The PROPAGATOR

Illawarra Amateur Radio Society Inc.

The monthly newsletter of the Illawarra Amateur Radio Society Inc.
Registered by Australia Post publication number :- NBH - 1491.

Meetings are held on the second Tuesday each month (except January) at 7.30 pm in the State Emergency Services building in Montague St, Nth Wollongong.

Visitors are most welcome.

VOLUME 92, NUMBER 3 MARCH 1992

EDITOR's TWO CENTS WORTH

Greetings and welcome to March. This of course means that there are only four months left until the Annual General Meeting. So from about here in, we will start dropping increasingly less subtle hints about the future committee. As they say, we want YOU!

We have a couple of new columns in this month's Propagator. I hope you like them, as everyone gets sick of reading the same thing over and over.

Maybe you aren't cut out for a Committee job. Perhaps you might like to write an article for the Propagator. Did you know that in two years, I have only had one article from someone other than our regular contributors??? And Ham radio is supposed to be about experimentation. Come on, what was YOUR last experiment? Can you remember back that far? Tell us all about it.

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PROGRAMME

Some more info on upcoming events, because now I have more to print:

MARCH: John Faulkner from the WIA to talk about Spread Spectrum (frequency agile) Communications. This is a bit of a new concept which should be most interesting.

APRIL: The Do-It-Ourselves antenna night. See article inside. You said you wanted more construction and antenna nights, so this is one idea.

MAY: Auction perhaps.

JUNE: The next Do It Ourselves project night if the April one works well. If not, we will do some other sort of practical night. Suggestions are very welcome.

JULY: Annual General Meeting. Good chance to get a job. See inside.

AUGUST: Col Christiansen to talk about another topic of interest. Those who were at the December meeting will remember that Col is a very interesting speaker.

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GET A JOB!

The Annual General Meeting of the IARS is, as they say, fast approaching. This is obviously silly, everyone knows that it is approaching at exactly one day per day. But anyway, the fact is that we have an AGM coming up which means that everyone can look at getting themselves an Executive position or two. (I've presently got three!!!)

As usual, all of the positions will be open for filling. Probably nobody will want to stand another term, but also nobody else will want to run either. This month, I will outline the elected positions, later I will outline the nominated ones.

PRESIDENT: Runs the meetings of the Society, and is the mouthpiece of it in dealing with outside organisations (eg, SES, DOTC).

VICE PRESIDENT: Assists the President in the above duties, also stands in when the Pres is not present.

SECRETARY: Looks after the records of the Society. This includes taking minutes of meetings and writing letters to people.

TREASURER: Looks after the monetary side of the Society. This includes endlessly chasing people for outstanding membership, taking money at auctions, writing cheques for the expenses of the club and similar activites.

COMMITTEE MEMBERS: There are only three elected committee members. These three plus the above four make up the executive committee, who make all of the Exec decisions of the Society. From time to time, the Committee members get small projects to do (like the Expo display last year).

Remember, these seven positions are the only ones that vote at Executive, and also the only positions that are actually voted in. We want YOU!!

LEATHER TONGUE AWARD ATTEMPT

New members or infrequent readers will probably not be aware of our Leather Tongue Award. This "award" can be won for inconsiderate use of the Society's repeaters, or general bad operating procedures.

One of the Committee (who shall, of course, remain anonymous) was overheard on VK2RAW/VHF the other week in conversation as follows:

Other Guy: "We'd better go to a simplex channel, Ray. Pick a channel please."

Prospective Awardee: "Ummm... simplex, what's that? Oh, yes. Ummm, can't do that. I've got this fancy handheld and I dunno how to change channels."

Other Guy: "Oh, well, we'd better stay here then, Ray. Does anyone else want to use the repeater?"

This is probably Leather Tongue operating in its early stages. However, it hasn't moved in a while. So it looks like the anonymous committee member gets it.

A subsequent interview with the anonymous person told the story - when VK2XCC is mobile, the rig usually ends up under the seat. So he can't change frequency even if he wants to. But the award stands.

John VK2XGJ, the Society Awards Manager (well, at least he helps look after the Leather Tongue) has suggested that a "trophy" be made for this award, so that people have something to show off their embarassment.

Remember, Ray, you have three months to find someone else to give the award to. Otherwise, it returns to its keepers who will find another victim.

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Minutes of IARS General Meeting - 11th February 1992 at SES HQ, Montague Street, North Wollongong. Start 19:45

Visitors: Col VK2DYM, Ian ZIO, Shauna XYC, Darrell USA, Richard WRP, Julian, Jim, Brian. (Sorry, no surnames supplied...Ed).

Apologies: VK2s EMI, JTB, KCV, KHE, ZDM, ZLJ.

A minute's silence was held in memory of Morry VK2EMV.

Conference of Clubs:
South Coast convention to be held May 1992. Letters to be sent out to all clubs in the area. Let us have your items or proposals please.

Ken VK2TKE is running a class in Principles of 2Way Radio, cost is $140, which is for 36 four hour sessions, including workshop techniques as well. Exams to follow classes. Registrations to the TAFE. Covers both Novice and Full Call levels.

Dale VK2DSH spoke about a permanent display at the Uni's Science Centre, details elsewhere in the newsletter.

Ray VK2XCC won the Leather Tongue Award, see elsewhere in the newsletter.

Ian O'Toole VK2ZIO spoke on some interesting parts of his Castle Hill Military Radio Museum. Boy have they got some stuff!!

Coming Events:
Gosford Field Day, money must be in tonight if you want to go.

Future meeting topics were also notified, see front page for details.

Meeting Closed 21:32.

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COMMITTEE MINUTES

Sorry, but there's no Committee minutes this month, nor General meeting minutes, because today is deadline, I haven't got the minutes and everyone is at Field Day. Also my dog ate my homework.

I would normally rough out some minutes from what I observed at the meeting. However for the first time all year, the meeting finished after only 70 minutes. Since I show up an hour late to Committee meetings (slacko), it was almost all over.

Most of the happenings centred around Dale VK2DSH's proposal for a display at the University's Science Centre, so see the separate article about that for details.

APRIL MEETING

For the April meeting, the Committee has decided to try something different - an antenna tutorial night.

The idea is that everyone who wants to (please, have a go!) would get up and give a few minutes' talk about antenna projects they have built. This might include pictures, drawings, whatever. It doesn't matter what band mode - HF, UHF, microwaves, scanner, whatever.

As a result, everybody puts in a bit of knowledge and takes away a lot. We don't want to get too carried away with heavy theory or maths, but of course some small amounts would be necessary.

Please feel free to join in and tell us about YOUR special antenna. Unconventional or modified designs would be interesting, or if you have built a "common" antenna you might care to tell us a bit about it (difficulties, tricks).

This should be an interesting night where everyone learns something off everyone else. If the idea works well and people like it, we might have another night in June, based on some other topic (ideas, anyone?)

LET'S GET SOME MEMBERS

Editor's note: Dale VK2DSH gave me the following information to print here to see if people are interested in a new and workable method of promoting the Society to the public. Let the Committee know if you would like to be involved.

An opportunity has arisen for a permanent display at the Uni's Science Centre, at Campus East in Fairy Meadow. This place is a "hands-on" display area where interested people can come on Sat and Sunday afternoons to see all sorts of displays. The centre is supported by the University and several local companies.

The IARS is able to run a display at this centre, which is visited by hundreds of people every weekend. Such a display would present various aspects of Amateur operating to the public. It would be set up in the area devoted to communications. The display would be interactive, and it is forseeable that local people could well keep coming back if they are interested enough.

The requirement from the Society (which of course means the members) would be for COMMITMENT and MANPOWER. The display would need to be manned for four hours every Saturday and Sunday. This would mean that about a dozen people would be required (to give people weekends off). If people aren't interested enough to help, the project will fail.

Next we need equipment for the display. This would not have to be left at the Centre, but would need to be available. A NEAT display (yes, I know - Hams don't know that word) would of course be required. Satellite modes are of particular interest to the centre, but all modes could be used. The centre could provide computer gear to provide for Packet, RTTY, SSTV and the like if required.

So how about it? Let Dale know if you will be involved!

SOME INFO ON POWER FM

Many of you would be aware of the new POWER-FM radio station broadcasting from Knight's Hill. Rob VK2MT gave me the following information from January 1992's Broadcast Engineering News...

The station is officially called 2WSK-FM, running an effective radiated power (ERP) of 25kW. But there is a "protection zone" between the bearings of 10 and 70 degrees east of true north where only 1.5kW is allowed. This is done by a directional antenna system.

One of the interesting parts of the million dollar system is the Digital Commercial System (DCS). It turns out that very little of the program you hear is from tapes or discs.

The DCS has two 760 megabyte hard disk drives (the average home computer has say 80, tops) which have on them 12 hours of program in a 15kHz bandwidth form. Yes - music stored on computer disks in digital format. About 2 hours are commercials and announcements, the rest is music.

So the photo in the article shows the announcer at work, with NO turntables, just a computer screen and the usual rows of channel volume controls. He just uses the computer system to play whatever music he wants. What's more, you can play whatever record from whatever studio, or even do it all by remote control.

The rest of the article deals with the other equipment fitted in the station, including the expected turntables, CD players and reel-to-reel tape decks (which are used to get the music onto the computer systems). Incidentally, 2ST also has a similar system, because it is only across the hall.

It does go to show you - Amateur radio has a way to go. Imagine voice sent as Packets (OK, Ray, you can just imagine Leather Tongues).

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NEW EDITORIAL RESIDENCE

In keeping with four years of IARS tradition, one of the Editors (Graham VK2GID) has moved house. Why tradition, you ask? Well Peter VK2FPN moved house during his time as writer of the Propagator, and I'm pretty sure that the Editor before him also did.

Check the new phone number on the back page to ring to send in Propagator articles (hint, hint), or for general info. Graham will still be available on Packet at VK2XGJ's bulletin board (once he gets some string into the air again). The new residence is higher (good) and also further east (good for getting signals over the escarpment).

Here is your chance to be part of tradition and move house as well. All you have to do is nominate yourself for the IARS editor at the AGM! You could even get your mates to nominate you.

DOTC QUESTION

Last month, we asked you: Which transistor circuit is best suited to supply a low impedance load?

The answer was (A) - Emitter follower. This circuit has unity gain and a low output impedance. The other circuits are: Common Emitter, which has a high output impedance. Common base and Grounded Base have a somewhat low impedance, but the common collector or emitter follower circuit has lowest of all.

This months question is about meters and resistors: I have a 100 microamp movement meter, with an internal resistance of 1000 ohms. I want to make this into a voltmeter with a full scale of 1 volt. What multiplier resistance is required?

(A) 1000 ohms
(B) 9000 ohms
(C) 10 k ohms
(D) 90 k ohms

Also, should the multiplier resistor be connected in shunt (parallel) or series manner?

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REPEATER REPORT

There will be no repeater report for this month. When I went over to Rob VK2MT's house to pick up the report, there wasn't one, and Rob was at Gosford. (Deadline this issue was Field Day day).

By way of my observations, all the IARS repeaters seem to be working properly, as far as I can tell.

The much harried wife of our hard working repeater chairman told me to just write that Rob was too slack.

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LOUSY INCONSIDERATE DUMMIES

Last month we brought you the first couple of LID's as recorded on John VK2XGJ's bulletin board. We follow that up with another couple that looked interesting.

Classic Leather Tongue award material. The mobile dingle who is driving to or from work and talking via the mountaintop repeater to a fellow dingle a half mile away. Much of the coversation has to do with expert criticism of observed poor driving practices in his vicinity, a subject of obvious deep interest to the dozens of chaps waiting to use the repeater.

A good pair of operators next, you'll strike some of each on the HF end of the world: Lid 58 - The ham who brags that he doesn't have any QSL cards when you ask him for one to confirm your contact with his grid square, state, country, or prefix.

Matched pair of the above: Lid 59 - The ham who sends out a QSL for every contact he makes, creating guilt feelings with type 58 lids who don't have any QSL cards and are too damned rotten chintzy cheap to buy any.

More LID's next month. Have you seen yourself yet???

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A BRIEF INTRODUCTION TO DESIGNING DC INVERTERS

By Dale Hughes VK2DSH

For many applications, the two transistor, single transformer inverter can be used to provide power in a flexible and economical manner. Components for this type of power supply are widely available and inexpensive. This short article is an attempt to explain the basic steps involved in the design of this type of inverter.

Figure 1 is the circuit of the inverter. The circuit can be considered as a push-pull, overdriven, transformer coupled oscillator. The core being driven into saturation in both directions of current flow. When the core saturates, the base voltage of the driven transistor falls forcing it to turn off. The collapse of the flux in the core induces a voltage in the base of the opposite transistor causing it to turn on which then drives the core into saturation in the opposite direction. The above cycle repeating as long as power is applied. Components R_1 & C are 'speed up' components, resistors R_2 force the circuit to oscillate at startup.

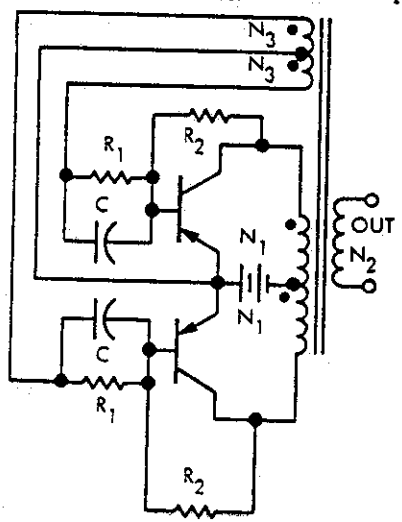

FIG 1

The frequency of oscillations is determined by the dimensional and magnetic characteristics of the core used as well as the supply voltage used to power the circuit. A very simple equation gives the operating frequency:- (Within close limits)

$$f = \frac{V_P * 10^8}{4\beta_s * A_{min} * N_1} \text{ Hz}$$

Where V_p is the supply voltage, β_s is the saturation flux density of the core in gauss, A_{min} is the minimum cross sectional area of the core in cm^2 and N_1 is the number of turns on one half of the primary winding. In general, higher frequencies result in lower core losses.

Suitable cores for the circuit are the EC70 ,52,41 &35 'E' cores with Seimens N27 material. These cores are available from a number of component retailers. (See the latest ALTRONICS catalogue) Values for saturation flux and minimum cross section are given below:

Core	β_s	A_{min}	P_o
EC-70	5100G	$2.11cm^2$	800W
EC-52	"	$1.41cm^2$	400W
EC-41	"	$1.06cm^2$	200W
EC-35	"	$0.71cm^2$	100W

P_o is the approximate upper limit of power handling ability at 25KHz. These cores have low switching losses up to at least 25KHz. The power handling capacity of the cores decreases at the frequency of operation decreases. It is best to seclect the largest core consistent with cost and space requirements.

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The first step in designing the inverter is to select the core based on the power requirements. The above table gives the upper limit of each core. Operating frequency is selected next, use as higher frequency as possible - up to 25KHz if possible. The number of turns for each winding is given by the following:

$$N_1 = \frac{V_p * 10^8}{4 * \beta_s * A_{min} * f} \text{ turns}$$

$$N_2 = \frac{k * V_o * N_1}{V_p} \text{ turns}$$

$$N_3 = \frac{k * V_{FB} * N_1}{V_p} \text{ turns.}$$

Multiple secondary windings can be used if required, use the equation for N_3 to determine the turns on each winding. The factor 'k' is a 'fudge factor' and should be in the range 1.05 to 1.2. Start with k = 1.1 and adjust if required. Round the number of turns up to next next whole number if fractional turns result. V_{FB} should be in the range of 1 to 3 volts for bipolar transistors.

All windings should have 700 to 1000 circular mils per amp. But if space permits, use the heaviest gauge of wire possible to reduce losses.

The transistors should be selected next, the 3 factors to consider, being: Collector current rating, collector-emitter voltage rating and switching speed.

The collector current required should be at least:

$$I_c = \frac{P_o}{0.75 * V_p}$$

The collector-emitter voltage rating should be at least 2.5 V_p due to switching transients. Transistor switching speed should be as fast as possible. MJ15003 transistors are a good choice for inverters up to 100 watts at 10KHz.

Components R1, R2 and C are calculated now. The value of R2 should allow approximately 10mA of base current to flow for every amp of collector current. If problems are experienced in starting the oscillator, the value of R2 can be reduced. R1 and C need not be used if the oscillation frequency is only a few KHz, but should be in the range of 50 to 500 ohms for R2 and 100pF for C if used. These values can be 'fiddled' to optimise the efficiency of the inverter if desired.

For most applications a DC output is required. The usual rectifier configurations can be used, but if the inverter is running at more than a few KHz, high speed rectifier diodes should be used.

The above brief notes show how to design inverters for many non-demanding applications. The two transistor inverter circuit is simple to design and easy to get going. The design is tolerant of component spreads and variations in supply voltage and overload. In fact a short circuit on the output winding will cause the oscillator to stop, preventing damage to the inverter components. The design is used in a wide variety of professional equipment.

For more detailed information see the MOTOROLA application note AN-222A. This note gives detailed design information. I can provide a photocopy of this application note to those who are interested. Good luck with your next design! Home brew rules OK!

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WAY BACK THEN... Episode 5.

Apr.1966 to Dec.1967 - and early VHF operation by Club members.

As I did not arrive in Wollongong until 1962 I do not have any records of operation by individual Amateurs in the area prior to that time. I replaced my 2 metre gear back in operation in June of that year, my first local contact being with VK2ANO on AM - the normal mode in use those days - on 144.09MHz, on 12.6.62. Other locals worked that year on 2 metres included VK2's ALV, ZRK, AFF, ZIH, AMD, ZNL and the Club station VK2AMW portable, using VK2ZRK's gear, at Mt. Keira Scout Camp.

I returned my 6 metre AM gear to operation in Dec. 1963 - with a contact with VK2ZRK. In the October 1965 issue of Electronics Australia there was an article on the modification of the "Pye Reporter" AM mobile transceiver for use on the 6 metre Amateur band. Several locals did this , with the result that we were now able to take up mobile operation in earnest! We also set up a Club Net shortly afterwards. It ran on 53.982MHz and we got together at 10am on Sundays. Some of the early Net members were VK2's ZRK, ZRY, AW, AMD, ALU, BRE and ZAI. I had AM contacts on this frequency until 1971. The WIA NSW Division's weekly broadcasts included one on 6metres AM - on 53.866MHz.

Of course, this was well before the days of our Club's Repeaters and it was the early 1970's before I started to log stations using FM (on 2 metres).

Perhaps someone who was operating locally on the VHF bands before my arrival in Wollongong may care to set down a record of activity prior to 1962 and also supplement my records of locals operating on these bands in the early days.

Getting back to Club activities - At the AGM in April 1966 the new Officers elected comprised Pres. Laurie Jordan VK2ALV, Vice Pres. Alan Ward VK2VH, Sec. Bob Young VK2ZAI, Asst. Sec. Don Reynolds VK2ZRK and Committee members VK2's BRE, ALU and ZCX. At that month's meeting there was also a discussion on operating problems on the Club's Net frequency (53.982MHz). It was recommended that "Overs be kept short and a check kept for stations trying to break in."(What's new!!!)

The program for Club meetings during 1966 included a display of members gear, audio tapes and slides on VHF Antennas, a film night, an auction night and a talk on Transistors. 6 metre Foxhunts were held each month during the year. The barbecue which was held in November at the home of Don and Pat Reynolds was voted a great success.

Late in 1965 a letter was received from NSW Divn. WIA, querying the use of the title "Section" in the name of several Radio Clubs. They indicated that clubs could either be a Branch of the WIA NSW Divn. or simply a Club. It was requested that we consider the options and advise them of our decision. After a period of discussion at Committee Meetings, the matter was put to the members at the July 1966 Monthly Meeting. The Asst. Sec. suggested that we become a Branch. However it was decided that firstly we should request that Members of the Council of the NSW Divn. WIA attend one of our future meetings, to explain the advantages and disadvantages of the options. This took place at the May 1967 Meeting, after which it was decided to apply to the NSW Divn. for listing as The Illawarra Branch of the NSW Division WIA. This would, amongst other benefits, result in us receiving a subsidy for those of our members who were

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also members of the WIA (13 at the time). Against this, we could not also charge them Club Membership dues. It was decided that the Club boundaries be those of the Wollongong Zone of the Civil Defence Organisation, but that membership for "individual Amateurs" need not be subject to this ruling.

At the AGM in March 1967 the following Officers were elected - Pres. Lyle Patison VK2ALU, Vice Pres. Laurie Jordan VK2ALV, Sec/Treas. Alan Ward VK2VH, Asst. Treas. John Simensen VK2ANO Committee - Peter Fackender VK2ZJF, Eric Fisher VK2DY and Bob Isaacs. The Meeting program for the year included talks on The Ionospheric Prediction Service, WICEN, Integrated Circuits, Civil Defence Communication, Low Voltage Transistor Power Supplies, an Audio Tape on TVI and a Question & Answer Night. A Ladies Night was held early in the year and a Christmas Party was held in December. Several Club members again participated in JOTA.

During the year a search was commenced for a new meeting place, more suitably located in the central part of the city. As a result we moved our Meetings to the Committee Room of the Wollongong Town Hall as from the November 1976 Meeting. (Cost $1.50 per night)

The issue to members of regular Monthly Newsletters commenced in April of this year. The Newsletter had no special name at this time.

Lyle VK2ALU.

MARCH MEETING

Don't forget the March meeting of the Illawarra Amateur Radio Society. This month, we bring you Peter Faulkner from the WIA, talking on the subject of Spread Spectrum communications.

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NEW MANUFACTURER ANNOUNCED

I have here a press release from a company called New Element Designs or NED for short, which claims to be Australia's largest maker of fictitious radio products.

The company's factory is located in Frederickton near Kempsey, NSW. In a low-key start to the market, the company has decided to target the IARS first, rather than advertise in the major magazines. Their first product is the NED-A1, a revolutionary dual band antenna for 2m and 70cm satellite work.

The NED-A1 achieves the circular polarisation required for satellite work by using a single 28 element yagi, fitted with a rotator to give the required spin. The feedline is connected through sliding contacts to prevent winding up the coax.

To control the rotation, an inbuilt microcomputer is programmed with the satellite parameters, making this the first ever smart antenna.

Early tests of the antenna showed that the computer was causing RFI to the received signal. Consideration was given into shielding the computer system, but it was felt that this would disturb the balance of this unique antenna. Instead, the interference is digitally removed by subtracting the (predictable) RFI component from the incoming signal. (This would not keep the RFI from your other antennas...Ed)

The company's spokesman, Mr Joseph King, is quoted is saying, "With this antenna, we are showing that this country already has the technology to design products that Japan has not even considered yet. We hope to introduce some home grown technology onto the Amateur bands, and even break into the international market."

We will keep you posted on any significant developments from this world-leading company.

Ripple on the S.S.B. 'Scope Pattern

IT IS well known that a perfect single-tone single-sideband signal consists of but a single radio frequency. When such a signal is displayed on the face of a 'scope being swept horizontally at an audio-frequency rate, the pattern is a horizontal band having perfectly smooth and straight upper and lower edges. It is identical with the pattern of any unmodulated carrier.

If the suppression of the other sideband or the carrier is not complete, the edges of the pattern show a ripple. Assuming that the carrier is completely suppressed, the relationship between the desired and undesired side frequencies can be represented by the phasor[1] diagram shown in Fig. 1. *AB* represents the amplitude

Fig. 1 — The mechanism by which the undesired side frequency makes a "ripple" on the desired side frequency of an s.s.b. signal. Other possible spurious components are neglected in this drawing, but can be included if their relative amplitudes, phases, and frequency separation from the desired side frequency are known.

of the desired side frequency and *BC* the amplitude of the undesired side frequency. The latter rotates with respect to *AB*, with *C* describing the dashed circle. The rate of rotation is equal to twice the audio modulation frequency since the two frequencies are separated in the spectrum by that number of cycles. At some instant during each such period of rotation point *C* will reach *X* and the total instantaneous amplitude will be the distance *AX*. A half-period later *C* will coincide with *Y* and the total instantaneous amplitude will be *AY*. As displayed on the face of the 'scope, this time variation is transformed into a ripple along the horizontal edges of the pattern, the maximum vertical excursions lying between *AY* and *AX*.

Since the relative amplitudes of the desired and undesired are *AB* and *BC*, respectively, the ratio of desired to undesired is *AB/BC*. This amplitude ratio is also equal to twice the length *AB* divided by the distance *XY*. In terms of the 'scope pattern, this means that the average height of the pattern divided by the vertical distance between a peak and valley of the ripple gives the ratio by which the undesired side frequency is suppressed.

Fig. 2 shows these quantities as they appear on the tube face, together with typical patterns for various ratios of spurious suppression. The latter are drawn as closely to scale as possible, and therefore can serve as a guide to estimating spurious suppression without actual measurement and calculation.

In examining such a pattern, it is necessary that the horizontal sweep in the 'scope be synchronized at some submultiple of the modulation frequency in order to get a stationary picture. Without such synchronization the ripple becomes merely a blur. Since the edge of the blur is a straight line, the unwary operator can lead himself to believe he has a "perfect" s.s.b. transmitter when in actuality it may be pretty poor.

It is also necessary, although it should not be, to emphasize that the audio gain must be kept below the point where any stage in the transmitter tends to saturate. Saturation of an amplifier gives a beautiful pattern, but unfortunately, the actual output contains all sorts of spurious that the 'scope can't show.

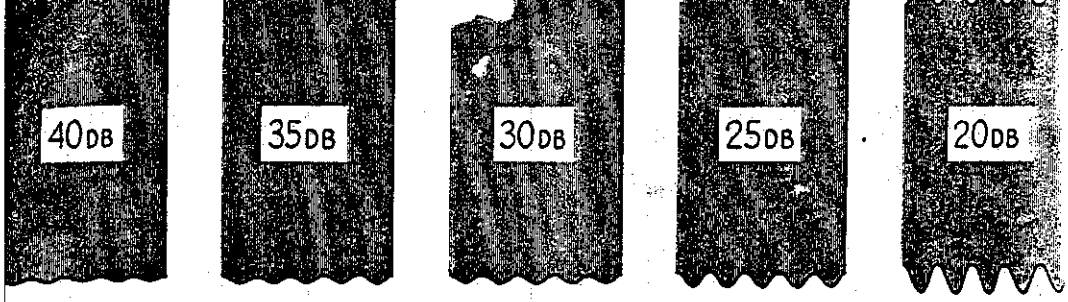
Total Spurious

The actual situation in a practical transmitter is not quite so simple as it has been outlined above. The assumption that the transmitter output consists only of the desired side frequency and its undesired "image" can seldom be justified in practice. There are always other components present in the transmitted signal even when the audio input is ostensibly a single tone. These are (1) the residual carrier, if it is not balanced out to considerably better than 40 db. below the desired side frequency; (2) components resulting from harmonic distortion either in the audio input signal or added to the signal in the speech amplifier and modulator; (3) intermodulation components generated in r.f. stages.

These components have a definite frequency spacing in the spectrum, always appearing at some multiple of the audio modulation frequency on one side or the other — or on both sides — of the carrier frequency. The amplitudes of the last two, at least, can easily exceed the amplitude of the undesired side frequency in a well-designed single-sideband transmitter. What the 'scope shows, consequently, is the composite of all the spurious components present.

As a result, the actual shape of the ripple

[1] The term "phasor" is not used in an attempt to confuse the reader, but to conform with a recommendation of I.R.E. "Phasor" is preferred to "vector" because while the vector representation is convenient for showing relative phase and amplitude of a.c. currents and/or voltages, these quantities are not actually vectors — that is, there is no spatial direction associated with them.



$$\frac{\text{DESIRED}}{\text{SPURIOUS}} = 20 \log \frac{X+Y}{2(X-Y)} \text{ DB}$$

FOR 40 DB	$\frac{X+Y}{2(X-Y)}$	= 100
35 DB		= 56
30 DB		= 32
25 DB		= 18
20 DB		= 10

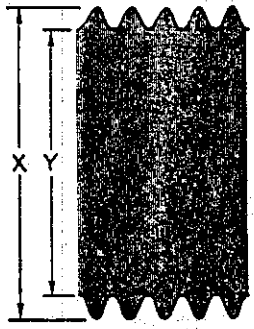


Fig. 2 — Examples of 'scope patterns for various desired/undesired ratios, and the method of calculating suppression of composite spurious from measurement of the 'scope pattern.

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ng the edge of the pattern is seldom as conventionally sinusoidal as the ripple in the drawing of Fig. 2. The ripple peaks are a measure of the total effect in about the same way that the corresponding peak-to-peak variations are a measure of the total effect of an ordinary a.m. signal displayed on a 'scope. That is, when the a.m. signal is tuned in in the normal way, with the beat oscillator off, using a receiving bandwidth large enough to accept the entire transmitted spectrum, the audio output is the total effect of the variations seen in the 'scope pattern. If the s.s.b. signal is tuned in similarly (using the desired side frequency as the carrier) the audio output from the signal is the total effect of the ripple.

No one component of the several always present in an actual signal can be separated readily from the others in the 'scope pattern. To do this requires a "spectrum analyzer" such as a receiver having sufficient selectivity for the purpose. Also, the peak-to-peak ripple as shown by the 'scope is usually less than the arithmetic sum of the individual components that make up the composite signal because of the non-uniform phase relationship between components. However, it is not likely that any *single* component would have an amplitude greater than that of the composite ripple. Hence the latter would appear to offer a reasonable basis for rating the desired/spurious ratio of the transmitter. As compared with other methods of rating that might be chosen, it has the advantage of being readily measured with the conventional 'scope set-up.

A desired/spurious ratio not exceeding 30 db. at any audio frequency within the nominal a.f. band of the transmitter can be achieved if the transmitter is adjusted and operated with reasonable intelligence. On a pattern having an average height of 2 inches (typical of a 5-inch 'scope) the peak-to-peak ripple height is 1/16 inch for a 30-db. ratio.

—*G.G.*

MORE QSL CARDS AT IARS!

The latest round of cards delivered from the QSL bureau to the Society are for the calls listed below. As usual, if your call is lsted and you received cards in the mailbox in the last month, ignore this notice.

Cards for VK2's: ALK, AND, ANO, BHO, BIT, CO, CDP, CRM, EJH, ENX, FCW, FGC/KHO, JJ, JAC, JHW, JJJ, KO, KEY, KHE, KSP, KSY, KWN, NNJ, OJ, PG, ZNS.

Please arrange to pick up your cards from Graham VK2GID. They will be available at the March meeting for collection. Small numbers can be posted out with the Propagator.

Also, if you have any QSL cards to go out, get them to Graham VK2GID or Bill VK2JBS and we will forward them to the Bureau at no cost to you.

POST BOX - All mail can be sent to "THE ILLAWARRA AMATEUR RADIO SOCIETY" at PO Box 1838, Wollongong, 2500.

REPEATERS	- VK2RUW -	29.620	Voice	Mt Murray/Knights Hill
	- VK2RAW -	146.850	Voice	Mt Murray
	- VK2RIL -	147.275	Voice/RTTY	Sublime Pt
	- VK2RAW -	147.575	Packet (NetRom)	Mt Murray
	- VK2RUW -	147.575	Packet (ROSE)	Knights Hill
	- VK2RUW -	438.225	Voice	Knights Hill
(Off air)	- VK2RIL -	438.725	Voice/RTTY	Sublime Pt

BROADCASTS - The Wireless Institute of Australia, N.S.W Division broadcast is relayed to 29.620 MHz and 146.850 MHz at 10.45am and 7.15pm each Sunday. Callbacks after the broadcast. RTTY broadcast in the week before the Club meeting, Sunday evening, 8:45pm on 147.275 MHz, relayed onto 3.618 MHz +/- QRM and 29.620 MHz, with callbacks immediately after.

NEWS LETTER - The "PROPAGATOR" is published each month to reach all financial members in the week preceding the Club meeting. Articles and letters are always welcome. Commercial advertising $40 per quarter page per year, member's classifieds free for one issue. See Graham VK2GID for details.

MEMBERSHIP - $15.00 P.A, concessions $12.00 P.A, expiring immediately after the Annual General Meeting in July.

STORE - The Club store is open at each meeting, and sells all sorts of [illegible] to get knick-knacks that you might need.

LAWRENCE HARGRAVE AWARD - VK stations require 10 contacts with IARS members. Overseas stations require 5 contacts. One contact with the Club station VK2AMW is suitable. Details of contacts are to be sent to the Club secretary.

********** COMMITTEE **********

PRESIDENT	-VK2KLH - Brian Clarke	
VICE PRESIDENT	-VK2GID - Graham Denney (042) 294170	
SECRETARY	-VK2KCV - Pat Kennedy (042) 673199	
ASSIST SEC	-VK2GPJ - Pat Jordan	
TREASURER	-VK2TKE - Ken Goodhew	
ASSIST TREAS	-VK2SRB - Robert Bonella	
COMMITTEE	-VK2DSH - Dale Hughes	-VK2GPJ - Pat Jordan
	-VK2XCC - Ray Ball	
ASSOCIATES	-VK2JRG - Ron Hanks	-VK2KWG - Ken Grimm
	-VK2MT - Rob McKnight	-VK2SRB - Robert Bonella
	-VK2XLA - Graeme East	
	-VK2XGJ - John Simons (042) 614628	
REPEATER PRES	-VK2MT - Rob McKnight	
REPEATER COMM	-VK2TKE - Ken Goodhew and others	
QSL CARDS	-VK2JBS - Bill Stone	-VK2GID - Graham Denney
PUBLICITY	-VK2KWG - Ken Grimm	
BROADCAST	-VK2TKE - Ken Goodhew and his merry men	
EDITORS/PRINTERS	-VK2DSH, VK2GID, VK2XCC	
SOCIAL DIRECTOR	-VK2XCC - Ray Ball	
CANTEEN	-VK2JRG - Ron Hanks	
STORE & TOWER	-VK2KVH - Vic Hee	
DOTC LIASON	-VK2OB - Keith Curle	
LIFE MEMBERS	-VK2ALU - Lyle Patison	-VK2CAG - Graeme Dowse
	-VK2OB - Keith Curle	