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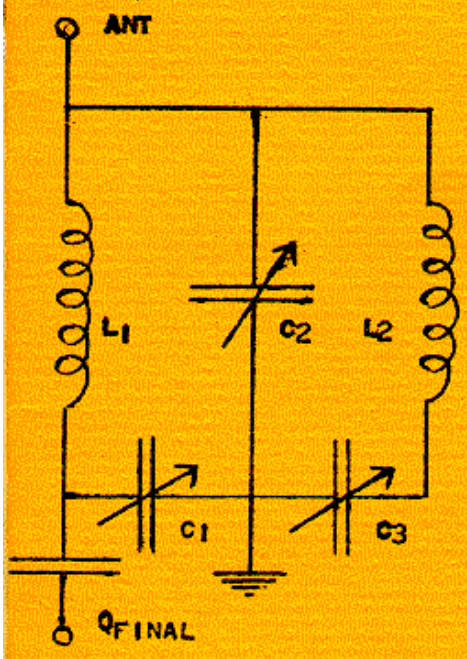
NATIONAL JOURNAL OF

the

Milliwatt: QRPp

DEVOTED EXCLUSIVELY TO UNDER FIVE-WATT amateur radio

VOL 1 #3 JUNE 1970



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EXTRA! ZL2AFZ WILL BE MONITORING 14075 KC SPECIFICALLY FOR STATESIDE QRPP STATIONS. THURSDAY & SATURDAY, 0330 GMT (2330 EDST WED. & FRIDAY) STARTING JUNE 1ST.

THE MILLIWATT: NATIONAL JOURNAL OF QRPP

VOL 1 #3
JUNE 1970

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41 K8EEG/Ø (900MW) 22 KØVQY (1.1W - 6M) 15 K3NVI (6W)
35 W8AVB (1W - 80M) 16 WØRHI (180MW-160M) (WAØAVB 2:DXCC 100MW 15M)

BEFORE PUTTING DOWN THIS ISSUE OF THE MILLIWATT, DO A LITTLE FOR THE QRPP CAUSE BY INDICATING ON A CARD YOUR WAS STANDING, POWER, AND BANDS USED. YOU ARE INVITED TO GIVE THE MILLIWATT A FULL RUNDOWN ON YOUR OPERATIONS SO THAT QRPP'RS KNOW WHAT'S HAPPENING ON THE AIR!

THE MILLIWATT FIELD DAY TROPHY

CONTESTS SUCH AS FIELD DAY ARE OPPORTUNE FOR QRPP OPERATION, SINCE A GREAT NUMBER OF STATIONS MANNED BY TOP OPERATORS ARE ON. THE MILLIWATT ESPECIALLY WISHES TO ENCOURAGE QRPP OPERATION DURING FIELD DAY, SINCE CONTEST RULES ALLOW A 4X MULTIPLIER FOR UNDER-10 WATT STATIONS. TO ENTER COMPETITION FOR THE MILLIWATT FIELD DAY TROPHY, YOU NEED ONLY ENTER THE FIELD DAY CONTEST IN THE UNDER-10 WATT CATEGORY. OFFICIAL SCORING WITH ONE MAJOR EXCEPTION WILL BE FOLLOWED (SCORE = # OF QSO'S X POWER MULT. X 1.5 MULT. FOR BATTERY POWER). THE EXCEPTION IS THIS: AN EXTRA MULTIPLIER CATEGORY WILL BE IN EFFECT. 2 - 10 WATTS GET REGULAR 4X MULT., WHILE STATIONS UNDER 2 WATTS GET A 5X MULTIPLIER. IN EVENT OF A TIE, STATION USING FULL BATTERY POWER WILL WIN. CHECK MAY QST FOR FULL RUNDOWN ON RULES AND SCORING. SUBMIT LOGS BY JULY 20 TO THE MILLIWATT. GET ON FOR FIELD DAY! EVEN IF YOU DON'T WANT TO COMPETE FOR THE TROPHY, DROP US A CARD INDICATING THE NUMBER OF QSO'S YOU MADE, POWER ETC.

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THE EDITORS OF THE MILLIWATT INTEND TO KEEP IT INTERESTING AND QUALITY, OR NOTHING AT ALL. ARTICLES, PROJECTS, OPERATING NEWS SUBMISSIONS ARE INVITED.

THE MILLIWATT: NATIONAL JOURNAL OF QRPP
. . . devoted to under-five watt amateur radio
June 1970 Vol. I #3

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Environmental pollution is currently a subject that everybody is discussing. Hams have been plagued with their own peculiar form of pollution for the last decade or so, namely, QRM resulting from crowded band conditions (the favorite explanation), especially on 75, 40, and 20 meter SSB. In general, pollution is attributable to overkill: bigger cars with bigger engines, bigger power plants, bigger factories, and even bigger transmitters. It seems that the majority of hams agree that we need more space in the h.f. spectrum as far as a theoretical solution is concerned; in the practical sphere, the solution is obvious--more power, bigger transmitters, or so it seems. I like to see the problem in a different light: the QRM situation exists because too many hams have that 'big S.O.B.' (i.e., 'signal on the band') attitude. Is it fair to blame the KW's, especially since nothing different happens at that power level than at, say, 125 watts? No, until we consider the question in its proper perspective.

A given antenna--a yagi, a quad, a dipole, or a simple clothespole--radiates a three dimensional RF field; the more directional an antenna gets, the greater is the attenuation of unwanted portions of that field. Following the practice of commercial broadcast stations, then, a solution to the ham QRM problem could be the use of directional antennas--put the signal where desired, and eliminate it where not desired. But such a solution is entirely relative to power level differential. Every directional antenna has its minor lobes--fields of lesser intensity than the main lobe, but present nonetheless. What does this mean in terms of a practical situation involving different power levels? Consider two hypothetical hams in Podunk Hollow: A runs 125 watts to a dipole, while B runs a KW to a quad which exhibits 9 db forward gain at a 20 db front/back ratio. Is the quad (with greatly reduced intensity in unwanted lobes) a solution to a possible QRM problem, given the power differential? Some comparative ratios: if A and B traded antennas, their signals would be roughly equal in the quad's favored direction, since a KW represents about 9 db over 125 watts. As it is, B has an 18 db advantage over A in the quad's forward lobe. But then, B deserves his edge in the maximum lobe, and A shouldn't complain, because in our

competitive society, the big dog gets the big bone. A can console himself with calling only stations falling on the backside of B's KW/quad. Seems fair 'nuf. But is it?

Compare the two antennas first. The quad is +9 db in comparison to the dipole at points east; the rear lobe of the quad is 20 db less intense than the main lobe, or in reference to the dipole, some 11 db less in its rear lobe. So, our dipole will be +11 db relative to the quad at points west when the quad is pointed east. This comparison holds for equal powers to both antennas. But drop the power of the dipole to 125 watts, and the signal drops 9 db in all directions; A has lost 9 db with regard to B's rear lobe, and A it will be remembered had only +11 db advantage to begin with! In other words, B's KW/quad pointing east will only be 2 db below A at points west! And if we drop A to about 84 watts, A and B will be roughly equal at points west! And if A goes to 42 watts, B will have a 3 db advantage; to 21 watts, and B will have 6 db advantage; to 10.5 watts, a 9 db advantage; to 5.25 watts, a 12 db advantage! And that is off the rear lobe of B's quad!

This brings us back to the original proposition: that QRM on the hams bands is not due primarily to overcrowding, but to overkilling. Remember also that a big signal is a wide signal, especially in SSB operation, and even more so in AM operation. In permitting American amateurs the unique luxury of KW operation, the FCC Commissioners assumed that we amateurs would be a rational group, using only the amount of power necessary to maintain contact. They certainly were optimistic humanitarians when they based the power level regulations on that assumption!

K8EEG/Ø

* * * * * * * * *

Those Who Have Gone Before . . . A Challenge

17820 miles-per-watt! This is the amazing performance of L. G. Windom of Columbus, Ohio. How many amateurs have bettered this record, even with the latest and most-sophisticated amateur DX techniques? These remarkable results were achieved back in 1925-26, using the simplest and most direct methods--without benefit of transistors, high-gain beam antennas, or even superheterodyne receivers. AND it wasn't done on one of the long-skip, low-attenuation bands, but on 40 meters.

This achievement won for 8GZ (there weren't any 'W' or 'K' prefizes in those days) the Jewell Watch Award, and is

briefly described in QST, July, 1926. The award was made by the Jewell Instrument Company, one of the leading electrical meter manufacturers of that era, to culminate a low power amateur communication contest which the company sponsored. The award was a first-rate watch, appropriately engraved.

In an earlier issue of QST, Larry Windom described the equipment that was to win him the award, along with some of the DX results he had achieved. These included all U.S. districts, Brazil, Australia, New Zealand, and others, all worked with a type 199 'peanut' tube at 75 volts and 4 ma. input. The circuit of the 8GZ rig and antenna used are presented in Fig. 1 & 2 below:

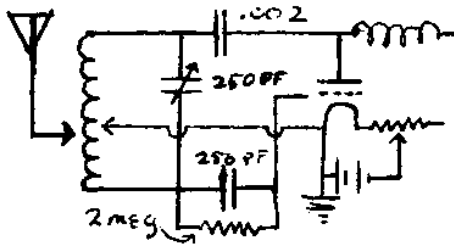


Fig. 1

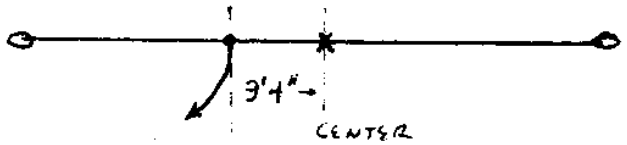


Fig. 2 ←——67'——→

A type 199 'peanut' tube used in this rig is equivalent to a modern 6C4, or half of a 6AU7. The B+ RF choke would be a 2.5 mh type. The 199 was a direct-heated filament tube; modern tubes separate the cathode and heater. One interesting construction detail regarding the 8GZ rig is the tank coil: it consisted of 8 turns of #5 solid copper wire 4" in diameter! The Windom antenna had a single wire feeder that was tapped directly onto the tank coil for best output. 8GZ's Windom antenna was horizontal, about seventy feet above ground; it became a very popular type of antenna following 8GZ's article in a later issue of QST, and was used with great success at W9SGH and many other stations during the early 1930's. Because the single-wire feeder, along with ground, acted as a high-impedance transmission line, it carried only about one-tenth as much RF current as the half-wave antenna itself, and thus it lost relatively little energy by radiation. Using this setup, with 75 volts at 4 ma. input, 8GZ worked, among many others, a5BG in Adelaide, West Australia with 0.567 watts input total to both filament and plate, a distance of 10,100 miles. He also worked o-A6N, in Capetown, South Africa with 0.540 watts total input, which represents 15.28 KM/W. So, regardless of how primitive or simple the 8GZ setup may seem, it really worked! As far as I am concerned, 8GZ's achievements still

qualify him as a QRPP Champ.

Of course, 8GZ was not the only such station on the air at that time. In an article in June, 1925 QST, entitled "The Low Power Report," log data from eleven QRPP stations is listed. Nine of these were in the U.S., one in England, and one in Switzerland. Power inputs reported range from 0.003 to 12 watts, and KM/W QSO's from .258 to 6.0 are listed. Two transoceanic contacts are listed: between England and Canada, and England and the East Coast. At first glance, this doesn't sound noteworthy, but these contacts were made on the 80 meter band using simple antenna-counterpoise systems, and the signals were received upon two (or at the most, 3) tube regenerative detectors. Even the Zepp antenna was three years in the future, while superhet receivers were almost a decade away.

The December, 1925 QST carries a complete description of a typical QRP station of the time: a Hartley oscillator transmitter with a flat-helix, copper-strip coil, a two tube regenerative receiver, and a simple antenna-counterpoise radiating system. This particular station worked, with apparent regularity, all U.S. districts, Puerto Rico, Cuba, England, Netherlands, France, Italy, Hawaii, New Zealand, Australia, and South Africa with usually less than ten, and never more than twenty, watts! How many owners of fancy, high-power rigs and high-gain beams can claim any more today?

Nearly every issue of QST during the twenties contained descriptions of QRP_p rigs, with comments on their relative successes. I'm wondering if ham radio will ever again become the true sportsman's hobby that it once was before the new general class hams could go out and pick a high-powered gadget off the shelf and blast away inanely. It's up to us to do something about it!

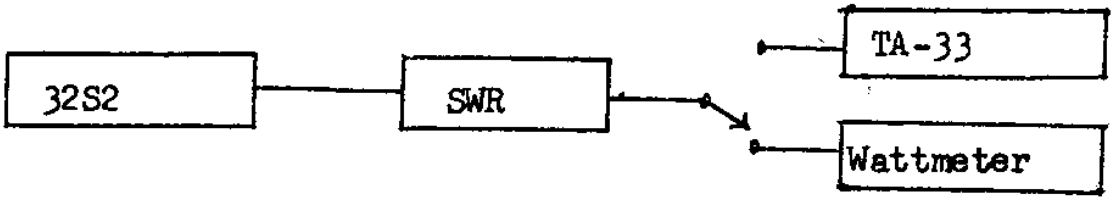
C. F. Rockey W9SCH

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W6QA to W1WMK on Less Than One Milliwatt

On March 21, 1970, at 1925 GMT, a 21.009 mhz. signal of less-than one milliwatt from the San Francisco Bay area was copied in southern New Hampshire. Propogation conditions reported by WWV at the time were N7. Equipment used in the test consisted of a Collins 32S3, Mars Model SW-10 SWR bridge, Waters Model 334 Wattmeter/Dummyload, and a TA-33 yagi. The procedure used by W6QA for determining RF power delivered to the antenna feedline is quite interesting and

warrants detailed description. The following setup was used by W6QA in arriving at his conclusions:



The MARS SW-10 Standing Wave Bridge has a scale graduated at 1.0, 1.5, 2.0, 2.5, with 3 at midscale; between midscale and full deflection consists of a red line, with full deflection indicated by a SET line. W6QA has observed that a power reduction of 90% (output) consistently results in a decrease in the deflection angle for various settings of the needle. He notes:

> I have determined that if I connect the transmitter to the wattmeter and adjust the power output to 100 watts, and adjust the SWR needle to the SET line (full scale), a decrease of output to 10 watts is accompanied by a decrease in the meter reading to the 1.85 point. The SWR meter is left in the FORWARD position at all times. I have also determined that this same change in the SWR FORWARD indication occurs if the power drops from 1000 to 100 watts, and from 10 to 1 watt. I am led to the conclusion that this change from SET to 1.85 is a function of the ratio of the two power outputs (i.e., 10:1) and not of the absolute value of each of the power levels.
>
> Furthermore, I have determined that a 10 to 1 power reduction results in a change of FORWARD SWR reading from 3.0 to 1.4 when the needle is originally set at the 3.0 point. Also, a 10 to 1 power reduction results in a change of FORWARD SWR reading from 1.4 to 1.1 when the needle is originally at the 1.4 point.

Since the Wattmeter used by W6QA is not sensitive to powers below one watt, the above ratios allow the SWR meter to be used in stepping from one watt to less power. For example, at a one watt reading on the Wattmeter, the SWR can be adjusted to SET; cutting back the exciter to a reading of 1.85 will indicate 0.1 watt output. At 0.01 watt, the SWR meter no longer was sufficiently sensitive to achieve SET deflection, or a 3.0 setting, so the SWR meter was adjusted to a reading of 1.4, and cut back to 1.1 which indicated an output of 0.001 watt. The SWR meter ran out of sensitivity at this point. The final transmission made by W6QA during the test was at a lower power level than this final setting and hence less than one milliwatt.

During the test, W6QA 'pulled a fast one' to ascertain whether his message was copied at the lowest power level. Without prior warning, he changed the pattern of transmission and simply sent the single word 'MARCH' a number of times. After returning to QRO, he asked W1WMK to repeat the last word copied. Actually I copied 'MARCH' four times on my scratchpad. This experiment puts us in the position of over 3 million miles per watt, conservatively rated! Stand by for 30 million!

C. W. Farr W1WMK

* * * * * * * * * *

Alaskan Super-QRPP

In one of the latest issues of QST, KL7YU outlined the record accomplishments of QRPP tests he and W7BVV ran on 10 meters: they managed communication with 1 microwatt of output for a record of 1.6 billion miles per watt! Although the theoretical calculations predicted that contact could be managed with one microwatt, it took a lot of hard work and determination to achieve this in practice. Dick, KL7YU, has provided some valuable information about the installations and procedures used in making contact at this power level.

Of special interest are the antenna systems used. For receiving, a Beverage antenna provided the necessary gain and directivity. The Beverage antenna consists of a wire of several wavelengths suspended from 3-8 feet above ground, and terminated at the far end with the proper resistance. While providing substantial gain along the forward line of the wire, it provides as much as 60 db attenuation off the sides and back. For transmitting, terminated VEE beams and a rhombic were used, primarily because of the cost vs. gain ratio. KL7YU's rhombic was surveyed in and erected for the Fairbanks-Portland path, and its estimated gain is 15-20 db. The angle of radiation sought was 8-12 degrees, optimum for the path distance of 1650 miles and an expected F_2 layer of 320-330 KM height; actual observations indicate a height of 350-360 KM.

During the record test, KL7YU's one microwatt was 539, while W7BVV's 50mw am was 56 in Fairbanks. This took place on 21 January, 1970, at 1320 (local) on 28760kc. Dick gives some practical hints about approaching such ultimate QRPP tests. Propogation is best on 10 meters, especially on north-south paths; best time for his path is around 2300GMT. Generally, north-south paths are easier to work because of the earth's magnetic fields, while trans-polar paths are the most difficult. In general, observation will indicate the

best time for a given path. Attention to refining the receiving system is perhaps most important.

All sources of local noise should be eliminated. Likewise, receiver front-end noise must be minimized. This can be accomplished by adding an FET converter ahead of the tube receiver's first MIXER--eliminating the noise generated by a first RF tube. Or, an FET can be substituted for a lower noise front-end. Secondly, the bandwidth of the receiver should be narrowed as much as possible, and peaked for the specific frequency to be used. Thirdly, the ultimate sensitivity of the receiver should be determined. If the manufacturer gives a 1 uv sensitivity figure, approximately one microvolt across the antenna terminals is necessary for a readible signal. The use of a calibrated signal generator will give the actual sensitivity, and can be used to calibrate the S-meter in terms of actual db below one watt that can be copied. Using the generator, the S-meter is calibrated in db from the lowest signal level up to one watt. In an actual test, the S-meter can then be used as a direct indicator of how far the other station can decrease his power. If the ultimate sensitivity is -148 db, and the other station's 100 mw signal produces a -90 db reading, he can decrease power 58 db immediately; this saves valuable time in an actual test situation where, as Dick notes, optimum conditions may exist for under one minute to 20 minutes time.

The description of the antenna systems used should be an indication of what is necessary in this respect. In designing an antenna system, the following steps can be followed. 1.) Determine the exact path distance using an azimuth distance map. 2.) Assume the expected F_2 layer height at what appears to be the optimum time of day for the given path, and determine the optimum angle of radiation that will allow the path to be traversed with the minimum number of reflections from the F_2 layer, and design the antenna accordingly. 3.) Calculate the theoretical path loss from the formula:

$$10 \text{ Log } \frac{1}{D^2} = \text{db path loss}$$

In KL7YU's case of 1650 miles, loss is in the range of 60-80 db. 4.) Calculate the expected loss in F_2 reflections depending upon the number of reflections expected, and add to total loss figure (and a 6 db system loss factor can be added in also). 5.) Subtract total gain of the antenna systems from the path loss figure. This figure can be used during a test to determine how close to optimum band conditions are at the time of the test. For example, if one watt

produces a -80 db S-meter reading, and the calculated loss figure is -75 db, then conditions are nearly perfect and it's time to crank down to minimum power.

As should be clear, the 1.6 billion miles per watt record was achieved through great attention to details both theoretical and practical. The procedure described above, however, will give even the average QRPP operator an idea of the various factors that he consider in improving his QRPP capability. A QRPP operator is not disappointed IF he knows what he can expect, given his setup and the distance which he is attempting to traverse. For example, in planning a Field Day operation with QRPP, the wise QRPP operator will apply KL7YU's procedures to make the best of his operation. He will determine the geographic area where the greatest number of FD stations can be expected to be in operation; he will determine what antenna system will best allow him to work that area, given all the factors; and finally, he will have the capability to switch maximum capability to another high intensity area should the first fall through. So, even though you don't want to work 1.6 billion miles per watt, KL7YU's savy shows you how to get the most out of everyday QRPP.

(Ed, note: in the next issue, W9SCH provides a complete description of how to figure path loss figures, and as an added extra, has designed a nomograph which allows you to determine, at a glance, just how much power you will need to work a given distance. Our drafting dept. is hard at work reproducing in scaled form this nomograph.)

* * * * * * * *

Antenna Height and 7 mc Propagation

This article is intended to provide an answer to that question which every QRPP operator asks at one time or another, namely: what can I expect in terms of distance and time of day from my antenna setup? Or other indirect questions such as: how come I call and call guys in Podunk Hollow (a distance of 427.3 miles) and never get a response? Any answer must take into consideration some basic theory regarding the propagation of HF radio waves. First, long distance HF communication is possible only because of the existence of belts of ionized particles ranging from 30-300 miles above the earth. Radio waves are bent back toward earth by these belts, a phenomenon known as "skip." The most important of these belts, the E-layer and F-layer, are

at average heights respectively of 50-75 and 150-200 miles depending upon many factors, including time of day, season, and sunspot activity. The E-layer, present during the hours from sunrise to sunset, reflects waves at about 60 miles up; the F-layer, present from after sunset to sunrise, reflects from a height of about 200 miles. Secondly, the angle of radiation from an antenna determines the angle at which the wave is reflected, and further, determines the distance that a wave can "skip" back to earth. The following chart presents the computed correlations between antenna height, angle of maximum radiation, and predicted single "skip" distances in either E-layer or F-layer conditions, for 7 mc prppagation.

HEIGHT	λ	∠ RADIATION MAX	MIN	MAX	E-LAYER (DAY) 1 SKIP, LOW ∠	F-LAYER (NIGHT) 1 SKIP, LOW ∠
<33FT	<.25	90 DEGREES			<175 MILES	<225 MILES
33FT	.25	80			175	225
40	.30	60			175	300
46	.35	50			175	350
53	.40	40			200	450
59	.45	35			235	525
66	.50	30	DEGREES		265 MILES	600
72	.55	28	65		280	630
79	.60	26	55		295	690
85	.65	24	50		305	740
92	.70	22	45		320	860
98	.75	20	40	90	350	900
106	.80	19	38	70		970
112	.85	18	36	64		1015
119	.90	17	34	56		1080
126	.95	16	32	52		1120
132	1.00	15	30	50	400	1200

Although antenna height is generally thought to be an important factor in successful long distance operation, this is clearly not the case for E-layer propagation, as can be seen from the chart. For instance, raising a 7 mc dipole from 33 to 98 feet above the ground (increasing its height by a factor of 3) will only double the distance from 175 to 300 mi. which can be covered by one skip off the E-layer. Ninety-eight feet is, of course, almost impossible for the average ham, unless some tall pines are available. Usually the dipole will be affixed to nothing higher than a beam-supporting tower about 60-75 feet high. But then, real height--in the range of 3/4 to 1 wavelength--serves little purpose anywat for E-layer propagation. The increase from 98 to 132 feet only lowers the angle of radiation by 5 degrees and lengthens the one-skip distance 50 miles. One good thing that can be said about an antenna of this height, however, is that two lobes of maximum radiation appear at 15 and 50 degrees, one of which is appropriate for local work and the other for DX.

Interestingly enough, the chart indicates that regardless of precise wave angle between 50 and 90 degrees, the

skip distances remains at about 175 miles. This means, in effect, that for daylight 7 mc work it serves no purpose to invest money and energy in raising the height of the dipole from 33-46 feet. 50 to 100 feet above ground is the region to experiment with. But again, while the angle of maximum radiation could be cut in half, the one-skip distance would increase only from 200 to 300 miles. A sad fact of life is that the E-layer hampers 40 meter DX work during the day not only because of its height above the earth, but also because of its high level of absorption. Ionispheric absorption is, in fact, the enemy of daytime DX, and antenna height has no effect on it. Irregardless of how high a dipole is, after two or three reflections off the E-layer, there is not much of a QRPP signal remaining. 175 to 300 miles is a reasonable coverage for average operation. I would be surprised if distances of more than 500 miles were achieved while using a power of 5 watts or less during the daytime. This is not to say that such distances are not possible; but if it takes place, it probably results from transmitter efficiency, antenna gain, and improved reception techniques, and not from antenna height.

F-layer propagation, during the nighttime hours, is fortunately another story. For every foot of height gained, the resulting coverage will miles greater! The chart makes clear that, while an increase in antenna height from 33 to 46 feet pays no dividends during daytime operation, it lengthens the skip distance at night from 200 to 350 miles, almost doubling the transmitting range. A dipole 1/2 wave high has an angle of 30 degrees and a one-skip distance of 600 miles. A truly fine dipole would result if it were hung at a height of .75 to .80 wavelength (98-106 feet), for this would produce both low and high angle maxima. Again, an antenna up 100 feet may be an impossible dream. But if your dipole is up about 40 ft it is worth thinking about raising it another 25 feet or so. The increase of 25 feet will cut the angle of radiation to 30 degrees. The added range of 300 miles per skip during the night, multiplied by the number of reflections, becomes most attractive for the QRPP operator.

The chart should give the QRPP operator a better idea of what to expect on the air with his antenna. It is also possible to use the chart in designing an antenna that will optimize communication between two points. For example, the distance between K8EEG/Ø and K6EIL/2 is 1075 miles. Using F-layer propagation, a signal with a maximum angle of radiation of 35 degrees would cover that distance in two skips, and thus, a dipole at about 60 ft would do the trick. The F-layer varies in altitude from 150 to 250 miles, depending

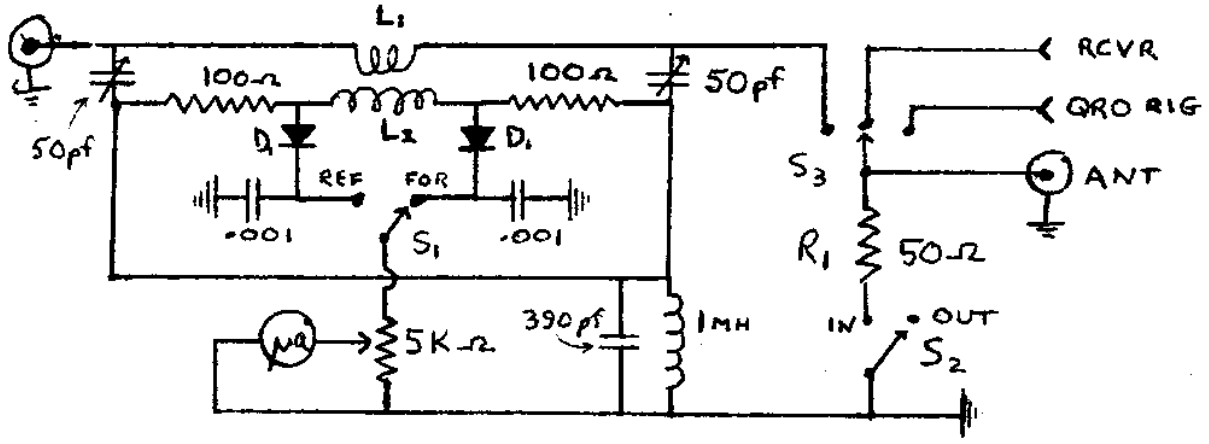
on the time of night, and signals between K8EEG/Ø and K6EIL/2 should peak about half-way between sunset and midnight (ionispherically speaking, that is), or midnight and sunrise, when the F-layer can be expected at about 200 mi. So much for nighttime operation. The QRPP'r active only during the daylight hours, in short, need not worry if his antenna is about 35 feet high or somewhat lower. Instead of figuring out how to get an extra 20 feet of height, he ought to work on antenna gain instead.

Wes Mattox K6EIL/2

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The Antenna Box--TR Switch, Dummy Load, And SWR Bridge

Three devices are very useful when operating a station whether it be QRO or QRPP: a transmit-receive switch for the antenna, a dummy load, and a SWR bridge. When running QRPP, it is necessary to use special units, since most SWR bridges on the market are insansitive at QRPP levels, regular dummy loads are too bulky, and antenna relay switches usually require a great deal more power than the whole QRPP rig. The Antenna Box combines all three devices for QRPP operation, and fits in a 3x4x5 minibox. The schematic reflects the simplicity of the design.



PARTS: L1 - 3T, L2 - 50T, AMIDON T-50-2 TOROID CORE
D1 - 1N34 OR SIMILAR. R1 - 6 330 OHM & 1 470 OHM, 2 W COMPOSITION RESISTORS IN PARALLEL. S1 - SPDT. S3 - SP3T, OR ONE HALF DP3T.

The TR Switch uses a SP3T configuration to allow one to connect a single antenna to the receiver or to one of two rigs, one of which is monitored by the SWR bridge. As the diagram indicates, the TR Switch presents a convenient way of going from the QRPP rig to the QRO rig without juggling around with coax connectors. Since SP3T switches are hard to come by, a DP3T (more common) can be used; Allied Radio has a complete line of slide switches of both kinds for under $1.

In the center position, the antenna is connected to the receiver. S2 puts the dummy load in or out of the circuit, while S1 switches the meter between forward and reflected readings.

The dummy load consists of seven composition resistors in parallel. These are two watt units, and limit the power level of the dummy load to about 7 watts. Six 330 ohm and one 470 ohm resistors come very close to 50 ohms when in parallel. The unit should not be used with above 7 watts. As W2OLU pointed out in April, 1970 ham radio, carbon resistors maintain their rating up to about 50% of maximum, and then due to heat begin to change resistance. Other combinations that can be used for the 50 ohm load: ten 560ohm and one 680 ohm in parallel; or, twenty 1000ohm in parallel: these combinations will give higher power capability.

The SWR bridge is quite sensitive. The parts do not seem critical, and almost any diode can be used, so long as the forward resistances are matched reasonably well. I used a 100ua meter, and only 150mw output is necessary to pin the needle at full sensitivity. If you wish greater sensitivity, use a smaller meter (i.e., 50 ua, 25 ua etc). The coil is wound on an Amidon toroid coil (see Feb issue for source, or advertisements in hr, 73, QST, CQ) T-50-2. It is wise to use #16 or larger wire, without breaking it, between input, around coil form, and to output connectors. L2 isn't critical. To adjust the SWR bridge, use a 50 ohm load switched in and an RF source under ten watts. With RF applied and the switch S1 in forward, adjust the forward side trimmer for a meter null, switch to reflect, and repeat the process, with the RF source and load reversed. Don't be stingy with solder when wiring the unit--keep loss down. The Antenna Box makes QRPP operation a lot more convenient, and provides an accurate method of measuring RF output and SWR. It's so simple to build too.

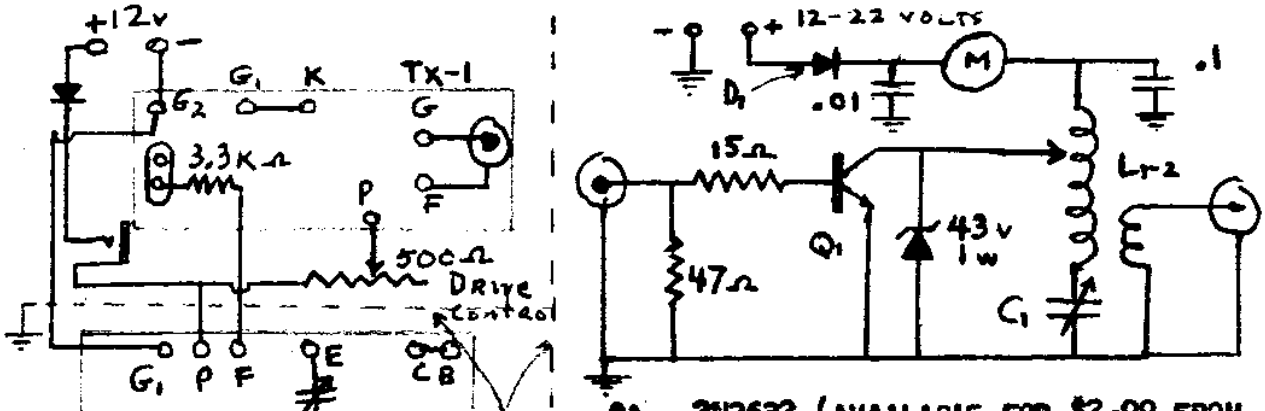
Mike Czuhajewski WA8MCQ

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The AL-MAC 1-20 watt 7 mc Final Amplifier

Random Radiation, the official publication of the Pacific Amateur Radio Guild (see Feb. The Mw. for details), is a really quality newsletter, as the following design will serve to indicate. It is the design of Mac (W7RK), one of the West Coast PARG QRPP stalworths, and should be of great interest to anyone with a QRPP rig capable of furnishing up to 1.5 watts drive for full 20 watt amplifier input who would like to QRO during rough conditions. Mac designed the final for use with his Ten Tec PM-1, which nicely furnishes

proper drive and VFO control also. The diagram illustrates both the final and the hookup to a Ten Tec PM-1



Q1 - 2N3632 (AVAILABLE FOR $2.99 FROM POLYPAKS, S. LYNNFIELD, MASS, UNUSED UNITS ALONG WITH DATA SHEETS—THESE ARE GOOD UNITS:ED)

43 VOLT 1 WATT ZENER (ALSO AVAILABLE FM POLYPAK) METER - 1 AMP. C1 - 200PF. D1 - 50V 1 AMP RECT. L1 - 19T # 15E TAPPED AT 6T FROM TOP, L2 - 7T #15; ON AMIDON TOROID FORM T-68-2. KEY JACK IS AT B PLUS AND MUST BE INSULATED FROM PANEL! TX-1 - TEN TEC XMTR MODULE, VO-1, TENTEC VFO MODULE, BOTH AVAILABLE FROM TEN TEC INC, HIGHWAY 411 EAST, SEVIERVILLE, TN 37862, $7.95 EACH.

For best results, heavy mechanically stable construction is necessary. An adequate power supply, preferably AC powered and regulated should be used, although a lantern battery will last for a short time for portable operation; auto battery more desireable. Solid connections and clean switch contacts are very important for the low voltage/high current final amplifier. The final is capable of 10w input at 12v, and 22w at 22v. A Ten Tec VO-1/TX-1 combo should be wired as indicated in the diagram with provision for shielding between the three sections. The use of the 3.3k ohm resistor between VO-1 output and TX-1 xtal socket is factory recommended; if the units from the factory have a different value, replace it. A few general precautions ought to be followed. 1.) Do not attempt to operate final without a load; 2.) any antenna connected to the final must have a low SWR--anything above about 2.5:1 will burn out the transistor immediately! 3.) a resistor of appropriate size may be inserted in B plus to the final for tuning purposes. 4.) A 1 ohm resistor of 1 watt size can be inserted in the collector of Q1 to protect against 'thermal runaway.'

The Milliwatt thanks W7OE, Editor of Random/Radiation, for permission to reproduce the AL-MAC 7 mc rig.

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New Addition: at this point in preparing The Milliwatt, a 5'12" son was born to K8EEG/Ø. The FD 'back-up' operator problem thus is potentially solved.

WHO WILL WIN THE MILLIWATT FIELD DAY QRPP TROPHY?

QRPP OPERATING NEWS

(AS A REGULAR FEATURE OF THE MILLIWATT, WE WILL PROVIDE AN INDEPTH REPORT ABOUT QRPP ACTIVITIES BOTH ON AND OFF THE AIR. ANY INFORMATION THAT PROVIDES INSIGHT INTO QRPP OPERATION WILL BE INCLUDED. AMONG THE THINGS WE WISH TO INCLUDE ARE: PROFILES OF QRPP OPERATORS, ACCOUNTS OF THEIR EXPERIENCE WITH QRPP, ADVICE BASED UPON THEIR USE OF QRPP BOTH IN REGARD TO DESIGN, CONSTRUCTION, AND OPERATION, DESCRIPTIONS OF THEIR EQUIPMENT AND THE SUCCESS ATTAINED NORMALLY, PROBLEMS AND SOLUTIONS, OBSERVATIONS UPON THE RELATIONSHIP BETWEEN PROPOGATION AND QRP ANTENNAS AND QRPP, AND EVERY ASPECT OF QRPP OPERATION.

WE ENCOURAGE YOU TO SEND REPORTS OF YOUR QRPP ACTIVITIES SO THAT THE INFORMATION CAN BE SHARED WITH OTHER OPERATORS. YOUR REPORTS AND CORRESPONDENCE SHOULD BE ADDRESSED TO YOUR DISTRICT EDITOR AS FOLLOWS: EAST (W1,2,3,) TO WES MATTOX K6EIL/2, 115 PARK AVE., BINGHAMTON, NY 13903; MIDWEST (W4,8,9,Ø) TO MIKE CZUHAJEWSKI WA8MCQ, ROUTE 3, PAW PAW, MICH 49079; WEST (W5,6,7,) TO ADRIAN WEISS K8EEG/Ø, MECKLING, SD 57044.

THE PURPOSE OF QRPP OPERATING NEWS IS MANIFOLD. BASICALLY IT IS AN ATTEMPT TO GATHER AS MUCH DATA AS POSSIBLE ABOUT ALL AREAS OF QRPP ACTIVITY. IT IS NOT A REPORT OF OUTSTANDING ACHIEVEMENTS, ALTHOUGH SUCH ARE RELEVANT. IT IS SIMPLY INTENDED TO PROVIDE A FORUM FOR REPORTS OF QRPP ACTIVITY: WHAT STATION USING WHAT TYPE OF RIG AT WHAT POWER LEVEL WAS ABLE OR NOT ABLE TO DO UNDER SPECIFIED CONDITIONS OF DATE, TIME, DISTANCE, PROPAGATION CONDITIONS WHILE USING A PARTICULAR ANTENNA AT A SPECIFIC HEIGHT AND EFFICIENCY. FOR EXAMPLE, AT K8EEG/Ø, IT HAS BEEN FOUND THAT, DURING EVENING HOURS OF LONG SKIP ON 40 M., A POWER OUTPUT OF ABOUT 1 WATT TO A 136' DIPOLE FED WITH OPEN WIRE AT A HEIGHT OF 60' CONSISTENTLY AND ALMOST WITHOUT FAIL PUTS AN S6-8 SIGNAL INTO THE DENVER AREA, A DISTANCE OF SOME 600 MILES. SIMILARILY, THE SAME SETUP PRODUCES, WITH REASONABLE CONSISTENCY, SOLID QSO'S WITH A S5-S SIGNAL IN THE NEW YORK AREA WHEN CONDITIONS ARE GOOD. HOWEVER, STATIONS FALLING 100 MILES EITHER SIDE OF THOSE TWO AREAS ARE ALMOST NEVER WORKED. THIS SUGGESTS, THEREFORE, THAT AQRPP STATION WITH A SIMILAR SETUP CAN EXPECT SIMILAR RESULTS. FURTHER, SWITCHING TO AN 200' INVERTED VEE UP ONLY 35 FEET CHANGES THE AREA OF CONSISTENT CONTACT CONSIDERABLY, BUT WITH EQUALLY CONSISTENT RESULTS TO THAT AREA. HENCE, THEORY REGARDING THE FUNCTION OF ANTENNA ABOVE GROUND AT A GIVEN FRACTION OF A WAVELENGTH IS BORNE OUT IN PRACTICE, AND FURTHER, LOW POWER LEVELS DEPEND UPON ANGLE OF RADIATION MORESO THAN HIGH POWER RIGS. THE CONCLUSION FOR A FANATIC QRPP OPERATOR IS THIS: DON'T PUT YOUR MONEY INTO A ROTABLE BEAM, BUT INTO A SET OF TOWERS THAT YOU CAN AUTOMATICALLY LOWER OR RAISE FROM THE SHACK TO OPTIMUM HEIGHT. OR TO BE MORE PRACTICAL, EFFICIENT ANTENNAS AT THREE DIFFERENT HEIGHTS.

EVERYONE CAN CONTRIBUTE SIGNIFICANT DATA OF THIS TYPE, AND SHOULD DO SO! IT IS IMPORTANT FOR THE QRPP CAUSE AND FOR THE QUALITY OF THE MILLIWATT.

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DE. . .W2BIV, MYRTON 'DOC' BILLINGS, D.D.S., 1141 EASTERN PARKWAY, BROOKLYN, NY 11213:

I'VE FOUND THE MATERIAL IN THE MILLIWATT VERY INTERESTING. I HAVE LISTENED FOR THE QRP NET ON 7080 BUT NEVER CALLED IN BEFORE. (ED. SINCE DOC WROTE US, HE HAS MADE THE NET SEVERAL TIMES, ALWAYS WITH A VERY GOOD SIGNAL IN SD) I HAVE BEEN DOING QRP WORK ON/OFF FOR 43 YEARS SO IT IS NOTHING NEW TO ME. BACK IN 1929 I WORKED A ZL4 USING A UV-199 WITH 45 V ON THE PLATE IN A SELF-EXCITED OSCILLATOR (ED. SEE W9SCH'S ARTICLE, P. 2 FOR A SIMILAR RIG); THE POWER WAS MINUSCULE. THIS WAS ACCOMPLISHED AFTER MUCH SCHEDULING, AND CUT AND TRY TESTING. TO ME, QRP IS UNDER 15 WATTS, AND I CAN'T SEE HOW 50 W CAN BE CONSIDERED QRP. I HAVE WORKED WAS, WAC, WAVE, CC, WBE, AND THOUSANDS OF FOREIGN HAMS WITH 7.5 WATTS AND LESS INPUT. IT'S NOT THAT I CAN'T RUN A KW; I HAVE AN HT-32, A T-4X8 AND A SWAN 350 TO GO WITH AN SB-200 I BUILT. THIS IS A RECENT ADDITION--EVERYBODY HAD A LINEAR SO I BUILT ONE TO BE STYLISH--BUT FOR ALL INTENTS AND PURPOSES IT GATHERS DUST. ACTUALLY, THE LINEAR MAKES VERY LITTLE DIFFERENCE AS FAR AS I'M CONCERNED.

AT PRESENT, I'M USING THE TEN-TEC PM-1 RIG. IT WORKS JUST GREAT AND THE RECEIVING SECTION IS HARD TO BELIEVE. I WORKED MY FIRST 80 M.

QRPP THE MORNING OF FEB. 25 AT 0825 LOCAL TIME, WITH WA3HIK NEAR HARRISBURG, PA WITH A 58/9 REPORT. I'VE BEEN RATHER UNSUCCESSFUL ON 80 M., AND MADE A FEW CHANGES IN MY ANTENNA COUPLER AND INTEND TO GIVE IT ANOTHER TRY. ON THE SAME MORNING ON 40 M., I WRKED W9MEN AT 0725. HE CALLED CQ, AND TWO OTHER GUYS WITH STRONG SIGNALS CALLED HIM. HE DIDN'T RETURN TO THEM, AND CALLED CQ AGAIN; I SNUCK MY CALL IN RITE AFTER THEY SIGNED AND HE CAME BACK TO ME IMMEDIATELY! THE SKIP WAS OBVIOUSLY RIGHT FOR ME, AS THE OTHER FELLOWS HAD STRONG SIGNALS. I FIND THE MORNINGS VERY GOOD FOR QRPP ON 40 METERS. WE SHOULD HAVE THE QRP NET SCHEDULED FOR SOME MORNING SESSIONS INSTEAD OF ONLY FOR NIGHT SESSIONS. EVENSO, I HAVE PRETTY GOOD LUCK ON 40 IN THE EVENING. THE NIGHT OF THE 24TH FEB. I WORKED WA3MPF AT 2030, W1AFD AT 2035, WB3FLK AT 2120, AND K3LUX AT 2315. SOME RESPONDED TO MY CQ! I WILL DO WHAT I CAN TO STIMULATE QRPP ACTIVITY. I'LL TRY TO MONITOR 7080KC AT 0800 AND 2000 EST AND ANYONE WANTING A SKED CAN DROP ME A CARD.

MY PM-1 OPERATES AT A HIGH EFFICIENCY OF ABOUT 90%, AND I REALLY CAN'T DO BETTER ON THE AIR WTH HIGH POWER. THE PM-1 PUTS OUT ABOUT 1.25 WATT AS MEASURED ON A JONES MICRO-MATCH, TAKING INTO ACCOUNT A POSSIBLE PLUS-ERROR. IF THE SWR SHOWS A REFLECTED POWER OF EVEN 1/8 WATT, IT MAKES A NOTICEABLE DIFFERENCE IN RESULTS. WITH 100 W OUTPUT, YOU CAN AFFORD 50 W REFLECTED POWER, IN IN QRPP, EVERY MINUSCULE IS IMPORTANT! GETTING EVERYTHING INTO THE ANTENNA IS THE WHOLE SECRET IN QRPP OPERATION.

IT HAS ALWAYS BEEN MY EXPERIENCE THAT GOOD PATIENT OPERATION IS THE BEST WAY, AND 'BEING WHERE THE OTHER FELLOW AIN'T' CAUSE YOU'RE COMPETING WITH THE BIG GUYS. I'D SAY THAT THE HCL ACID TEST IS AN IMPORTANT GUIDELINE ALSO:

GET YOUR ANTENNA H . . HIGH
C . . CLEAR
L . . LONG

I FIND THAT WITH QRPP IT IS VERY IMPORTANT TO KEEP THE SWR DOWN, AND TO CHECK IT VERY FREQUENTLY WITH 25 KC SHIFTS. WHEN CONDITIONS ARE BAD YOU CAN'T GET OUT WITH A KW, SO THERE IS NO USE KNOCKING YOUR BRAINS OUT WITH FLEA POWER. WHEN CONDITIONS ARE GOOD, YOU CAN GET OUT WITH FLEA POWER VERY CONSISTENTLY. BUT I HAVE OPERATED UNDER THE WORST OF CONDITIONS AND ALSWAYS MANAGED TO WORK SOMEBODY ANYHOW.

I MUST RELATE AN INTERESTING STORY. YEARS BACK I HAD A SKED ON 40 M WITH A VK5 (HIS CALLS SLIPS MY MIND). WE WORKED SKED FOR YEARS, AND THIS GUY REALLY PUT OUT A SIGNAL THAT WOULD KNOCK YOUR EARS OFF WITH 10 WATTS TO A RHOMBIC. I RAN ABOUT 200W TO MY 814'S IN PARALLEL. ONE MORNING SOME GUY KEPT CALLING AND CALLING HIM AND QRM'ING THE FREQUENCY, AND AFTER I SIGNED, HE EVENTUALLY WORKED THE NUISANCE. THE GUY WAS RUNNING A KW TO A 40 M BEAM. THE NEXT DAY, THE VK5 TOLD ME I WAS KNOCKING THE PANTS OFF THIS GUY. SO YOU NEVER KNOW ABOUT POWER.

I LIKE OPEN FEEDERS AND I CAN USE MY ANTENNA ON ALL BANDS 80-10M. AT PRESENT MY FEEDERS ARE OVER 135' AND NOT TOO EFFICIENT BECAUSE THE WAY IT RUNS AROUND THE MOLDING ON THE WAY TO MY SMALL SHACK. I HAD TO REMOVE THE 6" FEEDERS WHEN THE XYL PAPERED THE WALLS. HOWEVER, I MATCHED THE FEEDERS INDOORS WITH 2" SPACERS AND #19 WIRE AND IT WORKS FINE NOW. I THINK AN ANTENNA COUPLER IS ESSENTIAL FOR ANY GOOD ANTENNA, AND I HAVE USED ONE FOR OVER 43 YEARS NOW.

I WOULD SUGGEST THAT YOU PUBLISH A LIST OF QRPP'ERS BY CALL DISTRICT AND STATE. THIS WOULD HELP OUT THE CAUSE.

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DE. . .W8AVB, DICK SCHNEIDER, 1824 MT. VERNON RD., TOLEDO, O. 43607

I WASN'T VERY ACTIVE ON QRPP THIS PAST WINTER SO STILL HAVE 35 STATES IN ALL DISTRICTS ON 80 M. THIS WAS DONE ON 80 DURING THE BUSY EVENING HOURS 2000- 2300. RECENTLY I GOT A TEN-TEC PM2. MY ONLY COMPLAINT IS TVI, EVEN WITH AN ANTENNA TUNER AND LOW PASS FILTER. OUTPUT IS ONE WATT ON 80; IF DROPPED TO 1/2 WATT, TVI DISAPPEARS. I AM WORKING ON THE PROBLEM AT PRESENT AND AWAITING SOME ADVICE FROM TEN TEC. IT SURE IS A STABLE RIG THOUGH AND THE RECEIVER IS REALLY HOT.

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DE. . .KØVQY, BILL ESLICK, 260 E. 13TH ST., WITCHITA, KANS 67214:

I SUPPOSE THAT YOU HAVE SEEN SOME OF MY ARTICLES IN 73 AND HAM RADIO. I HAVE WORKED BOTH COASTS AND SEVERAL STATES WITH 100 MW ON

6 METERS. THE TRANSMITTER (WITHOUT POWER SUPPLY AND MODULATOR) CAN BE HELD IN THE PALM OF MY HAND. I HAVE ONE NOW WITH AN OSC-DRIVER-FINAL SETUP. IT HAS BEEN PUBLISHED. IT MEASURES 1.1 WATT INTO A BIRD WATTMETER. I'VE WORKED 22 STATES ON 6 M SO FAR. I ALSO HAVE A FIVE TRANSISTOR RIG WHICH PUTS OUT 2.5 WATTS ON TWO METERS.

DE. . .W9SCH, C.F. ROCKEY, 1124 CAMILLE, DEERFIELD, ILL 60015:

I HAVE THE TEN TEC PM-3. WITH IT I WORKED FOUR EUROPEANS ON 20 CW WITH ITS FIVE WATTS INPUT USING ONLY A SLOPPY OLD 80 M ZEPP ANTENNA. I THINK THAT I'VE GOTTEN MY $70 WORTH OUT IT ALREADY, BY CRACKY! TEN TEC HAS AN EXCELLENT SERVICE POLICY. THE FET MIXER IN MY JOB WENT BAD AND THEY SENT ME A REPLACEMENT WITHIN A WEEK! TVI IS MINIMAL WITH MY PM-3. NOT ZERO, BUT MINIMAL, WHICH IS ALL ONE CAN EXPECT. I LIKE THE LITTLE BOX SO MUCH THAT MY 90 WATTER IS GATHERING DUST. SURPRISINGLY, I WORK AS MUCH WITH IT AS WITH THE 90 WATTER AND THE REPORTS ARE ONLY AN S-UNIT OR SO LOWER ON THE AVERAGE. (THE QRO RIG PUTS OUT THE POWER TOO--AT ABOUT 60% PLATE EFFICIENCY. I'VE FOUND THAT 2 TO 5 WATTS IS ABOUT MINIMUM POWER FOR CONSISTENT WORK ON THE HF BANDS. LESS THAN THAT IS KIND OF A 'STUNT.' I THINK THE REASON FOR THIS IS PRIMARILY PSYCHOLOGICAL. GET A REAL RADIOMAN ON THE RECEIVING END AND HE CAN WORK WITH A SIGNAL 10 DB LOWER THAN THE AVERAGE HAM. I KNOW A TYPICAL SUPER-RICH CHICAGO NORTH SHORE HAM WHO OWNS THE $1,500 NATIONAL RECEIVER, BOASTS OF ITS SENSITIVITY, YET NEVER EVEN LISTENS TO ANYONE OTHER THAN HIS S-9 PLUS KW BUDDIES ON 20 SSB. FOR ALL THE RECEIVER, HE PROBABLY WOULDN'T KNOW WHAT TO DO WITH A WEAK SIGNAL!

DE. . .W2NEP, ARNOLD SEIPEL, 172 NANCY LANE, WYCKOFF, NJ 07481:

ALTHOUGH I HAVEN'T WORKED MUCH QRPP, THE FOLLOWING ARE SOME OF MY LOGGED QSO'S:

10 NOV	'68	OK3CDG	1.3W	559	28MC
14 DEC	68	DJ5AZ	1.3 W	559	28MC
21 DEC	68	VE2FJ	1.3W	54/59	28MC
14 APR	70	W2YT	0.1 MICROWATT OUT	Q5	28MC
18 APR	70	PY5ASN	7.5W	569	28MC
26 APR	70	W4JZZ	10W	589	3.5MC
26 APR	70	WA0YAK	10W	559	3.5MC

THE QSO'S IN 1968 WERE FROM CURIOSITY AS TO WHAT THE 2N3866 DRIVER STAGE FROM MY BIG RIG WOULD DO. I THEN BUILT A 2N3553 FINAL AND IT AT ABOUT 4.5 WATTS INPUT FOR THE 1969 QRP ARC CONTEST. AS A RESULT OF RECEIVING THE FIRST ISSUE OF THE MILLIWATT, I'VE DUSTED THE FINAL OFF AND BUILT AN SWR BRIDGE TO WORK WITH IT, SO THAT I CAN ADJUST THE ANTENNA TUNER WITHOUT HAVING TO THROW ON THE QRO RIG AND ALSO MONITOR THE RF OUTPUT. ABOUT THE ONE MICROWATT QSO WITH W2YT. WE RAN THIS EXPERIMENT 'JUST TO SEE' WHAT COULD BE DONE. I THEN CALCULATED THE POWER THAT I ACTUALLY NEEDED TO WRK THE OK3 AS I HAD IN '68:

ASSUME W2NEP TO OK3CDG = D = 3000 MILES
KNOWING W2NEP TO W2YT IS D OF 1.67 MILES, AND P IS ONE UW
P NEEDED TO WORK OK3 IS $\frac{P}{D^2}$

$$\frac{P}{D^2} = \text{APPROX. } 0.33 \text{ WATTS}$$

THE ACTUAL RF OUTPUT FOR THE OK3 QSO WAS 0.5 WATTS--A PRETTY CLOSE AGREEMENT IN THEORETICAL AND ACTUAL! AS FOR THE W2NEP-W2YT QSO, THE FOLLOWING DATA IS RELEVANT. APR 14, 1970, 0230GMT, 28050KC; D IS 8,840 FEET, OR 1.67 MILES. REPORTS: READABLE Q5 @ -40DB (1 MICROWATT), READABLE, CALLS ONLY, @ -45DB, AND NO ANSWER AT -48 DB. DISTANCE OVER POWER IS 16,700,000 MILES PER WATT.

DE. . .K3NVJ, DENNIS COOPER, 1013 RIDGEWOOD RD., RFD 7, YORK, PA 17402:

I OPERATE A HOMEBREW 6AG7 COLPITTS OSCILLATOR INTO A PI-NET OUTPUT AND AN END-FED ANTENNA 40 FEET LONG. THE RIG RUNS 6W INPUT AND OPERATES 80,40, AND 20 METERS. I HAVE WORKED AND CONFIRMED 15 WAS, & MY BEST DX ON 40 IS NORTH CAROLINA AND VERMONT. BEST ON 20 IS CZECHOSLOVAKIAM ALTHOUGH NOT YET QSL'D. I HOPE TO BUILD A TRANSCEIVER FOR

40,20, AND 15 METERS WHEN I GET THE TIME; PLAN TO USE TEN TEC MODULES FOR THE PROJECT. I OPERATE CRYSTAL CONTROLED ON 7041, 7053, 7036, 14040, 14050, AND 14036.

DE. . .K4OCD, JACK BURCHFIELD, 7609 KONDA DRIVE, KNOXVILLE, TENN 37920:

I THINK YOU WILL FIND QUITE A FEW HAMS WHO DID NOT REALIZE WHAT LOW-LOW POWER WILL ACCOMPLISH. HERE AT TEN TEC, WE HAVE QUITE A LIST OF LOGS OR PARTIAL LOGS SENT TO US ALREADY ATTESTING TO THE SUCCESS OF QRPP. ONE YOUR READERS WILL BE INTERESTED IN IS THAT OF PJ9JT. JOHN HASN'T SENT THE FINAL RESULTS IN YET, BUT WITH A TEN TEC PM-3A ON VACATION HE LOGGED QUITE A BIT OF DX. IN THREE OR FOUR DAYS, HE LOGGED 166 QSO'S INCLUDING VU2, AX3, AX4, FP8 ETC. (ED. WOW!). IN ONE 80 MINUTE PERIOD ON 20 METERS, HE WORKED 45 STATIONS! THE MILLIWATT IS TERRIFIC. I THINK IT WILL GO A LONG WAY TO INCREASE INTEREST IN QRPP AND PUT THE HAM BACK INTO HAM RADIO.

(ED. JACK IS VICE-PRESIDENT OF TEN-TEC, AND AN AVID QRPP OPERATOR HIMSELF. THE DEGREE OF GOOD HE HAS DONE FOR QRPP IS INESTIMABLE, NEEDLESS TO SAY. ONE MEASURE IS SIMPLY THE NUMBER OF TEN-TEC RIGS ON THE AIR--WE'LL NEVER BE ABLE TO DETERMINE HOW MANY GUYS WERE EXCITED BY THE TEN-TECS' ADS AND GOT OUT THE OLD QRPP RIGS.)

DE. . .WA7IYB, ROBERT DUDLEY, JR, 13219 35 TH AVE N.E. SEATTLE, WASH

I HAVE A TEN-TEC PM-1 AND AN OMEGA LT-5, WHICH I HAVE RETURED SINCE ACQUIRING THE PM-1. I DON'T HAVE MUCH IN THE WAY OF AN ELABORATE SETUP HERE IN NORTH SEATTLE. MY ANTENNA FARM CONSISTS OF A 40 METER DIPOLE FED WITH A HALF-WAVE OF RG58U AND IS ABOUT 20' OFF THE GROUND. THE OTHER ANTENNA IS A WINDOM WHICH I USE FOR ALL-BAND OPERATION; IT IS FED WITH 300 OHM TWINLEAD AND MATCHED TO THE RIG WITH A 'Z' MATCH COUPLER. THE WINDOM IS USED PRIMARILY WITH THE BONSET GSB-100, ALTHOUGH I OCCASIONALLY PUT THE TEN-TEC ON THE WINDOM TO WORK A LOCAL ON 80M. MY DX ON 80 WITH THE PM-1 IS ORFINO, IDAHO WITH A GOOD SIGNAL REPORT. 40M IS WHERE I DO MOST OF MY WORK WITH THE QRPP RIG. BEST DX SO FAR IS SAN DIEGO AND REGINA, SASK WITH REPORTS RESPECTIVELY OF 569 AND 339. BOTH STATIONS QSL'D. MY GROUND SYSTEM CONSISTS OF TWO 8' GRND RODS, ONE AT EACH CORNER OF THE HOUSE IN BACK AND TIED TOGETHER WITH A BURIED CONDUCTOR.

I TRIED A LITTLE EXPERIMENT THE OTHER DAY WHEN I WAS ON WHIDBY ISLAND. I TIED A PIECE OF WIRE ABOUT 6" UP FROM THE BASE OF THE BC WHIP ON MY TRUCK, AND MEASURED OFF (USING THE OUTSTRETCHED ARMS APPROACH) ABOUT 33' OF WIRE AND TIED IT TO A NEARBY POST. THE WHOLE ANT WAS ONLY 5' OFF THE GROUND. I MANAGED TO WORK A PORTLAND STATION WITH THIS ANTENNA AND THE PM-1 AT 1240 LOCAL TIME, BUT ONLY GOT A REPORT OF 339, WHICH IS OK FOR NO MORE THAN A QUARTER WAVE ANTENNA 5' HIGH. I ALSO HOOKED THE RIG DIRECTLY TO THE BC ANTENNA, WHOSE IMPEDANCE IS ? TRIED CALLING SEVERAL NOVICES ON 40, BUT EVEN THE REAL LOUD LOCALS DIDN'T SEEM TO HEAR ME. NEXT TIME I TRY THIS I WILL BE MORE DISCRIMINATING IN MY USE OF MATERIALS, NOW THAT I'VE DETERMINED THAT THE SLIPSHOD QUARTER WAVE WIRE WILL GET OUT WITH 2 WATTS. I HAVEN'T WORKED TOO MANY STATES WITH THE PM-1 YET. PART OF THE REASON IS THAT I'M NOT ON THE AIR EVERY DAY, AND, OF COURSE, I HAVE PLANS FOR GETTING MY DIPOLE A LITTLE HIGHER FOR FUTURE QRPP WORK. I GUESS I COULD WORK STATIONS WITH THE QRO RIG AND THEN QRP TO THE PM-1, BUT I FEEL THAT PART OF THE CHALLENGE LIES IN MAINTAINING THE QSO EXCLUSIVELY WITH QRPP. THE STATES I'VE WORKED SO FAR ARE LOCALS--IDAHO, OREGON, CALIF., AND WASHINGTON. I'VE GOTTEN 59 REPORTS FROM SOME OF THEM. AS YET, I DON'T HAVE AN SWR BRIDGE FOR LOW POWER, SO I'LL HAVE TO BUILD OR BUY ONE. (ED. SEE THE WA8MCQ SPECIAL IN CONSTRUCTION PROJECTS ABOVE)

DE. . .WA8MCQ, MIKE CZUHAJEWSKI, RT. 3, PAW PAW, MICH 49079:

I RECENTLY BUILT A ONE WATT RIG FOR 40M AS A PROJECT FOR MY COLLEGE ELECTRONICS COURSE. I HAVE ONLY MADE ABOUT 30 QSO'S (AS OF 3/70)

IN 10 STATES WITH IT, BUT I HAVEN'T BEEN TRYING TOO HARD. SOME OF THE QSO'S MADE WITH IT APPEAR BELOW (IN AT A GLANCE). NOTICE THE NUMBER OF 58/59 REPORTS. THESE WERE RECEIVED BEFORE I TOLD THE OTHER GUY HOW MUCH POWER I WAS RUNNING, SO THEY CAN BE CONSIDERED PRETTY HONEST. THE 2N3053 RIG GETS OUT MUCH BETTER THAN MY OLD 6AQ5 QRPP RIG AT ABOUT THE SAME POWER INPUT. IT IS POSSIBLE TO GET MUCH GREATER EFFICIENCY WITH TRANSISTOR RIGS THAN WITH TUBES. FOR INSTANCE, THIS RIG HAS ABOUT 90% EFFICIENCY. MY OLD 6AQ5 RIG DOESN'T EVEN WARM UP A 47 OHM 1/2 W RESISTOR DUMMY LOAD, BUT THE 2N3053 RIG MAKES IT QUITE WARM. THAT INDICATES A SIGNIFICANT DIFFERENCE IN OUTPUT FROM THE TRANSISTOR RIG.

I MUST DISAGREE WITH SOMETHING IN K6EIL'S 'QRPP OPERATING HINTS' (FEB. ISSUE). HE SAID THAT IT IS BETTER TO ANSWER RATHER THAN CALL CQ WITH QRPP. I FIND THAT ALMOST EVERY CQ I SEND RESULTS IN AN ANSWER. FURTHERMORE, I CANNOT AGREE WITH HIS STATEMENT THAT IT HELPS TO QRS TO IMPROVE READIBILITY. I FIND THAT IT HELPS GREATLY IF A WEAK QRPP STATION ACTUALLY SENDS FASTER. I HAVE NOTICED THIS ON K6EIL/2'S SIGNAL, AND OTHERS ALSO. WHEN SENDING SLOWLY, THE QRM BLOTS OUT A PART OF EACH LETTER, WHILE SENDING FASTER LETS MOST OF THE CHARACTERS GET THROUGH THE QRM, AND RELATIVELY FEW LETTERS ARE MISSED. IT IS EASY TO FILL IN THE MISSED LETTERS IN THIS CASE.
(ED. ACTUALLY, BOTH ARE RIGHT. THE SPEED OF A CW SIGNAL DETERMINES THE BANDWIDTH OF SELECTIVITY THAT CAN BE USED IN COPYING THE SIGNAL. FOR EXAMPLE, A 25 WPM CQ SIGNAL REQUIRES A MINIMUM OF ABOUT A 75 CYCLE BANDWIDTH. IF THE RECEIVER BANDWIDTH IS TWICE THAT FIGURE, THERE WOULD BE LITTLE PROBLEM IN COPYING THE 25 WPM SIGNAL. HOWEVER, IT IS COMMON PRACTICE TO DECREASE THE BANDWIDTH AS MUCH AS POSSIBLE WHEN COPYING A WEAK SIGNAL (I.E., INCREASE THE SELECTIVITY EITHER THROUGH A NOTCH FILTER OR CRYSTAL FILTER OR AUDIO FILTER WHEN ADJUSTMENT IS POSSIBLE; MANY OF THE NEW RECEIVERS, SUCH AS THE HEATH SB LINE OR COLLINS, HAVE BANDWIDTH ADJUSTMENT BUILT IN THROUGH THE USE OF A PREADJUSTED FILTER. AS FAR AS I KNOW, NONE OF THESE COMMERCIAL RECEIVERS PROVIDES A FILTER OF LESS THAN 250 CYCLES BANDWIDTH, IN WHICH CASE, A FASTER CW SIGNAL WOULD PROBABLY BE MORE EFFECTIVE.) HOWEVER, WHEN BANDWIDTH IS ADJUSTABLE, AND THE CRYSTAL FILTER OR MECHANICAL OR AUDIO FILTER IS PEAKED, BANDWIDTHS OF LESS THAN 100 CYCLES USUALLY OCCUR, IN WHICH CASE THE USABLE CW SPEED DECREASES PROPORTIONATELY. GIVEN QRN/QRM FACTORS, A SPEED OF 30 WPM IS ABOUT MAXIMUM USABLE WITH A BANDWIDTH OF 45 CYCLES. ON BANDS SUCH AS 160M, WHERE QRN AND NOISE LEVEL IS HIGH, IT IS COMMON PRACTICE WHEN WORKING DX TO USE A SPEED OF 3-8 WPM, AND TO 'SIT ON THE DASHES', THAT IS, OVER-EXAGGERATE THE SPACING OF THE DASHINGS AND THE LENGTH OF THE DASH. THIS AIDS IN DISCRIMINATING THE SIGNAL FROM QRM.)

DE. . .W4VNE, CARL MCCULLOUGH, 6511 HARWOOD PL., SPRINGFIELD, VA:

YEP, THAT RECENT ISSUE OF THE MILLIWATT SURE ISN'T AS IMPRESSIVE AS THE FIRST ISSUE! AS YOU GUYS SAY, IT'S UP TO US WHO ARE INTERESTED IN QRPP TO PROVIDE SOME MATERIAL TO KEEP IT INTERESTING FOR THE GANG.

MY SUBJECT THIS TIME IS HOW TO USE AN OLD FAMILIAR WORK HORSE OF THE HAM BANDS FOR BONAFIDE QRPP OPERATION. I REFER TO NOTHING LESS THAN THE VIKING II RIG! I HAVE A CALIBRATED SWR/POWER METER HERE SO YOU CAN ACCEPT MY STATEMENTS AS PRETTY ACCURATE.

WHILE I WAS EXPERIMENTING WITH QRPP ON 3.5MC SEVERAL YEARS AGO USING TRANSISTORS, I HAPPENED TO GET CURIOUS AS TO WHAT THE VIKING II WOULD PUT OUT IF THE RF DRIVE CONTROL WERE BACKED DOWN TO NEAR ZERO. AMAZINGLY, ALL THAT HAPPENED WAS A STEADY REDUCTION IN POWER DOWN TO A MEASURED OUTPUT ON THE POWER-METER OF LESS THAN 100MW! BUT THE OUTPUT TUNING CHARACTERISTIC OF 140 WATT OPERATION CHANGED DRASTICALLY, AND THE LITTLE 'L' NETWORK THAT I HAVE USED FOR YEARS WITH BOTH THE VIKING II AND QRPP RIGS TOOK CARE OF LOW SWR REQUIREMENTS. THE PLATE METER READING ON THE VIKING II READS BOTH PLATE AND SCREEN-GRID CURRENT, SO WHEN IT SAYS THAT THE RIG IS RUNNING ONLY 15 OR 20 MA FOR THE 100 OR 200 MW OUTPUT, YOU KNOW THAT YOU ARE REALLY QRPP! THE BEAUTIFUL PART OF USING THIS TYPE OF RIG IS THAT THE VIKING II LETS ONE OPERATE AT THE 100MW LEVEL ON ALL BANDS, 160-10 METERS, AND ONE GETS A REAL INSIGHT INTO THE POSSIBILITIES OF QRPP.

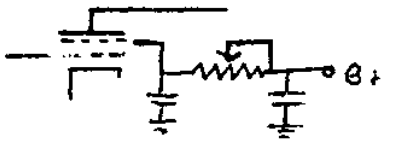
I TRIED QRPP WITH THE VIKING II FIRST ON 15/10 M LAST YEAR, USING MY PRESENT RATHER POOR-LOOKING SEMI-VERTICAL 125' WIRE. I RACKED UP A SCORE OF 35 COUNTRIES WITHOUT ANY REAL TROUBLE AT ALL. ON 160-20M, THE

RIG WORKS LIKE A CHARM ALSO.

MY POINT IS THIS: MOST COMMERCIAL RIGS SIMILAR TO THE VIKING II HAVE A MEANS FOR CONTROLING THE LEVEL OF RF DRIVE DELIVERED TO THE FINAL AMPLIFIER, AND IF THE GANG LOOKS AT THIS CLOSELY, THEY HAVE A MADE-TO-ORDER MEANS OF WORKING QRPP. MY LAST THOUGHT IS THAT, EVEN WITH THE CAPABILITY THAT I HAVE OF USING THE VIKING II, IT DOESN'T GIVE ME THE SATISFACTION THAT I GET FROM THE LITTLE TRANSISTOR RIG WHICH I BUILT AND WHICH OPERATES FROM A 12-15 VOLTS SOURCE. HOWEVER, THAT IS JUST A PERSONAL PREFERENCE, AND THE MAIN THING IS TO GET THOSE GUYS INTERESTED IN QRPP TO TRY OUT THEIR LUCK WITH QRPP. THEN WE'LL REALLY GET THINGS GOING FOR QRPP!

I'VE MENTIONED THAT LITTLE 'L' NETWORK SO MUCH THAT MAYBE I OUGHT TO GIVE SOME DETAILS. HOWEVER, THE NETWORK IS SIMPLICITY ITSELF, AND THE ONE I USE ISN'T EVEN DESIGNED TO ANY PARAMETER. HOWEVER, I'LL GIVE THE FELLOWS THE DETAILS IF YOU THINK THEY'D LIKE TO READ ABOUT IT (ED YES INDEED--I'M INTERESTED TOO!). THE BEST THING TO DO WILL BE TO SHOW HOW TO DESIGN AN 'L' NETWORK WITH SIMPLE MATH.

(ED. CARL HAS MENTIONED AND DESCRIBED A VERY PRACTICAL WAY OF USING A 'BUGLESS' COMMERCIAL RIG ON QRPP. FOR THOSE OF YOU WHO DON'T HAVE A QRPP RIG YET, BUT WOULD LIKE TO GET GOING WITH MINIMUM EXPENDITURE, THIS IS YOUR BIG CHANCE. SINCE MANY LATE MODEL RIGS DON'T HAVE THE RF DRIVE CONTROL MENTIONED BY CARL, HERE'S WHAT YOU DO. THE THEORY IS OF THE SIMPLEST MAGNITUDE: THE RF DRIVE IS SIMPLY A POTENTIOMETER IN SERIES WITH THE B PLUS LEAD TO THE SCREEN GRID OF THE FINAL AMPLIFIER TUBE--BY VARYING THE B PLUS VOLTAGE ON THE SCREEN (WHICH DRAWS A SMALL AMOUNT OF CURRENT) THE GAIN THE THE AMPLIFIER CAN BE VARIED, THAT IS, THE OUTPUT CAN BE CONTROLED. SO, GET A 2 WATT POTENTIOMETER OF ABOUT 25-50K OHMS, CONNECT IT IN SERIES WITH THE SCREEN GRID LEAD, AND SHORT THE CENTER CONTACT TO ONE END OF THE POT, THUS:



NO OTHER MODIFICATION IS NECESSARY! AS CARL POINTS OUT, THE FINAL TUNING CAN CHANGE AS A RESULT OF DRASTICALLY LOWERING THE POWER OF THE FINAL, BUT SIMPLY RETUNE FOR QRPP. WHEN THE CENTER CONTACT COMPLETELY SHORTS OUT THE POT., POWER WILL BE AS ORIGINALLY EXPERIENCED, AT FULL RESISTANCE (OR A MEASURED POINT), POWER WILL BE GREATLY REDUCED. QRPP FOR A BUCK-N-HALF THIS WAY!

QRP NET NEWS

THE QRP NET HAS BEEN MEETING SATURDAY, 0100 GMT ON 7080KC. SINCE THE APRIL ISSUE CAME OUT, NET ACTIVITY HASBEEN NIL. SEVERAL WEEKS OF VERY POOR CONDITIONS ARE RESPONSIBLE, ALONG WITH DAYLIGHT TIME. SO, NET WILL BE SUSPENDED UNTIL THE END OF SEPTEMBER. HOWEVER, K8EEG/Ø IS INTERESTED IN EXPLORING THE POSSIBILITIES OF A DIFFERENT TIME AND BAND: WILL TRY SATURDAY, 0530, 7080, WHEN CONDX SEEM VERY GOOD ALL AROUND THE STATES. ALSO, SATURDAY, 2200GMT, 14090.

AT A GLANCE

THE PURPOSE OF THIS SECTION IS PROVIDE, 'AT A GLANCE,' DATA ABOUT QRPP ON-THE-AIR-ACTIVITIES. IN SUBMITTING LOG LISTS, PLEASE INDICATE DATE/TIME, FREQ., STATION WRKD, POWER (YOUR), REPORT, DISTANCE (IF POSSIBLE), TYPE OF ANTENNA AND HEIGHT ABOVE GROUND. THIS NOT A 'RECORD' ACHIEVEMENT SHEET! EVERY QRPP QSO IS SIGNIFICANT, SO DON'T JUST SELECT YOUR 2 BILLION MILES PER WATT QSO'S!

DE. . .WØRHI, AL KELLER, ST PAUL, MINN. 160 METERS. 180MW. 300' ENDFED ZEPP, 100' TO 40' HIGH AT SHACK. 2N404 XTAL OSC ON 1802, 1997KC. 1970:

DATE	TIME	STATION	POWER	RST	DISTANCE	KM/W
8/2	2250CST	W4GSH	180MW	319	625	6.250
12/2	1925	WØII	180	559	175	.960
12/2	2040	W9DL	180	559	370	2.035
"	2101	VE3DU	180	349	600	3.600
	2116	WØBE	180	539	6	.032
	2210	W2EQS	180	339	1000	5.500

DATE	TIME	STATION	POWER	RST	DISTANCE	KM/W
16/2	2110	W8PBH	180MW	449	600	3.300
18/2	1947	WØII	180	559	175	.960
	2310	WAØTVD	180	569	200	1.100
20/2	0001	K8LKC	180	449	425	2.335
	0052	WØNXF	180	449	360	1.980
	1907	WØIH	180	549	7	.036
21/2	1922	W8PIW	180	569	170	.930
25/2	2350	WAØATT	180	339	200	1.100
27/2	2345	WØRFT	180	569	175	.960
6/3	2207	KØWPK	180	569	8	.044
15/3	0005	W1HGT	180	449	1100	6.150
	0058	K8IUA	180	339	550	3.029
20/3	2300	W9BKA/8	180	339	600	3.300
22/3	2320	W3AJS	180,	219	1000	5.500
	2343	K8GCV	180	369	700	3.850
23/3	1943	W8HID	180	559	510	2.800

(MANY OTHERS, ALL C.W. 160 OPERATORS ARE GENERALLY ABOVE AVERAGE ON RECEIVING, AND WØRHI'S SUCCESS TESTIFIES TO THAT FACT)

DE. . .WA8MCQ, MIKE CZUHAJEWSKI, RT 3, PAW PAW, MI. 40 METERS. 1 WATT TO 2N3053, XTAL CONTROLED. DIPOLE AT 35 FEET. 1970:

	GMT					
13/3	1310	K9UWN	1 WATT	86	150	.150
	1330	W9CQ		87	250	.250
	1359	W9JVC		85	150	.150
	1811	VE3CFW		87	230	.230
14/3	2133	W4OWE		86	450	.450
	2305	VE3ENK		85	250	.250
15/3	0042	WA8ZPO		85	4	.004
	1844	W9FJR	1 WATT	86	150	.150
20/3	1931	WAØRZU		86	400	.400
	2029	W9YH		89	175	.175
	2133	WA9OHR		88	120	.120
21/3	1216	W8BZX	1 WATT	87	150	.150
	1216	W2DCZ		86	350	.350
	1315	W4JXE		87	400	.400
	1454	W9PM/8		87	230	.230
	1543	WØPXB	1 WATT	85	420	.420
	1652	W9CT		85	125	.125

DE. . .WA6ABP, IAN CUMMINGS, 536 VIA ALMAR, PALOS VERDES, CA. 40/20M. GROUNDPLANE ON 20, INVERTED VEE ON 40. 500MW. 1970:

	PST					
2/3 (40)	1730	K8EEG/Ø	500MW	33/349	1435	2.870
8/3	0903	W7OE	500MW	549	1200	2.400
9/3	2016	W7RK	500MW	579	1000	2.000
	2039	WAØUCQ	500MW	549	800	1.600
6/3 (20)	1915	WA9HPE	500MW	579	2000	4.000
7/3	1145	WA7KBI	500MW	559	1000	2.000
	0810	VE4LD	500MW	559	1600	3.200
8/3	0808	WØEVA	500MW	359	1500	3.000
9/3	0803	W7EHF	500MW	579	1100	2.200
10/3	0729	WØHE	500MW	449	1500	3.000
	1623	W9JUO	500MW	449	1900	3.800

DE. . .WØBV, ROBERT PEAVLER, RT 4, KIRKSVILLE, MO 63501. QRP QSO PARTY 1969, 8/16-17. 40 METERS. 4W TO 1625. TWO HALF-WAVES IN PHASE.

	GMT				
8/17	0331	W7IEU	4WATT	449	WASH
	0335	K7JRE/1	4WATT	559	MASS
	0344	K3ZMI	4WATT	559	DEL
	0350	W1DIT	4WATT	449	CONN
	0355	W4UM/4	4WATT	579	VA
	1620	WA9UOT	4WATT	589	ILL
	1626	WAØVDG	4WATT	559	MINN
	1839	W9FRC	4WATT	479	ILL
	1848	WØMHK	4WATT	339	IOWA

WE HOPE THAT YOU HAVE ENJOYED THIS ISSUE OF THE MILLIWATT! HELP US IMPROVE IT BY SUBMITTING A REPORT OF YOUR ACTIVITIES, RIG, WAS QRPP STANDING, COMMENTS, AND ARTICLES. THE MILLIWATT IS A QRPP MAGAZINE WRITTEN BY QRPP OPERATORS, AND IT WILL BE ONLY AS GOOD AS YOU FELLOWS MAKE IT! SO, BEFORE PUTTING THIS ISSUE AWAY, WRITE US. IF YOU DON'T KNOW WHAT TO WRITE, THE FOLLOWING QUERY LIST WILL HELP YOU.

NAME—ADDRESS—CALL. HOW LONG HAVE YOU BEEN INTERESTED IN AND USED QRPP? WHAT IS THE CHIEF INTEREST THAT QRPP HOLDS FOR YOU?—THE CHALLENGE AND THRILL OF QRPP QSO'S, EXPERIMENTING WITH TRANSISTORS, DESIGNING AND BUILDING TRANSMITTERS AND ANTENNA SYSTEMS, EMERGENCY/PORTABLE OPERATION, DX QRPP, RAGCHEWING ETC?

WHAT QRPP RIGS HAVE YOU USED IN THE PAST? WHAT KIND OF RIG ARE YOU NOW USING? IF YOU'VE BUILT A QRPP RIG, EITHER TUBE OR TRANSISTOR, CAN YOU SEND US A SCHEMATIC AND PERHAPS A CONSTRUCTION ARTICLE ABOUT IT? WHAT ADVICE WOULD YOU GIVE TO A NEW QRPP'R ABOUT BUILDING A TRANSISTOR TRANSMITTER? ABOUT TUNING IT? HAVE YOU USED METHODS OTHER THAN A QRPP TRANSMITTER FOR OPERATING QRPP, SUCH AS COUPLING A REGULAR VFO TO AN ANTENNA, AND HOW HAVE YOU DONE IT? USED ATTENUATORS TO LIMIT POWER TO QRPP? DO YOU HAVE A DESIGN FOR A QRPP WATTMETER? WHAT PRECAUTIONS HAVE YOU OBSERVED IN GETTING THE MOST EFFICIENCY OUT OF YOUR TRANSMITTER AND ANTENNA SYSTEM?

WHAT TYPES OF ANTENNAS AND WHAT RESULTS WITH THEM HAVE YOU HAD IN QRPP WORK? WHAT WOULD YOU SUGGEST AS A GOOD ANTENNA SYSTEM AND HOW DO YOU EXPLAIN ITS SUCCESSFUL OPERATION? HAVE YOU MADE ANY OBSERVATIONS ON HOW A PARTICULAR ANTENNA SYSTEM WORKS UNDER VARYING CONDITIONS OF SKIP DISTANCE, TIME OF DAY, QSB ETC FROM YOUR ANTENNAS?

WHAT HAVE YOU FOUND TO BE THE BEST TIME OF DAY AND YEAR FOR QRPP OPERATION ON A GIVEN BAND? WHY? IF YOU USED QRPP DURING THE LOW PART OF THE SUNSPOT CYCLE, AND HOW DOES OPERATION DURING SUCH PERIODS COMPARE WITH OTHER POINTS OF THE CYCLE? HOW DOES THE SUNSPOT CYCLE OR SEASON AFFECT QRPP OPERATION ON A GIVEN BAND? HOW CAN A QRPP OPERATOR TAKE ADVANTAGE OF ANTENNA TYPE, SKIP DISTANCES, BAND CONDITIONS, AND PARTICULAR PROPAGATION PHENOMENON?

WHAT HAVE YOUR EXPERIENCES WITH QRPP REVEALED ABOUT THE POSSIBILITY OF DEPENDABLE QRPP OPERATION? HOW DOES QRPP PERFORM DURING A LONG PERIOD OF OPERATION SUCH AS A CONTEST LIKE FD OR SS OR CD? WOULD YOU JOIN IN WITH OTHER QRPP'RS DURING SUCH A CONTEST IN ATTEMPTING TO GATHER A HEAP OF DATA FROM WHICH WE CAN DRAW SOME CONCLUSIONS? HAVE YOU TRIED ANY WAY-OUT TYPE OF QRPP OPERATION, SUCH AS FROM A BALLOON OR A MINESHAFT, AND WHAT HAPPENED? HAVE YOU USED QRPP ON VACATION TRIPS OR OTHER PORTABLE TYPES OF OPERATION, AND WHAT POINTERS CAN YOU GIVE ABOUT ENGAGING IN QRPP OPERATION OF THIS TYPE?

GO AHEAD AND TELL US ABOUT IT ALL!!! WE'LL EDIT YOUR REMARKS IF YOU WISH. IT IS IMPORTANT THAT YOU SHARE YOUR QRPP KNOWLEDGE WITH EVERYBODY!!!

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COMING IN FUTURE ISSUES: 1W VFO 7 MC RIG FROM WA8MCQ; ANOTHER POWER SUPPLY, AND A COUPLE OF TRANSISTOR RIGS FROM W8CM; A 7MC 7W RIG FROM W2UUV; ANOTHER 7MC 7W RIG FROM W9IIL; A 6CL6 VFO RIG FOR 160-40METERS FROM K8EEG/Ø; A 2W TRANSISTOR RIG FOR 40/20/15 METERS VFO FROM K8EEG; ARTICLES ON PROPAGATION FROM K6EIL/2, ABOUT HOW TO KNOW WHAT TO EXPECT FROM YOUR ANTENNA SYSTEM IN TERMS OF DISTANCE AND TIME OF DAY; OPERATINGS HINTS; MORE LOG REPORTS FROM 80/40/20/15 METERS; IN SHORT, SOME REAL INTERESTING STUFF. WE NEED A LOT MORE MATERIAL THOUGH TO KEEP UP THE QUALITY. GET BUSY AND WRITE IT UP!

CHECK INTO THE QRP NET ON 7080 kc SAT. 0100; 3553k SAT. 0430.

RETURN POSTAGE GUARANTEED

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