



THE PROPAGATOR



MONTHLY NEWSLETTER OF THE ILLAWARRA AMATEUR RADIO SOCIETY

P.O. BOX 1838 WOLLONGONG N.S.W

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.. DECEMBER:1985

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MEETINGS ARE HELD ON THE SECOND TUESDAY OF EACH MONTH
(EXCEPT JANUARY) AT 7:30 PM AT THE STATE EMERGENCY SERVICES
BUILDING, MONTAGUE STREET, NORTH WOLLONGONG.
VISITORS ARE WELCOME TO ATTEND MEETINGS.

Merry Christmas and a Happy New Year !!!

NEXT MEETING -: The next meeting of the Illawarra Amateur Radio Society will be held at the State Emergency Service Headquarters in Montague Street, North Wollongong, on December 10th.

The meeting will be a ragchew meeting with no guest speaker so come along and join us in a cup of coffee or tea and a biscuit and have a chat with those present.

All members and friends or family are welcome to attend and any visitors will be made most welcome.

The raffle prize this month will be a Christmas ham so bring your money with you (or bring the XYL along to get the tickets).

Note that this is the last meeting for several months as there is no January meeting. The next meeting will be the February meeting (and after that, the March meeting which is the Society's Annual General Meeting).

CHRISTMAS PICNIC -: The annual Christmas picnic will be held on December 8th at Cataract Dam. Note that this is the Sunday BEFORE the December meeting of the society.

This is always a fun social day where the families of the club members get to meet each other. As usual games of cricket (perhaps we can emulate the Australian teams performance in the second Test against N.Z.), volley-ball etc. will be arranged and of course Santa Claus will arrive as his schedule allows. (If you are bringing children along please bring along a small present for each child for Santa to give to them.)

Note that tickets for the Christmas ham to be raffled at the December general meeting will be sold at the picnic.

From the Editor.....

Well it's that time of the year again. Every year seems to bring Christmas around faster than last year - a sure sign of old age setting in!

Over the next few weeks, all thoughts will be directed to the Christmas/New Year holiday period, and for all those lucky enough to be travelling over this period, I trust that your holiday will be a safe and happy one.

Perhaps at this time, it is wise to look back over the year in the club and see how things can be improved next year.

On the repeater front, the year started with the installation of a solar panel at Mt. Murray repeater to boost energy during the Summer months which previously had been periods of high energy consumption due to extra use over the holiday period, and low energy input due to lack of wind at the wind generator. During the year many comments have been heard on air praising both the repeater and the repeater committee for performing such a fine job in producing a repeater "to rival any in Australia!!"

Apart from minor energy problems at Mt. Murray and (very) few small faults in the other repeaters, the four I.A.R.S. repeaters have become almost maintenance free and can be considered a credit to the repeater committee and are assets for the club to be proud of.

At the Moonbounce site, all has been working very well, and during the first few months of the year, several good quality contacts were made on 1296 MHz, again thrusting VK2AMW into the world of EME, after the long arduous task of relocating the dish and rebuilding the station again.

Of course much credit goes to Lyle Patison VK2ALU who was granted life membership of the club this year in recognition of his services in the EME area and to the club in general.

Unfortunately, the EME site was again broken into during September and the equipment has been removed for safekeeping. Security is still being considered and measures will be taken to protect the site in the future.

Throughout the year attendances at the club meetings have been fairly good, averaging about 45 - 50. This is probably due to the excellent speeches and demonstrations held during the year. However the club has at present about 120 financial members, so perhaps next year we should aim at a higher level of attendance at the meetings. Why not aim to attend say, half the meetings next year?

Sadly during the year, one of our good club members and friends, Jim Mead VK2EJM passed away. Jim has been much missed at the club meetings during the year, and his voice has been missed on air.

Due to running costs of putting out the club newsletter "The Propagator", the newsletter may next year have to drop

a page from its printing run. At present the club has about 120 financial members for which each member receives one copy. In addition another 15 to 20 copies have to be printed to send to various other clubs, the WIA and the Department of Communications. Thus about 140 copies are being printed every month.

Alas the cost of paper and toner to print this amount of paper every month is becoming too much for the club to bear. Thus until we can obtain a source of cheap B4 paper, the newsletter will have to be reduced from 12 to 8 pages.

As Propagator editor and Broadcast Officer for the club, I would like to acknowledge the assistance of Jim Hayes VK2EJM and Gerhard Mueller VK2XGA on the newsletter, and Ian Callcott VK2EXN, Morry Van De Vorstenbosch VK2EMV and Wojciech Tomczyk VK2OE for the broadcast. Thanks fellas for the help and also to those who have helped with constructive criticism, articles or callbacks..... that's the only way I know if things are going wrong! Also, thanks to Mike Keech VK2DEK for the printing of the Propagator.

Well, thats about all I have space for this month except to wish all of you and your families a very happy and save Christmas period, and I look forward to seeing all of you next year.

73's from Paul VK2KPS.

THE SECRETARY

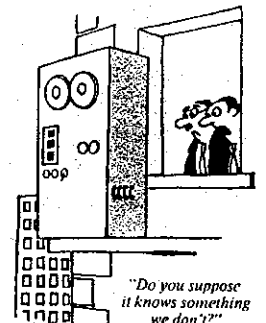
The Secretary — He just can't win.

If a Secretary writes a letter, it is too long; if he sends a postcard, it is too short; if he issues a bulletin, he's a spendthrift; if he attends a committee meeting, he's butting in; if he stays away, he's a shirker; if he offers a suggestion, he's a know-all; if he says nothing, he's useless; if attendance at the meeting is slack, he should have called the members up; if he calls them up, he's a pest; if he asks a member for his sub., he's insulting; if he doesn't, he's lazy; if the meeting is a big success, the committee gets the praise; if it is a failure, the Secretary is to blame; if he asks for advice, he is incompetent; if he does not, he is swollen-headed.

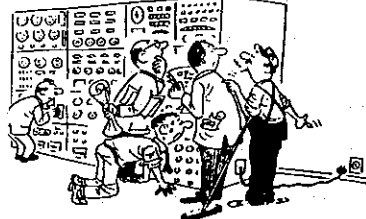
Ashes to ashes, dust to dust,
If the others won't do it, the Secretary must!



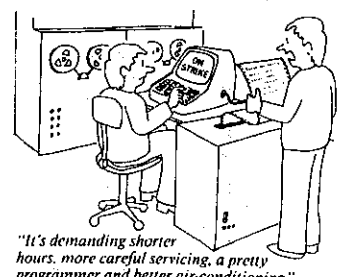
"I did it! I broke into the Smiths' computer and got Edith's recipe for lasagna!"



"Do you suppose it knows something we don't?"



"Computer still in the shop, Jenkins?"



"It's demanding shorter hours, more careful servicing, a pretty programmer and better air-conditioning."

REPEATER REPORT - GRAEME - VK2CAG

There have been no visits to the repeater sites in the last month or so, since there have been no problems.

The weather is getting more suitable now for doing work on repeaters, and we can be thankful that we have had very few calls to the various repeater sites do do necessary maintenance work over the winter period.

This month we intend looking into making some changes to the control system for Mt. Murray. Now that the summer period is back again, it will surely bring with it the energy shortage that plagued us last summer. The changes will be centred around more suitable ways of conserving the energy that is available. The 20 second time-out that we had to impose last year to limit repeater useage came in for a fair amount of criticism, especially from those users outside our own club, obviously from a lack of understanding of the problem.

Because of other club running expenses, particularly the cost of issuing the Propagator each month, our finances cannot stretch far enough to be able to spend the \$300 or so on another solar panel. After much investigation and discussions at committee level over the winter period, we seem to favour the idea of reducing the output power rather than shortening the time-out when the battery voltage is getting low. A combination of both low power and short time-out can be used only under extreme conditions, so it should not be necessary to switch the repeater off altogether, as has been the case in a few instances last year.

When these measures are implemented, there will be some sort of audible indication by way of loud beep tones which will be independent of the ident., similar to the system used at Dural channel 7000. When the power fails and the repeater is running from battery supply. More info will be given in the Propagator when the changes are made.

Other non urgent work to be done on repeaters are the making of duplexers for the other 3 repeaters. We are in possession of the cavity resonators for one 2 metre repeater (Sublime Point) and two 70 cm. repeaters. The difference the duplexer made to Mt. Murray was obvious. Just think how much better the rest of our repeaters will perform when fitted with duplexers combined with single improved antenna.

I have less time these days to spend on the repeaters, and would appreciate any one who can volunteer to take over any of these projects. If left entirely to me. it will take years to complete. I am quite happy to keep on maintaining the repeaters and upgrading the RF and control circuitry as technology advances, however, I do not have the time to build duplexers as well. The power reduction circuit for Mt. Murray involves the design and making of a pair of self-latching co-axial relays to bypass the final stage. This seems to be the only energy efficient way of doing the job. There will be quite some considerable time involved in making the special relays.

LATE REPEATER NEWS -: Due to the recent interference being caused to Mt. Murray repeater by an unknown person attempting to access the commands to control the repeater, the repeater committee have decided to close down the repeater when such interference occurs.

The repeater cannot be commanded by the recorded signals being used, but the source of the transmissions is so persistant as to affect the energy situation at the repeater. Thus the decision was made in the interests of the club members who wish to use the repeater. Please bear with the situation for present, and if the offender is heard, please DO NOT acknowledge his presence.

Editor

E.M.E. REPORT BY LYLE VK2ALU

The project which involves modifications to the feedhorn of the dish, has now commenced. The test rig has been completed, initial ground to sky noise and reference signal levels have been determined using the receive port. Measurements have been made of reflected power to forward power at the transmit feed port, using a high power signal generator and digital frequency meter to obtain the precise frequency in the 1296MHz region.

The feed probes will be removed and modified after polarisation rotation and circularity characteristics have been checked. They will then be reassembled and reoptimised, followed by adjustment of the polarisation and decoupling posts.

Further details have been finalised for the new security system and it is hoped that construction of equipment will commence shortly.

Satellite Notes.

Oscar 10 continues to provide good access to stations in the USA area.

Early November provided an opportunity for stations with transmit capability on 437.275MHz to try for a 'contact' with DP/SL, on board the Space Shuttle Columbia. The downlink signals on 145.575MHz were loud enough to be heard clearly on a 2 metre 'handy talky', using its normal 'rubber ducky' antenna. All transmissions heard at this QTH were from the spacecraft's automatic transmitter, which sent the callsign identification followed by the message 'record on tape' in morse code, after which approx. one minute was allowed for uplink transmissions from ground stations. Those received by the spacecraft equipment were taped for future acknowledgment. It is understood that the astronaut hams aboard the Shuttle Columbia also operated 'live' on occasions.

Several amateurs in the Wollongong area heard the signals from the spacecraft, using orbital prediction computer elements which were first heard at this QTH over Oscar 10.

Lyle VK2ALU.

Transmit Xtals Wanted

I spoke today to Basil Dale VK2AW, in Sydney via Rpr 5 on 2 metres. Basil will be well known to older Club members and wishes to be remembered to them. He sounded 'fighting fit' and is now 5 years into retirement.

Basil indicated that he is looking for xmit xtals which have a frequency either in the 7MHz CW band or 3.5MHz CW band. Should any Club member have such a xtal which he does not need then Basil would be happy to negotiate for it. His address is OK in the 1984/85 Callbook, or any 'giveaways' will be forwarded to him via VK2ALU.

Electrolytic Capacitors

Most of us build power supplies from time to time and are tempted to cut corners by using second-hand components. This is a laudable aim, but it is a good idea to be sure that the components are serviceable. These notes are intended to assist you in understanding something about electrolytic capacitors.

An electro packs a lot of capacity into a small space. Unlike the more usual capacitors which use a dielectric made of air, mica, paper, or plastics, the electro uses an incredibly thin layer of oxide as its dielectric. This dielectric is formed and maintained by a voltage applied to the terminals. Because of this these units are polarized, have a definite leakage current, are temperature sensitive and have high inductance. The latter makes them useful for low frequency use only.

Principal of operation: A metallic ANODE is coated with an oxide film which is the dielectric. A second metallic conductor serves primarily as the connection to the liquid CATHODE, thus providing an external connection. Note that the cathode is a liquid. In practice porous paper is wrapped around the metallic anode and saturated with the electrolyte to eliminate the spillage problem. The most common types of electros are the aluminium and tantalum, the aluminium being both larger and cheaper. It is important to understand that the aluminium oxide film has a very high resistance to current in one direction and a low resistance in the opposite direction, that is to say the film acts as a dielectric in one direction but as a plate or anode in the other. Because of this the correct polarity must be observed. If not the oxide film will break down, having in itself become anodic, and will promptly migrate to the cathode connection; bye bye electro. Special types such as semi and non-polarised electros will not be considered here.

Two points should now be apparent. Leakage current is necessary for operation and electros can and do dry out. Life is long but not infinite.

Leakage current: Leakage current can give us a good clue to the health of the beast. It is reasonable to assume that the higher the capacity the higher will be the leakage current. Shown here are the maximum tolerable leakage currents at room temperature, and after the capacitor has been allowed to fully re-form.

<u>Rated DC Voltage</u>	<u>Max. leakage in mA</u>
Up to 25	.002uF + 0.1
Up to 50	.004uF + 0.1
Up to 150	.01uF + 0.2
Up to 450	.02uF + 0.3

Thus a 1000uF unit rated and measured at its rated voltage of 25v should exhibit a steady leakage of no more than 1000 x .002 plus .1 milli-amps. That is 2.1 mA maximum. Most good units will show much less leakage. Discard those with higher leakage.

Note -: A discharged capacitor is briefly equivalent to a short circuit as the initial charging current flows. Secondly, if the electro has not been used for some length of time it may partially deform in storage and will require some minutes to reform the oxide film, a process that can be watched on a multimeter (milliammeter) in series with the applied voltage source. (Use a current limiting resistor to protect your meter!)

Temperature: Electros are temperature sensitive. Leakage current and capacity increase with rising temperature whilst the break-down voltage decreases. Units are generally rated at 25°C unless otherwise marked. As the temperature and leakage both increase, internal self-heating occurs rising both parameters again, a sequence that can lead to self-destruction. Reminiscent of transistors? The life is also much affected by heat.

Ripple: Filter capacitors in a power supply work by smoothing out the pulsating DC from the rectifier, alternatively absorbing the peak voltage and discharging it again. That is, it acts as a reservoir and thereby offers smoother DC to the circuit in use. This action involves work, and the greater the ripple the harder the electro has to work. Hard work equates with a shorter life-span and units used in power supplies must have adequate margins if longevity is to be achieved. The following illustrates the combined effects of temperature and ripple:
 At 65°C at rated voltage with no ripple expected life is (say) 10 000 hrs.
 At 75% rated voltage and no ripple, life doubles to 20 000 hours.
 At 75% rated voltage but 85°C, no ripple life is about 7 500 hours.
 At 75% rated voltage 85°C, ripple introduced, life is about 1 000 hours.

Working voltage: The rated voltage must never be exceeded, nor is it wise to greatly under-run the unit. Bear in mind that in circuits containing AC, the peak voltage will be the algebraic sum of the DC and AC components present. Similarly, the AC voltage must never cause the polarity to reverse. Should excessive voltage rupture the dielectric, leakage current would rapidly increase causing internal heating with possible explosion of the case. Most modern electros have a rubber seal to prevent explosion by venting excessive pressure, but under sufficient provocation the odd one may literally blow its guts out. We have seen that an adequate potential is needed to keep the unit fully formed and therefore it is a good idea not to under-run the capacitor too much. Choose a unit whose rated voltage is about 20-30% higher than the actual voltage encountered. For example an 18 volt working electro would be a good choice for a 13 volt circuit.

Summary: Put an over-run electro in a hot place and it will have a short and miserable life. It may even commit suicide, and if it is in a part of a circuit that can draw a heavy current it may take other components with it. Keep them cool, comfortably within the rated voltage, never reverse polarise them, never short-circuit them to test them, and they will give a long and reliable service. Treat large computer grade units with special care. They can store enormous amounts of energy for long periods due to their large capacity and low leakage. Circuit arrangements should always provide a path to bleed such capacitors following circuit shut-off.

I hope these comments may have been of some interest to some of the members at least, and help towards a greater understanding of something usually taken for granted. The development and manufacture of these devices is a fascinating story in its own right, but we'll leave that for another day.

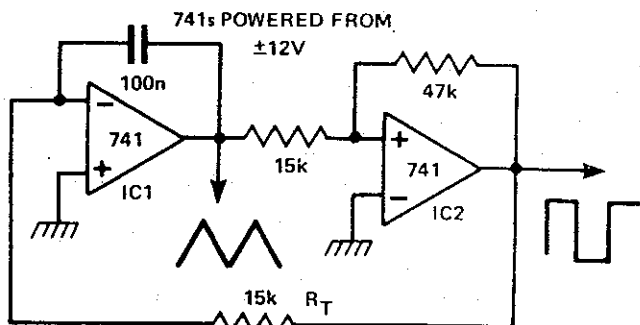
References - ARRL Handbook
 ABC's of Capacitors

(Written by Clive VK2DQE, reprinted from "Dragnet".)

Designing Oscillators

An oscillator is basically an amplifier with positive feedback to ensure a constant amplitude source. Limiting is needed to maintain the amplitude of oscillations at a steady value. This limiting may take the form of sensitive thermistors, diode limiters or FET automatic gain control (AGC) circuits.

The following few circuits are guaranteed to produce the described oscillations depending on the component values. (Information and circuits compiled from Electronics Today International, December 1979)

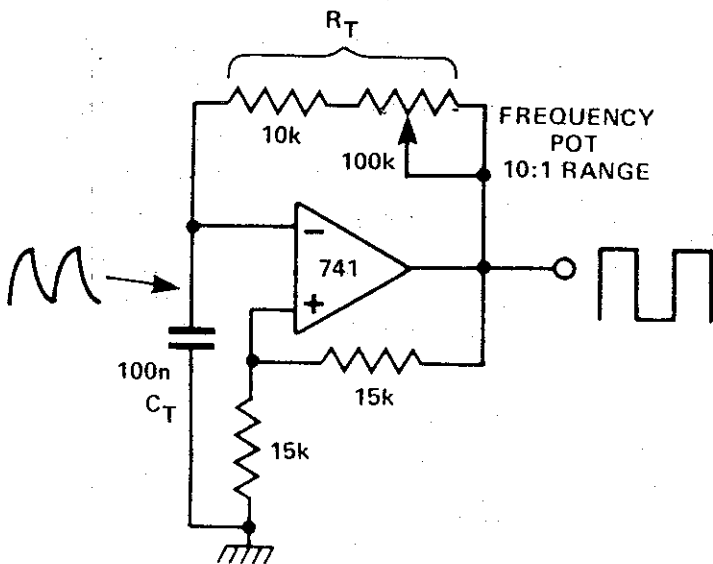
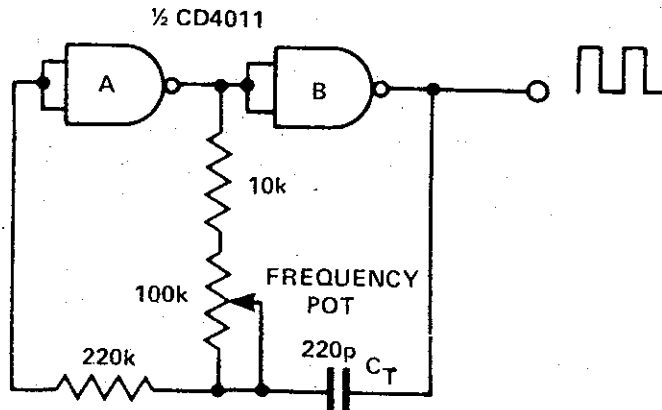


CMOS Oscillator

Two CMOS gates can be used to produce a simple oscillator. Imagine that output B is high. Then the input to A is also high due to it being coupled via the capacitor C_T to output B. Thus output A is low, input B is low and output B is high, which is as we would expect. However, capacitor C_T is being discharged via the 100k pot and 10k resistor to a logic 0. When this voltage reaches the crossover point for A, output A goes high, and thus output B goes low. Now the capacitor is charged up to a logic 1. Thus the process repeats itself. Varying the 100k pot changes the discharge rate of C_T and hence the frequency. A square wave output is generated. The maximum frequency using CMOS is limited to 2MHz.

Simple Triangle Square Wave Oscillator

This circuit simultaneously generates a triangle and a square waveform. The triangle could be 'bent' by a diode function generator to produce a sinewave. The circuit is always self starting and has no latch up problems. IC1 is an integrator with a slew rate determined by C_T and R_T and IC2 is a Schmitt trigger. The output of IC1 ramps up and down between the hysteresis levels of the Schmitt, the output of which drives the integrator. By making R_T variable it is possible to alter the operating frequency over a 100 to 1 range. Three resistors, one capacitor and a dual op amp are all that is needed to make a versatile triangle square-wave oscillator with a possible frequency range of 0.1Hz to 100kHz.



Manually Controlled Oscillator

In this circuit there are two feedback paths around an op-amp. One is positive DC feedback which forms a Schmitt trigger, the other is a CR timing network. Imagine that the output voltage is +10V. The voltage at the non-inverting terminal is +5V. The voltage at the inverting terminal is a rising voltage with a time constant of $C_T R_T$. When this voltage exceeds +5V, the op amp's output will go low and the Schmitt trigger action will make it snap into its negative state. Now the output is -10V and the voltage at the inverting terminal falls with the same time constant as before. By changing this time constant with a variable resistor a variable frequency oscillation may be produced.

GOING TO THE CHRISTMAS PICNIC ??? If so why not wear the I.A.R.S. Tee-shirt if you have one. It would be good to see the club being promoted so well on that day. Remember the picnic on December 8th at Cataract Dam.

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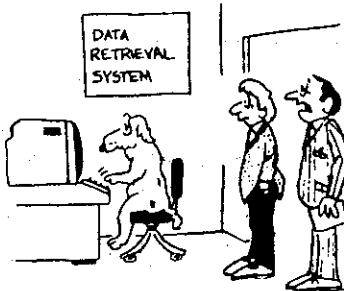
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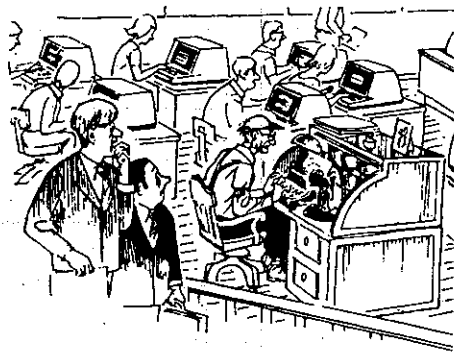
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(Just up from the Harp Hotel)



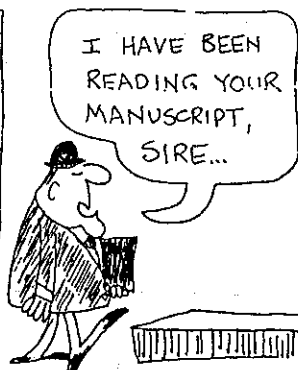
"I know he's a retriever,
but this is ridiculous."



"But we can't phase him out.
He's the only one who can spell."



THE ROYAL
PUBLISHER
TO SEE
YOU, SIRE!



I HAVE BEEN
READING YOUR
MANUSCRIPT,
SIRE...



I BELIEVE IT STANDS
A GOOD CHANCE OF
BEING THIS YEAR'S
FICTION BEST-SELLER



HOW DO I TELL HIM
THAT'S MY LOG FOR
THE VK/ZL CONTEST?

VKZAN

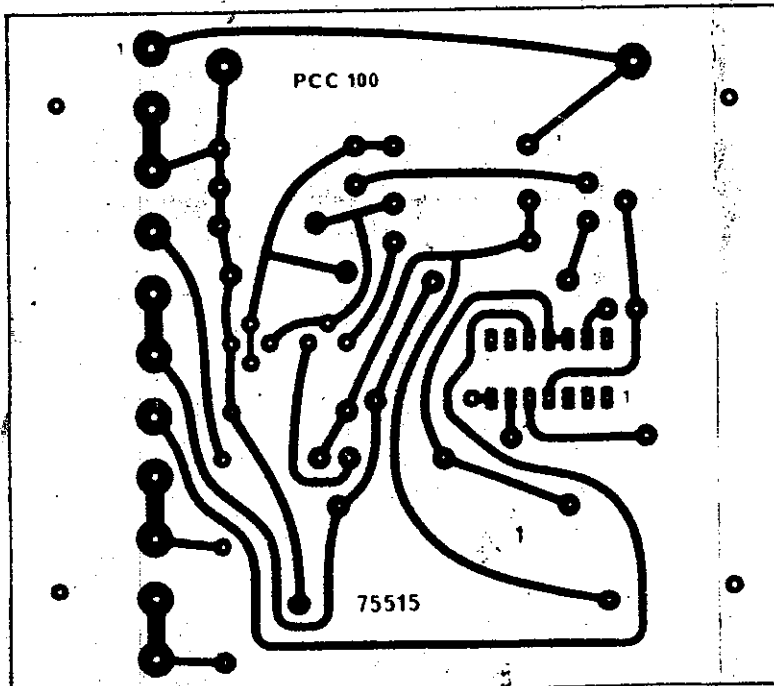
Definitions

- Automatic Level Control - A magazine used to prop up the front of the rig so you can read the dial more easily.
- Anti-trip Device - A real short mic cord.
- Resting Current - What you get when you touch the high tension terminal on your linear.
- Modulation Envelope - The one your phone bill comes in.
- Envelope Detector - A letter box.
- Product Detector - The name plate on the rig.
- PTT - Noise of a fuse blowing.

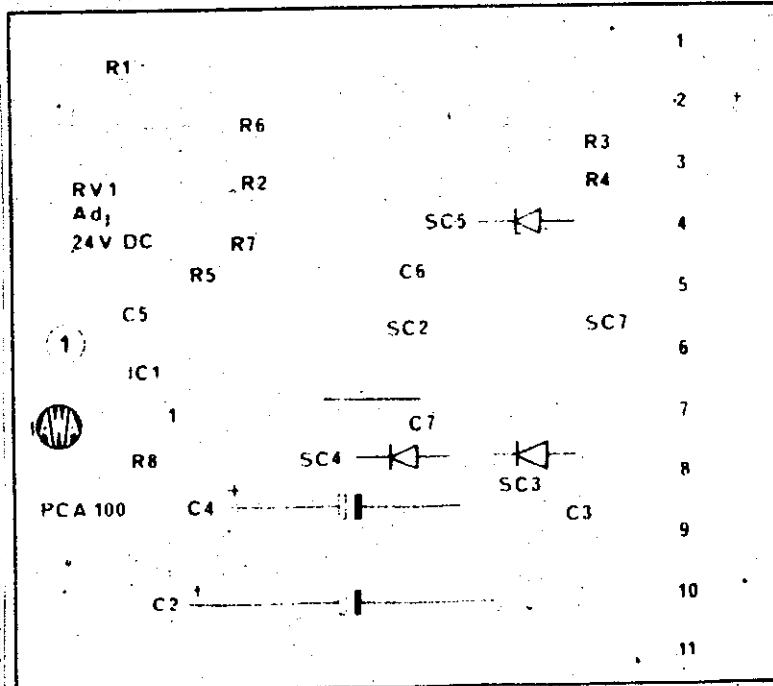
(Reprinted from B.A.R.G. News from the Ballarat Amateur Radio Group.)

Power Supply Circuit Details

For those of you who bought the 24 volt power supplies from 'the club store' (Cavions) several months ago and were after details of how to modify them, here is the circuit diagram and printed circuit board layout and foil pattern. (See also the July issue of the "Propagator" this year for details of how to modify the supply for 12 volts @ 2 amps.)
 Thanks to Ray VK2XCC/PHD for the diagrams.



PRINTED WIRING SIDE



COMPONENT LAYOUT

ELECTRONIC SYSTEMS



FOR THE 747s

A great deal has been written about the Boeing 747 Superjet—its huge dimensions compared with present-day international airliners; its passenger and freight capacity and the demands it will make on airport facilities. Less well publicised is the enormous array of electronic communications equipment it will carry—almost one million dollars' worth on each individual aircraft.

Equipment for the 747 was described recently by Mr John Wilmott, assistant communications manager of Qantas Airways. He was addressing a Sydney Division meeting of the Institution of Radio and Electronics Engineers, Australia.

Mr Wilmott said that some of the equipment was comparable with that currently in use in the airline's smaller 707 aircraft. Some of it reflected a changing emphasis in facilities and procedures; some of it represented a complete departure from present methods.

Like all other modern planes, the 747 makes extensive use of electronic devices to meter, monitor and control its physical and mechanical functions. The communications and navigational equipment which formed the subject of the lecture was quite distinct from this, adding up to 28 major systems for the Qantas version, as currently planned. Other equipment may be substituted or added during the life of the aircraft, if and when the need arises.

Many of the systems involve duplication or triplication as a precaution against failure. In design, the equipment relies heavily on solid-state technology, a factor which has not only made possible improved operational efficiency, but also a reduction in size, weight and power supply demand. As a result, while the equipment adds up to a complex and costly whole, it does not present anything like the weight penalty than would otherwise have been the case.

Summarised, the communications equipment in the Qantas 747s is as follows:

- Two HF single-sideband transceivers for the range 2-30MHz. These operate in conjunction with probe antennas, through couplers which adjust automatically to each new select-

ed frequency, with a VSWR of better than 1.3. Since most ground stations still operate on AM, the equipments will be used for much of the time in a compatible signal mode, radiating full carrier with upper sideband.

- Three VHF communications transceivers, operating in the range 118-136MHz. Two include provision to communicate via a satellite circuit. The antenna system is circularly polarised to minimise fading due to Faraday rotation. Qantas experiments during trans-Pacific flights some time ago demonstrated the potential value of a VHF satellite communications system, normally referred to as "SATCOM."

- Three VHF Omni-range navigation systems (VOR) operating in the range 112-118MHz. Integrated with them are three instrument landing systems (ILS) on 108-112MHz, and glide slope receivers on 328-335MHz.

- Two ADF radio compass systems operating on 190-1750KHz.

- Two DME (distance measuring

equipment) systems, 960-1215MHz. The display system includes a new feature, "ident blanking." If two beacons on the same frequency are within range, the call sign of the "locked-on" beacon will be the only call sign displayed to the pilot. The effective range has been increased from 200 miles to 300 miles.

- One VHF marker receiver on 75MHz.

- Two weather radar systems, operating on 9345MHz. These are for X-band operation, which represents a change for Qantas, whose aircraft are currently equipped with C-band weather radar. While the case for and against different classes of weather radar are not conclusive, X-band radar penetrates to more remote weather fronts and also offers the physical advantage of a much smaller antenna. Both features are an advantage for supersonic aircraft, such as the Concorde, which are faster and slimmer, and it makes good sense to standardise equipment for the 747 and the Concorde. The complete duplication of the weather radar elements, apart from the final waveguide and dish, is also an innovation in Qantas aircraft.

- Two air traffic control transponders, 1030-1090MHz. These automatically display the position and identity of the aircraft to the ground radar controller, together with its altitude.

- Two low-range radio altimeters

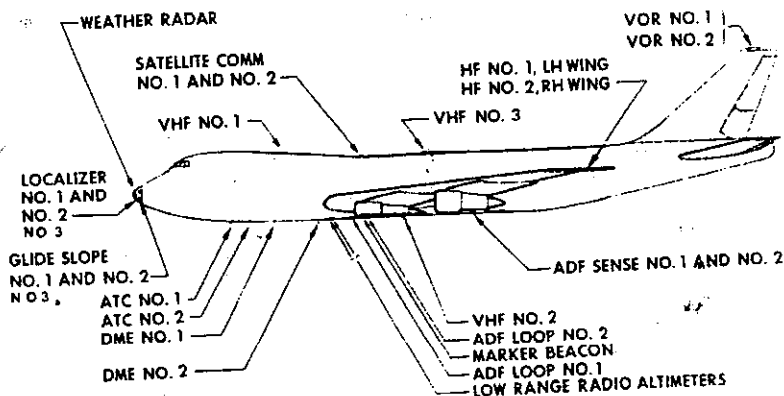


Diagram showing the locations of the 747s aerial systems.

(LRRRA) operating on 4300MHz. The frequency is deviated at a periodic rate and the equipment senses height by comparing the outgoing frequency at any instant with that returning after reflection from the ground. At 2500ft, the upper limit for this equipment, altitude reading is instantaneous, with an accuracy of plus and minus 2ft. At lower altitudes the error diminishes to less than 6 inches. The LRRRA equipment provides essential data for the autopilot system and triggers the flare function in autoland equipment at a height of 65ft.

- Four survival beacons.
- Two selcal decoders, operating in conjunction with the HF and some VHF radiotelephone circuits; these decoders respond to a particular sequence of audio tones and bring up the channel whenever a message is being directed to the individual aircraft.
- Three inertial navigation systems. Built around extremely sensitive gyroscopic platforms, the equipment displays positional information, track, ground speed, distance and time to destination (or the next selected point on the track), the cross-track distance and track angle error, heading and drift angle, wind direction and speed and the desired track angle. Because of the availability of these data and the reliability of the triplicated equipment, no navigation station will be carried in the 747. In fact, the plane has no facilities for astro-sightings.
- One cockpit voice recorder.
- One flight data recorder.
- Two central air data systems (CADS). Using static and pitot pressure and temperature sensors, the system provides data on altitude, air-speed, etc., for injection into other automatic systems.
- Two magnetic heading references.
- One central instrument warning system.
- Two flight control systems, which involve auto pilot, flight director, auto throttle, mach trim and yaw damper.

In addition to the above communications and flight control systems, a variety of audio systems are provided in the 747. These include:

- Crew interphone system.
- Cabin telephone system.
- Passenger address system.
- Passenger audio entertainment system.
- Passenger services system.

The equipment to provide passenger services, public address and entertainment breaks new ground. It is envisaged that each passenger will have access to something like ten different taped audio channels, two channels of audio for movies, a hostess call button and a reading light switch. In addition, an over-ride facility will allow announcements to be cut into whatever audio is being used.

In an aircraft carrying as many passengers as the 747, the weight problem would be significant if physical wiring were used to link each source or function to each individual seat. The mass of wiring, along with connectors, could also present a maintenance problem after a period of service.

Telephone Call Analyser

Business managements worried by imprudent or improper use of their telephone service are expected to welcome a new development by post office engineering research teams.

The new unit, called the "PETRA" Call Analyser, is intended to help management maintain a higher degree of supervision over the number and length of STD and local calls, or STD calls only, made from PABX and PMBX switchboard extensions. It is undergoing field trials and the first units should be available for service early in 1970.

Installed in the client's premises on a rental basis, PETRA will register pertinent details of a random sampling of STD calls passing over from one to five exchange lines and up to 100 extensions.

The complex electronic and electro-mechanical equipment of PETRA is coupled with a commercially-produced time tape printer and can be programmed to supply on paper tape a variety of information about telephone traffic, as required by the management.

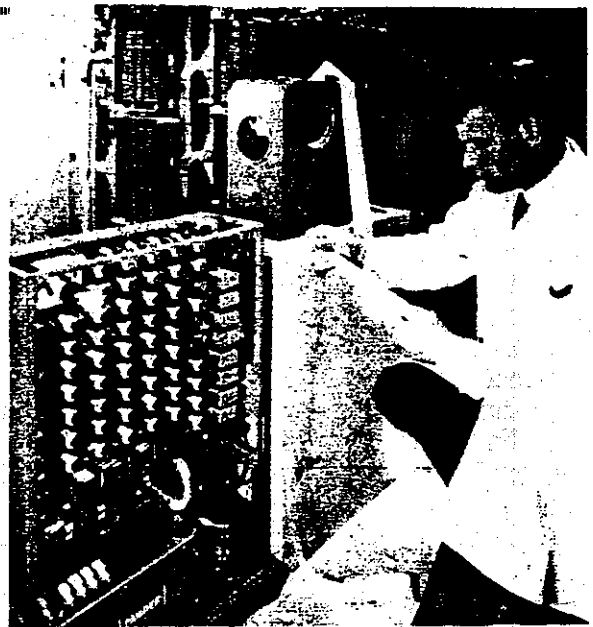
It can be set to print out the number dialled, a code for the extension making the call, and the time at which the call begins and ends. Alternatively, it can give a wider sampling by printing only the time a call begins then disengage itself from that particular call and prepare to accept the next number dialled. It can also be programmed to

In the 747, a single coaxial distributor is used to carry all the program or service information in multiplexed form. The descriptive data indicates that audio sampling is based on a 12-bit sample with a sampling rate of, typically, 17KHz. The system is capable of providing a frequency response 50-10,000Hz within plus and minus 3dB and with a signal/noise ratio of about 75dB. These figures are better than are achieved with the passenger entertainment systems currently in use.

Audio, which is common to the whole aircraft — notably the taped programs — is fed into the line through a central multiplexer. In local zones of the aircraft, typically five in number, secondary multiplexers add sound appropriate to the movies or television being displayed in that zone, plus "local" announcements, etc.

The system also interrogates the call-button or light switch at each seat and reacts to any new "command" within a small fraction of a second.

The multiplexing system has been made possible largely by ready availability of integrated microcircuits containing a high density of active



The PETRA Call Analyser undergoing field trials by the Post Office in Melbourne. The tape printer is standing in its normal operating position, on top of the cover, which has been removed to show the interior of the equipment.

detect numbers dialled by extensions not being supervised, with an indication that the call is from an unsupervised extension. In large PBX's the extensions under analysis will be selected by the subscriber and connected by a Post Office technician. The Post Office will change to another selection of extensions periodically, as required.

PETRA will be leased on a non-profit basis and a nominal charge will apply for a technician's visit to change the mode of operation,

elements and able to perform complicated tasks reliably and cheaply.

For example, the seat unit which "de-multiplexes" the signals from the cable is built around a silicon chip which measures 0.1 x 0.125in and which contains 424 transistor and 115 logic gates. One such unit serves each group of two or four seats, making available the full range of programs for local selection. Other ICs in each seat unit process the passenger call and service functions.

The encoding units and decoding units are standardised for ready replacement and ease of subsequent maintenance. It is anticipated that the system will be more reliable and easier to maintain than the traditional wired ducts and forms and a necessarily large number of complex plugs and sockets. The saving in weight in the 747 is about 500 pounds.

Success with the system will point up its possibilities for a variety of other applications in large aircraft, which currently rely on conventional wired circuits. This would include radio and intercom, facilities and a variety of monitoring and sensing functions. ■

Technical News

(by Phillip Greentree, compiled
from W.I.A. Broadcasts.)

The shape of things to come in passive components is surface mount packages. With the I.C. having led the way into space-saving rugged carriers, designers are now putting capacitors, resistors, filters and magnetic components that support the I.C.'s into the same types of carriers.

In resistors, the push into surface mounting is the crucial agent for change, producing chip resistor arrays and networks, whilst in the filter area the prime driving forces have been such considerations as shielding circuitry from interference and thwarting the emissions from electronic equipment.

The new packaging stems from the demand for more densely populated circuit boards. The trend towards automated assembly and the need to cut costs whilst increasing reliability.

Typically surface mount components are more expensive than conventionally packaged items, however it seems that this is outweighed by indirect savings because the higher density boards appear to have lower system costs.

Electronic researchers at Red Hill, England Laboratories of a major electronic research organization have developed an experimental single chip radio paging receiver that has a mere 11 off chip components. In fact the VHF pager fits on a coin sized board roughly 1/5 the size of most commercial units.

Research is continuing into this chip with the object of putting a complete VHF receiver for commercial radio onto a single chip, with obvious ramifications in the military area as well as in the amateur area, and the logical question to ask - Is it possible that one day not far off, will radio amateurs be using handhelds not much larger than fountain pens?

Sales of VCR units in Germany are on the increase following the introduction of the Video Program System by two German national TV networks. The broadcast of an invisible and inaudible code identifier at both the start on finish of the program. The result is that a VCR equipped with the VPSD coder is automatically switched on at the program start and off at the end after being set by the viewer. The result is the total elimination of program overlap caused by late or early starts of TV programs and it appears that other European countries are following the German lead.

Sketchy details have come to hand of tests being carried out to determine the resistance of power MOSFETS to electromagnetic pulses as experienced in nuclear blasts. A Californian based corporation has announced fabrication of experimental power mosfets that continued to operate after being exposed to such high intensity radiation. The only details so far released indicate that the drain-source voltages of more than 100 volts would indicate drain currents of more than 100 amps have failed to destroy the FETs. These are excellent results considering that power FETs by virtue of their larger junctions receive more radiation, the higher photo-currents from which, when absorbed, contribute to burn-out.

From Agrati Intellect comes news of an Italian designed 1 chip decoder and audio processor for dual channel TV sound with the CMOS circuit being adaptable for stereo transmissions elsewhere. The Italian approach combines both analog and digital circuits employing switched capacitor filters and digital control by a microprocessor over a serial data bus. This single I.C. is divided into two modules - a pilot tone decoder and an audio signal processor. The decoder uses a sequence of high pass filter, amplifier, bandpass filter, and decoding and control circuitry to determine from the pilot tone whether the received information is stereo, mono or bi-lingual and then loads this information into a register contained in the chip's microprocessor interface.

Over the serial data bus the microprocessor reads data and then selects the correct operating mode of the audio signal processing section. After de-emphasis of the demetric signal by a simple one pole switched capacitor network the circuit then selects the correct operating output such as VCR, Hi-Fi system, earphones or loudspeakers, and then modifies the signal to give the listener the impression that his speakers are further apart. Monofonic signals are split into two frequency bands feeding both left and right channels with different frequency components to give a pseudo-stereo effect.

And all this on a single chip !!!

The recent dispute concerning geostationary satellite slots between the industrialized nations and the third world bloc has ended in a compromise.

Satellite projects in the United States and it's allies will suffer little, if any, disruption following agreement reached at the mid-September meeting of the I.T.U. The developing countries receive an allotment scheme guaranteeing each of them at least one geo-stationary orbit slot. The agreement includes a plan whereby bandwidths of 800 MHz each for uplinks and downlinks in two transmission bands would be subjected to an allotment scheme to be defined by the meeting's next session in 1988.

The first allotment is the 4-6 GHz or C-Band where currently unused frequencies from 4.5 to 4.8 GHz will serve as downlink and a yet to be determined 300 MHz bandwidth in frequencies between 6.425 and 7.025 GHz will be chosen as uplink. The remainder of the allotted frequencies will come from the 11-12 to 14 GHz or KU-Band where the complementary 500 MHz of bandwidth will be designated.

A see-saw competition to set world speed records for Lasers and Laser photo-detectors is being conducted by major American research laboratories.

Bell Laboratories currently hold the record for a high-speed, long wavelength Laser that is 1.3 to 1.5 μm with a device that's capable of a 16 GHz continuous wave modulation rate.

GTE Laboratories have also produced a 15 GHz Laser and both research groups believe they will reach 30 GHz in the near future. Both teams are using Mesa type Indium-Gallium Arsenide Phosphide layers fabricated on a substrate of Indium Phosphide. The confining of currents to the active region of the laser has proved a problem since the earlier practice of using reverse biased P-N junctions for this purpose is not effective above 2 or 3 GHz because their capacitance diverts current from the active region.

THE ILLAWARRA AMATEUR RADIO SOCIETY.
P.O.BOX. 1838 . WOLLONGONG . N.S.W.

MEETINGS Second Tuesday of every month except January at 7.30.p.m. in the S.E.S. Headquarters, Montague Street, North Wollongong

REPEATERS: VK2RAW - 146.850 VHF Mt Murray
VK2RUW - 438.225 UHF Hill 60 Port Kembla
VK2RIL - 147.275 VHF Sublime Point
VK2RIL - 438.725 UHF Sublime Point

BROADCASTS: On Sunday evening prior to the club meeting - 7.00.p.m. R.T.T.Y. 7.15.p.m. voice. Transmitted on 147.275 VHF and by relay to 3.562 Mhz. Callbacks will be taken after the voice broadcast.

M.I.A. Relay: On 146.850. at 11.00 am. and 7.30.p.m. each Sunday.

CLUB NETS: 3.562 Mhz SSB on Sunday at 8.00.p.m. and a slow morse net on 28.440.Mhz on Tuesday at 8.00.p.m.

NEWSLETTER: "The Propagator", published monthly to reach financial members in the week preceeding the club meeting. All articles, adds, etc to the editor by the 3rh Tuesday each month.

MEMBERSHIP: The Secretary, I.A.R.S. , P.O.Box. 1838, Wollongong, code 2500. Full membership is \$10 per annum; students and pensioners concessional members \$5 per annum.

AWARDS: The award of the Illawarra Amateur Radio Society is the LAWRENCE HARGRAVE AWARD: VK stations require 10 contacts with I.A.R.S. members. Overseas stations require 5 contacts with I.A.R.S. members. Contact with the club station VK2AMW is sufficient for the award. Band details, date, frequency, station worked and \$2 or 4 I.R.C.'s to The Award Manager, I.A.R.S., P.O.Box. 1838, WOLLONGONG , code 2500. No QSL cards required.

STORE : The club store operates at eaach club meeting.

COMMITTEE: President - KEITH CURLE - VK2OB, 24 Beach Drive, Woonona.
Vice President - BILL CHADBURN - VK2DYU, 45 Beltana Ave, Dapto.
Secretary - JIM HAYES - VK2EJH, Kathleen Cres, Woonona.
Treasurer - ANDREW McEWAN - VK2XGC, 7 Nioka Ave, Keiraville.
Auditor - GEOFF CUTHBERT - VK2ZHU, 1 Nioka Ave, Keiraville.

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REPEATER CHAIRMAN: GREAME DOWSE. VK2CAG .

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E.M.E. CO-ORDINATOR: LYLE PATISON.VK2ALU.

STORE: RAY BALL.VK2PHD/XCC

PUBLICITY OFFICER: DAVE MYERS.VK2DFL.

BROADCAST OFFICER: PAUL SUTERS.VK2KPS.

PROPAGATOR EDITORS: PAUL SUTERS VK2KPS, JIM HAYES VK2EJH, GERHARD MUELLER VK2XGA.

LIFE MEMBERS: GRAEME DOWSE VK2CAG, KEITH CURLE VK2OB, LYLE PATISON VK2ALU.

SUNDAY-EVENING-CLUB-NET-ROSTER:

First SUNDAY OF THE MONTH : VK2DFK-MIKE KEECH.
2 ND SUNDAY OF THE MONTH : VK2PHD-RAY BALL.
3 RD SUNDAY OF THE MONTH : VK2EMV-M.v.d.VORSTENBOSCH.
4 TH SUNDAY OF THE MONTH : VK2NGS-DAVE ROUTLEDGE
5 TH SUNDAY OF THE MONTH : VK2EBI-KEVIN MURPHY