK8KL
4S7TK-Via JA1ELY
5H0HAS-To Box 2873, Lagos, Nigeria
5U7BE-c/o DK9KE
5W1AT-Via WA6AHF
5Z4NG/A-To DK9KD
5Z4YV-c/o JA2AJA
6T1YP-Via OH2BH
7X4BL-To K4CNW
8P6OH-c/o W2FLO
8P6MI-Via VE3JTQ
8Q7AW-To DJ2BW
8Q7AR-c/o K2TJ
9A1ONU-Via M1C
9M6MU-To N2CW
9N1MM-c/o K2UQ
9V1TK-Via JA6RIL
9X5LE-To SM3CXS

Percy, ZS6BGJ (on the left) stopped by for a visit with Joel, WA4HNL, just prior to the Atlanta Hamvention a few months ago.

Two other visitors to the shack of WA4HNL during this time were Mohammad, JY5HH (on the left) and Mohammad, JY4MB (on the right). Joel, WA4HNL is QSL Manager for JY4MB.

plaques offered in the *CQ* DX Program, and copies of rule sheets and application forms were distributed to interested DXers.

From the Mailbag

de Greg Johnson, N9AKP – Re *De Extra* in the June 1980 issue of *CQ*, here are my thoughts:

1. DXpedition stations should work only 3 per round from each call area. Assuming 30 seconds per contact, this will give each call area a chance every 15 minutes. 2. Each time the DXpedition station identifies, he should state "Please give me your call sign and signal report only."

These 2 specific rules will eliminate or reduce QRM from those stations who are losing propagation and keep everyone's interest at a high level, knowing they will get another chance in 15 minutes and giving them time to get an 807 or take a rest break. To be fair to all, this system should be extended to Europe, Japan and high density areas when propagation favors their part of the world.

73, John, K4IIF

The DX Quiz

Thanks to Roger Burt, N4ZC, of Mt. Holly, N.C. who contributed the questions and answers to test your DX acumen this month:

What is the correct zone for each of the following?

1. UF6	15	16	17	20	or 21
2. VU, Nicobar	21	22	26	37	or 39
3. VU Laccadive	21	22	26	37	or 39
4. UA0YT	17	18	19	23	or 25

List 4 countries that count as multipliers in the *CQ* Worldwide DX Contests but do not count in the ARRL DX Contests:

5. _____
6. _____
7. _____
8. _____

The following odd calls are worked in the *CQ* WPX Contest. The correct DXCC country for each is:

9. AM1AA	VK	W	KH4	EA	or LU
10. ES1AA	UR2	EA	ET	EP	or EI
11. HE1AA	HA	HB	HH	HC	or HV
12. 4A1AA	4S7	4X4	XE	XU	or VE

List the 6 French(F) DXCC countries in North and South America.

13. _____ _____ _____ _____ _____ _____

List the 7 island DXCC countries in the Mediterranean:

14.
15.
16.
17.
18.
19.
20.

Match the country prefix to the legal capital of each country: 60 - YI - YK - P29 - DU - CP - HR - ZA - ZS3 - HZ - YA - 70

21. Quezon City _____
22. Tegucigalpa _____
23. Sucre _____
24. Windhoek _____
25. Mogadishu _____
26. Port Moresby _____
27. Riyadh _____
28. Tirana _____

The ARRL DXCC list shows some island countries by 2 names, such as Auckland and Campbell Islands/ZL and Trinidad and Tobago/9Y4. List the correct prefix for each of the following of the less common names:

29. Roncador Cay _____
30. Jarvis _____
31. Martim Vaz _____
32. Prince Edward _____
33. Futuna _____
34. Gough _____
35. Miquelon _____

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YAGI ANTENNA 4' LONG APPROX. 20 TO 23 dB GAIN	$59.99
YAGI ANTENNA 4' WITH TYPE (N, BNC, SMA Connector)	$64.99
2 FOOT DISH WITH FEED AND MOUNT	$59.99
2300 MHz DOWN CONVERTER Includes converter mounted in antenna, power supply, antenna 75' and 3' RG59 cable with connectors, 75 to 300 ohm adapter, Plus 90 DAY WARRANTY	$299.99
OPTION #1 MRF902 in front end. (7 dB noise figure)	$349.99
OPTION #2 2N6603 in front end. (5 dB noise figure)	$400.00
2300 MHz DOWN CONVERTER ONLY	
10 dB Noise Figure 23 dB gain in box with N conn. Input F conn. Output	$149.99
7 dB Noise Figure 23 dB gain in box with N conn. Input F conn. Output	$169.99
5 dB Noise Figure 23 dB gain in box with SMA conn. Input F conn. Output	$189.99
DATA IS INCLUDED WITH KITS OR MAY BE PURCHASED SEPARATELY	$15.00

Shipping and Handling Cost:
Receiver Kits and $1.50, Power Supply add $2.00, Antenna add $5.00, Option 1/2 add $3.00, For complete system add $7.50.
Replacement Parts:

MRF901	$5.00	MBD101	$2.00
2N6603	$12.00	.001 chip caps	$2.00
		PC Board only	$25.00 with data

HOWARD/COLEMAN TVRO CIRCUIT BOARDS

DUAL CONVERSION BOARD $25.00
This board provides conversion from the 3.7-4.2 band first to 900 MHz where gain and bandpass filtering are provided and, second, to 70 MHz. The board contains both local oscillators, one fixed and the other variable, and the second mixer. Construction is greatly simplified by the use of Hybrid IC amplifiers for the gain stages. Bare boards cost $25 and it is estimated that parts for construction will cost $270. (Note: The two Avantek VTO's account for $225 of this cost.)

47 pF CHIP CAPACITORS $6.00
For use with dual conversion board. Consists of 6-47 pF.

70 MHz IF BOARD $25.00
This circuit provides about 43 dB gain with 50 ohm input and output impedance. It is designed to drive the HOWARD/COLEMAN TVRO Demodulator. The on-board band pass filter can be tuned for bandwidths between 20 and 35 MHz with a passband ripple of less than ½ dB. Hybrid ICs are used for the gain stages. Bare boards cost $25. It is estimated that parts for construction will cost less than $40.

.01 pF CHIP CAPACITORS $7.00
For use with 70 MHz IF Board. Consists of 7-.01 pF.

DEMODULATOR BOARD $40.00
This circuit takes the 70 MHz center frequency satellite TV signals in the 10 to 200 millivolt range, detects them using a phase locked loop, deemphasizes and filters the result and amplifies the result to produce standard NTSC video. Other outputs include the audio subcarrier, a DC voltage proportional to the strength of the 70 MHz signal, and AFC voltage centered at about 2 volts DC. The bare board cost $40 and total parts cost less than $30.

SINGLE AUDIO $15.00
This circuit recovers the audio signals from the 6.8 MHz frequency. The Miller 9051 coils are tuned to pass the 6.8 MHz subcarrier and the Miller 9052 coil tunes for recovery of the audio.

DUAL AUDIO $25.00
Duplicate of the single audio but also covers the 6.2 range.

DC CONTROL $15.00
This circuit controls the VTO's, AFC and the S Meter.

TOTAL COSTS
Using the HOWARD/COLEMAN boards and the recommended parts, it is easily possible to build the complete receiver (excluding LNA) for less than $600. Construction time is a few evenings and the tune up is minimal.

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11C91DC	650 MHz Prescaler Divide by 5/6	16.50
11C83DC	1 GHz Divide by 248/256 Prescaler	29.90
11C70DC	600 MHz Flip/Flop with reset	12.30
11C58DC	ECL VCM	4.53
11C44DC/MC4044	Phase Frequency Detector	3.82
11C24DC/MC4024	Dual TTL VCM	3.82
11C06DC	UHF Prescaler 750 MHz D Type Flip/Flop	12.30
11C05DC	1 GHz Counter Divide by 4	74.35
11C01FC	High Speed Dual 5-4 Input NO/NOR Gate	15.40

WISPER FANS

This fan is super quiet, efficient cooling where low acoustical disturbance is a must. Size 4.68" × 4.68" × 1.50", Impedance protected, 50/60 Hz. 120 Vac. $9.99

TRW BROADBAND AMPLIFIER MODEL CA615B

Frequency response 40 MHz to 300 MHz
Gain: 300 MHz 16 dB Min., 17.5 dB Max.
50 MHz 0 to − 1 dB from 300 MHz
Voltage: 24 volts dc at 220 ma max. $19.99

CARBIDE — CIRCUIT BOARD DRILL BITS FOR PC BOARDS

Size: 35, 42, 47, 49, 51, 52	$2.15
Size: 53, 54, 55, 56, 57, 58, 59, 61, 63, 64, 65	1.85
Size: 66	1.90
Size: 1.25 mm, 1.45 mm	2.00
Size: 3.20 mm	3.58

CRYSTAL FILTERS: TYCO 001-19880 same as 2194F

10.7 MHz Narrow Band Crystal Filter
3 dB bandwidth 15 kHz min. 20 dB bandwidth 60 kHz min. 40 dB bandwidth 150 kHz min.
Ultimate 50 dB: Insertion loss 1.0 dB max. Ripple 1.0 dB max. Ct. 0 + / − 5 pf 3600 ohms. $5.95

MURATA CERAMIC FILTERS

Models:	SFD-455D 455 kHz	$3.00
	SFB-455D 455 kHz	2.00
	CFM-455E 455 kHz	7.95
	SFE-10.7 10.7 MHz	5.95

TEST EQUIPMENT — HEWLETT PACKARD — TEKTRONIX — ETC.

Hewlett Packard:		
491C	TWT Amplifier 2 to 4 Gc 1 watt 30 dB gain	$1150.00
608D	10 to 420 mc .1 uV to .5 V into 50 ohms Signal Generator	500.00
612A	450 to 1230 mc .1 uV to .5 V into 50 ohms Signal Generator	750.00
614A	900 to 2100 MC. Signal Generator	500.00
616B	1.8 to 4.2 Gc Signal Generator	400.00
618B	3.8 to 7.2 Gc Signal Generator	400.00
620A	7 to 11 Gc Signal Generator	400.00
623B	Microwave Test Set	900.00
624C	Microwave Test Set	950.00
695A	12.4 to 18GC Sweep Generator	900.00
1702A	Storage Oscilloscope	1800.00
8691A	1 to 2 Gc Plug In For 8690A Sweeper	800.00
8692A	2 to 4 Gc Plug In For 8690A Sweeper	800.00
8693A	4 to 8 Gc Plug In For 8690A Sweeper	800.00
8742A	Reflection Test Unit 2 to 12.4 Gc	1800.00
Alitech:		
473	225 to 400 mc AM/FM Signal Generator	750.00
Singer:		
MF5/VR-4	Universal Spectrum Analyzer with 1 kHz to 27.5 mc Plug In	1200.00
Keltek:		
XR630-100	TWT Amplifier 8 to 12.4 Gc 100 watts 40 dB gain	9200.00
Polarad:		
2038/2436/1102A	Calibrated Display with an SSB Analysis Module and a 10 to 40 mc Single Tone Synthesizer	1500.00

RF TRANSISTORS

TYPE	PRICE	TYPE	PRICE	TYPE	PRICE
2N1561	$15.00	2N5590	$8.15	MM1550	$10.00
2N1562	15.00	2N5591	11.85	MM1552	50.00
2N1692	15.00	2N5637	22.15	MM1553	56.50
2N1693	15.00	2N5641	6.00	MM1601	5.50
2N2632	45.00	2N5642	10.05	MM1602/2N5842	7.50
2N2857JAN	2.52	2N5643	15.82	MM1607	8.65
2N2876	12.35	2N6545	12.38	MM1661	15.00
2N2880	25.00	2N5764	27.00	MM1669	17.50
2N2927	7.00	2N5842	8.78	MM1943	3.00
2N2947	18.35	2N5849	21.29	MM2605	3.00
2N2948	15.50	2N5862	51.91	MM2608	5.00
2N2949	3.90	2N5913	3.25	MM8006	2.23
2N2950	5.00	2N5922	10.00	MMCM918	20.00
2N3287	4.30	2N5942	46.00	MMT72	1.17
2N3294	1.15	2N5944	8.92	MMT74	1.17
2N3301	1.04	2N5945	12.38	MMT2857	2.63
2N3302	1.05	2N5946	14.69	MRF304	43.45
2N3304	1.48	2N6080	7.74	MRF420	20.00
2N3307	12.60	2N6081	10.05	MRF450	11.85
2N3309	3.90	2N6082	11.30	MRF450A	11.85
2N3375	9.32	2N6083	13.23	MRF454	21.83
2N3553	1.57	2N6084	14.66	MRF458	20.68
2N3755	7.20	2N6094	7.15	MRF475	5.00
2N3818	6.00	2N6095	11.77	MRF476	5.00
2N3866	1.09	2N6096	20.77	MRF502	1.08
2N3866JAN	2.80	2N6097	29.54	MRF504	6.95
2N3866JANTX	4.49	2N6136	20.15	MRF509	4.90
2N3924	3.34	2N6166	38.60	MRF511	8.15
2N3927	12.10	2N6265	75.00	MRF901	3.00
2N3950	26.86	2N6266	100.00	MRF5177	21.62
2N4072	1.80	2N6439	45.77	MRF8004	1.60
2N4135	2.00	2N6459/PT9795	18.00	PT4186B	3.00
2N4261	14.60	2N6603	12.00	PT4571A	1.50
2N4427	1.20	2N6604	12.00	PT4612	5.00
2N4429	7.50	A50-12	25.00	PT4628	5.00
2N4430	20.00	BFR90	5.00	PT4640	5.00
2N4957	3.62	BLY568C	25.00	PT8659	10.72
2N4958	2.92	BLY568CF	25.00	PT9784	24.30
2N4959	2.23	CD3495	15.00	PT9790	41.70
2N4976	19.00	HEP76/S3014	4.95	SD1043	5.00
2N5090	12.31	HEPS3002	11.30	SD1116	3.00
2N5108	4.03	HEPS3003	29.88	SD1118	5.00
2N5109	1.66	HEPS3005	9.95	SD1119	3.00
2N5160	3.49	HEPS3006	19.90	TA7993	75.00
2N5179	1.05	HEPS3007	24.95	TA7994	100.00
2N5184	2.00	HEPS3010	11.34	TRWMRA2023-1.5	42.50
2N5216	47.50	HEPS5026	2.56	40281	10.90
2N5583	4.55	HP35831E/		40282	11.90
2N5589	6.82	HXTR5104	50.00	40290	2.48
		MM1500	32.20		

CHIP CAPACITORS

We can supply any value chip capacitors you may need.

PRICES

1 to 10	$1.99
11 - 50	1.49
51 - 100	1.00
101 - 1,000	.75
1,001 up	.50

1pf	27pf	220pf	1200pf
1.5pf	33pf	240pf	1500pf
2.2pf	39pf	270pf	1800pf
2.7pf	47pf	300pf	2200pf
3.3pf	56pf	330pf	2700pf
3.9pf	68pf	360pf	3300pf
4.7pf	82pf	390pf	3900pf
5.6pf	100pf	430pf	4700pf
6.8pf	110pf	470pf	5600pf
8.2pf	120pf	510pf	6800pf
10pf	130pf	560pf	8200pf
12pf	150pf	620pf	.010mf
15pf	160pf	680pf	.012mf
18pf	180pf	820pf	.015mf
22pf	200pf	1000pf	.018mf

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120vac at 40 Amps.
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240 vac at 40 Amps.
Input Voltage 3 to 32 vdc.

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5.595-.500/4/CW
5.595-2.7LSB
5.595-2.7USB
5.645-2.7/8
9.OUSB/CW

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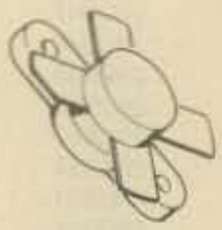
The RF Line

MRF454 $21.83

NPN SILICON RF POWER TRANSISTORS

. . . designed for power amplifier applications in industrial, commercial and amateur radio equipment to 30 MHz.

- Specified 12.5 Volt, 30 MHz Characteristics –
  Output Power = 80 Watts
  Minimum Gain = 12 dB
  Efficiency = 50%



MRF458 $20.68

NPN SILICON RF POWER TRANSISTOR

. . . designed for power amplifier applications in industrial, commerical and amateur radio equipment to 30 MHz.

- Specified 12.5 Volt, 30 MHz Characteristics –
  Output Power = 80 Watts
  Minimum Gain = 12 dB
  Efficiency = 50%
- Capable of Withstanding 30:1 Load VSWR @ Rated P_{out} and V_{CC}

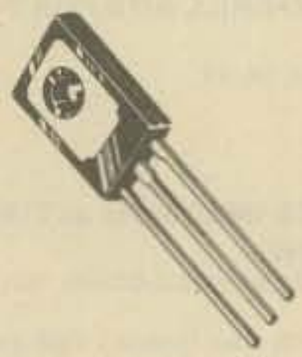
MRF472

$2.50

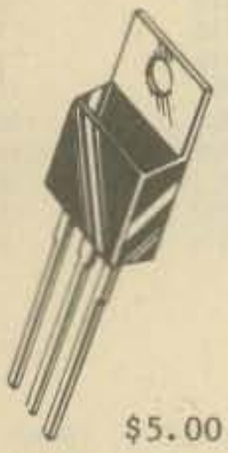
NPN SILICON RF POWER TRANSISTOR

. . . designed primarily for use in large-signal output amplifier stages. Intended for use in Citizen-Band communications equipment operating at 27 MHz. High breakdown voltages allow a high percentage of up-modulation in AM circuits.

- Specified 12.5 V, 27 MHz Characteristics –
  Power Output = 4.0 Watts
  Power Gain = 10 dB Minimum
  Efficiency = 65% Typical



MRF475



$5.00

NPN SILICON RF POWER TRANSISTOR

. . . designed primarily for use in single sideband linear amplifier output applications in citizens band and other communications equipment operating to 30 MHz.

- Characterized for Single Sideband and Large-Signal Amplifier Applications Utilizing Low-Level Modulation.
- Specified 13.6 V, 30 MHz Characteristics –
  Output Power = 12 W (PEP)
  Minimum Efficiency = 40% (SSB)
  Output Power = 4.0 W (CW)
  Minimum Efficiency = 50% (CW)
  Minimum Power Gain = 10 dB (PEP & CW)
- Common Collector Characterization

MHW710 - 2 $46.45

440 to 470MC

UHF POWER AMPLIFIER MODULE

. . . designed for 12.5 volt UHF power amplifier applications in industrial and commercial FM equipment operating from 400 to 512 MHz.

- Specified 12.5 Volt, UHF Characteristics –
  Output Power = 13 Watts
  Minimum Gain = 19.4 dB
  Harmonics = 40 dB

- 50 Ω Input/Output Impedance
- Guaranteed Stability and Ruggedness
- Gain Control Pin for Manual or Automatic Output Level Control
- Thin Film Hybrid Construction Gives Consistent Performance and Reliability

Tektronix Test Equipment

B	Wideband High Gain Plug In	$ 51.00
CA	Dual Trace Plug In	150.00
K	Fast Rise DC Plug In	63.00
N	Sampling Plug In	200.00
R	Transistor Risetime Plug In	116.00
W	High Gain Differential Comparator Plug In	283.00
TU-2	Test Load Plug In for 530/540/550 Main Frames	50.00
1AZ	Wideband Dual Trace Plug In	216.00
1S1	Sampling Unit With 350PS Risetime DC to 1GHZ	730.00
2A61	AC Differential Plug In	133.00
3S3	Dual Trace Sampling DC to 1GHZ Plug In	250.00
3S76	Dual Trace Sampling DC to 875MHZ Plug IN	250.00
3T77A	Sampling Sweep Plug In	250.00
3L10	Spectrum Analyzer 1 to 36MHZ Plug IN	1000.00
50	Amplifier Plug In	50.00
51	Sweep Plug In	50.00
53B	Wideband High Gain Plug In	25.00
53/54B	Wideband High Gain Plug In	45.00
53/54C	Dual Trace Plug In	112.50
53/54D	High Gain DC Differential Plug In	38.00
53/54G	Wideband DC Differential Plug In	68.00
53/54L	Fast Rise High Gain Plug In	68.00
84	Test Plug In For 580/581 Main Frames	75.00
107	Square Wave Generator .4 to 1MHZ	48.00
RM122	Preamplifier 2Hz to 40KHZ	63.00
123	AC Coupled Preamplifier	25.00
127	Power Supply For 2 Plug In's	148.00
131	Current Probe Amplifier	50.00
184	Time Mark Generator	363.00
R240	Program Control Unit	150.00
280	Trigger Countdown Unit	84.00
455	Portable Dual Trace 50MHZ Scope	2000.00
465	Portable Dual Trace 100MHZ Scope	2500.00
503	DC to 450KHZ Scope Rack Mount	250.00
535A	DC to 15MHZ Scope Rack Mount	263.00
543	DC to 33MHZ Scope	300.00
561	DC to 10MHZ Scope Rack Mount	150.00
561A	DC to 10MHZ Scope Rack Mount	200.00

Scopes with Plug-in's

567	Digital Readout Scope with a 6R1A Digital Unit and a 353 Dual Trace DC to 1GHZ Sampling Plug In and a 3T77A Sweep Plug In.	750.00
561A	DC to 10MHZ Scope with a 2S76 Dual Trace DC to 875MHZ Sampling Plug In and a 3T77A Sweep Plug In, Rack Mount	600.00
565	DC to 10MHZ Dual Beam Scope with a 2A63 Diff. and a 2A61 Diff. Plug In's	900.00
581	DC to 80MHZ Scope with a 82 Dual Trace High Gain Plug In	650.00
661	Sampling Scope with a 5T3 Timing Plug In and a 4S2 Dual Trace DC to 3.5GHZ Sampling Plug In.	575.00

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2E26	$ 5.00	4CX350FJ	$116.00	6146W	12.00
3-500Z	102.00	4CX1000A	300.00	6159	10.60
3-1000Z	268.00	4CX1500B	350.00	6161	75.00
3B28/866A	5.00	4CX15000A	750.00	6293	18.50
3X2500A3	150.00	4E27	50.00	6360	6.95
4-65A	45.00	4X150A	41.00	6907	40.00
4-125A	58.50	4X150D	52.00	6939	14.75
4-250A	68.50	4X150G	74.00	7360	12.00
4-400A	71.00	5728/T160L	39.00	7984	10.40
4-1000A	184.00	6LF6	5.00	8072	49.00
5-500A	145.00	6L06	5.00	8106	2.00
4CX250B	65.00	811A	12.95	8156	7.85
4CX250F/G	55.00	813	29.00	8226	127.70
4CX250K	113.00	5894/A	42.00	8295/FL172	328.00
4CX250R	92.00	6146	5.00	8458	25.75
4CX300A	147.00	6146A	6.00	8560A/AS	50.00
4CX350A	107.00	6146B/8298A	7.00	8908	9.00
				8950	9.00

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MICROWAVE COMPONENTS

ARRA

2416	Variable Attenuator	$ 50.00
3614-60	Variable Attenuator 0 to 60dB	75.00
KU520A	Variable Attenuator 18 to 26.5 GHz	100.00
4684-20C	Variable Attenuator 0 to 180dB	100.00
6684-20F	Variable Attenuator 0 to 180dB	100.00

General Microwave

Directional Coupler 2 to 4GHz 20dB Type N		75.00

Hewlett Packard

H487B	100 ohms Neg Thermistor Mount (NEW)	150.00
H487B	100 ohms Neg Thermistor Mount (USED)	100.00
477B	200 ohms Neg Thermistor Mount (USED)	100.00
X487A	100 ohms Neg Thermistor Mount (USED)	100.00
X487B	100 ohms Neg Thermistor Mount (USED)	125.00
J468A	100 ohms Neg Thermistor Mount (USED)	150.00
478A	200 ohms Neg Thermistor Mount (USED)	150.00
8478A	200 ohms Balanced Neg. Thermistor Mount (USED)	175.00
J382	5.85 to 8.2 GHz Variable Attenuator 0 to 50dB	250.00
X382A	8.2 to 12.4 GHz Variable Attenuator 0 to 50dB	250.00
X885A	8.2 to 12.4 GHz Phase Shifter +/- 360°	250.00
394A	1 to 2 GHz Variable Attenuator 6 to 120dB	250.00
NK292A	Waveguide Adapter	65.00
K422A	18 to 26.5 GHz Crystal Detector	250.00
K375A	18 to 26.5 GHz Variable Attenuator	300.00
8436A	Bandpass Filter 8 to 12.4 GHz	75.00
8439A	2 GHz Notch Filter	75.00
8471A	RF Detector	50.00
342A	VHF Noise Source	100.00
X347A	8.2 to 12.4 GHz Noise Source	250.00
H532A	7.05 to 10 GHz Frequency Meter	300.00
G532A	3.95 to 5.85 GHz Frequency Meter	300.00
J532A	5.85 to 8.2 GHz Frequency Meter	300.00
809A	Carriage with a 444A Slotted Line Untuned Detector Probe and 809B Coaxial Slotted Section 2.6 to 18 GHz	175.00
809B	Carriage with a 442B Broadband Probe 2.6 to 12.4 GHz and a X810B Slotted Section	200.00
809B	Carriage with a X810B Slotted Section and a PRD 250A Detector Mount 2.4 to 12.4 GHz	200.00

Merrimac

AU-25A/	801115 Variable Attenuator	100.00
AU-26A/	801162 Variable Attenuator	100.00

Microlab/FXR

Y410A	Frequency Meter 12400 - 18000 MC	250.00
N414A	Frequency Meter 3950 - 11000 MC	350.00
X638S	Horn 8.2 - 12.4 GHz	60.00
601-B18	X to N Adapter 8.2 - 12.4 GHz	35.00
Y610D	Coupler	75.00

Narda

3095/	22909 Directional Coupler 7 to 12.4 GHz 10dB Type N	250.00
4013C-10/	22540A Directional Coupler 2 to 4 GHz 10db Type SMA	90.00
4014-10/	22538 Directional Coupler 3.85 to 8 GHz 10dB Type SMA	90.00
4014C-6/	22876 Directional Coupler 3.85 to 8 GHz 6dB Type SMA	90.00
4015C-10/	22539 Directional Coupler 7.4 to 12 GHz 10dB Type SMA	95.00
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3044-20	Directional Coupler 4 to 8 GHz 20dB Type N	125.00
3040-20	Direcitonal Coupler 240 to 500 MC 20dB Type N	125.00
3041-20	Directional Coupler 500 to 1000 MC 20dB Type N	125.00
3043-20/	22006 Directional Coupler 1.7 to 4 GHz 20dB Type N	125.00
3003-10/	22011 Directional Coupler 2 to 4 GHz 10dB Type N	75.00
3003-30/	22012 Directional Coupler 2 to 4 GHz 30dB Type N	75.00
3042-20	Directional Coupler 950 to 2 GHz 20dB Type N	125.00
3043-30/	22007 Directional Coupler 1.7 to 3.5 GHz 30dB Type N	125.00
22574	Directional Coupler 2 to 4 GHz 10dB Type N	125.00
3033	Coaxial Hybrid 2 to 4 GHz 3dB Type N	125.00
3032	Coaxial Hybrid 950 to 2 GHz 3 dB Type N	125.00
784/	22380 Variable Attenuator 1 to 90dB 2 to 2.5 GHz Type SMA	550.00
22377	Waveguide to Type N Adapter	35.00
720-6	Fixed Attenuator 8.2 to 14.4 GHz 6 dB	50.00
3503	Waveguide	25.00

PRD

U101	12.4 to 18 GHz Variable Attenuator 0 to 60dB	300.00
X101	8.2 to 12.4 GHz Variable Attenuator 0 to 60dB	200.00
C101	Variable Attenuator 0 to 60dB	200.00
205A/367	Slotted Line with Type N Adapter	100.00
195B	8.2 to 12.4 GHz Variable Attenuator 0 to 50dB	100.00
185BS1	7.05 to 10 GHz Variable Attenuator 0 to 40dB	100.00
196C	8.2 to 12.4 GHz Variable Attenuator 0 to 45dB	100.00
170B	3.95 to 5.85 GHz Variable Attenuator 0 to 45dB	100.00
588A	Frequency Meter 5.3 to 6.7 GHz	100.00
140A,C,D,E	Fixed Attenuators	25.00
109J,I	Fixed Attenuators	25.00
WEINSCHEL ENG.	2692 Variable Attenuator +30 to 60dB	100.00

COMPUTER I.C. SPECIALS

MEMORY

MEMORY	DESCRIPTION	PRICE
2708	1K x 8 EPROM	$ 7.99
2716/2516	2K x 8 EPROM 5Volt Single Supply	20.00
2114/9114	1K x 4 Static RAM 450ns	6.99
2114L2	1K x 4 Static RAM 250ns	8.99
2114L3	1K x 4 Static RAM 350ns	7.99
4027	4K x 1 Dynamic RAM	3.99
4060/2107	4K x 1 Dynamic RAM	3.99
4050/9050	4K x 1 Dynamic RAM	3.99
2111A-2/8111	256 x 4 Static RAM	3.99
2112A-2	256 x 4 Static RAM	3.99
2115AL-2	1K x 1 Static RAM 55ns	4.99
6104-3/4104	4K x 1 Static RAM 320ns	14.99
7141-2	4K x 1 Static RAM 200ns	14.99
MCM6641L20	4K x 2 Static RAM 200ns	14.99
9131	1K x 1 Static RAM 300ns	10.99

C.P.U.'s ECT.

MC6800L	Microprocessor	13.80
MCM6810AP	128 x 8 Static RAM 450ns	3.99
MCM68A10P	128 x 8 Static RAM 360ns	4.99
MCM68B10P	128 x 8 Static RAM 250ns	5.99
MC6820P	PIA	8.99
MC6820L	PIA	9.99
MC6821P	PIA	8.99
MC68B21P	PIA	9.99
MCM6830L7	Mikbug	14.99
MC6840P	PTM	8.99
MC6845P	CRT Controller	29.50
MC6845L	CRT Controller	33.00
MC6850L	ACIA	10.99
MC6850P	ACIA	4.99
MC6852P	SSDA	5.99
MC6852L	SSDA	11.99
MC6854P	ADLC	22.00
MC6860CJCS	0-600 BPS Modem	29.00
MC6862L	2400 BPS Modem	14.99
MK3850N-3	F8 Microprocessor	9.99
MK3852P	F8 Memory Interface	16.99
MK3852N	F8 Memory Interface	9.99
MK3854N	F8 Direct Memory Access	9.99
8008-1	Microprocessor	4.99
8080A	Microprocessor	8.99
Z80CPU	Microprocessor	14.99
6520	PIA	7.99
6530	Support For 6500 series	15.99
2650	Microprocessor	10.99
TMS1000NL	Four Bit Microprocessor	9.99
TMS4024NC	9 x 64 Digital Storage Buffer (FIFO)	9.99
TMS6011NC	UART	9.99
MC14411	Bit Rate Generator	11.99
AY5-4007D	Four Digit Counter/Display Drivers	8.99
AY5-9200	Repertory Dialler	9.99
AY5-9100	Push Button Telephone Diallers	7.99
AY5-2376	Keyboard Encoder	19.99
AY3-8500	TV Game Chip	5.99
TR1402A	UART	9.99
PR1472B	UART	9.99
PT1482B	UART	9.99
8257	DMA Controller	9.99
8251	Communication Interface	9.99
8228	System Controller & Bus Driver	5.00
8212	8 Bit Input/Output Port	5.00
MC14410CP	2 of 8 Tone Encoder	9.99
MC14412	Low Speed Modem	14.99
MC14408	Binary to Phone Pulse Converter	12.99
MC14409	Binary to Phone Pulse Converter	12.99
MC1488L	RS232 Driver	1.00
MC1489L	RS232 Receiver	1.00
MC1405L	A/D Converter Subsystem	9.00
MC1406L	6 Bit D/A Converter	7.50
MC1408/6/7/8	8 Bit D/A Converter	4.50
MC1330P	Low Level Video Detector	1.50
MC1349/50	Video IF Amplifier	1.17
MC1733L	LM733 OP Amplifier	2.40
LM565	Phase Lock Loop	2.50

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CQ REVIEWS

The DenTron GLA-1000B Linear Amplifier

BY JOHN J. SCHULTZ*, W4FA

Linears using TV-type sweep tubes have certainly had their ups and downs since s.s.b. became popular. The list of advantages and disadvantages of linears using such type tubes versus linears using "transmitting" type tubes can become mighty long. If money were not a question, most amateurs, including the author, would in the final analysis choose an amplifier using "transmitting" type tubes such as the 3-5002, 8873 family, etc. However, on the other hand, it has been well proven that TV-type sweep tubes when *properly* used in a linear can provide reasonable performance in terms of power output, distortion and reliability at an economical price. The DenTron GLA-1000B is a commercial linear that well supports this argument.

The GLA-1000B is a self-contained linear amplifier with built-in 110/20 0 volt a.c. power supply for 80-10 meters. Because of the present unfortunate FCC regulations, it has to be sold as a 80-15 meter amplifier. However, a simple and economical ($5) modification kit is available from DenTron to licensed amateurs to expand its coverage to include 10 meters.

The first impression one receives of the GLA-1000B is that of a "heavy" unit although it weighs only 24 lbs and measures far less than a cubic foot (5 3/8 × 11 × 11 inches to be exact). Perhaps one just expects a TV-tube linear to be a light-weight! The basic construction of the linear is quite rugged. Steel front and back panels are joined together by a chassis plate. Then heavy rolled and perforated steel top and bottom covers are used to enclose the amplifier. Most of these details can be seen from the photographs, although in the top view the top cover has been removed. The front panel controls are well arranged and use nicely dimensioned knobs.

*c/o CQ Magazine

Front view of the GLA-1000B. The top cover has been removed temporarily.

The basic circuitry of the GLA-1000B is shown in fig 1. Four type D-50A (6LQ6) tubes, which have been factory matched, are used in a conventional grounded grid circuit. The output circuit is a pi-network type and there is a separately switched pi-network input matching circuit for each band. The inclusion of the latter networks is the main difference between the GLA-1000B and the old GLA-1000A. These networks allow the linear to present an almost constant 50 ohms input impedance to the exciter such as a "no-tune" solid-state transceiver. As a bonus, they also add an extra bit of harmonic attentuation to the output of an exciter. The power supply is a straight-forward bridge rectifier type with a total of about 33 mf output filtering.

A switched meter allows for the monitoring of plate voltage, plate current and relative r.f. output. LED status indicators show whether the linear is just turned on (standby) and whether the relay line to the linear has been keyed (transmit). A cooling fan runs continuously to suck out air from the D-50A tube envelopes. All in all, the circuitry is similar to that used for TV sweep tube linears for the last 20 odd years. The only thing significantly different, and a point which might be picked up by home-brewers, is the use of a zener diode, D1, to provide bias. In this case, it is a 24 volt/50 watt zener but it saves having to provide another transformer winding and/or rectifier/filter circuit for the bias supply.

Considering the price of the linear, the execution of the circuitry is very neatly done with good quality components. The top view shows the interior of the linear with the power supply components grouped on the left and the r.f. components on the right. All of the components are mounted on either the chassis plate or on the front or rear panels except for components associated with two PC boards. One PC board is used to mount the tube sockets and plate choke. Another one is used to mount the rectifier diodes and filter capacitors associated with the power supply. A wide spaced transmitting type variable is used for the plate tuning capacitor while a three section BC type capacitor is used for loading. The pi-network coil tap switch as well as the dummy load selector switch are well dimensioned and appear to have steatite insulation. A small board to the left of the coil tap switch holds the fixed-tuned input pi-network circuits for each band. They are switched by a separate section on the coil tap switch. The meter used is larger than usual and with its green back-lighted scale makes for very easy reading of plate voltage, plate current or relative power output. There is a potentiometer mounted on the back panel so one can externally adjust the meter reading for relative power output. As DenTron suggests, this can be a useful aid to avoid overdrive of the linear. When loaded for full c.w. power input, the relative output meter reading is set for full scale. Then when operating s.s.b., the exciter microphone gain control is adjusted to limit meter deflection to about one-half scale on voice peaks. Finally, to complete the look "inside", one should mention the power transformer which has the "danger" sign on top. It is a very husky transformer and must account for more than half the weight of the linear—quite contrast to the skimpy

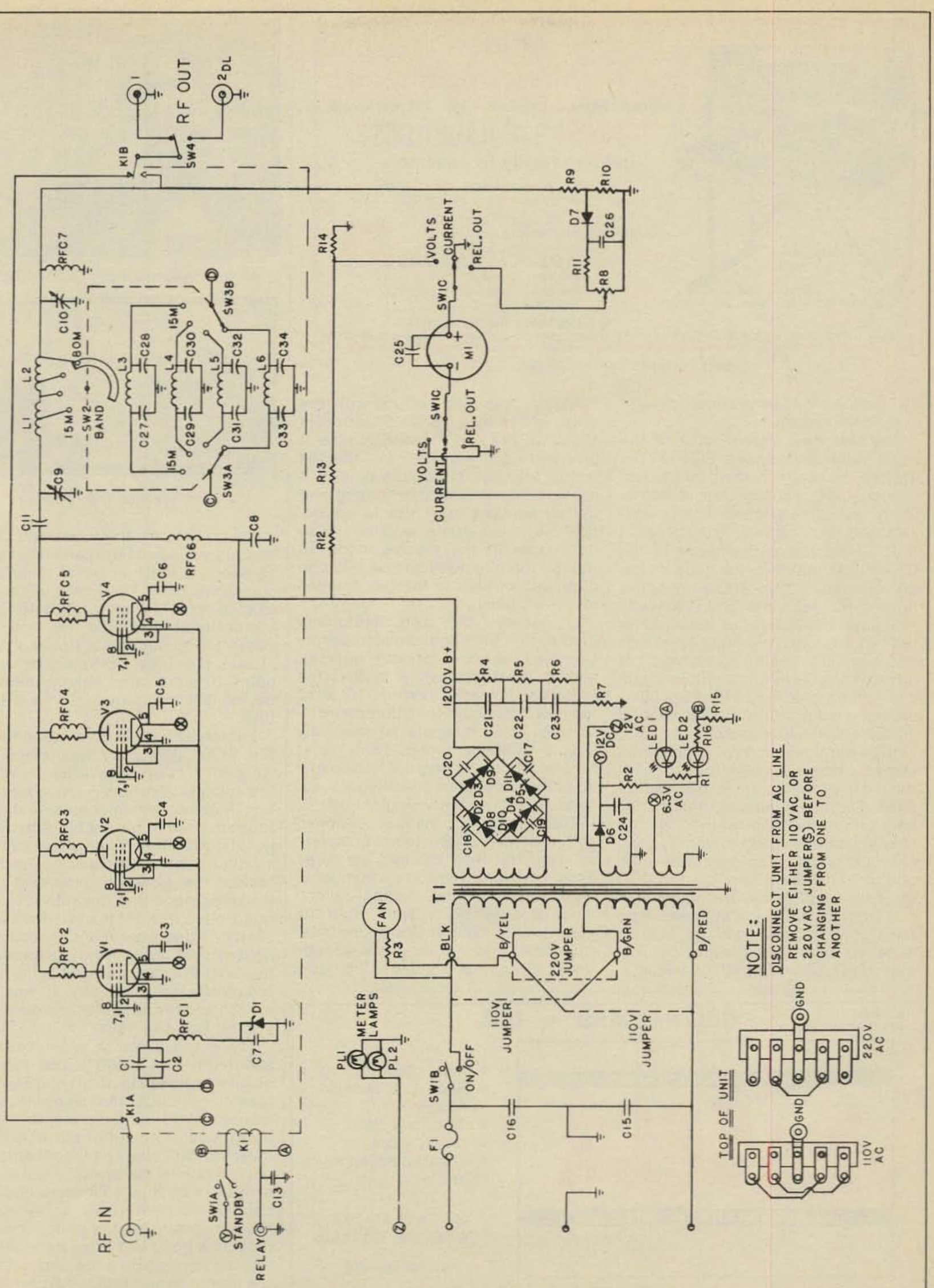


Fig. 1—Schematic diagram of the GLA-1000B.

No-29-30

TV type transformers one often sees in home-brew linears.

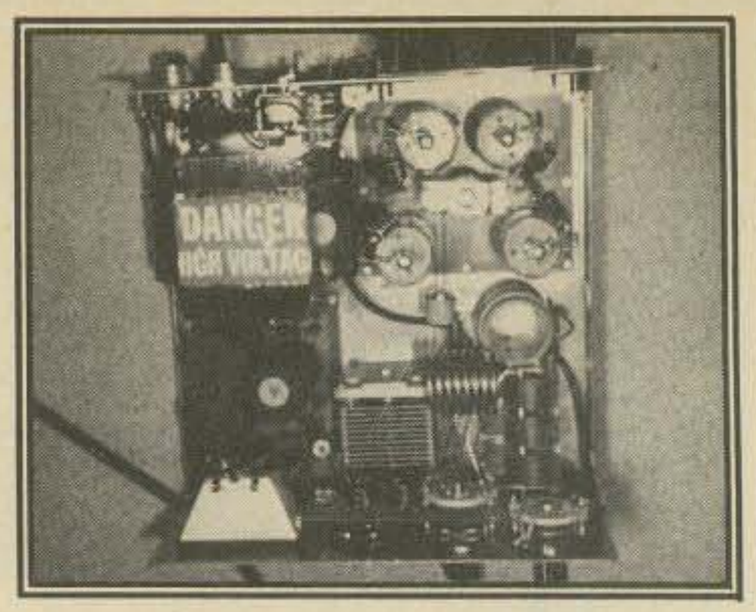
The rear view shows some of the construction techniques. SO-239 connectors are used for all r.f. in/out connections. The exhaust fan is particularly well dimensioned and is well screened for r.f. shielding purposes.

The electrical performance of the GLA-1000B matches its good mechanical construction. The amplifier is rated at 800 watts c.w. and 1200 watts PEP input on 80-10 (when modified for the latter band). This input level was easily achieved using 80-100 watts of drive. The power output efficiency on c.w. and s.s.b. ranged from 55 to 60%, dropping off a bit on the very end of 10 meters. IMD measurements on a high-power linear can be complicated because one must take into account the IMD products from the exciter used. The measurements made may be a bit on the conservative side but they indicated – 30db third order IMD products on all bands except the high end of 10 meters where it fell to – 27 db. These IMD specs are better than one finds with the usual sweep tube linear but not as good as can be acheived with tubes especially designed for linear amplifier service.

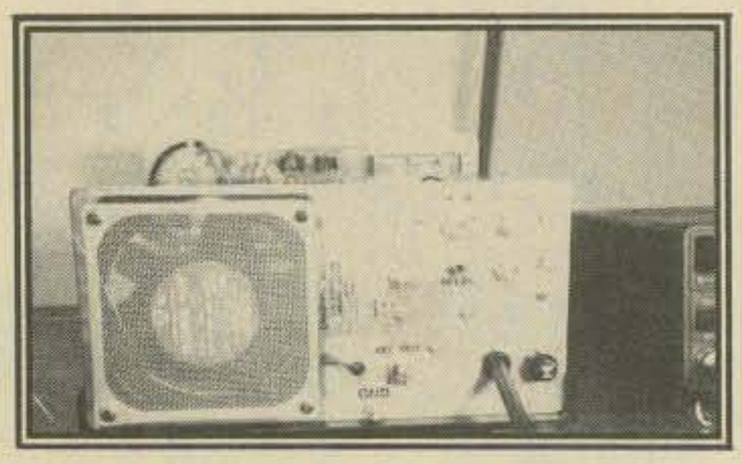
Actual operating results with the linear driven by a TS-120S were very pleasant. The linear is easy to tune, it provided a definite boost as expected to the barefoot TS-120S's output, it showed no signs of overheating and the air exhaust fan noise is not noticeable. Also, there was no noise noticeable in the receive mode although there is no provision for complete cut-off bias to the D-50A tubes during standby.

Obviously, the antenna/dummy load switch provided can also simply be used as an antenna selector switch. Another feature is that the linear can be easily modified for all of the new h.f. bands when they come into use. Also, it would be relatively simple to add a built-in s.w.r. meter function by modifying the front panel selector switch and installing a s.w.r. sensing bridge or sensing circuit.

The operating manual supplied with the GLA-1000B is quite complete as regards instructions, diagrams and a parts list. There are a number of precautions in the manual which must be observed. In spite of all the good qualities of this linear, one must remember that it is a sweep-tube linear. One must allow 3 minutes



An inside view of the GLA-1000B.



Rear view of the linear.

warm-up time for the tubes and continuous key-down time cannot exceed 15 seconds with an equal length of cool-down time. The linear might be usable for RTTY at some quite low power input level but the manual doesn't even suggest a figure. If one abuses the linear obviously one can harm it since the only protective device it incorporates is an a.c. line fuse.

Factory service is quite responsive. The GLA-1000B which was tested developed a fault soon after delivery. The idle plate current jumped up to a few hundred milliamperes and the tubes started to glow a bit. Apparently, D1—the zener diode shown in fig. 1— had shorted. The factory was contacted, the situation explained and the offer made that the author would replace the diode if the factory would send one and if such action would in no way void the warranty (a usual 90 day one). The diode arrived in the mail practically the next day, it was installed and the amplifier has been operating fine ever since.

There are a lot of nice features about the GLA-1000B which cannot all be mentioned in an article. The engineering thought that went into it is interesting to contemplate. It is not an expensive amplifier but care was taken to put quality components at critical points. Care was taken in assembly to do things like scraping the paint away from screw holes where the top cover joins the bottom one to provide a good electrical bond. All in all, considering its price and quality, the author would rate the GLA-1000B as one of the best commercial sweep-tube linears to come on the market.

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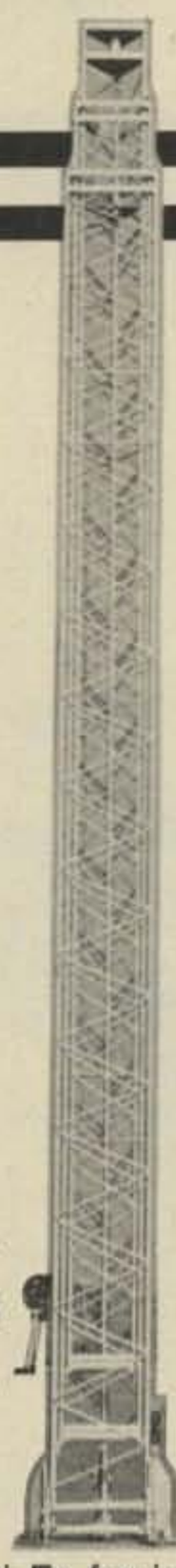

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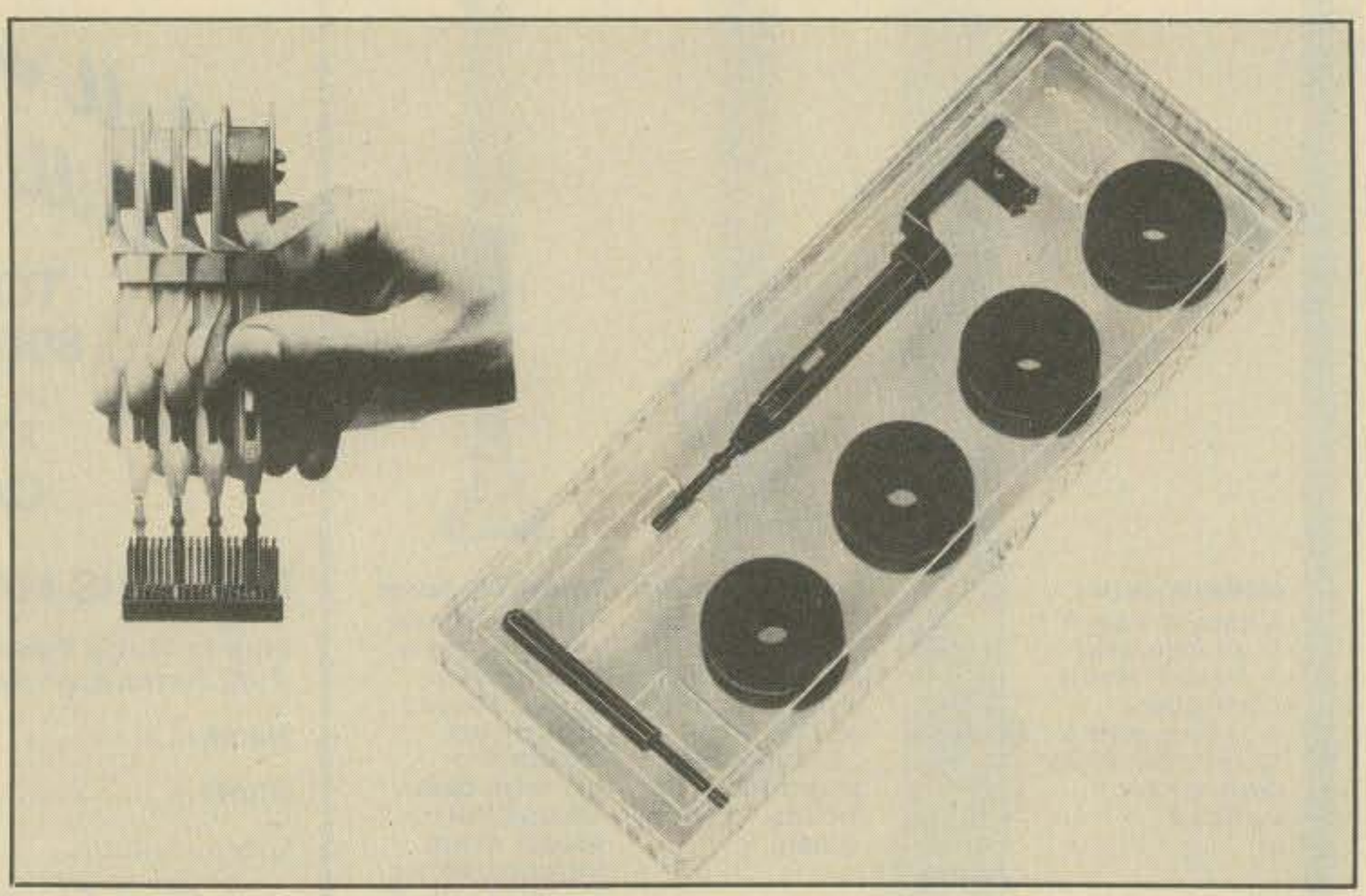
Here's a little background information on an alternate method of construction.

A Wire-Wrapping Primer

BY VAUGHN D. MARTIN*

The proliferation of wire-wrap[1] products advertised in hobbyist electronics magazines is in striking contrast to just two years past when scarcely any wire-wrap products appeared. The hobbyist has available to him a wide assortment of wire-wrap products ranging from S-100 bus compatible wire-wrap boards with 100 pin edge connectors that plug directly into hobby computers to more standard wire-wrap boards with bussed ground and power planes. Also, numerous types, sizes, and colors of wire-wrap wire in both spooled and pre-cut form are now available. Discrete component holders (headers) and IC sockets with wire-wrap pins are also found. Flat interconnecting ribbon cables and other interconnecting/interfacing connectors having wire-wrap pin terminations are now available if so desired.



The "Just Wrap Kit" by OK Machine & Tool Co.

Why the sudden interest in wire-wrapping and just what is wire-wrapping? Wire-wrapping offers the advantages of being solderless, compact for high parts density, neat through all interconnecting wires being on the board's bottom side, fast for circuit breadboarding an idea, plus I feel that the craze has also been brought on by hobbyists becoming more sophisticated and having greater exposure to electronic products. This, coupled with the growing number of home computer hobbyists and programmable ICs on the market and entering the marketplace almost on a daily basis, necessitates the use of some solderless means by which the hobbyist can wire and rewire time and time again a certain circuit to change and/or experiment with that IC's characteristics.

The use of protoboards also has its place; however, wire-wrapping tends to be more permanent because of its resistance to vibration and other abuse. Also, protoboards eventually will suffer contact wear after prolonged use, whereby the contacts no longer hold the wire tightly. This can also result from using too large a wire that springs the protoboard's contacts. Wire-wrap boards will last forever if properly cared for by not applying lateral force to the pins which can break off if bent over and straightened back up too many times.

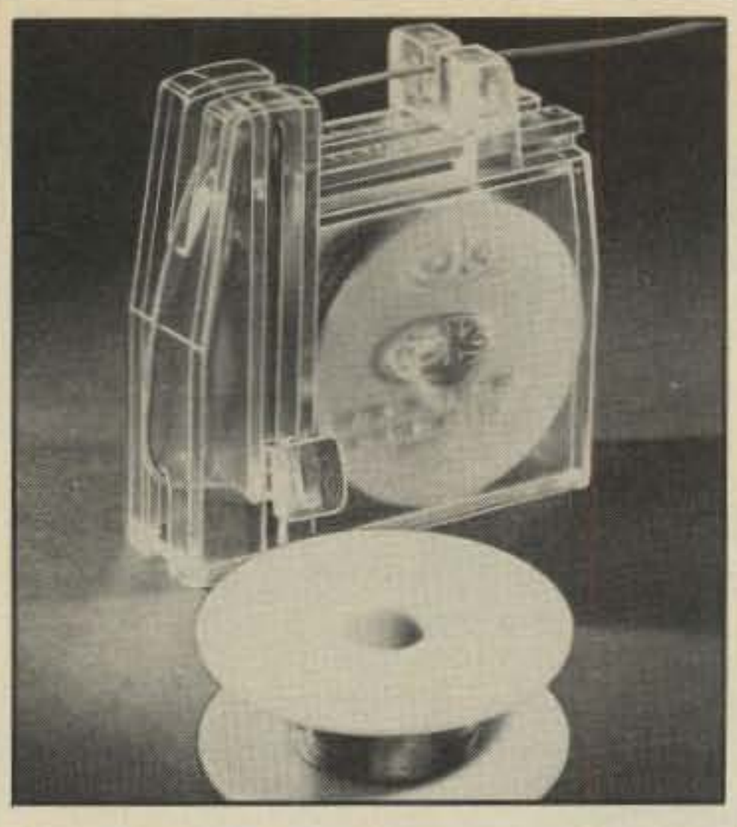
No matter how sophisticated or simply you go about it, wire-wrapping comes down to one basic fact. That is the simple task of removing the insulation from the wire and spinning or wrapping the bare portion around the wire-wrap post. The post is usually a 25 thousandths inch diameter square protruding from the board's underside.

Today wire-wrapping ranges from computer automation to simple manual stripping and wrapping. Point-to-point wire-wrapping is accomplished under computer control by a programmer coding a sheet of point-to-point interconnects that causes a wrapping tool to be indexed over a post, come down on that post, and wrap the wire around it. Naturally, extreme precision alignment is required for this operation.

In the small engineering development lab or within the hobbyist's own workshop this degree of sophistication is naturally not present. Usually the wrapping tool looks like a fat pencil and does wrapping on one end, unwrapping on the other, and has a slit in which to place the wire. The wire is then given a quick tug, stripping away the insulation. There is a middle ground of sophistication with electric handheld guns that now even have bits that automatically strip away the insulation to a predetermined length. The operator then presses the trigger which twirls the bare wire around the

Southwest Research Institute, P.O. Drawer 28510, 6220 Culebra Rd., San Antonio, Texas 78284.

[1]Although the term wire-wrap is a registered trademark of Gardner-Denver Corporation, the concept and technique of wire wrapping was originated and developed during the early 1950's by Bell Telephone Laboratories. Bell Telephone Laboratories supplies the R&D for Western Electric Company.



An adjustable wire dispenser and replacement roll of wire used in wire wrapping.

wire wrap post with neatness and precision wrapping tension applied on the wire.

Wire-wrapping is a veritable science. The most crucial areas are concerned with the wire itself, the method of wrapping, and the wire-wrap post, more commonly and hereafter referred to as the wrapost.

The wire used by hobbyists is almost always 30 gauge or 30 AWG. The AWG stands for American Wire Gauge and #30 has a 100.5 circular mil cross-sectional area. It is this cross-sectional area that determines wire resistance and in turn its current-carrying capability. A general approximation of relatively good accuracy is that for each three numbers you go down in the AWG chart you experience a doubling in cross-sectional area. Therefore, one would expect a #27 wire to have double the cross-sectional area of a #30 AWG wire. Actually, it is 201.5/100.5 circular mils for a 2.005 ratio which is indeed nearly a doubling.

There are numerous types of wire-wrap insulation with Kynar[2] being the most popular with hobbyists because of its ease of stripping. The wire's insulation is no greater than the thickness of the wire itself nor any less than 80 percent of this dimension. The smaller the wire the more it will stretch. Refer to Table I. All three popular wire-wrap sizes—24, 26, and 30—have 30,000 PSI tensile strength.

Wire-wrap wire insulation bonding strength is crucial for automatic wrapping machinery that has to know how hard to pull to adequately strip away the insulation. The hobbyist is not too concerned about this, but Kynar insulated #30 AWG, the hobbists' favorite, requires from 3 to 12 oz. pull to strip back 1 inch of wire.

Wire-wrapping technique is important for a successful highly reliable electrical connection. There are essentially two kinds of wraps; refer to fig. 1. These are the standard wrap and the modified wrap. The standard wrap consists of the bare wire being wrapped around the post and the insulated portion being wrapped around the post only a fraction of a revolution, as opposed to the modified wrap which has the insulated portion of the wire making between one and two full revolutions.

The modified wrap is a bit more secure and is recommended for smaller size wire such as the #30 AWG wire the hobbists use. Fig. 2 shows the acceptable method of a modified wrap along with unacceptable methods, and explains why the latter methods are unacceptable.

Now for the wire wrapost or terminal. This piece of hardware is usually square; however, there are oblong and rectangular shaped posts. These are less popular and effective because of the "pigtail" that typically results. A "pigtail" is the end of the wire that does not conform to the shape of the post but, rather, has a tendency to stand out. There are three rules of thumb with respect to wraposts. These are: (1) the wrapost should not be less than one wire diameter, (2) the wrapost width should not be more than 2-1/2 times the wrapost's thickness, and (3) the maximum wrapost width should not be more than three times the conductor's diameter.

Also, the wrapost should be long enough to accommodate two wire wrap connections. A quick rule of thumb for determining the number of wraps is to divide the AWG number by four; therefore, a #30 AWG wire should have approximately 7-1/2 wraps with the first and last wraps not counting because they are not involved in the bond determining qualities of the wrap.

[2]*A registered trademark of Pennwalt Corporation.*

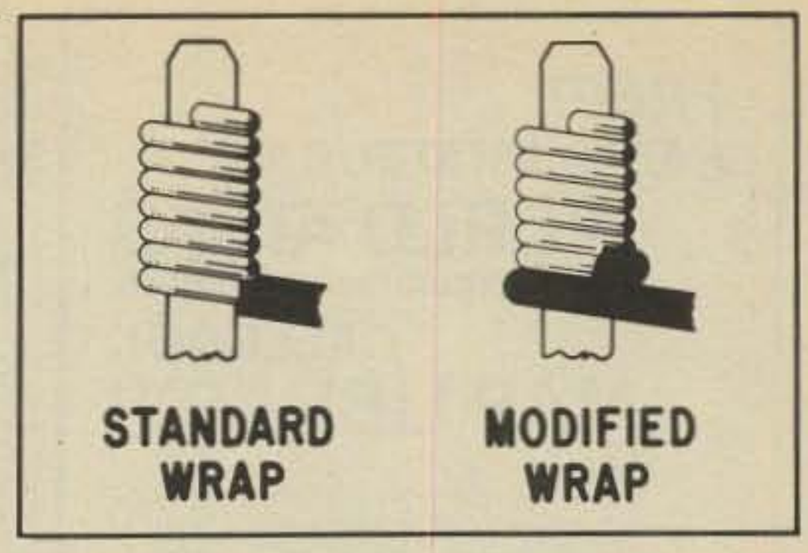


Fig. 1- Two methods of wire wrapping. (A) The standard wrap. (B) The modified wrap.

Fig. 2- The acceptable methods of a modified wrap along with the unacceptable methods of wire wrapping.

Fig. 3- Common wrapost configurations.

Wire AWG No.	Minimum Elongation Per 10 Inch Length	Minimum Strip Force Lbs./Newtons
30	15%	3.0 (13.4)
29	15%	3.5 (15.6)
28	15%	4.0 (17.8)
26	15%	5.0 (22.3)

Table I # Physical characteristics of wire-wrap wire.

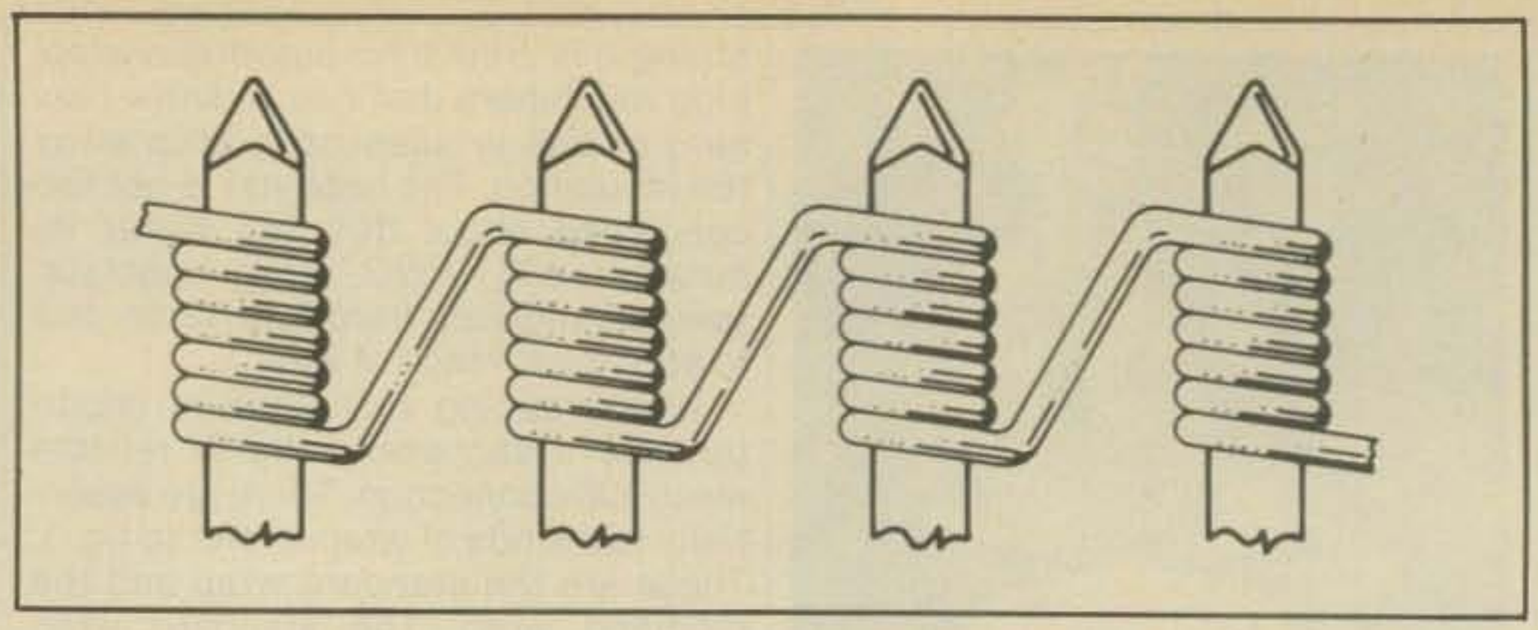
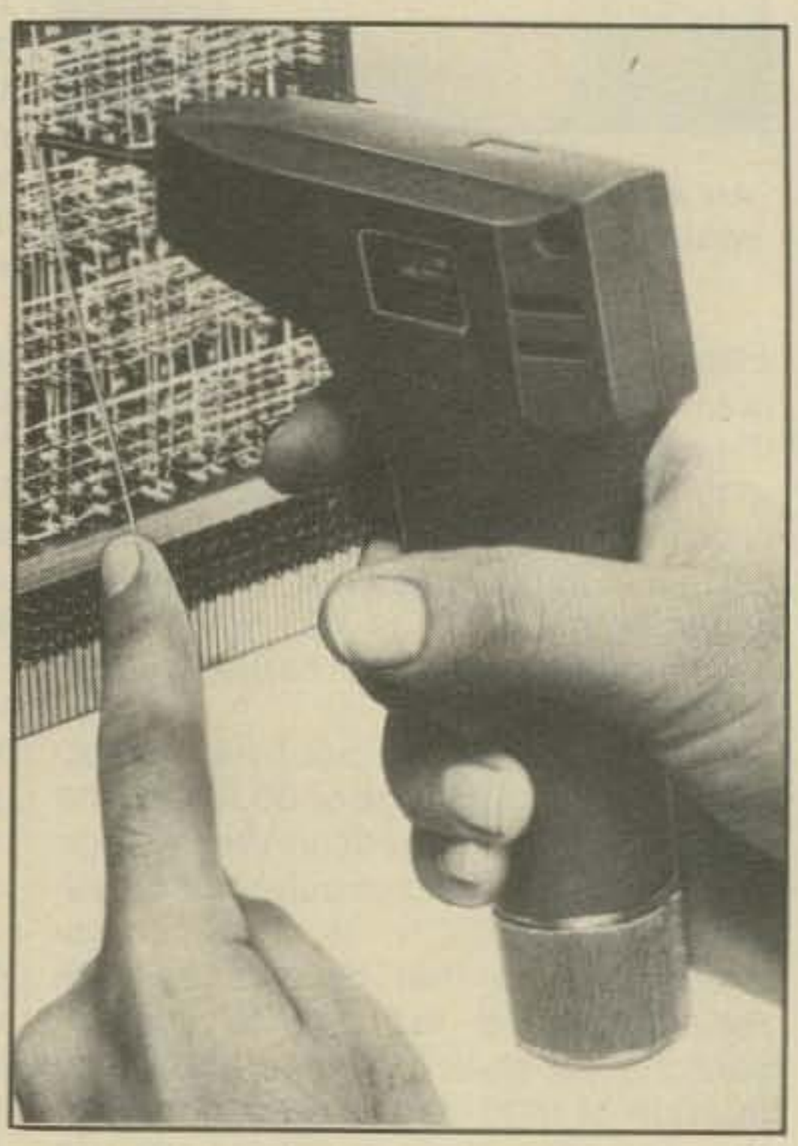


Fig. 4- The daisychain method of wrapping.

The wraposts themselves are made of one of six commonly used materials: (1) beryllium copper, (2) phosphor bronze, (3) half hard brass, (4) copper-nickel, (5) nickel silver alloys, or (6) plated steel, see fig. 3.

In summary, you now know all about wire-wrapping. But to go along with this technical knowledge here are some tips on technique to help you wrap more effectively. Try to wrap one end of the wire on the lower side of a wrapost with the other end on the high end of another post. This is called the diasychain method and is illustrated in fig. 4. This technique is most appreciated when a wire has to be lifted off an IC pin because using this method never requires more than one wire to be removed. If, on the other hand, all connections to a point in question were made on the bottom of the wrapost then a great number of wires would have to be removed and chaos would result.

Some additional tips are: Examine any wrapost being replaced for excessive damage taking special care to see if the wrapost is starting to crack and pull away from the board. Insert the wire as far as it will go up into the bit or wrapping tool. Always dress the wire in a wrapping direction. Do not ever try to reapply the wrapping tool to a connection that has been poorly wrapped. Unwrap it and start again! Do not use pliers of any kind on a wrapost; use an unwrapping tool. Do not use the bit and sleeve of the wrapping tool as a pry. Lastly, if possible, do not put over two wrap connections on any one single post.



A battery operated wire wrapping tool.

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"The Wrap-Up: Connections Without Solder." W.H. Long. *Electronic Engineering Times,* July 1977.

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Wire-Wrapping Technology And Production Equipment. David Weltman. OK Machine & Tool Corp., 3455 Conner St., Bronx, N.Y. 10475.

Acknowledgement

We would like to thank the OK Machine & Tool Corp. for providing the illustrations used in this article.

a monthly feature by
IRWIN MATH, WA2NDM

Math's Notes

A LOOK AT THE TECHNICAL SIDE OF THINGS

It seems like we have really struck a nerve in our past few columns about telephone related devices, since the mail has literally been pouring in. As a result, in this month's somewhat abbreviated version of Math's Notes, we'd like to pass on some more such data.

About a dozen readers have asked how they might add a hold button feature to their telephone when going from one extension to another. Fig. 1 shows such a circuit. With the telephone "hung-up" the SCR is cut off and the 48-volt open circuit voltage has no effect. When the receiver is picked up to answer a call, the telephone line voltage drops to a low d.c. value due to the load placed on the line by the telephone circuitry. It is this "keep-alive" load that must be maintained to "hold" the line. To use the hold button, you must push the button and hold it in while hanging up the receiver. When you do this, the SCR fires, placing the 470-ohm resistor and LED indicator across the line, and the telephone is on hold. When someone again picks up the receiver, the lower resistance of the telephone equipment forces the SCR to stop conducting, and the initial conditions resume.

When building this setup, you must be certain that you have the correct polarity of the telephone line. If you cannot determine this, or if you have a scheme where the line voltage is reversed, then the revised circuit of fig. 2 must be used. Here, a full-wave bridge does the polarity switching.

In either case, all of the circuitry will easily fit inside most home telephones, and if you employ a switch with an internal LED illuminated button, a neat professional installation will result. Before making all connections permanent, be certain to check the entire circuit on the bench. You must be certain that you will not interfere with the normal operation of the telephone network. Since there are only a few parts, this should be an easy job.

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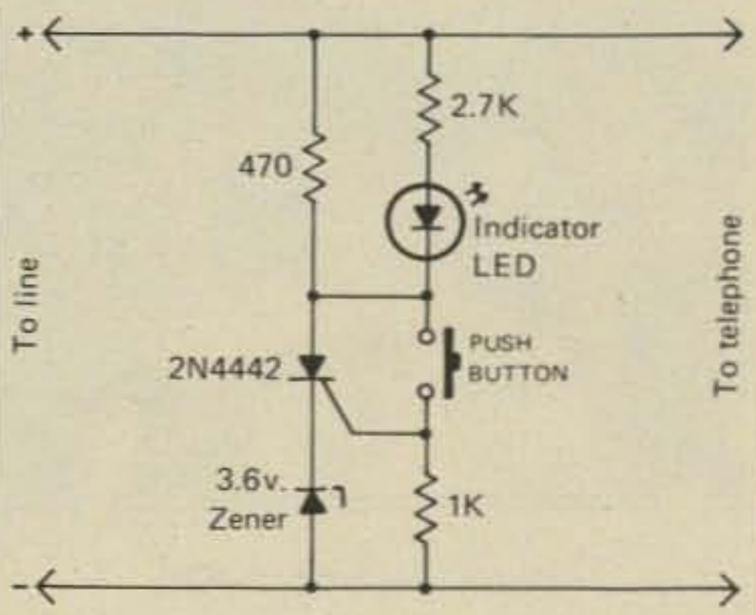


Fig. 1– The hold circuit as discussed in the text. Be sure to observe the correct polarity.

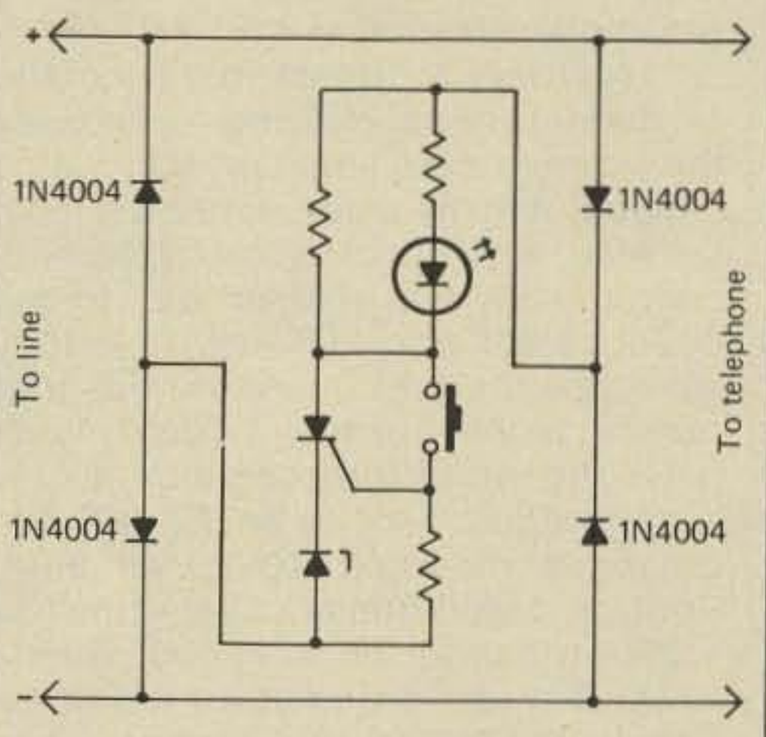


Fig. 2– The addition of a bridge circuit for bipolar lines. The circuit within the bridge is the same as in fig. 1.

By installing this circuit in every telephone in your home, the common yell "hang up the phone" when switching from one extension to another will be gone.

Before concluding, I just want to answer a question that at least 20 people have asked relating to the circuit in the July 1980 column. The value of Vcc should be 10-12 volts, the relay a 12-volt low-current reed type, and the transistor a 2N3904 or the equivalent.

See you next month.

73, Irwin, WA2NDM

a monthly feature by

A. EDWARD HOPPER, W2GT

Awards

NEWS OF CERTIFICATE AND AWARD COLLECTING

The "Story of The Month" as told by Bruce is:

Bruce A. Jacobs, K2QK
All Counties #259 12-12-79

"Our family consists of Lois, Louis II (age 10), Sean (age 8), and myself. I'm 38 (as of 12-27-79) and come from Queens, NY. I went to CW Post College, the Arthur T. Roth Graduate School of Business, and have done extensive work at SUNY, Albany, NY.

"After graduating college in 1964, I worked in the family manufacturing business but left after 2 years to take my present position of Associate Professor of Business at the Fulton Montgomery Community College.

"Lois is a Philadelphia girl and graduated from Drexel University as a Home Economist. We met in August 1967 and after two days we decided to get married, which we did in December of that year.

"Louis was born eight days before Neil Armstrong walked on the moon and our second boy was born 2½ years later.

"In February 1976 we bought a new car and Lois used it for the first time. The car died at 12 midnight (it turned into a lemon). The next day I had a CB put in the car and I was bitten by the radio bug.

"Well, after SSB sets, beam antennas, and all the rest, I was disgusted. Too many power miles, too many people and too many idiots led me to feel that there had to be a better way. WB2JVP talked me into going to the Rochester Hamfest in May 1977. In late July my Technician's ticket arrived as WB2QKD. In late January of 1978 I received my Extra Class ticket.

"Well, I worked a little DX and loved to rag-chew with W2UJ, WA2LSU, and N2FN on 75 meters. Russ, W2UJ, suggested I try the 75 meter net. I listened for two weeks before working K7HWK in Cister, Montana on 8-25-79, and I was had by the bug. Well it took until 12-1-79 for WB5YDH to get Catahoula, Louisiana for #3074 (the *last* one).

P.O. Box 73, Rochelle Park, N.J. 07662

Bruce Jacobs, K2QK.

"The wide range of events that take place on the net, from extreme generosity to a degree of selfishness that blows my mind, never ceases to amaze me. But that's the way the world goes around.

"I feel very fortunate to have made so many friends. Helping to sponsor the Northeastern Mini last May was a high-point in my amateur radio hobby.

"Also, when I got close to the end, people went out of their way to get counties for me, knowing that they were not the last counties. For that reason alone, I know I could never leave the net or the people on it.

"The equipment is an FT 901 DM driving a modified SB220 amplifier through a modified MT2000A tuner to a TH3 tribander on a 71 foot Aluma tower. I'm very proud of my modification on the MT2000A, which now has internal antenna switching, and my modification to the SB220, which is a variation of the QST modification.

"Lois does not share my enthusiasm for radio. She is a designer/salesperson for a local kitchen and plumbing contractor. Her hobby is photography, and I'm very proud of her work, as she is of mine on the radio. The boys are interested and I think Louis may try for a ticket very soon.

"I am a volunteer examiner for the handicapped through the FCC and have also taught a Novice course through the college. I was also an instructor through the ARRL until that organization lost sight of it's purpose and responsibility.

"I used to be head tennis professional at one of the top complexes in the Northeast and still teach occasionally. My interest has been centered on community activities involving the Lexington Training Center. This is our training center for rehabilitating the handicapped. I run a tennis tournament to raise money for the center and I believe very strongly in what is being done.

"I enjoy running mobile and putting our counties for the net. I use a TS-120S, which really works well. I have given out many last counties but receive very few awards for my efforts. At $1.25 (or more) per gallon of gas, it would be nice if people would spend a dollar to say, thank you."

Special Honor Roll
All Counties

#285 J. H. Kahrs, K2UVG/6 6-13-80.
#286 T. Gary Banks, N9ER 6-16-80.
#287 Alfred S. Guignard, WB7QFI 6-19-80.
#288 Jane H. Willis, K6RLR 6-24-80.
#289 Randy Woelk, W0DSY 6-25-80.

Awards Issued

Hank Kahrs, K2UVG/6, that Navy Commander, formerly from Paramus, NJ, added USA-CA-3000 and All Counties to his nice collection.

Dr. Gary Banks, N9ER (formerly WA9CZI), who received USA-CA-500 in April 1977, really went to work and caught USA-CA-1000 through All Counties.

Al Guignard, WB7QFI waited until he had them All before sending for USA-CA-500 through All Counties.

Jane Willis, K6RLR (OM is Frank, K6YBI) also waited until she had them All and then acquired USA-CA-500 through All Counties.

Randy Woelk, W0DSY had a bit of a wait for some QSL's, then hit me for USA-CA-500 through All Counties.

Charley Schneider III, WA3ZTY/WB5ZEJ is awaiting a few QSL's for them All, but did not wait and qualified for USA-CA-500 through USA-CA-3000.

"Mat" Santos, CT1TZ, with fine help from Dorothy, WB9RCY, sent for USA-CA-2500 endorsed All S.S.B. #1 to CT1.

Bill Grim, Jr., W0MHK (who moves around a little) picked up USA-CA-2500.

Hugh Williams, Jr., N7AKG obtained USA-CA-500 through USA-CA-2000 endorsed All S.S.B., All 14 MHz.

John Alexander, W8GZF claimed USA-CA-2000.

Bayard Smack, Jr., W3NB (ex W3AYS) gained USA-CA-1500.

Ellis Evans, GW3CDH was happy to make USA-CA-1000 and USA-CA-1500 endorsed All S.S.B., #2 to GW. As I write this, he and his XYL are on their way to the MARAC Convention in Denver.

Mark Stidam, AI9Y (formerly WD9FPQ) won USA-CA-1000 and USA-CA-1500.

Rich Marshall, WB4CCT came up with USA-CA-500 and USA-CA-1000 endorsed All S.S.B., All 14 MHz.

Ivo Sarcevic, YU2OB took a little while to become #2 in Yugoslavia with USA-CA-1000.

USA-CA-500 Certificates endorsed Mixed, went to:

Marshall S. Epstein, N4YJ;
Jurgen A. Weigl, OE5CWL;
Dr. Wolff Parmentier, DJ5JH;
Takashi Kondoh, JA1DFQ;
Akinori Kuruma, JJ1BBQ.

USA-CA Honor Roll

3000		K6RLR	431	K6RLR	607
K2UVG/6	311	WA3ZTY	432	WA3ZTY	608
N9ER	312	W0DSY	433	W0DSY	609
WB7QFI	313	W8GZF	434	GW3CDH	610
K6RLR	314	1500		YU2BO	611
WA3ZTY	315	N7AKG	482	AI9Y	612
W0DSY	316	N9ER	483	500	
2500		W3NB	484	N4YJ	1480
N9ER	373	WB7QFI	485	N7AKG	1481
WB6QFI	374	K6RLR	486	OE5CWL	1482
CT1TZ	375	WA3ZTY	487	WB4CCT	1483
K6RLR	376	W0DSY	488	WB7QFI	1484
WA3ZTY	377	GW3CDH	489	K6RLR	1485
W0DSY	378	AI9Y	490	WA3ZTY	1486
W0WHK	379	1000		DJ5JH	1487
2000		N7AKG	603	W0DSY	1488
N7AKG	428	N9ER	604	JA1DFQ	1489
N9ER	429	WB4CCT	605	JJ1BBQ	1490
WB7QFI	430	WB7QFI	606		

Awards

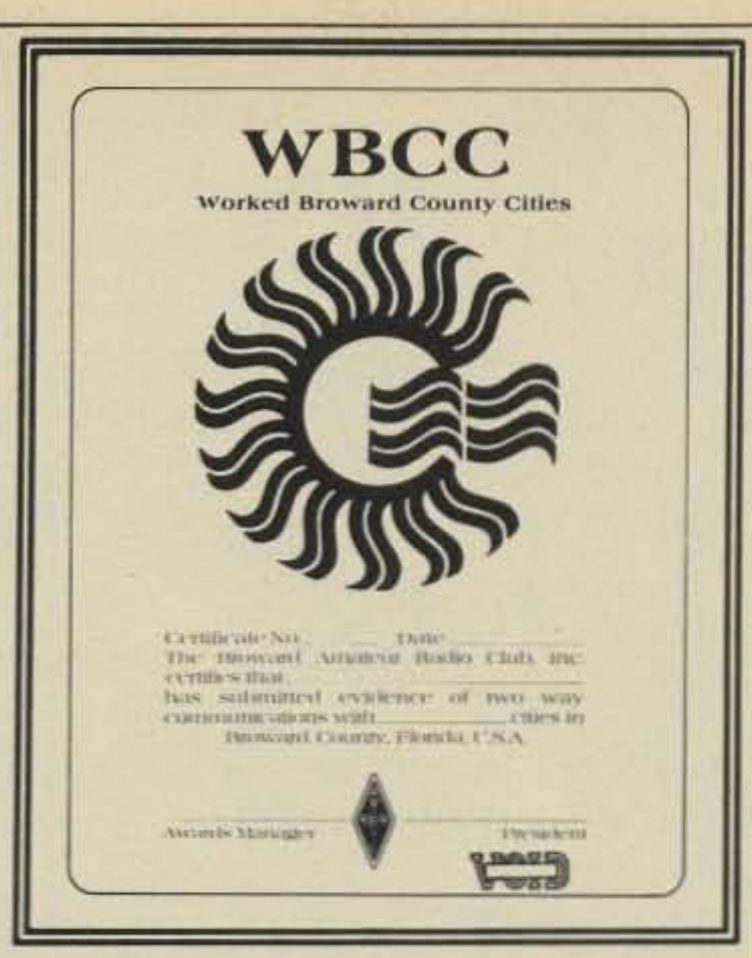
Worked Broward County Cities Award (W.B.C.C.): The Broward Amateur Radio Club, Inc. is happy to sponsor the all new WBCC Award. The Award is available to all amateurs who submit proof of two-way contacts as follows:

A. Residents of Browards, Colliers, Dade, Glades, Hendry, Lee, Martin, Monroe, or Palm Beach Counties—with all 29 cities.

B. All other amateurs—with 15 of the 29 cities in Broward County.

C. Contacts must be made from the home QTH of the applicant, but contacts with mobile or portable stations in Broward County are acceptable. All legal amateur bands and modes (except through repeaters) are valid.

D. Applications to show date, time, frequency, and mode, as well as call and QTH of the Broward Stations.



WBCC Award.

Certification by the applicant that he has QSL's for all contacts and verification by two licensed amateurs is needed. Mail application, preferably on form that can be obtained for s.a.s.e., together with the fee of $1.00 and 30¢ in stamps for postage (DX applicants U.S. $1.00 plus 3 IRCs or a total of 10 IRCs) to: Awards Manager B.A.R.C., WD4RAF, 1921 NW 41st Street, Oakland Park, Florida 33309, U.S.A.

Tri-State Certificate: Rules are: All contacts must be made on or after January 1, 1977. W1-K1 call area must work three (3) stations from the Tri-States of Connecticut, Massachusetts, and Rhode Island. All other call areas and DX stations must work one (1) station from each of the Tri-States. QSLs must be in your possession; they need not be sent, but any may be requested to confirm your log. Log data must consist of date, time, call, name, state. Open to all amateurs on all bands. Hand written endorsements on request. Send log data, two (2) dollars, check or money order for U.S. (DX send two IRCs) to: Tri-State Amateur Radio Club, Award Committee, Box 213A, R1, Thompson, Connecticut 06277. (Thanks to Bill Welsh, W6DDB for the data.)

Worked All New England Award: Rules are: All contacts retroactive to January 1, 1976 will count. W1-K1 call area stations must work two (2) stations in each of the 6 New England states (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont) for a total of 12 contacts. All other call areas and DX need to work one (1) station from each of the 6 New England states, total 6 contacts. Available to anyone who operates 50 MHz or higher. Endorsements on request for ATV, s.s.b., c.w., Oscar, etc. Send full log data with date, time, call, name, and state. Send check or money order (DX 2 IRCs) for $1.50 (made payable to Ron Pariseau, Chairman) to: Worked All New England Award, Ronald Pariseau, Chairman, R1, Box 213A, Thompson, Connecticut 06277. (Again thanks to Bill Welsh, W6DDB for the data.)

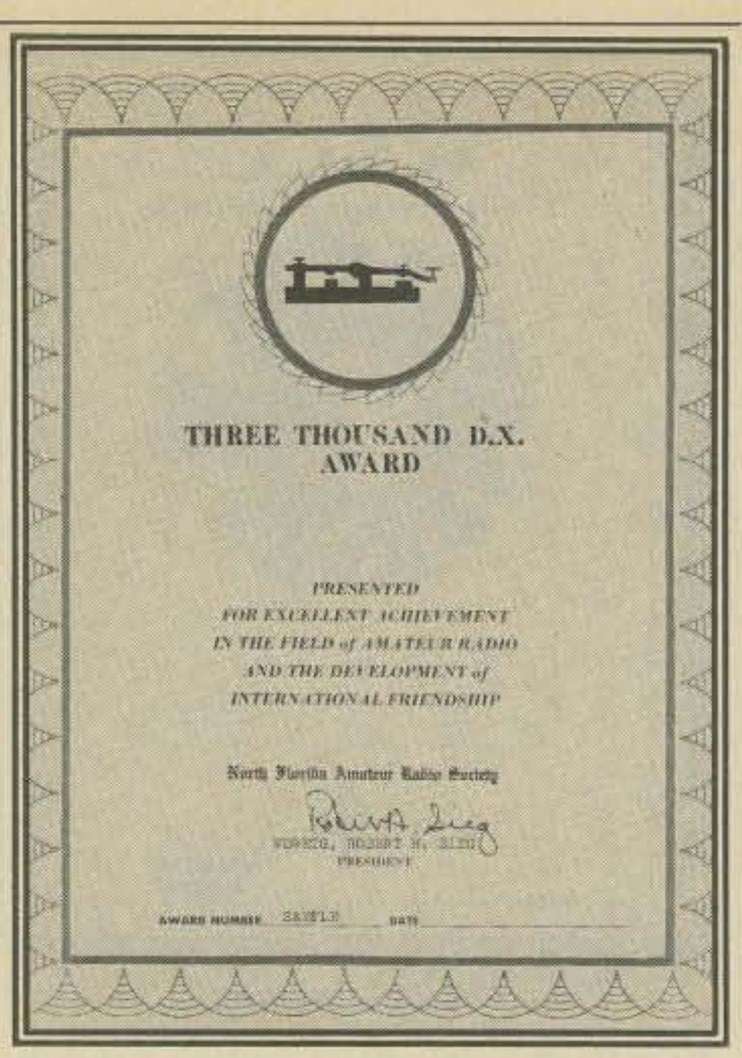
Three Thousand DX Award: In April 1980 *CQ*, data was given on the Five-Five Thousand DX Award, but although the response was very good, there seemed to be a lack of response from the East Coast states. Perhaps this is because so many work Europeans and thus are under the 5,000 mile mark. So here is one for them. Like the 5,000 award, this one is sponsored by the North Florida Amateur Radio Society. It can be earned by logging three or more rag-chew-type QSOs with any DX amateur over 3,000 miles away. Mixed bands, modes, and skeds are okay. Certificates will be sent to you and your DX friend. Remit both names, callsigns, and full QTHs with log data and $2.00 to: Dale Mann, N4AWI, 5433 Glorianne Circle N., Jacksonville, Florida 32207.

The Yasme Award: A beautiful and unusual certificate will be awarded, free of charge, to any amateur presenting proof (QSL) verifying contact with the holders of 30 different Yasme DX-pedition calls, including any calls held by Yasme officers or directors, past or present.

Calls for Yasme Award:
*Danny Weil:*G7DW/MM;VP2VB;KZ5WD;FO8AN;VR1B;VK9TW;VR4AA;CR10AB;YV0AB;VP2KF;VP2AY;VP2MX;VP2KFA;VP2DW;VP2LW;VP2SW;VP2GDW;-VP4DW;VP7VB;VP5VB;HK0AA;HC2VB;ZK1BY;ZM6AW;VR2EO;FW8DW.

Armstrong Pioneer Memorial Award. For details see page 91, CQ, Feb. '80. For more details write to The Major Armstrong Memorial ARC, Box 1234, Englewood Cliffs, NJ 07632. (Photo via WA2HAR)

Dick McKercher: W0MLY;W6MLY;AC0MLY;HZ1MY;FL8MY;FL8MY;VQ6MY;4W1MY;6L6MY/Qatar;W0MLY/TJ8;W0MLY/TL8;W0MLY/TN8;W0MLY/TZ2;TY2MY;W0MLY/TR8;W0MLY/TT8;5V4MY;TI9RC;K7JDG;KL7JDG;CN8HF.
Lloyd & Iris Colvin: W6KG;W6QL;W6DOD;FA8JD;W6ANS;DL4ZB;W6IPF;K7JG;JA2KG;W6KFD;K2CC;J2AHI;W2USA;K4WAB;W7YA;DL4ZBD;J2USA;W6AHI;W7KG;JA2US;W4KE;DL4ZC;KL7KG;W6BWS/KG6;W4ZEW;KL7DTB;KG6SZ;W6KG/KG6;KC6SZ;KG6SZ/KC6;VR1Z;GD5ACH/W6KG;GD5ACI/WB6QEP;ZB2AX;GC5ACI/WB6QEP;GC5ACH/W6KG;CT3AU;CT2YA;6W8CD;5T5KG;ZD3I;9L1KG;5L2KG;9G1KG;TU2CA;5V1KG;TY2KG;WW6ITU;VR8B;3D2KG;C21NI;FO0KG;YJ8KG;W6KG/AJ3;VP2VDJ;VP2EEQ;PJ8KG;W6QL/VP2A;VP2MAQ;KG4KG;W6QL/6Y5;ZF2CI;W6KG/TI5;HR0QL;VP1KG;J3ABV;VP2SAX;J6LOO;J7DBB;VP2KAH;HI6XQL.
Robert Vallio: W6RGG;KE6ITU.
Martin Laine: OH2BH;3C1EG;3C0AN;OJ0MR;EA8CR;OH2AM/OH0;CT3BZ;OH2BH/ZD3X;OJ0DX;CT9AT;OH0AM;SV1GA/A. In these calls, Marty was *not always* the operator. Only the cards indicating Marty was the operator will be accepted.
Past and Present Yasme Officers and Directors: Past—W5NC;K5JLQ;W8EWS;W5IGJ;W6GN;K6AN;W6LDD;W9AC. Deceased prior to 1977—W4QDZ;K4KCV;W4TO;G2DC. Present—W6AM;KV4AA;N6SF;W6OAT;JA1KSO;VK2EO;K5RC;WA5LES.
Application: Send QSLs with list of cards to: Yasme Award Custodian, Dick McKercher, W0MLY, Box 7, Rippey, Iowa 50235, U.S.A. (Although the Award is free, *if* you value your QSLs, may I suggest you send them registered and include postage/funds for their return by registered mail—Ed.)



Three Thousand DX Award.

Notes

Final Results of the 1980 MARAC County Hunters SSB Contest. Plaques to be awarded to the highest scoring *fixed* U.S. or Canadian station, *DX* station, *mobile* station, and *second highest* scoring mobile station. Certificates to the top 10 fixed and mobile stations in the U.S. and Canada and to the highest scoring station in each DX country.

This year we had repeat winners in the fixed and mobile categories. A lot of mobiles spent a large amount of effort and money putting out counties. Appreciate everyone's cooperation this year, again. As you can see by the logs, there was plenty of activity. Thanks to all, 73 de, John, W0QWS.

Regarding **Awards Directories** or whatever you want to call them, the only ones (in English) I am aware of are: the one put out by the Radio Society of Great Britain; the *DX-Awards Guide* put out by Charles J. Ellis, P.O. Box 1136 Welch Station, Ames, Iowa 50010.

I repeat that for those interested in County Hunting on s.s.b., send 54¢ in stamps (no envelope required) to Walt Allen, W0DG, 10310 W. 170th Terrace, Olathe, Kansas for a bundle of information on Nets, special CH QSLs, special CH QSL Bureaus, and much more.

Those interested in County Hunting on c.w. send s.a.s.e. to Jim Hoffman, K1ZFQ, 42 Gresham Street, Milford, Connecticut 06460 for information on their frequencies, QSL Bureau, etc.

Fixed Station Scores

*N7TT/2	4,469,304
†K1NWE	3,820,064
†AG9S	2,069,262
†WA3YEY	1,555,200
†WD5EYM	1,466,059
†WD4FGW	960,918
†K5IID	603,120
†W3ARK	280,434
†WB3CFD	263,493
†W7JYW	239,760
†VE1RQ	206,976
K9DAF	199,906
N8BGF	117,420
WA0RJJ	49,470
WA2WCW	30,960
WB8MDG	8,723
WD8QOY	5,130
WB9SMU	4,104
WB8WEZ	1,955
K9GTQ	1,491
K9GDF	333
K5XY	250

Mobile Scores

*N4UF	575,340
W0QWS	343,295
*WB5BBS	234,360
†K3KX	135,125
†W5VOR	131,376
†W4OWY	54,240
†WB4FBS	27,186
†VE3IR	1,566
†K4ZT	1,554
†W1EXZ	540
†K9DAF	243

DX Scores

*WB4KEA/KP4	1,787,832
†G2AFQ	206,778
†I2PHN	83,681
†VK4VU	72,900
†CT4SL	9,460
†JH1BBU	6,322
†SM0CHA	2,600

**Plaque winners.*
†Certificate winners.

Two other fine items helpful for County Hunters (actually aimed at the s.s.b. group) are put out at cost by B & B Shop, 1348 Pinewood Drive, Woodbury, Minnesota 55119. The *County Hunters Directory* consists of 74 pages of full data on all the active County Hunters. Present price until the supply is exhausted is $5. The other item is the *County Hunter Handbook*, which is full of valuable information on each active County Hunter, lists active County Hunters in each county, and has much more, such as data on the Independent Cities. It has 68 pages and costs $2.

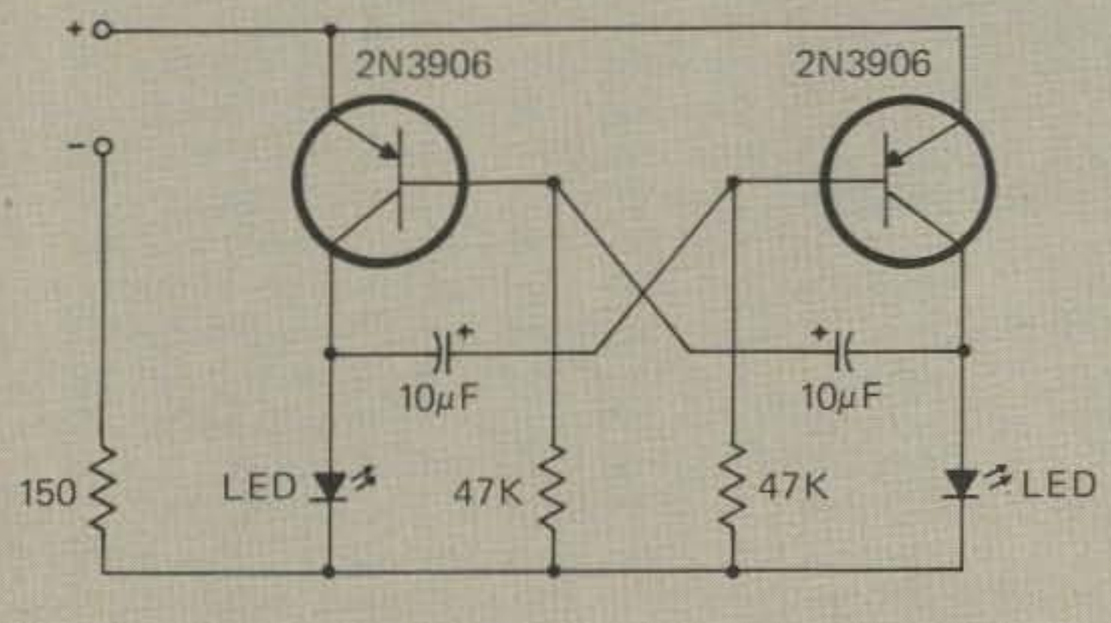
Hope you all had a fine time at the MARAC Convention in Denver and also a wonderful summer.

73, Ed, W2GT

CRANIUM QUERIES

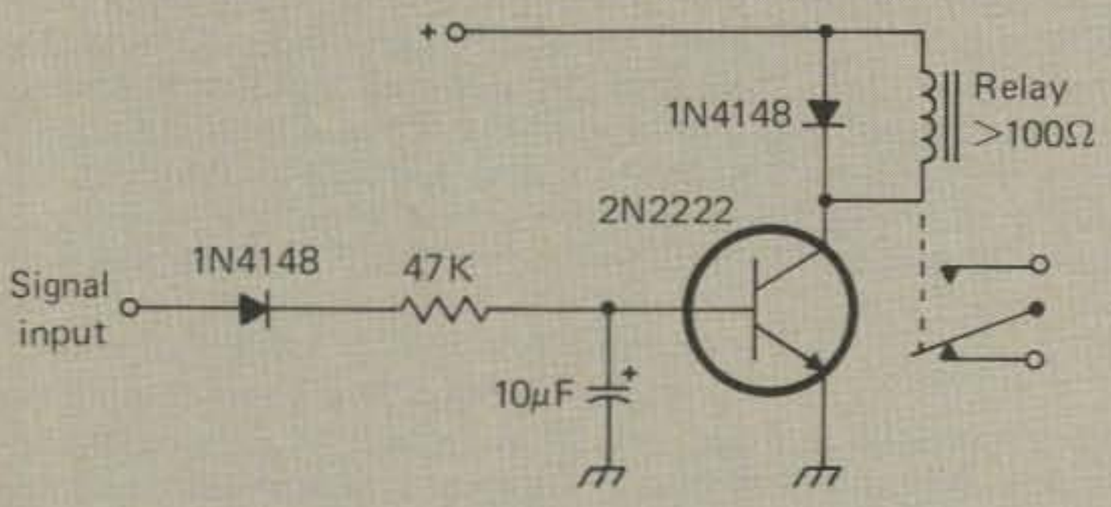
FIND THE ERROR

BY MARTIN BRADLEY WEINSTEIN, WB8LBV
c/o CQ



Here's What Was Wrong

Somehow the 47K resistors and the LEDs ended up trading places with each other in our Badge Blinker. A quick swap set everything working quick as a wink.



What's Wrong?

There are lots of uses for this Signal Operated Relay With Delayed Release, like turning a cassette recorder on and off automatically when signals appear on the a.f.s.k. and s.s.t.v. nets. But this beauty blew one of the diodes, and still wouldn't work right. How come?

a monthly feature by
BILL WELSH, W6DDB

Novice

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Worldwide Sources of Code Practice — Part I of II

The September 1979 Novice column provided a long list of code transmissions that amateurs and others can use to improve code reception proficiency. That list evoked a lot of favorable comment and enough update information to make it worth printing again. Special thanks go to those who submitted a lot of useful changes and additions, including Jerry Johnson, W6VKY, Norris Maxwell, K5BA, Dick Milligan, K5RCG, K. Nagase, JK1QLR, and Eros Chiasserini, I1OEC.

I hope you obtain and read the three-part article about code that was printed in the June through August 1979 Novice columns. That article should help you attain a better understanding and appreciation of code. Code operation is truly a privilege extended to amateur radio operators. It provides Novices with the most efficient method of radio communications right at the start of their exposure to amateur radio.

A natural follow-up to the code article is an article about code practice sources, which is what this is. If you have read my previous Novice columns, you should know that I believe there is no better code practice than actual on-the-air contacts. However, I know that beginners have to learn the code well enough to earn the Novice license. I also can understand that someone may wish to supplement his on-the-air practice with code receiving practice to help increase receiving proficiency.

If you are just getting started and do not yet know the International Morse Code, I advise you to obtain and read the code articles in previous issues of this magazine. There are many aids available to help you learn the code and become proficient in its use. Most electronics stores have code practice oscillators, handkeys, books, records, and tapes to help you master the code.

2814 Empire Ave., Burbank, CA 91520

Henry J. Peters, WD8KCA, of Cincinnati, Ohio, advises that it took him 36 years to get on the air as an amateur. He first became interested in radio when he completed the Armored Force Radio School in Fort Knox, Kentucky in 1943. After WW II, he was still interested in amateur radio but marriage, additional education, and earning a living kept him too busy to become licensed until 1977. He gave up smoking and bought a Yaesu FT-101-ZD Transceiver with the money he would have burned up smoking. He uses dipole antennas cut for each Novice band and he is working hard to develop a good clean fist. Henry enjoys the Novice column and advises that he makes good use of the lists of telegraphic abbreviations and Q-signals printed in previous Novice articles. He is really enjoying amateur radio and wishes he had not waited 36 years to get started.

Training aids are usually advertised in amateur radio publications. A careful search through this issue should disclose several code instruction aids currently for sale. The for-sale ads often list used code aids available at reasonable prices.

You need a good manual telegraph key (handkey) and a code practice oscillator (c.p.o.) The c.p.o. does not need to be an expensive device; you just require something that produces a reliable audio tone. It is advisable to be able to adjust both volume and tone of the c.p.o. It is also best to have a headphone jack on the c.p.o. and the internal speaker should automatically be disconnected when the headset connector is plugged into the c.p.o. If you already have station equipment, you may be able to use it for code practice without putting it on the air. If you have access to equipment that has a built-in sidetone oscillator, you should not need a separate c.p.o. The sidetone oscillator produces an audible tone that enables the operator to hear his own sending when he is on the air with his receiver section automatically muted. It is possible to use the sidetone oscillator as a c.p.o. with most equipment by simply switching to a voice mode position. This usually permits the sidetone signal to be heard without any transmitter r.f. output. It is easy to determine whether or not this unintentional code practice feature is available in any equipment. If you have equipment that does not permit you to use a sidetone oscillator for code practice, you can use the receiver section for code practice. Simply tune the receiver to a steady signal (such as WWV on 2.5, 5, 10, and 15 MHz) and insert your handkey in series with one of the leads supplying audio output to your speaker or headset. In this arrangement, you will hear your code characters as you close the key to send dits and dahs. Naturally, the key contacts would have to be left closed (or electrically short circuited) for the receiver to function normally when you are not practicing code sending. I advise you to get a good communication (not high fidelity) headset and to use it whenever you are practicing code or operating on the air. These dits and dahs may soon sound like music to your ears, but they will remain just aggravating noise to others in your home. Using a good double earphone (both ears covered) headset also isolates you from household

noises that could distract you and make your code practice less useful. It is particularly important to use a good headset when you are trying to work a station with an extremely weak signal; with earphones you can hear and work weak ones that you may not be able to work using a speaker.

You will need some type of receiver if you plan to increase your code speed by copying on-the-air stations. The amateur-band-only type of receiver is your best dollar value once you have your amateur ticket and you're ready to operate. However, some beginning students have general-coverage military surplus or old commercial types of receivers. These receivers are usually not satisfactory for use on today's amateur bands, but they are more than adequate to let you get a lot of excellent on-the-air code receiving practice. The list I've detailed herein shows stations transmitting a wide variety of code transmissions from all parts of the world and over a frequency range of about 15 kHz to 25 MHz. You can use some really junk-type receivers and still hear good code practice stations shown in this list.

The November 1977 through March 1978 Novice columns provide information to help you select and install the best possible station. If you are not familiar with amateur radio equipment, I advise you to obtain these issues and read them very carefully.

There are several stations regularly transmitting code practice in the amateur bands, and you can request free details from the American Radio Relay League, 225 Main Street, Newington, Connecticut 06111. The ARRL operates W1AW, which provides regular code practice. With the exception of national holidays and infrequent special occasions, W1AW sends code practice transmissions on 1.835, 3.58, 7.08, 14.08, 21.08, 28.08, 50.08 and 147.555 MHz. Each code practice run is 8 minutes long. Slow speed code practice transmissions begin at the lowest speed and progress to the highest speed. High speed code practice transmissions begin at the highest speed and drop down to the lowest speed.

Slow speed W1AW code practice runs are made at 5, 5, 7.5, 7.5, 10, 13, and 15 words per minute (w.p.m.). On Monday, Wednesday, and Friday, slow practice starts at 0000 and 1400 UTC. On Tuesday, Thursday, Saturday, and Sunday, slow code practice starts at 0300 and 2100 UTC.

Fast speed W1AW code practice runs are made at 35, 30, 25, 15, 13, and 10 w.p.m. On Monday, Wednesday, and Friday, fast practice starts at 0300 and 2100 UTC. On Tuesday, Thursday, Saturday, and Sunday, fast code practice starts at 0000 and 1400 UTC. UTC is Universal Time Coordinated. It is simple to convert UTC to your local time. UTC is the same basic time that was previously called Greenwich Mean Time (GMT) or Zulu (Z) Time. UTC is 5, 6, 7, and 8 hours ahead of EST, CST, MST, and PST (Standard Time), respectively. UTC is 4, 5, 6, and 7 hours ahead of EDST, CDST, MDST, and PDST (Daylight Savings Time), respectively. Consequently, just deduct the proper number of hours from the indicated UTC to determine your local time.

NOTE: Remember that the first two numbers of four-digit time represent the hours and the second pair of numbers are the minutes. Consequently, 0930 is 9:30 a.m. and 2130 is 9:30 p.m.

Once you've learned the code and attained a receiving proficiency of at least 7 w.p.m. the best way to increase your code speed further is to get your Novice license and to operate as much as possible. If you are preparing yourself to pass a code exam, make sure to copy every required character down because you must practice to perfect your ability to transcribe what you hear. Just listening is not enough.

The following list of commercial and military code transmissions is of prime use to anyone who wants to increase code receiving proficiency anywhere between 10 and 50 w.p.m. Remember that these transmissions are protected

This is 16-year-old Ned Linch, KA4AXS, of West Point, Georgia. He contacted amateurs in 44 states, 15 countries, and 5 continents during his first year and a half on the air. He has worked 62 DX (foreign) amateurs. His station includes a Heath SB-100 Transceiver and a hybrid quad antenna. Most of his operation is on the 10 meter Novice band and his 10-X number is 26,801. His QRP Amateur Radio Club number is 4414 and he is an ARRL member. Ned has the Ten American Districts and the 1000-Mile-Per-Watt operating awards. He reads the Novice column regularly and he particularly liked the December 1979 coverage of the modified Phillip's code used by amateurs.

by the Secrecy of Communications Act, which prohibits you from either making use of the received information or from passing it along to someone else. This on-the-air receiving practice is particularly beneficial to beginners because it gives them the opportunity to become familiar with receiving under various on-the-air conditions.

Code students normally progress from listening to time ticks (for receiver familiarization) through copying traffic lists, weather reports, broadcasts to merchant ships, hydrographic reports, and (finally) press reports. This list contains code practice sources that are useful to code enthusiasts of all capabilities, and it indicates the content of each broadcast by one or more of the following:

HX is a hydrographic report. This is good practice for students who are not yet able to copy fast press reports.

MCST is a broadcast to merchant ships. This is most useful to the student who has progressed past the need to copy weather reports.

PX is a press report. This provides the best code practice for advanced students because broadcasts range between fixed speeds of 15 to 50 wpm. You'll copy news that you'd otherwise not always see or hear. This is truly enjoyable practice!

TFC is a traffic list. This is the best practice for a beginning code student. The shore station repeats the four letter ship callsign twice for each ship for which it has traffic.

TX is a time tick. This has very little code practice value, but some stations do identify in code and this is useful to a beginner. Time ticks are listed to help newcomers get accustomed to receiver calibrations. Since many time and frequency standards stations operate on the same frequencies, the strongest one overrides weaker signals at each listening location. The following table lists some time and frequency standards stations.

Frequency		Callsign	Location
16	kHz	GBR	Rugby, United Kingdom
17.8	kHz	NAA	Cutler, Maine
18.6	kHz	NLK	Jim Creek, Washington
21.4	kHz	NSS	Annapolis, Maryland
23.4	kHz	NPM	Lualualei, Hawaii
24	kHz	NBA	Balboa, Panama
50	kHz	OMA	Podebrady, Czechoslovakia
60	kHz	MSF	Rugby, United Kingdom
60	kHz	WWVB	Fort Collins, Colorado
77.5	kHz	DCF 77	Mainflingen, W. Germany
100	kHz	(Loran-C)	Carolina Beach, N.C.
2.5	MHz	JJY	Sanwa, Japan
2.5	MHz	MSF	Rugby, United Kingdom
2.5	MHz	OMA	Podebrady, Czechoslovakia
2.5	MHz	WWV	Fort Collins, Colorado
2.5	MHz	WWVH	Kekaha, Hawaii
2.5	MHz	ZUO	Olifantsfontein, Republic of South Africa
3.3	MHz	CHU	Ottawa, Canada
4.5	MHz	VNG	Lyndhurst, Australia
5	MHz	JJY	Sanwa, Japan
5	MHz	LOL	Buenos Aires, Argentina
5	MHz	MSF	Rugby, United Kingdom
5	MHz	WWV	Fort Collins, Colorado
5	MHz	WWVH	Kekaha, Hawaii
5	MHz	ZUO	Olifantsfontein, Republic of South Africa
7.335	MHz	CHU	Ottawa, Canada
7.5	MHz	VNG	Lyndhurst, Australia
8	MHz	JJY	Sanwa, Japan
10	MHz	ATA	New Delhi, India
10	MHz	JJY	Sanwa, Japan
10	MHz	LOL	Buenos Aires, Argentina
10	MHz	MSF	Rugby, United Kingdom
10	MHz	RWM	Moscow, Russia
10	MHz	WWV	Fort Collins, Colorado
10	MHz	WWVH	Kekaha, Hawaii
12	MHz	VNG	Lyndhurst, Australia
14.67	MHz	CHU	Ottawa, Canada
15	MHz	JJY	Sanwa, Japan
15	MHz	LOL	Buenos Aires, Argentina
15	MHz	RWM	Moscow, Russia
15	MHz	WWV	Fort Collins, Colorado
15	MHz	WWVH	Kekaha, Hawaii
20	MHz	WWV	Fort Collins, Colorado
20	MHz	WWVH	Kekaha, Hawaii
25	MHz	WWV	Fort Collins, Colorado

WX is a weather report. This is most useful to a student who has progressed past the need to copy traffic lists. Weather reports, hydrographic

Please send all reader inquiries directly

Karel Karmasin, OK2BLG, is working on a new piece of equipment for his station. He advises that the Novice column is very helpful in areas where prospective amateurs have very few sources of aid. If you want a contact with Breclav, Czechoslovakia, listen for him.

reports, and broadcasts to merchant ships frequently overlap each other in their degrees of copying difficulty.

Please bring all corrections and additions to the attention of the author. Your letter or card will be greatly appreciated. Please understand that I'm just trying to make it easier for people who want to learn the code.

This completes the first part of this two-part article. Next month's Novice column will contain the list of stations you can copy to improve code proficiency.

G3XCS points out that David S. Porter, K2BPP, is the first person who visited both the North Pole and the South Pole. Also, Naomi Uemara, JG1QFW, was the first solo explorer to reach the North Pole. Yugoslavian amateur radio station callsigns sometimes end /X or /Y, meaning that the station is being operated by a member of the licensee's family.

Topographic Maps

There is an excellent series of geological survey topographic maps available. These maps are required when determining antenna height above average terrain (HAAT) and they are useful in many other ways. You can obtain an index to the maps of your state by requesting it from one of the following:

East of the Mississippi River
Branch of Distribution
U. S. Geological Survey
1200 South Eads Street
Arlington, Virginia 22202

West of the Mississippi River
Branch of Distribution
U.S. Geological Survey
Box 25286 Federal Center
Denver, Colorado 80225

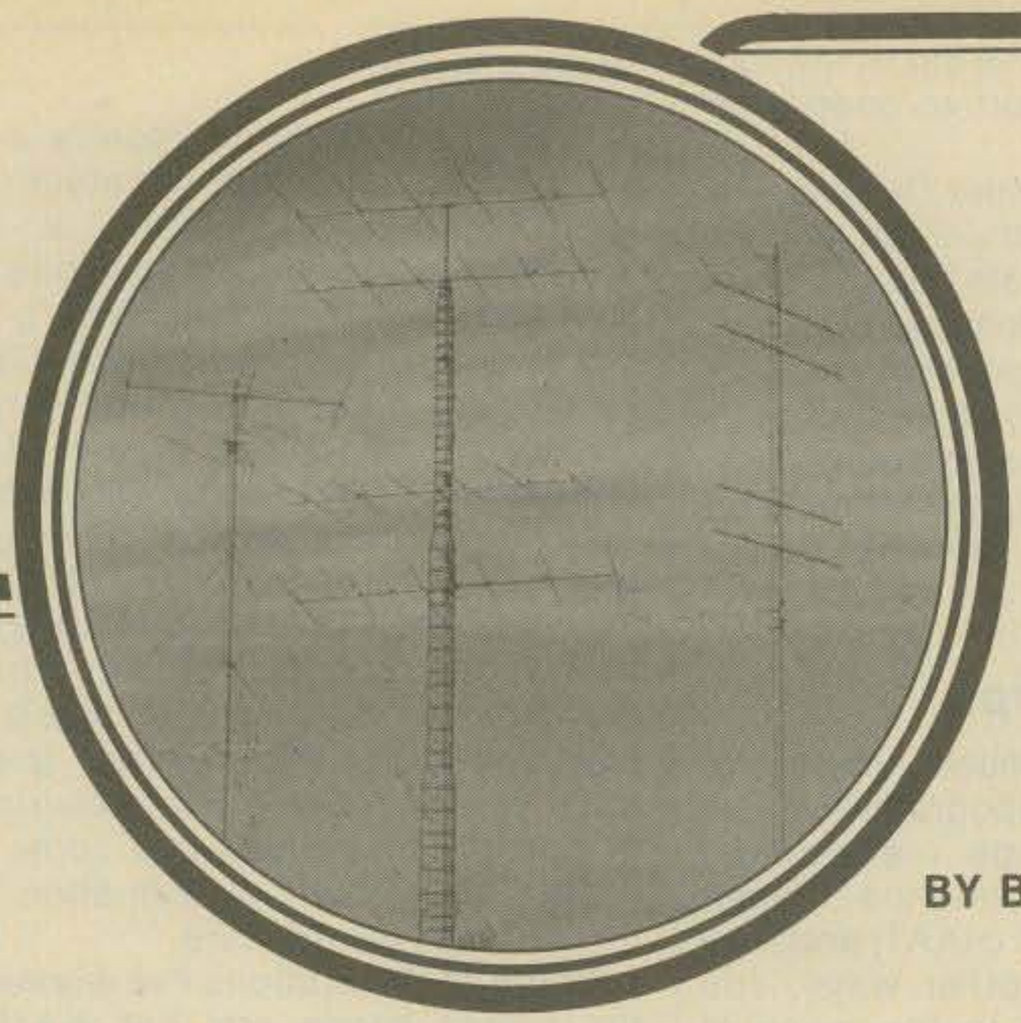
Newsletter

If you would like to receive a free sample copy of a good amateur radio service newsletter, send a self-addressed and stamped envelope with your request to Fred Maia, W5YI, 1322 Edgewood Drive, Richardson, Texas 75081. The issue I saw was very interesting. The correct name of the newsletter is *W5YI Report* "Dits & Bits."

Novices are urged to submit good black-and-white pictures of themselves at their operating positions. If your photograph is printed in a future Novice column, you will receive a one year subscription or renewal (please state which) to *CQ*. A brief description of operating activities and some personal background information are needed with your picture.

Some of the stations I've worked on the novice bands are: Sal, KA1ETB, New Haven, Conn.; Ted, KA2HAR, Rochester, N.Y.; Jim, KA3ESU, Beaver Falls, Penn.; Ken, KA4JUA, Melbourne, Fla.; Ray, KA5HXR, Kenner, Louisiana; Rick, KA6DID, Arleta, Calif.; Carmen, WB7UGU, Grants Pass, Ore.; Dave, KA8IDJ, Kentwood, Mich.; Dave, KA9EDP, Elizabeth, Illinois; Elli, KA0FNY, O'Fallon, Missouri; Nomar, WP4BBM, Aguadilla, Puerto Rico.

73, Bill, W6DDB



1979 CQ World-Wide DX Contest — CW Results

BY BOB COX*, K3EST, AND LARRY BROCKMAN†, N6AR

After checking approximately 500,000 QSO's, the 1979 CQ World-Wide CW DX Contest enters the record books as the most successful ever! It was clearly the year of the high frequency bands. Ten new 28 and 21 MHz records were set. For those with enough energy to try the low bands, rewards were found in surprisingly good band openings. For all entrants increased operating skills were needed to cope with the onslaught of QSO's.

The World Champion Single Operator score was EA8AK operated by OH6DX. Erkii averaged 80 QSO's per hour for the 48 hour period. He was followed by 9Y4VT operated by N6AA. Third and fourth places go to UF6DZ and OK2RZ.

The Multi-Single category generated quite a race. NP4A barely edged out R6F for the new world record. Both stations broke the old world record by quite a margin.

The battle of the Multi-Multi giants resulted in PJ2CC setting a new world record. They were followed closely by 9Y4W. PJ2CC was sponsored by the Potomac Valley Radio Club, while 9Y4W was sponsored by the Frankford Radio Club.

The top USA All Band score was K1AR. John was happy with U0Y calling him on 40 meters! Look at the battle for second place in the US. Four stations within 53,000 of one another. K1VTM operated by K1JX edged out W1ZM, W1CF and N2LT.

The USA Multi-Single effort was lead by K5RC's pace-setting record of 4 million points. The antenna farm of N4AR had to settle for a second place finish.

The USA Multi-Multi effort was headlined by N2AA. All six top finishers beat the old CW record which had stood since 1970! K8LX and K3WW finished second and third, respectively.

The following stations set new records: LU8DQ: World 28 MHz; FR0MM: Africa 28 MHz; UH8EAA: Asia 17 MHz; JH3LPT: Asia 21 MHz; 4Z4KX: Asia 28 MHz; G3SZA: Europe 1.8 MHz; YU2CDS: Europe 7 MHz; SM5GMG: Europe 21 MHz; DK3GI: Europe 28 MHz; VP2MEE: N. America 21 MHz; KV4FZ: N. America 28 MHz; KH6XX: Oceania 28 MHz; UF6DZ: Asia Single Operator All Band; OK2RZ: Europe Single Operator All Band. M.O.S.T.: Africa, EA9EU; Asia, R6F; Europe, YU7BCD; N. America, NP4A. M.O.M.T.: Europe, SK2KW; N. America, N2AA; S. America, PJ2CC.

The new QRP category continues to grow. An excellent effort by Chris, G4BUE, brings him this year's QRPp Trophy. The top USA entry was WA4LOF with W5YZ very close behind.

Something To Think About

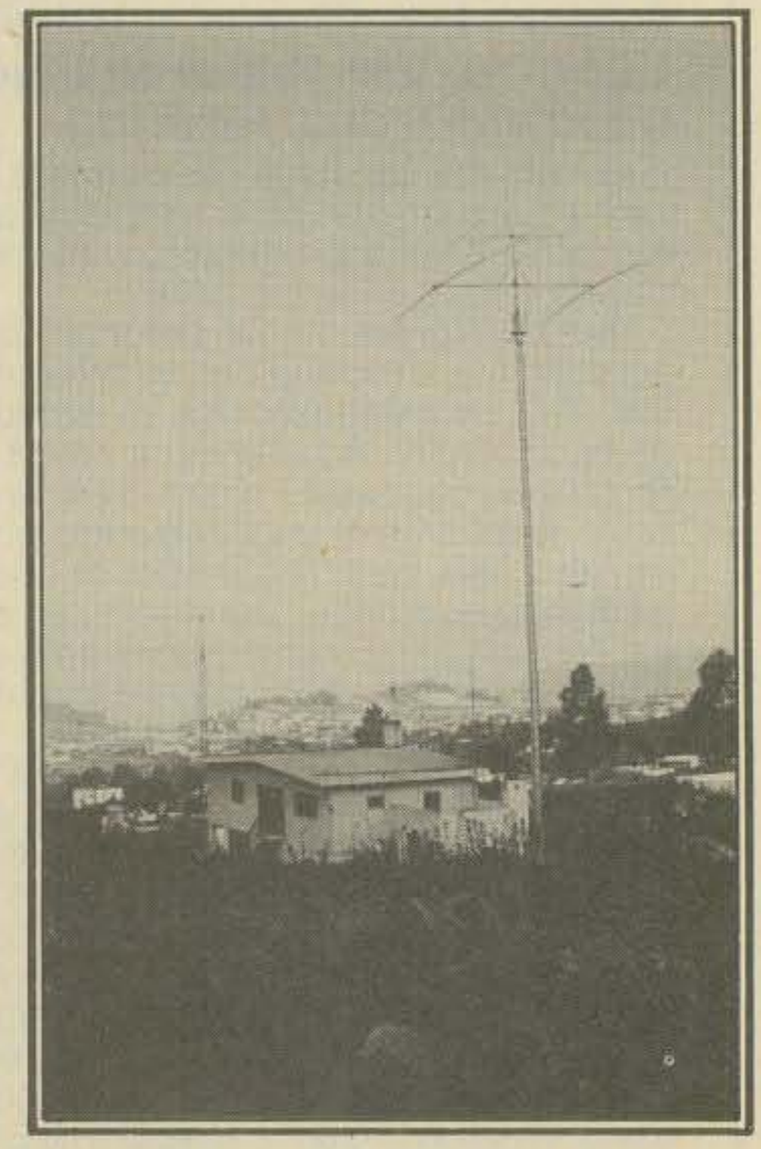
Each year the committee receives complaints concerning unsportsmanlike activity by a few operators. Complaints based on actual log data are verified by the committee. However, other types of violations *not based* on log data, such as excessive power, unsportsmanlike operating techniques, violations of the single operator category, are very difficult to substantiate.

Contesting, by its very nature, relies heavily on the honor and word of the participants. When the statement you sign on the summary sheet becomes meaningless, it only serves to diminish the satisfaction of the achievement.

The following people devoted much time and effort to verifying the results: Frank Anzalone, W1WY; Terry Baxter, N6CW; John Battin, K9DX; Yuri Blanarovich, VE3BMV; Lenny Chertok, W3GRF; Dave Donnelly, K2SS; Lew Jenkins, N6VV; Fred Morris, AD6C; Glenn Rattmann, K6NA; Jim Sullivan, W7EJ; Reg Toumi, N6SV; Gene Walsh, N2AA; Gene Zimmerman, W3ZZ; and Doug Zwiebel, WB2VYA.

Congratulations to all the winners!

73, Bob, K3EST, and Larry, N6AR



EA8AK operated by OH6DX. Top Single Operator score.

*5801 Huntland Road, Temple Hills, MD 20031
†7164 Rock Ridge Terrace, Canoga Park, CA 91307

Quite a setup at N9MM

WB9BCR and WB9CEJ.

C.W. TROPHY WINNERS AND DONORS

Single-Operator, All Band
World
EA8AK (Opr. Erkki J. Korhonen, OH6DX)
Donor: W2AB Memorial (K4FW)
U.S.A.
John Dorr, K1AR
Donor: Frankford Radio Club
Canada
Sauli Arosankari, VE1AIH
Donor: Canadian DX Association
Caribbean/Central America
Jose M. Lozano Lozano, XE2MX
Donor: Mort Grotenstein, N6JT
Europe
Jiri Kral, OK2RZ
Donor: W3AU Operators
Africa
Ted Collins, ZD8TC
Donor: Gordon Marshall, W6RR
Asia
Valentin V. Makhalov, UF6DZ
Donor: JA CQ Magazine
Oceania
Willmer Hew, KH6NO
Donor: Maui Amateur Radio Club
Japan
Saty Nakamura, JE1JKL
Donor: Palm Garden Contest Club

Single Operator Single Band
World (28 MHz)
William C. Poellmitz, FR0MM
Donor: W2JT Memorial (No. Jersey DX Assn.)
World 3.5 MHz
Alvaro Robledo, EA2OP
Donor: Fred Capossela, K6SSS
U.S.A. (21 MHz)
Peter Chamalian, W1RM
Donor: No. Illinois DX Association
Canada (21 MHz)
Yuri Blanarovich, VE3BMV
Donor: Canadian Amateur Radio Federation
Caribbean/Central America (28 MHz)
Tim Wininger, C6ACY
Donor: DX Club of Puerto Rico
Europe 14 MHz
Drago Turin, Jr., YU3ZV
Donor: G2LB Memorial from his friends
South America (21 MHz)
Elcio Neves, PY3CFD
Donor: Rafael DeLeon, CX3BR
Oceania 21 MHz
Haryono S., YB0GF
Donor: Pacific Radio Amateur Transmitting Society

Multi-Operator Single Transmitter
World
NP4A (Oprs. NP4A, K2TR, K3UA, KP4EHP, N2NT)
Donor: Anthony Susen, W3AOH

Multi-Operator Multi-Transmitter
World
PJ2CC (Oprs. K3EST, K3KU, K4BAI, K4VX, PJ2FR, PJ9EE, W1BIH, W1GNC, WB4SGV, YU3EY)
Donor: Hazard Reeves, K2GL
U.S.A.
K8LX (Oprs. K8LX, K8GM, K8MD, N8EA, W8KPL, W8TA, W8WA, WA8TBQ, WA8YVR, WA8ZDT, WN8PEE, WD9HFW)
Donor: Rush Drake, W7RM

Contest Expeditions
World Single Operator
3B8RS (Opr. Walter Skudlarek, DJ6QT)
Donor: CQ Magazine
World Multi-Operator
U0Y (Oprs. UV0BB, UA0BW, UA0ABB, UA0ACQ, UA0AG, UA0AAK)
Donor: Bill Schneider, K2TT

Top World Single Operator Combined Phone/CW
9Y4VT (Opr. Richard Norton, N6AA)
Donor: John Knight, W6YY
World Top QRP
Christopher J. Page, G4BUE
Donor: Gene Walsh, N2AA

Club Trophies
World High
Frankford Radio Club, 173,821,640
Donor: CQ Magazine
Most Improved Radio Club
Mad River Radio Club, 24,119,894
Donor: Southeastern DX Club

Neville, ZS6BSQ.

K3YL at the key.

Mark, 4Z4KX.

U.S.A. Club Scores

Frankford Radio Club	173,821,640
Yankee Clipper Contest Club	81,556,186
Potomac Valley Radio CLub	81,121,926
Southeastern DX Club	47,212,683
Southern California DX Club	27,619,591
Mad River Radio Club	24,119,894
San Diego DX Club	17,921,546
Northern California DX Club	16,323,530
Western Washington DX Club	15,390,656
North Texas Contest Club	14,564,849
Murphy's Marauders	9,673,789
Texas DX Society	9,621,558
North Florida DX Association	9,237,751
Northern California Contest Club	9,194,849
Eastern Iowa DX Association	8,935,659
Michigan DX Association	7,451,320
Kansas City DX Club	6,981,220
Alamo DX Amigos	6,669,414
Central Virginia Contest Club	5,520,441
Northern Illinois DX Association	4,951,273
Ill Wind Contesters	4,796,165
Glouchester County A.R.C.	4,228,123
Central Arizona DX Association	3,829,374
Greater Milwaukee DX Association	3,378,420
Buffalo Area DX Club	2,765,988
Indianapolis DX Association	2,623,850
Northern Ohio A.R.S.	2,339,757
Southern Florida DX Association	2,226,758
Neenah-Menasha A.R.C.	2,110,234
Wireless Institute of the Northeast	1,907,750
Lynchburg A.R.C.	1,363,048
Delta DX Association	1,271,351
Sheboygan County DX Association	1,222,177
Williamette Valley DX Club	1,208,521
Red Stick DX Association	1,173,548
DX Association of Connecticut	1,010,331
Mississippi Valley DX and Contest Club	640,825
Livonia International DX Society	449,212
Fort Wayne Radio Club	448,802
Great South Bay A.R.C.	418,314
Boiled Owls of New York	291,014
Poughkeepsie A.R.C.	286,238
Point Radio Operating Society	111,125
Whidbey Island DX Club	1,914

DX Club Scores

Rhein Ruhr DX Association	41,593,795
Lithuanian Contest Group	25,287,271
Voroshilovgrad Radio Club	21,763,473
Chelyabinsk Radio Club	21,555,865
South German DX Group	20,382,719
Kaunas Polytechnic Institute R.C.	18,638,982
YU DX Club	17,244,870
Tallinn Radio Club	13,289,503
Northern Lithuania DX Group	12,161,088
Edmonton DX Club	8,496,894
Leningrad Radio Club	7,334,229
Minsk Radio Club	5,438,193
Alaska DX Association	5,037,562
Ontario Contest Club	5,029,161
Halifax A.R.C	4,965,214
Radio Club of the G.D.R.	3,941,417
Riga Radio Club	3,185,602
Saar Pfalz DX Club	3,035,696
Winnepeg DX Club	2,213,205
Thunder Bay Contest Club	1,984,018
Pushinko Radio Club	1,816,242
Students Radio Club (OE6XRG)	1,797,200
Moscow Radio Club	1,041,643
SP DX Club	988,915
Grupo Argentino De CW	931,664
Voice of Hida Ham Club	689,983
Noviomacum Contest Group	575,535
Guernsey A.R.S.	484,034
Baku City Radio Club	427,924
OK1KIR Club	90,918
Kiev Radio Club	81,169

STATION OPERATORS

Multi-Operator Single Transmitter

AA4FF & WD4GCE, K4XL, K4MKR, N4CMJ, W4WWQ, W4VP, WB4ZPF. **AA4M** & KC4B. **AB0** & Operators. **AC8E** & WD8ALG, K8AAZ. **AI9J** & N9EVB, N9US. CX7CO & CX4CQ, CX7BY. **DJ6BN** & DK5QK. **DK0TU**: DJ9NX, DK1PD, DK5GB, DK6QI, DL7ON, DL7ZN, DF5GX. **DL8CM**: DL8AN, DL8CH, DL8BL, DL8FR, DL1VJ. **DL0AA**: DJ4XG, DJ5PA, DK8IE, DJ8WL, DK2ZO, DL1YD, DL3BK, DL6KB, DL8NU. **DL0ER**: DL9XY, DL3CU, DF5JT, DJ5GN, DJ2LA, **DL0WW**: DA1UY, DA1FM, DA1TN, DJ2PI, DJ5NR, DJ9CB, DJ0V, DK8WD, DL3ZA, DL8OJ, DF1ZC, DF1ZY, DF5ZF, DF7ZP. **DM2CDL** & DM2CCL. **DM3GM**: DM3BGM, DM3DGM, DM3SGM, DM3YUF, DM2FJM. **DM3YL** & DM4ZQL. **DM4IH**: DM2AUH, DM4OIH, DM2GLH. **DM4RA** & DM4ORA. **DM4UG**: DM4VUG, DM4YUG. **DM5IG**: DM5XIG, DM-92781G, DM5AIG. **EA3AIR**: EA3OG, EA3XH, EA3AVV, EA3XZ. **EA9EU**: EA7TL, EA7AAW, EA7ALG, EA9EO, EA9GK, EA9EU. **F3TV**: F6BEE, F6ARC, F6DIM. **F6KKE**: F6EBA + 2 ops. **F79WARC**: F5IN, F6AUO. **G3GJL**: G3RLF, G3TQD, G3VQC, G3DEE, G4AAL, G4CZE. **G4BP**: G3LCG, G3HKO, G3VAN, G3JBR. **G4BRA**: G3YMC, G3XVR, G4DDL. **G4DSE**: G3RZI, G4GXL. **HA1KSA**: Kovacs, Kovacs, Muller, Kurcsics, Varga. **HA1KSS**: Fairos, Antal, Imre, Lasilo, Mihaly. HA1KZU: Biczo, Ekler, Gulyas, Ferszti, Biro. HA1KZZ: HA1ZZ, HA1ZI, HA1XB, Czapan, Nemeth, Balogh. **HA2KMR**: Fanos, Karoly, Laszlo, Craba. **HA2KRZ**: Laszlo, Dezso, Fenrc, Tamas, Laszlo. **HA3KHB**: Bela, Anna, Zoltan, Lojos. **HA3KHC**: Nemeth, Szabo, Borsfoldi, Kardos. **HA3KNA**: Jozef, Ferenc, HA3NU, HA3NS. **HA4KYH**: HA4XX, HA4YO, HA4YQ, HA4YK. **HA5KAI**: Andras, Antal. **HA5KHG**: Horlobagyi, Becskei, Hajpo, Borbas, Szabadkai, Molnar. **HA5KKC**: HA5MA, HA5LV, HA5MO, HA5GQ, Jozef. **HA6KNP**: HA6DU, HA6NQ, HA6OM. **HA7KLB**: Sandor, Gabor. **HA7KLG**: Lazslo, Lstudn, Karoly, Laszlo, Erzsebet. **HA7KLC**: Csato, Salyi, Varga, Baracsi. **HA7KSV**: Adamecz, Deak, Demeter, Ifzu, Rozsa, Waradi. **HA8KAX**: Janos, Lstuan. **HA8KAZ**: Olasz, Csak, Szabo, Szabo, Gyori. **HA8KUA**: Jozsef, Jozsef, Sandor, Imre, Bela. **HA8KVB**: Modok, Palinkas, Frei. **HA9KOV**: Zsolt, Bela. **HA0KHK**: Szabo, Bodnar, Gorgya, Mezo, Toth. **HA0KHW**: HA0IF, HA0IG, Fulop. **HA0KLE**: Sapi, Tomasovsky, Kurucz, Fabian, Devenyf, Szalontai. **HA0KLL**: Bela, Jstuan, Autal, Autal. **HA0KLU**: Gulyas, Szab, Kabay, Toth, Nagy, Nagy. **HB9AYZ** & Schuetz. **HG6V**: Laszlo, Laszlo, Geza, Tamas, Ferenc, Laszlo. **HH2MC**: W2SR, N4TO, W4QM, WA4DRU, WB4OSN. **IM0ARI**: IS0BYR, IS0DTK, IS0FGD, IS0TOA, IS0OGW, IS0MIJ. **JA1YFG**: JI1RCB, JH4CQQ, JL1OLH, JG1QNV, JJ1EEF, JI1JMH, JI1OAE. **JA2YKA**: JH2QXG, JR2GMC, JE2RQT, JR3URO, JA4UDP, JA9NFO, Cat: Keni Keni. **JA6YDH**: JH6NFR, JH6NLY, JH6RAD, JH6SWF, JH6DRF, JR6DUL, JR6JKS, JE6ASN. **JA6YFS**: JH6WDO, JH4JLS, JE3MYB. **JA7YCQ**: JG1SLY, JA0SLY, JI1FLB, JI1OFP, JH7ROP, JH7IMX, JH7FZI, JH7XUZ, JR7RWW, JH0CZQ. **JA0YAK**: Akira, Sioda, Tozawa, Hirano, Takeda, Sato. **JF1YPF**: JH1OGC, JR1MTS, JE1QDQ, JG1GGF, JJ1AJT. **K1IK** & N1RI. **K1RQ** & W1ZT. **K2BK** & W2IFK, K2BMI, W2REH. **K2FL** & N2ATX. **K2OY** & WA2STM. **K2XA** & AF7M **K3SME** & K3KNH, WA3FZQ. **K3QMR** & W3YQ, WB3KKX, WB3LCD, WB3LEC. **K3UC** & K3VDU. **K3YL** & K3PA. **K4PB** & WA4PWK, WB4PKP. **K5RC** & K5GA, K5LZO, K5ZD, W5VAH. **K8RT** & WDAUB, WB8KKI, WD8BIA, WB8YSD. **K9KA** & K9GL, WB9OEP. **K9RF**: K9BG, K9NO, W9OF, W9OFV, W9RW. **KB9GD** & AG9A, WB9VLV. **K0NR** & K0LUZ. K0RWL & K0VBU, AK0A, W0VWW, WB0LFY, WA0GKZ. **LA1H**: LA4KQ, LA9OI. **LA7A**: LA4NL, LA6UT, LA8QU, LA8UL. **LZ1KDP**: LZ1GC, LZ1ZF, LZ1MS, Slavi, George, Nick. **LZ1KFZ**: Georgiev, Ivanov. **LZ1KPM**: Welkow, Todozow. **LZ1KSP**: Kostadin, Angel, Donka. **LZ1KUF**: Bogdanov, Mihailov, Ranov. **LZ2KEF**: Todoror, Penkov, Radoev. **LZ2KIM**: Todor, George. **LZ2KKZ**: Dimiter, Cyris, Willy, Vesso. **LZ2KRR**: Krassimir, Rumen. **N1AC** & W1IHN, K1UO. **N1TZ** & K1FIR, K1KNQ, W1BR. **N3BB** + NET. **N3RG** & K2HR. **N3WW** & K3OA. **N4AR** & N4KG, K4KSC, WA4GHO, WA4PRU, W8KIC, WN4KKN. **N4KE** & N4IB, W4ORT, WB4IAE, K4UTE, W4FDA, AJ2E. **N4UF** & WD4ITK, K0OO, K4LK, WD4SAR. **N6AV** & N6AW. **N6MG** & WA6PGB + NET. **N0NO** & W0ZZ, K0WWX, K0DHI. **NP4A** & K2TR, K3UA, KP4EHP, N2NT. **OH2AA**: OH2BRW, OH2BQS, OH2DS, OH2BNP, OH2BSS. **OH2BSX** & OH2BSU. **OH3AA**: OH3KS, OH3TQ, OH3WS, OH3XS. **OH3AM**: OH2BEJ, OH2BEN, OH2JF/OH3GX. **OH5AB**: OH5BB, OH5UQ. **OH7VR** & OH7UE, OH7XM, OH7-186. **OH9AB**: OH9PH, OH9UW, OH9VE, OH9VL, OH9VM. **OK1KQJ**: Club. **OK1KRG**:OK1ADS, OK1ALW, OK1AWZ, OK1DIM, OK1DWA. **OK1KRQ**: Club. **OK1KRS**:OK2PEG, OK1PG, OK1DOK. **OK1KRY**: Club. **OK1KSO**: OK1AEZ, OK1WT, OK1AMF, OK1SF, OK1JWA, OK1JCW, OK1TS, OK1AXK. **OK1KTW**: Club. **OK1KUR**: Club. **OK1KYS**: Club. **OK1KZQ**: Club. **OK1ONI**: OK1DMS, OK3TRI, OK1DMM. **OK2KET**: Club. **OK2KJU**: OK2QX, OK2BDX. **OK2KMR**: OK2SEO, OK2BQZ. **OK2KOD**: Club. **OK2KPS**: Club. **OK3KEE**: OK3CEE, OK3CGG, OK3CTL. **OK3KFO**: Club. OK3KKQ: Club. **OK3KVE**: Club. **OK3KXR**: OK3YDP, OK3YDQ, OL9CJH, OL9CJB, OK3CDP. **OK3RJB**: OK3TCN, OK3CSA, OK3CKW, OK3TFI, OK3TCL, OK3-26693, OK3-26694, OK3CPG. **OK3VSZ**: OK3PQ, OK3FON, OK3ZAF, OK3-4158, OK3-26928, OK3-26701. **OZ1EE** & OZ1FAO. **R6F**: UB5EC, UY6LK, UB5MCD, UB5MNM, UB5UN, UB5MOA. **SM6AEK** & SM6AFH, SM6EOC, SM6JHO, SM7IUN. **SK7CE**: SM7RN, SM7BGK, SM7DXX, SM7EQL, SM7ITN, SM7IPB, SM7KOO, SM7FUE. **SK7GC**: SM7KHC, SM7KAQ, SM7IDF. **SL2ZZU**: SM2CEW, SM2CLY, SM2GET, SM2EFN, SM2EUO, SM2GXN. **SP2PDI**: SP2FAX, SP5GRM, SP2BLU. SP9ICA. SP3JHT. **SP2ZFJ**: SP2ASJ, SP2FAP. **SP6KZW**:SP6BNR, SP6CQO. **SP7KLD**: Club. **SP8KAF**: Club. **SP8KAR**: SP8CEO, SP8BVK. **SP9PDF**: SP9-3207KA, SP8JDX. **SQ2P**: SP2BBD, SP2AJO. **TF3IRA**: TF3KB, TF3KX, TF3UA, TF3US, TF3YH. **TG9CH**: N4NJ, W4QO. **U0Y**: UV0BB, UA0BW, UA0ABB, UA0ACQ, UA0AG, UA0AAK. **UK1AAA**: UA1ALZ, UA1-169-12, UA1ADN, UA1-169-471, UA1ARF, UA1AFN, UW1AE. **UK1AFA**: UA1AAF, UA1AFA, UA4NEB, UA1-169-897. **UK1NAA**: Bykovskij, Ureka, Kuzminov. **UK2AAA**: Vikhazev,

Jorma, OH3XZ.

NEW! MFJ INTRODUCES THE *GRANDMASTER* MEMORY KEYERS

At $139.95 this MFJ-484 GRANDMASTER

memory keyer gives you more features per dollar than any other memory keyer available — and Here's Why . . .

WEIGHT CONTROL TO PENETRATE QRM. **PULL** TO COMBINE MEMORIES A AND B FOR 1, 2, OR 3 FIFTY CHARACTER MESSAGES.

MESSAGE BUTTONS SELECT DESIRED 25 CHARACTER MESSAGES.

RESETS MEMORY IN USE TO BEGINNING.

SPEED CONTROL, 8 TO 50 WPM. **PULL** TO RECORD.

MEMORY SELECT: POSITIONS 1, 2, 3 ARE EACH SPLIT INTO MEMORY SECTIONS A, B, C, D (UP TO TWELVE 25 CHARACTER MESSAGES). SWITCH COMBINES A AND B. **POSITION K** GIVES YOU 100, 75, 50, OR 25 CHARACTERS BY PRESSING BUTTONS A, B, C, OR D.

LEDs (4) SHOW WHICH MEMORY IS IN USE AND WHEN IT ENDS.

TONE CONTROL. PULL TO TUNE.

VOLUME CONTROL. POWER ON-OFF.

DELAY REPEAT CONTROL (0 TO 2 MINUTES). **PULL** FOR AUTO REPEAT.

LED INDICATES DELAY REPEAT MODE.

NOW YOU CAN CALL CQ, SEND YOUR QTH, NAME, ETC., ALL AUTOMATICALLY.

And only MFJ offers you the MFJ-484 Grandmaster memory keyer with this much flexability at this price.

Up to twelve 25 character messages plus a 100, 75, 50, or 25 character message (4096 bits total).

A switch combines 25 character messages for up to three 50 character messages.

To record, pull out the speed control, touch a message button and send. **To playback,** push in the speed control, select your message and touch the button. That's all there is to it!

You can repeat any message continuously and even leave a pause between repeats (up to 2 minutes). **Example:** Call CQ. Pause. Listen. If no answer, it repeats CQ again. To answer simply start sending. LED indicates Delay Repeat Mode.

Instantly insert or make changes in any playing message by simply sending. Continue by touching another button.

Memory resets to beginning with button, or by tapping paddle when playing. Touching message button restarts message.

LEDs show which 25 character memory is in use and when it ends.

Built-in memory saver. Uses 9 volt battery, no drain when power is on. Saves messages in memory when power loss occurs or when transporting keyer. Ultra compact, 8x2x6 inches. All IC's in sockets.

PLUS A MFJ DELUXE FULL FEATURE KEYER.

Iambic operation with squeeze key. Dot-dash insertion.

Dot-dash memories, self-completing dots and dashes, jamproof spacing, instant start (except when recording).

All controls are on front panel: speed, weight, tone, volume. Smooth linear speed control. 8 to 50 WPM.

Weight control lets you adjust dot-dash-space ratio; makes your signal distinctive to penetrate QRM.

Tone control. Room filling volume. Speaker.

Tune function keys transmitter for tuning.

Ultra reliable solid state keying: grid block, cathode, solid state transmitters (−300 V, 10 ma. max., +300 V, 100 ma. max.). CMOS ICs, MOS memories. Use 12 to 15 VDC or 110 VAC with optional AC adapter, $7.95. Automatically switches to external batteries when AC power is lost.

OPTIONAL BENCHER IAMBIC PADDLE for all memory keyers. Dot and dash paddles have fully adjustable tension and spacing for the exact "feel" you like. Heavy base with non-slip rubber feet eliminates "walking". $42.95 plus $3.00 for shipping and handling.

THIS MFJ-482 FEATURES FOUR 25 OR A 50 AND TWO 25 CHARACTER MESSAGES.

- **Speed, volume, weight, tone controls**
- **Combine memory switch**
- **Repeat, tune functions**
- **Built-in memory saver**

$99.95

Similar to MFJ-484 but with 1024 bits of memory, less delay repeat, single memory operating LED. Weight and tone controls adjustable from rear panel. 6x2x6 inches. 110 VAC or 12 to 15 VDC.

THIS MFJ-481 GIVES YOU TWO 50 CHARACTER MESSAGES.

- **Speed, volume, tone controls**
- **Repeat function**
- **Tune function**
- **Built-in memory saver**

$79.95

Similar to MFJ-482 but with two 50 character messages, less weight controls. Internal tone control. Volume control is adjustable from rear panel. 5x2x6 inches. 110 VAC or 12 to 15 VDC.

For Orders Call toll-free 800-647-1800

Order any product from MFJ and try it. If not delighted, return within 30 days for a prompt refund (less shipping).

Order today. Money back if not delighted. One year unconditional guarantee. Add $3.00 shipping/handling.

For technical information, order/repair status, in Mississippi, outside continental USA, call 601-323-5869.

Order By Mail or Call TOLL FREE 800-647-1800 and Charge It on VISA master charge

MFJ ENTERPRISES, INC. P. O. BOX 494 MISSISSIPPI STATE, MISSISSIPPI 39762

CIRCLE 37 ON READER SERVICE CARD

BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES
Number groups indicate: QSO's/Zones/Countries on each band.

WORLD TOP SINGLE OPERATOR—ALL BAND

Station	160	80	40	20	15	10
EA8AK	19/4/11	132/11/33	310/13/44	917/23/51	1037/22/51	1410/22/65
9Y4VT	34/5/8	167/13/34	293/17/51	915/27/63	857/28/66	886/27/64
UF6DZ	34/8/20	285/13/32	519/13/44	954/27/60	560/16/42	1188/22/57
OK2RZ	17/3/17	216/14/49	157/17/55	764/35/87	412/29/81	897/30/78
K1AR	11/6/9	147/14/47	447/27/65	485/30/71	483/28/70	415/25/64
UA1DZ	64/6/20	119/16/48	268/20/60	660/33/78	700/26/64	363/32/81
OZ1LO		477/16/50	348/21/54	706/26/59	336/22/45	906/25/60
K1VTM	16/7/12	131/18/51	310/18/58	473/25/71	527/27/61	406/23/66
W1ZM	22/8/16	116/16/52	260/23/58	426/29/74	467/24/71	439/26/75
UV9AX	89/8/25	185/12/38	276/19/50	594/25/65	416/26/62	472/26/65

WORLD TOP MULTI-OPERATOR SINGLE TRANSMITTER

NP4A	76/7/19	238/16/58	922/22/66	1307/35/89	1796/32/79	1761/28/74
R6F	22/6/21	500/23/60	640/22/66	1253/36/91	1003/30/84	1547/31/86
UK9AAN	61/8/22	425/23/57	517/29/76	1273/38/96	670/34/80	756/34/96
HH2MC	13/5/8	280/15/40	449/22/57	1974/31/86	1142/31/74	921/26/74
VP2SX	3/2/2	190/11/32	953/19/57	847/22/63	1174/29/69	1765/24/73
EA9EU	21/5/17	237/12/48	408/15/46	1141/29/69	884/24/60	961/21/63

WORLD TOP MULTI-OPERATOR MULTI-TRANSMITTER

PJ2CC	81/6/10	704/18/53	1768/25/76	3442/33/95	3244/38/100	2447/34/88
9Y4W	133/8/15	717/18/55	1343/23/71	3108/34/92	2514/34/81	2565/31/81
N2AA	29/6/14	324/24/64	741/29/82	1394/40/116	1237/36/96	952/32/89
SK2KW		516/20/58	844/28/72	2192/36/91	1713/36/91	1151/30/82
DLØPG	140/7/28	727/15/51	932/25/75	1245/33/87	1154/33/80	1280/29/88
K8LX	33/8/14	99/19/45	610/32/78	1353/38/102	1178/33/85	748/32/80

USA TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
K1AR	11/6/9	147/14/47	447/27/65	485/30/71	483/28/70	415/25/64
K1VTM	16/7/12	131/18/51	310/18/58	473/25/71	527/27/61	406/23/66
W1ZM	22/8/16	116/16/52	260/23/58	426/29/74	467/24/71	439/26/75
W1CF	12/5/8	140/18/56	237/19/56	627/32/75	347/26/68	426/25/69
N2LT	18/7/9	85/16/41	263/19/61	584/31/76	343/27/72	450/27/76
W3GRF	5/4/4	75/11/37	282/20/56	378/29/74	479/23/67	427/29/80
K3LR	19/6/11	72/16/41	190/24/53	342/27/72	402/29/64	545/28/73
N3AD	9/5/5	64/11/36	266/19/53	516/29/75	319/28/63	485/25/71
K9DX	18/8/12	64/17/38	155/24/59	506/26/73	438/26/66	381/25/66
N6RO	6/5/3	178/19/32	403/28/50	326/26/61	387/27/57	408/26/63

USA TOP MULTI-OPERATOR SINGLE-TRANSMITTER

K5RC	10/7/9	60/18/39	328/30/79	773/38/100	728/34/92	658/33/85
N4AR	11/7/11	80/21/58	187/29/71	620/36/93	480/32/89	614/32/85
W3BGN	13/7/10	113/16/47	209/21/59	739/33/84	479/33/92	520/30/75
N1AC	5/3/4	36/10/26	81/16/40	649/28/71	622/25/63	538/24/63
K2BK		57/14/35	211/20/57	558/36/93	345/29/76	342/26/71
NØNO	6/4/4	31/13/25	167/26/56	696/33/82	455/29/65	255/27/66

USA TOP MULTI-OPERATOR MULTI TRANSMITTER

N2AA	29/6/14	324/24/64	741/29/82	1394/40/116	1237/36/96	952/32/89
K8LX	33/8/14	99/19/45	610/32/78	1353/38/102	1178/33/85	758/32/80
K3WW	42/9/18	204/21/61	649/26/74	1121/39/104	1048/36/95	663/31/90
N9MM	84/11/21	148/25/56	391/30/78	1113/35/98	1039/39/98	748/30/81
KØRF	47/7/9	217/27/49	536/29/69	987/37/92	1096/34/80	785/32/79
W3FA	46/8/16	212/21/57	504/25/77	1158/35/98	767/33/88	657/30/86

Savuschin, Kojezo. **UK2AAB:** Kosarev, Krushinsky, Pilosyn. **UK2AAG**: UC2-009-105, UC2-009-490, UC2-009-562. **UK2AAR**: Digilewich, Karajtchencew, Antsiperowich. **UK2AAX**: UC2DS, UC2-009-522, UC2-009-523. **UK2BAB**: Saulis, Balsys, Kasparaitis. **Uk2BAF:** Vasiliauskas, Stankus, Venckus. **UK2BAS**: UP2PAJ, UP2BBC, UP2GF, UP2-038-609, UP2-038-628. **UK2BAT**: UP2-038-948, UP2-038-898. **UK2BBB**: UP2BAV, UP2BAS, UP2MB, UP2-038-727, UP2PX, UP2BAW, UP2-038-517. **UK2BBE**: UP2-038-938, UP2-038-919, UP2-038-917, UP2-038-918. **UK2BBF**: UP2BAI, UP2BDX, UP2-038-787, UP2-038-788. **UK2BCC**: UP2-038-346, UP2-038-728, UP2BDW. **UK2BCG**: UP2BFM, UP2-038-1618, UP2-038-1617. **UK2GAB**: UQ2GID, UQ2-037-157. **UK2GDZ**: UQ2-037-1016, UQ2-037-27, UQ2-037-168, UQ2-037-169, UQ2GAE. **UK2PAD**: UP2BEG, UP2BGV, UP2BEY, UP2BFN. **UK2PAO**: UP2BHN, UP2-038-574. **UK2PAP**: UP2BCI, UP2PAX, UP2OX, UP2BFB, UP2BEB. **UK2PAQ**: Lautusonis, Giniunas, Meistas. **UK2PAT**: UP2BCO, UP2BCW, Antanas. **UK2PCR**: UP2-038-469, UP2BDM, UP2BDG. **UK2RDX**: UR2RRJ, UR2REZ, UR2RCN, UR2REE, Mart, Nigul, Andrus. **UK3ABF:** Cherkezov. **UK3DAU:** Samojlov, Zajcev, Chibsov. **UK3UAA**: UA3UBN, UA3UAY, UA3UCD, UA3UAC. **UK3WAC**: Fomenco, Salov. **UK3XAB**: UA3XAC,RA3XBS, UA3-127-200, UA3-127-204, UA3-127-216, UA3-127-803. **UK4CAA**: Eremenko, Gladkov, Kudryashov. **UK4LAA**:Vershinin, Balakshin. **UK4WAB**: Baranov, Gabitov, Krylov, Pankov, Saifullin, Sakerin. **UK4WAR**: UA4WAF, UA4WAM, UA4WAX, UA4WBJ, UA4WPX, UA4-095-176, UA4-095-300, UA4-095-381. **UK5HAB**: UB5-071-73, UB5HEW. **UK5IAZ**: UB5-073-342, UB5-073-202, UT5AA, UB5-073-1618, UB5-073-239, UB5-073-3157. **UK5IEG**: Zatynro, Mistchenko, Zachepilo. **UK5LAK**: UB5LJC, Bolotov, UB5LJW, UB5LKW. **UK5LAN**: UY5DV, UB5LBI, UB5LEE. **UK5MBE**: Dyblja, Mazkov, Kudelin. **UK5MBQ**: UB5MGC, UB5-059-073, UB5-059-075. **UK5MDI**: UB5MBM, UB5MJS, UB5-059-111, UB5-059-94, UB5-059-92. **UK5QAA**: Shimko, Golikov, Sorzytsky, Kuzminov, Dolinny, Salata. **UK5UDX**: UA4LAR, UB5-065-494. **UK6DAJ**: Hachaturjan, Golubev, Sadchikov. **UK6DAU**: Ivanov, UD6DII, UD6DHG. **UK6LAZ**: UA6LHK, UB5-060-650, UA6-101-252, UB5-060-901. **UK7CAK**: Podskresk, Shewcov, Scherbakov. **UK7GAA**: UL7-018-6, UL7-018-99, UL7-018-136. **UK7NAQ**: UL7NAC, UL7NCG, UL7NHA. **UK8AAC**: UI8-053-495, UI8-053-671, UI8-053-559. **UK8HAA**: Matshenko, Gubenko, Markov, Stepnov, Liagin, Osetinski. **UK8JAA**: UJ8JCL, UJ8JCT, UJ8JCR, UJ8JCQ. **UK9AAN:** UA9AN, UA9ACZ. UA9AIZ, UA9AJD. **UK9ADY:** UA9ADH, UA9AFZ, AU9ADI, UA9AAX, UW9AT. **UK9CBD:** UA9CBM, UA9CT, UW9DW, UV9DO, UA9CDJ, UA9CNQ. **UK9CAA:** Kodochigov, Sokolov, Dyachuk. **UK9HAC:** Rekunov, Matulian, Soloviev, Shugailov, Shumkin, Bazenov. **UK9LAA:** Kurash, Kozlov, Klokov, Gorshunov, Karpyuk. **UK9OAD:** Pashkov, Dolganov, Pugachev, Dubinin. **UKØCAA:** Gorelik, Starsev, Lankin. **UKØFAA:** UWØFM, UWØFZ, UAØFBE, UAØ-153-1, UAØ-153-79, UAØFBX. **UKØLAD:** UAØ-107-398, UAØ-107-324, UAØLBZ. **UKØSAW:** UAØSKE, UAØ-124-303, UAØ-124-293. **UKØZAB:** UAØZBF, UAØZBW. UKØZAF: Pchelin, Ryasnoy, Sopov. **UP2PCR**: UP2PAV, UP2BBT, UP2BCR, UP2BCT, UP2BBX, UP2BDF, UP2BFL, UP2-038-794, UP2-038-1524, RP2BET. **VE3OCU**: VE2DZE, VE3CXL, VE3KKU, VE3VC, VE4OY. **VE7AV** & VE7AXH, VE7ENF, VE7ENI. **VE8NI** & M. Assad. **VP2SX**: K1TO, K1XA, VP2SQ. **VP9DX**: VP9BY, VP9DL, VP9HP, VP9IV. **W2RQ** & W2SQ. **W2SUA** & AA2Z, N2CQ. **W2UI** & N3KR. **W2YX** & WB2SJG. **W3BGN** & N3DA. **W3EVW** + NET. **W3GG** & N3AM, WB3FGR. **W3GNQ** + NET. **W3NX** & AD3V. **W3NZ** & N3AMK. **W5VX** & K5ISQ, W5MCO, K5BDS. **W6BIP** & WA6DJI, AA6GM. **W6GO** + NET. **W6NKR** & K3VA. **W6UA** & W6UM. **W9RW** & W9JG, WB9VJE. **WØEJ** & WBØPYD, NØBGI. **WØSA** & WAØVKF. **WØSD** & WØGKF, NØAIT, WAØUFS, WBØPJB, WØSMV, NØACL, WBØYMR. **WA4FKK** & W3DGI. **WB9BCR** & WB9CEJ. **YO3KWF**: YO3CFF, YO3AAJ. **YO6KAF**: YO6AW, YO6AWR. **YO6KED**: YO6UG, YO6BTY. **YO7KAJ:** YO7AHR, YO7AOT. **YO8KAN/P**: YO8ME, YO8QH, YO8AXP. **YU1DKL**: Club. **YU2EZA**: Ivo, Neno, Matko. **YU7AJD**: YU7ORS, YU7RS-668, YU7RS-688, Jordan, Dule. **YU7BCD**: YU1OFT, YU7NQW, YU7ODO, YU7ODS, YU7OQI, YU7OQZ, YU7ORR, YU7PEJ, YU7QBC. **YU7GST**: Club. **YU7JDE**: Karoly, Imi, Ivan, Bandi, Josef, Fero, Tibi, Elvira, Kalman, Robert, Laci, Tibi, Charlie, IMRE/7VR, TEO/7BCU, Li. **YX5A**: YV5AAS, YV5AAZ, YV5ANT, YV5AW, YV5BNR. **4N4Y**: Goran, Dubo, Ivo, Emil, Lubo, Nedim, Ilfo, Braco, YU4FRS.

WA3LRO, W3XU, N2MM, 9Y4VU, W2GD, N7TT.

STATION OPERATORS
Multi-Operator Multi-Transmitter

DLØKF: DJ8FR, DK8LE, DJ5AZ, DF6LI, DF6LH, DK8LD, DJ7SW, DF5LO, DL2ZT, DL2NF, DJ6TN, DJ4FZ, DJ4SO, DF3LZ, DF3LP, DK6LG, DJ5UZ, DF9LF. DLØPG: DK3BJ, DK5JI, DJ6TK, DF1DN, DJ9IC, DK9DX, DK5PV, DK9JL, DF1QQ, DK2JS, DK5HH, DK6BO, DJ7MI. **JA1YHA**: JK1LSE, JK1UNQ, JE3MLS, JA5WIO, JF1KFU, JK1CJO. **JA1YXP:** JI1HGD, JK1OUQ, JK1EPI, JE3UBC, JH4OWG, JA5IEP, JA5OWP, JH4QLX, JR6NJD, JA8RNM, JAØXUF. **JA2YEF**: JR2VDA, JH2TBS, JF2GNY, JR2TWA, JH2VOR, JR2LDM, JE2ATB, JE2LDO, JR2PVI, JR2TPD, JF3THB, JA9QNC, JAØUEX, JF2KKL, JR2UWZ, JE2KIH, JE2RDI, JE2RWP, JE2TUH, JF2ACB, JF2NTV, JF3EIT. **JA3YBF**: JH3KIL, JE3MCC, JH6UBZ, JF3ELY, JR3UPO, JH4CES, JE3PED, JA5XUU, JR3VSW, JA9TAF, JR3IOT, JE3KIV, JF3KZB. **JA3YKC**: JA3UPK, JA3REU, JE3KKC, JA5GZB, JA6VXM, JH3JRB, JG3EMB, JR2SQU, JE3MXQ, JA5TDH, JA3WJJ, JR3BKH, JR3KEG, JH3PKS, JR3XGK, JR3RIU, JF3SFP, JH3VOT, JF3KJJ, JH2LRS, JR3FRR, JE3MAS, JA5MOU, JR3SUK, JE3BLA. **JA3YQD**: JE2HOI, JH3OXA, JH3SUC, JR3GWH, JR3NGA, JR3KQV, JE3EPK, JF3PLF, JG3POU, JG3UTL, JF2GHQ, JH3OGY, JH6TLC, JA8SJW. **JA4YQO**: JA5POE, JH4AQA, JR2SCJ, JH6CGU, JH4WAT, JA4XGA, JH4LGI. **JA7YAA**: JA7WBW, JH7WTC, JH7AEF, JH7LIS, JH7SFY, JH7HWR, JH7WHM, JG1UJD, JA9PPC, JA7TNO, JA7NRQ, JA8FTW, JR7OMD. **JH1YDT**: JH1GNU, JE1QMV, JE1SCJ, JF1EAL, JF1QDO, JF1SDH, JI1SHX, JK1DLQ, JK1RJU, JAØVSH. **K2UA** & K2BU, WA2HGM. **K3WW** & AJ3G, K2ZSY, K3WJV, KB3GJ. **K8LX** & K8GM, K8MD, N8EA, W8KPL, W8TA, W8WA, WA8TBQ, WA8YVR, WA8ZDT, WN8PEE, WD9HFW. **KØRF** & KØDU, KØGU, N6DX, N6ZV, N7DF, NØRR, WØUN, WØZV, WBØCMM, WDØDSU, KAØBJI. **KL7Y** & AL7H, AL7J, KL7JHD, KL7HDS, WB6FZN, KL7DP. **LU7X**, LU1AF, LU1DZ, LU6EF, LU7XP, LU4XS. **N2AA** & K2GL, K2BQ, K2NG, K2UR, K2TT, W1PM, K1KI, K2SS, N1XX, N2WT, WA2OVE, WB2VYA, WA2SFB, K2XR. **N2RM** & N2ME, N8DM. **N3LR** & W3BI, WB3HEQ. **N3RD** & K3FD, N3RS. **N6ND** & K6UJS, K6XT, N6RM, N6ZI, W6UQF, WB6HGJ. **N9MM** & K8MN, W8CNL, K9FN, K9JF, K9UWA, N9NC, N9NS, W9OBF, W9RE, W9VNE, W9ZRX, W9ZTD, WB9LTY, WB9POH. **OH1AA**: OH1FH, OH1HU, OH1IO, OH1LQ, OH1MD, OH1NH, OH1NK, OH1NM, OH1OG, OH1RM, OH1SY, OH1TV, OH1WR, OH3ZE. **PJ2CC**: K3EST, K3KU, K4BAI, K4VX, PJ2FR, PJ9EE, W1BIH, W1GNC, WB4SGV, YU3EY. **SK2KW**: SM2ALH, SM2CPF, SM2DMU, SM2DLZ, SM2DGQ, SM2DQS, SM2EPR, SM2EKM, SM2HAK, SM2HRW, SM2HTF, SM2JFT, SM2KWQ, SM2HZQ, SMØDGU, SMØGNU. **SK5AJ**: SM5AD, SM4BNZ, SM5CAK, SM5CBN, SM5CNQ, SM6CST, SM6CTQ, SM7EXE, SM4GLC, SMØJHF, SM5VB. **TGØAA**: W1XX & TG9ML. **VP2VEQ**: K4GKD, N6ZZ, AA6RX. **W3FA** & K3ZZ, W7ABC, W3IUU, W3XY, WA3ECT, WA3KCY, WA3ZAS, K4YF. **W3GM** & AA3B, K3GQK, K3RL, KA3BLP, WA2YOF. **W3GU** & W3KV. **W3LPL** & K3NA, K3ON, K3RT, WA3UXU, WD4AXM. **W3MM** & N2BA, K3OO, K3GM, N3UU. **W3RJ** & K3VW. **YO8AJG** & YO8BAM, YO8AMT, YO8AP, YO8AHH. **ZF2AD** & K3MBF, N3ED. **9Y4W**: WA3LRO, N2MM, W3XU, W2GD, N7TT, 9Y4VU.

USA QRM

Sure missed hearing KH6IJ...*K4PI.* Distressing to hr multi-multi's continuously occupying freq with CQ's...*WB4SXX.* Where were all those rare ones...*K4KUZ.* 10 meters outstanding...*WA4QML.* Thanksgiving weekend is tough for us family men...*K4VT.* Nice to work "TF" on CW..*WB4WHE.* After spending two years writing letters and trying to arrange the schedules with DF4NW/A7 on CW he calls me!...*N4WW.* My SB220 went "up in smoke" Sat. night at 0048 GMT...*N4ZC.* Please consider alternating phone and CW weekends each year ...*K4RV.* Great to hear so many USSR stations...*N4PN.* Should be handicap for living in the same districts with the big guns...*K5KG.* Very few kooks this time...*K5DB.* Pile-ups get worse each year...*W5DUI.* Problem finding DX in zero beat of US stns calling CQ...*N5HB.* Not enough Europe...*W5MYA.* Rotator stuck twice. Had to climb tower at night with flashlight ...*AF5K.* 80 M opening LP to EU/SSR on Sat. morning outstanding...*N6RO.* My best score from home in 10 years...*N6IC.* Thank heaven for narrow IF filters...*WB6SHL.* TVI complaint 2 blocks away. XYL told neighbors I wasn't home...*N6OZ.* CQWW contests are "main event"...*WB6JMS.* Southern hemisphere scarce... *W6ABT.* A few stations actually heard my 8 hrs. of pounding... *N6PE.* Worked KH3AA 8 minutes after the contest. Where was he when I needed him?...*WB3JRU.* ZL3GQ was loudest signal on 160 M from the Pacific right through W6's and W7's calling him...*W7JYH.* My first DX contest. Gotta trade the straight key for a keyer...*KL7FDQ/7.* Wish I could have more time to operate, but I got two new countries...*WB7SQM.* Was very pleased with the DX in the Novice band...*WD9EJE.* Glad to find and work FR0MM on 10 meters...*WA7YHP.* Polar adsorption on 40 meters kept long haul contact total down...*K7UR.* Hope to have a beam and shorter call next year. My first time at CQ WW. Had a ball...*KA8CQI.* Don't know if it was more fun than work or more work than fun, but I'll be in the next one...*KB0HA.* Congrats to the JA's. Some of the best CW ops in the world...*K0ZX.* Chased FB8XV around 20 meter long path, but couldn't catch him. Maybe next year...*W0WP.* Available: one wife, three sons, one dog any contest weekend...*AB1U.* Too bad for those who missed one of the best USA-EU openings in years (160 M)... *K1PBW.* Learned a great deal about 7 mc propagation... *K1VUT.* Finally, a contest that nothing broke...*K1NA.* Too many W's calling CQ...*W2AO.* Highlight: QSO with ZL3GQ on 1.803 MHz with 3 watts output...*W8VSK/QRP.*

DX QRM

Finally got license after 1½ years just two weeks before the contest...*SV0AR (WB9UIY).* Poor activity from Africa... *YU1EXY.* What a lot of W's! But where are the JA's?...*I4IND.* From 1950, almost every year with you in this contest...*HB9KC.* Installation of the big 7 MHz yagi before the contest made me more tired than all the contest operation...*OH6DX operator EA8AK.* I love CW...*JE1JKL.* Again aurora...*OH8SR.* My age is 13 and I am fond of contests...*OH6DC.* First contest. I'm 13 years old so I have many years left for contests...*OH5KR.* When power went off I took part in chess competition and won a medal!...*YT3L, QRP.* Used only 8 crystals...*OH6GZ/2.* A bit more support could have more than doubled the score. Otherwise a VG contest...*VP9DX.* The brilliant aurora did us in as far as working Europeans was concerned; no Africa either... *VE7AV.* Condx so good and pile-up so big on 10 meters, we had great difficulty picking out calls...*VE8NI.* See you next year with bigger score...*TF3CW.* After 3 years operating from YB3 it was nice to try again from home...*PA0LOU.* Activity good and conditions favorable. Managed to give GI to lots of stations. Still young at 70...*GI3JEX.* On air for over 47 years and still no beam. Wonderful what bits of wire will do...*GI5UR.* Wonder if CW interest is going down. Maybe we need a slow speed section...*SM0AJU.* Active in contests since 1926...*F8TM.* Was trying to beat the European record but no JA opening on 10 and 15 spoiled it...*OZ1LO.* Nice to beat record that has stood since

Ted, ZD8TC, helped give out zone 36.

VP2SX operated by K1XA, VP2SQ, and K1TO (not shown).

Chris, G4BUE, World Top QRP score.

I was five years old...*GU4CHY.* Antenna system went up on Friday and down on Monday to keep peace in neighborhood... *G5CMX.* How about some real reports. I know I am not S9 everyplace!...*G3JKY.* Worked 39 W stations on 7 MHz and ZL3GQ long path on 14 MHz with 5 watts...*G4BUE.* It is remarkable to have gotten HH2MC and PJ2CC with QRP rig...*JR6KRI.* Even with 5 watts it is possible to reach every heard station at least on 10 meters...*DK2BJ/A.* First CQ WW test. Hope to do better next year...*UL7MAR.* It seems that our 3 element quad on 7 MHz and 5 element on 14 MHz was designed especially for CQ WW Contest. On Monday after CW part it crashed in strong wind...*UK2PAP.* Don't think we could do any better this year. UK9 doesn't sound like PJ2 and the sun covers the south—Hi! ...*UK9AAN.* Nice to work 160 for first time in contest... *UR2RDX.* Activity great. Nice to hear the likes of HZ1HZ, etc... *C6ACY.* Every time the best contest on the amateur bands... *HR1AT.* Some of these rare contest calls drive me up the wall... *VE3FAE/HCI.* Condx poor, tropical QRN strong S+9, Caribbean station calling CQ in DX window...*YV1OB.* Big thrill QSO with K3VA on 160 M. First ever contacts between JA and W3... *JA7AO.* I wish more activity from Africa and South America... *JF1PUW.* Most difficult country for me was JA, because they neglected my call...*JJ1SOE.* On Friday Murphy stepped in! Stuck with us throughout the contest. Next year will wipe him out...*SL2ZZU.* 14 mc conditions were just like the sunspot bottom...*JA3YKC.* One rig caught fire, one blew fuses and dial lights of a turned-off amplifier lit to full brilliance...*KL7Y.* My first single band entry in this contest, worked all multipliers that I heard except TG0AA and W5JMM/SU...*OE5CWL.* Condx very good again this year, suspect many records broken...*I4JCC/5 (op: W3US).* Great this festive moment in our amateur life... *YO3JX.* Did not hear any VK/ZL stations. So. America was poor here. I hope to work 1980 CQ Contest with QRO on all bands. A fine contest!...*YO5BQ.* As usual, the finest contest ever! See you next year!...*YO3BEJ/9.* Had to take 8 hours rest period on Saturday night, AC power went out...*HA0HW.* Many stations did not give their call sign for 15-20 minutes and many dupe QSOs...*YU4CF.* I wish I could try it from zone 09...*OK2RZ.* Built a new vertical for 40 M and it proved to be working fine. Went to bed after the contest and woke up Tuesday morning! Guess will keep myself limited to single band entries in the future and leave all-band to younger chaps. Hi...*OK3EA.* Very few stations on 15 M all contesters were up on 10 M where the condx were much better...*OK1TA.*

TOP SCORES

WORLD Single Op All Band		USA Single Op All Band	
EA8AK	4,005,050	K1AR	2,635,224
9Y4VT	3,769,259	K1VTM	2,379,465
UF6DZ	3,440,172	W1ZM	2,368,968
OK2RZ	2,916,045	W1CF	2,360,450
K1AR	2,635,224	N2LT	2,326,170
UA1DZ	2,614,568	W3GRF	2,064,972
OZ1LO	2,523,528	K3LR	2,016,204
K1VTM	2,379,465	N3AD	2,001,300
W1ZM	2,368,968	K9DX	1,970,829
UV9AX	2,368,546	N6RO	1,961,883

Single Op Single Band 28MHz		Single Op Single Band 28MHz	
LU8DQ	1,033,399	N4WW	349,206
FR0MM	978,012	K8NZ	309,632
KV4FZ	653,072	N8II	309,222
DK3GI	592,848	AE2A	306,306
KH6XX	586,236	W5MYA	299,976
C5AT	495,558	K1NA	291,126
21 MHz		**21 MHz**	
VP2MEE	623,118	W1RM	450,120
VE3BMV	574,056	K8IA	408,590
SM5GMG	526,229	N5CR	394,750
I4IND	502,448	N7XX	352,768
W1RM	450,120	N6CW	343,824
VE7DXC	448,572	K4RV	322,028
14 MHz		**14 MHz**	
YU3ZV	598,506	K8ZH	440,496
KX6PI	441,780	N4PN	433,576
K8ZH	440,496	K0KX	423,025
N4PN	433,576	W6KPC	371,500
K0KX	423,025	W5FO	366,404
UH8EAA	411,120	K1SA	309,750
7 MHz		**7 MHz**	
YU2CDS	361,680	W5UN	202,176
I2XXG	279,648	K7UR	142,740
YU1EXY	223,652	N6AW	133,620
W5UN	202,176	N5TP	123,270
K7UR	142,740	K2IGW	112,021
GW3NYY	139,040	W8UVZ	91,104
3.5 MHz		**3.5 MHz**	
EA2OP	114,075	WB3AVN	35,287
DJ2BW	110,618	W9LF	25,179
UA9CM	91,712	K1MEM	24,780
YU5FAA	86,184	W2FR	21,312
H31LR	79,356	N7EA	14,709
LZ2PP	73,233	WB9TIY	8,512
1.8 MHz		**1.8 MHz**	
G3SZA	21,960	K1PBW	11,040
K1PBW	11,040	W8LRL	6,232
OK1DIJ	9,006	W1BB/1	2,842
UC2AAK	8,262	W2IB	2,632
UA2FCW	8,126	K5GO	1,920
OK1DWF	6,820	AE6U	1,648

Multi-Op Single Transmitter		Multi-Op Single Transmitter	
NP4A	7,982,576	K5RC	4,148,784
R6F	7,966,368	N4AR	3,199,572
UK9AAN	6,357,553	W3BGN	3,045,549
HH2MC	5,426,104	N1AC	2,093,649
VP2SX	4,859,777	K2BK	1,998,461
EA9EU	4,200,839	N0NO	1,946,610

Multi-Op Multi-Transmitter		Multi-Op Multi-Transmitter	
PJ2CC	20,045,952	N2AA	8,542,056
9Y4W	16,835,172	K8LX	6,568,430
N2AA	8,542,056	K3WW	6,467,632
SK2KW	7,101,325	N9MM	5,951,372
DL0PG	6,846,726	K0RF	5,715,264
K8LX	6,568,430	W3FA	5,683, 174

KENWOOD
...pacesetter in amateur radio

Easy selection.

15 memories/offset recall, scan, priority, DTMF Touch-Tone®

TR-7800

Kenwood's remarkable TR-7800 2-meter FM mobile transceiver provides all the features you could desire for maximum operating enjoyment. Frequency selection is easier than ever, and the rig incorporates new memory developments for repeater shift, priority, and scan, and includes a built-in autopatch DTMF encoder.

TR-7800 FEATURES:

- **15 multifunction memory channels, easily selectable with a rotary control**

  M1-M13...memorize frequency and offset (±600 kHz or simplex).
  M14...memorize transmit and receive frequencies independently for nonstandard offset.
  M0...priority channel, with simplex, ±600 kHz, or nonstandard offset operation.

- **Internal battery backup for all memories**

  All memory channels (including transmit offset) are retained when four AA NiCd batteries (not Kenwood-supplied) are installed in battery holder inside TR-7800. Batteries are automatically charged while transceiver is connected to 12-VDC source.

- **Priority alert**

  M0 memory is priority channel. "Beep" alerts operator when signal appears on priority channel. Operation can be switched immediately to priority channel with the push of a switch.

- **Extended frequency coverage**

  143.900-148.995 MHz, in switchable 5-kHz or 10-kHz steps.

- **Built-in autopatch DTMF (Touch-Tone®) encoder**

- **Front-panel keyboard**

  For frequency selection, transmit offset selection, memory programming, scan control, and selection of autopatch encoder tones.

- **Autoscan**

  Entire band (5-kHz or 10-kHz steps) and memories. Automatically locks on busy channel; scan resumes automatically after several seconds, unless CLEAR or mic PTT button is pressed to cancel scan

- **Up/down manual scan**

  Entire band (5-kHz or 10-kHz steps) and memories, with UP/DOWN microphone (standard)

- **Repeater reverse switch**

  Handy for checking signals on the input of a repeater or for determining if a repeater is "upside down"

- **Separate digital readouts**

  To display frequency (both receive and transmit) and memory channel.

- **Selectable power output**

  25 watts (HI)/5 watts (LOW).

- **LED bar meter**

  For monitoring received signal level and RF output.

- **LED indicators**

  To show: +600 kHz, simplex, or -600 kHz transmitter offset; BUSY channel; ON AIR.

- **TONE switch**

  To actuate subaudible tone module (not Kenwood-supplied).

- **Compact size**

  Depth is reduced substantially.

- **Mobile mounting bracket**

  With quick-release levers.

See your Authorized Kenwood Dealer now for details on the TR-7800...the remarkable 2-meter FM mobile transceiver!

NOTE: *Price, specifications subject to change without notice and obligation.*

MATCHING ACCESSORY:

- KPS-7 fixed-station power supply

TRIO-KENWOOD COMMUNICATIONS INC.
1111 WEST WALNUT / COMPTON, CA 90220

Small wonder.

Processor, N/W switch, IF shift, DFC option

TS-130S/V

An incredibly compact, full-featured, all solid-state HF SSB/CW transceiver for both mobile and fixed operation. It covers 3.5 to 29.7 MHz (including the three new Amateur bands!) and is loaded with optimum operating features such as digital display, IF shift, speech processor, narrow/wide filter selection (on both SSB and CW), and optional DFC-230 digital frequency controller. The TS-130S runs high power and the TS-130V is a low-power version for QRP applications.

TS-130 SERIES FEATURES:

- **80-10 meters, including three new bands**
  Covers all Amateur bands from 3.5 to 29.7 MHz, including the new 10, 18, and 24-MHz bands. Receives WWV on 10 MHz. VFO covers more than 50 kHz above and below each 500-kHz band.
- **Two power versions . . . easy operation**
  TS-130S runs 200 W PEP/160 W DC input on 80-15 meters and 160 W PEP/140 W DC on 12 and 10 meters. TS-130V runs 25 W PEP/20 W DC input on all bands. Solid-state, wideband final amplifier eliminates transmitter tuning, and receiver wideband RF amplifiers eliminate preselector peaking.
- **Built-in speech processor**
  Increases audio punch and average SSB output power, while suppressing sideband splatter.
- **CW narrow/wide selection**
  "N-W" switch allows selection of wide and narrow bandwidths. Wide CW and SSB bandwidths are the same. Optional YK-88C (500 Hz) or YK-88CN (270 Hz) filter may be installed for narrow CW.
- **SSB narrow selection**
  "N-W" switch allows selection of narrow SSB bandwidth to eliminate QRM, when optional YK-88SN (1.8 kHz) filter is installed. (CW filter may still be selected in CW mode.)
- **Sideband mode selected automatically**
  LSB is selected on 40 meters and below, and USB on 30 meters and above. SSB REVERSE position is provided on the MODE switch.
- **Built-in digital display**
  Six-digit green fluorescent tube display indicates actual operating frequency to 100 Hz. Also indicates external VFO or fixed-channel frequency, RIT shift, and CW transmit/receive shifts. Also analog subdial for backup frequency indication.
- **IF shift**
  Allows IF passband to be moved away from interfering signals and sideband splatter.
- **Single-conversion PLL system**
  Improves stability as well as transmit and receive spurious characteristics.
- **Built-in RF attenuator**
  For optimum rejection of intermodulation distortion.
- **Built-in VOX**
  For convenient SSB operation, as well as semi-break-in CW with sidetone.
- **Effective noise blanker**
  Eliminates pulse-type interference such as ignition noise.
- **Built-in 25-kHz marker**
  Accurate frequency reference for calibration.
- **Compact and lightweight**
  Measures only 3-3/4 inches high, 9-1/2 inches wide, and 11-9/16 inches deep, and weighs only 12.3 pounds. It is styled to enhance the appearance of any fixed or mobile station.

Optional DFC-230 Digital Frequency Controller
Allows frequency control in 20-Hz steps with UP/DOWN microphone (supplied with DFC-230). Includes four memories (handy for split-frequency operation) and digital display. Covers 100 kHz above and below each 500-kHz band. Very compact.

Ask your Authorized Kenwood Dealer about the compact, full-featured, all solid-state TS-130 Series.

NOTE: Price, specifications subject to change without notice and obligation.

MATCHING ACCESSORIES FOR FIXED-STATION OPERATION:

- PS-30 base-station power supply (remotely switchable on and off with TS-130S power switch).
- SP-120 external speaker
- VFO-120 remote VFO
- MC-50 50kΩ/500Ω desk microphone

Other accessories not shown:

- YK-88C (500 Hz) and YK-88CN (270 Hz) CW filters
- YK-88SN (1.8 kHz) narrow SSB filter
- AT-130 compact antenna tuner (80-10 m, including 3 new bands)
- MB-100 mobile mounting bracket
- MC-30S and MC-35S noise cancelling hand microphones
- PC-1 phone patch
- TL-922A linear amplifier
- HS-5 and HS-4 headphones
- HC-10 world digital clock
- PS-20 base-station power supply for TS-130V

- SP-40 compact mobile speaker
- VFO-230 digital VFO with five memories

WORLD TOP TEN QRP
(5w input)

1.	G4BUE	481,347
2.	UB5CI	402,753
3.	YT3L	374,661
4.	OK1DKW	304,194
5.	SM5CCT	256,365
6.	WA4LOF	188,055
7.	W5YZ	163,348
8.	WA6POC	143,377
9.	VE5JQ	70,512
10.	K8DU	69,823

Number groups after call letters denotes following: Band (A = all), Final Score, Number of QSO's, Zones and Countries. Certificate winners are listed in Bold Face.

C.W. RESULTS
SINGLE OPERATOR
NORTH AMERICA

UNITED STATES

K1AR	**A**	**2,635,224**	**1988**	**130**	**326**
K1VTM		**2,379,465**	**1863**	**118**	**319** (Opr. K1JX)
W1ZM	"	**2,368,968**	**1730**	**126**	**346** (Opr. K1ZM)
W1CF	"	**2,360,450**	**1789**	**125**	**332** (Opr. K1UA)
W1RR	"	1,935,549	1530	117	324
K1DG	"	1,867,455	1608	110	295
W1KM	"	1,840,440	1611	103	289
N1GL	"	1,456,420	1230	113	299
K1RX	"	1,081,598	1167	90	232
W1GG	"	602,196	672	96	225
W1FJ	"	383,130	507	78	192
WA1UZH	"	272,154	484	60	141
W1LQQ	"	231,352	353	74	168
W1OO	"	175,071	320	70	131
K1TN	"	172,860	285	66	149
KA1EP	"	165,620	361	61	108
AB1U	"	165,416	315	64	120
K1BV	"	155,991	331	55	108
W1WY	"	150,880	268	67	138
K1WJ	"	143,276	271	59	137
WB1AGO	"	120,228	248	52	120
W1PL	"	76,410	203	40	952
W1HX	"	68,675	142	66	109
K1MBQ	"	65,975	325	64	139
W1CNU	"	63,500	175	42	85
K1CC	"	40,713	126	40	83
KA1DS	"	36,000	125	33	67
W1SD	"	34,684	111	37	79
WA1KSF	"	28,362	112	25	62
WB1EYI	"	26,136	100	34	65
N1AU	"	23,808	86	35	61
WB1DFV	"	11,891	91	15	32
WA1YVT	"	8,500	59	16	34
W1CM	"	3,932	59	17	29
N1DC	"	3,744	53	22	30
W1OPJ	"	88	4	4	4
K1NA	**28**	**291,126**	**823**	**29**	**92**
AG1C	"	71,764	327	22	55
K1EMU	"	19,992	106	26	42
K1IJU	"	11,475	80	12	39
W1TN	"	9,231	63	15	36
W1RM	**21**	**450,120**	**1173**	**37**	**95**
WA1FCN	"	159,444	528	30	73
K1SA	**14**	**309,750**	**885**	**36**	**89**
W1YN	"	254,750	885	34	81
K1WJL	"	104,760	334	30	78
K1WAI	**7**	**83,678**	**345**	**21**	**65**
K1VUT	"	16,578	115	13	41
K1MEM	**3.5**	**24,780**	**130**	**16**	**54**
K1PBW	**1.8**	**11,040**	**85**	**14**	**32**
W1BB/1	"	2,842	36	9	20
AA1K	"	1,302	44	7	14
WB1HIH	"	176	40	3	5
N2LT	**A**	**2,326,170**	**1743**	**127**	**335**
W2VJN	"	**1,620,432**	**1358**	**113**	**319**
W2YV	"	**1,435,152**	**1417**	**91**	**257**
K2DM	"	**1,231,155**	**1322**	**96**	**231**
W2YC	"	814,668	842	97	251
K2SX	"	715,204	729	101	255
K2TD	"	560,280	615	96	226
N2MR	"	520,025	608	87	218
W2LYL	"	482,300	658	76	184
K2MFY	"	424,751	561	78	191
W2NS	"	340,764	532	65	154
K2QIL	"	266,844	428	67	155
W2FTY	"	235,104	363	77	160
K2VV	"	178,947	353	52	125
K2SPO	"	163,152	281	68	130
WA2ORX	"	132,612	274	56	116
K2PF	"	130,680	251	63	135
K2PE	"	129,642	198	53	121
WA2DPU	"	124,320	241	53	107
K2FS	"	110,670	222	58	128
WA2LJM	"	109,792	265	46	100
WB2LJK	"	82,225	213	48	95
K2QF	"	69,550	222	41	66
W2IY	"	66,690	147	66	105

WB2ZTB	**	59,895	220	32	67	K3AV	**	323,736	406	79	203	WA4QMQ	**	173,940	318	65	130	K5LP	**	593,600	795	94	171	W6OKK	**	463,401	668	93	150
W2FUI	**	58,647	175	36	77	W3KT	**	306,720	405	77	193	W4BFR	**	128,064	240	62	122	K5DB	**	440,960	611	75	185	W6IWX	**	368,466	589	77	140
N2SS	**	57,572	142	49	99	W3HDH	**	303,210	404	86	184	WA4OML	**	113,880	266	45	101	W7FG/5	**	427,096	597	93	178	N6IC	**	237,725	351	97	160
WB2GES	**	54,487	188	37	66	W3ZJ	**	250,179	335	101	166	K4VT	**	110,442	246	51	107	WA5IDG	**	387,760	525	86	176	N6AN	**	215,740	475	61	100
K2MN	**	36,186	113	37	74	W3BB	**	231,384	435	55	131	W4DR	**	79,588	153	74	128	K5AQ	**	373,673	485	93	184	W6BYH	**	207,808	380	74	117
W2GUP	**	34,056	174	17	49	W3GRS	**	183,027	267	81	166	WD4PZN	**	78,256	215	50	96	KA5W	**	341,130	510	89	160	N6FL	**	185,976	526	56	70
W2DW	**	24,904	97	30	58	W3ALB	**	158,498	290	50	144	WB4FOT	**	78,128	188	58	94	W5JC	**	302,489	431	84	173	WB6SHL	**	176,301	367	71	100
N2AWH	**	23,850	100	30	60	K3JGJ	**	147,405	332	51	104	W4OVU	**	77,356	180	62	104	W5LFJ	**	272,808	456	76	140	N6UW	**	150,400	346	67	93
WA2AUB	**	19,291	70	46	55	K3SA	**	141,321	289	62	101	N4HI	**	75,164	171	57	115	WA5SOG	**	247,989	368	81	160	N6OZ	**	127,136	328	53	84
WA2KIR	**	13,873	74	26	47	W3PC	**	130,345	236	65	134	N4IA	**	65,786	180	45	82	W5BE	**	232,960	397	73	135	K6DC	**	124,000	280	59	96
WB2SST	**	12,576	61	29	38	WA3SZV	**	70,750	196	37	88	W2HAE/4	**	64,533	156	50	97	W5DV	**	208,679	347	72	139	WB6JMS	**	123,504	277	70	96
WA2TJE	**	7,338	88	25	42	WA3WRD	**	68,138	161	55	102	W4ZEI	**	64,236	213	31	75	W5OB	**	196,854	331	78	140	N6JM	**	109,515	262	56	93
KA2CIW	**	1,080	18	13	14	W3HVM	**	62,865	181	46	81	W4KMS	**	56,889	143	54	93	K5EOA	**	192,765	327	72	141	W6SMD	**	103,240	255	55	90
K2HPV	**	924	16	8	13	W3EAN	**	56,370	186	41	72	K4BAM	**	50,830	159	51	79	W5RRR	**	168,300	297	72	132	AA6EE	**	92,820	274	58	72
AE2A	**28**	**306,306**	**912**	**31**	**86**	W3MA	**	53,392	128	50	92	W4XR	**	36,960	134	29	67				(Opr. W5LSZ)			AJ6V	**	87,904	246	61	73
N2PP	**	273,938	784	29	90	N3GW	**	51,850	153	38	84	K4AVX	**	16,036	80	26	50	W5GUI	**	155,400	303	76	109	W6ABT	**	80,931	175	58	101
W2AYJ	**	76,622	291	25	66	W3KFQ	**	45,955	158	39	62	W4DGJ	**	11,954	57	34	52	K5BDX	**	136,606	292	56	111	KA6CPL	**	77,309	279	42	55
WB2RNT	**	34,418	164	23	53	W3YFV	**	43,554	156	42	60	KJ4N	**	11,480	53	39	43	W5ODD	**	91,848	189	64	114	WD6EWG	**	70,692	209	50	79
KA2EAO	**	21,386	108	24	50	WB3JRU	**	27,667	140	26	47	N4MM	**	10,062	48	36	42	WB5YOT	**	85,540	236	46	84	K6LEN	**	70,192	234	38	69
WA2IFS	**	3,570	40	12	22	W3DKL	**	21,420	86	29	55	W4MLA	**	8,978	48	27	40	W5GO	**	69,120	251	30	66	W6OUL	**	64,993	233	45	58
KA2DFO	**	3,360	39	12	21	W3IW	**	21,344	91	38	54	WB4WHE	**	255	11	9	6	N5BET	**	65,790	195	54	75	K6YK	**	56,048	166	46	78
W2AZO	**21**	**237,405**	**703**	**35**	**84**	WA3DMH	**	19,520	84	30	50	**N4WW**	**28**	**349,206**	**1009**	**34**	**87**	W5UJY	**	54,900	152	42	80	W6VG	**	54,780	139	53	79
AC2U	**	179,760	549	33	79	WB3EFI	**	16,616	90	29	35	N4ZC	**	279,676	828	33	83	WD5ABF	**	54,849	149	54	87	WB6VJX	**	46,458	187	39	50
K2WK	**	151,872	537	26	70	W3BI	**	10,324	62	22	36	N4BP	**	234,576	764	30	78	W5QF	**	47,795	149	47	74	WA6LFF	**	42,594	161	38	55
W2HG	**	89,888	299	32	74	W3KV	**	6,048	53	24	42	K8MF/4	**	99,037	355	26	71	KA5Q	**	42,432	172	36	60	W6FQF	**	34,202	128	44	54
WA2LOG	**	54,600	229	24	60	W3FQE	**	2,290	31	10	19	WA4YZF	**	96,138	344	29	69	N5HB	**	25,440	124	35	71	W6PYU	**	32,630	92	56	74
WA2VZW	**	42,160	246	21	41	N3RL	**	962	15	12	14	W4WJ	**	79,794	296	28	65	W5HEZ	**	17,836	68	46	52	N6GL	**	21,280	104	32	44
KA2GIS	**	42	4	4	3	**N3UN**	**21**	**200,634**	**582**	**32**	**87**	KB4AJ	**	70,785	243	28	71	W5YB	**	12,376	80	19	37	WA6KCX	**	19,596	77	36	56
W2AO	**14**	**193,080**	**557**	**35**	**85**	KA3BRO	**	29,733	208	14	37	WD4IBO	**	36,708	183	19	50	W5KCR	**	7,560	51	26	30	K6CN	**	17,724	91	40	44
K2IGW	**7**	**112,021**	**451**	**25**	**66**	K3KMO/M	**	2,584	29	12	22	W4OGG	**	16,072	118	15	34	K2SCU/5	**	5,535	44	20	25	N6ST	**	17,360	88	28	42
N2UN	**	20,040	126	14	46	**K3GQT**	**14**	**48,330**	**183**	**26**	**64**	**K4RV**	**21**	**322,028**	**905**	**34**	**90**	W5EIJ	**	4,655	39	21	28	W60VO	**	12,276	76	30	36
W2ER	**3.5**	**21,312**	**121**	**15**	**49**	**W3EWL**	**7**	**15,744**	**116**	**12**	**36**	N4HB	**	219,003	680	33	78	WØBDKJ/5	**	2,511	32	15	16	**W6NV**	**28**	**230,230**	**730**	**29**	**81**
W2IB	**1.8**	**2,632**	**40**	**9**	**19**	**WB3AVN**	**3.5**	**35,287**	**191**	**17**	**54**	W4KFC	**	102,480	321	31	81	K5LM	**	1,988	28	14	14	**N6NU**	**	**192,150**	**668**	**29**	**76**
W3GRF	**A**	**2,064,972**	**1646**	**116**	**318**	**K4VX**	**A**	**1,852,155**	**1640**	**106**	**289**	W4OEL	**	78,752	255	30	77	**W5MYA**	**28**	**299,976**	**889**	**31**	**85**	W6TPH	**	163,152	582	32	67
			(Opr. K8DQ)						(Opr. K4PQL)			W4JD	**	58,296	245	27	57	**K5MR**	**	**266,112**	**815**	**31**	**81**	W6CYX	**	136,955	524	26	65
K3LR	**	**2,016,204**	**1570**	**130**	**314**	**W4RX**	**	**1,766,016**	**1399**	**122**	**316**	K4JRF	**	23,465	127	21	44	K5NU	**	260,117	883	30	77	W6TPJ	**	82,216	330	26	60
N3AD	**	**2,001,300**	**1659**	**117**	**303**	**K4PI**	**	**1,179,512**	**1098**	**111**	**265**	KA4FXE	**	5,035	36	22	31	AF5M	**	183,492	614	31	77	WA6TKT	**	78,540	314	29	55
K3RA	**	**1,541,191**	**1471**	**107**	**282**	WB4BVY	**	940,725	986	102	231	K4EKO	**	276	10	5	7	K5WA	**	182,886	612	29	73	WB6MBF	**	57,646	278	22	52
K3TW	**	1,502,476	1286	121	283	W4EI	**	917,643	993	95	228	**N4PN**	**14**	**433,576**	**1059**	**37**	**106**	N5EA	**	164,280	508	30	81	AI6Z	**	36,882	239	18	36
N3CW	**	1,393,698	1269	106	275	W4YE	**	907,921	923	104	239	N4TZ	**	224,896	698	33	79	W5VGX	**	162,459	589	28	71	W6YMH	**	26,016	192	19	29
W3AP	**	1,288,815	1225	104	261	W4LVM	**	812,736	920	101	205	W4AAV	**	159,599	454	35	86	AF5K	**	143,507	611	24	59	KA6HLX	**	12,956	127	14	27
W3FV	**	1,034,752	966	110	266	K4CTY	**	615,329	652	95	236	W3YY/4	**	121,900	435	29	71	W5OSJ	**	74,424	313	26	58	W6PRI	**	10,530	92	14	25
WA3YIV	**	992,325	1148	90	213	K4EZ	**	559,429	660	91	208	**N4XM**	**7**	**28,152**	**142**	**21**	**51**	AK5E	**	10,992	84	17	31	**N6CW**	**21**	**343,824**	**1010**	**33**	**83**
N3AFU	**	843,720	968	98	218	AA4AK	**	528,264	731	75	178	N4RJ	**	14,550	101	14	36	**N5CR**	**21**	**394,750**	**1084**	**35**	**90**	K6EVR	**	239,088	813	31	71
K3MD	**	822,332	965	87	214	N4RA	**	498,900	590	92	208	AA4S	**	10,701	90	12	29	K5KU	**	320,569	1013	33	76	N6TO	**	87,166	358	27	55
K3II	**	808,984	873	95	224	K4OD	**	485,782	561	97	214	K4YOA	**	8,695	63	15	32	**W5FO**	**14**	**366,404**	**941**	**38**	**101**	W6DCC	**	72,996	333	25	52
N3VV	**	786,800	966	83	198	AB4H	**	478,819	505	103	216	**W9TS/4**	**3.5**	**7,396**	**67**	**9**	**34**	N5AIL	**	77,478	298	37	74	W6DN	**	59,803	269	26	53
W3UJ	**	769,955	868	93	216	W4OUN	**	432,738	584	84	177	AK4Q	**	6,762	64	9	33	W5LUU	**	27,702	123	28	53	K6VI	**	37,074	180	24	50
K3NZ	**	719,712	846	92	202	W4BV	**	422,016	488	96	218	**AA4V**	**1.8**	**1,056**	**63**	**6**	**10**	**W5UN**	**7**	**202,176**	**667**	**32**	**72**	AB6R	**	8,736	73	15	27
N3AW	**	711,613	873	83	194	W4DM	**	376,035	505	77	188	N4IN	**	612	17	7	10	N5TP	**	123,270	410	30	75	N6CDA	**	240	40	1	1
W3OV	**	640,154	679	101	230	N4AA	**	368,868	544	71	165	**K1EA/5**	**A**	**1,680,633**	**1646**	**109**	**244**	**K5FUV**	**3.5**	**3,026**	**46**	**13**	**21**	**W6KPC**	**14**	**371,500**	**1013**	**35**	**90**
W3ARK	**	544,752	657	83	208	WB4SXX	**	337,920	496	72	168	**W5AC**	**	**1,317,336**	**1187**	**131**	**262**	**K5GO**	**1.8**	**1,920**	**42**	**10**	**14**				(Opr. N6TJ)		
K3NL	**	489,426	658	73	185	K4LQ	**	302,400	382	100	180				(Opr. K5GN)			K5YY	**	1,536	34	10	14	N6GG	**	242,400	687	34	86
K3AO	**	461,656	547	90	209	W4RW	**	266,760	383	71	163	**N5AU**	**	**1,297,620**	**1119**	**122**	**283**	**N6RO**	**A**	**1,961,883**	**1708**	**133**	**266**	K6RU	**	133,836	410	34	80
W3AZ	**	372,690	529	76	170	K4OAQ	**	257,164	386	76	163	N5JB	**	1,273,011	1369	107	220	**N6AR**	**	**1,185,043**	**1101**	**128**	**239**	W6OGC	**	19,600	102	25	45
W3GN	**	370,400	423	93	207	N2IC/4	**	255,205	421	63	152	K5NA	**	1,189,981	1095	125	258	**K6RR**	**	**1,078,000**	**1338**	**101**	**179**	**N6AW**	**7**	**133,620**	**538**	**28**	**57**
N3HW	**	350,982	561	66	156	N4AM	**	219,646	380	74	129	K5KLA	**	921,744	972	100	233				(Opr. N6IN)			K6ZM	**	88,620	441	24	46
K3CY	**	339,136	522	68	156	K4KUZ	**	206,912	318	89	155	N5RM	**	891,261	1002	102	227	AA6DX	**	1,011,076	1468	86	156	N6VI	**	79,200	386	24	48
N3II	**	333,200	432	83	189	AA4DR	**	182,280	328	62	134	K5KG	**	760,612	861	103	213	KD6F	**	472,012	856	74	123	N6PEJ	**	9,500	77	20	30

N6VR	**3.5**	**8,256**	**98**	**14**	**18**
AE6U	**1.8**	**1,648**	**83**	**8**	**8**
WA7NIN	**A**	**1,954,612**	**2012**	**120**	**221**
			(Opr. N6TV)		
K7RI	"	**1,826,992**	**1751**	**127**	**229**
W6RR/7	"	**1,076,670**	**1148**	**109**	**206**
W7IR	"	1,070,000	996	125	250
K7ZA	"	621,920	836	98	162
W7SE	"	261,171	522	70	133
N7RT	"	282,586	452	76	153
WB7FFF	"	217,930	647	56	99
N7AM	"	210,756	418	73	109
K7LAY	"	184,842	413	60	102
W7JYW	"	173,558	410	59	95
W7TS	"	143,220	319	54	101
WB7USQ	"	129,270	352	58	81
W7IIT	"	108,900	311	45	76
K7NF	"	105,203	278	54	79
W7LGG	"	84,084	200	53	94
W7KKR	"	76,582	242	52	66
K7CPC	"	53,469	171	52	65
KL7FDQ/7	"	46,782	201	48	65
W7JKA	"	37,440	116	43	74
N7DX	"	36,985	217	31	34
W7YS	"	36,540	141	36	54
W7KRM	"	36,480	134	36	60
K7UU	"	24,518	112	39	43
K7LXC	"	9,185	64	24	41
WB7SQM	"	6,862	57	22	25
W7DRA	"	2,198	54	8	6
WB7BNP	"	1,914	28	18	15
W7WA	**28**	**160,735**	**656**	**27**	**58**
W7EJ	"	104,896	425	28	60
N7TU	"	88,160	408	25	51
WA7YHP	"	65,760	293	24	56
W1YY/7	"	38,760	206	21	47
N7NW	"	5,160	49	13	27
N7XX	**21**	**352,768**	**1140**	**30**	**76**
			(Opr. WA1KKM)		
N7RO	"	200,430	760	30	60
AF7S	"	152,886	658	28	55
AJ7S	"	111,264	505	25	51
K7AA	"	24,304	136	26	36
K7KJM	"	9,534	80	18	24
W7AYY	14	26,550	157	19	40
K7UR	**7**	**142,740**	**560**	**27**	**63**
K7WA	"	29,280	223	18	30
N7EA	**3.5**	**14,309**	**136**	**15**	**26**
K7CW	"	3,753	51	10	17
K7MKS	"	736	18	8	8
WB7BFK	**1.8**	**374**	**29**	**6**	**5**
			(Opr. K5WTA)		
N8JW	**A**	**1,098,984**	**1100**	**105**	**243**
K8GL	"	**830,726**	**820**	**107**	**252**
K8US	"	465,630	672	82	173
W8QWI	"	437,684	618	71	176
WA8TNO	"	381,240	497	87	183
K8JK	"	359,400	434	93	207
K8SS	"	300,300	400	87	186
W8GOC	"	175,638	298	69	150
WD8QBP	"	164,500	326	62	126
N8BJQ	"	158,472	300	58	128
K8OQL	"	150,150	280	75	135
N8BC	"	136,324	283	58	115
K8SIA	"	126,144	254	65	127
WD8MOV	"	125,080	235	66	122
W8GBE	"	114,204	242	61	125
AI8M	"	100,951	244	58	99
W8UD	"	96,140	354	28	64
W8YGR	"	93,867	173	74	127
K8MR	"	84,309	196	59	98
K8AC	"	70,028	157	59	105
K8OT	"	69,440	183	49	91
WB8RTJ	"	30,195	107	38	61
K8LJG	"	23,310	94	34	56
AF8O	"	22,659	96	30	53
N8MK	"	7,998	48	26	36
K8MVZ	"	4,428	36	16	25
K8HV	"	3,760	35	16	31
K8HLJ	"	1,924	25	17	20
K8NZ	**28**	**309,632**	**906**	**31**	**87**
N8II	"	**309,222**	**864**	**32**	**91**
K8MFO	"	272,056	755	31	93
W8WPC	"	244 640	777	29	81
K8CX	"	235,764	748	29	79
W8TWA	"	131,040	474	29	67
W8DSO	"	36,113	166	22	55
W8WVU	"	24,505	136	20	45
K8IA	**21**	**408,590**	**1106**	**35**	**95**
WA8PKB	"	280,200	800	35	85
W8UA	"	212,892	642	32	81
KA8CQI	"	5,735	82	14	17
K8ZH	**14**	**440,496**	**1117**	**38**	**100**
N8CC	"	288,408	814	34	88
N8XE	"	4,995	45	16	29
N8AGU	"	836	15	9	13
W8UVZ	**7**	**91,104**	**318**	**29**	**75**
K8ND	"	56,090	309	21	50
N8RA	"	26,460	177	15	45
AA8S	"	6,176	76	9	23
KA8EC	"	4,235	63	11	24
W8LRL	**1.8**	**6,232**	**60**	**11**	**30**
K9DX	**A**	**1,970,829**	**1576**	**126**	**315**
K9BN	"	**706,898**	**822**	**104**	**199**
W9OP	"	625,989	800	91	182
WA9EKA	"	320,944	537	67	141
K9UQN	"	213,195	407	58	135
K9DAF	"	202,530	349	72	143
WD9DEE	"	177,660	309	69	141
WD9DCL	"	167,980	277	76	151
N9ER	"	116,808	226	67	119
W9GIL	"	110,110	347	33	77
W9QWM	"	88,924	218	67	105
W9FBC	"	48,100	164	34	66
K9CC	"	35,207	120	39	70
K9RC	"	27,600	103	45	55
W9TNZ	"	19,600	86	27	53
W9HPG	"	17,621	103	24	43
WB9SMU	"	2,555	29	14	21
W90A	**28**	**198,699**	**643**	**30**	**77**
N9NO	"	**179,826**	**610**	**29**	**73**
W9VA	"	148,100	514	28	72
N9DP	"	124,778	490	27	62
WB9JKI	"	112,224	410	27	69
K9WJU	"	98,688	363	26	70
			(Opr. AB1J)		
W9YYG	"	70,383	283	25	62
W9PNE	"	57,602	247	24	59
K9MK	"	46,320	212	25	55
WD9EJE	"	40,710	226	21	48
W9LT	**21**	**268,525**	**822**	**32**	**83**
K9RN	"	**258,656**	**770**	**33**	**85**
WD9IIX	"	96,842	398	24	58
W9DWO	"	94,374	311	33	74
K9WYI	"	23,651	126	20	47
AI9W	"	17,818	108	21	38
WB9TBU	"	3,780	32	16	26
K9RS	**7**	**37,146**	**168**	**23**	**59**
K9PQG	"	6,720	52	17	31
W9LF	**3.5**	**25,179**	**130**	**23**	**54**
WB9TIY	"	8,512	61	16	40
K9KM	"	3,400	44	10	24
K9HDE	"	945	12	5	7
W9CG	**1.8**	**1,386**	**27**	**9**	**13**
W9CH	"	**1,360**	**35**	**8**	**12**
WØ WP	**A**	**1,061,450**	**1125**	**103**	**222**
NØ GA	"	**775,533**	**824**	**112**	**219**
KØ FX	"	623,766	766	99	187
NØ TT	"	579,370	816	88	165
WØ IUB	"	483,975	725	80	159
WØ HW	"	333,861	747	54	147
WBØ ZTN	"	260,400	387	80	160
WØ SR	"	199,106	321	81	145
WØ VU	"	180,400	301	82	138
AGØ A	"	179,340	302	72	138
AKØ M	"	91,931	203	53	108
WBØ OTA	"	71,736	206	48	74
WAØ TVV	"	40,824	252	63	99
WØ UZ	"	20,169	88	32	51
WØ LHS	"	20,086	86	32	51
KØ IFL	"	19,076	82	29	47
WBØ ISW	"	12,716	76	30	38
KAØ ASU	"	11,448	68	29	43
NØ AYM	"	7,544	61	13	33
WØ YK	**28**	**223,400**	**769**	**30**	**70**
WBØ YUI	"	80,655	300	27	68
KBØ HA	"	69,126	289	24	58
WØ UM	"	30,488	150	23	51
WØ VX	"	22,144	126	21	43
KØ ZX	**21**	**301,368**	**911**	**34**	**82**
NØ AT	"	221,088	817	31	67
AJØ I	"	7,740	83	12	24
KØ VW	"	3,597	40	15	18
KØ KX	**14**	**423,025**	**1203**	**37**	**88**
WØ FO	"	161,590	508	33	80
KØ CS	7	300	11	7	8

ALASKA

KL7RA	**A**	**1,393,678**	**2273**	**84**	**158**
KL7AF	"	558,600	1146	86	114
KL7IVX	**28**	**109,500**	**975**	**20**	**30**
AL7O	**21**	**16,926**	**261**	**14**	**12**
AL7Y	**7**	**13,524**	**119**	**15**	**27**
KL7IBT	"	**6,288**	**111**	**12**	**12**

BAHAMA ISLANDS

C6ACY	**28**	**313,368**	**1479**	**28**	**60**

CANADA

VE1AIH	**A**	**914,413**	**1147**	**94**	**229**
VO1AW	"	**688,246**	**1122**	**73**	**184**
VE1BNN	"	253,764	448	70	158
VO1KO	"	116,208	425	34	74
VE1BWE	"	2,988	40	15	21
VE1TG	**28**	**161,760**	**675**	**73**	**73**
VE1UG	**14**	**138,840**	**525**	**31**	**73**
VE2AYU	**A**	**827,122**	**1210**	**80**	**197**
VE2WA	"	404,340	556	85	191
VO2CW	**21**	**180,810**	**822**	**27**	**63**
VE3DUS	**A**	**541,658**	**854**	**81**	**170**
VE3DAP	"	370,720	705	77	147
VE3KZ	"	185,194	335	67	139
VE3GCE	"	137,900	287	58	117
VE3JCV	"	137,496	277	68	136
VE3KYP	"	20,097	105	38	49
VE3BMV	**21**	**574,056**	**1602**	**38**	**96**
VE3KGI	"	29,295	175	22	41
VE3FCU	14	55,029	268	28	55
VE3JTQ	"	47,656	265	23	51
VE3ABG	**1.8**	**1,736**	**124**	**4**	**3**
VE3INQ	"	1,704	151	3	3
VE4VV	**28**	**298,530**	**1382**	**27**	**66**
VE4XK	**1.8**	**530**	**54**	**3**	**2**
VE5AAD	28	6,630	218	9	6
VE5RA	**3.5**	**9,632**	**152**	**12**	**20**
VE6AYI	**A**	**821,845**	**1707**	**76**	**135**
VE6LU	"	496,555	844	83	152
CZ6MP	"	150,183	523	45	66
CZ6KW	**28**	**183,260**	**922**	**28**	**57**
VE6APN	"	11,020	183	13	60
VE7WJ	**28**	**416,871**	**1541**	**34**	**83**
			(Opr. K755)		
VE7DXC	**21**	**448,572**	**1494**	**35**	**87**
			(Opr. AH6Z)		
VE7IQ	7	4,140	82	12	11

DOMINICAN REPUBLIC

HI8LC	**28**	**126,163**	**785**	**23**	**56**

HONDURAS

HR1AT	**14**	**31,365**	**299**	**16**	**35**

MEXICO

XE2MX	**A**	**567,285**	**1458**	**65**	**112**

MONTSERRAT

VP2MDD	**A**	**2,123,238**	**2693**	**96**	**238**
			(Opr. W3ZZ)		
VP2MEE	**21**	**623,118**	**2457**	**30**	**72**
			(Opr. N8BM)		

REPUBLIC OF PANAMA

H3ILR	**3.5**	**79,356**	**549**	**19**	**49**

U.S. VIRGIN IS.

KV4FZ	**28**	**653,072**	**2384**	**32**	**87**

AFRICA

ASCENSION ISLAND

ZD8TC	**A**	**542,445**	**850**	**70**	**145**

CANARY ISLANDS

EA8AK	**A**	**4,005,050**	**3825**	**95**	**255**
			(Opr. OH6DX)		
EA8TY	"	221,112	502	48	100
EA8SR	21	52,530	343	16	35
EA8EY	**7**	**43,659**	**297**	**13**	**36**

CHAGOS ISLANDS

VQ9KK	**3.5**	**27,360**	**155**	**23**	**37**

EGYPT

W5JMM/SU	**A**	**127,290**	**332**	**61**	**82**

GAMBIA

C5AT	**28**	**495,558**	**1511**	**31**	**83**

KENYA

5Z4RM	**A**	**89,157**	**263**	**44**	**69**

LIBERIA

5L2AV	**14**	**182,413**	**791**	**23**	**54**

MAURITIUS

3B8RS	**A**	**780,068**	**1085**	**86**	**158**
			(Opr. DJ6QT)		

Wolff, DJ5JH.

4X4UH, David.

REPUBLIC OF SOUTH AFRICA

ZS5BK	A	219,958	526	52	90
ZS2CW	"	34,368	185	30	34
ZS6ME	28	149,200	624	26	54
ZS6BSQ	"	10,582	96	13	24

REUNION ISLAND

FRØMM	28	978,012	2590	36	90
			(Opr. K1MM)		

TRISTAN da CUNHA

ZD7BW	A	3,600	32	17	23

ASIA

INDIA

VU2GO	A	136,120	327	55	109
VU2UH	3.5	24,549	178	18	31

ISRAEL

4Z4KX	28	368,986	1237	29	77
4X4UH	21	358,386	1193	33	73
4Z4NUT	"	242,112	1047	27	51

JAPAN

JE1JKL	A	1,696,700	1550	135	245
JA1BWA	"	1,230,450	1314	117	208
JE1CKA	"	1,141,560	1409	94	186
JG1CDM	"	827,148	978	112	189
JK1OPL	"	823,979	1089	98	165
JF1SEK	"	647,420	1039	82	146
JA1YJF	"	443,778	710	90	132
JF3CCN	"	430,157	733	73	130
JA2MGE	"	423,072	632	93	141
JA8SW	"	361,530	653	77	118
JA5KJD/1	"	340,362	618	81	117
JA6AKW	"	337,340	698	57	110
JA6CNL	"	327,474	521	84	142
JH7BRG	"	318,201	561	82	117
JA1PCY	"	300,825	596	73	102
JH7WKQ	"	278,640	574	71	99
JR6HVC	"	229,246	488	61	105
JR2IEG	"	218,036	431	73	109
JH1MTR	"	181,745	398	68	95
JA2UA	"	176,715	337	76	111
JJ1SOE	"	173,889	442	60	79
JH7LMZ	"	165,217	325	71	108
JA3YEE	"	165,165	364	61	104
JA3RLI	"	160,128	402	61	83
JA1AYC	"	157,920	481	47	65
JF1NCT	"	133,584	395	46	75
JA6BIF	"	128,188	312	58	88
JG1JMH	"	127,641	293	63	94
JA9SQO	"	118,989	350	51	66
JH2JEV	"	117,760	375	56	59
JA7FFN	"	88,752	239	57	72
JK1AJX	"	87,230	282	52	58
JA7BVA	"	86,016	248	56	72
JF2DQJ	"	84,600	297	42	58
JA1IZ	"	82,716	252	46	67
JA4AQZ	"	69,912	249	41	63
JA1BSU	"	64,380	204	49	62
JH4UVU	"	63,242	218	41	62
JK1BBO	"	62,622	175	52	74
JA5AF	"	61,533	177	52	77
JAØUH	"	60,912	185	51	57
JH4PUL	"	54,670	181	50	60
JA3BQU	"	54,400	275	32	36
JA9FT	"	50,552	194	37	52
JR6LKG	"	34,128	163	34	38
JA7MJ	"	33,580	132	45	47
JA6AKV	"	30,104	146	27	44
JR3XEX	"	21,340	139	30	25
JA7FMZ	"	18,906	104	38	31
JR6BZK	"	15,514	83	34	40
JA2AJA	"	9,856	150	12	10
JH8LIZ	"	9,315	76	20	25
JA3BAG	"	8,512	78	19	19
JK1FIL	"	8,256	66	20	23
JA1OUM	"	8,008	71	29	23
JH7BDS	"	5,568	42	24	24
JA9BV	"	5,544	46	22	20
JAØGZ	"	3,900	46	18	12
JASCUX/1	"	3,264	46	13	11
JA1EA	"	3,135	55	12	7
JA9PBZ	"	2,499	40	11	10
JA9CWJ	"	2,294	26	13	18
JH8RHI	"	1,785	34	9	12
JA1EF	"	800	14	8	12
JK1FRH	"	231	9	6	5
JA2RFG	"	100	6	5	5
JE1HJJ	28	344,925	1124	31	74
JI1KUV	"	215,760	854	28	59
JA9BEX/3	"	215,370	848	29	61
JH3ZRT	"	178,360	672	30	61
JH1VRQ	"	152,260	567	29	63
JA8TRT	"	130,264	602	26	50
JR2DWW	"	121,626	438	28	59
JA3EQC	"	120,120	543	24	53
JA2WB	"	108,062	442	28	58
JA1CMD	"	93,200	402	28	52
JA2IU	"	90,080	396	26	54
JA1AFF	"	88,726	412	23	51
JH7UJU	"	79,350	377	23	52
JA4YFH	"	75,702	393	22	44
JE1GCI	"	73,722	383	25	41
JA1DFQ	"	71,784	345	25	47
JA1EM	"	50,832	252	22	50
JH1DMS	"	42,201	187	25	56
JA2DHL	"	41,541	236	21	40
JA7BIJ	"	35,700	343	17	18
JJ1OSP	"	33,152	178	23	41
JA1OP	"	32,438	225	20	29
JA7JND	"	31,878	169	18	48
JA2OJ	"	28,704	145	24	45
JA7EC	"	20,520	136	21	33
JA9YE	"	16,440	98	21	39
JR4DZM	"	15,750	126	16	26
JA8DJY	"	14,728	93	19	37
JH4WHV	"	14,670	117	16	29
JA1AAT	"	13,621	89	19	32
JA8EJO	"	12,118	63	24	49
JA7ECT	"	7,314	112	12	11
JA3BLN	"	6,000	50	15	25
JE1MCJ	"	5,240	86	11	9
JR6LP	"	256	22	4	1
JF1EEK	"	1,750	26	13	12
JH3LPT	21	376,208	1151	35	77
JA8GQ	"	299,781	1258	25	56
JE2BNZ	"	297,990	973	32	73
JA6OKQ	"	289,590	1016	33	65
JH3CXL	"	256,838	834	33	73
JK1GDD	"	223,320	665	37	83
JK1AII	"	205,500	703	35	65
JG1IGX	"	185,731	764	33	58
JA2AXB	"	178,622	705	28	58
JA1IDY	"	145,120	621	27	53
JR1SLU	"	144,050	575	27	59
JH6DOG	"	141,750	604	26	55
JA1CSB	"	134,292	610	25	51
JA6VZB	"	114,048	537	26	46
JH2DMY	"	109,725	494	25	52
JF1EZH	"	103,878	411	30	57
JA9SOT	"	97,644	421	26	53
JF1PUW	"	87,376	349	28	58
JA1AEW	"	67,488	310	28	48
JAØBMS	"	64,148	347	21	37
JF3PNO	"	62,169	310	26	43
JH1BCY	"	54,250	272	25	45
JAØNC	"	53,680	233	27	53
JA7AZJ	"	51,870	272	24	41
JA1HQS	"	48,204	279	21	35
JA2CUO	"	39,008	260	18	35
JR4BVD	"	31,310	176	23	39
JA3GN	"	26,558	187	19	30
JG1FPE	"	25,428	173	20	32
JK1ASO	"	25,023	152	21	36
JH7WEE	"	22,181	190	18	23
JH7RKT	"	21,053	200	15	22
JG1RJP	"	16,700	118	23	27
JH6XLL	"	14,440	129	17	23
JA1SIN	"	12,768	106	18	24
JH2XTV	"	8,019	83	15	18
JA1BZM	"	6,435	67	14	19
JAØZG	"	5,820	68	14	16
JH6TNH	"	2,726	36	13	16
JL1VNJ	"	2,233	28	10	19
JA6BFI	"	774	21	8	10
JHØIFI	"	279	11	5	4
JE2XLQ	"	264	12	5	3
JA2EIV	14	236,210	716	33	82
JA7FTR	"	188,064	680	32	64
JR1RNC	"	162,798	656	29	57
JG1EEE	"	162,000	563	33	67
JE1AYU	"	151,262	508	33	73
JR1XFS	"	105,092	437	30	56
JAØCGJ	"	74,983	325	31	52
JH4DRB	"	42,229	213	30	43
JA2DN	"	31,442	144	28	51
JJ1DBA	"	22,080	139	24	36
JI1HNC	"	21,816	140	21	33
JG1QGQ	"	17,215	113	24	31
JH7IMX	"	14,227	132	20	21
JA3ARM	"	13,984	116	17	29
JA3AOL	"	13,338	92	25	29
JR6CWC	"	9,487	65	23	30
JA7AOU	"	5,022	56	16	15
JA2HFB	"	3,162	35	17	17
JA1SMA	"	2,750	47	12	10
JA6FYM	"	1,740	31	11	9
JA2AVI	"	1,420	39	12	16
JH1KRX	"	1,081	21	9	14
JA1UPO	"	1,020	17	9	11
JR2BDG	"	924	30	6	5
JR1AOQ	7	131,898	536	29	60
JH1RFM	"	73,036	342	25	31
JR1PNX	"	52,633	270	24	29
JA2INS	"	13,184	77	24	40
JJ1GCA	"	7,805	85	15	20
JA1BOK	"	5,307	61	16	13
JA1JIX	"	2,883	33	12	19
JH7FZI	"	1,064	27	7	7
JK1ERR	"	341	11	6	5
JA6LCJ	3.5	34,068	201	26	42
JA6AUH	"	33,299	187	26	45
JA8DNV	"	15,800	120	21	29
JA1VK	"	1,472	25	12	11
JA3BCT	"	351	27	6	7
JA9CWJ	"	273	15	4	3
JA3ONB	1.8	800	21	9	7
JA7AOO	"	645	18	9	6

MONGOLIA

JT1KAA	14	31,205	394	12	24
JT1AN	"	2,060	39	9	11

SAUDI ARABIA

HZ1HZ	A	906,716	1234	84	177
HZ1AB	"	453,600	1012	43	119
				(Opr. W7KJJ)	

THAILAND

HS1ABD	A	2,189,770	2528	119	255

TURKEY

TA1ZB	A	219,450	723	49	126

ASIATIC U.S.S.R.

ARMENIA

UG6GAT	A	6,355	55	13	28
UG6GAI	7	131,976	623	20	55

ASIATIC RUSSIA

UV9AX	A	2,368,546	2036	116	304
UA9OO	"	589,098	773	79	203
UA9FAR	"	244,036	547	51	118
UV9DB	"	162,810	460	40	94
UA9MR	"	142,592	218	80	176
UA9UTF	"	117,263	288	47	102
UA9YCN	"	77,190	291	40	53
UA9NN	"	55,955	135	63	82
UA9KAN	"	48,736	200	25	47
UA9KAM	"	33,264	142	30	58
UA9MM	"	13,524	106	15	31
UA9SAX	28	224,826	879	29	77
UA9LCU	"	118,360	488	25	63
UA9QBT	"	90,545	405	26	65
UA9BZ	"	67,760	339	19	58
UA9CHB	"	18,314	136	14	40
UA9FV	21	87,611	443	24	55
UA9HBD	"	72,438	379	25	51
UA9OEK	14	177,100	722	28	64
UA9AFO	"	113,802	513	23	55
UA9WCQ	"	105,625	585	17	48
UA9ACU	"	11,427	293	10	29
UA9WBO	"	144	8	4	2
UA9JBN	7	102,500	507	23	59
UA9LAW	"	8,992	116	8	24
UA9CM	3.5	91,712	614	15	49
UA9WS	"	33,973	247	12	41
UA9FGJ	"	33,408	249	10	38
UA9WEE	1.8	2,530	44	7	16
UAØSY	A	184,360	745	35	75
UWØUQ	"	161,152	699	48	80
UAØSE	"	132,356	440	36	80
UAØIAJ	"	60,895	333	45	50
UVØEN	"	29,656	337	18	26
UAØCCD	"	18,669	146	17	32
UAØCDM	"	1,560	67	7	17
UAØSGN	28	125,531	714	25	54
UAØSGL	"	41,250	310	15	35
UAØSH	"	22,491	177	14	35
UAØSAU	"	204,263	1012	25	58
UAØACJ	"	92,224	585	20	44
UAØNH	"	86,140	672	18	41
UAØSB	"	56,666	437	18	40
UAØQDH	14	273,045	929	33	76
UAØLEO	"	182,424	759	28	60
UAØQWB	"	181,700	730	28	64
UAØQWO	"	77,183	406	28	51
UAØPJ	"	70,312	405	24	44
UAØJDD	"	64,068	425	23	34
UAØSBQ	"	26,150	225	17	33
UAØOAT	"	3,1500	49	13	17
UAØCDA	"	2,646	55	9	12
UAØSID	7	21,1505	224	16	31
UWØFB	3.5	5,060	157	12	10
UAØLBS	1.8	8	4	1	1

AZERBAIJAN

UD6DFY	A	1,009,008	1422	72	192
UD6BW	"	233,305	606	40	105
UD6DKW	"	612	12	8	9
UD6DLJ	28	156,736	821	21	58
UD6CN	14	57,065	565	32	69

GEORGIA

UF6DZ	A	3,440,172	3540	99	255
UF6QAC	21	129,978	551	26	61
UF6VAG	1.8	1,683	36	6	11

KAZAKH

UL7MAR	A	1,202,976	1561	78	210
UL7PBY	"	352,404	563	69	165
UL7TA	"	162,624	620	55	57
UL7CAZ	"	74,176	241	39	83
UL7LBM	"	36,720	216	24	44
UL7LAW	28	183,012	762	27	73
UL7GAA	"	56,511	299	18	50
UL7GI	"	26,720	126	24	56
RL7GDN	"	3,168	72	8	8
UL7EAH	21	56,916	356	18	44
UL7PA	"	49,232	276	21	47
UL7NAC	"	2,875	47	6	17
UL7LCZ	14	223,912	810	32	72
UL7BAZ	"	128,553	635	25	48
UL7EAT	"	94,276	470	22	52
UL7JAW	7	85,652	512	20	56
UL7AAS	"	33,480	229	14	40
UL7GAV	"	20,880	180	11	37
UL7TBM	3.5	33,123	235	17	44

KIRGHIZ

UM8MAO	A	879,138	1080	99	207
UM8MBA	"	271,856	523	63	145
UM8NNN	21	86,600	644	17	33
UM8MBN	14	125,302	509	31	63
UM8MBL	"	27,390	230	20	35

TADZHIK

UJ8JAS	7	107,692	540	18	58

TURKOMAN

UH8HAI	A	779,793	1306	62	151
UH8BO	21	4,368	46	15	24
UH8EAA	14	411,120	1401	31	73
UH8EAD	7	12,048	112	12	36

UZBEK

UI8LAG	A	1,717,450	1735	103	247
UI8BI	"	854,962	1185	83	218
UI8AFA	"	458,640	1039	55	127
UI8GAJ	"	380,370	856	56	130
UI8ADQ	14	2,340	26	14	18

EUROPE

AUSTRIA

OE3RE	A	131,028	500	51	128
OE5CWL	7	46,848	481	14	50

AZORES ISLANDS

CT2QN	28	109,928	753	25	66

BALEARIC IS.

EA6FD	3.5	180	12	4	12

BELGIUM

ON4FD	A	980,730	1700	86	220
ON6FT	"	445,378	1275	45	121
ON7ZV	"	143,726	473	48	91
ON4XG	28	109,746	555	23	55
ON6NL	"	50,226	305	23	43
ON5WL	3.5	5,168	139	5	29

BULGARIA

LZ1QV	A	683,265	1101	93	210
LZ2UU	"	128,037	319	55	92
LZ1KAU	"	125,235	569	38	83
LZ1NJ	"	101,178	255	63	91
LZ1WR	"	62,370	274	25	74
LZ1MH	"	50,688	127	64	78
LZ2YJ	"	20,817	143	27	55
LZ2WB	"	20,090	169	27	43
LZ2GS	"	12,852	53	34	50
LZ2DR	"	1,708	20	14	20
LZ2EU	"	665	13	8	11
LZ1CW	28	187,480	814	30	79
LZ2RF	"	136,512	580	29	79
LZ1XL	"	45,942	251	22	56
LZ1IA	28	4,532	45	16	28
LZ2RB	21	315,180	1360	30	72
LZ2ZA	"	95,095	530	26	69
LZ2FH	"	78,384	536	20	51
LZ2AP	14	118,038	635	29	74
LZ2VP	"	69,102	396	28	71
LZ1FM	"	24,300	236	15	39
LZ2XW	7	7,160	81	12	30
LZ2PP	3.5	73,233	700	20	59
LZ2AB	"	27,440	487	15	49

CZECHOSLOVAKIA

OKZRZ	A	2,916,045	2463	128	367
OK1MMW	"	1,805,414	2070	103	271
OK3EA	"	1,354,752	1668	106	286
OK2BLG	"	926,028	1280	88	260
OK3IF	"	369,420	824	62	173
OK2PBM	"	329,680	675	65	195
OK3WW	"	293,468	598	70	153
OK3ZFB	"	287,079	630	69	152
OK3YX	"	270,708	539	71	133
OK1MIN	"	240,195	514	52	149
OK1MAW	"	216,112	634	53	155
OK3TDN	"	210,320	420	75	164
OK1DKR	"	193,787	376	72	151
OK3BA	"	168,896	518	53	150
OK2PBG	"	162,120	429	46	122
OK2SGW	"	147,030	378	49	120
OK2QX	"	145,379	299	74	137
OK2BEC	"	136,408	395	49	87
OK3IAG	"	130,375	395	54	95
OK3BT	"	115,500	309	59	116
OK3CKY	"	111,045	428	45	120
OK1MG	"	107,311	194	87	152
OK3CAU	"	97,362	674	24	57
OK1MWN	"	96,393	405	41	86
OK1KZ	"	93,520	300	50	90
OK1AOR	"	79,278	283	39	107
OK1DCW	"	78,396	217	54	85
OK3YCA	"	77,028	268	49	82
OK1MAA	"	64,136	315	36	90
OK1TJ	"	62,675	286	41	76
OK1FCA	"	61,623	192	47	76
OK3CEG	"	47,005	162	51	68
OK2JK	"	43,935	272	29	72
OK1MKU	"	40,710	186	31	86
OK2LN	"	39,055	220	30	65
OK1DIE	"	36,960	245	22	62
OK2BEI	"	27,406	167	21	50
OK1AJY	"	21,726	140	21	50
OK2BCJ	"	15,936	130	19	29
OK1AHQ	"	12,688	108	18	39
OK2KZT	"	10,656	85	21	51
OK1IBL	"	10,602	109	46	58
OK1FBH	"	8,771	77	18	31
OK1MHI	"	8,694	106	21	48
OK1MZO	"	8,580	118	14	46
OK1FIM	"	6,018	44	25	26
OK2BCI	"	5,555	35	22	33
OK1EP	"	5,146	43	26	36
OK3EQ	"	4,992	38	22	26
OK2BSG	"	4,940	33	20	32
OK1HBD	"	4,860	104	6	24
OK3TDP	"	3,784	45	18	25
OK1OFK	"	2,970	55	10	35
OK2SOD	"	2,418	52	6	33
OK1AEH	"	648	28	5	22
OK3SI	"	217	31	4	3
OK1CIJ	28	153,915	699	28	65
OK3EE	"	83,520	355	29	61
OK3TOA	"	24,592	194	16	37
OK1QH	"	17,589	182	16	25
OK2PFQ	"	11,700	201	18	27
OK2SPS	"	4,992	83	12	12
OK2BBJ	"	950	20	9	10
OK1AKD	"	450	10	5	10
OK1TA	21	207,473	758	31	76
OK1FV	"	164,160	642	33	75
OK3KKF	"	111,456	656	24	57
OK1ABP	"	97,873	465	31	66
OK1AGN	"	67,379	390	20	53
OK1FAM	"	35,945	212	24	41
OK1ASQ	"	25,048	158	18	44
OK3CFS	"	22,816	162	19	43
OK1DAV	"	10,656	67	21	53
OK1DDS	"	7,955	72	17	26
OK1AIA	"	7,831	84	15	26
OK2SAT	"	3,332	53	12	16
OK1PCL	"	3,066	50	10	11
OK2BAD	"	260	10	6	7
OK3UQ	14	216,756	938	33	75
OK1KCI	"	45,122	289	29	48
			(Opr. OK1AIA)		
OK2BNX	"	20,748	213	16	41
OK2YN	"	18,290	152	14	45
OK1JVQ	"	11,628	160	16	18
OK1DMJ	"	9,900	101	18	32
OK2BUJ	"	9,792	75	21	27
OK3TCF	"	7,869	118	13	30
OK1AII	"	6,600	55	16	39
OK1ZY	"	5,880	55	18	24
OK2ABU	"	4,648	32	14	14
OK1AOU	"	1,378	32	10	16
OK3CYU	"	1,325	23	9	16
OK3KFF	7	126,479	810	19	60
OK2BFN	"	115,566	619	26	76
OK1XJ	"	26,840	312	12	43
OK2SMO	"	15,400	263	10	34
OK3TAY	"	12,690	143	11	43
OK2BJU	"	11,711	147	11	38
OK1AWF	"	10,626	216	10	36
OK1AES	"	8,094	167	7	31
OK1HCG	"	1,032	40	6	18
OK1MAC	3.5	30,200	454	12	38
OK3CDX	"	19,992	298	11	45
OK2HI	"	19,947	257	14	47
OK3CEI	"	19,100	351	9	41
OK3ZBU	"	17,368	226	11	41
OK1DDO	"	11,520	243	7	32
OK1DCN	"	7,954	174	7	34
OK1DEC	"	7,878	196	7	32
OK3TDO	"	7,497	105	9	42
OK3ZAX	"	7,140	210	6	28
OK3CES	"	7,000	210	6	29
OK2BUD	"	4,644	172	5	22
OK3COK	"	2,139	54	1	3
OK3CXW	"	1,357	59	7	16
OK2BWH	"	1,239	59	4	17
OK1MIZ	"	817	37	4	18
OK1DIJ	1.8	9,006	203	9	29
OK1DWF	"	6,820	206	6	25
OK1DWC	"	5,049	143	7	26
OK3CXF	"	4,480	148	6	26
OK1AXD	"	4,060	142	5	23
OK2BTW	"	3,808	104	8	24
OL8CGS	"	3,360	100	7	25
OL6AUL	"	2,990	110	4	22
OL8CII	"	2,912	100	5	23
OL8CLL	"	2,889	111	4	23
OK1DJK	"	2,340	87	5	21
OK1MIX	"	2,250	90	4	21
OK1DFP	"	2,136	89	4	19
OK1DKZ	"	1,848	90	3	19
OK2BMF	"	1,650	66	4	21
OK1KPU	"	1,470	70	4	17
OK2BUV	"	1,275	51	4	21
OK2UD	"	1,080	54	3	17
OK2BEJ	"	860	44	3	17
OK1AYY	"	840	21	3	14
OL9CJH	"	820	41	3	17
OL8CIR	"	735	38	4	17
OK1MNW	"	704	31	4	18
OK1AIJ	"	544	33	3	14
OL3AXS	"	408	23	3	13
OK2PAW	"	352	23	3	13
OK2BQU	"	132	13	3	9
OK1OPT	"	15	11	2	3

DENMARK

OZ1LO	A	2,523,528	2773	110	268
OZ1DFS	"	259,072	621	57	127
OZ1EQC	"	235,505	627	62	123
OZ7BW	"	193,865	407	70	133
OZ5QU	"	184,710	512	67	168
OZ4HW	"	109,150	368	55	130
OZ1FGS	"	108,288	316	50	91
OZ4KG	"	87,057	464	63	90
OZ2UA	"	76,705	275	42	103
OZ2BM	28	120,575	506	26	65
OZ1BII	"	77,937	625	26	57
OZ7YL	"	76,640	380	26	54
OZ8E	"	1,440	24	5	4
OZ2DM	21	115,290	489	26	64
OZ7HT	14	180,136	847	28	64
OZ5WQ	"	17,250	163	20	49
OZ6XR	3.5	12,464	302	6	32

ENGLAND

G3MXJ	A	2,122,120	1938	114	310
G5CMX	"	1,249,558	1640	88	238
G3XTT	"	547,820	783	79	222
G3ESF	"	514,280	1006	69	191
G3DYY	"	453,632	780	77	179
G2AJB	"	143,714	406	56	125
G4BUO	"	58,302	230	44	79
G6NK	"	43,610	257	26	63
G8DI	"	41,216	201	35	77
G4IUF	"	27,180	103	30	60
G3CWL	"	2,001	43	10	19
G3FXB	28	389,302	1197	32	90

G3HCT	"	324,618	1058	32	86
G3RUX	"	285,797	1028	30	77
G3TZU	"	198,107	898	28	63
G4CNY	"	193,380	700	32	78
G3MZV	"	152,640	733	26	70
G4FNL	"	75,040	575	15	41
G4FDC	"	11,058	105	13	25
G3TVW	21	106,920	553	26	64
G3JKY	"	50,912	365	20	54
G4DNV	"	32,890	324	20	45
G3KDB	14	246,584	1027	30	74
G3PVA	"	132,552	699	25	59
G3SZA	1.8	21,960	283	12	33

FINLAND

OH2PM	A	581,607	833	90	261
OH3KM	"	294,117	630	70	167
OH7NW	"	136,324	371	53	144
OH1HS	"	127,238	302	68	158
OH2CZ	"	111,153	237	65	136
OH2VZ	"	84,150	243	54	96
OH5PT	"	83,328	176	70	122
OH3NM	"	64,116	190	44	112
OH1EB	"	58,982	213	43	111
OH6NG	"	51,858	163	45	89
OH1EH	"	27,104	128	33	44
OH7QU	"	26,036	133	32	60
OH6EI	"	17,794	160	24	58
OH6GZ/2	"	7,384	143	15	37
OH4TQ	"	6,656	56	20	44
OH9TD	"	4,995	46	18	27
OH3FW	"	4,183	38	23	24
OH3WH	"	1,920	22	11	19
OH3JR	"	1,872	31	7	9
OH2XB	"	1,675	23	11	14
OH3XZ	28	388,864	1280	34	94
OH2FS	"	224,886	807	31	80
OH2EL	"	78,540	387	23	61
OH6RC	"	63,428	311	27	74
OH1CQ	"	41,080	233	20	59
OH2JQ	"	26,800	164	21	46
OH5SS	"	22,720	170	18	53
OH3TY	"	4,450	33	20	30
OH2BAH	"	504	10	8	10
OH5YX	"	6	1	1	1
OH6AC	21	418,215	1529	28	77
			(Opr. OH6WZ)		
OH3UU	"	356,372	1283	29	77
OH4SL	"	256,641	971	30	71
OH5KR	"	105,698	610	24	58
OH5PZ	"	80,869	470	21	46
OH2BSQ	"	71,988	419	22	62
OH2BOE	"	51,430	308	20	54
OH2BVI	"	15,675	175	17	38
OH2BUB	"	8,330	179	9	25
OH3HV	"	2,700	43	11	25
OH6DC	"	2,592	80	8	20
OH1PY	"	2,516	57	9	25
OH2BTX	"	2,078	45	8	19
OH6DH	"	1,196	41	8	15
OH2QV	14	363,903	1419	29	72
OH3DE	"	19,710	199	15	30
OH3CN	"	9,282	103	18	24
OH2BSA	"	4,950	52	14	31
OH1MQ	"	4,144	55	12	25
OH2BCD	"	2,960	38	16	21
OH8SR	7	110,160	620	22	68
OH2BCI	"	79,212	651	22	62
OH6RE	"	11,172	150	13	44
OH1VQ	3.5	50,236	524	21	55
OH2SX	1.8	5,049	180	4	23
OH2BO	"	4,712	130	8	23

FRANCE

F6DDP	A	199,680	517	60	135
F8TM	"	138,024	396	49	113
F6EQV	"	86,715	308	42	81
F9BB	"	43,350	176	36	66
F8DD	"	15,892	158	18	40
F6BVB	"	7,611	79	21	22
F6FVY	"	3,145	45	16	21
F8TQ	21	65,116	381	22	51
F2VO	"	31,111	271	17	36
F6DKV	14	38,688	300	17	35
FØSE	"	38,464	327	20	44
F6EOP	3.5	2,457	45	10	29
F8VJ	1.8	195	33	5	10

GERMANY (FRG)

DJ5JH	A	1,377,252	1332	103	299
DK8NG	"	1,115,513	1065	108	305
DK3SN	"	951,792	1218	88	228
DJØUP	"	546,700	706	95	260
DL1JF	"	543,848	764	88	226
DK3KD	"	534,725	843	89	204
DK1II	"	473,908	780	83	174
DL7BQ	"	467,146	843	81	181
DJ6BW	"	398,231	844	63	166
DL3LU	"	387,450	573	93	222
DJ1YH	"	291,802	512	79	187
DL7CF	"	234,832	510	63	145
DL1MD	"	221,910	495	59	136
DJ2YE	"	183,150	380	65	157
DJ9MH	"	183,027	389	75	172
DK8KC	"	160,381	420	52	117
DL8BU	"	128,688	415	44	124
DJ9KB	"	118,221	277	60	97
DL2JO	"	117,440	360	51	109
DK1DB	"	112,896	360	45	99
DA1UI	"	75,870	330	38	97
DL1YA	"	62,238	207	49	89
DK9NH	"	56,565	250	45	90
DF3QN	"	53,568	201	39	85
DL7XI	"	51,635	212	42	73
DJ2UU	"	44,472	201	30	72
DJ4EJ	"	31,625	144	30	85
DF8EA	"	23,100	145	28	56
DK4HD	"	8,505	60	22	59
DL7CW	"	8,505	48	27	36
DK3GI	28	592,848	1584	37	101
DJ6RX	"	463,302	1518	35	91
DK5WL	"	345,240	1070	33	87
DK5TI	"	83,030	240	28	67
DL5TV	"	41,152	238	20	44
DL1AM	"	24,986	147	22	51
DJ4EY	"	21,024	113	23	50
DL7IJ	"	9,950	75	20	30
DK7AH	21	129,228	625	27	62
DK1VN	"	106,266	462	25	64
DL1TH	"	27,511	177	20	41
DK8BI	"	23,895	152	14	31
DK5PR	14	203,580	755	35	82
DL3CW	"	4,000	755	35	82
DK6PY	7	120,750	903	18	57
DJ2BW	3.5	110,618	703	20	62
DLØEP	"	12,596	205	19	38

GERMANY (GDR)

DM3XSO	A	830,550	1477	86	208
DM2DRK/a	"	572,678	1044	77	204
DM2CUJ	"	496,860	872	70	175
DM3XZN	"	186,186	505	60	126
DM2AJH	"	80,755	214	54	101
DM3VLG	"	77,924	307	46	108
DM4CVE	"	74,562	273	41	88
DM3UE	"	68,068	239	39	79
DM3WMJ	"	51,923	140	58	79
DM3VTL	"	44,064	194	43	93
DM2CCM	"	38,582	165	32	69
DM3BE	"	34,540	130	40	70
DM4ZSM	"	33,031	192	29	38
DM2DEA	"	29,808	128	37	44
DM3CF	"	28,261	191	21	38
DM4ZFM	"	20,806	79	41	62
DM4ZLM	"	19,465	133	28	57
DM2CGB/a	"	16,856	110	25	61
DM2GHL	"	15,718	113	20	38
DM2CLM	"	14,852	81	37	42
DM2DZG	"	14,190	118	18	37
DM3XUE/a	"	9,648	58	26	46
DM3JCN	"	8,694	88	21	48
DM4XOM	"	8,610	124	11	30
DM5BA	"	7,808	98	14	47
DM2CMA	"	6,649	82	17	44
DM2CJA	"	6,370	60	19	30
DM2BPF	"	5,754	53	18	24
DM2CBE	"	4,496	45	19	19
DM3PAA	"	3,740	30	18	26
DM3UNL	"	3,399	47	13	20
DM5WGL	"	3,280	56	10	10
DM2DLE	"	1,740	22	16	14
DM4SF	"	1,568	24	14	14
DM2CIL	28	42,316	249	19	52
DM3VBF	"	28,202	177	19	40
DM2AYH	"	17,628	123	20	32
DM2GGL/a	"	6,351	80	12	17
DM4YEL	"	5,880	48	16	33
DM4YZA	"	5,876	47	19	33
DM4XCE	"	4,368	57	10	18
DM3YEA	"	256	22	2	6
DM3XXI	21	76,230	502	18	52
DM3YUH	"	57,132	397	20	49
DM2BUB	"	20,625	145	20	35
DM3LE	"	17,250	150	13	33
DM4DB	"	12,144	108	18	30
DM2CYE	14	16,770	100	22	56
DM2FWL	"	6,930	74	18	28
DM2AXB	"	1,512	32	9	12
DM3PQO	7	119,886	716	20	67
DM2DIF	"	59,349	456	15	58
DM3WBI/p	"	22,387	238	13	48
DM2DHG	3.5	987	51	5	16
DM2FRM	"	874	40	4	19

GREECE

SV1LV	A	48,899	286	31	76
SVØAR	21	66,585	639	19	50
SV1IU	14	78,204	537	21	63

GUERNSEY

GU4CHY	28	427,934	1700	31	78
GU3MBS/m	21	50,830	830	21	40
GU4IUW	14	5,270	120	7	24

HUNGARY

HA5NP	A	1,318,928	1674	97	276
HAØHW	"	534,336	1047	67	175
HA5KB	"	299,413	747	66	161
HA1ZG	"	166,200	484	49	101
HA6ZV	"	155,196	485	51	111
HA2SK	"	56,050	255	37	81
HA7UJ	"	39,204	205	32	67
HA7SU	"	33,440	161	27	68
HA6NP	"	19,244	116	28	40
HA1VA	"	6,060	94	15	45
HA5OM/p	28	357,380	1366	33	74
HG4XS	"	106,408	465	25	69
HA2KMJ	"	34,240	240	22	42
HA3GA	"	26,447	200	21	32
HA5HM	"	5,536	63	15	17
HA5LZ	"	4,408	40	16	22
HA5JP	"	1,350	30	9	9
HA8CH	21	99,360	504	25	65
HAØLR	"	71,136	406	24	52
HA2MV	"	18,727	131	20	41
HA1KVK	"	15,228	153	14	40
HA4YG	"	10,339	113	15	34
HA5DE	"	5,244	56	12	26
HA7TM	14	63,656	446	24	49
HA6NW	"	61,685	509	18	47
HA5BA	"	60,520	415	23	62
HA5BZ	"	56,185	361	25	60
HA4XR	"	48,818	271	22	55
HA7MW	"	38,560	244	24	56
HA5JK	"	32,294	282	22	45
HA5FE	"	24,832	232	14	48
HA5GU	"	20,945	229	16	43
HA8UB	7	57,024	445	18	63
HA3HZ	"	28,851	328	13	46
HA3PT	"	12,393	198	12	39
HA4XW	3.5	46,872	480	19	53
HA6NL	21	25,550	428	10	40
HA7UI	"	20,041	335	10	39
HA3HU	"	8,856	204	7	34
HA5OJ	"	1,210	59	4	18

ICELAND

TF3CW	21	202,458	1040	23	59

IRELAND

EIØCS	21	2,176	50	8	26
EI2BB	14	164,560	872	24	61
EI1DH	7	22,800	324	9	41

ITALY

I7PXV	A	220,073	635	61	150
I1ZYR	"	103,180	371	48	106
I4JCC/5	28	311,880	992	32	88
I6POY	"	211,945	886	30	67
IØDYB	"	150,912	631	29	67
I2BVS	"	64,512	327	22	50
I2RVW	"	27,840	464	20	40
I4IND	21	502,448	1603	36	88
I5ZUF	14	152,193	788	27	70
I1QJC	"	62,250	440	18	57
I7LMR	"	62,048	560	20	36
I1KVE	"	25,830	311	18	45
I2XXG	7	279,648	1450	23	73
IV3HL	3.5	1,800	59	7	18

THE NETHERLANDS

PAØLOU	A	686,205	892	97	248
PA3ABA	"	186,065	436	59	140
PAØINA	"	120,558	325	53	89
PAØDIN	"	60,435	211	36	117
PAØGT	"	44,928	157	47	81
PAØTA	"	35,534	227	24	85
PAØUV	"	31,212	147	33	69
PAØRRS	"	29,403	97	48	73
PAØINE	"	16,720	89	32	56
PAØCF	"	2,368	30	10	27
PI1PT	28	73,295	284	27	80
PA3ADA	21	7,920	90	10	30

NORTHERN IRELAND

GI3JEX	A	161,756	315	61	157
GI5UR	"	118,632	102	28	40

NORWAY

LAØCA	A	480,004	1045	61	135
LA9HW	"	234,872	895	48	139
LA9GX	"	41,118	462	27	62
LA3UG	"	21,364	108	31	67
LA2BG	"	9,646	74	23	33
LA8XT	"	7,314	64	23	30
LA6ZW	"	7,104	49	21	43
LA6XO	"	1,908	53	10	26
LA1VL	28	322	15	5	9
LA4XT	21	30,954	226	19	47
LA8WG	"	25,155	268	17	26
LA1EE	7	76,788	600	21	60
LA4IE	3.5	6,840	151	6	34

POLAND

SP9AKD	A	117,530	330	55	106
SP9ZD	"	104,052	294	57	117
SP4JWR	"	52,216	315	32	90
SP6EIY	"	50,652	249	36	98
SP7ELQ	"	50,400	188	42	63
SP9HWN	"	37,632	160	42	70
SP2JGW	"	35,280	179	37	68
SP6DMJ	"	26,460	150	31	74
SP9ADU	"	25,308	90	37	74
SP6BYF	"	15,960	107	28	67
SP8AWP	"	8,235	92	15	30
SP8FHJ	"	6,148	94	15	43
SP5AD	28	104,860	430	28	70
SP9CAV	"	103,790	437	27	70
SP5DIR	"	34,385	196	20	45
SP9ADA	"	17,334	110	24	57
SP1EWS	"	12,400	124	17	33
SP8ATI	"	10,416	101	17	25
SP9CVY	"	2,850	54	9	16
SP3IBS	"	1,314	30	8	10
SP8KDF	21	46,920	319	21	48
SP5JTR	"	37,044	264	20	43
SP5BR	"	23,488	154	20	44
SP3EQE	"	23,128	205	16	33
SP9BRP	"	19,152	183	14	34
SP4ETO	"	4,585	45	15	20
SP2AVE	14	109,060	617	28	67
SP2BRZ	"	89,094	529	27	66
SP8MJ	"	26,840	187	17	44
SP5SIP	"	18,147	120	20	49
SP8HPW	"	16,524	149	15	39
SP2HMT	"	13,454	143	17	45
SP9EMU	"	11,902	154	12	32
SP4BEU	"	9,628	74	21	37
SP2HPD	"	8,815	147	12	29
SP9EML	"	8,100	87	12	33
SP3XR	"	4,200	99	10	25
SP5CJQ	"	2,035	37	9	26
SP6DMI	"	1,500	34	8	22
SP2EPV	"	1,431	31	10	17
SP9UX	"	1,425	34	9	16
SP3DOI	7	98,462	450	24	67
SP5ARN	"	60,010	400	19	66
SP2JKC	"	50,007	420	18	61
SP9CTW	"	34,580	341	16	54
SP9EMI	"	23,746	226	15	47
SP9LDR	"	9,225	152	10	35
SP3HYK	"	6,012	119	7	29
SP5AGT	"	3,822	67	8	31
SP9BDQ	3.5	16,872	259	10	47
SP4JSR	"	16,524	278	9	42
SP4CZD	"	10,530	262	8	31
SP5LGP	"	4,205	148	4	25
SP9JCN	"	988	57	4	15
SP3FYX	"	551	30	5	14
SP5IUY	"	168	14	4	8
SP9DH	1.8	5,712	206	5	23
SP5IXI	"	5,400	180	5	25
SP2FAP	"	2,968	94	6	23
SP7ICE	"	330	20	4	11

ROMANIA

YO3JX	A	657,052	1435	64	210
YO4XF	"	290,465	689	60	155
YO3CR	"	186,530	506	58	172
YO8FZ	"	118,406	314	42	104
YO8DD	"	79,636	313	46	126
YO7DL	"	74,415	260	36	85
YO7ARY	"	55,714	169	25	64
YO2BEO	"	52,095	259	33	82
YO3AAQ	"	47,573	263	31	82
YO4BUA	"	3,402	68	15	27
YO8BDF	"	1,786	42	12	26
YO3AC	"	1,470	34	10	20
YO5AVP	28	15,312	152	18	26
YO5BAT	"	6,847	77	18	23
YO6KNI	"	2,752	50	12	20
YO8RL	"	1,600	40	7	18
YO5BQ	21	51,336	358	20	49
YO4KCA	"	6,552	107	11	25
YO9HP	14	25,110	261	16	46
YO7BEN	"	4,466	50	8	21
YO3BEJ/9	7	111,972	867	22	62
YO4CAH	"	11,739	242	9	32
YO7AWZ	3.5	7,200	136	5	20
YO8BDV	"	1,743	93	4	17
YO8BDQ	"	592	41	4	12
YO5AAU	"	108	16	3	6

SARDINIA

ISØOMH	A	143,472	417	49	168
ISØFPH	14	150,100	835	26	69

SCOTLAND

GM3NHQ	A	81,070	336	34	76
GM3WRN	"	80,560	292	41	111
GM4BFX	"	36,378	201	31	64
GM3YOR	28	59,040	339	22	60

SPAIN

EA2IA	A	2,006,400	2332	99	281
EA1FD	"	519,750	787	64	161
EA3GF	"	7,874	70	23	29
EA5AUB	28	138,992	889	20	53
EA3ALV	"	38,982	231	23	50
EA2CR	"	1,323	33	9	18
EA3IH	21	23,199	246	17	40
EA4BV	7	1,323	36	7	20
EA2OP	3.5	114,075	811	18	57

SWEDEN

SM3EVR	A	1,493,096	1581	104	272
SM3AOE	"	1,326,304	1510	115	267
SMØDJZ	"	618,624	805	97	261
SM5CMP	"	420,604	621	97	187
SMØBYD	"	326,151	619	60	157
SM5CLE	"	252,144	414	77	195
SM2CDF	"	98,748	165	34	200
SMØCGO	"	84,460	261	52	112
SM6CPO	"	39,072	155	39	72
SM5AKT	"	31,700	120	42	58
SM5BDV	"	27,250	104	46	63
SM5RE	"	23,168	162	25	39
SM3DNI	"	21,300	83	41	59
SM6DUA	"	20,868	200	31	63
SMØEEJ	"	16,416	69	41	55
SM2VY	"	4,896	36	21	27
SM6HCJ	"	3,479	34	49	71
SMØAJU	28	207,594	730	30	84
SM6CYZ	"	122,325	439	30	75
SMØBDS	"	103,240	455	25	64
SM6INC	"	52,114	290	22	49
SKØCT	"	45,816	233	22	66
			(Opr. SMØAHQ)		
SM5IMO	"	17,212	119	16	36
SM5DYC	"	7,227	94	11	22
SM7AIO	"	5,720	126	12	20
SMØBWM	"	3,638	107	13	21
SM5CSS	"	1,666	24	13	21
SM5BDA	"	1,349	27	9	10
SM6BBX	"	99	33	3	9
SM5GMG	21	526,229	1660	35	86
SM4CNN	"	280,941	1049	30	81
SMØKV/Ø	"	174,930	717	30	75
SM1BVQ	"	19,765	160	16	43
SM6AOQ	"	15,714	149	17	37
SM7CGK	"	6,407	65	14	29
SM6DJI/1	"	90	6	4	5
SM6JY	14	27,170	266	15	40
SM5CBM	"	19,825	160	20	41
SM5CTJ	"	17,056	187	15	37
SM5UQ	"	15,028	186	15	37
SM6BXV	7	2,542	28	12	19
SM6DJI	3.5	1,482	61	5	21

SWITZERLAND

HB7G	A	543,038	1157	66	152
			(Opr. HB7AW)		
HB9ADD	"	186,025	447	69	106
HB7QA	"	19,228	131	29	63
HB7BOW	"	6,615	108	11	10
HB9DX	21	10,935	64	23	58
HB7BU	14	13,448	145	11	30

WALES

GW3JI	A	356,004	626	67	212
GW3MPB	"	145,656	316	68	170
GW3NYY	7	139,040	929	19	69
GW3GWX	1.8	1,280	61	4	16

YUGOSLAVIA

YU7JDE	A	1,229,566	1532	98	263
YU4CF	"	1,165,758	1527	105	269
YU2OB	"	441,000	669	78	202
YU1OBH	"	308,730	517	82	169
YU1BM	"	302,412	692	62	175
YU1NZW	"	260,848	521	68	170
YU7NGO	"	218,064	516	48	129
YU7OCZ	"	142,560	432	55	121
YU3WO	"	43,344	516	22	62
YU3TZP	"	22,962	141	30	56
YU2RAT	"	13,804	102	22	36
YU7NZR	"	12,580	128	30	44
YU2BTU	"	4,343	38	20	23
YU3ER	28	424,824	1251	34	90
YU3AE/X	"	264,397	933	29	78
YU1EFG	"	157,237	672	22	75
YU7KWX	"	147,561	604	30	71
YU3TU	21	425,216	1280	34	94
YU7OCV	"	418,528	1432	32	84
YU4VOY	"	223,416	822	32	84
YU4CBC	"	61,965	376	27	54
YU7NQG	"	29,707	225	20	41
YU2CCJ	"	19,248	200	14	34
			(Opr. DAMIR)		
YU1OVU	"	12,330	126	16	29
YU2IZ	"	9,276	127	11	26
YU3ZV	14	598,506	1818	38	100
YU3BC	"	355,861	1216	35	86
YU3TMF	"	65,856	276	29	67
YU1OON	"	4,636	80	12	26
YU2CDS	7	361,680	1204	32	88
			(Opr. YU2RQX)		
YU1EXY	"	223,652	1156	22	70
			(Opr. YU2RKG)		
YU2HDE	"	60,324	483	15	51
YU5FAA	3.5	86,184	744	18	58
			(Opr. YUIW/X)		
YU4VBR	"	51,932	560	17	54
YU5RU	"	40,800	437	15	45
YU7SF	"	21,511	399	9	40
YU2KDE	"	12,716	258	8	36
			(Opr. BOZIDAR)		
YU2CRM	"	5,664	170	6	26

EUROPEAN U.S.S.R

BYELLO RUSSIA

UC2ACA	A	2,276,714	2069	127	349
UC2OBA	"	212,296	617	60	163
UC2SE	"	51,876	259	35	96
UC2ACL	"	43,450	277	30	80
UC2AW	"	14,560	73	35	45
UC2OCH	28	165,256	651	30	76
UC2WBL	14	88,416	526	27	69
UC2OCS	"	53,167	348	26	53
UC2OAI	"	51,935	370	20	45
UC2WAS	"	37,240	310	19	51
UC2WAZ	"	21,546	342	19	44
UC2AFE	7	29,835	291	14	51
UC2AAK	1.8	8,262	221	7	27

ESTONIA

UR2QD	A	1,686,804	1568	125	342
UR2RCU	"	359,546	580	78	199
UR2RBH	"	84,800	362	34	72
UR2RKS	"	21,560	105	30	58
UR2RWA	"	11,800	156	18	41
UR2RER	"	1,551	22	14	19
UR2FU	28	210,105	811	31	74
UR2TAB	"	162,980	351	29	87
UR2RL	"	108,017	436	26	65
UR2RGO	"	34,371	221	22	45
UR2AW	"	14,405	93	18	49
UR2JL	"	8,748	80	18	36
UR2OI	"	3,162	46	12	19
UR2QI	21	393,414	1605	30	72
UR2RSA	"	136,224	693	29	70
UR2REC	"	57,882	418	19	47
UR2HB	"	897	33	6	17
UR2NP	14	41,640	381	16	44
UR2NW	"	34,086	270	22	47
UR2CR	"	204	11	4	8
UR2RHF	7	64,000	597	19	61
UR2QY	"	3,420	86	8	28
UR2RKN	3.5	33,123	449	14	47
UR2RAF	"	26,940	369	14	46
UR2RKX	"	3,892	138	5	23
UR2RIC	"	2,356	70	5	26
UR2RMN	"	1,728	72	5	19
UR2JW	1.8	4,810	192	4	22
UR2RFK	"	3,912	155	6	18
UR2RAI	"	616	48	3	11

EUROPEAN RUSSIA

UA1DZ	A	2,614,568	2174	133	351
UK6APA	"	1,017,240	1606	88	206
UW3UO	"	518,340	1055	72	193
UA1ZW	"	504,780	852	78	157
UA4HBP	"	339,471	811	67	176
UA3VDS	"	332,047	847	61	162
UA3ST	"	260,019	638	53	120
UA1TAL	"	218,106	632	52	137
UA3RO	"	165,635	436	58	153
UA6AYR	"	147,849	294	76	145
UA1FV	"	128,100	601	39	101
UA4ACD	"	112,712	390	43	103
UW3NE	"	89,096	226	53	95

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UA3EZ	"	70,022	293	42	115
UA3VFI	"	59,740	259	44	101
UA1DF	"	51,392	160	48	98
UV3AP	"	45,932	218	35	101
UA3LAB	"	25,802	114	39	94
RA3PGC	"	4,466	66	10	20
UA6AKB	"	21,942	91	38	68
UA3TAG	"	17,353	123	31	46
UA4IU	"	14,647	69	31	66
UA3GO	"	6,901	57	26	41
UV3NG	"	2,665	39	17	24
UA1AWO	**28**	**173,826**	**703**	**31**	**80**
UA3TDK	"	114,762	576	25	68
UA3AGF	"	104,400	451	34	82
UA4FCZ	"	70,380	327	27	65
UA4CH	"	55,110	217	20	46
UA3EX	"	36,144	251	23	49
UA6AJF	"	5100	52	17	33
UV3MM	"	1,239	31	9	12
UA4CM	"	75	25	1	2
UA6LFX	**21**	**125,244**	**752**	**23**	**48**
UW3HY	"	115,720	547	26	62
UA1QAU	"	69,417	391	24	57
UA6XBJ	"	49,345	346	23	48
UA6AJO	"	47,740	371	19	51
UA4HDV	"	24,888	200	19	42
UA3XJ	**14**	**147,157**	**691**	**31**	**70**
UA4NAM	"	124,525	637	23	62
UA1CAI	"	111,628	640	24	62
UW6CV	"	87,808	443	29	69
UA4HDZ	"	74,368	372	21	62
UA3TBQ	"	66,649	337	26	57
UA1ZCZ	"	63,840	449	24	56
UA3QAQ	"	58,707	232	30	69
UA3ESN	"	50,560	326	22	58
UA1AJ	"	40,271	345	22	55
UA3WBA	"	38,280	154	23	32
UA4LM	"	37,450	252	20	50
UA6AXX	"	28,348	181	23	53
UA3ADO	"	24,924	225	17	45
UA3ECJ	"	17,391	180	15	36
UA1ZDB	"	14,842	152	14	27
UA4NBH	"	8,692	158	10	31
UA4PGO	"	5,472	62	9	29
UA6AKK	**7**	**42,264**	**381**	**15**	**57**
UA3XAW	"	21,420	227	14	49
UA3AGX	"	11,713	165	11	42
UA6UX	"	7,181	104	10	33
UK3XAM	"	506	19	7	23
UA4CDC	**1.8**	**1,357**	**58**	**6**	**17**

KALININGRAD

UA2FCB	**A**	**404,271**	**794**	**87**	**192**
UA2FCW	**1.8**	**8,126**	**218**	**7**	**27**
UA2FBG	"	18	4	2	4

KARELO-FINNISH REPUBLIC

UN1BX	A	64	6	4	4

LATVIA

UQ2GCN	**A**	**1,285,752**	**1758**	**96**	**240**
UQ2PQ	"	**839,970**	**1567**	**81**	**225**
UQ2DZ	"	53,845	264	30	79
UQ2IF	"	13,067	77	25	48
UQ2GDM	**28**	**196,536**	**722**	**32**	**82**
UQ2HO	"	60,516	284	25	57
UQ2GCP	"	9,114	100	15	27
UQ2GEY	**14**	**67,236**	**495**	**22**	**56**
UQ2GAG	"	7,020	107	11	28
UQ2GHW	**7**	**55,146**	**475**	**17**	**61**
UQ2GEC	"	3,132	71	7	29
UQ2GCE	**3.5**	**13,340**	**264**	**11**	**35**
UQ2PP	"	13,296	215	10	38
UQ2GIP	"	8,580	214	7	32
RQ2GCR	**1.8**	**3,328**	**120**	**6**	**26**

LITHUANIA

UP2NV	**A**	**2,113,020**	**1939**	**125**	**343**
UP2CY	"	**1,358,266**	**1322**	**121**	**318**
UP2NK	"	**1,304,925**	**1551**	**107**	**274**
UP2DM	"	**1,302,048**	**1606**	**99**	**253**
UP2BAO	"	1,150,100	1543	96	254
UP2BAR	"	1,117,030	1320	102	268
UP2PCI	"	853,092	1375	92	232
UP2DO	"	832,476	1105	95	251
UP2BFE	"	599,110	987	89	242
UP2BAT	"	477,100	721	93	238
UP2PAW	"	432,016	802	74	174
UP2NA	"	416,240	841	67	153
UP2BEL	"	318,780	692	64	166
UP2BEN	"	166,734	619	50	127
UP2DV	"	109,230	390	45	120
UP2BCX	"	99,953	431	36	95
UP2PCE	"	92,710	357	46	100
UP2PAQ	"	28,768	150	36	80
UP2AV	"	10,428	85	27	52
UP2BGO	"	9,699	186	13	10
UP2BGF	"	7,344	150	12	36
UP2BCG	28	25,410	140	22	55
UP2BF	21	21,450	189	17	38
UP2BEI	**14**	**82,318**	**525**	**23**	**56**
UP2BER	"	32,960	282	17	47
UP2PCB	**7**	**23,423**	**291**	**13**	**46**
UP2PAP	**1.8**	**5,742**	**166**	**8**	**25**

MOLDAVIA

UO50BE	**A**	**123,880**	**360**	**52**	**138**
UO50GX	"	58,440	370	24	56
UO50WC	**21**	**53,253**	**477**	**18**	**43**
UO50DA	7	1,081	27	7	16
UO5GR	3.5	1,104	40	7	16
UO5AP	**1.8**	**2,200**	**78**	**5**	**20**

UKRAINE

UB5ZEL	**A**	**1,201,200**	**1664**	**100**	**285**
UB5LAW	"	802,164	941	98	256
UB5MDD	"	**339,768**	**700**	**66**	**168**
UB5MFY	"	**202,440**	**537**	**59**	**191**
UB5MPD	"	**192,402**	**515**	**53**	**136**
UT5HP	"	154,869	450	55	154
UB5QIA	"	125,860	489	39	116
UY5TE	"	97,361	406	43	124
UB5MFT	"	88,200	289	54	114
UB5MLV	"	77,090	319	39	91
UB5MAM	"	65,520	326	31	86
UB5ZBF	"	51,480	251	35	97
UB5MDP	"	30,175	135	32	53
UB5LR	"	24,054	127	34	80
UB5MAV	"	23,300	159	27	73
UB5EEW	"	14,420	144	20	50
UB5MPF	"	13,038	113	22	82
UB5MDL	"	9,322	66	21	38
UB5GBW	"	5,304	49	21	31
UB5MCS	**28**	**425,280**	**1410**	**31**	**89**
UB5IF	"	154,631	564	28	73
UB5QBT	"	96,985	544	26	59
UB5MMM	"	92,136	510	26	62
UB5IEP	"	46,104	300	19	49
RB5IWF	"	37,293	219	28	65
UB5KAK	"	37,230	198	20	53
UB5IER	"	31,482	297	15	39
UB5EIS	"	702	28	7	6
RB5IOV	"	527	11	6	11
UK5QAD	"	132	11	3	1
UB5FAQ	**21**	**93,700**	**504**	**27**	**73**
UT5BX	"	19,152	152	19	37
UB5VAW	"	7,020	111	11	28
UB5QAV	"	1,040	20	8	12
UB5CE	**14**	**161,652**	**670**	**33**	**81**
UT5XW	"	**148,785**	**645**	**30**	**75**
UY5EK	"	74,704	338	28	64
UB5MDR	"	72,450	489	26	49
UB5KAY	"	58,400	423	25	55
UB5VAA	"	57,300	420	21	54
UB5UBV	"	45,000	370	20	52
UB5ICS	"	41,850	193	29	64
UB5MHP	"	30,954	230	25	42
UB5EEP	"	19,520	218	17	44
UT5BW	"	4,841	61	15	32
UB5UCR	**7**	**79,953**	**486**	**23**	**64**
UB5UWG	"	61,539	443	18	55
UT5BP	"	61,538	439	17	60
UB5UCE	"	38,592	381	15	49
UB5UCF	"	28,025	306	15	44
UB5GCH	"	25,272	300	13	41
UB5UGF	"	12,852	187	14	40
UB5UCY	"	8,055	126	11	34
UB5FDG	"	3,354	52	10	29
UB5NQ	**3.5**	**59,422**	**611**	**18**	**56**
UB5IHO	"	40,761	449	13	50
UB5HAF	"	23,166	429	11	43
UB5RS	"	2,848	65	32	89
UT5AB	**1.8**	**3,565**	**100**	**6**	**25**
UY5OO	"	840	38	5	15
UT5BN	"	782	26	5	18

OCEANIA

AUSTRALIA

VK3AEW	**A**	**186.020**	**452**	**62**	**80**
VK6FS	"	139,302	438	38	71
VK2BDS	"	73,224	226	42	66
VK2BQQ	"	56,070	215	37	52
VK4UR	"	18,744	144	21	23
VK3APN	"	396	13	6	5
VK4QK	**28**	**465,015**	**1790**	**26**	**61**
VK4XA	"	268,554	1214	26	52
VK6AJ	"	116,014	553	23	48
VK3QE	"	77,073	375	21	48
VK3RJ	"	17,496	167	16	20
VK6HD	**1.8**	**2,346**	**48**	**8**	**9**

GUAM

K5UA/ KH2	**A**	**734,958**	**1442**	**73**	**98**

HAWAII

KH6NO	**A**	**1,281,713**	**1886**	**99**	**130**
KH6CKJ	"	375,564	1068	55	64
KH6XX	**28**	**586,236**	**2013**	**34**	**64**
KH6DL	**14**	**301,200**	**1051**	**31**	**69**
KH6JWK	"	36,018	174	25	44
KH6CC	**1.8**	**5,760**	**128**	**8**	**7**

INDONESIA

YB8GF	**21**	**97,902**	**615**	**24**	**30**

MARSHALL ISLANDS

KX6PI	**14**	**441,780**	**1347**	**34**	**77**

NEW ZEALAND

ZL3BK	**A**	**916,626**	**1356**	**80**	**147**
ZL1IL	"	73,876	284	37	55
ZL1ARV	14	17,523	100	22	37
ZL1AZV	**3.5**	**9,906**	**89**	**19**	**20**
ZL1AZE	"	2,970	56	11	11

PHILLIPPINES

W7LPF/ DU2	**A**	**542,490**	**1072**	**76**	**93**
WA4QDE/ DU2	"	20,829	131	24	29

WESTERN SAMOA

5W1BZ	**A**	**183,172**	**354**	**87**	**94**

SOUTH AMERICA

ARGENTINA

LU9FAZ	**A**	**56,364**	**174**	**42**	**80**
LU8DQ	**28**	**1,033,399**	**2775**	**34**	**93**
LU3FG	**14**	**71,806**	**454**	**19**	**38**
LU2KAK	"	18,260	116	16	39
LU1EWL	"	14,896	137	14	24
LU2DPW	"	1,368	24	6	13

BOLIVIA

CP5NK	21	11,513	135	11	18

BRAZIL

ZW4OD	**A**	**1,204,008**	**1795**	**72**	**155**
PY1BOA	"	169,371	619	51	128
PT7AQ	"	23,782	181	16	31
PY2KN	"	14,529	65	36	51
PY2FNE	"	322	10	6	8
PY2TM	"	180	7	6	6
PY2BTR	**28**	**92,903**	**545**	**16**	**45**
PY3CFD	21	288,486	1220	28	65
PY2DLK	"	226,788	986	30	53
PY8ZLC	"	5,940	35	9	18
PY2FRW	**14**	**101,728**	**507**	**20**	**48**

COLUMBIA

HK5AJF	**14**	**183,582**	**727**	**28**	**66**

ECUADOR

VE3FAE/ HC1	**14**	**59,220**	**350**	**20**	**43**
HC1BI	"	378	14	5	4

TRINIDAD

9Y4VT	**A**	**3,769,259**	**3152**	**117**	**286**
			(OPR. N6AA)		

URUGUAY

CX8DT	**3.5**	**5,175**	**79**	**12**	**13**

VENEZUELA

YV1NX	**A**	**1,353,672**	**1427**	**99**	**225**
YV10B	**1.8**	**5,103**	**85**	**7**	**14**

MULTI-OPERATOR SINGLE TRANSMITTER

NORTH AMERICA

UNITED STATES

N1AC	**2,093,649**	**1931**	**106**	**267**
K1RQ	**1,692,972**	**1600**	**97**	**272**
K1IK	1,238,433	1219	96	261
N1TZ	1,218,992	1150	107	269
K2BK	**1,998,461**	**1513**	**125**	**332**
W2SUA	1,501,380	1375	109	271
K2XA	1,501,115	1357	106	279
W2YX	1,445,980	1250	113	281
K2OY	1,016,937	1148	96	217
K2FL	883,920	821	114	267
W2UI	583,510	693	83	212
W2RQ	208,624	371	69	139
W3BGN	**3,045,549**	**2073**	**140**	**367**
W3GG	**1,711,620**	**1600**	**105**	**265**
K3YL	1,420,321	1512	93	238
K3UC	1,265,888	1236	100	258
N3RG	1,129,132	1174	96	236
W3NX	1,108,980	960	121	283
W3NZ	879,274	825	106	268
K3SME	793,266	959	79	212
K3QMR	652,032	870	79	177
W3GNQ	554,694	696	90	191
N3WW	421,500	456	85	215
W3EVW	278,610	405	83	168
N3BB	73,164	193	48	86
N4AR	**3,199,572**	**1992**	**157**	**407**
N4KE	1,854,442	1421	131	327
AA4M	884,058	1081	88	203
N4UF	741,559	937	88	193
AA4FF	673,396	744	90	226
K4PB	257,023	421	66	155
WA4FKK	135,042	321	40	102
K5RC	**4,148,784**	**2557**	**160**	**404**
W5VX	1,780,418	1473	133	289
N6MG	**1,382,717**	**1351**	**121**	**250**
N6AV	1,031,715	1174	103	200
W6BIP	1,002,456	1310	91	182
W6NKR	836,304	835	122	214
W6UA	294,975	385	97	188
W6GO	156,546	265	88	135
K8RT	**1,463,535**	**1505**	**102**	**231**
AC8E	924,219	1055	92	217
K9KA	**1,568,577**	**1482**	**112**	**269**
K9RF	1,497,195	1198	135	306
AI9J	1,444,740	1270	132	276
WB9BCR	180,264	305	79	143
KB9GD	116,280	281	51	102
W9PK	58,739	184	57	94
W9RW	55,476	155	50	84
N0NO	**1,946,610**	**1610**	**132**	**298**
W0SD	**1,729,404**	**1525**	**126**	**276**
K0RWL	1,216,958	1322	104	222
AB0I	1,186,944	1216	111	241
K0INR	1,009,268	1087	103	235
W0EJ	405,032	595	80	177
W0SA	349,691	498	86	155

BERMUDA

VP9OX	**845,649**	**1789**	**60**	**157**

CANADA

VE3OCU	**1,326,065**	**1785**	**87**	**212**
VE7AV	**532,875**	**1500**	**57**	**90**
VE8NI	**116,040**	**842**	**19**	**41**

GUATEMALA

TG9CH	**1,434,874**	**2859**	**68**	**158**

HAITI

HH2MC	**5,426,104**	**4776**	**127**	**339**

PUERTO RICO

NP4A	**7,982,576**	**6100**	**141**	**385**

ST. VINCENT

VP2SX	**4,859,777**	**4931**	**107**	**295**

AFRICA

CUETA

EA9EU	**4,200,839**	**3652**	**106**	**303**

ASIA

ASIATIC S.S.R.

UK9AAN	**6,357,553**	**3705**	**166**	**427**
UK9ADY	**2,778,768**	**2394**	**110**	**304**
UK9HAC	2,342,052	2185	117	285
UK9CBD	1,460,784	1612	85	227
UK9LAA	1,185,973	1369	92	239
UK9OAD	605,896	1037	60	152
UK9CAA	567,349	1072	57	142
UØY	3,742,188	3439	129	307
UKØFAA	907,200	1600	91	152
UKØZAF	310,905	1217	65	70
UKØSAW	243,764	665	47	102
UKØLAD	211,968	679	53	85
UKØZAB	85,470	317	52	53
UKØCAA	68,886	338	37	52

AZERBAIJAN

UK6DAU	214,123	466	58	123
UK6DAJ	5,928	67	23	34

GEORGIA

R6F	**7,966,368**	**4965**	**148**	**408**

KAZAKH

UK7GAA	**1,030,720**	**1340**	**96**	**226**
UK7CAK	443,928	491	101	248
UK7NAK	37,808	240	17	51

TADZHIK

UK8JAA	**1,116,308**	**1563**	**93**	**205**

TURKOMAN

UK8HAA	**600,894**	**922**	**74**	**177**

UZBEK

UK8AAC	**435,540**	**823**	**62**	**148**

JAPAN

JA2YKA	**1,368,565**	**1383**	**123**	**224**
JF1YPF	**820,335**	**1117**	**96**	**159**
JA6YFS	667,520	1039	81	143
JA7YCQ	385,728	812	67	97
JA0YAK	341,865	594	82	131
JA1YFG	250,746	562	59	99
JA6YDH	114,240	294	57	83

EUROPE

BULGARIA

LZ2KIM	**1,409,514**	**1927**	**99**	**248**
LZ1KDP	**1,285,273**	**1732**	**101**	**252**
LZ2KKR	437,436	746	71	190
LZ2KKZ	365,800	700	71	177
LZ2KEF	196,875	442	58	117
LZ1KVF	136,884	320	66	121
LZ1KSP	75,924	325	39	69
LZ1KFZ	47,712	333	26	70
LZ1KPM	10,290	131	13	29

CZECHOSLOVAKIA

OK1KRG	**2,797,020**	**2373**	**127**	**365**
OK1KSO	**1,959,940**	**1881**	**109**	**321**
OK3VSZ	**1,041,755**	**1395**	**92**	**249**
OK1KQJ	664,430	1082	69	200
OK1KUR	571,428	884	84	213
OK2KMR	543,348	965	72	186
OK1KRQ	438,170	854	65	150
OK3KEE	435,507	776	78	171
OK1KRS	358,750	625	72	178
OK3RJB	208,472	500	57	127
OK2KOD	187,436	475	59	129
OK1KTW	170,775	548	48	87
OK1DCW	78,396	217	54	85
OK1ONI	71,250	312	36	114
OK1KYS	69,084	178	59	112
OK1KZQ	42,244	176	41	77
OK2KET	35,984	213	34	70
OK1KRY	33,065	269	33	52
OK2KPS	22,134	168	21	30
OK2KJU	20,400	110	30	45
OK3KXR	15,554	118	25	52
OK3KFO	3,660	132	6	24
OK3KKQ	2,024	90	6	21
OK3KVE	1,716	40	7	15

DENMARK

OZ1EE	**1,276,288**	**1792**	**92**	**246**

ENGLAND

G4DSE	**1,246,485**	**1516**	**95**	**250**
G3GJL	935,010	1474	78	192
G4BRA	379,750	1550	66	179
G4BP	214,840	1310	48	116

FINLAND

OH2AA	**2,053,725**	**2238**	**116**	**301**
OH3AA	942,130	1430	87	226
OH1VR	800,640	1275	91	229
OH3AM	507,600	958	70	170
OH9AB	407,572	885	66	170
OH5AB	219,400	537	59	141
OH2BSX	145,524	523	50	131

FRANCE

F3TV	**3,196,935**	**3046**	**121**	**338**
F79WARC	**1,277,930**	**2541**	**67**	**168**
F6KKE	374,472	869	57	111

GERMANY (FRG)

DL8AA	**3,250,098**	**3081**	**115**	**318**
DK0TU	**2,553,780**	**2342**	**125**	**340**
DL8CM	1,713,480	1846	106	287
DL0WW	999,462	1353	89	225
DJ6BN	343,312	990	53	119
DL0ER	128,949	360	56	103

GERMANY (GDR)

DM2CDL	**1,265,192**	**1606**	**97**	**237**
DM4UG	**1,108,968**	**1672**	**95**	**233**
DM3GM	1,001,147	1346	88	241
DM4IH	336,141	886	57	164
DM4RA	207,844	692	55	127
DM5IG	19,152	139	29	47
DM3YL	3,000	58	14	36

HUNGARY

HG6V	**3,220,176**	**3530**	**123**	**315**
HA3KNA	**1,340,688**	**1712**	**98**	**274**
HA7KLG	**1,038,096**	**1563**	**92**	**232**
HA5KKC	939,300	1485	89	214
HA4KYH	925,298	1408	82	225
HA1KZZ	783,510	1377	82	212
HA1KSA	746,289	1244	86	217
HA0KLE	682,722	1116	84	198
HA2KRZ	566,280	1130	72	170
HA8KVB	555,220	1092	70	160
HA7KLC	487,529	912	74	183
HA0KLU	452,592	1030	72	180
HA8KAZ	362,766	914	53	153
HA7KSV	349,672	761	69	149
HA5KHG	321,856	755	58	156
HA0KHW	305,996	648	71	156
HA6KZS	300,756	752	62	151
HA1KZU	282,072	644	68	151
HA0KHK	271,110	692	63	147
HA3KHC	246,078	728	51	135
HA5KAI	178,816	603	52	124
HA1KSS	175,973	655	41	120
HA8KLL	113,096	419	45	89
HA8KUA	91,091	453	34	109
HA2KMR	85,800	324	47	85
HA7KLB	59,492	270	35	72
HA9KOV	35,763	219	27	64
HA3KHB	26,505	169	31	64
HA6KNP	16,560	157	16	32
HA8KAX	13,115	124	16	45

ICELAND

TF3IRA	**1,314,990**	**2123**	**79**	**206**

NORWAY

LA1H	**1,358,760**	**1677**	**94**	**218**
LA7A	**1,053,116**	**1489**	**88**	**201**

POLAND

SP2PDI	**2,475,774**	**2340**	**131**	**310**
SP2ZFJ	**1,043,460**	**1427**	**92**	**282**
SQ2P	686,145	1276	83	224
SP9PDF	206,040	530	64	138
SP8KAF	205,165	804	48	137
SP6KZW	136,080	490	50	112
SP7KTE	39,393	148	50	83
SP8KAR	35,000	310	23	47
SP7KLD	7,420	124	11	24

ROMANIA

YO8KAN	**208,032**	**703**	**55**	**142**
YO6KAF	66,285	318	39	96
YO3KWF	49,780	276	33	62
YO7KAJ	18,240	69	12	20
YO6KED	935	57	7	10

SARDINIA

IM8ARI	**212,646**	**626**	**49**	**134**

SPAIN

EA3AIR	**1,044,636**	**1962**	**69**	**194**

SWEDEN

SM6AEK	**1,224,108**	**1548**	**99**	**234**
SL2ZZU	**1,020,928**	**1675**	**81**	**175**
SK7CE	293,820	639	68	168
SK7GC	149,700	528	47	103

SWITZERLAND

HB9AYZ	**282,700**	**668**	**62**	**158**

YUGOSLAVIA

YU7BCD	**4,072,150**	**2913**	**154**	**421**
4N4Y	**2,937,312**	**3085**	**109**	**314**
YU7JDE	1,227,761	1536	98	263
YU7AJD	199,906	442	61	157
YU1DKL	161,409	522	56	138
YU7GST	68,580	294	43	92
YU2EZA	18,941	148	17	20

BYELO RUSSIA

UK2AAB	**770,880**	**1176**	**99**	**253**
UK2AAG	**661,540**	**1164**	**89**	**252**
UK2AAR	380,016	778	70	182
UK2AAX	119,000	539	35	101
UK2AAA	54,708	308	27	70

ESTONIA

UK2RDX	**1,756,352**	**1934**	**111**	**305**

EUROPEAN RUSSIA

UK1AAA	**2,812,342**	**2434**	**128**	**366**
UK6LAZ	**2,331,186**	**2149**	**136**	**371**
UK4WAR	**2,299,284**	**2116**	**129**	**339**

UK3XAB	1,568,160	2001	90	262
UK4WAB	1,492,224	1814	111	291
UK1AFA	848,292	1530	90	227
UK3UAA	598,640	1093	74	206
UK3DAU	547,932	970	84	224
UK4CAA	535,780	1034	77	224
UK3ABF	532,926	1139	68	210
UK4LAA	354,816	835	67	164
UK3WAC	56,400	431	72	75

KARELO-FINNISH REPUBLIC

UK1NAA	**454,020**	**1130**	**63**	**147**

LATVIA

UK2GDZ	**959,420**	**1313**	**98**	**258**
UK2GAB	5,040	80	16	44

LITHUANIA

UK2BBB	**3,451,896**	**2693**	**147**	**420**
UK2PCR	**2,885,856**	**2277**	**144**	**408**
UK2BAS	**2,777,544**	**2486**	**120**	**342**
UK2PAP	2,044,620	1951	120	324
UK2PAO	925,140	1396	85	255
UK2PAT	426,636	847	75	177
UK2PRC	400,200	754	79	197
UK2BBE	337,428	743	75	177
UK2BAF	193,479	891	47	96
UK2PAD	179,467	545	53	144
UK2BAB	165,396	542	55	124
UK2BBF	159,528	549	50	134
UK2BCG	74,661	536	33	90
UK2BAT	23,560	158	24	71
UK2PAQ	7,714	125	16	42

UKRAINE

UK5IAZ	**3,010,172**	**3012**	**135**	**338**
UK5QBE	**1,853610**	**2150**	**110**	**301**
UK5QAA	618,728	1093	84	232
UK5MBE	441,045	1027	69	174
UK5MBQ	419,253	1012	61	176
UK5LAN	242,614	816	48	130
UK5IEG	129,440	478	47	113
UK5MDI	80,400	670	38	82
UK5LAK	26,600	158	27	49
UK5HAB	18,963	147	21	42
UK5UDX	8,800	77	21	34
UK5MAG	7,552	45	27	37

SOUTH AMERICA

URUGUAY

CX7CO	**413,001**	**1318**	**32**	**77**

VENEZUELA

YX5A	**2,747,628**	**2726**	**101**	**241**

MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA

UNITED STATES

N2AA	**8,542,056**	**4677**	**167**	**461**
K8LX	**6,568,430**	**4018**	**162**	**404**
K3WW	**6,467,632**	**3727**	**162**	**442**
N9MM	**5,951,372**	**3523**	**170**	**432**
K8RF	**5,715,264**	**3668**	**166**	**378**
W3FA	5,683,174	3344	152	422
W3MM	5,650,940	3395	155	425
W3RJ	5,274,060	2988	158	452
W3LPL	5,029,056	3024	150	426
N6ND	**4,873,765**	**3517**	**147**	**338**
N3RD	4,467,442	2721	154	420
K2UA	4,152,650	2740	141	388
W3GM	3,114,496	2134	145	367
N2RM	2,442,421	1774	127	352
N3LR	1,001,644	1047	98	234
W3GU	528,045	570	101	228

ALASKA

KL7Y	**4,464,829**	**5470**	**110**	**213**

BRITISH VIRGIN ISLANDS

VP2VEQ	**4,674,108**	**4930**	**102**	**279**

CAYMEN ISLANDS

ZF2AD	**2,274,932**	**3334**	**92**	**206**

GUATEMALA

TG8AA	**2,411,520**	**3309**	**97**	**223**

ASIA

JAPAN

JA3YKC	**4,478,684**	**3311**	**158**	**318**
JA3YBF	**4,298,070**	**3630**	**115**	**307**
JA2YEF	1,993,572	2178	114	210
JA1YXP	1,821,204	2045	114	194
JA7YAA	1,736,407	2018	120	222
JA1YHA	740,955	1120	102	133
JA3YQD	522,554	804	93	134
JH1YDT	486,746	900	74	120
JA4YQO	360,672	636	79	129

EUROPE

GERMANY (FRG)

DL8PG	**6,846,726**	**5476**	**142**	**409**
DL8KF	**5,127,720**	**4803**	**133**	**386**

FINLAND

OH1AA	**5,375,696**	**4524**	**145**	**393**

POLAND

SP3KEY	**226,520**	**348**	**77**	**203**

ROMANIA

YO8AJG	**2,301,210**	**3452**	**125**	**280**

SWEDEN

SK2KW	**7,101,325**	**6416**	**146**	**381**
SK5AJ	**6,019,072**	**5528**	**143**	**369**

SOUTH AMERICA

ARGENTINA

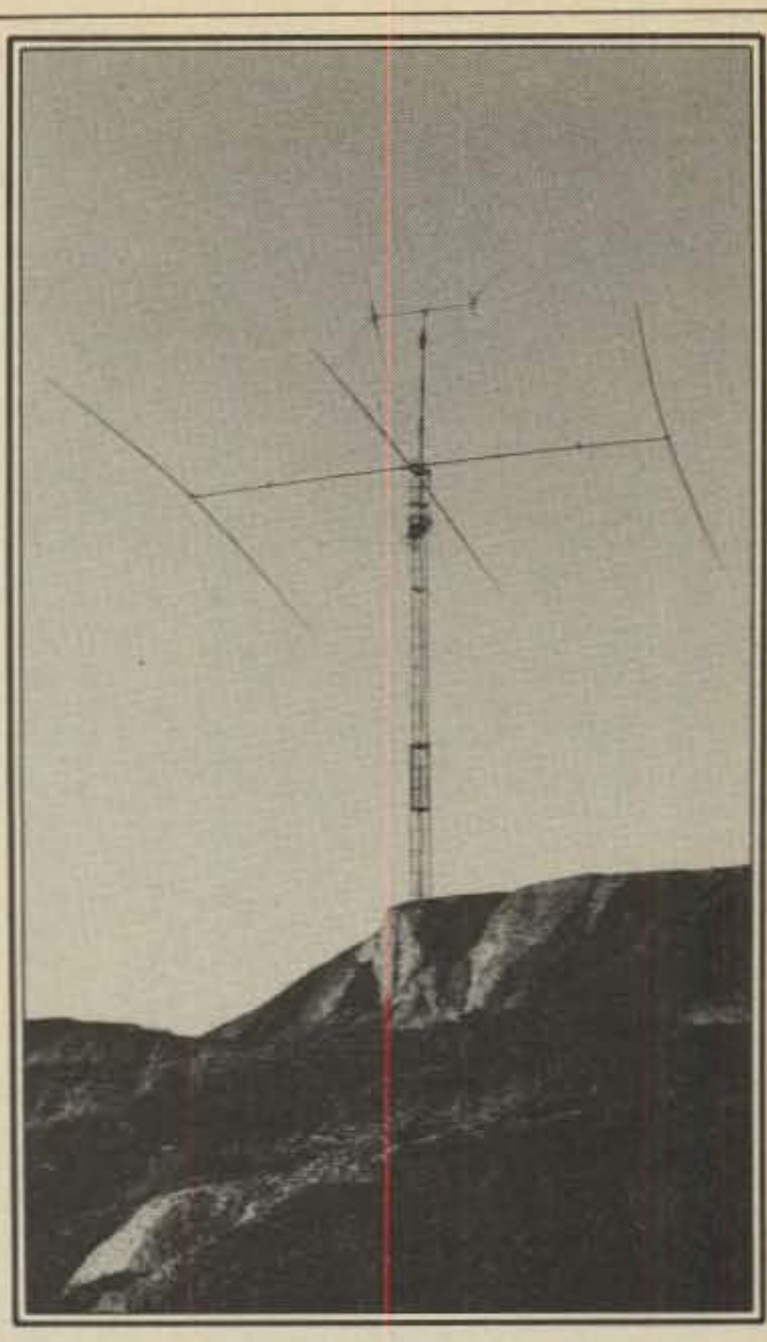
LU7X	**915,400**	**1580**	**50**	**149**

NETHERLAND ANTILLES

PJ2CC	**20,045,952**	**11786**	**154**	**422**

TRINIDAD

9Y4W	**16,835,172**	**10380**	**148**	**395**



LA1EE QTH.

WORLD QRP SECTION

5 WATTS OR LESS INPUT

G4BUE	**A**	**481,347**	**923**	**63**	**174**
UB5CI	"	**402,753**	**734**	**79**	**220**
YT3L	"	**374,661**	**532**	**87**	**226**
			(Opr. N1YU)		
OK1DKW	"	**304,194**	**661**	**64**	**178**
SM5CCT	"	**256,365**	**549**	**68**	**175**
WA4LOF	"	**188,055**	**337**	**71**	**128**
W5YZ	"	163,348	308	64	130
WA6POC	"	143,577	393	47	82
VE5JO	"	70,512	299	44	60
K8DU	"	69,823	199	43	88
N2GC	"	60,032	178	37	91
WA2JOC	"	55,622	146	41	96
UB5AAL	"	50,552	219	41	101
KX6MY	"	45,198	170	48	45
HP1XAT	"	44,044	400	25	27
UC2ACT	"	26,400	144	29	71
KQ4A	"	22,477	94	36	55
DM2DTG	"	14,706	142	25	66
W8VSK	"	10,877	59	15	24
UA6AKT	"	10,350	88	21	48
JR1IOS/2	"	9,845	62	25	30
K2RF	"	9,690	63	20	37
AB5N	"	9,568	84	26	26
N5ARB	"	7,480	55	24	31
KL7IBT	"	6,750	56	22	23
SM7CZC	"	3,080	36	18	26
SM3BP	"	1,537	29	11	18
WA2ZWH	**28**	**71,295**	**258**	**27**	**70**
JF1VVR	"	**47,784**	**259**	**21**	**45**
UM8MBQ	"	19,904	193	16	32
W1PWK	"	16,182	92	17	45
OK1MDK	"	12,366	83	19	35
DK2BJ/A	"	10,841	120	15	22
N6QR	"	9,477	94	16	23
PA0ANK	"	9,472	102	14	23
VE3LJJ	"	9,240	108	14	26
JE1BQE	"	1,323	65	14	23
K1CGJ	**21**	**75,256**	**289**	**26**	**66**
JR6KRI	"	**56,019**	**276**	**24**	**47**
SM5KAS	"	35,955	359	14	33
WB4BBH	"	24,540	145	20	40
JA9AUD	"	22,528	148	17	27
OK1JCH	"	3,296	55	11	21
SM7BNG	"	2,784	60	8	21
JH8DEH	"	2,392	39	11	12
WA7HDI	"	1,133	28	6	5
WB4YFF/ C6A	"	127	15	4	3
UB5KBF	**14**	**62,228**	**384**	**25**	**69**
K3FN	"	**42,168**	**178**	**25**	**59**
DM2BPN	"	**5,776**	**95**	**10**	**28**
DM2FEI/P	**7**	**5,700**	**132**	**7**	**31**
OK1DCP	"	5,203	79	8	35
OK2BMA	"	1,560	38	7	23
JJ1INO	"	497	26	4	3
YO2CGZ	**3.5**	**1,122**	**70**	**4**	**13**
OK1MNV	"	240	15	3	13
JF1SMV	**1.8**	**4**	**2**	**2**	**2**

CHECK LOGS

Our deepest thanks to the following stations who sent in Check Logs:

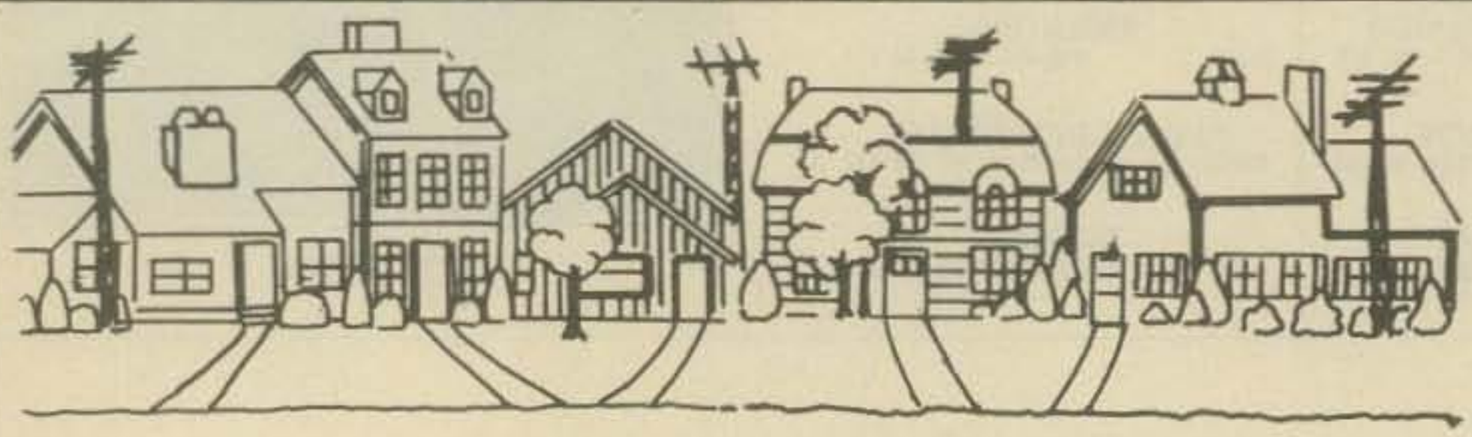
AI3E, AL7O, DA1UV, DM2ABL, DM2ACF, DM2ADC, DM2AHB, DM2AXO, DM2BML, DM2BTD, DM2BWA, DM2BWK, DM2CBA, DM2CBF, DM2CKD, DM2CMF, DM2CVB, DM2DGE, DM2DZH, DM2FCI, DM2FIL, DM2FWI, DM2GDL, DM2JXJ, DM3EA, DM3FC, DM3IM, DM3OVA, DM3PFF, DM3PFY, DM3SF, DM3SBM, DM3TYF, DM3WPL, DM3ZUE, DM4CM, DM4YSL, DM4ZA, DM4ZCO, DM4ZKF, DM5ZDL, GU3MBS/M, I0YWK, IT9-72013, LA2AV, LA2IE, LA3BO, LA3FE, LA4AT, LA5VJ, LA5YJ, LA7SP, LA7XB, LA8CJ, LA8SE, LZ1AM, LZ1KDP, LZ1MT, LZ1QG, LZ1RU, LZ1UA, LZ1YF, N6OB, OH2BLD, OH2MM, OH5LJ, OH5GD, OH6GQ, OH6RE, OH0MM/2, OK1DMP, OK1IAR, OK1US, OK2BMA, OK2SWD, OK3CO, OL6AWY, OX3RA, OY7ML, OZ1GIC, OZ2JZ, OZ6SF, OZ6XT, OZ7XU, PA0CYW, PA0PLM, PA50VRC, PT2BW, PT7AW, PY2BTR, PY2CPU, RA3XBN, SM2COR, SM2JFO, SM4ASI, SM4AZD, SM5AFE, SM5EVQ, SM6AVD, SM6AYM, SM6BZE, SM6JNW, SM7QY, SM7TV, SP2JXM, SP4KAI, SP4LDT, SP5AD, SP5ATO, SP5CFD, SP5KVW, SP8BVO, SP9BPF, SP9CDA, SP9CTW, SP9CVY, SP9DTH, UA1AHQ, UA1ODP, UA1OEC, UA1OSA, UA1OSM, UA2FEA, UA3ABI, UA3ACJ, UA3AIT, UA3ALJ, UA3DAT, UA3DDC, UA3DER, UA3DFV, UA3DGI, UA3DLD, UA3DLS, UA3IDT, UA3PDA, UA3PEZ, UA3PHA, UA3QBP, UA3TCI, UA3TDP, UA3UBN, UA3VEZ, UA3VGO, UA4AY, UA4FCL, UA4HAN, UA4HEJ, UA4HFG, UA4HGC, UA4HJA, UA4MX, UA4NEJ, UA4NET, UA4OP, UA4PAU, UA4RT, UA4SBF, UA4YAB, UA6AAO, UA6ABS, UA6AKO, UA6AWE, UA6HBF, UA6LFQ, UA6LXZ, UA6XAE, UA9CES, UA9FCA, UA9MQ, UA9OBG, UA9OBL, UA9PP, UA9SBP, UA9SDL, UA9UOB, UA9UOF, UA9URS, UA9XS, UA0ABC, UA0AG, UA0KBC, UA0LAQ, UA0QCA, UB5AAF, UB5ABY, UB5EF, UB5EU, UB5HCU, UB5IAN, UB5IBR, UB5IIA, UB5JKR, UB5MBP, UB5QCP, UB5QEB, UB5RAF, UB5SBM, UB5UBI, UB5UBU, UB5UCH, UB5UDC, UB5UDG, UB5UDH, UB5YE, UB5ZA, UB5ZAT, UB5ZDK, UC2CFA, UC2WBJ, UK1OAZ, UK2BAG, UK2TAD, UK3AAK, UK3DBV, UK3MAA, UK3WAW, UK4HBB, UK5EAE, UK5IAI, UK6ABC, UK6HCZ, UK6LWW, UK7TAA, UK9CCR, UK9UAD, UK9XAA, UK0KAD, UK0LAB, UL7BBJ, UL7GBP, UP2AW, UP2BCS, UP2BV, UQ2CR, UQ2GGS, UQ2MU, UQ2PJ, UT5DL, UT5LF, UT5SY, UV3DN, UW1LW, UW3GL, UW3MW, UW4NH, UW6CF, UW9PT, UY5GG, UY5YB, UY5YY, K7SS/VE7, VK3XB, W1OCV, W3CV, W9RX, WB2MCB, WD9CIJ, YO4ATW, YO4KRE, YO4ZJ, YO5AFJ, YO5AY, YO5BJW, YO6EZ, YO6XA, YU3TRI, YU4RS-6643, YU4-17867, YU7ADA, ZS5XT.

Addendum: Bill, K5GA, was inadvertently left out of the phone results. His score was 2,064,160 points, 1513 QSO's, 135 zones, 350 DXCC. Our apologies.

Disqualifications:

W6VPH: Excessive duplicates and broken calls.

ZX4BW: Excessive duplicates.



THE CONTEST

'Twas a week till the contest and all thru the town
All the hams were preparin' with nary a frown.
We cleaned up our stations and got lots of rest
'Cause the contest demanded the peak of our best.

I was ready this year. I was willing and eager.
For the last fifteen years my scores had been meager.
This year would be different, I'd taken a vow.
I knew I could win it if Fate would allow.

The first year I tried TVI did me in
And I had to leave off where I'd planned to begin.
So I filtered and bypassed and shielded and grounded
Till I got rid of spurs and was no longer hounded.

The very next year my poor transmitter died.
The six one four six in the final got fried.
So I stocked up on spares of all sorts of parts;
Now the size of my junk box will gladden your hearts.

The third year I tried and I got on the air!
But my skill in the contest was ranked less than fair.
So I dug out my key and brushed up on the code
And I checked into nets in the SSB mode.

As each year went by, something different went wrong.
Each contest I tried, Murphy's Law was along.
I couldn't admit it to family or friend,
But this was my limit—I'd not try again.

There's no fighting Fate, some things aren't meant to be.
If I failed again then from contests I'd flee.
But I wasn't worried, I'd come out on top.
With fifteen years practice I just couldn't flop!

My station was perfect. There was naught that it lacked.
That I'd win this year's contest I knew for a fact.
I'd studied and practiced like a second career.
My whole goal in life was to win it this year.

I'd spent every evening and half of the night
Working DX till the dawn's early light.
I'd fine tuned my skills to the highest degree
And I'd studied the rules of the F C and C.

I'd harvest the contacts and reap such a score
That my record would stand for a dozen years more.
I dreamed of my conquest all night in my bed,
For little I knew of my troubles ahead!

The next morning's mail hit me just like a shock.
Uncle Charlie had written (on his famous pink stock)
A letter of warning (it's called a citation)
For working DX from an expired station.

I started at my ticket and found it was true.
My license had expired. I forgot to renew.
And then as I wept salty tears in my beer,
My wife said, "Don't cry dear. There's always next year."

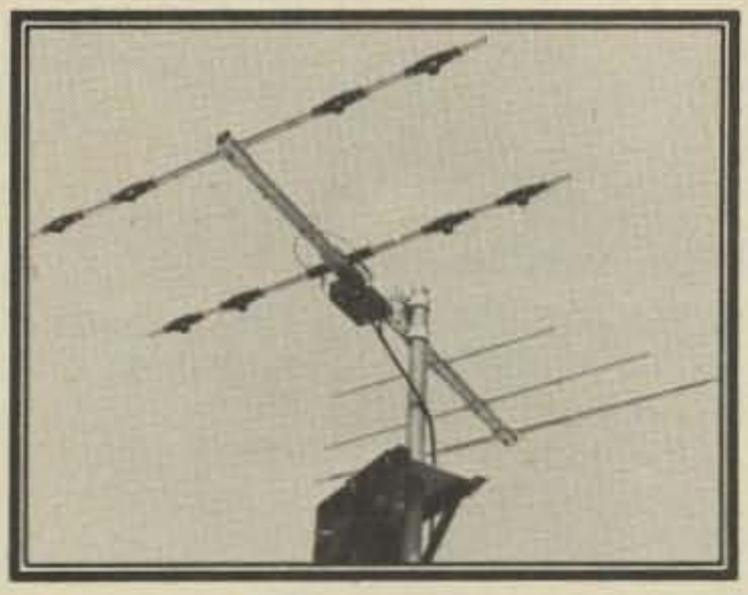
By Glen Charnock, WB6JKM

CQ SHOWCASE

ICM 24-Channel Satellite Receiver

The TV-4300 Satellite Receiver tunes all channels within the 3.7 to 4.2 gHz band. Standard dual audio output is provided at 6.2 and 6.8 MHz. Others are available. The TV-4300 is a fully packaged and assembled receiver complete with built-in LNA power supply, built-in AFC, tuner, control circuitry, and power cable. All output levels are compatible with video monitor and VTR input.

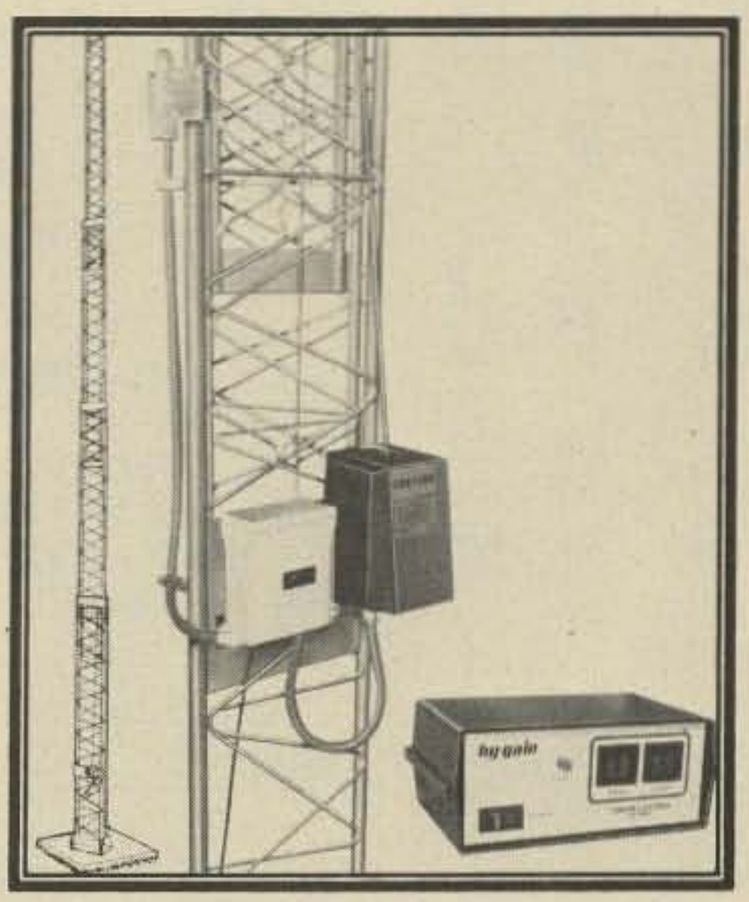
International Crystal offers several options, including a remote tuning control and selectable audio with stereo output. For more information contact International Crystal Manufacturing Company, Inc., 10 North Lee, Oklahoma City, OK 73102, or circle number 103 on the reader service card.



Telrex Labs. Tri-Band Model TB5ES

The latest in Telrex's series of antennas is the 5-element "balun" fed 10, 15, 20 meter Tri-Band Model TB5ES. The antenna provides optimum forward gain, f/b ratio, and signal to noise ratio. It has an 18 ft. boom, 36 ft. longest element, 22 ft. turning radius, 7 sq. ft. wind surface area, and weighs 49 lbs. The one-half power beamwidth is 60° with 35 dB side nulls and a 1 kw power rating.

The TB5ES has a precision machined boom, hermetically sealed epoxied traps, stainless steel electrical hardware, preformed gusset mounting straps, reinforced boom and elements, and more. The antenna is priced at $315. For more information contact Telrex Labs., P.O. Box 879, Asbury Park, NJ 07712, or circle number 104 on the reader service card.



Hy-Gain Adds To Tower Line

Hy-Gain has announced the addition of three new products to its tower line. The HG-70HD, a new 70 foot self-supporting crank-up tower, is all steel, has four sections and features an improved guide system providing rigid, close-tolerance structural support while leaving the tube ends open for complete surface galvanizing and unrestricted moisture drainage. This heavy-duty tower was designed for antenna loads of up to 16 sq. feet in winds of up to 60 mph. The top section is predrilled for thrust bearing bolts and a rotor mounting plate is included.

Hy-Gain has also developed a new electric winch system, Model No. HG-EW, that fits the new HG-70HD, as well as the existing 54 foot HG-54HD and the 52 foot HG-52SS. This winch system can be converted at any time to remote-control operation by adding the new Hy-Gain tower control, HG-EWRC, which has been specifically designed as a modular addition to the HG-EW winch. For further information contact Hy-Gain, Div. Telex Communications, Inc., 8601 Northeast Highway Six, Lincoln, NE 68505, or circle number 105 on the reader service card.

Shure Model 444D Microphone

The new Shure Model 444D fixed station microphone which retains all the performance characteristics that made the Model 444 popular, also offers added features for amateurs.The Model 444D has a new impedance selector switch located on the bottom of the base, which allows selecting either high or low impedance operation. A second easy-to-use slide switch is provided for switching between normal or VOX operation. These new features join the unit's easy-to-use, momentary or locking, push-to-talk switch bar, which actuates the microphone and an external relay or control circuit with fingertip action.

Other added features of the Model 444D are a coiled cable, the availability of a free, personalized nameplate, and a wiring guide. User net price of the Model 444D is $55.50. For more information contact Shure Brothers Inc., 222 Hartrey Avenue, Evanston, IL 60204, or circle number 108 on the reader service card.

CQ World-Wide DX Contest All-Time Phone Records

BY FREDERICK CAPOSSELA, K6SSS

In the records listed below, boldface listings denote world records. Number groups after calls are: year of operation, total score, contacts, zones, and countries. All-band and Multi-Operator records include a band-by-band breakdown of the world leader in each category.

Single Operator/Single Band

WORLD RECORD HOLDERS

1.8	**KV4FZ('76) 37,584**	**380**	**11**	**37**
3.5	**KV4FZ('75) 275,319**	**1,297**	**23**	**80**
7.0	**KX6LA('77) 405,678**	**1,523**	**28**	**63**
14	**KV4FZ('78) . . . 1,520,904**	**3,890**	**36**	**132**
21	**H31LR('79) . . . 1,448,848**	**3,524**	**36**	**127**
28	**OH2MM/CT3('79) 1,827,150**	**4,068**	**37**	**113**

AFRICA

1.8	No Entrant			
3.5	CT3BZ('79) 235,113	772	22	87
7.0	EA8CR('74) 253,528	639	31	103
14	CR6WW('74) . . 1,058,446	2,152	35	132
21	EA8JJ('77) 766,125	1,900	31	104
28	**OH2MM/CT3('79) 1,827,150**	**4,068**	**37**	**113**

ASIA

1.8	4X4UR('74) 1,188	35	3	9
3.5	VE3MR/4X('71) . 197,106	742	22	69
7.0	VE3MR/4X('72) . 215,840	643	27	88
14	VE3BWK/4U('78) 1,061,634	2,532	39	122
21	4X4UH('78) 738,315	1,907	33	102
28	JH1JGX('79) . . 1,035,464	2,474	35	107

EUROPE

1.8	PA5ØHIP('79) 7,644	171	7	35
3.5	I3MAU('75) 113,535	778	18	69
7.0	I5NPH('79) 273,144	1,073	28	86
14	UA6HZ('79) . . . 1,020,181	2,296	38	135
21	YU3ZV('78) . . . 1,212,530	2,975	37	109
28	G3MXJ('79) . . . 1,296,826	2,905	38	119

NORTH AMERICA

1.8	**KV4FZ('76) 37,584**	**380**	**11**	**37**
3.5	**KV4FZ('75) 275,319**	**1,297**	**23**	**80**
7.0	HR1RF('72) 399,542	1,349	28	93
14	**KV4FZ('78) . . . 1,520,904**	**3,890**	**36**	**132**
21	**H31LR('79) . . . 1,448,848**	**3,524**	**36**	**127**
28	**KV4FZ('79) . . . 1,482,525**	**4,079**	**39**	**126**

OCEANIA

1.8	KH6CC ('79) 2,975	63	9	8
3.5	KH6XX('77) 116,416	606	28	40
7.0	**KX6LA('77) 405,678**	**1,523**	**28**	**63**
14	VK6HD('72) 706,251	1,483	37	132
21	VK4VU('79) . . . 1,079,335	2,609	35	104
28	VR3AH('78) . . . 1,442,244	3,970	35	89

SOUTH AMERICA

1.8	HK4EB('76) 3,672	34	4	9
3.5	YV4AGP('72) 72,666	388	18	48
7.0	CX4CR('76) 363,110	1,125	30	80
14	FY7AK('76) . . . 1,415,329 (Opr. F5QQ)	2,950	36	127
21	CW4CR('70) . . 1,196,085	2,462	39	126
28	CW3BR('78) . . 1,662,718	4,028	35	104

Single Operator/All Band

AF	**EAØCR('78) . . . 7,639,624**	**4,876**	**130**	**396**
AS	HS1ABD('79) . 2,772,192	3,092	116	286
EU	G3FXB('79) . . . 4,708,014	3,710	116	341
NA	KV4FZ('70) . . . 4,961,551	4,362	128	369
O	KH6RS('72) . . . 5,331,072 (Opr. K2SIL)	4,739	128	256
SA	**9Y4VT('78) . . . 8,281,800 (Opr. N6AA)**	**6,194**	**118**	**332**

WORLD RECORD

Station	Band	Contacts	Zones	Countries
9Y4VT	1.8	31	5	6
Opr.	3.5	247	12	25
N6AA	7.0	436	18	60
(1978)	14.0	1986	27	78
8,281,800	21.0	1363	27	76
	28.0	2131	29	87
	Total	4,876	130	396

Multi-Operator/Single Xmtr.

AF	9LICA('78) 7,367,846	5,393	118	340
AS	R6F('79) 9,029,396	5,643	137	411
EU	EM6A('79) 8,120,574	5,497	136	431
NA	**HI8XWP('79) . . 9,872,267**	**7,603**	**134**	**417**
O	5W1AZ('77) . . . 5,452,302	5,154	125	241
SA	FY7BC('78) . . . 8,989,695	6,125	124	371

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	10	4	9
HI8XWP	3.5	276	14	52
(1979)	7.0	511	22	65
9,872,267	14.0	1,076	30	96
	21.0	2,362	32	96
	28.0	3,370	32	99
	Total	7,603	134	417

Multi-Operator/Multi-Xmtr.

AF	EA8CR('77) . . 21,351,898	10,290	153	544
AS	EX9A('78) . . . 15,364,080	9,233	164	519
EU	YU3EY('79) . . 16,646,364	9,562	153	528
NA	**VP2KC('79) . . 37,770,012**	**17,767**	**175**	**677**
O	KH6XX('79) . . 21,990,252	10,989	184	494
SA	PJ9JR('78) . . 29,211,300	14,598	147	528

WORLD RECORD

	Band	Contacts	Zones	Countries
	1.8	526	11	47
VP2KC	3.5	1,079	22	95
1979	7.0	1,702	28	107
37,770,012	14.0	4,208	39	153
	21.0	5,417	39	145
	28.0	4,835	36	130
	Total	17,767	175	677

Club record: Frankford Radio Club ('79) 173,821,640

CQ World-Wide DX Contest All-Time C.W. Records

Single Operator/Single Band

WORLD RECORD HOLDERS

1.8	**KV4FZ('76) 42,800**	**390**	**13**	**37**
3.5	**CT3/OH1TV('77) 223,364**	**1,066**	**19**	**57**
7.0	**KP4AST('73) . . . 447,421 (Opr. WA4PXP)**	**1,479**	**32**	**95**
14	**CX4CR('75) . . . . 935,025 (Opr. CX9BT)**	**2,303**	**34**	**103**
21	**LU8DQ('78) . . . 1,011,220**	**2,611**	**34**	**106**
28	**LU8DQ('79) . . . 1,033,399**	**2,775**	**34**	**93**

AFRICA

1.8	EA8CR('76) 7,696	100	8	18
3.5	**CT3/OH1TV('77) 223,364**	**1,066**	**19**	**57**
7.0	5A1TW('64) 227,814	918	22	64
14	CR6IK('74) 925,386	2,021	38	116
21	TJ1AW('70) 549,888	1,447	35	93
28	FR0MM('79) 978,012	2,590	36	90

ASIA

1.8	4X4NJ('74) 4,818	76	6	16
3.5	UI8LAG('78) 110,552	606	16	57
7.0	4X4FA('64) 174,505	781	25	60
14	UH8AA('79) 411,120	1,401	31	73
21	JH3LPT('79) 376,208	1,151	35	77
28	4Z4KX('79) 368,986	1,237	29	77

EUROPE

1.8	G3SZA('79) 21,960	283	12	33
3.5	DK3GI('77) 165,216	967	23	73
7.0	YU2CDS('79) . . . 361,680 (Opr. YU2RQX)	1,204	32	88
14	OH8OS('77) . . . . 625,812 (Opr. OH2BH)	1,961	34	87
21	SM5GMG('79) . . 526,229	1,660	35	86
28	DK3GI('79) 592,848	1,584	31	101

NORTH AMERICA

1.8	**KV4FZ('76) 42,800**	**390**	**13**	**37**
6.5	KV4FZ('75) 190,082	789	24	77
7.0	**KP4AST('73) . . . 447,421 (Opr. WA4PXP)**	**1,479**	**32**	**95**
14	KV4FZ('70) 908,514	2,315	36	117
21	VP2MEE('79) . . . 623,118	2,457	30	72
28	KV4FZ('79) 653,072	2,384	32	87

OCEANIA

1.8	**VR3AH('78) 20,310**	**238**	**12**	**18**
3.5	**VR3AH('76) 178,560**	**956**	**24**	**40**
7.0	**AH6Z('78) 387,750**	**1,382**	**30**	**64**
14	**VK6HD('75) 469,320**	**1,325**	**32**	**8**
21	**KH6XX('78) 816,102**	**2,311**	**38**	**81**
28	KH6XX('79) 586,236	2,013	34	64

SOUTH AMERICA

1.8	YV1OB('77) 14,220	192	9	21
3.5	N4JI/HC1('77) . . . 77,748	463	21	36
7.0	CV4DL('75) . . . . 230,040 (Opr. CX1BBL)	1,020	24	57
14	**CX4CR('75) 935,025**	**2,303**	**34**	**103**
21	**LU8DQ('78) . . . 1,011,220**	**2,611**	**34**	**106**
28	**LU8DQ('79) . . . 1,033,399**	**2,775**	**34**	**93**

Single Operator/All Band

AF	**CT3BZ('78) . . . 5,135,104**	**4,256**	**105**	**311**
AS	UF6DZ('79) . . . 3,440,172	2,540	99	255
EU	OK2RZ('79) . . 2,916,045	2,463	128	367
NA	KP4RF('78) . . 4,908,186 (Opr. N6CJ)	3,797	135	379
O	KH6RS('72) . . 2,748,307 (Opr. W6MAR)	2,990	121	190
SA	9Y4VT('77) . . . 4,697,304 (Opr. N6AA)	3,992	122	275

WORLD RECORD

	Band	Contacts	Zones	Countries
	1.8	0	0	0
CT3BZ	3.5	274	14	41
(1978)	7.0	526	16	49
5,135,104	14.0	856	28	84
	21.0	810	24	64
	28.0	1,790	23	73
	Total	4,256	105	311

Multi-Operator/Single Xmtr

AF	EA9EU('79) . . . 4,200,839	3,652	106	303
AS	R6F('79) 7,966,368	4,965	148	408
EU	YU7BCD('79) . 4,072,150	2,913	154	421
NA	NP4A('79) 7,982,576	6,100	141	385
O	5W1AZ('76) . . . 2,534,416	3,043	108	176
SA	FY7AK('75) . . . 4,197,364	3,670	98	288

WORLD RECORD

	Band	Contacts	Zones	Countries
	1.8	76	17	19
NP4A	3.5	238	16	58
(1979)	7.0	922	22	66
7,982,576	14.0	1,307	35	89
	21.0	1,796	32	79
	28.0	1,761	28	74
	Total	6,100	141	385

Multi-Operator/Multi Xmtr

AF	EA8CR('78) . . 17,734,970	9,799	142	463
AS	EX9A('78) 8,721,019	6,882	137	384
EU	SK2KW('79) . . 7,101,325	6,416	146	381
NA	N2AA('79) 8,542,056	4,677	167	461
O	KS6ER('73) . . . 1,415,650	2,136	102	123
SA	**PJ2CC('79) . . 20,045,952**	**11,786**	**154**	**422**

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	81	6	10
PJ2CC	3.5	704	18	53
(1979)	7.0	1,768	25	76
20,045,952	14.0	3,442	33	95
	21.0	3,244	38	100
	28.0	2,447	34	88
	Total	11,786	154	422

CQ World-Wide DX Contest
All-Time U.S.A Records

BY FREDERICK CAPOSSELA, K6SSS

Tabulated below are the record-high scores achieved by U.S. contesters in the CQ World Wide DX Contest. Number groups following calls and bands are: year of operation, total score, contacts, zones, and countries.

PHONE

Single Operator/Single Band

1.8	K1PBW('76) 7,280	100	10	30
3.5	W1CF('78) 114,227	435	23	80
7.0	W3PHL('75) 110,799	337	29	88
14	W4AXE('70) . . . . 595,725 (Opr. WA4PXP)	1068	39	156
21	**K1RM('79) 870,237**	**1,768**	**38**	**129**
28	**WA2SPL('79) . . . 735,528**	**1,659**	**36**	**116**

Single Operator/All Band

	Band	QSOs	Zones	Countries
	1.8	55	8	14
N7DD	3.5	50	15	28
(1979)	7.0	74	20	42
3,113,788	14.0	420	34	76
	21.0	794	35	86
	28.0	813	34	100
	Total	2,206	147	346

Multi-Operator/Single Xmtr

	Band	QSOs	Zones	Countries
	1.8	7	5	5
K5GA	3.5	39	15	37
(1978)	7.0	173	21	64
4,150,306	14.0	549	39	125
	21.0	619	35	103
	28.0	1057	33	111
	Total	2,444	148	445

Multi-Operator/Multi-Xmtr

	Band	QSOs	Zones	Countries
	1.8	109	8	16
N2AA	3.5	406	24	79
(1979)	7.0	366	28	84
13,299,750	14.0	1646	40	152
	21.0	2198	40	144
	28.0	1354	36	120
	Total	6,079	176	595

CW

Single Operator/Single Band

1.8	K1PBW('76) 22,626	157	15	39
3.5	W1MX('76) . . . . 108,288 (Opr. WA8WNU)	403	21	75
7.0	W5WZQ('76) . . . 322,383	907	33	90
14	W6VPH('78) . . . 468,312	1105	36	116
21	W1RM('79) 450,120	1,173	37	95
28	N4WW('79) 349,206	1,009	34	87

Single Operator/All Band

	Band	QSOs	Zones	Countries
	1.8	9	9	8
W3RJ	3.5	54	16	36
(1978)	7.0	210	22	65
2,186,948	14.0	516	34	88
	21.0	371	28	76
	28.0	420	28	83
	Total	1,580	137	356

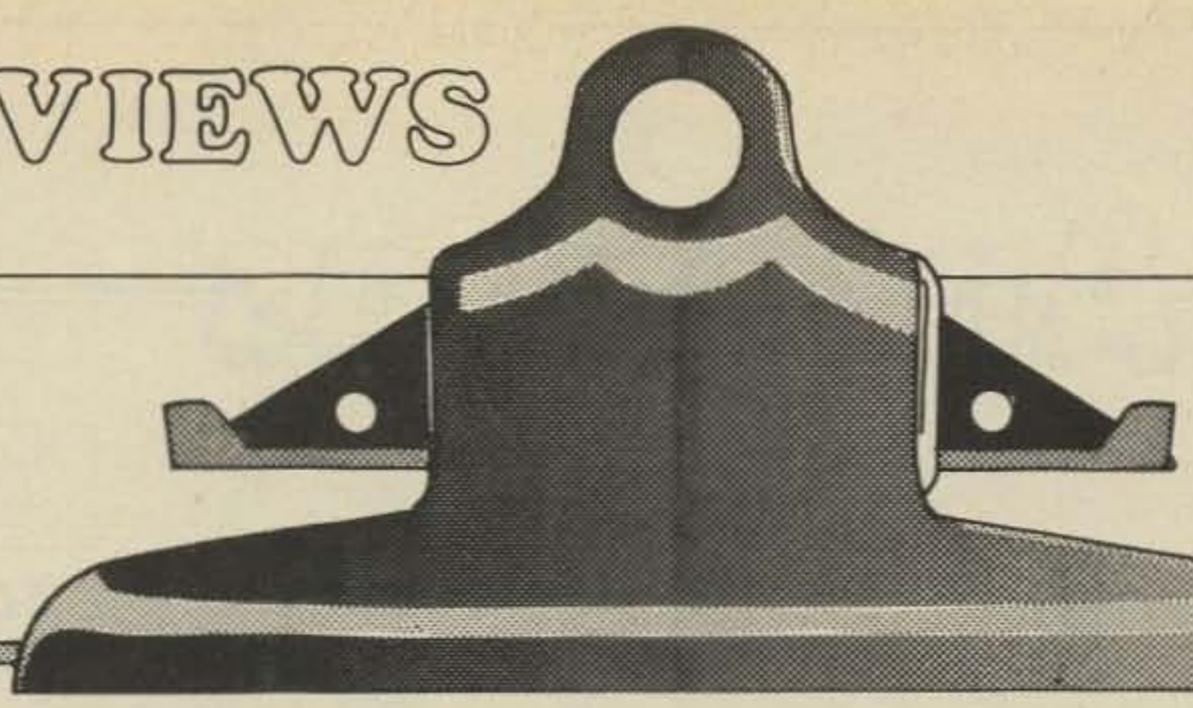
Multi-Operator/Single Xmtr

	Band	QSOs	Zones	Countries
	1.8	10	7	9
K5RC	3.5	60	18	39
(1979)	7.0	328	30	79
4,148,781	14.0	773	38	100
	21.0	728	34	92
	28.0	658	33	85
	Total	2,557	160	404

Multi-Operator/Multi-Xmtr

	Band	QSOs	Zones	Countries
	1.8	29	6	14
N2AA	3.5	324	24	64
(1979)	7.0	741	29	82
8,542,056	14.0	1,394	40	116
	21.0	1,237	36	96
	28.0	952	32	89
	Total	4,677	167	461

Club Record: Frankford Radio Club ('79) 173,821,640



The Heathkit SA-1480 Remote Coax Switch

BY ALAN M. DORHOFFER*, K2EEK

If you're fortunate to have several antennas up, or are planning to put up a few more this year, Heath has a practical solution to the feeding problem. With the Heath SA-1480 remote coax switch you can use one feedline to feed and use up to five different antennas.

The remote switch consists of two units, a small console for your operating position and the actual weatherproof remote switch, which is connected by an 8-wire cable, and can be either tower or mast mounted by a single clamp. The console houses the a.c. supply, which supplies 30 v.d.c. to operate the motor switch in the remote unit.

The front panel of the remote coax switch console has six LED indicators, indicating any of five antennas or ground. All five antennas can be grounded simultaneously at the flick of a switch to protect your system from lightning. If perchance something happens to jam the motor, the LED's will glow dimly to indicate the malfunction.

The front panel antenna selector switch routes the 30 v.d.c. to the remote motor switch through any of six positions. The motor switch and a pulse switch step in 30° increments until an open circuit is found. The motor will stop then at the appropriate antenna, or ground, via the rotary switch section, and the corresponding LED will light.

Construction is quite easy and straightforward. One area of concern where caution should be exercised is in soldering the connections to the 6-lug terminal strip mounted on the bottom of the console. This terminal strip has connections through the terminals and the rivet type holes below supporting the terminals which are near chassis level. There is a flat 6-wire cable running under this terminal strip, at right angles to it. There is the danger of melting through the flat cable insulation when soldering through one of the lower hole connections on the terminal strip. If you put a small piece of insulated vinyl electrical tape over the flat cable at this point you can prevent it from happening or repair it if necessary. I leave it to you to figure out how I found this out.

As I mentioned, construction is easy and takes about 7 hours using simple tools and a light pencil-type soldering iron.

The SA-1480 uses standard SO-239 connectors and is rated up to 150 MHz. It will handle the legal limit with input impedances between 50 and 70 ohms. Switch contacts are silver plated.

The SA-1480 sells for $89.95. It requires 8-conductor cable (not supplied). Heath supplies the cable in three lengths: IDA-1290-1, 50 ft. $7.95; IDA-1290-2, 100 ft. $14.95; IDA-1290-3, 150 ft. $21.95. For further information contact Heath Company, Benton Harbor, MI 49022.

*Editor, CQ

a monthly feature by
KARL T. THURBER, JR., W8FX

Antennas

DESIGN, CONSTRUCTION, FACT, AND EVEN SOME FICTION

More On H.F. Verticals: Getting Fancy

Last month, author W8FX began a discussion of h.f. vertical antennas. He covered the merits of vertical vs. horizontal polarization, basic theory and full-size designs, as well as grounding and matching requirements. This month, he goes on to discuss popular variations on basic vertical designs.

-K2EEK

Last month we covered basic h.f. vertical antenna design and theory. We also highlighted straightforward vertical designs, including two of my favorites, the folded vertical and the no-trap multiple vertical. This month's column continues the article which began last month. We will go on to discuss shortened and loaded verticals, including mobile antennas and base loaded multibanders.

Let's go into what happens when we substantially shorten the vertical from "reasonable" lengths of ¼-wavelength or longer to mini-sized configurations.

Shortened/Loaded Verticals

While quarter-wavelength or longer antennas make for more efficient radiators, shorter verticals can still be effective radiators as long as they possess an adequate ground system, don't exhibit excessive loading coil losses, and show a reasonably good match to the transmission line.

A very short vertical has a low radiation resistance and a high "Q" or selectivity factor. At all frequencies lower than the antenna's self-resonant frequency, it electrically looks like a low resistance in series with a high capacitive reactance. In order to resonate the antenna to the desired frequency and to match the antenna to a convenient transmission line impedance (such as 50-75 ohms), the reactance must be cancelled out and an impedance transformation accomplished. This calls for the use of a series loading coil or L/C network.

A quarter-wave vertical has an impedance of about 35 ohms. An acceptable match can be effected by direct connection to coax cable, or an r.f. transformer or base-matching circuit can be used for more effective power transfer from transmission line to antenna. However, when the length of an antenna is physically reduced with respect to wavelength, the radiation resistance is also lowered. For example, a 0.2 wavelength antenna has an impedance of about 18 ohms, showing capacitive reactance. A very short vertical, for instance, a 16-foot antenna on 80 meters, will show a radiation resistance of but a few ohms; coupled with high capacitive reactance, it's hard to match. Since radiation resistance is low relative to the ohmic resistance of the antenna, the radiator becomes a very inefficient one—with most of the power wasted in the form of heat.

If size reduction is not carried to the extreme, decent results can be had with shortened antennas if a

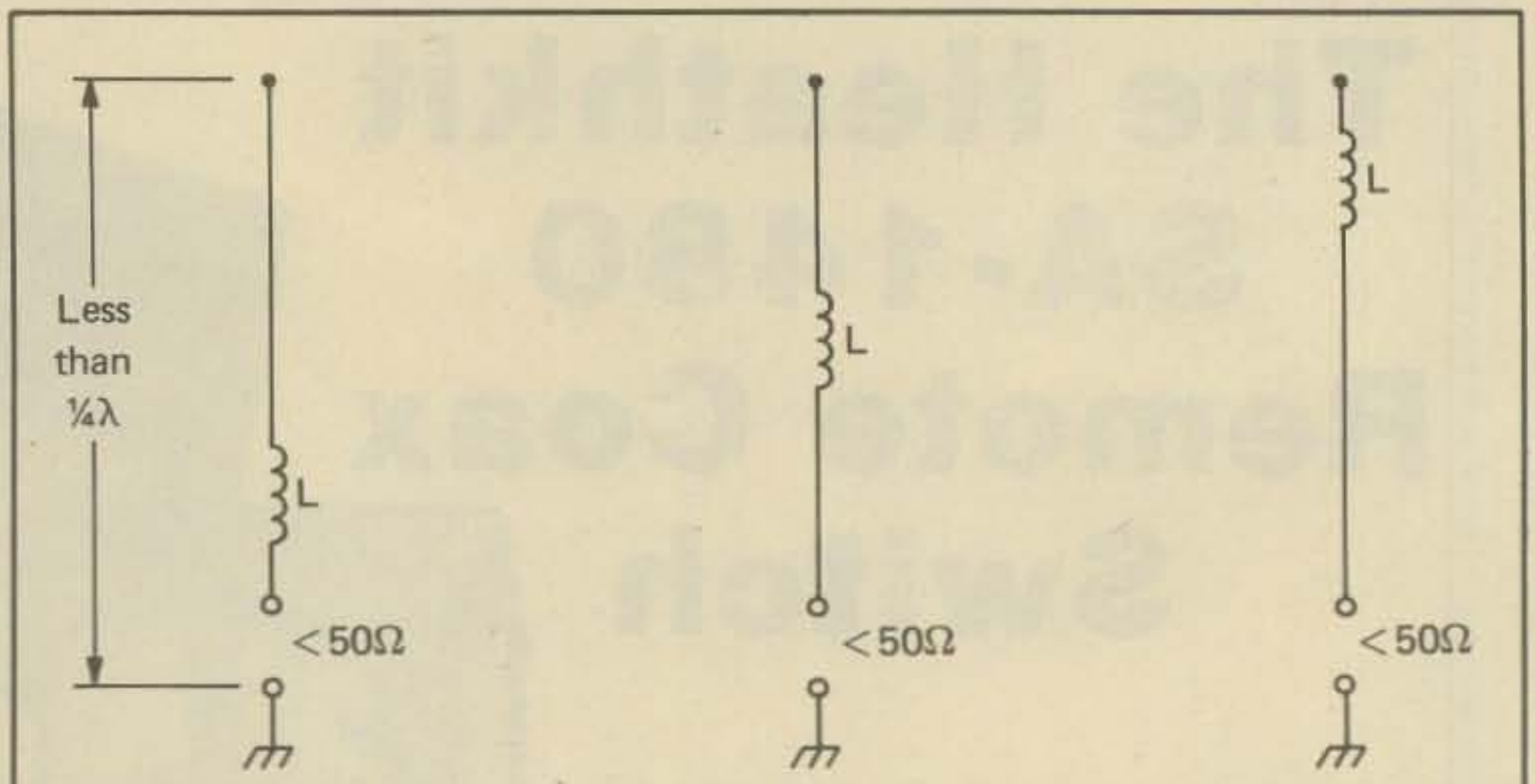


Fig. 1-The shortened/loaded and mobile vertical antennas.

Three representative classes of shortened verticals are shown above.

The electrically short antenna shows high Q (selectivity factor), and a low radiation resistance. The capacitive reactance which is present is tuned out and the antenna resonated by means of a series loading coil. The coil may be mounted at any point, though base loading (A) is usually most convenient, and is usually done with fixed station antennas. Center loading (B) is more efficient, and top loading (C) is the most efficient—though the least convenient, mechanically speaking. A "top hat" may be added to reduce the size of the loading coil required and thus to minimize coil losses. Continuously-loaded, helically-wound coils have also been used with some success. The idea is to make the coil as small as possible and to raise the point of maximum current in the antenna as high as possible above ground.

The same principles apply to mobile antennas—only more so. The typical, 8-foot, center loaded whip becomes inefficient and extremely unforgiving of even small QSYs; feedpoint impedance is quite low and can be very difficult to match to coax.

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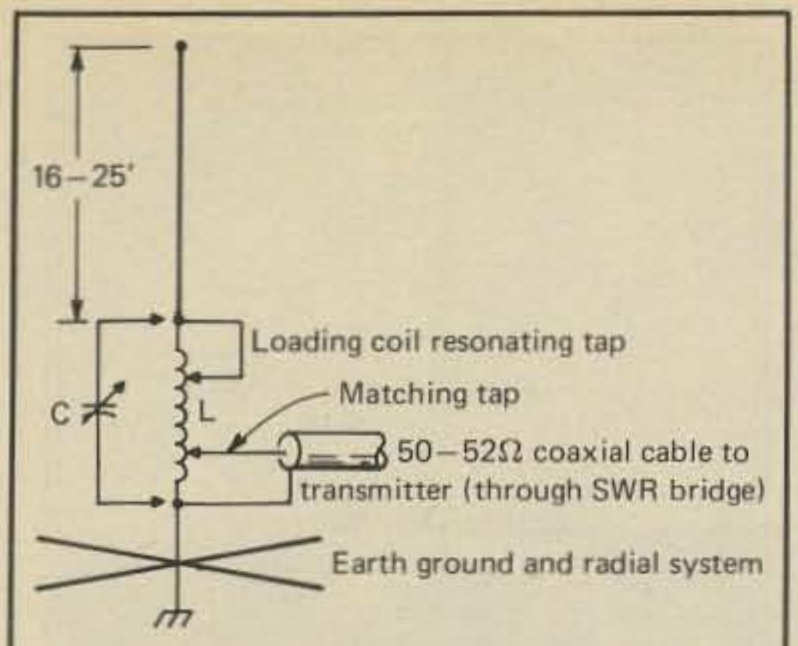


Fig. 2–Base loaded multiband verticals.

Typical base loaded multiband vertical antenna. In this antenna design, a loading coil is installed at the base of a vertical length of wire, tubing or rod about 16-25′ long to enable the antenna to be manually resonated on several bands.

Inexpensive and especially suited to home construction techniques, a couple of 10′ TV mast sections can make up the radiating element, which is supported by a beverage bottle or by ceramic insulators. For 80-10 meter operation, the inductor (L) is usually about 30 turns of 2-3 inch diameter coil stock. The capacitor (C) is a maximum of 100-150 pf. and is used only if a good match to the transmission line can't be obtained without its use. An "L"-network can be used to resonate the antenna, and a wideband r.f. transformer can be used to secure an impedance match.

Several manufacturers sell low-cost multiband verticals incorporating the base loading principle.

high-Q loading coil is used to minimize losses, provided the resultant narrow operating bandwidth is acceptable. An antenna slightly less than 1/8-wavelength is about the shortest that should be used for good results; 24 feet is about the minimum for really good 75/80-meter operation. The very low base impedance—around 15 ohms for a 25′ vertical on 80 meters—is difficult to properly match to coax, though one of the new r.f. transformers (as offered by Palomar Engineers, SST Electronics, and Swan) should fill the bill. The Palomar transformer, for example, has taps at 8, 12.5, 16, 22, 32 and 50 ohms, allowing close matching of almost any shortened vertical to coax.

The problems of the shortened vertical are magnified when considering mobile antennas. On all bands except 10 meters, where a standard 8′ whip works out to full quarter-wave resonance, the antenna is extremely short relative to wavelength; longer whips are not usually practical since they risk hitting obstructions. The efficiency of a loaded antenna drops off markedly on the lower bands, especially on 75 and 160 meters, because the resistance of the loading coil assumes a large proportion of the total resistance into which the transmitter output power is fed. No one likes to mention it, but radiation efficiency on 75 meters can drop to 3% or less—compared with nearly 100% for a full-size, half-wave dipole.

Antenna efficiency can be substantially improved (by 50% or more) by moving the loading coil from the base to the center of the antenna. Adding a capacitive "top hat" decreases the size of the loading coil required, and therefore increases the overall efficiency of the antenna system. However, on the lower bands, the Q (selectivity factor) of an efficient antenna is so high that it's necessary to retune the antenna for even small QSYs (changes in frequency)—as little as 10 kHz on 160 or 75 meters—if efficiency and low s.w.r. are to be maintained. With most mobile antennas, changing bands means changing coils and/or top sections, although there are a few *multiband* antennas available and several schemes have been devised for remote resonating and bandswitching from the driver's seat.

Mobile antenna tuneup is much trickier than adjusting fixed station antennas. A good s.w.r. bridge and dummy load/wattmeter, and possibly a grid dip oscillator or antenna noise bridge, are practical necessities. Achieving a good feedpoint match is even more important than with the shortened fixed station vertical, since mobile whip impedance may be 10 ohms or less. Needless to say, when it comes to h.f. mobile antennas, a little extra effort to reduce unnecessary system loss may increase your ability to "work out" more than any other improvement you can make.

Of interest to the apartment dweller and renter where a windowsill antenna is the only possibility, a number of amateurs have effectively used standard mobile coil-and-whip combinations, mounting them as windowsill semiverticals. At least one manufacturer, Barker and Williamson, has come up with a *portable* base loaded antenna system that covers the 2- through 40-meter bands using several interchangeable coils and a 57″ whip. Since it's almost impossible to secure a real "r.f. ground" in an apartment, antennas of this kind are usually not truly grounded, but are instead fed against an insulated, artificial ground

Precise s.w.r. adjustment is important to proper resonating and efficient tuning and matching of short mobile whips. The Swan SWR-3 "pocket" s.w.r. meter is a compact, lightweight device intended for mobile or portable use. Directional coupler measures 1:1 to 3:1 s.w.r.s at 50 ohms with 3% accuracy from 1.7 to 55 MHz. (Photo courtesy Swan Electronics)

known as a *counterpoise.* Ground system and antenna adjustment can be tricky, and it's especially difficult to keep the shack free of "floating r.f." caused by poor impedance matching and the strong r.f. fields that are induced in metal objects, including station equipment.

Fig. 1 shows representative shortened antenna types.

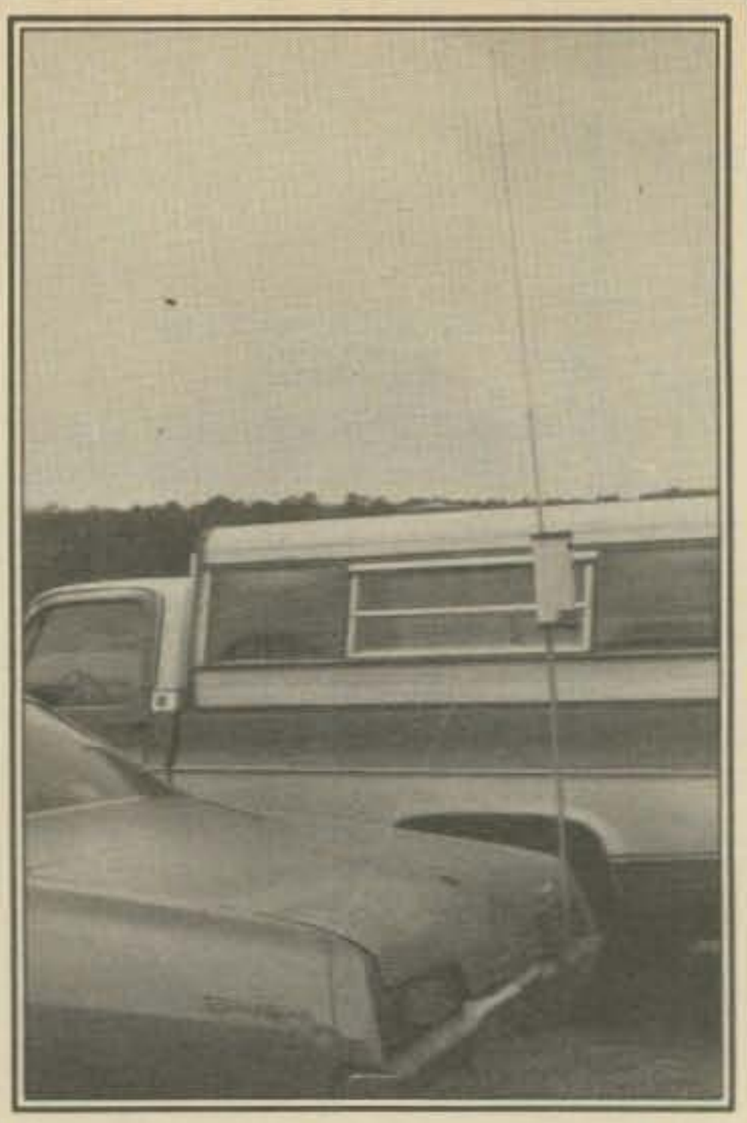
Base Loaded Multiband Verticals

We've said that the simple quarter-wave antenna is basically a one-band antenna. Nevertheless, one can easily load up a single 16-25′ vertical on all bands, 80-10 meters. The usual configuration is a vertical piece of tubing, used in conjunction with a base loading coil. By tapping the coil at appropriate points, the antenna can be roughly matched to 50-ohm coaxial cable on any band. This no-trap antenna must be manually adjusted when switching bands. Adjustment must be made at the antenna, not from the shack; bandswitching isn't automatic.

This type of antenna is an excellent compromise for all-band operation, especially for the budget-conscious amateur who can't erect separate verticals for each band, or who can't afford the cost of an all-band trap antenna. The antenna design lends itself to homebrew construction, since there are no mechanically challenging traps to build, weatherproof and install. It's also a good antenna for the space-limited amateur, since its overall length is normally under 25′. This length works out to a bit longer than 3/4-wavelength on 10 meters, chosen as the maximum length that will yield a low-angle radiation characteristic on the highest band to be used.

Fig. 2 shows electrical details of the base loaded multiband vertical. A tapped inductor, consisting of about 30 turns of 2-3″ diameter B&W or similar coil stock, makes up the loading coil. It is tapped from the top at the appropriate points so as to resonate on each band of interest; the clip is tapped down the coil as bands are changed. The center conductor of the coax is tapped up from the bottom of the coil for impedance matching purposes, or an r.f. transformer can be used to effect impedance transformation. The parallel capacitance shown in the figure, about 100 to 150 pf., may or may not be required, depending on the band in use and the length of the antenna. An s.w.r. bridge is recommended for adjustment. An antenna noise bridge may also be used for accurate resonance determination.

Low-low r.f. transformers such as this 500-watt unit by Palomar Engineers allow broadband matching to low-impedance antennas, such as short verticals and mobile whips. Small, high-efficiency package has switch-selected taps at 8, 12.5, 16, 22, 32, and 50 ohms. An r.f. ferrite toroid core is at the heart of the device. (Photo courtesy Palomar Engineers)



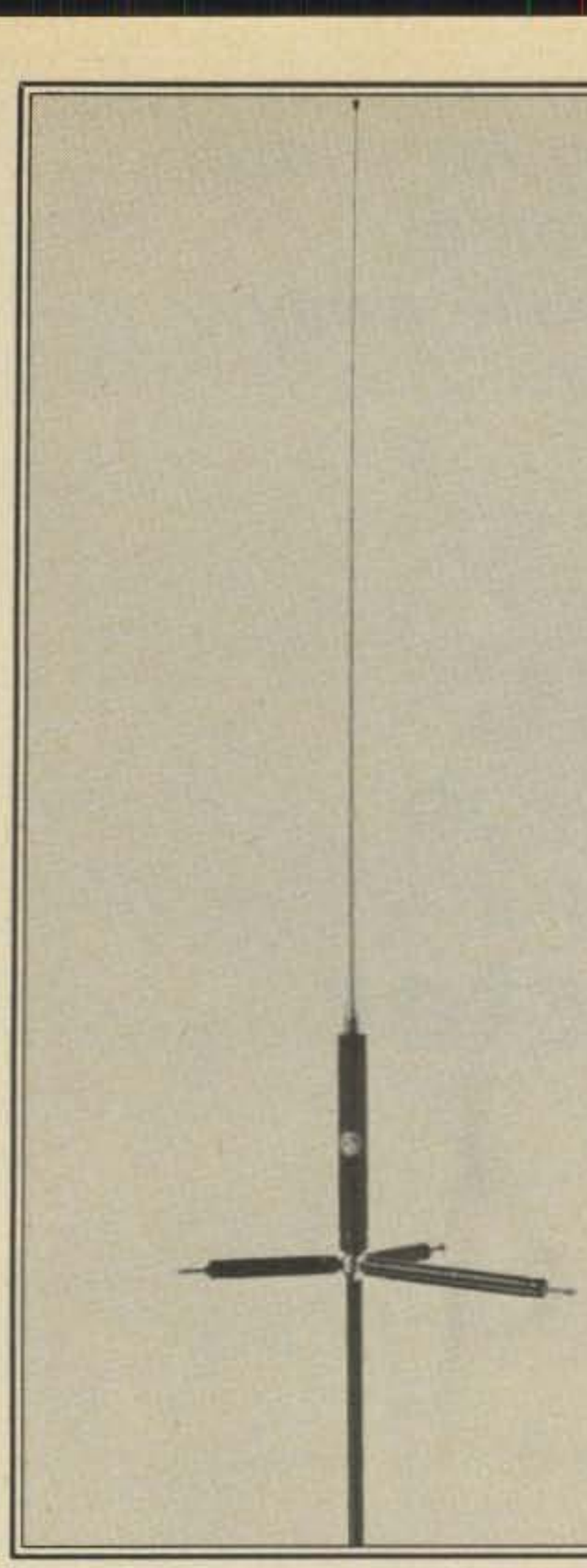
A tri-band mobile antenna by Swan features automatic operation on 20, 40, and 75 meters. After initial adjustments have been made, the antenna requires no changing of coils to change bands. Just flick the transceiver bandswitch. Operating bandwidth is 25 kHz on 75, 70 kHz on 40, and 90 kHz on 20 at the 2:1 s.w.r. points.

Mechanical details are simple. Two or three sections of 10′ TV mast can be used to construct the antenna. The masts can be supported by a soda or beer bottle and guyed with nylon cord or rope if necessary. Another possibility is to side-mount the mast sections on a length of wood using heavy ceramic insulators. Since the loading coil is connected at the base, it doesn't interfere with the antenna's mechanical strength.

As with most verticals, the quality of the ground system is important, especially on the lower bands. The antenna can be fed as a ground plane or it can be ground mounted. However, if fed as a ground plane, separate, resonant radial sets are required for each band for good results. This becomes unwieldly, to say the least, especially on the lower bands. For this reason, I suggest installing the antenna on the ground and using a ground rod and radial system, as described last month. Resonant radials need not be used if the antenna is ground mounted.

What about performance? This type of multiband antenna can produce surprisingly good results despite its simplicity and relatively low cost. It's

Antenna of the Month



Unusual, multiple-resonant Swan mobile antenna covers 10, 15, and 20 meters and requires no coil change or readjustment after initial tuning; for additional band coverage, optional 160, 80, or 40 meter coils and top section can be added. The 200-watt p.e.p. mobile antenna features low s.w.r. at resonance; independent resonance adjustments on each band; wide bandwidth; and a low-wind-resistance profile. Its design also lends itself to trailer park, mobile home, camper, or apartment mounting schemes.

Besides the basic 3 lb. antenna base rod and 10/15/20 meter resonators, accessories include a base extender rod, telescopic top section (for 160/75/40 meter operation), and center loading coils required for 160, 80, and 40 meter work. (Photo courtesy Swan Electronics)

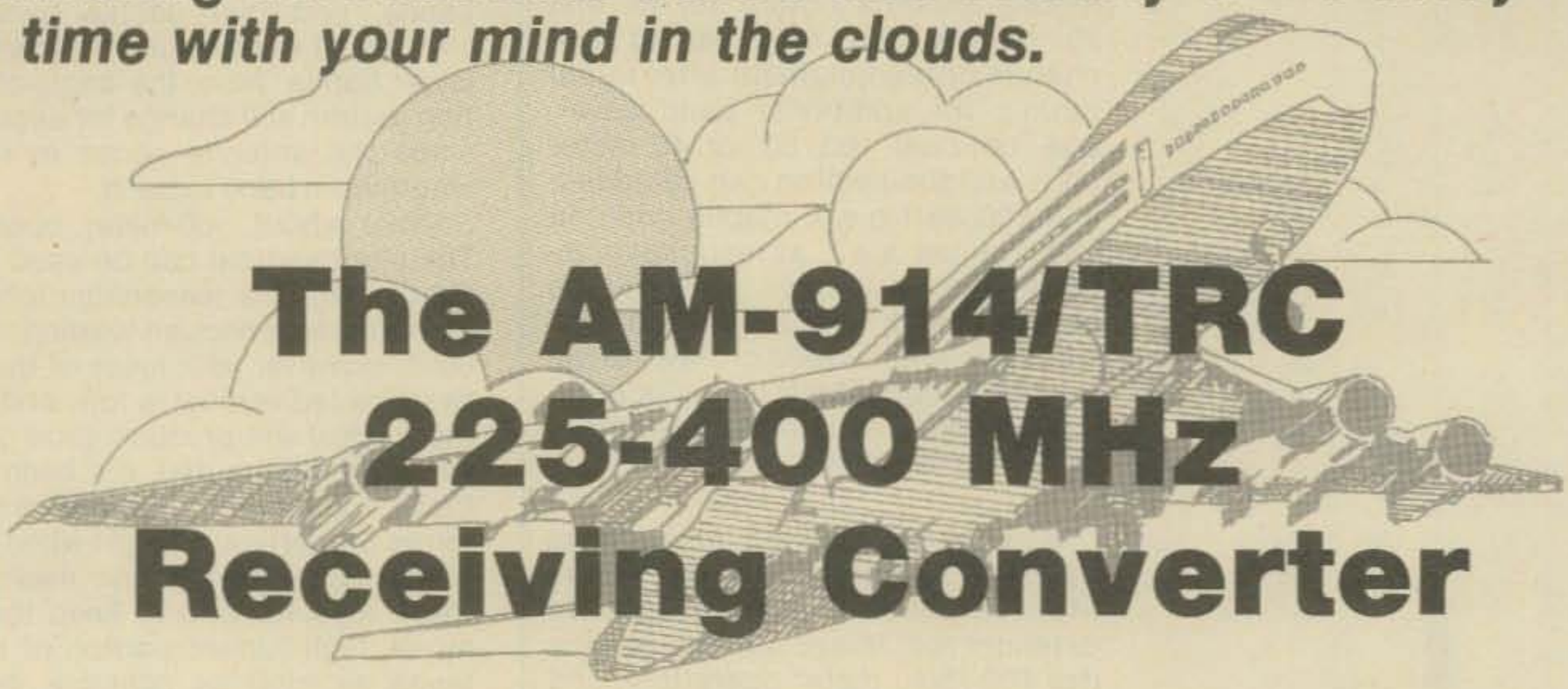
an especially attractive proposition for the Novice who wants to try his hand on *all* the h.f. bands open to him—80, 40, 15, and 10 meters. Two things to consider are that the antenna *must* be manually returned when switching bands, and that usable bandwidth (and s.w.r.) will be quite narrow on the lower bands. Also, the angle-of-radiation pattern will change for each band, since the antenna varies in relative length from band to band.

What about 160-meter operation? The short vertical can be used on the "top band" if a reasonably long radiator and large-enough loading coil are used. However, efficiency of the short base loaded vertical is low. And, while the vertical will produce good groundwave signals on 160, it's been found that a horizontal antenna often outperforms the vertical at night when propagation is by ionospheric means. For these reasons, and to keep the loss-prone, high-current portion of the antenna as high as possible, bent or L-shaped antennas are favored for 160-meter operation. We'll cover these specialized antennas in a later column.

Next month we will conclude our discussion of verticals with trap-type verticals, matching and a bibliography of interesting articles concerned specifically with vertical antennas. See you then.

73, Karl, W8FX

Surplus fans, there's a hidden bargain waiting for you. With a little bit of effort you can tune in on some fascinating aeronautical traffic and literally while away the time with your mind in the clouds.



The AM-914/TRC 225-400 MHz Receiving Converter

BY ROBERT B. GROVE*, WA4PYQ

The 225-400 MHz band is somewhat neglected by monitoring enthusiasts. And yet this band often teems with military aeronautical action. Strategic Air Command missions are in constant communication. Air Force, Army, and Navy training exercises are regular listening fare. Even the Coast Guard utilizes this portion of the spectrum for much of their air-borne activity.

Commercial receiving equipment for this lower part of the u.h.f. spectrum is hard to find. No scanner presently made includes this frequency range. The Collins R-278/GRR is a nice receiver, but it is big, heavy, and old. National's shipboard URR-13 and URR-35 are the most popular surplus radios for this range, but they, too, are rather large and difficult to service.

Since most of us already have h.f. receiving equipment, and since the vast majority of 225-400 MHz military radio activity is in the a.m. mode, a converter is the way to go. The limited amount of satellite f.m. communications which may be heard may be slope detected by an a.m. receiver.

Probably the nicest converter to come out of recent years was the CV-253. It tuned continuously from 38-1000 MHz in four bands, but the market has dried up.

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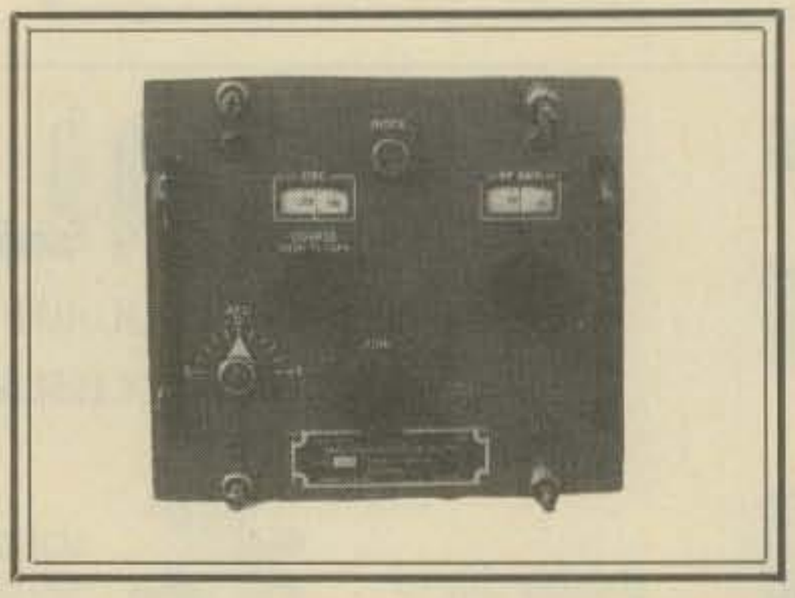

Fig. 1- The AM-914/TRC before conversion.

One old-timer which we recently uncovered at Fair Radio Sales (P.O. Box 1105, Lima, OH 45802) was made for the Navy, and carries the nomenclature AM-914/TRC. It is pictured in fig. 1.

The AM-914/TRC was originally designed to plug into an R-417/TRC mainframe receiver. That unit worked off 120 v.a.c./60 Hz, and had a 30 MHz i.f. input.

As you can see from the schematic (fig. 2), the design is very straight forward. A string of triodes provides all functions: 2 stages of r.f. amplification, a local oscillator, buffer, and mixer. The 30 MHz output may be fed into a general coverage receiver, 10-meter transceiver, or even a CB rig will do in a pinch. For f.m. only, a low-band scanner may be used.

By using a tube-type receiver or transceiver as a mainframe, 6 volt filament power and 150 v.d.c. B+ will be readily available. The extra 20 ma d.c. drain should not cause a problem to any receiver, although five extra filaments might!

The Conversion

How does one go about converting a converter? In fact, *why* does one go about it? The AM-914/TRC will operate just fine without doing a thing to it but connecting the appropriate voltage and r.f. leads. However, I personally prefer the roomy simplicity of stripping down unnecessary components. Feel free to include or delete any of the steps you wish except the alignment procedure; *that* you will need!

Remove top dust cover and visually inspect the unit thoroughly for damaged or missing components and connections. Test all tubes. If original replacements are impossible to find, suitable substitutes are available. For the 5670, try a 2C51, 6385, or 7961. For the 6J4's a 6AN4, 7137, or 7245 should work. And there are others.

1. Remove coarse tuning knobs. Remove spring and retaining washer. Replace knobs and press in shaft to engage gears.

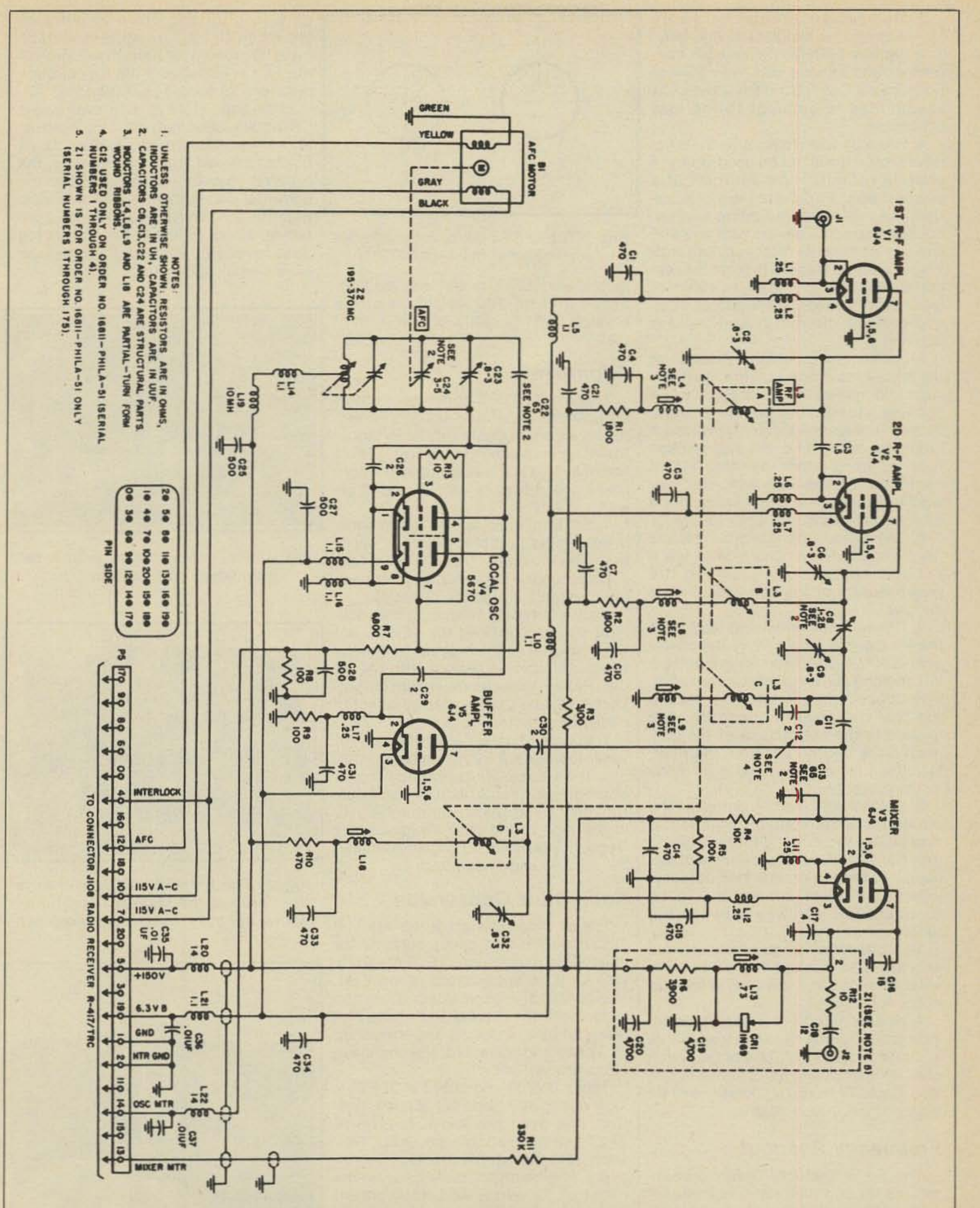

Fig. 2- Schematic of the AM-914/TRC converter.

2. Remove superficial hardware (panel lockbolts, handles) as desired.

3. Remove both rear apron coax connectors and replace with type SO-238 connectors. Use the old BNC and coax assemblies to connect to the new SO-238's.

4. You may wish to remove the a.f.c. drive motor. It will not be used, and will provide room for the addition of a power supply. To remove the motor, extract the two lower mounting screws. Loosen the clutch collars with an Allen wrench, and pry the motor upward with a screwdriver, freeing it from its rear cup shell housing. Snip the two pairs of leads from the rear power supply strip, and remove the motor and its rear housing.

5. Loosen the forwardmost collar on the a.f.c. knob shaft. Pull the shaft forward and tighten the collar again while pushing it toward the rear of the shaft. This will tighten the assembly, making it more stable. The a.f.c. dial may be used for fine tuning rather than the "FINE" control which has backlash. You may wish to substitute a larger knob on the a.f.c. control for less touchy tuning.

6. Connect appropriate ground leads from the chassis to one side of the 6 v.a.c. filament supply and to the negative side of the 150 v.d.c. power supply.

7. Connect the remaining lead from the 6 v.a.c. line to pin 19 of the power connector. It is located on the bottom left, looking at the rear of the converter.

8. Connect the 150 v.d.c. B+ lead to pin 5 of the power connector. It is located at the bottom row of the connector, the second pin from the right. No other connections need to be made to the power plug.

9. Since the 30 MHz i.f. output of the converter is capacitively coupled, it may be hooked directly to the antenna input of any 30 MHz receiver without danger to the equipment. This output is located at the BNC connector atop the tuner chassis, midway between the tubes.

10. Connect an appropriate antenna and low-loss coaxial feedline to the antenna connector, the BNC at the rear of the tuner.

A Newtronics DCX discone, or 10-inch ground plane will work well in this application (see fig. 7). Use only enough coax for the run, and make sure it is low-loss. Cable TV RG-6U works very well for v.h.f. and u.h.f. applications.

Frequency Readout

The Department of Defense channelizes its communications frequencies. The window displays on the converter are not read in MHz, but rather in channel designators. Fortunately, the scheme is logical, and easy to convert.

To convert the dial readout to MHz, merely add 199.5 to the dial reading. Since adding 200 would be close enough, "75" is really 275 MHz. Simple?

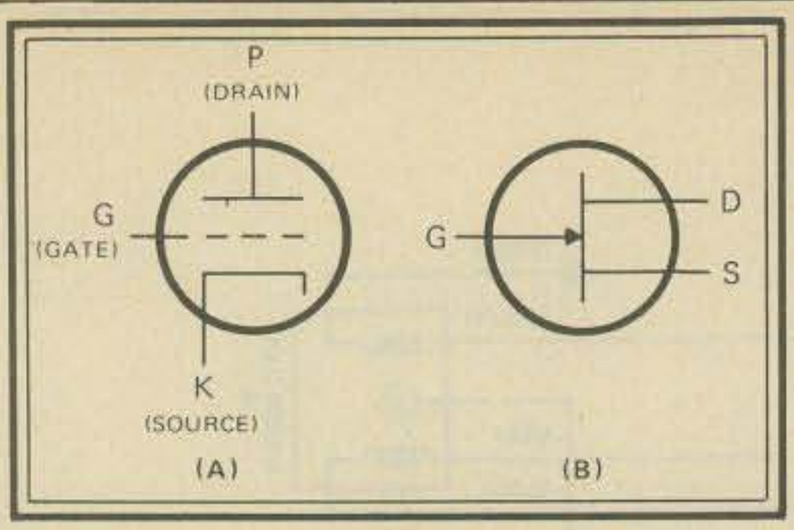

Fig. 3- Tube/FET analogy for solid-state conversion of the AM-914/TRC.

Alignment

The AM-914/TRC converter is built around the venerable Mallory inductuner, a continuously rotatable inductor. It is an excellent circuit, albeit noisy in this early application. Alignment procedure is very straightforward.

1. Set both dials to "50". With background hiss audible, peak for maximum output: C2, C6, C9, and C32 (located under the tuner and accessible through a slot in the chassis).

2. By alternately advancing the oscillator dial and peaking the r.f. dial, set the converter to the highest frequency which still can be peaked with the r.f. dial. Peak in order for maximum output: L4, L8, L9, and L18 (located adjacent to capacitors of step 1).

3. Locate i.f. mixer slug at center of tuner top. Peak it for maximum output.

4. If an accurate-frequency signal source is available, adjust oscillator trimmer C23 (accessible through a hole in the side of the cabinet) for correct frequency readout. A.f.c. dial must read "0" for this alignment step.

Solid-State Conversion

The all-triode design of the AM-914/TRC makes it particulary suitable for solid-state conversion. FETS are available for u.h.f. applications at low cost. Notice that the oscillator utilizes two triode sections in parallel; they may be replaced by one device, and a touchup of C23 should correct for the change in circuit capacitance.

Types 3N200 and 40673 MOSFET's look especially good for this application, and even the low-cost 2N4416 JFET could probably be used. Personally, I'd bet on the 3N200's!

B+ will be much lower now, on the order of 12 volts. And no filament voltage is required!

Before permanently mounting the FET's, plug them into tube sockets firmly to test the scheme. Be sure that they are connected: source to cathode, gate to grid, and drain to plate as shown in fig. 3. The correct voltage must be present for proper operation of the FET's. Either vary the B+ or plate resistors for proper operation.

In the solid-state version, even an old CB walkie-talkie may be employed as an i.f. mainframe. With the circuit board removed from the housing, the receiver may be mounted within the converter cabinet along with batteries, making the whole system self-contained! Holes drilled in the side or top dust cover will allow audio to escape from a small speaker.

Fig. 4- Dial calibration is in channel designators; add 199.5 for MHz.

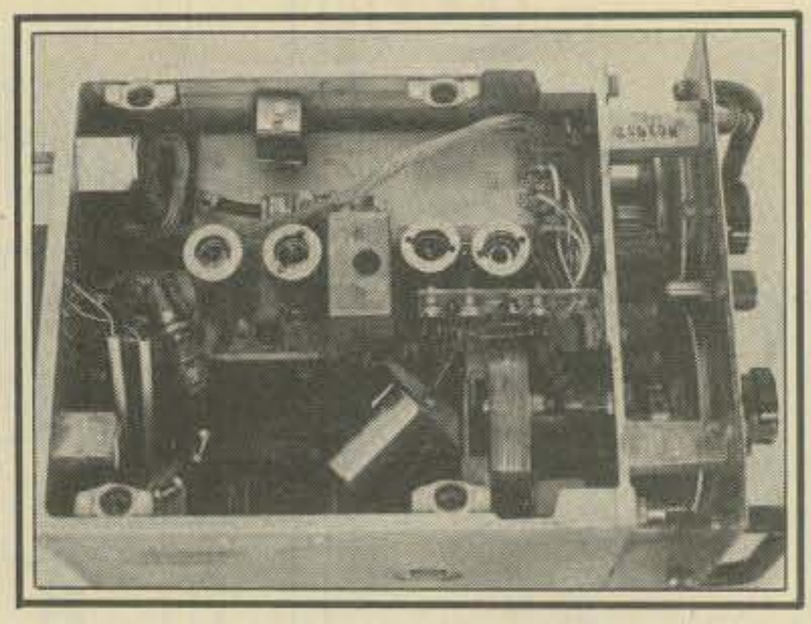

Fig. 5- The AM-914/TRC converter is built around the Mallory inductuner, shown centrally located in the cabinet.

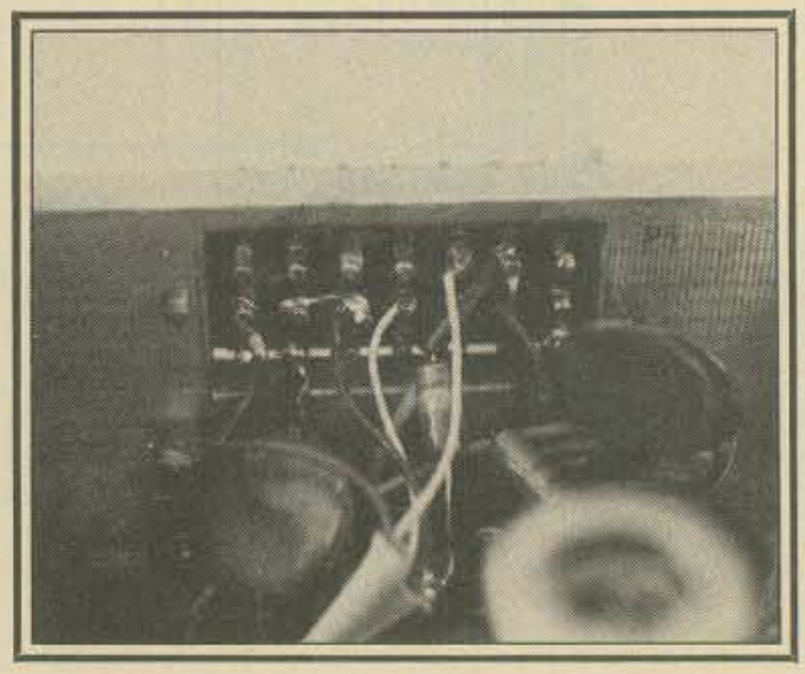

Fig. 6- The power connector has a lot of pins, but few are connected, and even fewer actually need to be used.

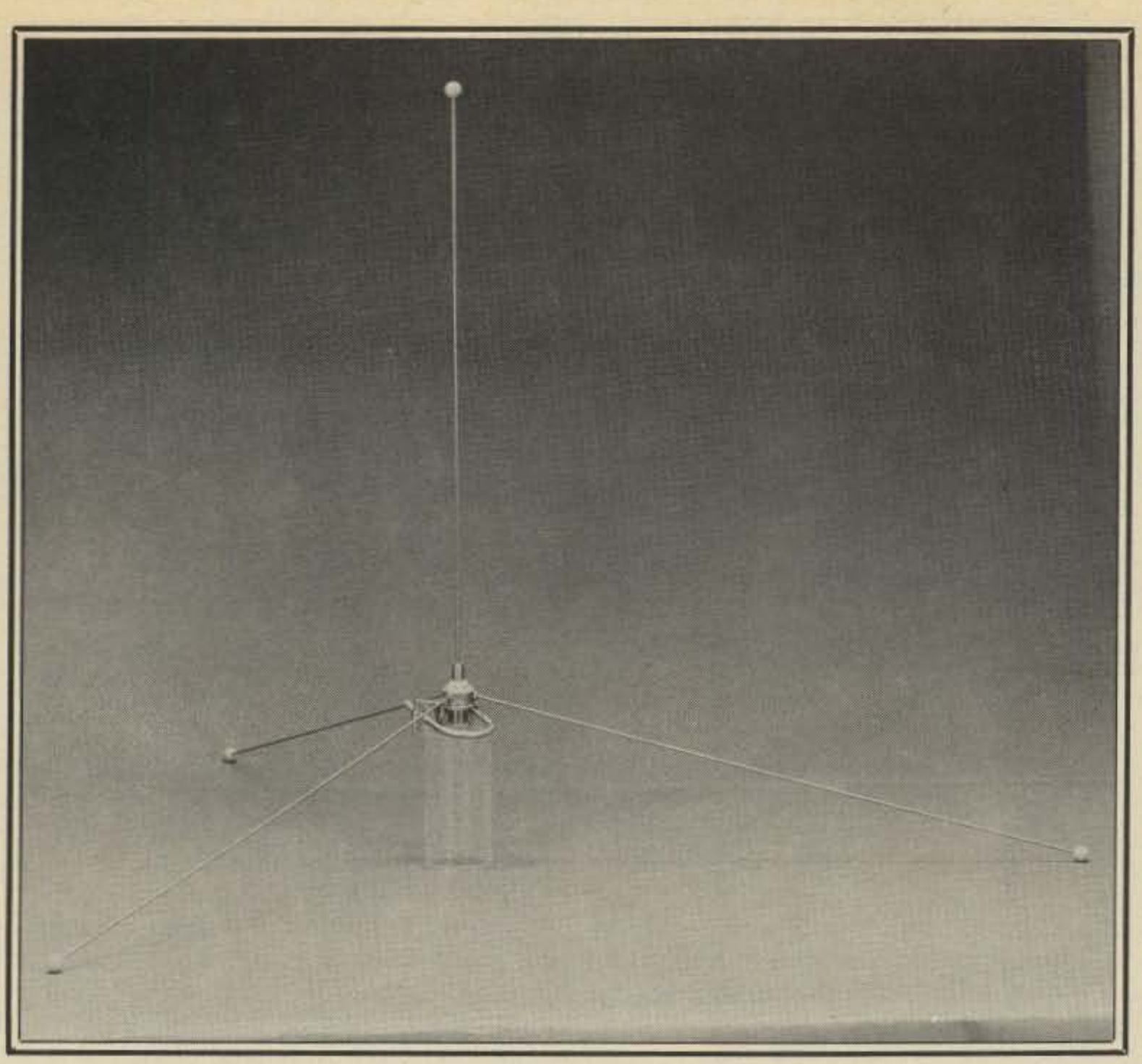

Fig. 7- An inexpensive ground plane antenna like this unit from Radio Shack (stock no. 20-176) will provide good local reception.

Where To Listen

While the entire 225-400 MHz military aeronautical communications band is available for tactical communications, there is a basic band plan. For the most part, channelization is done every 100 kHz. When the space shuttle is finally launched, listen for u.h.f. communications with ground stations on 296.8 and 259.7 MHz. FLEETSATCOM satellite down-link channels are between 240-270 MHz. They are f.m., but slope-detection a.m. works fine. Fed into a scanner, however, satellite reception is a natural.

You may wish to use an external preamplifier to help lower the noise floor of the system, or perhaps the solid-state conversion will improve the situation.

Conclusion

While the AM-914/TRC is hardly the latest thing in sophisticated technology—it is over 30 years old—it does permit the listener to hear military aeronautical communications, especially if he is located relatively near a base. Don't expect rock stability or low noise performance. But for $39.95 plus shipping, and a little bit of workshop diddling, the unit makes a fun project for the incurable experimenter.

a regular feature by

THEODORE J. COHEN, N4XX

dateline... Washington, D.C.

THE INS AND OUTS OF THE WASHINGTON SCENE

Court Decision May Impact Attempts To Stop Amateur Jammers

A recent decision by the U.S. District Court, District of Columbia (James Reston, Jr., vs. the Federal Communications Commission, 30 May 1980) holds that amateur radio communications, in general, are protected (i.e., covered) by Section 605 of the Communications Act of 1934 (as amended). Section 605, in essence, states that it is illegal to intercept and devulge the contents of communications which you are not intended to receive.

While final guidance in the matter has yet to be developed by the Commission's General Counsel, Mr. James McKinney, Chief of the Field Operations Bureau, noted that the Court's decision "throws into question the area of self-enforcement by all radio services."

Said McKinney, "It is all right for an *individual* to notify the Commission of illegal amateur operations without violating Section 605. However, the new ruling suggests that a group of amateurs working on interference cases may *collectively* violate Section 605 by exchanging information among themselves."

At the least, the new ruling will require that the Commission re-examine Section 605 and the enforcement plans which were under development for use in the amateur service.

10 Meter Amplifier Ban To Expire

The Commission's ban on the manufacture of 10 meter amplifiers is set to expire on 28 April 1981. As such, the FCC is now considering whether to renew the prohibition on these devices.

According to Mr. Jeffrey Young, Chief, Investigations Branch (Field Operations Bureau), the FOB has found the ban useful in closing down the manufacturers of 10 meter amplifiers and in prosecuting individuals who defy the ban.

There is no indication at this time as to whether the ban will be extended.

Commission Moves To Counter Illegal 10 gHz Radar Jammers

Various Commission bureaus and offices are now discussing ways in which to curb the growing use of 10 gHz radar jammers. In a recent meeting, representatives from the Private Radio Bureau, Field Operations Bureau, and the Office of Science and Technology entered into preliminary discussions as to how the jamming transmissions could be distinguished from legitimate amateur transmissions. Consideration was also given to making certain changes in the amateur rules, and specifically in the definition of amateur radio, since the wording of the definition may be a major factor in making the distinction between jamming and legal amateur operations. According to a spokesman at the Commission, every attempt will be made to minimize the impact of Commission actions on the amateur service.

ARRL Representatives Meet With FCC Chairman

On 19 June 1980, ARRL President Harry Dannals, W1HD, and Washington Area Coordinator Perry Williams, W1UED, met with FCC Chairman Ferris to discuss matters of mutual interest and concern. Also present at the meeting were Carlos Roberts, Chief, Private Radio Bureau; James McKinney, Chief, Field Operations Bureau; and Dr. Stephen Lukasik, Chief Scientist, Office of Science and Technology.

Some of the areas discussed included the need for amateur exams to be given at hamfests and conventions, and the matter of code requirements for amateurs, both from an international standpoint as well as from a digital/computer licensing standpoint.

The Chairman was very open and candid during the meeting, and he expressed much interest in hearing from representatives of the amateur service. In all, the participants indicated that it was a good "give and take" session, and that a dialogue had now been re-established between the Chairman's office and the ARRL.

Third Party Agreements With Micronesia In Limbo

For many years, health and welfare messages between such areas as the Marshall Islands and the United States have been handled by amateur operators. A problem has now arisen, however, in the continuing use of amateur radio for this purpose.

The problem comes about because the various entities which make up "Micronesia" (e.g., the Northern Marianas, the Marshalls, the Federated States of Micronesia, etc.) are being terminated as a U.S. Trust Territory. The U.S. Department of the Interior has been pressing to obtain reciprocity agreements which will permit the third party communications to continue, but the State Department refuses to cooperate. The State Department claims that one cannot enter into a reciprocity agreement unless the other party is an independent nation, and that no one really knows when, or how, the various Micronesian states will become individual nations.

Many aspects of the relationship

**8603 Conover Place, Alexandria VA 22308*

between Micronesia and the United States are already complicated by the termination of Trust status. Whether such complications will serve to terminate important third party communications between the new nations and the United States, however, is a question viewed with concern by many individuals in both areas.

New Report Prepared By CCIR Study Group 8E (Amateur Terrestrial)

A new draft report, "Technical Investigations by the Amateur Service," has been prepared by CCIR Study Group 8E. Included in the report is a review of technical investigations by amateurs in the following areas:

- Improved reliability of long distance communications
- Signal-to-interference protection ratios
- Signal processing techniques for HF circuits
- Bandwidth compression
- Computer communications
- Spread spectrum techniques
- Development of low cost communications equipment

The report will be submitted to the CCIR for approval during the next round of CCIR meetings.

Reports and other documents prepared and approved by the CCIR, the technical arm of the International Telecommunications Union (ITU), form the bases for frequency allocations to the various telecommunication services recognized by the ITU.

AFCEA Holds Annual Amateur Radio Luncheon

As part of the Armed Forces Communications and Electronic Association's 34th Annual Convention, your Washington editor hosted the annual Amateur Radio Luncheon at the Sheraton Washington Hotel on 25 June 1980. The luncheon was attended by over 120 amateurs from government, industry and the military. Following lunch and the drawing for door prizes, three representatives from the FCC were invited to make informal comments on where they see the amateur service "going" in the 1980's.

First to speak was Carlos Roberts, Chief of the Private Radio Bureau. Roberts stated that amateur radio was now "technology driven," and that he expected to see amateurs experimenting shortly in such areas as spread spectrum and packet switching. He cautioned amateurs, however, that they have to get their "story" out if they hope to receive favorable attention in Washington. In this regard, Roberts commended Perry Williams, Washington Area Coordinator for the ARRL, for his work to make the government aware of amateur radio and the services we provide to the public. Roberts closed by saying that he is encouraging a liberal policy vis-a-vis the issuance of Special Temporary Authorizations for experimentation, and that he hoped amateurs would take advantage of this policy by working with new communications techniques.

Next to speak was James McKinney, Chief of the Field Operations Bureau. McKinney expressed concern for a recent ruling involving Section 605 of the Communications Act (reviewed elsewhere in this column), and noted that the ruling may damage the self-policing aspects of amateur radio. He also mentioned that reports of malicious interference to amateur operations have tripled over the past year, and that the FOB was moving to identify and cite violators.

Last to speak was Michael Marcus of the Commission's Office of Science and Technology. Marcus stated that the amateur service should be a test bed for communication technology, and that he hoped to see more experimentation in such areas as digital communications and spread spectrum modulation. He also asked the amateur community to keep an open mind on such issues as sharing with radiolocation inthe 420 MHz band (Del Norte is proposing to use a spread spectrum radiolocation system in this band) and as regards a new digital communications license similar to that now available in Canada.

The luncheon closed with a request from Perry Williams for assistance in bringing amateur radio's story to our officials in Washington, D.C.

ARRL Files In Opposition To Extension Of Radiolocation Operations In 420 MHz Band

In the matter of Del Norte's petition to permit the continued assignment of frequencies in the 420-450 MHz band for non-government radiolocation (RM-3378), the League opposed the extension of the 1 January 1981 cut-off date for non-government radiolocation operations. The League noted, in part, that "Del Norte, seemilngly unmindful of the Commission's intent to shift non-government radiolocation to its proper frequency range, apparently attempted to further entrench HIRAN at 420-450 MHz by beginning a research and development effort to develop equipment for use (in this band)." Further, "preliminary study by the ARRL indicates that the chirped (spread spectrum) radiolocation system proposed by Del Norte could create serious interference to the steadily expanding amateur television operations on 420-450 MHz, as the required bandwidth for amateur television is on the same order as the proposed service of Del Norte." Concerns were also expressed regarding interference to amateur repeater operations.

The League concluded its comments by noting that no support for the Commission's proposal to extend the cut-off date appears to have been filed by any non-government radiolocation users of the 420-450 MHz band at the time of the ARRL's filing.

No-79-80

Here's a ubiquitous gem of an antenna that will work from 48 MHz to 148 MHz and harmonically operate on 220 and 420 also.

A Log Periodic Antenna For All V.H.F. - U.H.F. Bands

BY T.E. WHITE*, K3WBH

The author postulated one day that a single antenna could be designed, constructed and operated on all frequencies from 48 to 148 MHz, and harmonically on the 1¼ and ¾ meter bands also. A boom limit of 24′ was a criterion, and gain requirements were set at a consistent 7 dB for all lower frequencies, rising to 10 dB on 2 meters and 11.5 dB on u.h.f. (These are honest gains over a dipole, not ephemeral isotropic manufacturer-type ballooned figures.)

Lo and behold, what emerged was a Texas-sized Log Periodic. To enhance 2 meter gain (and 432 gain: LP antennas work well on 3rd harmonic), a director string was added, projecting on a single boom out from the front terminating block of the main twin-boom assembly. By the way, electrical 3rd harmonic resonance is not exactly physically ⅓ times a fundamental length, but the broadness of the 220 and 420 bands allows for some rubber here.

Using the twin boom method of LP feeding not only provides a bridge-girder-like boom structure but enables the elements to be attached directly to the booms without insulating mounts, which would be needed on a single boom. The twin booms must however be insulated from the mast, as they are really part of the feed line. They are shorted together at the rear end only, effectively terminating the feed system and enhancing front-to-back ratio.

Not only to conserve space and turning radius, but to sharpen the forward main lobe, elements are swept forward rather than perpendicular to the booms (for some LP "Theory," see the author's April '78 *CQ* article).

This array will receive all signals in the following bands (and of course may be used for two-way contact in the ham bands):

49 MHz experimental
50 MHz amateur
54-88 TV BC
108-136 aeronautical
136-144 Govt. & satellite
144 MHz amateur
220 MHz amateur
420 MHz amateur

Thus the amateur who also likes to monitor air traffic (despite its horizontal polarization, the antenna will pick up vertically polarized aero signals quite well), and fool around with DX TV and f.m. reception will be able to do so with the very same array he operates his v.h.f. and u.h.f. gear on.

The feed system evolved for the antenna is a twin one. For all low v.h.f. reception and 6 meter work, a 50 ohm coax line is baluned to the feed point in a standard manner (the balun is cut 55″ for 6 meters; reception on other frequencies will not be adversely affected). For listening above the f.m. band and for 2, 1¼, and ¾ meter operating, a twinlead line is connected through a mast-mounted relay. Baluns for these operations are at the shack end, for lowest loss (fig. 6).

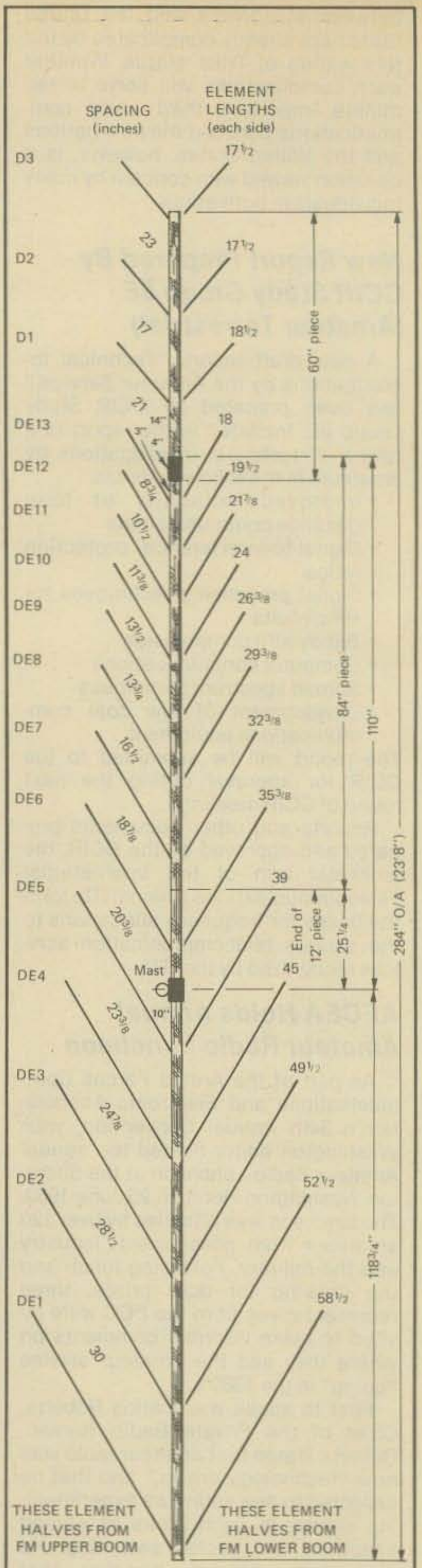

Fig. 1- Overall dimensions for the multi-band log periodic antenna.

*36 Lake Ave., Fair Haven, N.J. 07701

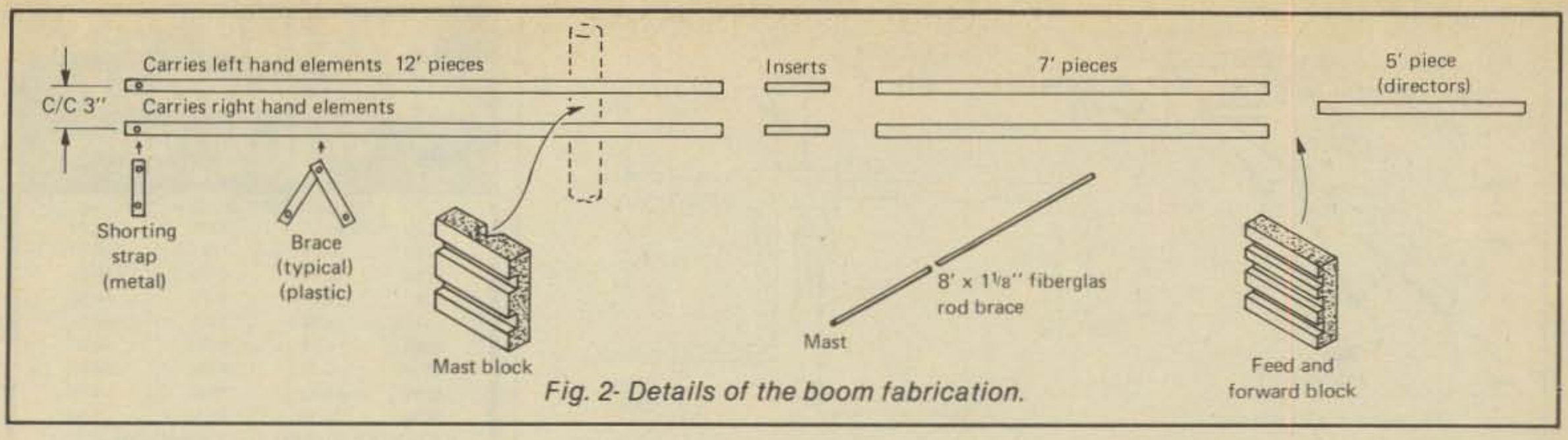

Fig. 2- Details of the boom fabrication.

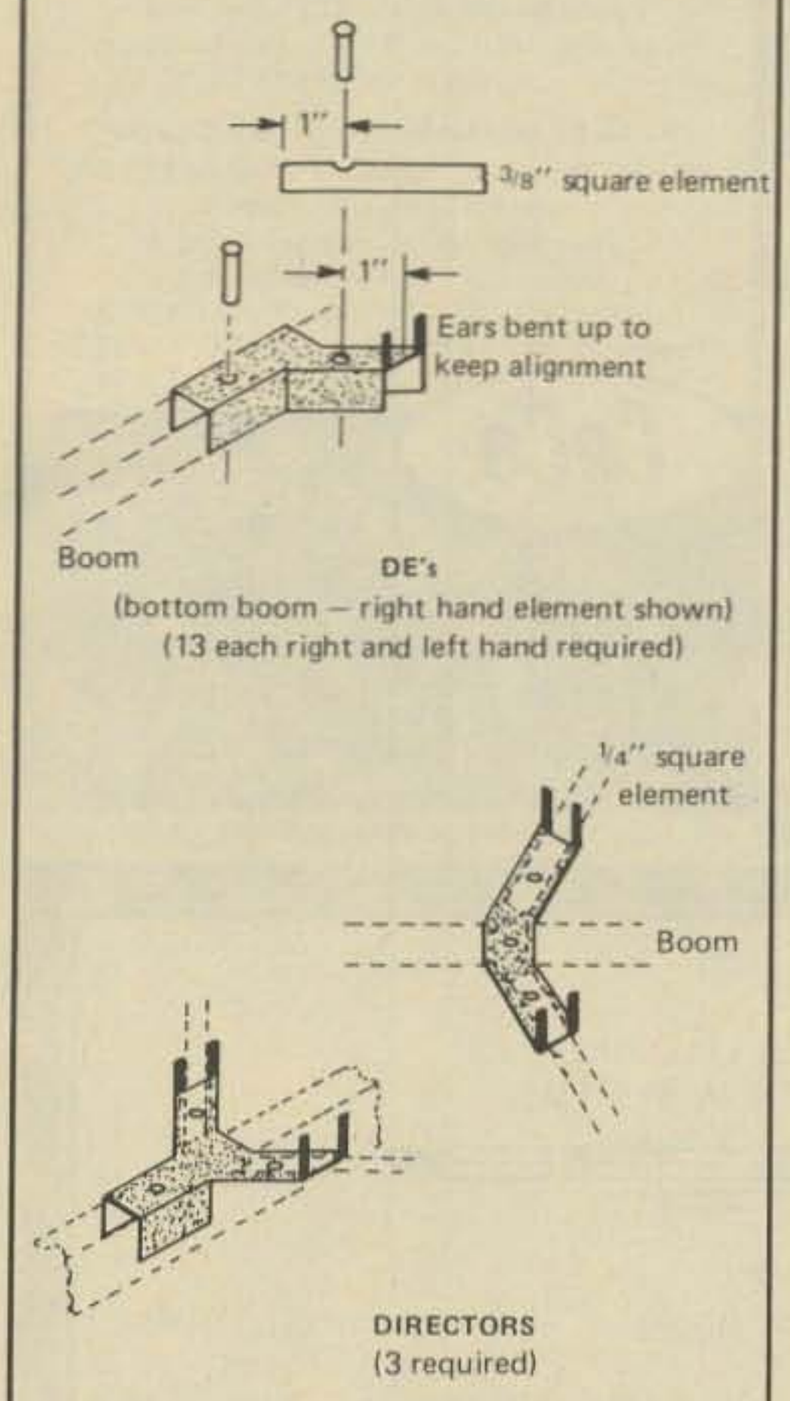

Fig. 4- Clips used to secure elements.

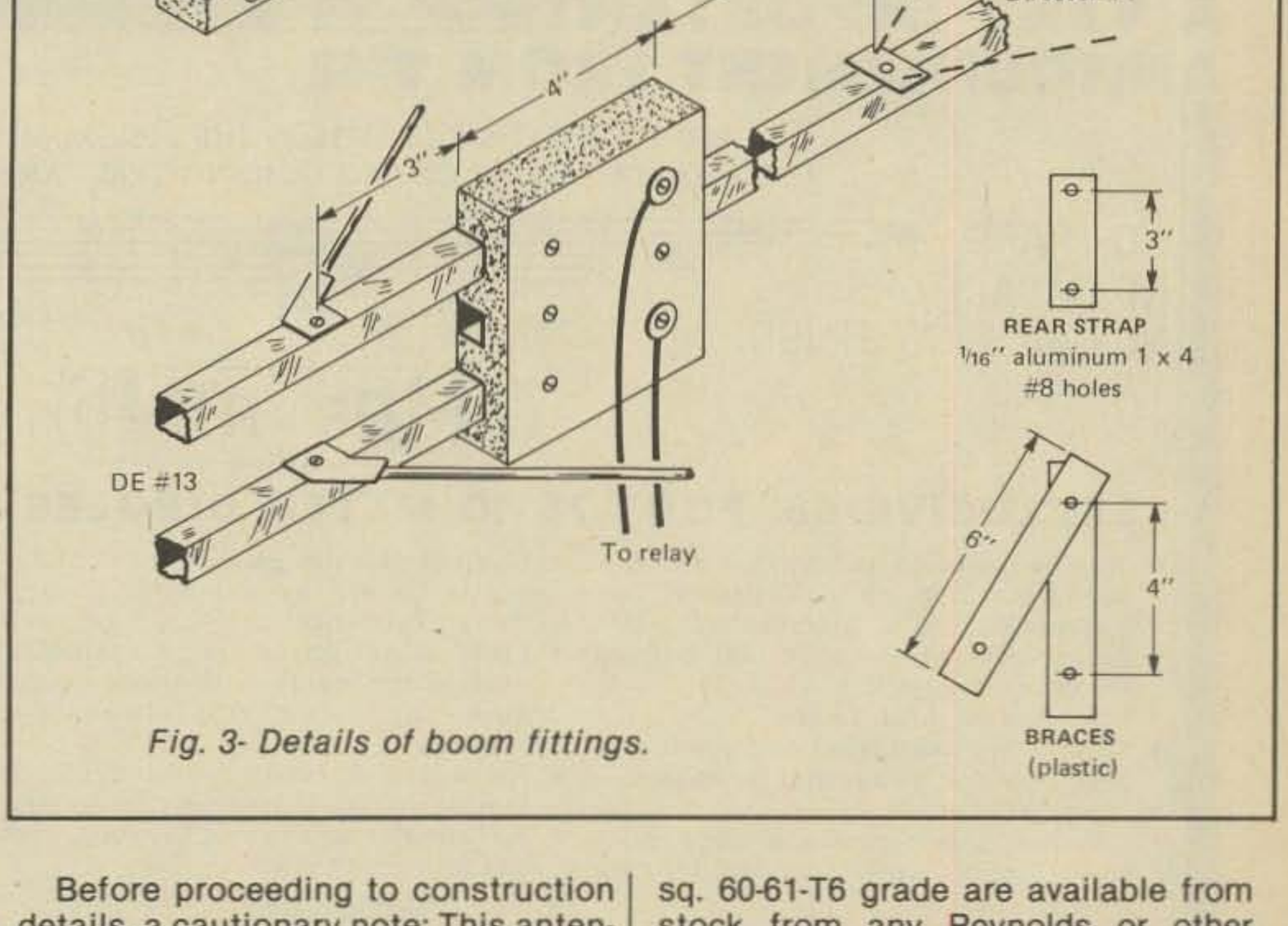

Fig. 3- Details of boom fittings.

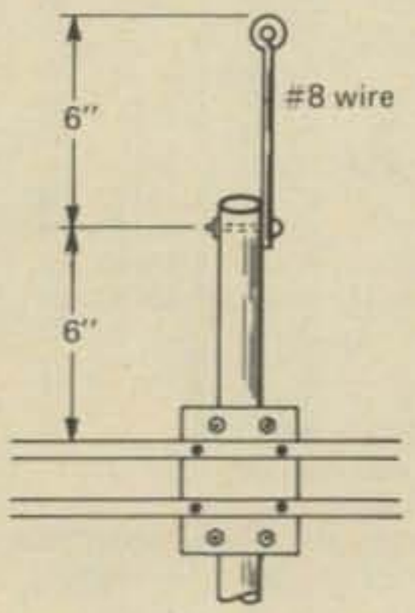

Fig. 5- A static drain.

Before proceeding to construction details, a cautionary note: This antenna will radiate any spurious out-of-band transmitter products. Make sure your rig's spurious emissions are at least 60 dB down. A low-pass filter on six is mandatory.

Square tubing is much stronger than round, and despite what you may think, offers no more wind resistance or loading. Standard 12′ lengths of 1″ sq. 60-61-T6 grade are available from stock from any Reynolds or other aluminum distributor. We need four lengths, broken up as shown in fig. 2. The whole lengths are spliced at point "T" of fig. 1 to the partial lengths, using inserts of square maple (the kind used for drawer guides in good quality furniture) about 9″ long.

Plastic blocks of hi-impact Lexan, Cycolac or equivalent, one for the

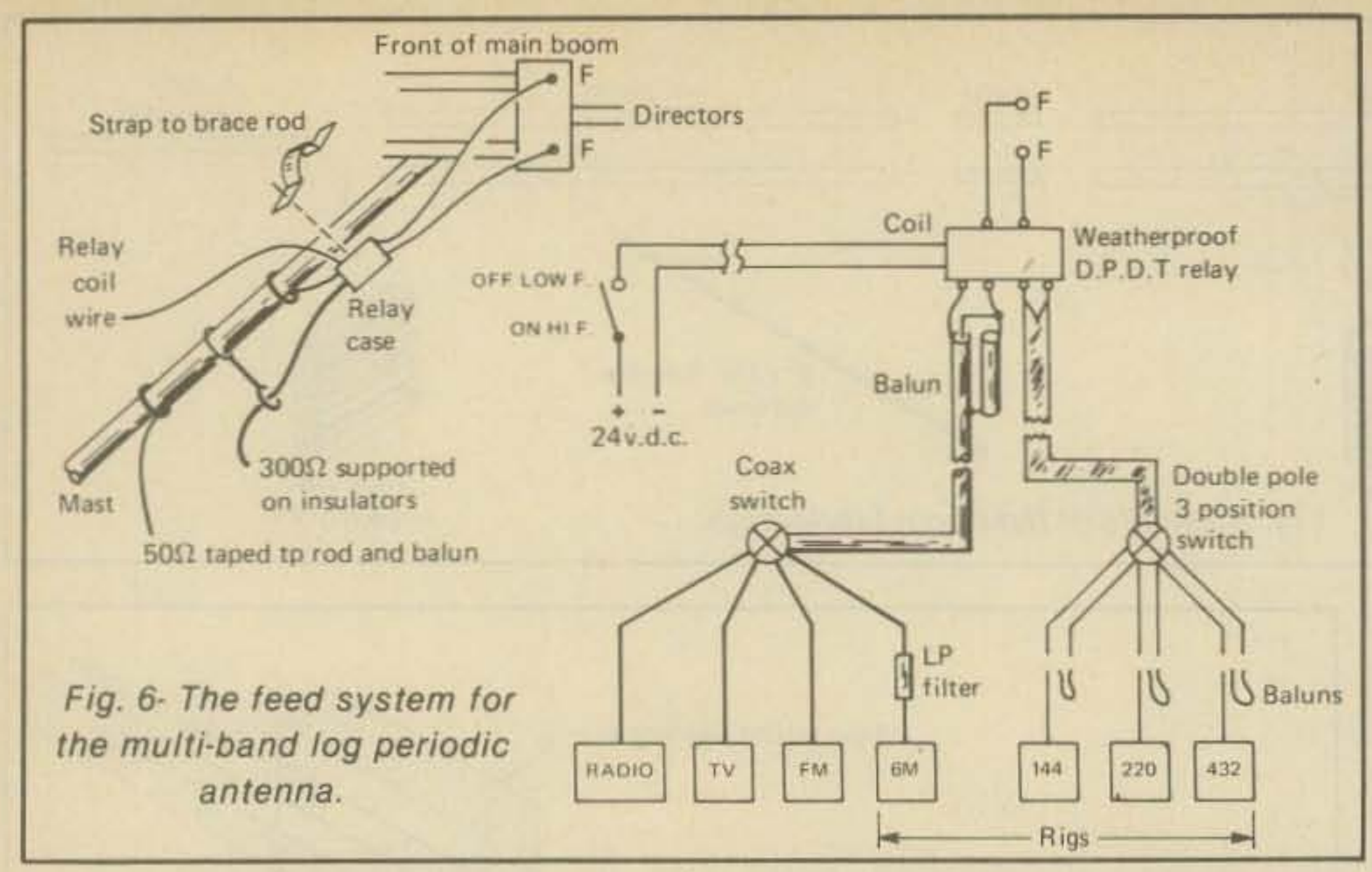

Fig. 6- The feed system for the multi-band log periodic antenna.

mast and one for the forward feed point and director boom attachment, are shown in fig. 3. Also shown there are triangular plastic stiffening straps and the rear shorting strap. Fig. 4 shows the zip element clamps required, which may be punched, stamped or diecut out of $^{3}/_{64}$ alum. sheet. Also shown are the director clips.

Element material is $^{3}/_{8}$ tubing for the larger ones in the rear and ¼ into $^{3}/_{8}$ sleeves for the shorter pairs. The director elements are all ¼".

The boom brace is fiberglass rod, as it must not ground the booms. The whole antenna is above ground and arrestors must be inserted in both feed lines. The mast should extend 6" above the upper boom, with a static drain of #8 wire above that (fig. 5).

LP antennas do not seem to be as ground-reflective sensitive as yagis, and great height is not required. Anything above 25' will do nicely. More important than height is a clear field of fire in any desired direction: no foliage, wires, etc.

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a monthly feature by
FRANK ANZALONE, W1WY

Contest Calendar

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Complete rules for our World Wide DX Contest coming up at the end of this and next month (phone in October and C.W. in November) appeared in last month's issue. They are the same as for previous years.

However, a few questionable points have been clarified:

1. The physical location of transmitters in a multi-multi operation is now defined as being within a 500 meter diameter area.

2. Recopied or computerized logs will be accepted only if they are accompanied by a photocopy or the original.

3. Multi-Single Transmitter logs found in violation of the 10 minute rule will automatically be reclassified as multi-multi entries.

4. The Trophy list has been updated with only a few changes. Note that a station winning a World Trophy will not also be considered for a sub-area award. That trophy will be awarded to the runner-up of that area.

The three year eligibility clause is still in effect. Taking into consideration that a previous winner who turns in a record world score is also deserving of an award, CQ will award a championship plaque.

Awards for the African, Carib./C.A. and Canadian areas are still for residents of those areas only. The original intent of these awards was to stimulate more interest, but the locals of the African and Carib./C.A. areas have done little to justify the continuation of this practice. However, the donors still feel that it should be continued. So you fellows better get with it before they have a change of mind.

The question of contacts with non-contest participants during the contest: These QSO's may be counted as long as a contact has been made and signal report exchanged.

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

Oct. 4-5	California QSO Party
Oct. 4-5	VK/ZL/Oceania Phone
Oct. 11-12	VK/ZL/Oceania C.W.
Oct. 12	RSGB 21/28 MHz Phone
Oct. 15-16	YLRL Anniv. C.W. Party
Oct. 18-19	CLARA AC-DC Party
Oct. 18-19	Scouts Jamboree
Oct. 18-19	WADM DX Contest
Oct. 19	RSGB 21 MHz C.W.
Oct. 18-20	ARCI QRP Contest
Oct. 25-26	**CQ WW DX Phone**
Nov. 5-6	YLRL Anniv. Phone Party
Nov. 8-9	European RTTY Contest
Nov. 8-9	Int. Police Assn. Contest
Nov. 9	Czech. DX Contest
Nov. 15	DARC 10 Meter RTTY
Nov. 15-16	Austrian 160 Contest
Nov. 29-30	**CQ WW DX C.W. Contest**
Dec. 8-9	VU Garden City Contest

You will note that your contest log may now be sent directly to the Contest Directors as well as to the CQ home office. This will speed things up, but it's more reason why you should not include any other material except contest logs in your envelope.

Good luck, see you in the pileups.

73 for now, Frank, W1WY

California QSO Party

Starts: 1800Z Sat., October 4
Ends: 2359Z Sun., October 5

This year's party is again sponsored by the Northern California Contest Club.

Operating time is limited to 24 out of the 30 hour period for single operator stations. Multi-operator stations may use the full 30 hours. Off times must be clearly indicated on the log.

The same station may be worked once per band, per mode, simplex only. CA stations that change counties are considered new stations.

Exchange: QSO. no., and QTH. County for CA stations. State, province or DX country for others.

Scoring: Phone contacts are worth 2 QSO points; c.w. contacts 3 points.

The multiplier for CA is the number of states (50) and VE call areas (8) worked (max. of 58).

Frequencies: C.W. - 1805, 3560, 7060, 14060, 21060, 28060. S.S.B. -1815, 3895, 7230, 14280, 21355, 28560. Novice - 3725, 7125, 21125, 28125.

Awards: Certificates to the highest scorers in each CA county, each state, province and DX country. This year trophies have been added for the Top single operator in CA and out of state station, and the highest scoring expedition to a CA county.

Indicate each new multiplier on the log as worked. Include a summary sheet showing the scoring and other information. A large s.a.s.e. will get you a copy of the results.

Mailing deadline is Nov. 1st to: NCCC, c/o Dennis Egan, N6QW, 811 Byerley Ave., San Jose, CA 95125.

VK/ZL/Oceania DX Contest

Phone: Oct. 4-5 C.W.: Oct. 11-12
Starts: 1000 GMT Saturday
Ends: 1000 GMT Sunday

Stations in the rest of the world will be concentrating on working stations in Oceania with the emphasis on VK/ZL for their multiplier.

Following rules apply to areas other than VK/ZL.

Exchange: RS(T) plus a progressive QSO number starting with 001.

Scoring: *For Oceania* - Two points for VK/ZL contacts, 1 point per QSO with other areas.

Outside Oceania - Two points for VK/ZL contacts, 1 point for other Oceania contacts.

Final Score: Total QSO points from all bands multiplied by the sum of VK/ZL call areas worked on each band. (Single band logs also accepted.)

Awards: Attractive colored certificates to the top all band scorers, both phone and c.w., in each country and call areas of Japan, USA and USSR. Additional awards will be issued if returns warrant.

Logs: Date/time in GMT, station worked, number sent/rec'd, band and QSO points. Underline each new VK/ZL call area worked on each band. Use a separate sheet for each band. Include a summary sheet showing the scoring, name and address in BLOCK LETTERS, and a signed declaration that all rules and regulations have been observed.

S.W.L. Section: Log VK and ZL stations only, including call of station being worked. Log and scoring same as indicated for the transmitter stations. Phone and c.w. scores are combined for final score.

Logs must be in the hands of the Committee by January 31, 1981. This year they go to: NZART Contest Mgr. Jock White, ZL2GX, 152 Lytton Road, Gisborne, New Zealand.

RSGB 21/28 MHz SSB Contest

0700 to 1900 GMT Sunday, October 12

It's the world working the British Isles on 21 and 28 MHz in this one. There are seven countries in the British Isles: G, GD, GI, GJ, GM, GU and GW. A total of 42 prefixes when the numerals are included (G2, GD3, GI4, etc.).

The same station may be worked on each band for QSO and multiplier credit. Entries are limited to single operator only.

Exchange: The RS report plus a progressive contact number starting with 001.

Scoring: Each contact with a British Isle station is worth 3 points. Multiply total QSO points from each band by the sum of the prefixes worked on each band. (A max. of 42 possible on each band. The GB prefix does not count.)

There is also a s.w.l. section. Only British Isles stations are to be logged. Scoring is the same as indicated above.

Awards: There are two Trophies for the British. Overseas entries will settle for 1st, 2nd and 3rd place certificates for world winners.

Separate logs are required for each band, include a summary sheet showing the scoring, a list of prefixes worked, and the usual signed declaration that rules and regulations have been observed, plus your name and address in BLOCK LETTERS.

Logs from overseas entries must be received no later than December 1st and go to: RSGB HF Contest, c/o M. Harrington, 123 Clensham Lane, Sutton, Surrey, SM1 2ND England.

YLRL Anniversary Party

C.W.: Oct. 15-16 Phone: Nov. 5-6
1800 to 1800 GMT Wed./Thurs.

This is strictly a YL only affair, open to YL's around the world. It's the 41st annual party run by the YL Radio League.

All bands may be used. Phone and c.w. are separate contests and require separate logs. A dupe sheet for logs with 100 or more contacts is also adviseable.

Exchange: QSO no., RS(T) and ARRL section, country for DX stations. (Check *QST* for list of ARRL sections.)

Scoring: One point per QSO between stations within an ARRL section and between DX stations. Two points if QSO is between DX and ARRL section stations. The same station may be worked once only regardless of the band.

Multiplier: Is derived from the number of ARRL sections and DX countries worked. There is also a low power multiplier of 1.25 if power input is 150 watts or less on c.w., 300 watts p.e.p. on s.s.b.

Final Score: Total QSO points times ARRL sections and DX countries worked, times power multiplier if any.

For each duplicate contact that is removed from the log in the course of checking, a penalty of 3 additional and equal contacts will be exacted.

Awards: 1st, 2nd and 3rd place certificates to both c.w. and phone world top scorers, and to winners in each U.S. and VE call area and DX country.

Only YLRL members are eligible for Trophy awards. There are two gold cups, c.w. and phone, to the top scoring members in the world. There are also three special plaques: the Cocoran for the highest combined c.w./phone score in an ARRL area, the Hager for the highest combined score for North and Central America and Caribbean areas, and one for the rest of the world.

Logs must be received no later than December 12th and they go to: Ione O'Donnell, WA2DMK, Newcomb, N.Y. 12852.

C.L.A.R.A. AC/DC Contest

Starts: 1800Z Sat. October 18
Ends: 1800Z Sun. October 19

Sponsored by the Canadian Ladies Amateur Radio Assoc. this contest is open to both YL's and OM's.

Each station may be worked twice, once on c.w. and once on phone, or on two different bands, c.w. or phone.

Exchange: RS(T), QTH, name and call.

Scoring: For C.L.A.R.A. members, 1 point per QSO (YL or OM), 3 points for each contact with a bonus station. (YL's will identify if they are a bonus station.)

Non-members work YL stations only. Scoring same as above.

Multiply total QSO points by num-

ber of Canadian provinces/territories worked.

Frequencies: Phone - 3775, 3900, 7200, 14280, 14160, 21300. C.W. - 3690, 7035, 14035, 21035.

Awards: C.L.A.R.A. winners, 1st place, C.L.A.R.A. pin and certificate, 2nd and 3rd place winners a certificate.

Non-member winners, 1st place, plaque and certificate, 2nd and 3rd place certificates. (YL or OM)

All entries are elgible for a mini prize drawing.

Mailing deadline for logs is December 31st to: Diana VanderZande, VE7DTO, SS#3 Jensen Road, Prince George, B.C. Canada V2N 2S7.

Scouts Jamboree-on-the-Air

Starts: 0001Z Sat., October 18
Ends: 2400Z Sun, October 19

This is the 23rd annual Jamboree sponsored by the World Scout Bureau for Scouts everywhere, including Girl Scouts and Guides.

This is not a contest but an opportunity for Scouts or anyone interested in Scouting as well as former Scouts to get together on the air.

Amateurs can invite members of Scout units or individuals to visit their stations and see how ham radio operates.

No specific exchange, no scoring, and no logs are required. However, participation certificates are available from the USA/JOTA Coordinator, W2GND. Be sure to include a s.a.s.e. with your report.

Frequencies: Phone - 3940, 7290, 14290, 21360, 28990, 50500. C.W. - 3590, 7030, 14070, 21040, 28190, 50050. Novice - 3750, 7125, 21140. Also s.s.t.v. and r.t.t.y. frequencies.

Stateside participants should send their reports to: Harry A. Harchar, W2GND, 216 Maxwell Avenue, Hightstown, NJ 80520.

RSGB 21 MHz C.W. Contest

0700 to 1900 GMT Sunday, October 19

Like the 21/28 MHz S.S.B. contest, activity in this one is between the British Isles and the rest of the world.

Operation is limited to single operator stations only.

There is a separate QRP section in which power input must not exceed 5 watts.

Exchange: RST report plus a progressive QSO number starting with 001.

Scoring: Each contact with a British Isles station is worth 3 points. Multiply total QSO points by the number of British Isles prefixes worked. (G2, G3, GD2, etc. A maximum of 42 possible. GB does not count for QSO or mulitplier.)

Awards: Certificates for each section, British, Overseas and QRP.

Include a summary sheet with a list of prefixes worked, station description, the usual declaration and your name and address in BLOCK LETTERS.

Include a summary sheet with a list of prefixes worked, station description, the usual declaration and your name and address in BLOCK LETTERS.

Entries must be received no later than December 31st and go to: J. Bazley, G3HCT, Brooklands, Ullenhall, Solihull, West Midlands, B95 5NW England.

WADM DX Contest

Starts: 1500Z Sat., October 18
Ends: 1500Z Sun., October 19

This activity is usually held the 3rd weekend in October each year, with phone and c.w. being part of the same contest.

Use all bands 3.5 through 28 MHz, both phone and c.w. However, the first 10 and last 25 kHz of the 3.5 and 14 MHz bands are to be kept free of contest operation. The same station may be worked once on each band and on each mode for QSO and multiplier credit.

There are three classes—single operator, multi-operator and s.w.l.

Exchange: RS(T) plus a 3 figure QSO number statring with 001. The DM stations will send a signal report and 2 figures identifying their district (Kreiskenner).

A district is identified by the last letter in the call, A through O, not by the number in the call. A maximum of 15 on each band. DM7, DM8 or DM0 may be substituted for missing districts. (This year the special commemorative prefix may also be used, Y22, Y24, etc.)

S.w.l.'s get 1 point for each DM station reported, and 2 points if the station being worked is also reported. Rest of scoring same as above.

Awards: Certificates to the top stations in each section of each country.

Use a separate log sheet for each band and include a summary sheet showing the scoring, a list of DM districts worked, the usual signed declaration that all rules and regulations have been observed and your name and address in BLOCK LETTERS.

Entries must be postmarked no later than 30 days after the contest. They go to: DM Contest Bureau, RKDDR, Hosemannstr. 14, DDR 1055 Berlin, German Democratic Republic.

ARCI QRP Contest

Starts: 2000Z Sat., October 18
Ends: 0200Z Mon., October 20

This is the Fall edition of this QRP contest sponsored by the QRP Amateur Radio Club International. It is open to both members and non-members.

Exchange: RS(T), state, province or country, and QRP number for members, power input for non-members.

Scoring: Contacts with a member 3 points, non-member 2 points, stations other than W/VE 4 points. The same stations may be worked on each band for QSO and multiplier credit.

There is also a power multiplier:

Over 100 watts input . . . . . ×1
30 to 100 watts input . . . . . ×1.5
10 to 30 watts input . . . . . ×2
3 to 10 watts input . . . . . ×4
1 to 3 watts input . . . . . ×6
.1 to 1 watt input . . . . . ×10

Following bonus points also available: +300 if solar or wind power, +100 for battery power. Must be used for duration of the contest.

Final Score: Total QSO points × (states + provinces + countries per band) × power multiplier + bonus points if any.

Frequencies: C.W. - 1810, 3560, 7060, 14060, 21060, 28060, 50360. S.S.B. - 1810, 3985, 7285, 14285, 21385, 28885, 50385. Novice - 3710, 7110, 21110, 28110. Try s.s.b. on even hours. V.h.f./u.h.f. contacts must be direct.

Awards: Certificates to the highest scoring station in each state, province and country. Additional awards depending on returns. A certificate to the top overall Novice or Tech., and to the station showing three "skip" contacts using lowest power.

Include a summary sheet showing the scoring, equipment description and other information.

Logs must be received by November 20th and go to: QRP ARCI Contest, c/o Edwin R. Lappi, WD4LOO, 203 Lynn Drive, Carrboro, NC 27510. Include a s.a.s.e. for results.

Winners in this year's Bermuda Contest (March) are U.S.A.—W3MA, Canada—VE5RA, Great Britain—G4DSE and West Germany—DK9WB. Each one will receive his Trophy at the Society's annual banquet in Hamilton, Bermuda later this month.

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a monthly feature by
GEORGE JACOBS, W3ASK

Propagation

THE SCIENCE OF PREDICTING RADIO CONDITIONS

DX Contest Special

The 1980 *CQ* World Wide DX Contest will be held on the following dates:

Phone: 0000 GMT Saturday, October 25 to 2400 GMT Sunday, October 26

C.W.: 0000 GMT Saturday, November 29 to 2400 GMT Sunday, November 30

See pages 64-65 in last month's issue of *CQ* for complete rules and details concerning the 1980 Contest.

For the 30th successive year, this month's Propagation column is devoted to a special forecast for use during the Contest.

Exceptionally Good Conditions Expected

Solar activity during last year's *CQ* World Wide DX Contest reached a near peak in the present cycle, with smoothed sunspot levels recorded in the low 160's. This resulted in near record breaking conditions on the h.f. bands.

The 1980 contest period won't be quite as good as last year, but it may be difficult to detect the difference. Although solar activity is now believed to be declining, expect another great period for h.f. propagation conditions. Sunspot activity should be in the low-to-mid 140's, and unless mother nature comes up with a radio storm, the following conditions can be expected on each of the amateur h.f. bands.

Band-By-Band Conditions

The following is a band-by-band summary of DX propagation conditions expected from mid-October through mid-December, and centered on the 1980 Phone and C.W. contest periods.

10 Meters: Good, solid openings should be possible to almost every section of the world sometime during the *daylight hours*, with the band remaining open to southern and tropical areas well into the *early evening*. The band should open just *after sunrise* towards Europe, Africa, and the east, as well as in a southerly direction towards the Caribbean and Central and South America. Signals should peak towards Europe and the east an hour or so *before noon*, towards Africa about an hour or so *after noon*, and towards the south during the *late afternoon*. Optimum conditions towards the Far East, Australasia, Southeast Asia, etc., should occur during the *late afternoon* and *early evening*. Exceptionally strong signal levels can be expected on many *10* meter openings, particularly when conditions rise to HIGH or ABOVE NORMAL.

15 Meters: This should be the *best* band for DX during most of the *daylight hours*. Excellent propagation conditions are expected from shortly *after sunrise* through the *early evening hours*. The band may remain open to as late as *midnight* towards southern and tropical areas. Expect signals to peak on *15* meters about an hour or so later than the peak on *10* meters from similar geographical areas.

20 Meters: This should be an *around-the-clock* DX band, with good openings possible to all areas of the world. Signals should peak from all directions for about an hour or two *after sunrise* and again during the *early evening*. Excellent openings should be possible to many areas of the world during most of the *daylight hours* and throughout most of the *hours of darkness* as well. Expect *long-path* openings on this band for about an hour or so *after sunrise* and again for an hour or so *before local sunset*. Exceptionally strong signal levels should be noted during peak propagation periods. If you plan to operate on a single band during the Contest, this should be the one to produce the longest period of DX, the strongest signals, and openings to more areas of the world than any other single band.

40 Meters: Good DX conditions are expected to most areas of the world on this band from the *late afternoon*, through the *hours of darkness*, and until *shortly after sunrise*. The band should open first for DX towards Europe and the east during the *late afternoon*. Signals should improve steadily as *darkness* approaches. During the hours of *darkness* expect good DX openings to most parts of the world. Signals should peak from an easterly direction about *midnight* and from a westerly direction just *after sunrise*. Excellent openings in a southerly direction should be possible *throughout the night*.

80 Meters: While not quite as good a *nighttime* DX band as *40* meters, expect relatively good DX openings on

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for October 1980

	Expected Signal Quality			
Propagation Index	(4)	(3)	(2)	(1)
Above Normal: 5, 14	A	A	B	C
High Normal: 1, 4, 6, 17-18 23-24, 26, 31	A	B	C	C-D
Low Normal: 2-3, 10, 13, 15-16, 19, 21-22, 25, 28-30	B	C	C-D	D-E
Below Normal: 7, 9, 11-12 20, 27	C	C-D	D	E
Disturbed: 8	C-E	D-E	E	E

Where expected signal quality is: A—Excellent opening, exceptionally strong, steady signals greater than S9 + 30 dB.

B—Good opening, moderately strong signals varying between S9 and S9 + 30 dB, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good (B) on Oct. 1st, fair (C) on the 2nd and 3rd, good (B) on the 4th, excellent (A) on the 5th, etc. Conditions look fair-to-good for the contest period Oct. 25-26.

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this band to many areas of the world during the *hours of darkness* and into the *sunrise period*. The band should peak towards Europe and the east around *midnight*, and towards the west just *prior to sunrise*. Expect good openings towards the south throughout *most of the night*.

160 Meters: Some DX openings should be possible during the hours of *darkness* and the *sunrise period*. The band will be noisier than *40* and *80* meters, and signals considerably weaker, but look for some relatively good openings towards Europe and towards the south from the eastern half of the country and towards the south, the Far East, Australasia, and the South Pacific from the western half of the country. DX openings to other areas of the world may also be possible. A good propagation aid for determining DX openings on this band (and for *80* and *40* meters as well) is a set of sunrise and sunset curves, since DX signals tend to peak when it is *local sunrise* at the *easternmost* end of a path.

For a more detailed circuit-by-circuit forecast refer to the *DX Propagation Charts* appearing on the following pages. Instruction for the proper use of these charts is given elsewhere in this column.

Contest Work Plans

The *DX Propagation Charts* on the following pages show the times when each amateur band from *6* through *160* meters is expected to open from each of the continental USA time zones to the major areas of the world. The information contained in the charts can easily be reorganized into more convenient operating guides or schedules for use during the Contest. For example, for multi-band operation the charts will indicate the times when optimum conditions exist on each band. On the other hand, if you plan to operate single band, the charts will give you a good idea of what to expect throughout the day. Experience gained during previous Contests has shown that such planning can be extremely useful in piling up contacts and points with a minimum of wasted time.

Table 1 is an example of a *single band* schedule for *20* meters. It shows the times when propagation conditions are expected to be optimum to various areas of the world (propagation index 3 or 4, unless otherwise shown) for each three hour period throughout the day. An Eastern time zone location has been chosen for this example, but similar schedules can be devised for the other time zones, and for other bands and contemplated operating conditions.

Radio Storm

A "Last Minute Forecast" for the Phone section of the 1980 Contest, made at press time, appears at the beginning of this column. A similar forecast for the C.W. section will appear in next month's column. Subscribers to MAIL-A-PROP will receive updated day-to-day information for the Contest period. Information concerning MAIL-A-PROP can be obtained from P.O. Box 1714, Silver Spring, MD 20902. Updated geomagnetic and solar data also can be obtained during the Contest period from WWV broadcasts transmitted 18 minutes past each hour on 2.5, 5.0, 10.0, 15.0, and 20 MHz. The hourly forecasts broadcast on WWV, along with the latest solar flux and geomagnetic indices, also may be obtained by telephoning area code 303-499-8129 at any time. This *is not* a toll-free number, but there is no other charge for this service.

If a radio storm should develop during the Contest, expect conditions to drop to BELOW NORMAL and possibly even DISTURBED to many areas of the world, depending upon the storm's severity. Signals will become weaker, fading will increase and noise levels will be substantially higher during a radio storm. Paths passing through polar regions and the upper latitudes are often more adversely affected than signals in mid-and-lower latitudes. During certain types of radio storms, conditions may actually improve at times for openings to southern and tropical areas.

If a radio storm should develop, concentrate on working trans-polar paths on *10*, *15*, and *20* meters during the daylight hours. Also check the *40*, *80*, and *160* meter bands for unusually good openings to some areas of the world during the hours of darkness.

V.h.f. Ionospheric Propagation

Expected seasonal increases in daytime maximum usable frequencies coupled with continuing high levels of solar activity should make DX openings possible to many parts of the world on *6* meters during October. The best times for such openings are shown in the *DX Propagation Charts* on the following pages with †. Generally speaking, check for openings from the eastern half of the USA towards Europe, Africa, and the east *before noon*. The best chance for *6* meter DX openings towards the Caribbean and Central and South America from all areas of the USA should be from an hour or two *after sunrise* through the *early afternoon*. Look for openings towards the Far East, the South Pacific area, New Zealand, and Australasia during the *late afternoon* hours. These openings will favor stations located in the western half of the USA, but some openings may extend considerably to the east.

The ORIONIDS meteor shower should take place between October 20-23, with peak conditions taking place on the 22nd. Since an hourly meteor count of approximately 25 is expected during peak periods of this shower, check the v.h.f. bands for meteor-reflection-type ionospheric short-skip openings during the course of the shower.

Time EST	Areas To Which DX Conditions Expected To Be Optimum
00-03	Europe, Africa, South Pacific & New Zealand, Australasia, Caribbean, Central and South America, Antarctica, Far East*
03-06	Western Europe*, Africa*, South Pacific & New Zealand*, Australasia*, Caribbean*, Central and South America*, Antarctica* (Good time to catch up on some sleep)
06-09	Europe, Central & South Asia, Far East, South Pacific & New Zealand, Australasia, Caribbean, Central America, Southeast Asia*, South America*, Antarctica*, Africa*
09-12	Australasia, Caribbean, Central America, Europe*, Africa*, Central and South Asia*, Far East*, South Pacific & New Zealand*, South America*
12-15	Europe, Caribbean, Central America, Africa* (Another good time for food and sleep)
15-18	Europe, Africa, Caribbean, Central America, South America*
18-21	Europe, Africa, Eastern Mediterranean & Middle East, Caribbean, Central and South America, Southeast Asia*, Far East*, South Pacific & New Zealand*
21-00	Europe, Africa, Eastern Mediterranean and Middle East, Central and South Asia, Far East, South Pacific & New Zealand, Caribbean, Central and South America, Antarctica, Australasia*

* Propagation index (2), all others (3) or (4).

Table 1- Sample twenty meter operating schedule for Eastern USA.

October 15 - December 15, 1980
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Central Europe & North Africa	06-07 (1) 07-08 (3) 08-13 (4)† 13-14 (3) 14-15 (1)	06-07 (1) 07-08 (3) 08-14 (4) 14-16 (3) 16-17 (2) 17-18 (1)	04-06 (2) 06-09 (4) 09-10 (3) 10-14 (2) 14-16 (3) 16-22 (4) 22-00 (3) 00-02 (2) 02-04 (3)	16-17 (1) 17-18 (2) 18-20 (3) 20-01 (4) 01-02 (3) 02-03 (2) 03-04 (1) 19-21 (1)* 21-23 (2)* 23-01 (3)* 01-02 (2)* 02-03 (1)*
Northern Europe & European USSR	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (4)† 11-12 (3) 12-13 (2) 13-14 (1)	06-07 (1) 07-09 (3) 09-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-17 (3) 17-20 (4) 20-22 (3) 22-00 (2) 00-02 (3) 02-04 (2)	17-19 (1) 19-02 (2) 02-04 (1) 20-03 (1)*
Eastern Mediter-ranean & Middle East	07-08 (1) 08-09 (3) 09-13 (4)† 13-14 (3) 14-15 (1)	06-07 (1) 07-08 (3) 08-10 (4) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	07-12 (1) 12-15 (2) 15-17 (3) 17-22 (4) 22-00 (3) 00-01 (2) 01-03 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-01 (2) 01-02 (1) 20-00 (1)*
Western Africa	06-07 (1) 07-12 (3)† 12-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	04-06 (1) 06-07 (2) 07-14 (3) 14-20 (4) 20-22 (3) 22-00 (2) 00-01 (1)	03-04 (3) 04-06 (2) 06-13 (1) 13-15 (2) 15-17 (3) 17-03 (4)	18-22 (1) 22-01 (2) 01-03 (1) 00-03 (1)*
Eastern & Central Africa	07-08 (1) 08-09 (2) 09-12 (3)† 12-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (3) 09-13 (2) 13-15 (3) 15-18 (4) 18-19 (3) 19-22 (2) 22-00 (1)	03-05 (2) 05-09 (1) 12-14 (1) 14-16 (2) 16-17 (3) 17-01 (4) 01-03 (3)	19-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
Southern Africa	07-08 (1) 08-10 (3)† 10-14 (4) 14-16 (3) 16-17 (2) 17-18 (1)	06-08 (1) 08-11 (2) 11-13 (3) 13-16 (4) 16-18 (3) 18-20 (2) 20-22 (1)	06-09 (1) 11-14 (1) 14-15 (2) 15-17 (3) 17-21 (4) 21-02 (3) 02-05 (2)	18-19 (1) 19-22 (2) 22-23 (1) 19-21 (1)*
Central & South Asia	08-09 (1) 09-10 (2) 10-11 (1) 20-22 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-20 (1) 20-22 (2) 22-00 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-11 (1) 18-20 (1) 20-21 (2) 21-23 (3) 23-00 (2) 00-01 (1)	18-21 (1) 06-08 (1)
Southeast Asia	10-12 (1) 12-14 (2) 14-15 (1) 17-18 (1) 18-20 (2) 20-21 (1)	09-10 (1) 10-12 (2) 12-13 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	02-06 (1) 06-09 (2) 09-11 (1) 18-21 (2) 21-23 (1)	18-20 (1) 05-07 (1)
Far East	08-10 (1) 16-17 (1) 17-18 (2) 18-20 (3) 20-21 (1)	08-09 (1) 09-11 (2) 11-12 (1) 16-17 (1) 17-18 (2) 18-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	00-04 (2) 04-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 16-18 (1) 18-20 (2) 20-00 (3)	04-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
South Pacific & New Zealand	09-12 (1) 12-14 (2) 14-16 (3) 16-19 (4)† 19-20 (3) 20-21 (2) 21-22 (1)	08-09 (1) 09-11 (2) 11-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-23 (2) 23-00 (1)	13-19 (1) 19-21 (2) 21-22 (3) 22-02 (4) 02-04 (3) 04-07 (2) 07-10 (3) 10-13 (2)	00-02 (1) 02-03 (2) 03-07 (3) 07-08 (2) 08-09 (1) 03-04 (1)* 04-07 (2)* 07-08 (1)*
Australasia	08-09 (1) 09-11 (2) 11-12 (1) 14-16 (1) 16-17 (2) 17-18 (3)† 18-19 (4)† 19-20 (2) 20-21 (1)	07-08 (1) 08-11 (2) 11-16 (1) 16-17 (2) 17-18 (3) 18-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	07-08 (3) 08-10 (4) 10-11 (3) 11-12 (2) 12-14 (1) 17-19 (2) 21-23 (1) 23-00 (2) 00-01 (3) 01-03 (4) 03-04 (3) 04-07 (2)	03-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (2) 08-11 (4)† 11-13 (3)† 13-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	06-07 (1) 07-08 (3) 08-11 (4) 11-13 (3) 13-20 (4) 20-21 (3) 21-23 (2) 23-01 (1)	07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-02 (4) 02-03 (3) 03-06 (2) 06-07 (3)	18-19 (1) 19-21 (3) 21-04 (4) 04-06 (2) 06-07 (1) 19-21 (1)* 21-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-09 (4) 09-11 (3)† 11-15 (2)† 15-16 (3) 16-19 (4) 19-20 (2) 20-21 (1)	06-07 (1) 07-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-22 (4) 22-23 (3) 23-00 (2) 00-01 (1)	06-08 (2) 08-11 (1) 14-16 (1) 16-17 (2) 17-19 (3) 19-02 (4) 02-03 (3) 03-05 (2) 05-06 (3)	20-23 (1) 23-04 (2) 04-06 (1) 23-04 (1)*
McMurdo Sound Antarctica	15-17 (1) 17-19 (2) 19-20 (1)	15-17 (1) 17-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	16-18 (1) 18-21 (1) 21-22 (2) 22-03 (3) 03-05 (2) 05-07 (1) 07-09 (2) 09-10 (1)	00-06 (1)

Time Zones: CST & MST
(24-Hour Time)
CENTRAL USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	06-07 (1) 07-08 (3) 08-11 (4)† 11-12 (3) 12-13 (2) 13-14 (1)	06-07 (1) 07-08 (3) 08-12 (4) 12-13 (3) 13-14 (2) 14-15 (1)	03-06 (1) 06-08 (3) 08-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-20 (2) 20-00 (1) 00-03 (2)	17-18 (1) 18-20 (2) 20-23 (3) 23-01 (2) 01-02 (1) 19-20 (1)* 20-23 (2)* 23-00 (1)*
Nothern & Central Europe & European USSR	06-07 (1) 07-08 (2) 08-10 (3)† 10-11 (2) 11-12 (1)	06-07 (1) 07-08 (3) 08-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	02-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-16 (3) 16-17 (4) 17-19 (3) 19-20 (2) 20-22 (1) 22-02 (2)	18-20 (1) 20-23 (2) 23-01 (1) 20-23 (1)*
Eastern Mediter-ranean & Middle East	07-08 (1) 08-09 (2) 09-12 (3)† 12-13 (2) 13-14 (1)	06-07 (1) 07-08 (2) 08-11 (3) 11-12 (4) 12-13 (3) 13-14 (2) 14-15 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-13 (2) 13-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	17-19 (1) 19-22 (2) 22-23 (1) 20-22 (1)*
Western Africa	06-07 (1) 07-11 (3)† 11-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	05-06 (1) 06-10 (2) 10-14 (3) 14-18 (4) 18-19 (3) 19-21 (2) 21-22 (1)	05-12 (1) 12-15 (2) 15-17 (3) 17-23 (4) 23-01 (3) 01-05 (2)	17-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Eastern & Central Africa	07-09 (1) 09-11 (2)† 11-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-12 (2) 12-15 (3) 15-17 (4) 17-18 (3) 18-20 (2) 20-21 (1)	06-14 (1) 14-16 (2) 16-19 (3) 19-21 (4) 21-23 (3) 23-00 (2) 00-02 (1)	20-00 (1) 21-23 (1)*
Southern Africa	07-08 (1) 08-09 (2) 09-11 (3)† 11-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-10 (2) 10-12 (3) 12-15 (4) 15-17 (3) 17-18 (2) 18-20 (1)	06-13 (1) 13-15 (2) 15-17 (3) 17-20 (4) 20-23 (3) 23-02 (2) 02-04 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Central & South Asia	07-08 (1) 08-10 (2) 10-11 (1) 18-19 (1)† 19-21 (2) 21-22 (1)	06-07 (1) 07-10 (2) 10-11 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-02 (1) 02-04 (2)	18-20 (1) 06-08 (1)
Southeast Asia	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (2) 11-13 (1) 15-16 (1) 16-19 (2)† 19-20 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-12 (2) 12-13 (1) 16-17 (1) 17-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-10 (2) 10-12 (1) 18-19 (1) 19-21 (2) 21-23 (1)	04-07 (1)
Far East	15-16 (1) 16-19 (3)† 19-20 (2) 20-21 (1)	08-10 (1) 15-16 (1) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	04-05 (1) 05-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 17-19 (1) 19-20 (2) 20-22 (3) 22-23 (2) 23-00 (1)	02-03 (1) 03-07 (2) 07-09 (1) 03-06 (1)*
South Pacific & New Zealand	09-12 (1) 12-13 (2) 13-15 (3) 15-18 (4)† 18-19 (3) 19-20 (2) 20-21 (1)	08-11 (1) 11-13 (3) 13-16 (2) 16-17 (3) 17-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	11-17 (1) 17-18 (2) 18-20 (3) 20-01 (4) 01-03 (3) 03-07 (2) 07-09 (4) 09-10 (3) 10-11 (2) 11-12 (2)	23-01 (1) 01-02 (2) 02-07 (3) 07-08 (2) 08-09 (1) 00-02 (1)* 02-07 (2)* 07-08 (1)*

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location, The Eastern USA Chart can be used in the 1, 2, 3, 4, 8 KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. An * indicates the best time to listen for 160 meter openings.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

4. Time shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M. etc. Appropriate *standard* time is used, *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 8 hours in PST Zone, 7 hours in MST Zone, 6 hours in CST Zone, and 5 hours in EST Zone. For example, 13 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 04 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level for each 10dB loss, it will lower by one level.

6. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

Australasia	08-09 (1) 09-11 (2) 11-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	06-08 (1) 08-09 (3) 09-11 (2) 11-12 (1) 16-18 (1) 18-19 (2) 19-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	06-07 (2) 07-09 (4) 09-10 (3) 10-11 (2) 11-12 (1) 15-17 (1) 20-22 (1) 22-00 (2) 00-04 (3) 04-06 (1)	02-04 (1) 04-07 (2) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	06-07 (1) 07-08 (3) 08-10 (4)† 10-12 (3)† 12-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	05-07 (1) 07-08 (3) 08-10 (4) 10-13 (3) 13-18 (4) 18-19 (3) 19-21 (2) 21-23 (1)	06-07 (3) 07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-00 (4) 00-02 (3) 02-06 (2)	18-19 (1) 19-21 (3) 21-03 (4) 03-05 (2) 05-07 (1) 19-21 (1)* 21-02 (2)* 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	06-07 (1) 07-08 (3) 08-10 (4)† 10-14 (3)† 14-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	05-06 (1) 06-07 (2) 07-09 (3) 09-13 (2) 13-15 (3) 15-20 (4) 20-21 (3) 21-23 (2) 23-00 (1)	04-06 (1) 06-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-02 (3) 02-04 (2)	19-21 (1) 21-01 (2) 01-03 (1) 03-04 (2) 04-06 (1) 21-05 (1)*
McMurdo Sound, Antarctica	07-08 (1) 08-09 (2) 09-10 (1) 17-18 (1) 18-20 (2) 20-21 (1)	06-07 (1) 07-09 (2) 09-10 (1) 14-16 (1) 16-18 (2) 18-22 (3) 22-23 (2) 23-00 (1)	06-08 (2) 08-09 (1) 16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 04-06 (1)	23-05 (1)

October 15 - December 15, 1980
Time Zone: PST (24-Hour Time)
WESTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	06-07 (1) 07-08 (2) 08-11 (3)† 11-12 (2) 12-13 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (4) 12-13 (2) 13-14 (1)	05-06 (1) 06-08 (2) 08-10 (1) 10-12 (2) 12-14 (4) 14-16 (3) 16-18 (2) 18-20 (1) 23-01 (2)	18-20 (1) 20-22 (2) 22-00 (1) 19-23 (1)*
Central & Northern Europe & European USSR	07-08 (1) 08-10 (2)† 10-11 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	05-07 (1) 07-09 (3) 09-10 (2) 10-14 (1) 14-17 (3) 17-19 (2) 19-23 (1) 23-02 (2) 02-03 (1)	18-20 (1) 20-22 (2) 22-23 (1) 19-22 (1)*

Eastern Mediterranean & Middle East	07-08 (1) 08-10 (2)† 10-11 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-10 (2) 10-14 (1) 14-16 (2) 16-18 (1) 18-20 (2) 20-22 (1) 00-02 (1)	18-22 (1) 06-08 (1)
Western Africa	06-07 (1) 07-08 (2) 08-11 (3)† 11-13 (4) 13-15 (3) 15-16 (2) 16-17 (1)	05-06 (1) 06-07 (2) 07-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-10 (1) 10-14 (2) 14-15 (3) 15-20 (4) 20-22 (3) 22-02 (2) 02-03 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Eastern & Central Africa	07-08 (1) 08-10 (2)† 10-14 (3) 14-15 (2) 15-16 (1)	06-08 (1) 08-12 (2) 12-16 (3) 16-17 (2) 17-19 (1)	06-14 (1) 14-16 (2) 16-22 (3) 22-23 (2) 23-00 (1)	18-21 (1) 06-08 (1)
Southern Africa	07-08 (1) 08-10 (3)† 10-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-10 (1) 10-12 (2) 12-13 (3) 13-16 (4) 16-17 (3) 17-19 (2) 19-21 (1)	06-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-22 (3) 22-01 (2) 01-03 (1)	17-19 (1) 19-20 (2) 20-21 (1) 06-08 (1) 18-19 (1)*
Central & South Asia	16-17 (1) 17-19 (3)† 19-20 (1) 07-09 (1)	16-17 (1) 17-19 (3) 19-20 (2) 20-21 (1) 07-09 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-11 (1) 16-17 (1) 17-19 (3) 19-21 (2) 21-22 (1)	17-19 (1) 04-09 (1)
Southeast Asia	08-09 (1) 09-10 (2) 10-11 (3) 11-12 (2) 12-14 (1) 14-15 (2) 15-17 (3)† 17-19 (2) 19-20 (1)	07-08 (1) 08-11 (3) 11-12 (2) 12-15 (1) 15-17 (3) 17-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1) 19-22 (1) 22-01 (2) 01-03 (3) 03-06 (2)	02-03 (1) 03-06 (2) 06-08 (1) 03-06 (1)*
Far East	13-14 (1) 14-15 (3) 15-19 (4)† 19-20 (2) 20-21 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (2) 13-15 (3) 15-17 (2) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-14 (2) 14-18 (1) 18-20 (2) 20-21 (3) 21-23 (4) 23-02 (3) 02-06 (2)	23-01 (1) 01-05 (2) 05-07 (3) 07-08 (1) 01-05 (1)* 05-06 (2)* 06-07 (1)*
South Pacific & New Zealand	08-09 (1) 09-10 (2) 10-19 (4)† 19-21 (3) 21-23 (2) 23-00 (1	07-08 (1) 08-11 (4) 11-18 (3) 18-00 (4) 00-02 (3) 02-03 (2) 03-04 (1)	11-18 (1) 18-19 (2) 19-21 (3) 21-04 (4) 04-07 (3) 07-09 (4) 09-10 (3) 10-11 (2)	21-22 (1) 22-00 (2) 00-07 (3) 07-08 (2) 08-09 (1) 22-00 (1)* 00-06 (2)* 06-07 (1)*
Australasia	09-11 (1) 11-12 (2) 12-14 (4) 14-18 (3)† 18-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	07-08 (1) 08-12 (3) 12-14 (2) 14-18 (1) 18-20 (2) 20-21 (3) 21-00 (4) 00-01 (3) 01-02 (2) 02-03 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-04 (4) 04-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 12-14 (1)	02-03 (1) 03-04 (2) 04-07 (3) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	06-07 (1) 07-08 (3) 08-10 (4)† 10-15 (3) 15-17 (4) 17-18 (2) 18-19 (1)	05-06 (1) 06-07 (2) 07-10 (4) 10-14 (3) 14-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	06-08 (4) 08-10 (3) 10-14 (2) 14-16 (3) 16-00 (4) 00-02 (3) 02-04 (2) 04-06 (3)	18-19 (1) 19-21 (3) 21-02 (4) 02-05 (2) 05-06 (1) 19-21 (1)* 21-02 (2)* 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil Chile Argentina & Uruguay	06-07 (1) 07-13 (3)† 13-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	06-07 (2) 07-09 (3) 09-14 (2) 14-16 (3) 16-21 (4) 21-23 (3) 23-02 (2) 02-06 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-01 (3) 01-03 (2) 03-05 (1) 05-07 (2) 07-09 (1)	20-22 (1) 22-04 (2) 04-05 (1) 22-04 (1)*
McMurdo Sound, Antarctica	07-08 (1) 08-09 (2) 09-10 (1) 19-20 (1) 20-22 (2) 22-23 (1)	06-07 (1) 07-09 (2) 09-12 (1) 14-17 (1) 17-20 (2) 20-23 (3) 23-01 (2) 01-02 (1)	16-18 (1) 18-20 (2) 20-04 (3) 04-05 (2) 05-06 (1) 06-08 (2) 08-10 (1)	00-05 (1)

*Indicates best time to listen for 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a Propagation Index of (2), or higher.

†Indicates best times to check for 6 Meter F-2 layer DX openings. While such openings will not occur frequently, some may be possible when day-to-day conditions are HIGH NORMAL or better.

Also, check the v.h.f. bands for unusual ionospheric short-skip openings during periods that are expected to be BELOW NORMAL or DISTURBED on the h.f. bands. This information is contained in the "Last Minute Forecast," which appears at the beginning of this column.

C.W. Contest Forecast

The *DX Propagation Charts* contained in this month's column are valid for *both* the Phone and C.W. sections of the 1980 Contest. *Be sure to keep them handy for use during next month's C.W. section.* Short-skip propagation forecasts for October appeared in last month's column.

As a check against present forecast methods and for possibly improving future forecasts, the Editor would appreciate any comparisons or comments concerning actual vs. forecast conditions during the 1980 Contest. These may be mailed directly to W3ASK, P.O. Box 1714, Silver Springs, MD 20902.

Good luck in the 1980 Contest. It looks like it will be another exceptionally good one!

73, George, W3ASK

This month we compare the efficiencies of machine language, assembler programs and BASIC.

INTRODUCTION TO BASIC

A Computer Programming Language

Part X—Machine Language

BY BUZZ GORSKY*, K8BG

In the very first part of this exploration of BASIC (*CQ* January, '80) I mentioned that *machine language* is much more efficient than BASIC. In this article of the series, I will demonstrate that fact. First I will introduce the few BASIC statements which are used with machine language routines. The **PEEK (N)** statement will provide a value equal to whatever is stored in memory location **N. PRINT PEEK(N)** will thus print that value. This can be useful in finding something in memory if you know about where it is, but do not know exactly. **POKE N,I** is another statement directly involving memory. The value **I** will be placed in memory location **N** by this statement. Whatever was in **N** before will simply cease to exist. Obviously a few misplaced **POKE** statements will destroy a program, so these statements must be used with care. **USR(N)** is a dummy function which causes a BASIC program to branch to a machine language routine. Suppose for example we have a machine language routine that sends Morse code, and that this is operated from a BASIC program. When we wish code to be sent we could have any statement which includes **USR(N)** and the program would go to the machine routine. We might say **PRINT USR(X)** or we might say **Y=USR(I)**—it would not matter as long as **USR(X)** were included. However, before we could successfully enter a machine routine in this fashion, we would have to give the program the correct memory address to begin the machine program. This is done in a complex way which will be difficult to understand if you are not familiar with hexadecimal numbers—remember that in that first article I also mentioned that BASIC was nice since you didn't have to worry about such things.

The TRS-80 (Radio Shack trademark) stores addresses in two adjacent memory locations. The address is stored as a hex value. The least significant bit is stored first followed by the most significant bit. Suppose our machine language program begins at address 32000 (decimal). That is 7D00 hex. Thus we would indicate this address by storing 00 first and then 7D. Of course, BASIC does not know anything about hex values, so these must be stored in decimal form. The 00 is easy since zero in hex is also zero in decimal. The 7D could be evaluated from the program which I presented for converting hex to decimal values. 7D = 125 decimal. So we would store 0 and then 125. Oddly enough that would indicate 32000! (It may sound crazy but that's how it works! In order to execute a **USR** call in BASIC we must put the least significant bit of the machine program address into location 16526 and the most significant bit into 16527. So those two **POKE**s would have to be done before the **USR** statement.

I recognize that this discussion may be a bit hard to follow, so I will provide an example which will demonstrate the efficiency and speed of machine language—and you do not have to understand anything about machine language to appreciate the example. However, before I do that I will explore machine language a bit, in case you are interested.

The "brain" of a computer functions in a step by step way. It sees an address in memory, picks up the number stored there and then does whatever that number represents as a machine function. Some machine functions are stored as a single number while others may require several numbers. In each case the machine will do whatever is required. For BASIC to work, the machine has a lengthy machine language program in memory which stepwise interprets the BASIC program into machine steps which are accomplished. We have seen several examples of ineffi-

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ciency with this system. A straightforward machine language program, however, is simply a list of numbers, in proper sequence, indicating the steps for the computer to do. The computer does not have any extra interpreting to do. It merely begins at the first step, does whatever that says, and then goes on to the next. It can do that very quickly.

As you can imagine, though, programming in machine language is quite tedious. You must know all of the possible machine language statements (and there are hundreds) and you must know the numerical value for each. Furthermore, since many will refer to memory locations, you must keep track of the memory location for everything you wish stored, so that you can include proper instructions for finding things. You must also keep track of the memory location for each of the machine steps so that you can branch to a given step when you wish. Obviously there is a lot to keep track of. Most programmers do not actually use machine language. Rather they use what is called *assembler*. This language uses word, or rather abbreviation, symbols for the machine steps. The program is written with these abbreviations and then a program called an *assembler* composes the equivalent machine language program. Once the program is assembled, there is a machine program which can be entered into the computer and run just as if it had been written that way originally. The assembler program will also usually have features so that the programmer can label program lines and memory locations with abbreviations which are meaningful to the programmer and make keeping track of things easy. For example if a certain memory location is to keep track of the address of a table, we might call the location **TABLE** in the assembler program, and whenever the assembler saw the symbol **TABLE** it would substitute the correct address.

I wish to emphasize one very important difference between the BASIC *interpreter resident* in the machine, and an *assembler program*. The **BASIC interpreter** takes the BASIC program in memory one step at a time and interprets each step into machine language as it goes. Thus there is a lot of time involved. Also, it does each step independently so that if a variable is used in two adjacent steps the BASIC interpreter will not know that and it will look up and file the variable each time. Furthermore the BASIC interpreter will not know of a syntax error, for example, until the error is encountered in execution. The **assembler program** on the other hand will

look through an entire program for errors before assembling, and once the program is assembled the program exists as a series of machine steps requiring no further interpretation.

What kinds of steps can be accomplished in machine code? Well they are all small steps and they involve special locations within the microprocessor called **registers, peripheral devices,** and **peripheral memory locations.** Only addition and subtraction can be done. And only simple comparisons can be done. The program can be instructed to branch based on the result of a comparison.

Now for the example which hopefully will make this somewhat theoretical discussion clearer. I am going to present a program task involving the video display—so that we can see what is going on—and I am going to accomplish the task three different ways. The first two will involve BASIC, though one will be more straightforward than the other, and the last will involve machine code. The task is simple. I wish to display on the screen each of the characters in the character set, having the screen filled with each of the characters in sequence. Consider the following program:

```
5 CLS
10 FOR J = 33 TO 95: FOR I = 1 to 16
20 PRINT STRING$ (63,J)
30 NEXT:NEXT:GOTO10
```

This program works its way through the ASCII character set (except for character #32, the blank space) and prints sixteen lines—i.e. a full screen—of 63 character strings of each character. After it finishes the last character it will go back and start again. If you run this program you will be able to see the characters appear on the screen one at a time, and you will doubtless get bored long before the program has completed its first run.

Now let's think of how such a program might be executed in machine code, and do the same thing in BASIC. In the TRS-80 each location on the screen is mapped to a location in memory. If a value is put into the memory location, it will appear on the screen. Thus the **POKE** statement can be used to put material on the screen. The memory location for the upper left corner of the screen is 15360 and that for the lower right corner is 16383. Take a look at this next program:

```
99 CLS
100 FOR I = 33 to 95: FOR J = 15360
  to 16383
110 POKE J,I
120 NEXT:NEXT:GOTO 100
```

This program will do the same thing that the first program did, but it requires much less interpretation on the part of the BASIC interpreter. We are telling the program directly to put a value into a given memory location and then go to the next location. However, we are still requiring that the machine do some interpreting. It has to figure out the **POKE** statement and keep track of the two variables. What's more, since it's in BASIC it has to do this each time the **POKE** is encountered. So if you watch this program run you will see that it runs a bit faster than the first, but it is still slow.

Now let's implement the program in machine language. To do this I wrote a program in *assembler* code and then let my assembler give me the machine language program. I wrote a program just like that shown in lines 99 to 120 above, but it used simple machine codes. That program can be implemented as follows:

```
200 FOR A = 32600 to 32624
210 READ N: POKE A,N:NEXT
220 DATA 62,33,33,0,60,30,16,6,64,
  119,35,16,252,29,32,247,60,254,
  96,195,90,127,195,88,127
230 END
300 POKE 16526,88: POKE 16527,
  127:X = USR(X)
```

Lines 200 to 230 enter the machine language program into memory. The **POKE**s put the data values into the memory locations. Those numbers in the DATA statement ARE the program. There is nothing else! The END causes execution to stop. Line 300 loads the start address and then calls the machine language program. This program will do just what the previous two programs did—but what a difference. As you watch this one on the screen, it will go so fast that you will not be able to tell what is on the screen. You can hit the reset button to stop execution so that you can see what is going on.

There are a few other requirements for this program. Before doing lines 200-300, you should use 32600 in the memory size statement so that BASIC will not interfere with the memory you want for the machine language program. Also it must be obvious that this is not the best way to implement a machine program. Actually when using the assembler program, it will make a tape of the machine program and then that tape can be entered with the **SYSTEM** command so that you do not have to do all of that poking manually. Once you have executed lines 200-230 you can use **SYSTEM** to get the program running instead of using line 300. Simply type **SYSTEM** and when you get the prompt type /32600 and hit enter. This will also start the machine language program at the instruction in memory location 32600.

Next month we will consider the alternatives to a tape based system. I will describe disk storage and explore what kinds of things can be done with a disk based system.

(To Be Continued)

As crowded band conditions persist, tensions and hostilities become more evident on the air. Perhaps a little introspective satire will help bring about mutual respect and cooperation among our ranks.

The Heckler

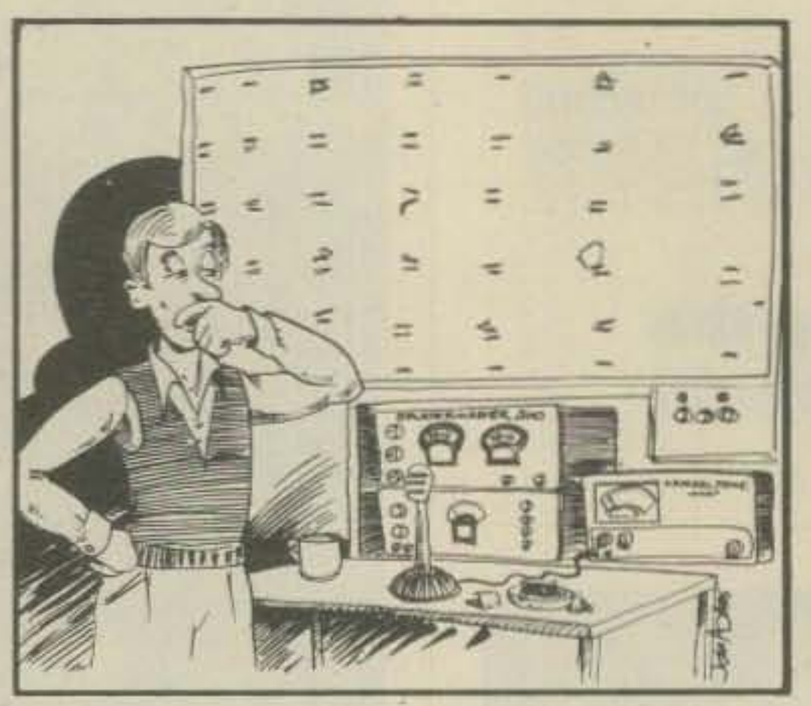
BY HUNT TURNER*, K0HT
ILLUSTRATIONS BY JOHN ADAMS

"In my opinion," said Joe, "what this hobby needs is more self criticism. All I hear on the bands these days is QRM and pileups." I sat back and pulled deeply on my pipe. "After all, it's only a hobby and some of these DXers act more like it's a profession." Joe was perched precariously atop a rickety old stepladder waving his stapler at me threateningly. "There," he grunted as his fist drove the chisel point coldly through the 8Z4 into the expectant plasterboard, "that's the last of 'em!" He tripped from the ladder and seated himself in a rocker beside me.

Outside, February winds whipped the coax in a dismal rhythm as Joe and I settled back for our weekly lament on the sorry state of amateur radio. But somehow Joe's heart just wasn't in it. He sat staring forlornly at his wall of exotic prefixes. "What'll I do now?" he moaned. "You know those cards cost me much more than the IRCs. Just think of the alimony, the doctor bills and the batteries for this confounded hearing aid."

I told him the hearing aid was his own fault. All those years of c.w. DXpeditions through a 50 Hz crystal filter had rendered his hearing as useless as that of an acid-rock road manager. Many was the night that I entered Joe's shack amid such pings and screeches that I thought myself to be on the set of *The Enemy Below.* As Joe's hearing grew worse, he would smile philosophically and say, "There's always RTTY – DXCC."

Following Joe's initial exaltation over that last card, he entered a period of insufferable melancholia. He tried



The transceiver sat parked on 3810 in front of a wall full of staples.

v.h.f., s.s.t.v., r.t.t.y. and traffic handling, but eventually he settled back into his long forgotten pasttime of 75 meter ragchewing.

Slowly he emerged from his cocoon of self pity. His recovery and transfiguration were complete and startling. A real Dr. Jekyll and Mr. Hyde, he came to hold utter disdain for those who sought his once coveted award. "What a senseless waste of life," he smirked. At first I thought these actions symptomatic of withdrawal, though I soon became convinced of his sincerity.

One cheerful Saturday morning in the spring, I dropped by as usual for a pot or two of coffee. There sat Joe at the kitchen table with his nose buried in a *National Geographic* magazine. "Have a seat; I just put on a fresh pot. It'll be done in a minute." I looked upon the table with keen interest. There, just below his cup, was a most unusual coaster. He picked up his coffee. I gasped in horror as he put the cup to his lips. There it was, in plain sight, the four corners roughly torn away, circled time and again with the brown footprint of the cup, JY1.

"I think it's ready now," he said, taking a fresh cup from the cupboard. "I've really got to clean this pot someday. Just look at that residue." He placed the steaming cup in front of me on a similarly distinctive coaster. I sipped my coffee in silence as he finished his article.

We filled our cups again and shuffled off to the shack. It was just as I had expected; the transceiver sat parked on 3810 in front of a wall full of staples.

"Well," he said, falling into his chair, "what shall we discuss today?"

"Oh, I dunno, how about ex-CBers with two letter suffixes?"

'Nah, that's old hat," he scoffed. "What we need are fresh ideas. You know I've found myself some new heroes. I don't spend all my time hanging around 75 anymore just talking to you. It began here, though. One night I moved up the band and ran across the devil worship net. What a hornet's nest! It almost equalled the confusion of a pileup what with all the jammers. So, I decided to check the higher

There it was in plain sight. . . JY1!

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bands. Boy, were they loaded with QRM. After some analysis, I came to realize that heckling had its big guns too, though there aren't many who operate with real style. You have your tuner-uppers, c.w. machine gunners and the anonymous whistler who knows what evil lurks in the hearts of men, your heeeeeelos and ooooooohlas but they lack finesse.

"We need a network of far western United States stations to transmit every one kc from 14 hundred up and listen from 14.193. We need to establish procedures for calling CQ incessantly upon all occupied frequencies, preferably net frequencies. This technique would be most effective if one ran eonugh power in watts. With today's crowded conditions, there's really not much else to do. So, we must encourage such operations by offering incentive awards, you know, the old wallpaper scam."

His eyes were afire. He paced nervously up and down the shack, muttering to himself about awards and certificates. "Just look; I've prepared a list. I've got a friend who's a printer. Let's get started."

"What about Slashed All Mobile Tires?"

He handed me the list. There it was, in black and white: Heckled All States, Heckled All Continents, Kerchuncked All Repeaters, Whistled All Frequencies (with endorsements for frequency increments), A-1 Heckler, The Soliloquy Award for One Way Ragchews. I had had enough. I placed the list on the desk and with my head bowed, turned to leave.

"No...wait, wait," he screamed, "what about...what about Slashed All Mobile Tires and...Burned All Radio Clubs and..."

The door closed behind me with a dull thud. My eyes, blinded by the bright morning sun, stared blankly at the base of the tower. Gradually, my eyes began a 200 foot climb, rung by rung, until at last they came to rest upon the gargantuan monoband array, its drooping elements swinging frantically in search of their next victim.

The Printed Word: new reading material

Hal Communications Amateur Radio Catalog. Hal's catalog contains information and specifications on their line of amateur-related equipment. Included are the DS3100 ASR automatic send-receive terminal, the DS 2000 KSR low-cost keyboard send-receive terminal, the ST-6000 and ST-5000 RTTY Demodulators, and Hal Parts Kits. Also included are two pages entitled "Answers to Often-Asked Questions About RTTY." A price list and order form are part of the catalog. For a copy of the catalog, contact Hal Communications Corp., Box 365, Urbana, IL 61801, or circle number 113 on the reader service card.

Hy-Gain Amateur Catalog. Hy-Gain's 24-page catalog features over 100 base and mobile antennas, towers, rotators, microphones, headphones, boom mic headsets, and accessories for the amateur radio operator. A full line of desk and hand mics, the new HDR 300 antenna rotator, and a series of 7 crank-up antenna towers are the newest additions to the line. The catalog contains specifications on all products, including SWR curves on all base antennas. For a copy of the catalog contact Hy-Gain, Div. of Telex Communications, Inc., 8601 Northeast Highway Six, Lincoln, NE 68505 and ask for catalog AM 2504, or circle number 114 on the reader service card.

Vector Electronic Packaging Catalog. Vector Electronic Company's 148-page catalog gives details on over 1200 electronic packaging products, tools, and kits. Special emphasis is placed on microcomputer interface boards for all conventional uses, card cages and cabinets, breadboarding components, and sockets and terminals. Price lists are included along with a list of the firm's authorized distributors. For a more information contact Vector Electronic Company, 12460 Gladstone Ave., Sylmar, CA 91342, or circle number 120 on the reader service card.

TRS-80 Level II Basic. This self-teaching guide is for learning to program and use a Level II TRS-80 Microcomputer System with no previous experience. This 351-page step-by-step manual includes all the information needed to make the computer work for you. Each chapter is composed of frames which present a topic on the BASIC language, the TRS-80, or a program that is being developed. *Radio Shack TRS-80 Level II BASIC* by Bob Albrecht, Don Inman, and Ramon Zamora is available from Radio Shack stores and dealers and is priced at $9.95. For more information circle number 118 on the reader service card.

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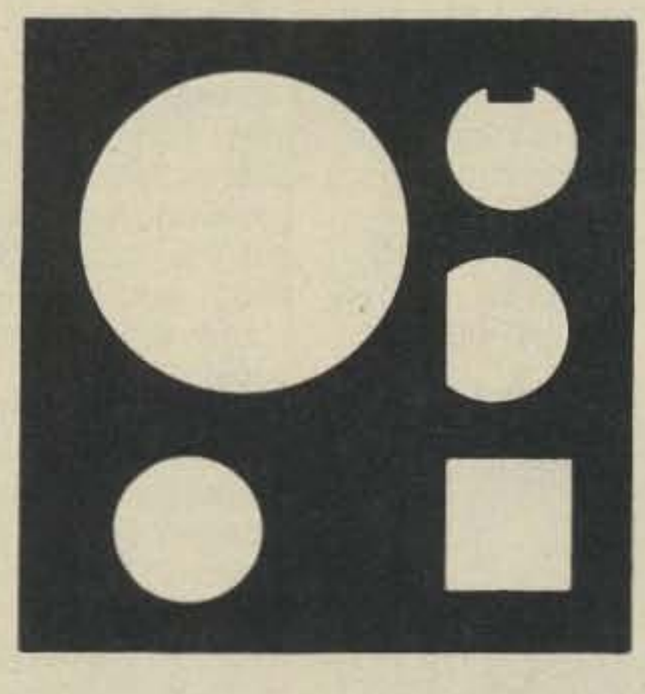

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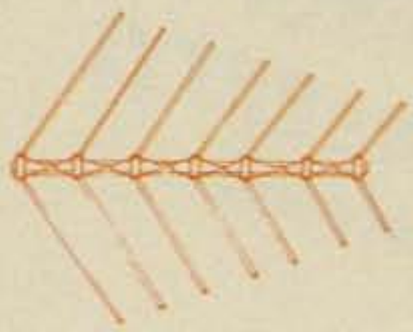

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ZERO BIAS
(from page 4)

I recognize that there does exist a certain antipathy towards the Japanese which, though well filtered by time, will take several more generations to eradicate. To change our buying habits and desires to "Buy American" may take even longer. The public would have to give up the product and freedom of choice. The importer and all of the people in the chain of distribution of Japanese products would have to give up some if not all of their amateur sales in favor of a totally American commodity and marketplace yet to be rebuilt. I think it would be pure fantasy and idealism to expect that this would occur.

Well, if we had that lobby for amateur radio in Washington that we've talked about, we could attack the problem from another viewpoint. We could try to urge our government to urge the Japanese government to relax trade barriers whereby our goods could be purchased at a favorable rate. I know that this too is idealistic and that it hasn't worked out well with the auto industry. On the other hand, restricting the flow of imports only increases the prices for those products along the lines of supply and demand.

Since there is an apparent demand for the product, and if that product is not priced dramatically differently from products produced here, there ought to be lessons to be learned. The technology is not that drastically unique, nor is the availability of super esoteric components confined to the orient. I don't think it's bragging or boastful to say that America has produced some of the finest engineering talent and scientific minds in the world. Someone recently said that we could take the Sphinx, package it in a rocket and send it to the moon. The technology is available; the only problem would be to fund the task.

The Japanese have evolved into a group of merchants and risk takers. We seem to be evolving into a group of consumers, less willing to take risks in what some people see as a shaky economy. The Japanese seem to have formed a symbiotic relationship between their electronic industry and their government. They apparently have worked out a favorable relationship between creating hundreds of thousands of new amateurs and having an industry right there to support that interest. The government has indeed fostered its amateur and industrial growth because it is good economically and good for the country. Indirectly, it has been good for us in that it has opened up a brand new source of equipment and has forced us to rethink our own methods.

We, on the other hand, seem to be faced with a bureaucratic dilemma of our own making. Starting with incentive licensing, we, as a group, have promulgated more and more restrictive, nit-picking amateur rules and regulations than ever before in U.S. amateur history. We have become bureaucratic pains in the FCC's rear. Through what I would like to believe are good intentions, Newington has proposed and continues to propose licensing changes and conditions to structure our pastime or hobby in order to suit some almost megalomaniacal view of stewardship and proprietary interest in protecting the status quo *a la* 1934. At the same time we are facing a situation whereby the government and especially the FCC seem to want to deregulate amateur radio and make it simpler. We all know that a Hobby Class license is in the offing, and that it rears its head every so often, so that some day it will be a reality. I know that this concept is unpopular in Newington and with some readers of *CQ*. I know that there are people with a strong traditional sense of amateur radio out there who would like things to remain the same, and that there are even some who would like some of our licensing procedures stiffened up.

What we need at the moment is growth. Without growth we are merely an annoyance in demanding and requesting from our government something they are trying very hard to divest themselves of. At some point, someone in authority may even ask just how important amateur radio is. Is it worth all of the time, energy and paper work to keep 300,000 to 400,000 people relatively happy? We saw what happened during the CB boom. When it was a very hot issue and the electronics industry flourished through CB business and operating, they could get whatever they wanted. When the boom was no longer a boom and the last fizzle was out of the economic balloon, the CB industry could no longer count on the government to supply extra channels or considerations. It just wouldn't wash. We got a first-hand example of our expertise and the influence of our ham tradition when we went before the FCC in the matter of linear amplifiers.

Yet there is a problem that isn't resolved. Yes, some American manufacturers are experiencing difficulty in competing with Japanese products. Yes, American manufacturers are hampered in selling their products in Japan. Enlarging our market will not in any way solve that problem. It will, however, increase their sales potential here in this country. As some of our own manufacturers are finding out, it's the bells, whistles and packaging that seem to attract you (everything else being relatively equal), and maybe this is an area to be catered to. We all expect to find style and panache in everything we buy from our stereo equipment to our car. Why not amateur radio gear? Why shouldn't an advertisement for an amateur radio product look as elegant and sophisticated as the product is supposed to be?

I've been told that a lot of these "frills" are too expensive and retooling is prohibitive. I know that a great deal of this is true. But what is the alternative? One alternative is to push for an isolationist position. Keep imports out, retrench and put the wagons in a circle. It won't work and it would hurt economically. We would stand to lose far more than we could possibly gain.

The best alternative for the long run and the one that would prove most beneficial would be to open up our market to increased sales. I think that we should take a lesson from the Japanese as they took from us and work towards a cooperative effort with our government and our industry to support amateur radio. I think that inadvertently the FCC is helping towards that goal by their efforts in deregulation and that it should be carried a few steps further. I think that opening up our licensing to include as many people as possible who want access to communication will improve everyone's lot.

With hundreds of thousands of potential new customers there is the incentive for risk capital. With a large base there is room for competition and perhaps even more innovation. With a large enough amateur population to draw upon it doesn't matter if you don't export as much. Everyone can and will sell more. With a burgeoning fresh market, however, the ultimate consumer will still determine the type of equipment that is sold. It will still be up to the manufacturer to heed the needs, wants and desires of the customer.

Now that we've solved the problems of the world, and of American manufacturers, Japanese manufacturers, importers and exporters, how does all of this affect you the reader and the average amateur?

First, you might wonder how any of this affects you or why industry's problems should be your problems. Industry creates jobs, pays taxes and consumes raw materials. Industry has a very visible effect on the economy and hence a potentially bigger voice in government. The bigger the dollar potential the bigger the helping hand from Washington. The consumer (you) determines how big the industry gets by his buying practices. If you buy their product because it's the only game in town, the industry get bigger. However, if there are several to choose from, they all get bigger, providing they all try to give you what you want. A strong, healthy electronics industry satisfies the needs of its customers and provides a strong, healthy economic base for the country. They get more of what they want, and you get more of what you want.

We are at a very interesting point in our cyclic history. There are more and more companies selling parts and components now than two or three years ago. There are small companies forming, selling small items manufactured at home or in garages. The little fellow is starting up in business. Whether it's just to augment a salary in our tight economy or to provide that extra bit of income to pay for vacations and home improvement, there is that glimmer of confidence that with a little investment and a lot of work some money can be made. It's almost a repeat of the 1950's. I expect in time to see some of these little companies grow into larger ones just the way many of our well known companies today did. I think we are at a point where we can begin to move. . . if we choose to.

America was founded on risk and entrepreneurship. We taught the world how we did it and encouraged the world by our example and capital. Somewhere along the line we became cautious and conservative. The Japanese believed the dream, followed the lessons and put them into practice. They found a way to make it work. Certainly, since we invented it, we can do the same or better. It is within our power and ability to do anything we've told everyone else they can do. . .we've got to want to.

Competition is a challenge. It means choice to the consumer through a variety of products produced especially to satisfy his needs. It is incentive to the manufacturer to remember that he is there only as long as he satisfies those needs. It's a reciprocal agreement. The auto industry forgot the agreement when they stopped making a product that satisfied the consumers' (and even their own workers') needs.

73, Alan, K2EEK

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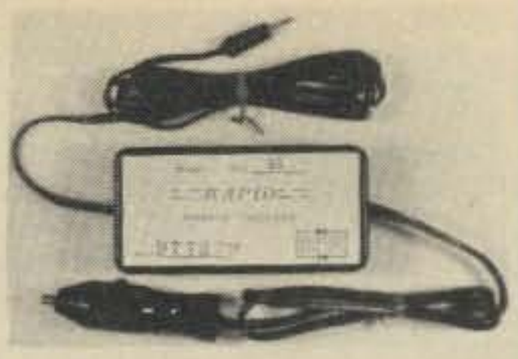

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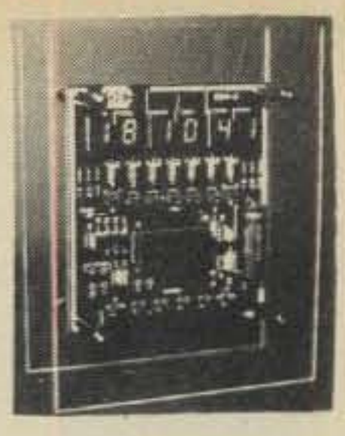

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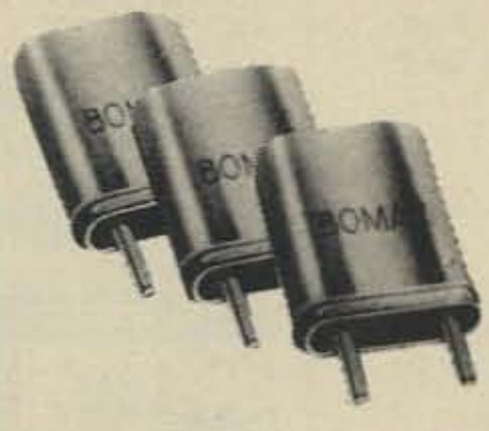

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COLLINS	SPECIAL $125 EACH										
75S-3B/C		✓	EQUALS OR EXCELS $400 COLLINS UNIT								

● 2nd IF $125 for R-820 only

FOX-TANGO CORP. Box 15944C, West Palm Beach, FL 33406

CIRCLE 65 ON READER SERVICE CARD

CUSTOM TRANSFORMERS

HEAVY-DUTY

REPLACEMENT TRANSFORMERS

ALPHA A77D Power Transformer	$210.00
ALPHA A77S Power Transformer	$270.00
BTI LK-2000 Plate Transformer	$145.00
COLLINS 30L-1 Power Transformer	$145.00
COLLINS 30S-1 Plate Transformer	$265.00
COLLINS 516F-2 Power Transformer	$110.00
COLLINS KWS-1 Plate Transformer	$175.00
COLLINS PM-2 Power Transformer	$ 95.00
DENTRON DTR 2000L-B Power Transformer	$145.00
DENTRON MLA 2500 Power Transformer	$135.00
DRAKE L4B Plate Transformer	$165.00
DRAKE L4B Outboard Plate Transformer	$210.00
GONSET GSB-201 or 201 MK IV Power Transformer	$145.00
HALLICRAFTERS HT-32 or HT-37 Power Transformer	$110.00
HEATH HA-10 Warrior Plate Transformer	$130.00
HEATH SB-220 Plate Transformer	$135.00
HEATH SB-220 Outboard Plate Transformer	$195.00
HENRY 2K Plate Transformer	$175.00
HENRY 2K-4 Power Transformer	$175.00
HENRY 3K-A Plate Transformer	$185.00
HENRY 3K-A DC Filter Choke	$ 90.00
JOHNSON Thunderbolt Plate Transformer	$140.00
NATIONAL NCL-2000 Power Transformer	$135.00
SWAN MK II or MK VI Power Transformer	$135.00

OFF-THE-SHELF SPECIALS

PLATE XFMR: 2400 VAC @ 1.5 AMP ICAS, 220/240 VAC Pri., 41 LBS	$165.00
PLATE XFMR: 2400 VAC @ 2.0 AMP CCS, 115/230 VAC Pri., 60 LBS	$215.00
PLATE XFMR: 3000 VAC @ 1.5 AMP CCS, 230 VAC Pri., 60 LBS	$215.00
PLATE XFMR: 3000 VAC @ 3.0 AMP CCS, 230 VAC Pri., 120 LBS	$395.00
PLATE XFMR: 3500 VAC @ 1.0 AMP ICAS, 115/230 VAC Pri., 41 LBS	$165.00
PLATE XFMR: 4000/4600 VAC @ 1.5 AMP ICAS, 230 VAC Pri., 60 LBS	$220.00
PLATE XFMR: 6000 VCT @ 0.8 AMP CCS, 115/230 VAC Pri., 41 LBS	$165.00
FILMT XFMR: 5.0 VCT @ 30 AMP, 115/230 VAC Pri., 9.5 LBS	$ 37.50
FILMT XFMR: 5.0 VCT @ 60 AMP, 110/220 VAC Pri., 13.4 LBS	$ 75.00
FILMT XFMR: 7.5 VCT @ 21 AMP, 105/117 VAC Pri., 9.5 LBS	$ 37.50
FILMT XFMR: 7.5 VCT @ 75 AMP, 115/230 VAC Pri., 20.2 LBS	$ 95.00
FILTER CHOKE: 8.0 HY @ 1.5 AMP DC, 10KV Ins., 41 LBS	$165.00
SWINGING CHOKE: 5-30 HY @ 1.0 AMP DC, 10KV Ins., 23 LBS	$115.00
FILMT. CHOKE: 30 AMP Bi-Filar wound RF filament Choke (1.8-30 MHZ)	$ 12.00

ALL TRANSFORMERS AND CHOKES GUARANTEED FOR 12 MONTHS
Many others also available. Write for free list or quote on any custom transformer, choke, or saturable reactor.

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CIRCLE 68 ON READER SERVICE CARD

NEW!

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Provisions for our new bands and many other features.

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CIRCLE 79 ON READER SERVICE CARD

MORE FEATURES FROM ALLIANCE!

HD-73 HEAVY-DUTY ROTATOR

with exclusive Dual-Speed Control!

For antennas up to 10.7 sq. ft. of wind load area. Mast support bracket design permits easy centering and offers a positive drive no-slip option. Automatic brake action cushions stops to reduce inertia stresses. Unique control unit features DUAL-SPEED rotation with one five-position switch. SPECIFICATIONS: Max. wind load bending moment—10,000 in.-lbs. (side-thrust overturning); Starting torque — 400 in.-lbs.; Hardened steel drive gears; Bearings —100-⅜" diameter (hardened); Meter — D'Arsonval, taut band (backlighted). There's much, much more — so get the whole story!

CQ

Mail this coupon for complete details!

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☐ Give me the name of my nearest dealer!

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Please send all reader inquiries directly

Antenna Tuner

NEW!

NEW LOW PROFILE DESIGN

Here is a new tuner that puts more power into your antenna, works from 160 through 10 meters, handles full legal power and then some, and works with coax, single wire and balanced lines. And it lets you tune up without going on the air!

WE INVESTIGATED

All tuners lose some rf power. We checked several popular tuners to see where the losses are. Mostly they are in the inductance coil and the balun core.

So we switched from #12 wire for the main inductor to ¼'' copper tubing. It can carry ten times the rf current. And we've moved the balun from the output, where it almost never sees its design impedance, to the input where it always does. Thus more power to your antenna.

IMPOSSIBLE FEAT

The biggest problem with tuners is getting them tuned up. With three knobs to tune on your transceiver and three on the tuner and ten seconds to do it (see the warning in your transceiver manual) that's 1½ seconds per knob.

We have a better way; a built-in 50-ohm noise bridge that lets you set the tuner controls without transmitting. And a switch that lets you tune your transmitter into a dummy load. So you can do the whole tuneup without going on the air. Saves that final; cuts QRM.

BROCHURE AVAILABLE NOW

For further details on this exciting new high-power low-loss, easy-to-use tuner send for our new brochure. Or visit your Palomar Engineers dealer.

Model PT-3000 $349.50 plus $10 shipping/handling. California residents add sales tax.

master charge THE INTERBANK CARD

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Advertiser's Index

Tomorrow's Technology—Here Today!

THE YAESU FT-207R

The "horse-and-buggy" days of crystal-controlled handies are gone! Yaesu's engineers have harnessed the power of the microprocessor, bringing you 800 channels, digital display, memory, and scanning from a hand-held package. Only with Yaesu can you get these big performance features in such a compact package.

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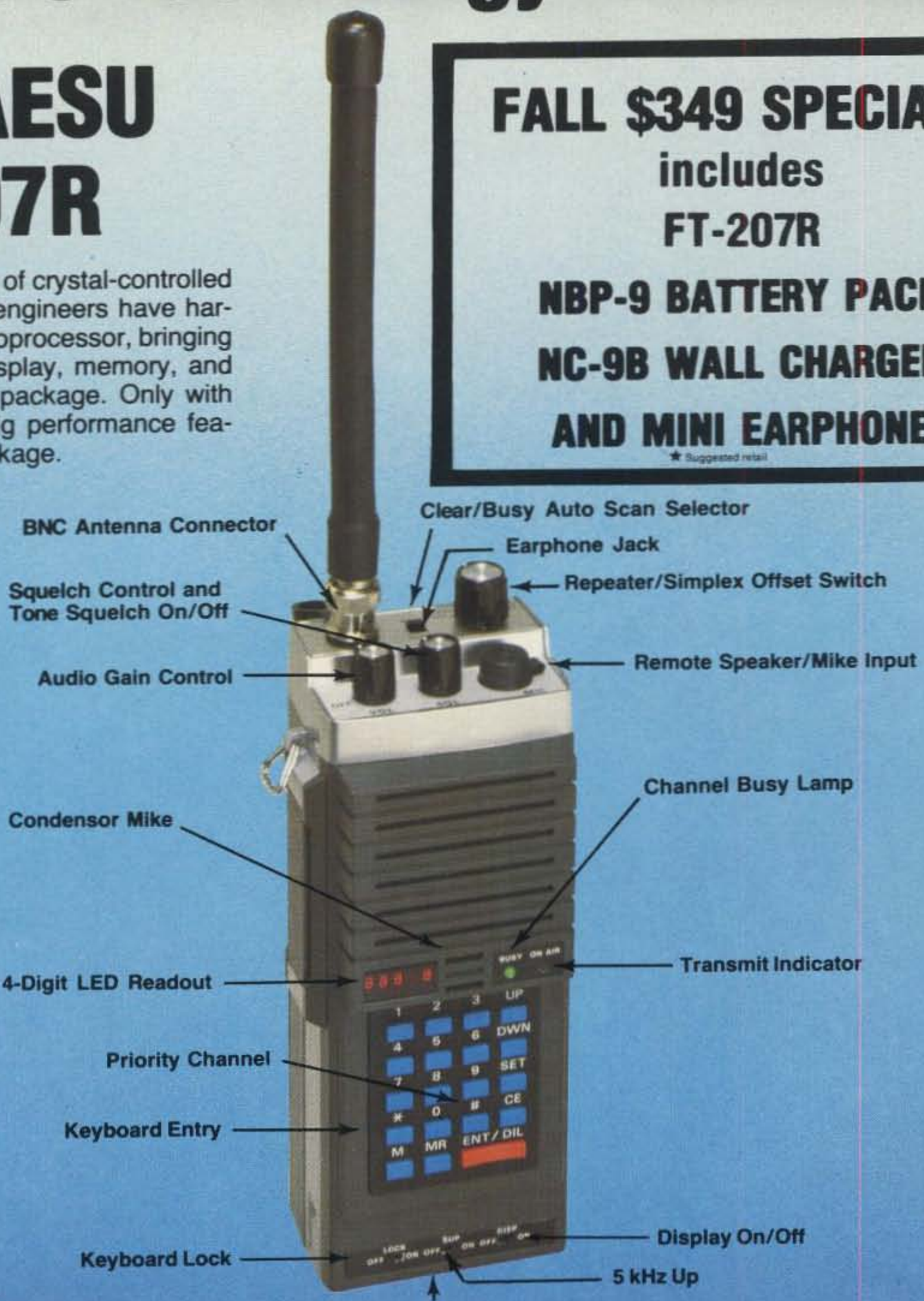

SPECIFICATIONS:

GENERAL

Frequency coverage: 144-148 MHz
Number of channels: 800
Emission type: F3
Batteries: NiCd battery pack
Voltage requirement: 10.8 VDC ± 10%, maximum
Current consumption:
Receive: 35 mA squelched (150 mA unsquelched with maximum audio)
Transmit: 800 mA (full power)
Case dimensions: 68×181×54 mm (HWD)
Weight (with batteries): 680 grams

RECEIVER

Circuit type: Double conversion superherterodyne
Intermediate frequencies.
1st IF = 10.7 MHz
2nd IF = 455 kHz
Sensitivity: 0.32 uV for 20 dB quieting
Selectivity: ± 7.5 kHz at 60 dB down
Audio Output: 200 mW at 10% THD

Price And Specifications Subject To Change Without Notice Or Obligation

TRANSMITTER

Power Output: 2.5 watts minimum /200mW
Deviation: ± 5 kHz
Spurious radiation: −60 dB or better
Microphone: Condenser type (2000 ohms)

OPTIONS

LC-C7 Leather Carrying Case
YM-24 Remote Speaker/Microphone
Tone Squelch Unit

CIRCLE 48 ON READER SERVICE CARD

YAESU
The radio.
180

YAESU ELECTRONICS CORP., 6851 Walthall Way, Paramount, CA 90723 ● (213) 633-4007
YAESU ELECTRONICS Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45246

6 Meters + ICOM + Sunspots = The best DX

ICOM's 551D is Essential to the 6 mtr DX Formula.

The IC-551D is the high powered brother to the ICOM IC-551. With an 80+ watt output, you have all the punch you need for that really good DX when the Sunspots are working for you. The 551D has the same no-backlash, no-delay dual VFO light chopper system, coupled to the microprocessor for split frequency as well as completely variable offsets.

For quick access to DX excitement, three memories are provided for programmed beacon watching, which can be scanned and programmed to stop on the first one heard. A room full of white noise is no longer a problem with ICOM. Pass band tuning and VOX are included at no extra cost.

SPECIFICATIONS

Frequency Coverage: 50~54MHz

Power Supply Requirements:
13.8V DC±15%, negative ground
Current drain 18A max.
(at 200W input). AC power supply speaker console is available for AC operation.

Emission Modes:
A3J SSB (USB/LSB)
A1 CW
A3H AM
F3* FM

Dimensions: 111mm (H)× 241mm (W)×311mm (D)

Weight: 6.6kg

Sensitivity: SSB/CW/AM
Less than 0.5μV for 10dB S+N/N
FM* More than
30dB S+N+D/N+D at 1μV

Squelch Sensitivity: SSB/CW/AM 1μV
FM* 0.4μV

Selectivity: SSB/CW/AM
More than ±1.1 KHz at -6dB
Less than ±2.2KHz at -60dB
Adjustable to 1KHz at -6dB
FM*
More than ±7.5KHz at -6dB
Less than ±15KHz at -60dB

*Only when FM Unit is installed.

HF/VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

ICOM

ICOM AMERICA, INCORPORATED

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2112 116th Avenue NE
Bellevue, WA 98004
Phone (206) 454-8155

3331 Towerwood Dr., Suite 307
Dallas, TX 75234
Phone (214) 620-2780

ICOM INFORMATION SERVICE CQ
2112 116th Ave., N.E.
Bellevue, WA 98004

Please send me: ☐ IC-551D specifications sheet; ☐ full color ICOM Product Line Catalog; ☐ List of Authorized ICOM Dealers.

NAME _____ CALL _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

You may send a machine copy of this form

All stated specifications are subject to change without notice. All ICOM radios significantly exceed FCC regulations limiting spurious emissions.