MARCH 1978 CROSSTALK VOLUME 20 NO. 3

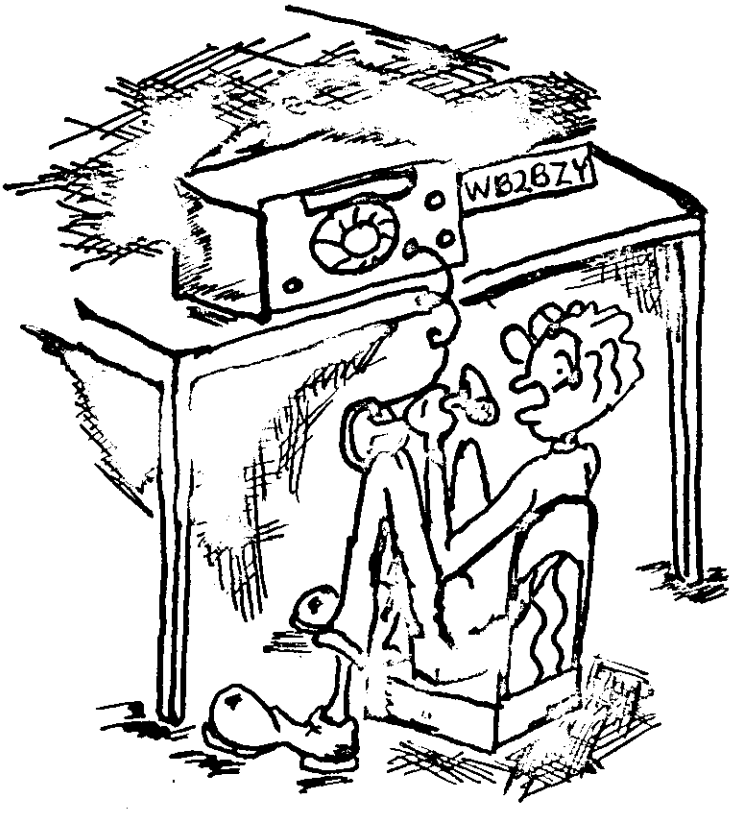
CROSSTALK IS PUBLISHED MONTHLY BY THE GLOUCESTER COUNTY AMATEUR RADIO CLUB.,ARRL AFFILIATED.

CLUB NETS

2	METER FM	78/18	SUNDAY	8:00 PM
6	METER AM	50.9	SUNDAY	9:00 PM
10	METER SSB RAG CHEW	28.8	FRIDAY	9:30 PM
15	METER SLOW CW NET.	21.175	FRIDAY	7:30 PM

Amateur Radio News Service

PRESIDENTS CORNOR:



YES OM, IM PRES. OF OUR CLUB

To each member of the GCARC:

Your presentation to me of a life membership, gold membership card and framed certificate together with the personalized gifts from the former Presidents, was one of the nicest things I ever had happen to me. I'm very pleased and flattered to know that my work in the Club was so appreciated. I've always enjoyed it very much, along with associating with such a swell bunch of hams. Many, many thanks,

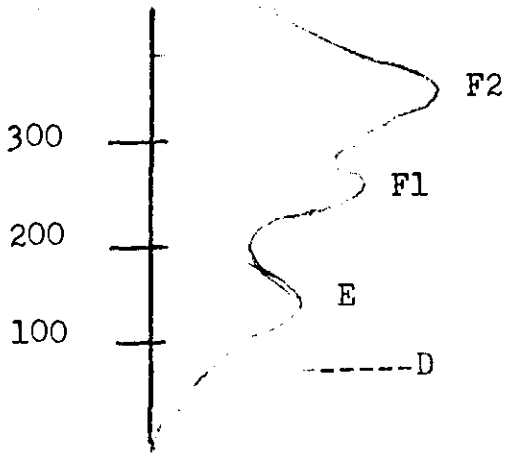
73's & 88 Della, W2AFZ

THE IONOSPHERE (section 2) RADIO WAVE PROPAGATION, ART OR SCIENCE, BY K2JF

The ionization of the upper atmosphere apparently is caused by ultra-violent radiation from the sun. Thus the degree of ionization over any portion of the earth's surface at any instant is determined by all the factors which affect the sun's radiation reaching that position at that time. Some of these factors are: time of day; season of the year; relative time along the sunspot cycle, and hour-by-hour variations in any unusual solar activity. From the data obtained over a number of years, it is now possible to predict from current measurements the probable degree of ionization and their effect on radio transmission a considerable time (several months) in advance--- (I have attempted to project the entire year of 1978 by computer simulation which will be shown to those who are interested.) with the exception of those effects caused by unusal and sporadic solar activities. While the ionized regions of the upper atmosphere which affect radio transmission, have the effect of reflecting layers, this term may be some what confusing. Actually there is some ionization of all the earth's atmosphere, the degree of ionization in general increasing with altitude within limits.

Forever in motion, during the hours of night when the area is shielded from the furnace of the sun by the body of the earth, the layers coagulate into a single blanket known as the F-layer, hovering 150-250 miles above the surface of the earth. Protected from the outburst of ultra-violet radiation from the sun, the F-layer is weakly ionized. The higher frequency radio signals easily penetrate the F-layer and are lost in space, never to return to earth. Lower frequency radio signals, however, are reflected from the F-layer during the night hours, Thus, as one tunes his receiver across the radio -spectrum during the dark hours, a noticeable thinning out of the stations will be apparent as the higher frequencies are passing through the night time F-layer, perhaps to be heard on the moon, or Mars, but escaping reflection to the ears of listeners on the earth. Moon bounce boys have to take into consideration this condition to enjoy their speciality. -The effect is somewhat as shown in the figue 1. Three layers are shown, designated E, F1 and F2. These are the layers that have the greatest effect on radio transmissions and are shown at typical noon heights in summer. It will be seen that the increased degree of ionization at certain heights with lesser degrees of ionization between produces the effect of layers of abnormal ionization at several heights above ground.

Investigations of the ionosphere are made by transmitting short pulses of vertically and receiving the reflected pulses at a receiver located either at or near the transmitter; also, we now have special stations located at exact known lat., and long., That also receive certain frequencies and they report the condition of the received wave. The receiver normally picks up at least two pulses, one along the ground directly from the transmitter, the other or others reflected from the ionsphere. The received pulses are recorded by means of an oscilloscope equipped with a continuous photographic recorder. By carefully measuring the time along the photographic record between the direct pulse and the reflective and the refractive characteristics of the layer vary. Further, these characteristics are different for the different frequencies. As the radio frequency of the signal is increased, for any given degree of ionization, the greater is the tendency for the signal to penetrate the layor rather than to be reflected by it. From this has been developed a term CRITICAL FREQUENCY. The critical frequency is defined as " the lowest radio frequency of a wave which penetrates a layer at normal incidence."



Degree of Ionization

Figure 1

During the daylight hours when the ionosphere is exposed to the full force of the ultra-violet radiations from the sun, the onionlike strata form again, each layer having its own particular density of ionization,. The lowest of these daytime layers is the D-layer, a mere 30-50 miles above the earth. This is a region of relatively dense atmosphere. The ionization of this layer is directly affected by the quantity of sunlight that falls upon it. The ionization is greatest around noon time and quickly drops to nothing when the sun hides itself behind the earth. The D-layer contributes little or nothing to long distance communication; on the contrary, it is a region of absorption of signals of the lower frequencies and is the principal reason that daylight communication on 160 meters and 80 meter amateur bands is confined to relatively short distances.

Pulsing above the D-layer at a height of 50-80 miles is a second definable region of ionized atmosphere called the E-layer. The intensity of ionization of this second layer follows the sunlight as does the ionization of the D-layer. This E-layer also absorbs a certain portion of the low frequency radiations, but on a smaller basis than the D-layer. Waves of 7 Mhz., to 10 Mhz., are reflected back to earth by this second layer of the onion.

Approximately 150-200 miles above the sunlit side of the earth is the region of the F2 layer, the most useful of the many ionized layers. Located in a plane of low atmospheric pressure the re-ionization process of this layer is slow, and not nearly so dependent upon the location of the sun as are the actions of the lower layers, which are buried in a thicker sea of air. Ionization gradually decreases in the F2-layer region as the sun sets, reaching a minimum just before the next sunrise. Unlike the D-layer and the E-layer, the F2-layer remains partially ionized during the evening hours, permitting long distance communication during these times on medium frequencies. The 40 meter DX-man who combs the band during the small hours of the morning pays homage to the F2-layer.

During daylight hours, the F2-layer may split asunder, forming a subordinate layer designed the F1-layer. This skin of the onion adds little to the efficiency of the sky mirror, but serves as an additional absorber of energy that is reflected from the F2-layer. Another term that should be understood is the "virtual height" of an ionized layer. This term is defined as follows: " The height at which reflection from a definite boundary surface would cause the same time of travel as the actual reflection, for a wave transmitted from the ground to the ionosphere and reflected back." Virtual height depends on the wave components and the frequency; the value usually stated is for the ordinary wave and for the lowest frequency at which reflection occours.

In certain frequency ranges under certain conditions simultaneous reflections may occur from more than one layer. This is owing to the fact that while some of the energy is reflected from a lower layer, some energy penetrates and is reflected from an upper layer.

Measurments taken over a number of years have established several pertinent facts. In the latitude of Camden NJ there are at all times two major ionosphere layers, the E layer from 100 to 120 kilometers above the earth's surface and the F2 Layer with approximate virtual heights from 230 to 350 kilometers. A third layer, present in daytime

and especially in summer as mentioned before, is termed the F1 layer and exists in heights from 180 to 240 kilometers. The F2 layer as mentioned before is a daytime continuation of the F layer and varies symmetrically round noon. The F1 layer disappears during the night.

The highest frequency at which a vertically projected signal would return to earth is termen the critical frequency. It man be considered to be the MAXIMUM USABLE FREQUENCY (MUF) for a zero length path between two adjacent earth points.

Next month of this stirring exciting episle will cover CRITICAL FREQ.
K2JF

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OFFICIAL BULLETIN NR 692 FROM ARRL HEADQUARTERS NEWINGTON CT FEB. 10, 1978 TO ALL RADIO AMATEURS BT: On Wed. Feb. 8, FCC took action in Docket 21135 to abolish the licensing of secondary and special events stations. No action concerning the disposition of club, military recreation, and RACES stations was taken at this time, However, the Commission adopted a Notice of Proposed Rulemaking concerning the revision of eligibility criteria and processing procedures for these types of licenses. Also, an immediate freeze was imposed on the acceptance of applications for new club, military recreation, and RACES station licenses. Modifications and renewals will still be accepted. Present secondary station licenses will be valid until the end of their terms, and procedures will be set up to allow licenseesto switch their pirmary and secondary call signs should they prefer to keep their secondary call. The effective date of the action is not yet know, but will be no sooner than March 13. AR
OFFICIAL BULLETIN NR 693 FROM ARRL HEADQUARTERS NEWINGTON CT. FEB. 16, 1978 TO ALL RADIO AMATEURS BT: The FCC announced Feb. 13, 1978, that it is permitting licensed amateur radio operators to operate their primary stations as repeater, auxiliary link, control and remotely controlled stations without prior FCC approval. Primary stations operating in the repeater mode must identify by following their call sign with RPT/repeater, primary stations operating in the auxiliary link mode must identify by following their call sign with AUX/auxiliary, depending on the mode used. There are no special identification requirements required for primary stations operating in the control or remotely controlled modes. This waiver is effective immediately and will terminate when the FCC releases a further order in 21033 pertaining to this matter. The upcoming edition of the Repeater Directory will include active repeaters operating under this new authorization, as well as those operating under WR call signs, provided that information has been registered with ARRL headquarters by March 1. AR

Rose Ellen N2RE received a trophy from the YLRL for bringing in the most new members (38) last year. She also received a certificate for Assistant Vice Director of Atlantic Division of the ARRL.

CLASSIFIED- For sale- 2-meter transceivers new & used; Call Curt WA2JSG,

For sale- T.V. Repair NRI equipment:
5" Wide Band Scope, asking $120
Color Pattern Generator, asking $75
Tube Tester, asking $75
Alignment Kit & Degaus. Coil, asking $13
Call Bob Ridgway,

Congrats also to Harry Dannals elected as Pres of the ARRL. We are happy to report resolutions adopted by the ARRL Board of Directors at their Jan. 19-20, 1978 meetings expressed gratitude to Bob White, W1CW and Ellen White, W1YL for outstanding service on the occasion of completing 25 years of service at headquarters.

Also, They warmly thanked Leitha Phillips Tilton, now retired,for her faithful service during the 30 yrs. with the League.

A speedy recovery to our friend Lew McCoy, W1ICP who suffered a mild heart attack Jan.19, 1978. Send cards to Hartford Hospital, Hartford, Conn. 06106.

CONTEST CORNER

March 4-5 ARRL DX Contest - Phone
March 18-19 ARRL DX Contest - CW

ARRL DX CONTEST.

There is still plenty of time to work some choice DX during the March half of the contest. Some good ones have already been worked by club members during the first half, such as YBØ, JT9, HKØ, LX1, UG6, UL7, EP2, ZK5, andYM(TA).

Just before the first weekend of the DX Contest, at one particular bull session, some of the participants engaged in a heated debate as to who could do what to whom during the upcoming DX contest. The debate turned into a challenge, with the club being divided into two teams to settle the issue. The Red team, consisting of W2KI and N2CQ, have challenged the captain of the Green team, WB2OSQ, to put together a team out of the rest of the club to compete against them for the bragging rights, and certain other consideration, in the four weekend event. KI and CQ seem to feel that their combined score will be higher than all others combined. At the half way point they seem to be correct, but by a rather uncomfortably slim margin. If you would like to help make them even mor uncomfortable, and help the club score at the same time, see Mark Wilson, WB2OSQ to enlist.

NOVICE ROUNDUP

Mailing deadline for logs is March 13. Let N2CQ know your score for crosstalk publication. We will mail your logs for you if you bring them to the march meeting.

VHF SWEEPSTAKES

All I can say is WOW!! You all really did a job for the club. the total of 58,427 and 21 members submitting logs, are both new club records. We are almost certain to be in the top ten nationally. It would have been good for 6th in 1976, and 7th in 1977. Congratulations on a fine performance! Thanks to all who helped.

Claimed Scores VHF Sweepstakes

	Score	QSOs	Sect.	Hours
N2CQ	7344	204	8	12
WB2OSQ	7098	169	11	9
WA2OMY	6804	162	11	14
WA2MMA	6528	192	7	-
W2KI	5334	127	11	6
WA2PTC	5068	181	4	-
[illegible]	[illegible]	170	3	11
[illegible]	[illegible]	111	3	-
WA2VEE	2088	101	3	8
WB2FJE	2080	80	3	-
WB2RRJ	1898	73	3	12
WA2FZB	1638	63	3	8
WB2OCR	960	40	2	3
[illegible]	[illegible]	[illegible]	[illegible]	-
[illegible]OL	676	26	3	-
WA2ZMS	532	87	3	-
WB2WJZ	430	70	3	-
K2NH	418	19	1	-
W2SUA	352	16	1	1
K2HPV	308	14	1	5
WA2VKG	221	10	1	-

CB/10 sets are now obtainalbe for a price of_$35.00. The sets are Converted RCA, 23 channel, AM sets. The sets are already converted to the Ten meter band. They are using the 1.795 MHz "bump" plan that was in February's Crosstalk. Oh yes Channel 23 should read 29.050, my mistake. A deal for the Club to make a few dollars: The end customer will pay $35.00 for a converted set. You buy them from the club for $35.00, the Club buys them for $32.50. The Club makes $2.50 on each sale. If interested contact K2JF who will give you the name of the person who is selling the sets.

NEW PRODUCTS OF INTEREST TO HAMS

SOLID STATE MOBILE KW AMP: Magnus Electronics Corp. is selling a 12 VDC operated amplifier covering 80-10 meters. Unit MA 1000 may be driven from any 100 watt output transmitter. Current drain is of course very high, in fact on voice peaks, it can run up to 70 amps, with the average being 40 amps. Size of unit is 10" wide by 17" deep and 4 1/2" high. Price $795.00. 5715 N. Lincoln Ave., Chicago, Ill. 60659

FM T/R 144-220-440 MHZ: Drake has just introduced their UV 3-3 band transceiver, which covers the three FM ham bands 2 M. 1 1/4 M and 3/4 M. Operation is FM only and the unit is fully synthesized in 5 Khz steps, with a four digit readout. Power output is 25 watts on 144, 10 watts on the two higher bands. A low power position is also available on each band. The UV 3 can be purchased for one band, or 2 bands or all three bands. If the single or two band version is purchased first, the second or third modules can be added later just by plugging them into the main frame. In addition to the synthesizer, four fixed channels may be selected from the front panel. When these channels are in use, a scanner function may be activated, which checks the frequency dialed into the synthesizer. Price UV 3-3 Band $995. 2 Band $795. 1 Band $595. Modules as added $250. Power Supply $89.95. (R.L. Drake Co.) 540 Richard St. Miamisburg, Ohio 45342

VHF RECEIVER MODULE KITS: Valley Instruments Products is now producing kits for 10,6,2 and 220 Mhz. bands. Sensitivity is rated at .25 mv and the 6 pole crystal filter results in 75 db adjacent channel rejection. Unit is built onto a PC board only 4" by 2.35". Operation is from a 12 V battery with a drain on squelch of 15 Ma. Case, spkr, and control kit are available as options. Price $49.95. P.O. Box 339, Bartlett, Ill. 60103.

TWO METER ANTENNA MATCHER: B&W is selling their new AT 200 antenna matching unit, which allows the use of the regular car AM/FM antenna. This avoids having the second antenna to attract rip-off problems, Unit can be adjusted to 1.2/1 SWR or less. Tunes and switches from the front panel of the compact case. B&W, Canal St., Bristol, Pa. 19007.

PRE-SELECTOR FILTERS (UHF): Spectrum International now has available two very interesting interdigital filters for these UHF bands, PSF 432 covers 420-450 Mhz and PSF 1296 covers 1250-1340 Mhz. Both units use 3 pole circuits and BNC fittings, and are mounted in a well shielded box with flanges for attaching to chassis. Price $36.70 + $3.50 shipping. P.O. Box 1084, Concord, Mass. 01742.

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SILENT KEY

Lester J. Wolf W2GI Westmont, N.J. Retired R.C.A. about 12 yrs.
Local Affilation with: South Jersey Radio Association. Lester was an active Director, and also had a Novice Class going on when he passed away. He died while returning home from vacation in Las Vegas, in flight, of a heart attack.

FROM THE "HILLTOPPER" (TOMKINS COUNTY ARC)

HOW TO REWIRE POWER TRANSFORMERS

BY K2OOD

Did you ever want a special transformer and could not find "just the thing"? Consider winding your own. Discussed here will be a typical problem. You want to build an adjustable supply for a 12 volt transceiver. A 12.6 volt filament rransformer, well filtered, will give under load about 12-13 volts, but when the load is removed, it will soar up to perhaps 18 volts! Not GOOD! One could put a Zener across the putput, but it would have to absorb a lot of watts under light load conditions, not good enough yet.

The design goal here is to produce about 18 volts at the required current, well filtered to the point that, under full load, the voltage never drops below 18 volts as observed on an oscilloscope. You now have to make a choice of filter input circuits: choke or capacitor. The capacitor input circuit will produce higher no load voltage, but poor regulation. The choke input circuit has the advantage of needing smaller filter caps and reduced input surge through the rectifier diodes. I recommend the choke input arrangement, but you ask, where will I get a suitable choke that has very low resistance? That will be the subject of the next article.

Now you know you have to have a transformer that will produce about 18 volts filtered D.C. Determine the current you will need, figure out the wattage, and then pick any transformer out of your (or someone else's) junk box, that has the right wattage, being sure the 110 VAC winding is next to the core.

Our procedure is to disassemble all the iron and remove the bobbin containing the windings. This makes re-winding simple but there is this drawback. When the laminations were stacked at the factory, the iron was covered with a thin varnish which insulated the plates, one from the other. Somehow, you have to replace this insulation. If you do not, eddy currents will flow in the iron and it will get hot and draw lots of 110 VAC current even without a secondary! The solution to this problem is to carefully clean all the laminations and then spray with a thin layer of clear acrylic. (One side is enough.) Another method involves pulling a bobbin with the required length of wire in and out of the transformer core openings. It requires lots of patience and time, but produces a more satisfactory result.

In either case, carefully separate the leads going to the 110 VAC winding and get them taped out of harm's way. If you break them off, all is lost. Remove the outer insulating layers and identify a low voltage winding whose voltage is determined. When you un-wind this winding count the turns, then the number of turns per volt can be determined. Assuming a conventional power transformer, the 5 volt winding is usually on top. (Count the turns) then remove the 6.3 VAC winding, again count the turns for a double check. Remove any other winding with a hack-saw, razor blade, or with your teeth, if necessary. Discard all the junk and you should have the original 110 VAC winding left. You will probably discover that most transformers have about three turns per volt.

To rewind, choose a wire size that will handle the current your design calls for, from the table in the back of the ARRL Handbook. Measure the length of one turn around the largest diameter of the original winding,multiply this by the number of turns determined by the above, and cut off the correct length. Use enamel covered wire. The inside, or bottom turns, will take less wire per turn, but that leaves a comfortable margin for error. Determine which side of the transformer you want the leads to come out on (preferably on the opposite side from the 110 VAC winding) and carefully anchor the wire to the bobbin. Wind even layers, do not scramble wind, this is apt to produce shorts. When the first layer is complete, wrap tape over it. Glass re-inforced tape is best for this, as the adhesive cures under heat. Vinyl tape melts and creeps and is not satisfactory. Black friction tape is also good. When the required number of turns has been laid on, stop and test. This test should be under maximum anticipated load. Add on a few turns, or, take off a few to get the desired voltage. This is critical. If the voltage is too high, the pass transistor(s) will have to dissipate the extra watts. Cut off the extra wire and solder on flexible leads.

Tape the whole mess together and reassemble. If you picked a transformer that was fully shielded, you can invert and fill the whole pot with epoxy. This prevents hum and makes sure the wires do not thrash about on the core. Currents in the wires tend to make them vibrate and wear off the enamel. The epoxy potting also helps carry off the heat, but makes repair impossible.

MARCH PROPAGATION FORECAST: 160 Meters This band is going to start suffering. As March marches on the static levels will be going up; because of the increase in static levels and the general deteriotation of this and 160 will not be included after this month unitl October-Look for some possible openings shortly before local sunrise and sunset, possible 1300 miles. 80 METERS: The static levels are on the rise, but from March 1st thru Easter (19) fairly good results on the North-South leg into the Caribbean and So. Amer. 2000 - 0300,No. Africa 1900 - 0200. 40 METERS: Here is your night time band for all night operation for a while. The noise level will increase but there is still a lot of good stuff on this band Western-So. Europe 2200 -0000- NorthAfrica 2300-0100-So. Pacific New Zealand 0200-0500- Caribbean, So. Amer. 2000-0500. 20 METERS: Look for stuff from allover the planet. Start an hour after Sunrise to around 1100 then look for Europe, then around 1400-1800 Africa and Mid Atlantic-As eveningcomes on start hearing So. Amer. and Caribbean. AroundSunset 1900-2030 Asia, Oceania will be coming in. After 2100 the band will quite down for awhile then as the sunrises stations will start coming in again.Generally good all over. 15 METERS: Well this band is starting to look like 20 more & more. World wide DX during the whole daylight hours: Like 20 it will open first toward Europe but about an hour later than 20; then as time marches on so will signals from East to West. Around noonto 1600 start hearing very loud So. America and Caribbean signals. About 1600 to 1900 Oceania will come in, but not as str ong as So Amer. Antarcitica should show up fairly well aswill the tip of So America. 10METERS: Look for some real good skip during the mid-afternoon. So. Africa and So. Amer. will be hot between 1300 and 1640. Good openings betweenthe Phila-Pitt-Wash. triangle for Oceania and Asia between 1400-1600. Signals will drop quickly after 1700. This band has not arrived but it is getting there. Intra-continent contacts will be very good. The CB/10 bunch on 28.80 will be wide open-Just remember the time difference (1300 here is 1000 there). 6METERS : Hey Ray, Tony-Things are looking up. T.E. is coming back to us. Not fully here yet, but listen good between 2000-2300. Look at a perpendicular line across the equator from Phila. like the 75W Long. line. C6A landis a good bet, and look for KG400 (Gitmo Bay) toward the end of the month. Auroral scatter will de velope this month for some short skip. Best days to look for it will be 23, 29, 30, & 31. Some sporadic E-propagation will staart this month, could get you 1000 miles North South leg. 2METERS: When mobil use the repeaters; whenstationary use simplex-This band is not going anywhere this month. Sit-back and take it easy. Rest up for the week-ends of the March 4-5 (phone) 18-19 (CW DX) competition. The club needs the scores.

We are entering our spring time propagation time. The temperates zones are now sharing equal conditions. As we go into summer they go into winter. The solar flux high and climbing and as such the 20, 15, & 10 meter bands will become more active. Static will begin to build up on 160, 80, & 40; but, 40 will be useable as the night time band. the Phone week-end does not look too promising generally a LOW NORMAL but the CW week looks like a "goodie". High NORMAL, starting the 17th with a peak on the 18th, a very high above normal, to a High normal on the 19th. --CQ, KI, OSQ, SUA, & VCZ you guys should just about go out of your minds the week-end of the 17 thru the 19th. You won't have enough hands.

GOOD LUCK

K2JF