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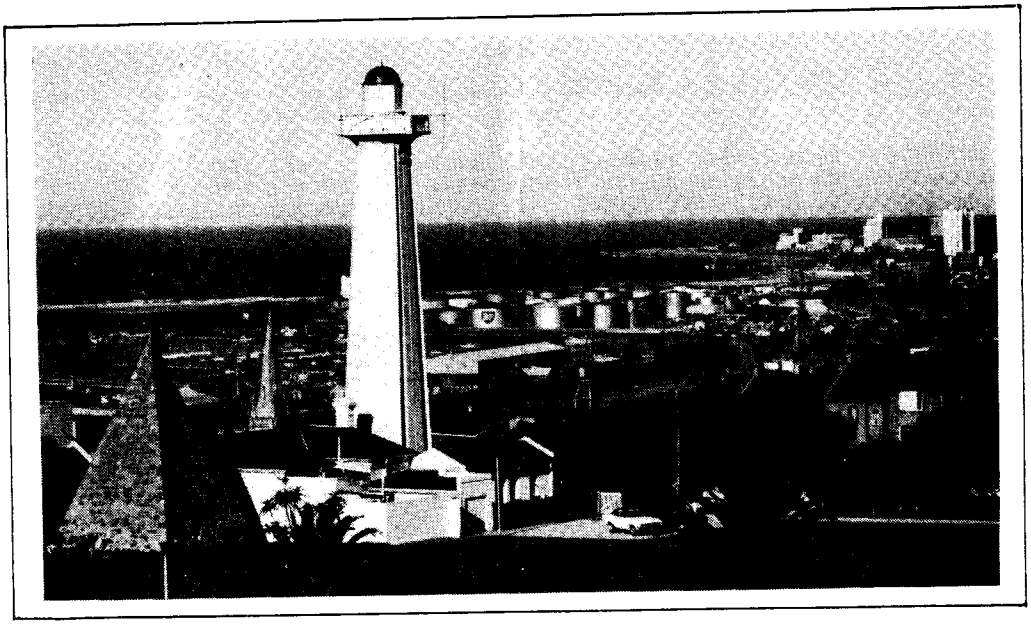


THIS NEWSLETTER IS PUBLISHED BY THE PORT ELIZABETH BRANCH OF THE SOUTH AFRICAN RADIO LEAGUE.

P.O. BOX 462,
PORT ELIZABETH
6000

P.O. BOX 10402
LINTON GRANGE
6015

August '86

PORT ELIZABETH BRANCH

NOTICE OF MONTHLY MEETING

MEMBERS ARE REMINDED THAT THE MONTHLY GENERAL MEETING OF THE PORT ELIZABETH BRANCH OF THE SOUTH AFRICAN RADIO LEAGUE WILL BE HELD AT ST. MARTIN'S CHURCH, GREAT WEST WAY, KABEGA PARK ON FRIDAY 15TH AUGUST 1986.

AFTER THE BUSINESS OF THE MEETING, THERE WILL BE A SLIDE SHOW AND COMMENTARY ON TRISTAN DA CUNHA.

NOTICE OF ANNUAL GENERAL MEETING

MEMBERS ARE HEREBY GIVEN ADVANCE NOTICE THAT THE ANNUAL GENERAL MEETING OF THE PORT ELIZABETH BRANCH WILL TAKE PLACE ON SATURDAY 20TH SEPTEMBER 1986 AT 3.00P.M. THE MEETING WILL BE FOLLOWED BY A SPIT BRAAI AND SOCIAL GET-TOGETHER FOR WIVES AND ALL MEMBERS OF THE FAMILY.THE VENUE AND FULL DETAILS WILL BE GIVEN IN NEXT MONTH'S QSX-PE.

COMMITTEE

CHAIRMAN:	*BRIAN ZS2AB 303498*	*VICE CHAIRMAN:*	*LIONEL ZS2DD 321770*
SECRETARY:	*MARGE ZS2OB 303498*	*TREASURER:*	*DICK ZS2RS 322111*
AWARDS:	*BILL ZS2-157 512580*		*TREVOR ZS2AE 321746*
QSX-PE:	*ZS2OB AND ZS2AB*	*LIBRARIAN:*	*COLIN ZS2AO*

BULLETIN ROSTER

17TH AUGUST	*BILL ZS2-157*	*FROM THE MIDDLE UP*
24TH AUGUST	*BRIAN ZS2AB*	*FROM THE TOP DOWN*
31ST AUGUST	*LIONEL ZS2DD*	*FROM THE BOTTOM UP*
7TH SEPTEMBER	*MARGE ZS2OB*	*FROM THE MIDDLE DOWN*
14TH SEPTEMBER	*DICK ZS2RS*	*FROM THE MIDDLE UP*

SUNDAY BULLETINS 08H40

HF	40M	-7098KHZ (LOWER SIDEBAND)
	80M	-3640KHZ (LOWER SIDEBAND)
VHF	145,700 AND 145,75MHZ (FM)	

BRANCH FREQUENCIES:

P.E. REPEATER	145,05/65
GRAHAMSTOWN	145,15/75
LADY'S SLIPPER	145,10/70
COCKSCOMB	145,00/60
RTTY MAILBOX	145,35

SUBSCRIPTIONS

ARE NOW OVERDUE. PLEASE LET US HAVE YOUR SUBS, TOGETHER WITH THE COMPUTER FORM WHICH WAS SENT TO YOU WITH YOUR COPY OF MAY RADIO ZS, AS SOON AS POSSIBLE. WE REALLY APPRECIATE YOUR VALUED MEMBERSHIP AND WOULD HATE TO LOSE YOU. IF YOU DO NOT INTEND RENEWING YOUR SUBS, PLEASE DROP US A LINE SO THAT WE CAN KEEP OUR RECORDS UP TO DATE AND ALSO INFORM HEADQUARTERS. YOU ARE TAKEN OFF THE MAILING LIST AT HEADQUARTERS AT THE END OF SEPTEMBER, SO PLEASE HURRY, HURRY, HURRY!!!!MANY THANKS IN ADVANCE.

MINUTES OF THE GENERAL MEETING OF THE PORT ELIZABETH BRANCH OF THE SOUTH AFRICAN RADIO LEAGUE HELD AT ST. MARTINS CHURCH, KABEGA PARK, PORT ELIZABETH ON FRIDAY 18TH JULY, 1986.

PRESENT: 33 MEMBERS AND VISITORS.

THE CHAIRMAN WELCOMED ALL TO THE MEETING, ESPECIALLY NOEL STAPLES, RON HARVEY, TOFF SCARR, VICKY ANSELL, BOB RUST AND TWO VISITORS GAVIN AND MARK.

APOLOGIES: ZS2DT, ZS2LW, ZS2PR, ZS2HB AND ZR2BL.

MINUTES

THE MINUTES OF THE MEETING HELD 20TH JUNE 1986, HAVING BEEN PUBLISHED AND CIRCULATED IN QSX-PE WERE TAKEN AS READ; PROPOSED BY LYNN ZS2MM AND SECONDED BY TREVOR ZS2AE.

ARISING

COMMENT WAS MADE THAT THE HOBBIES FAIR HAD BEEN GOOD FUN, BUT FURTHER DISCUSSION WOULD TAKE PLACE UNDER GENERAL.

CORRESPONDENCE

(1)LETTER FROM RAPHY ZS2SP THANKING THE BRANCH FOR THE FACILITIES PROVIDED AND ENCLOSING A DONATION TOWARDS THE UPKEEP OF REPEATERS AND MAILBOX.
(2)SEVERAL BRANCH NEWSLETTERS.

FINANCE

IT WAS REPORTED THAT MORE THAT 70 SUBSCRIPTIONS HAD BEEN RECEIVED. AN MOUNT OF R1452 HAD BEEN SENT TO HEADQUARTERS.

GENERAL

(1)GUS WINTER ZS2MC WAS APPOINTED TO AUDIT THE BOOKS FOR THE FORTHCOMING A.G.M.
(2)MEMBERS WERE ASKED TO ONLY USE THE FRONT DOOR FOR MEETINGS, SO THAT THE BACK DOOR COULD BE KEPT LOCKED FOR SECURITY REASONS.
(3)THANKS WERE EXTENDED TO THE TEAM WHO HAD CLIMBED THE COCKSCOMB TO RE-INSTATE THE REPEATER. UNFORTUNATELY SOMETHING SEEMED TO HAVE GONE WRONG AND WOULD NEED ATTENTION AGAIN. DICK ZS2RS WAS CONGRATULATED FOR HAVING DONE THE CLIMB/
(4)SYMPATHIES WERE EXTENDED TO BILL HODGES WHO HAD FALLEN AND CRACKED A RIB.
(5)THANKS WERE EXTENDED TO ANDRE ZS2BK FOR HIS DONATION OF SPARE PARTS WHICH WOULD BE SOLD FOR BRANCH FUNDS.
(6)MEMBERS WERE REMINDED THAT THE LIBRARY WAS STILL ALIVE AND ACTIVE AND TIME WOULD BE DEVOTED AT THE MEETINGS FOR THOSE WHO WANTED TO MAKE USE OF THE FACILITY.
(7)THE HOBBIES FAIR WAS DISCUSSED. THANKS WERE EXTENDED TO ALL THOSE WHO HAD HELPED IN ANY WAY, BY SETTING UP THE STAND, THE LOAN OF EQUIPMENT, MANNING THE STAND AND TO CLIVE ZS2RT FOR THE VERY EXCELLENT SET OF SLIDES WHICH WE WOULD MAKE USE OF IN THE FUTURE. HF OPERATIONS WERE NOT VERY SATISFACTORY IN VIEW OF THE POOR CONDITION OF THE BANDS, THE HIGH ELECTRICAL NOISE IN THE HALL AND THE FACT THAT THE BELTEL STAND WAS VERY CLOSE TO OURS. IT HAD ORIGINALLY BEEN INTENDED THAT RADIO ALGOA HAVE THE STAND RIGHT NEXT TO OURS, BUT THIS HAD BEEN AVOIDED BY TIMELY INTERVENTION. ATTENDANCE AT THE FAIR HAD BEEN GOOD,IN FACT BETTER THAN AT THE FEATHER MARKET HALL, IN SPITE OF THE FACT THAT THE WEATHER WAS NOT VERY GOOD. ESPECIALLY ON THE FRIDAY, WHICH IS USUALLY THE BEST DAY. BRIAN

MENTIONED THAT IT WAS HOPED THAT THE BRANCH WOULD BE ABLE TO BUY A COMPLETE SET OF EQUIPMENT WHICH COULD BE USED FOR FUTURE HOBBIES FAIRS, FIELD DAYS, JOTA AND SIMILAR FUNCTIONS, SO THAT MEMBERS WOULD NOT HAVE TO DISMANTLE THEIR STATIONS. IT WAS HOPED TO ACHIEVE THIS THROUGH THE SALE OF THE COMPUTER PARTS AND OTHER EQUIPMENT WHICH THE BRANCH HAD BEEN DONATED AND WHICH WE HOPED TO ADVERTISE ON A NATIONAL SCALE. MEMBERS WOULD BE GIVEN PREFERENCE. ALL THE EQUIPMENT STILL HAD TO BE DISMANTLED AND BOXED INTO CATEGORIES. VIV ZS2VM SAID HE THOUGHT THE STAND WAS NOT THE VERY BEST PLACE AS IT DID NOT LEND ITSELF TO DISPLAY PURPOSES AND IF THE SAME VENUE WAS RETAINED, WE SHOULD PERHAPS HAVE A FLOOR STAND. BRIAN SAID THAT IN FUTURE, PRIOR TO ANY KNOWN EVENTS OF A SIMILAR NATURE, A WORKING GROUP WOULD BE FORMED TO PREPARE EVERYTHING IN ADVANCE. BEAVEN ZS2RL SAID THAT THE ONLY DRAWBACK WAS THAT THERE WERE NO EFFECTIVE HF COMMS. IT WAS ALSO FELT THAT IN FUTURE, OPERATORS SHOULD FAMILIARISE THEMSELVES WITH THE EQUIPMENT ON THE STAND.
(8)IT HAD BEEN DECIDED TO APPLY FOR A NEW POSTBOX FOR THE BRANCH. THE OLD BOX 462 WAS VERY INCONVENIENT IN THE CENTRE OF TOWN AS IT WAS SELDOM THAT ANY OF THE MEMBERS WENT THERE. A BOX AT EITHER NEWTON PARK OR LINTON GRANGE WOULD BE OBTAINED, BUT THE OLD BOX NUMBER WOULD CONTINUE FOR AT LEAST TWO YEARS IN ORDER THAT QSL BUREAUX AROUND THE WORLD COULD BE INFORMED. IT WOULD BE WIDELY PUBLICISED.

(9)MEMBERS WERE REMINDED OF THE BRANCH A.G.M. TO BE HELD IN SEPTEMBER. IT WAS THOUGHT THAT PERHAPS WE SHOULD HAVE AN ORDINARY BRAAI RATHER THAN A SPIT BRAAI, BUT THIS WAS REJECTED AFTER A SHOW OF HANDS. THE VENUE OF THE SCOUT HALL IN WALMER WAS PREFERRED. A CO-ORDINATOR WOULD BE APPOINTED TO ARRANGE EVERYTHING IN ADVANCE AND WIVES WOULD BE ASKED FOR SALADS AGAIN.
(10)ROBBIE ZS2RB ASKED WHETHER THE BRANCH WOULD BE PREPARED TO DO COMMS FOR A LONG-DISTANCE MODEL GLIDERS RALLY AND BRIAN SAID THIS WOULD BE IN ORDER AS LONG AS SUFFICIENT NOTICE WAS GIVEN.
(11)BRIAN ZS2AB SAID THAT POSSIBLY HE WOULD NOT BE AVAILABLE FOR RE-ELECTION AS CHAIRMAN AND MEMBERS WERE ASKED TO GIVE SOME THOUGHT TO THE NEW COMMITTEE.DICK ZS2RS SAID THAT IT WOULD BE GOOD TO HAVE NEW MEMBERS WITH NEW IDEAS.
(12)DICK ZS2RS WAS THANKED FOR THE EATS.

THERE BEING NO FURTHER BUSINESS, THE MEETING WAS CLOSED AND A VERY INTERESTING AND INFORMATIVE VIDEO ON THE CONSTRUCTION AND LAUNCH OF OSCAR 10 WAS SHOWN. THIS WAS PROVIDED BY COLIN ZS2AO.

SIGNED:
B.A.WELLER ZS2AB
CHAIRMAN

SIGNED:
M.T.WELLER ZS2OB
SECRETARY

NEW-LOOK QSX-PE

YOU WILL HAVE NOTICED THAT THIS ISSUE OF QSX-PE IS RATHER DIFFERENT FROM PREVIOUS ISSUES. APART FROM THE NEW-LOOK COVER WHICH WILL BE CHANGED ON A 3-MONTHLY BASIS,THE TYPED ARTICLES HAVE ALL BEEN PREPARED USING OUR NEW WORD-PROCESSOR RUN ON THE MAILBOX APPLE COMPUTER. WE HOPE TO MAKE EVEN BETTER USE OF THE FACILITIES OFFERED BY THIS PROGRAM AS TIME PASSES. ANY COMMENTS WILL BE APPRECIATED.

THE EDITOR.

BRANCH POSTBOX.

THE BRANCH NOW HAS A NEW POSTAL ADDRESS.THE NEW BOX AT LINTON GRANGE WILL BE USED IN PARALLEL WITH THE OLD BOX IN TOWN FOR ABOUT TWO YEARS TO GIVE ALL CONCERNED TIME TO CHANGE OVER. WE ASK LOCAL MEMBERS TO MAKE USE OF THE NEW BOX WITH IMMEDIATE EFFECT AND ALSO PASS THE NEW ADDRESS ON AT EVERY OPPORTUNITY TO DX CONTACTS.
THE NEW BOX NUMBER IS 10402 LINTON GRANGE 6015.

We like being <u>your</u> branch!

USING THE GRID-DIP METER

presents "How To" information on using the ubiquitous G.D.O. around the ham shack.

BY WILFRED M. SCHERER, W2AEF

With acknowledgements to CQ.

Part II
Applications

A shunt resistor used for broadbanding or swamping may have the same effect and require removal. Transistors, too, may heavily load a circuit and therefore might have to be removed, before the resonant dip will be indicated. Where this has been necessary, the subsequent resonant frequency will be altered, depending on the capacitive effect of the transistor.

Receiver Circuits: In the case of a receiver, the tuned circuits should be resonated to the desired frequency as indicated by the g.d.o. function. Gang-tuned circuits should be aligned for bandspreading and tracking by checking for resonance at each end of the range as well as at one or two places in between. Methods of electrically obtaining bandspread and tracking may be found in radio textbooks.

After this procedure, power may be applied to the receiver and the instrument employed as a signal generator for checking the final alignment. A very short antenna should be connected to the receiver input and the instrument should be placed on the bench away from nearby conductors and where body movements are least apt to affect the r.f. signal from it. If, during the procedure, the signal is too strong producing overload or spurious birdies, the antenna should be cut down or the instrument placed farther away or the receiver gain reduced.

The receiver S-meter or a v.t.v.m. at the detector will have to be used as the level indicator. The a.f. output may be used if the grid-dip meter is modulated. This can be done with the application of tone into the phone jack of the instrument.

Where a superheterodyne-type of receiver is involved, it may be necessary to first align the i.f. system, in which case the g.d.o. inductor should be positioned near the input lead for the i.f. system. This can also be done where one stage at a time must be checked, including mixer and r.f. stages.

If, after the i.f. strip is working, the set fails to function, the cause may be due to a defect in the heterodyning oscillator or v.f.o. This can be checked by using the instrument either as a diode or an oscillating detector to find out if the receiver oscillator is working and at what frequency. On the other hand, if a malfunction is suspected in this area, the instrument as a signal generator may be temporarily substituted for the receiver oscillator by coupling it near the input of the particular mixer.

Transmitter Circuits: Using the instrument as a g.d.o., the tank circuits may be adjusted to the desired frequency, similarly following the procedures used with receiver circuits. Any output load should be removed from the p.a. tank when this stage is checked.

After these steps, connect the output load (preferably a dummy load), apply power and touch up the alignment according to the meter readings and power output. If the equipment fails to function, the individual stages may be checked for r.f. power in the associated tank circuits, also making sure it is at the correct frequency. This can be done using the instrument either as a diode or an oscillating detector. Search also may be made thereby for harmonics or spurious signals, such as mixing products as often experienced with multiple-conversion transmitters. The oscillating detector will be more sensitive for this work. While doing so, care must be taken to avoid coming in contact with high voltages that may be present at the test circuits.

BEFORE continuing with a discussion on the applications of the grid-dip meter, some procedures, not mentioned previously, will be taken up.

When the g.d.o. is to be coupled to large-diameter inductors made with heavy conductors such as tubing, it may be necessary to position the g.d.o. inductor inside the end of the test inductor and next to the inside edge of the conductors.

In applications where the instrument is used as an oscillating detector, due to the circuit loading when the tube then functions as a diode, the meter response will be relatively broad. The frequency calibration also will shift slightly to a lower-frequency dial reading than with g.d.o. operation.

Besides producing a response in headphones, the meter will tend to kick upward with the signal as it is tuned in during operation as an oscillating detector. Both the meter and headphone response will be extremely sharp, necessitating slow and careful tuning.

Applications

Neutralization: Remove *plate* power from the transmitter. Using the instrument as a g.d.o., couple it to the driver of the stage to be neutralized and tune it for a dip. Leave the instrument set with the meter deflected at the bottom of the resonant dip and adjust the neutralizing control so that tuning the plate tank of the neutralized stage through resonance has no reaction on the deflected meter reading. Each time the neutralizing setting has been changed, a new resonant dip may have to be first located, before the check is made by tuning the p.a. tank.

Another method is to remove plate power from only the stage to be neutralized. Apply power to the driver stages and with the instrument used as a diode detector tuned to the operating frequency, couple it to the amplifier tank and check for an indication of r.f. Adjust the neutralizing control until no or a minimum indication of r.f., is observed according to the detector meter reading.

Parasitic Oscillations: Use instrument as either a diode or an oscillating detector coupled to the unstable circuit to find the frequency of the oscillations. It may be observed that during such searching with diode detection, that the meter reads at the high-frequency end of the range, regardless of which instrument inductor is in place. This is due to the very low C at this point which with the diode loading lowers the Q and broadens the response. It is particularly noticeable with v.h.f. parasitics. The looked-for frequency is not indicated, unless the meter reading peaks somewhere in the range.

When the parasitic frequency has been determined, remove power from the equipment and using the instrument as a g.d.o. to locate circuits or components, such as r.f. chokes, wiring, etc. that are resonant at the parasitic frequency. Steps taken to alter such resonances may cure the oscillations.

One cause of parasitics may be cavity resonance produced by the chassis on which the equipment is built. This usually can be found by the g.d.o. function with coupling made in one corner of the chassis interior. Detuning the chassis by means of a bar or partition shield inside the chassis has been found to cure such difficulties.

Parasitics may occur even in receivers as may be evidenced by birdies (other than oscillation due to instability at the operating frequency) as a circuit is tuned. We had one case where a check with the grid-dip meter as a detector indicated that the oscillations did not take place at the operating frequency, eliminating the possibility of r.f. feedback, but rather occured at a very high frequency. This was due to the capacitance of the antenna trimmer and the inductance of its connecting lead to the bandswitch that produced resonance at the high frequency (as learned with the g.d.o.) that introduced the parasitic oscillations. A change in the lead length corrected the difficulty.

Parallel-Resonant Traps: Use instrument as a g.d.o. Traps usually are best pretuned or checked prior to installation in a circuit or with at least one circuit lead disconnected, since under some conditions wiring or other elements involved in the associated circuit may introduce additional shunt capacitance or inductance and produce a resonance indication other than that of the trap itself or prevent a dip indication at the actual resonant frequency of the trap alone.

If the circuit "strays" and their Q are small in comparison with the trap values, chances are that they will not seriously affect the dip readings, in which case checks made with the trap installed will be approximately correct.

Final precise adjustment should be made by applying power to the circuit and tuning the trap for the desired effect under actual operating conditions.

Series-Resonant Traps: Use g.d.o. in similar procedure as with parallel-resonant traps, but where resonance is to be checked prior to installation, the trap must be first connected as a parallel circuit. At high frequencies or where the trap inductance is low, the lead making the parallel connection should be a short heavy conductor to keep its inductance low and leads to be used for installation connections also must be included with this setup.

Harmonics: Harmonics may be checked using the instrument as either a diode or oscillating detector coupled to the tank circuits or other elements of interest. Except where such harmonics are relatively strong, indications may not be found with the grid-dip meter, particularly energy produced by stray radiation from the equipment that may cause TVI; but in any case, where a particular harmonic is known to create trouble, the cause of its pro-

duction due to faults in the transmitter often may be tracked down using the g.d.o. to locate circuit resonances that could encourage harmonic production.

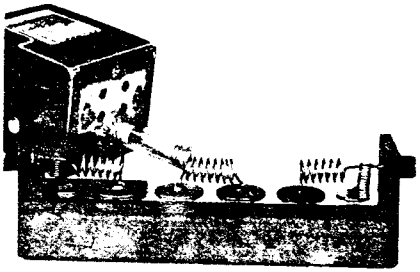
Low-, high-, and band-pass r.f. filters may be checked using the g.d.o.

For a single low- or high-pass constant-*K* Pi-section, disconnect it from associated circuitry. Use of the g.d.o. coupled to the inductor (for a low pass filter) or *one* of the inductors (for a high pass filter) will indicate the cutoff frequency.

For a single low-, or high-pass constant-*K* *T*-section filter, short-circuit the input and output. Follow a similar procedure as above.

For multi-section filters using constant-*K* and *M*-derived sections, the cutoff frequency may be found with the g.d.o. coupled to an "untuned" series inductor (in a low pass filter) or a similar shunt inductor (in a high pass filter) at one of the mid sections.

If the capacitive and inductive values are known or designated for a particular section,



G.d.o. coupled to center section of low-pass filter for determining filter cutoff frequency.

the g.d.o. may be helpful for checking the proper resonant frequency thereat as predetermined by calculation or the use of an *L/C* resonance chart or nomograph. This can be particularly helpful during filter construction, as illustrated on page 16 in *CQ* for March, 1967.

Checking Crystals: Plug crystal into grip-dip meter in place of the instrument inductor. This may require the use of a jig or short leads equipped with clips or banana plugs. Use the instrument in the oscillate mode. Rotate the tuning capacitor until grid current is indicated, the value of which at a given capacitor setting for various crystals will indicate the relative activity of the crystals. Oscillation is best obtained near a low-capacitance setting (toward h.f. end of scale).

This also is necessary when the crystal frequency is to be determined by checking the oscillator signal with a calibrated receiver, since most crystals are rated for a load capacitance of about 33 mmf.

Crystals also may be checked for activity and *approximate* frequency by making a one or two-turn loop around the g.d.o. inductor with a short lead the ends of which may be clipped to the pins of the crystal holder. The g.d.o. will indicate a sharp dip when tuned through the crystal frequency (with the appropriate inductor in use). This is useful for overtone crystals with which the overtone frequencies also will be indicated. The fundamental and overtones of many other crystals also will be found.

In some cases the dip may occur at two slightly different frequencies, depending on whether or not the g.d.o. is tuned starting above or below the crystal frequency. In such cases split the difference between the two readings.

This method is handy for use where even the range in which the crystal frequency falls is not known. After this has been determined, a much more accurate frequency check may be had by plugging the crystal directly into the g.d.o. and checking the signal with a receiver as described above.

Field Strength Meter: Use instrument as a diode detector with a short antenna connected to one inductor terminal or to a one or two turn loop wound around the inductor with the other end of the loop grounded to the instrument case. The frequency calibration might thereby be altered somewhat, but for this application the requirement is only to tune for a maximum meter reading. This is indicative of the signal strength.

R. F. Chokes: The *parallel* resonances of r.f. chokes may be checked using the g.d.o. coupled to the choke with both its leads open.

The *series* resonance is similarly checked, but with the leads of the choke connected together.

Where the choke is the single solenoid type, it may be better to check it while it is installed in the place where it is to be used. The end nearer ground may be connected, but the "hot" end should be left floating.

Self Resonance of Inductors: This actually is the same proposition as r.f. chokes and may be treated as such, but there are some additional aspects which sometimes crop up. These involve a tuned circuit where the inductor is tapped for operation on different ranges.

Self resonances in the unused, and sometimes in the used, portion of the inductor may

introduce adverse effects on the operation of the equipment, such as signal suckout, parasitics, instability, harmonics, etc. This may occur either if the unused turns are shorted or left open. Using the g.d.o. for checking such resonances can be helpful in tracking down difficulties.

Quantitative Measurements

A number of quantitative measurements may be made with the grid-dip meter as follows:

Capacitance Measurement: Use the g.d.o. to find the resonant frequency with the unknown capacitance connected across an inductance of known value. The capacitance then may be found from $C_X = \frac{1}{4\pi^2 f^2 L}$ where f is the resonant frequency in megacycles, L is the inductance in micro-henries, C is the capacitance in micro-farads. If known, the distributed capacitance of the inductor should be subtracted from the result. Many manufacturers of grid-dip meters specify the values of the inductors for the instrument or provide a calibration chart for utilizing the instrument inductors to determine the capacitance *vs.* resonant frequency with each one. A small jig or short leads equipped with clips may be set up for connecting the capacitor to an inductor.

A do-it-yourself expedient that can easily be set up and one which we've found more handy and convenient, is one individual test-inductor standard made up of 7 turns of a B & W #3002 Miniductor equipped with alligator clips as shown at fig. 1.

This one inductor will permit a continuous frequency coverage of 2.4—80 mc to be used for capacitance measurements of 10 mmf to .01 mf as indicated by the calibration chart at fig. 2.

The distributed capacitance of the inductor is very low, and thus will introduce a negligible error, leaving the accuracy primarily up to the g.d.o. calibration.

This inductor also exhibits a very high Q, often making it possible to obtain a measurement on a capacitor actually installed in a circuit. In any case, the inductor should be clipped on as near the capacitor body as possible in order to avoid additional inductance from the capacitor leads.

Inductance Measurement: This will be limited to r.f. inductors. Connect a capacitor of known value across the inductor (using as short leads as possible) and use the g.d.o. to find the resonant frequency of the combination. The inductance then is $L_X = \frac{1}{4\pi^2 f^2 C}$, where L is the inductance in micro-henries, f is the frequency in megacycles, C is the capacitance in micro-farads; or reference may be made to an L/C resonance chart.

Due to the distributed capacitance of the inductor, a slight error will result, however, if the value of the capacitor is quite high, the error will be negligible. The capacitor itself also should exhibit a low inductance.

Resonant Frequency of Capacitors: Connect capacitor leads together and use g.d.o. coupled to the partial loop formed by the leads.

Finding the resonant frequency of a capacitor often is helpful in determining its effectiveness with bypassing for TVI reduction in equipment.

An interesting experience we ran across with capacitor resonance involved a case where grid drive over a narrow range in the 14 mc band faded away. The culprit, as found with the g.d.o., was a ceramic bypass in a 7 mc doubler stage which heated sufficiently to gradually shift its resonant frequency to smack on the doubler frequency and cause a suckout of the signal.

Circuit Q: Use instrument as a signal generator. Connect v.t.v.m. with r.f. probe across the circuit to be measured. Couple the grid-dip meter to the circuit and tune the instrument for a maximum reading on the v.t.v.m. This is where the circuit is resonant. Note the frequency at which this occurs. Then tune the instrument each side of resonance to the points where the v.t.v.m. reading drops 70.7% of that at resonance. Note the frequency at these two points and calculate the circuit Q from $Q = f_r \div \Delta f$ where f_r is the resonant frequency and Δf is the difference between the two off-resonance frequencies just found.

The coupling of the grid-dip meter should initially be made so that a convenient reading at circuit resonance is obtained on the v.t.v.m. The coupling then should be left fixed for the remainder of the operation. In order to minimize circuit loading, it would be advisable to couple the v.t.v.m. to the circuit with as small size capacitor as possible while still obtaining a reading.

When the circuit Q is quite high, it may be necessary to check the grid-dip meter frequencies with a calibrated receiver, since the off-resonance points will appear too closely together for an accurate reading on the instrument scale.

The conclusion of this series will be made with Part III which will cover applications relating to transmission lines and antennas. ■

DISCOVERING 28MHZ

TROPOSPHERIC DUCTING

THE VHF OPERATOR, MINDFUL OF THE BAROMETRIC PRESSURE, KNOWS WHEN TO EXPECT A LIFT IN CONDITIONS. THE 28MHZ BAND DISPLAYS SIMILAR LIFT CHARACTERISTICS DURING PERIODS OF HIGH PRESSURE AND ON FOGGY DAYS. TEMPERATURE INVERSIONS FREQUENTLY REFRACT 28MHZ SIGNALS OVER DISTANCES FROM 30 TO OVER 200 MILES. SIGNALS ASSISTED IN THIS WAY ARE SUBJECT TO DEEP, SLOW AND OFTEN COMPLETE FADES.THE AREA OF REFRACTION CAN BE QUITE SELECTIVE, WITH STATIONS A FEW MILES APART BEING OUTSIDE THE REFRACTED DISTANCE. UNLIKE F OR E PROPAGATED SIGNALS, TROPOSPHERIC SIGNALS ARE OFTEN LESS INCLINED TO THE PHASE DISTORTION EXPERIENCED WITH THE IONOSPHERIC MODES - INDEED, ON MANY LONG-HAUL INTER-G SIGNALS NO SUCH DISTORTION HAS BEEN APPARENT. IT WOULD APPEAR THAT THERE IS SOME DEGREE OF LIFT PRESENT MOST OF THE TIME ON 28MHZ, BUT A LACK OF ACTIVITY ON THE SSB AND CW MODES ALLOWS SLIGHT LIFTS TO GO UNNOTICED. THE RSGB CUMULATIVE CONTEST IN AUTUMN 1984 PROVED THAT CONSIDERABLE DISTANCES COULD BE WORKED WHEN STATIONS ACTUALLY USED THE BAND. CONTACTS BETWEEN HARLOW AND YORKSHIRE, HAMPSHIRE, NOTTINGHAM AND SOUTH WALES WERE ALL MADE ON SSB DURING ONE EVENING'S ACTIVITY USING AN ASSISTED PATH. THERE IS MUCH RESEARCH THAT COULD BE DONE INTO THIS FASCINATING MODE - PERHAPS A SERIES OF VERTICALLY-POLARISED BEACONS COULD BE SET UP ACROSS THE COUNTRY TO STUDY THE PHENOMENA.

SPORADIC-E

THE SUMMER MONTHS ON 28MHZ PROVIDE A RICH VARIETY OF CONTACTS WITH EUROPEAN AND EVEN NORTH AFRICAN STATIONS VIA SPORADIC REFLECTIONS FROM THE E-LAYER. DISTANCES RANGING FROM A FEW HUNDRED TO ABOUT 2000 MILES ARE TYPICAL. THE CONDITIONS ARE TOTALLY VARIABLE WITH SIGNALS OVER S9 VANISHING INTO THE NOISE WITHIN A FEW MINUTES. THE USUAL E-SEASON STARTS AROUND APRIL AND CAN LAST UNTIL SEPTEMBER AND IS NOT AFFECTED BY THE SUNSPOT CYCLE. HOWEVER, E-PROPAGATION CAN OCCUR AT ANY TIME OF THE DAY OR NIGHT AND AT ANY TIME OF THE YEAR. SEVERAL OPENINGS HAVE BEEN WORKED BY G3YPZ IN MIDWINTER AT TIMES APPROACHING MIDNIGHT WHEN AN UNEXPECTED QSO WITH A GM, AN LA OR SM HAS BEEN COMPLETED ON A SO-CALLED DEAD BAND. THE DLØIGI BEACON HAS BEEN HEARD AS LATE AS Ø400GMT ON SOME OCCASIONS.

AURORA AND METEOR SCATTER

AURORAL DISTURBANCES COMPLETELY DISRUPT F-LAYER SKIP ON ALL OF THE BANDS, BUT ON 28MHZ, AS ON VHF, THIS CAN BE AN INTERESTING PHENOMENON. DURING AN AURORA, SIGNALS FROM G AND EUROPEAN STATIONS CAN BE WORKED, BUT WITH THE ROUGH DISTORTION ASSOCIATED WITH THIS MODE. AN EXAMPLE OCCURRED AT Ø130GMT 21 APRIL 1985 WHICH BROUGHT AN UNEXPECTED SSB/CW CONTACT WITH GM4PSF WHOSE RASPY SIGNAL REACHED QUITE A CONSIDERABLE STRENGTH AT THE HARLOW QTH. THE AURORA ALSO TENDS TO BRING AN ENHANCEMENT IN LOCAL CONDITIONS WITH SIGNALS DISPLAYING A TROPOSPHERIC EFFECT.

METEOR PINGS ARE REGULARLY HEARD ON 28MHZ, ESPECIALLY WHEN THE DIRECT PATH IS VERY WEAK OR NON-EXISTENT. EXAMPLES OF THIS HAVE BEEN EXPERIENCED ON ALL MODES, WITH THE BURST DURATIONS LASTING UP TO A COUPLE OF SECONDS. THIS BAND COULD THEREFORE BE OF GREAT INTEREST TO MS DEVOTEES.

28MHZ RECEIVERS.

ALLOWING FOR THE FACT THAT THE RESIDUAL ATMOSPHERIC NOISE IS HIGHER AT 28 THAN AT 144MHZ, IT IS A FACT THAT MANY CURRENT RECEIVERS LACK THE DEGREE OF SENSITIVITY FOR SERIOUS LOW SIGNAL WORKING. WEAK INTER-G DX IS OFTEN CONSIDERABLY WEAKER THAN SOME OF THE MOST CHALLENGING SATELLITE SIGNALS, HENCE A RECEIVER WITH A GOOD LOW-NOISE FRONT-END IS ESSENTIAL. MOST COMMERCIAL HF RIGS, WHILE BEING ADEQUATE FOR STRONG IONOSPHERIC OR LOCAL SPACEWAVE SIGNAL WORKING, ARE UNFORTUNATELY NOT SATISFACTORY FOR SERIOUS 28MHZ USE. OLDER TRANSCEIVERS OF THE KW2000, FT101 AND TS520 VINTAGE GIVE VERY POOR RESULTS ON THEIR TOP RANGES.

ACTIVITY.

AS STATED ABOVE, THERE IS A GROWING AMOUNT OF FM ACTIVITY THROUGHOUT THE COUNTRY, AND THIS SHOULD CONTINUE TO FLOURISH, BUT THE SSB AND CW MODES ARE VERY LITTLE USED DURING LOW SKIP ACTIVITY. IT IS THE LOWER END OF THE BAND THAT IS MOST THREATENED BY PIRATE ACTIVITIES - BOTH IN THE UK AND ABROAD. IN THE LONDON AREA AN SSB CALLING AND WORKING FREQUENCY OF 28,305KHZ HAS BEEN IN USE FOR SEVERAL YEARS. THE CHOICE OF THIS SPOT WAS DELIBERATE - IT HAPPENS TO BE CHANNEL 40 ON THE ILLEGAL MULTI-MODE CB RIGS, AND IS THUS COMMONLY ABUSED BY THIS FRATERNITY. THE ADOPTION OF THIS OR SOME OTHER FREQUENCY AS A CALLING CHANNEL WOULD STIMULATE ACTIVITY NATIONWIDE. PERHAPS LOCAL CLUBS OR THE RSGB COULD LOOK AT AN ACTIVITY NIGHT OR SOMETHING SIMILAR.

THE 28MHZ BAND IS AN EXCITING, CHALLENGING PART OF THE AMATEUR RADIO SPECTRUM. THERE IS MUCH TO DISCOVER ABOUT ITS CHARACTERISTICS, THERE IS PLENTY OF ROOM FOR ALL MODES, AND EQUIPMENT COSTS ARE VERY REASONABLE. IT WOULD BE A TRAGEDY IF THIS ALLOCATION WERE TO BE TAKEN OVER BY ILLICIT USERS BECAUSE THE AMATEUR FRATERNITY DID NOT USE IT. TRY 28MHZ AND PERSEVERE WITH IT - THE RESULTS WILL BE WORTHWHILE.

BY JOHN PETTER G3YPZ FROM "RADCOM" NOVEMBER 1985.

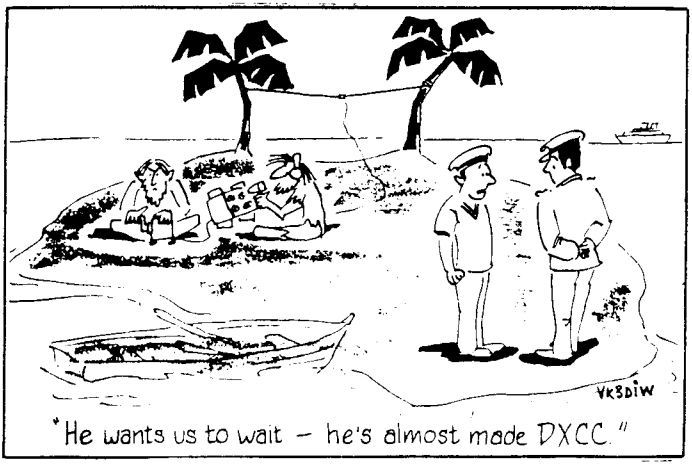
DE SIYAFUNDA

DEBATE	DE STUFF DAT CATCHES DE FISH
DEFENCE	DE WIRE AROUND DE CAMP
DEFEAT	DE TINGS YOU WALK ON
DETAIL	DE TING ON DE BACK OF DE CAT
DETAIN	DE PLACE WHERE DE FLOWERS GROW
DIVORCE	DE STUFF YOU EAT WID DE MEALIEPAP
DEFINE	DE MONEY YOU PAY FOR SPEEDING
DEPART	DE PIECE OF DE SOMETHING
DESTROY	DE TING WIF WOT YOU DRINK DE COCACOLA
DENY	DE NO COMMENT
DEFER	DE TING DAT COVERS DE CAT
DETERMINE	DE BOMB OF DETER
DEFECT	DE HONEST TO GOODNESS TRUTH
DESIGN	DE TING DAT YOU SHOW DE ENEMY
DEBUG	DE TING DAT CAUSES DE ITCH
DELIVER	DE ENEMY OF DE ALCOHOL
DELETE	DE SONG DAT YOU SING
DELIGHT	DE THING DAT SHINES
DERAIL	ONE OF DE TINGS YOU BLOW UP
DEVINE	DE LIQUOR YOU DRING WHEN DE MAMPOER IS FINIS
DECOY	DE TING YOU SLEEP ON
DETENTE	DE TINGS IN YOUR MOUTH DAT YOU EAT WID
DEFROST	DE WHITE STUFF ON DE GROUND IN WINTER
DELUXE	DE STUFF DEY WASH YOU WID WHEN YOU WERE A PICCANIN.

SOME NEWS ABOUT JAS-1 SATELLITE

WITH THE RELEASE OF THE PROJECTED ORBITAL ELEMENTS FOR JAS-1 AND IT'S PLANNED LAUNCH ON JULY 31ST, HERE ARE SOME PREDICTIONS BASED ON THOSE ORBITAL ELEMENTS. THE FIRST 'SIGHTING' SHOULD BE ON ORBIT NO 4 AT 04.25 UTC ON AUGUST 1ST.AZ.11 DEGREES AND THE LOS WILL BE SOME 15 MINUTES LATER AT AZ..100 DEG. CIRCLING THE EARTH AT 1500 KM JAS-1 WILL REAPPEAR SOME 60 MINUTES LATER ON ORBIT NUMBER 5 AT AZ..325 DEGREES AND LOS WILL OCCUR TWENTY MINUTES LATER AT AN AZ. OF 131 DEGREES. DURING THAT FIRST PASS THE MAX. ELEVATION WILL BE 14 DEGREES AND ON THE SECOND PASS THE ELEVATION WILL BE 71 DEGREES. THE SATELLITE WILL BE IN VIEW UP TO ORBIT NUMBER 10 AND WILL BE OUT OF RANGE DURING ORBITS 11, 12, 13, 14 AND 15 REAPPEARING ON ORBIT NUMBER 16 AT 03.40 UTC AND AZ. 42 DEGREES FOR 10 MINUTES WITH LOS AT AZ.96 EACH SUBSEQUENT ORBIT UP TO NUMBER 23 WILL BE ACCESSIBLE WHEN AGAIN IT WILL BE OUT OF RANGE UNTIL ORBIT NUMBER 29. SO THE PATTERN OF PREVIOUS LOW LEVEL ORBITING SATELLITES WILL BE FOLLOWED AND THE SATELLITE WILL HAVE TO BE TRACKED OR SOME TYPE OF OMNI-DIRECTIONAL ANTENNAS USED (CROSSED DIPOLES) THAT CAN BE SWITCHED FOR POLARISATION CHANGES AS THE SATELLITE PASSES FROM ONE TO THE OTHER. THE PACKET RADIO REQUIREMENTS FOR JAS-1 ARE AS FOLLOWS: 1200 BAUDS WILL BE USED FOR BOTH THE UPLINK AND THE DOWNLINK, AND DATA WILL BE EXCHANGED USING MANCHESTER ENCODING THAT REQUIRES A FREQUENCY MODULATED SIGNAL FROM THE GROUND FOR THE UPLINK. PHASE SHIFT KEYING WILL BE EMPLOYED FOR THE DOWNLINK THAT WILL REQUIRE A SINGLE SIDEBAND TYPE RECEIVER AT THE GROUND USERS STATION WITHIN 200-300HZ OF TRUE SIGNAL. THE JAS-1 DIGITAL TRANSPONDER WILL TRANSMIT WITH 1 WATT OUTPUT, WHILST THE USER WILL REQUIRE SOME 50 TO 100 WATT E.I.R.P.(E.G. 10 WATTS TO A 10 DB GAIN 145MHZ ANTENNA) AS THIS SATELLITE IS A 'JD' MODE, 145MHZ UP AND 435MHZ DOWN. THE UPLINK HAS FOUR CHANNELS SPACED BETWEEN 145,900 AND 146,000MHZ TO GIVE A SINGLE 435,910MHZ CHANNEL DOWNLINK. ONE MEGABYTE OF PACKET USER MEMORY IS AVAILABLE FOR LOADING. ON CW AND SSB, THE LINEAR TRANSPONDER WILL HAVE AN UPLINK PASSBAND RUNNING FROM 145,900 TO 146,000MHZ TO GIVE A DOWNLINK BETWEEN 435,900 AND 435,800MHZ INVERTED, THAT IS L.S.B. UP FOR U.S.B. DOWN. 28 CHANNELS OF SATELLITE HOUSEKEEPING MEMORY WILL BE SENT BY THE TELEMETRY SYSTEM. POWER REQUIREMENTS FOR THE USER ARE SIMILAR TO THAT OF THE DIGITAL TRANSPONDER. LOOKS AS THOUGH WHEN WORKING PACKET RADIO DX, ANY REPLY WILL ONLY ARRIVE BACK ON SUBSEQUENT ORBITS OR DAYS. ALSO BEING LOW-LEVEL THE REAL-TIME SSB CONTACTS WILL NOT HAVE THE RANGE OF OSCAR-10. BUT DO MONITOR THE GENERAL BEACON ON 435,795MHZ AFTER AUGUST 1ST AND HAVE FUN.

(ACKNOWLEDGEMENTS TO HOTLINE - HIGHWAY BRANCH AND DAVE ZR5GQ)



"He wants us to wait - he's almost made DXCC."