IARS The IARS
PROPAGATOR

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, North Wollongong.
Visitors are most welcome.

Number 6 Volume 93 June 1993

**** Editorial ****

Well, it's that time again. Time to decide who will guide Our Club for the next 12 months. Unfortunately, history has shown that rather than deciding who is the best person for the job, we have had to find someone who is prepared to do the job. Frequently, members have done the job because they were pushed, rather than volunteered. This year will, I fear, be no different. Not that this is necessarily a problem since our committee have done a good job. Maybe they are the best ones for the job, but it would still be nice to have a choice. Now I have said that, the only jobs that don't have nominations so far are Broadcast Officer and Propagator editor. Please, lets have someone who can volunteer for these two jobs. Whilst I have maintained a high production quality, the same can't be said for the content quality. There are many members out there more capable than me to compose this Propagator. Please, let us have some more nominations for all positions.

*** Future Events ***

June

This meeting is a general rag chew. Time to talk about Our Club, what it has, what it needs, what you have, what you need. Maybe our committee will provide some cheese and wine to lubricate our vocal chords

A visit to the airport communications and control centre is on the 20th June. See details elsewhere in the Propagator.

July

This is the election night. Maybe our committee will organise a wine and cheese night to celebrate 12 months of service. Bring your money for your fees so the treasurer can top up the bank account.

18th July will be a visit to WIN TV. 2pm start with lunch before at the Pizza Hut.

August

If we can put the screws on the new committee, we may have a wine and cheese night to celebrate their election.

****

The Ultimate Power Supply 28v Designs.

28v is, in reality, two standards. One of them is the lead acid standard of 12 cells of 2 (nominal) volts, but which at full charge is 27v6 (ie 2 * 13v8). The other standard is that of 20 NiCd cells at 1v2 nominal or 1v25 full charge ie 24v nominal, 25v full charge. Hence we need to design for either 2 o/p voltages or have variable output.

Remember that to have a variable o/p we need to produce the highest voltage (27v6) and regulate down, thus throwing away power (as heat) in the pass regulator. How much power?

700w @ 24v5 = 28A6 (IL)

27v6 - 24v5 = 2v1.

Plost = 2.1 * 28.6 = 60 Watt.

If this is of concern, it may be useful to have a tapped transformer. Equally, some of us may have the need to charge Pb/H_2SO_4 or NiCd/KOH batteries; the first needs voltage limiting, the second needs current limiting - but both will need more than 27v6 during charging, but probably not more than 30v.

As with the 13v8 supply, let us use full wave bridge rectification - if taps are required for different o/p volts we only need one set of taps; with a centre tap, we need 2 sets of taps.

Assume maximum diode volt drop of 0.7v ie 1v4 for two diodes.

Assume minimum regulator drop out of 2v5. Hence,:-

non-load volt drop = 2.5 + 1.4 = 3v9 as before and we have 2 (3?) full load o/p voltages of 24.5, 27.6 (and not exceeding 30).

The $^t/_{RC}$, Vmin/Vpeak and Vripple% conditions apply unaltered.

The +- 10% line regulation condition holds.

So, into the calculations starting with 27v6, 30A load.

Minimum DC input to regulator = 31v5 (27v6 + 3v9).

Allowing for ripple, taking $^t/_{RC}$ = 0.1, minimum peak input = 31.5 / 0.905 = 34v8 (or 24v6 RMS) and this must be achieved when line input is lowest; so design voltage is

24.6 * 1.1 = 27v1 RMS

Capacitor peak maximum is

34v8 * 1.1 * 1.1 = 42v1.

What size capacitor?

When $^t/_{RC}$ = 0.1,

RL = 27v6 / 30A = R92

so C = 10 msec/(0.92 * 0.01)

= 0.11F = 110,000 uF.

Now we tabulate rather than list all the calculations. Firstly the voltages:-

o/p volts / t/RC	24v5		27v6		30v	
	Xfr	C	Xfr	C	Xfr	C
0.1	24.4	38.0	27.1	42.1	29.1	45.3
0.2	27.0	42.0	30.0	46.5	32.2	50.2
0.3	29.8	46.4	33.0	51.4	35.5	55.3
0.4	32.9	51.3	36.6	56.8	39.3	61.1
0.5	36.4	56.7	40.4	62.8	43.4	67.5

Now the capacitor values

I_{load} / t/RC	10A	20A	30A
0.1	36mF	72mF	110mF
0.2	18mF	36mF	55mF
0.3	12mF	24mF	36mF
0.4	9mF	18mF	27mF
0.5	7m2	14m4	22mF

You will note I have not calculated capacitance values for each of the

separate o/p voltages. This is because of the tolerance on C's (-10% to +50% or so).

How do we select C's? Use the $^{t}/_{RC}$ formulae;

When $t = R*C$, $E_t = 0.37E_i$ (because $e^{-1} = 0.37$).

So choose a large R, charge the C, calculate RC (R in Ohms, C in Farads, T in secs), use your high impedance voltmeter (preferably >100*R) and note how much time elapses for the voltage to fall to 37% of the initial charge.

Example. A fat capacitor labelled 63v 20,000uF looks inviting but is covered in dust and appears to have a manufacturers date of about 20 years ago. A little reforming would be in order first, but that's another story.

Then charge to say 50v. If we use a 1k resistor (checked on our ohmmeter), our expected RC = 20 seconds and our expected voltage at 20 seconds is 18v5. The initial power rating of the resistor is 2w5 falling to w4 at 20 secs so we need a 5w resistor to be safe.

Drop the R across the C, all the while watching the watch with one eye and the digital voltmeter with the other. Say 23 sec elapses when the voltage has fallen to 18v5. C = 23/1000F = 23,000uF. Simple eh?

And now a few worked examples:-

1). I have a 32V 30A Xfr. What to do? It could supply 30v (or 27.6 or 24.5) easily, provided the $^{t}/_{RC}$ of 0.2 minimum is used (for 30v OP). This will entail finding 55mF of capacitance rated at 50v. Aim for CCS current, I_L, of 30/1.414 = 21A2

Because of the explosive force with which electrolytics of this size go off when their voltage or current ratings are exceeded :-

a) try out the circuit, firstly, with less capacitance of a higher voltage rating and read the no load voltage. Check mains input voltage. Calculate what peak voltage is likely at nominal mains +10%

b) Build up a bank of capacitors to reach the required C. Why? One large C has less external heat radiating, conducting and convecting surfaces per Farad (and hence per ripple current amp) than several smaller capacitors. One larger C will have higher inductance than several smaller ones.

How much ripple current to allow for? Ripple current can be as much as 3 * load current. So, for a 20A load, I_{ripple} may reach 60A. 5 capacitors of 10mF each of 12A ripple rating will in fact take up less geographic and wallet space than one 60A 55mF capacitor. Your average hi fi type electrolytic is designed to be used with much smaller transformers which have higher impedance and hence I_{ripple} is limited. So, for amateur applications, go for computer grade capacitors out of the computers Alfredo Cavion is demolishing.

The second example.

I have a military grade 250W FM transmitter, which requites 28v nominal DC input. I intend using an RF proof regulator (see next

instalment) which has a minimum ripple rejection of 50dB. What size transformer and capacitive filtering do I need, assuming FW bridge rectification?

a) 50dB ripple rejection means we can get away with murder in terms of input ripple to the regulator. However, capacitance peak voltage is pushed up.

b) 250w FM is likely to be class C. Hence max theoretical efficiency = Pi / 4 = 0.785. In reality, we should assume efficiency closer to 0.60.

Hence, W_{in} = 250/0.6 = 417W

and max I_L = 417/27.6 = 15A

So transformer I rating =

15 * Sqrt(2) = 21A3

R_L = 27v6/21A3 = 1R3

c) Now inspect the table for transformer and capacitor voltages vs t/RC. For 27v6 out, t/RC = 0.1, transformer nominal voltage is 40v4 RMS and capacitor peak voltage is 42v1. For t/RC = 0.5, transformer nominal voltage is 40v4 RMS and capacitor peak voltage is 62v8.

d) Inspect the table for C vs I_L vs t/RC. At a 20A load, t/RC =0.1, we need a capacitance of 72mF. Because ripple may exceed 60A, try to find 6 capacitors of 12,000uF rated at 45 volts.

If we are willing to waste power in the transformer and pass transistors, look at t/RC = 0.5. Capacitance required is 14,400uF rated at 63V and 60A ripple. It will be better to go for three capacitors of 4,700uF, 63V rated at 20A ripple. Such high voltage capacitors will be rare at Cavions or other computer wreckers.

In the next instalment we will start looking at regulator circuit design using readily available cheap components! Heat sinking will be treated in some detail.

STOP PRESS:

At a recent visit to Cavion's, I saw umpteen big rectifier diodes on heat sinks, either alone, double, or in FW bridge configuration rated 300A and up. Good stuff!!

Bibliography.

ARRL Handbook (1988) Ch 6.
National semiconductor Application Note on PSU design.
Barry Davis "DC Power Supplies". Prentice Hall, Melbourne.

John D Lodding

VK2ZLJ

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***** Airport Visit *****

This is on the 20th June. We will meet at the Sylvania Pizza Hut, corner of the Princes Highway and Holt Road. John VK2XGJ and I will be there at 12:00 for lunch and the group will leave at 13:30. Pick your time. I have space for 2 or 3 in my car if anyone wants a lift. If you can drive, it also means I can have my fair share of the liquid side of the lunch and keep John company and you get the chance to drive a 'Dream Machine'.

****

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***** Auction *****

Last months auction went well. Auction? You didn't know about it? Didn't I tell you? Gee, I'm so sorry {snigger snigger}. Buy of the night was a hand held that went for $240! I would have gone higher, but Darrel VK2USA carries a bit more beef than I do and may have got nasty if I pushed him too high. Nice buy Darrel. Couple of PC's went at a good price, but I thought Simon VK2XQX was a bit rash paying $30 for one! The fact it worked and had nothing wrong with it has nothing to do with it. (was that the one with a hard drive Simon?) Simon also sells computers, so maybe he knows a good thing when he sees one. Rob VK2MT also bought one so now he is learning to drive it - Hey Rob, being the Propagator editor gives you plenty of typing practice.

***** Welcome ****

We have two new members in Our Club. Welcome to Brian Farrar, VK2UBF and Dennis Beaver VK2ZWG. I don't know whether you are aware of an old tradition in Our Club - new members must volunteer their services to be the Propagator editor for the next year! Since there's two of you, you can share the job. One of the 'fringe benefits' is that you have the use of a photo copier. Of course, the only problem with sharing a job is that you also have to share the enjoyment. Not a major problem, but I thought I'd mention it.

****

***** Police *****

The visit to the Warilla Police centre went off well last month. It's surprising (maybe it's not) what they know about you. I'm not as bad as I thought I was (or their records aren't as accurate as they should be). My last speeding fine was 1984 (luckily, they don't have records of fines in other states! Those rotten speed cameras in Victoria grabbed me twice in one day and a pretty lady constable caught me the day before on the expressway.

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***** Caution *****

In the middle of the Pacific ocean there is a line you can cross and lose a whole day.
In the middle of our highways there is a line you can cross and lose a whole life!

(Thanks to B.A.R.G. news who most probably thanked someone else who most probably thanked someone else who most pro .....

***** Auction *****

Yea, I thought that might get your attention but it's not one.
We have discovered a latent talent in Our Club. Simon VK2XQX is a Master Auctioneer! He did a superb job. A fantastic job. An excellent job. Only problem is that he'll have to leave before he can get rid of the job!
Congratulations Simon - you did it great!
Now that I have given sufficient adulation, I can offer, on behalf of Our Club, Simon's services to anyone who wants a superb auctioneer. Fee is a modest 33% of whatever is sold - Simon gets 1.5%, Our Club gets 1.5% and I, as Simon's manager,get the balance so you can see it's going to a worthy cause.

***** Rude *****

Ever notice how rude some people can be? Like the person who won't stop talking when you are trying to break into his conversation? Or the person who makes feeble excuses so he won't have to listen to you talk?

****

*** Way Back Then ***

Episode 19.....1976.

Major Events.

(i) Commencement of regular monthly broadcasts of club news.

(ii) WICEN mobile exercises.

Raffles of useful items, such as test equipment and tools, were held at the monthly meetings throughout the year as a means of raising funds.

More members came on to 2 metres FM as they completed their "Billdit" project construction.

The May Propagator included a run down on the 2 metre repeater, VK2RAW. Transmit output was 90 watts from a QQE06/40 valve, with initial output of 5 watts during the first few minutes of use. Normal power supply was from the AC mains, with battery backup. While battery power was being used the repeater operated at 5 watts o/p.

A new mast was erected for the repeater in May, initially with a half wave transmit dipole at the top of the (60ft?) mast and a similar antenna for receive at the 20 ft. level. Gain arrays were installed later.

During the year the repeater's operating channel was redesignated from Channel 6 to Channel5 although it's frequency was not changed. It's input frequency (146.250MHz) was designated as Channel 47 on the new National Bandplan and it's output frequency (146.850MHz) was Channel 57.

Regular monthly broadcasts of club news commenced over our 2 metre repeater on 8th August 1976. The initial broadcast was conducted by John, VK2BHO.

The Officers elected at the AGM included - Pres. Ian VK2ZGA, VP. Bill VK2DJ, Sec.Keith VK2ZYJ, Treas. Charlie VK2ZEN.

Regular Propagator articles during the year included - "DX Panorama" by Gerry VK2APG, "WIA News and Notes" by our delegate on the Combined Clubs Committee, Geoff VK2ZHU, "WICEN News" by Jim VK2BBG, and a Components for Sale section which covered some of the items available from the club store.

Several WICEN exercises were held during the year. The highlight of these was a mobile exercise which involved a total of 23 vehicles, including quite a few from the Illawarra Vintage Car Club.

A list of club members was included in the July Propagator (another idea not seen over recent years). There was 112 names listed, some as far afield as VK4 and VK6, and several more outside the local area. By December membership had grown to 128, with some of the additional being in VK3 and VK5. It seemed that our Moonbounce efforts had caught the imagination of amateurs in other places!

The club had a display at the Wollongong "Focus on Leisure" exhibition, held in MacCabe Park in July. Quite a lot of interest was shown in Amateur Radio by the general public.

Fourteen members offered their services for JOTA in October and most were subsequently involved.
A large quantity of crystals, in FT243 holders, was obtained by the club from the WIA. They were put in the store for sale at 5 cents per crystal.
Talks at monthly meetings included:-

June - Trade display of amateur equipment by Peter Schulz of Sideband Electronics Sales.
Aug - Film and talk on State Emergency Services.
Oct - Film on Computer Graphics Displays - IBM
Nov - Talk on Novice Licensing and CB Radio Communications by District Radio Inspector, John Milton.

Other interesting events which took place during the year - outside the club.
Cavions moved from their Fernhill shop to their present location in Bulli.
The Mid South Coast Amateur Radio Club had its inaugural meeting on 6/11/76. (according to the Propagator)
Novice Operators started to appear on the bands allocated to them.
Finally, the year ended on an unfortunate note, with the 2 metre repeater, VK2RAW, being struck by lightning, causing it to be out of service for quite some weeks while extensive damage was repaired, including replacement of many of its transistors.
Lyle VK2ALU.

(continued on the next column)

WAY, WAY back then.

During a holiday in Victoria, from which I have just returned, we stayed with friends in Seymour. My friend's father had been interested in radio many years ago. While going through some of his old books we found one called "The Radio Guide 1928". It included pictures of AWA broadcast receivers of that time, circuits of simple receivers etc. for the radio constructor,details of transmitters manufactured by AWA for broadcast and shortwave service, Australian broadcast stations and their frequencies etc and Australian and overseas shortwave station call signs, frequencies etc. etc. etc.
Also included was a 6 page section of "Australian Transmitting Licences", which covered AWA mobile stations, Police radio cars, Public Works Dept. portable stations, Coastal Trawlers, Radio Dealer's stations, Broadcast Stations outside Sydney and Melbourne - some of which were classed as "Experimental Stations". In those of this class were a number of call signs issued to people who would, today, be called Radio Amateurs.
Amongst these "real Old Timers", some of whom were known to me in my younger days, was only one in the Wollongong area. He was - Bushby T.R.W. "Craig Royston", Urain Rd. Bulli. Anybody ever heard of him? I also noted that there were several call signs shown as Radio Clubs - (there was no VK prefix in those days)

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(Continued from previous page)

2BV - Waverley Amateur Radio Club.
2LH - Leichhardt and District Radio Club.
2WI - Wireless Institute of Australia.
2YB - Croydon Radio Club.
2UI - Illawarra Radio Club!! The address of the person in the club to whom the licence was issued was 75 Montgomerie St. Kogarah.
It seems to me that, with only one licensed "Amateur" in the Wollongong area, this club would not be based in our area. Maybe it took its name from Illawarra Road in the southern part of Sydney, but it is intriguing to see a club with that name so long ago! Does anybody know anything more about this club?
Lyle VK2ALU.

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*** Repeater Report ***

28/4/93 - 26/5/93

VK2RAW (146.850) - The past reports for 6850 have been pretty much the same every month - no problems. Well this time around, there is... On the 15/5/93, John (XGJ) rang me around 1730 to inform me that the rptr appeared to be off the air. I tried "interrogating" the system with the DTMF Controller, but no luck. Spoke to Ken & we both had a bad "gut-feeling" about the problem. The rptr itself has proven to be very reliable, so our "feeling" was that some outside influence (ie: intruders or vandals) had visited the rptr site. The next day was Sunday & we both had domestic plans, but decided to defer them in favour of a trip to the site. On the way up the next day, Peter (BIT) called in on 8225 &

suggested he head over to the site before us, he only lives 10 mins away, to gain an idea on what we could expect. Upon arrival, he found that the rptr's cubicle had indeed been broken into. All the incoming feedlines had had their plugs removed & also all the special cables on the rptr's diplexer had been removed. At this point Ken & I decided to turn around & head back to our respective homes to hopefully gather enough parts to repair the rptr. In total the following items were stolen.:-LDF 4-50 N-plug, RG-58CU BNC plug, 2 RG-213 BNC plugs, RG-213 PL 259 plug, BNC 3 socket T-piece, 2 BNC-BNC patch leads, 6 BNC-BNC diplexer leads, 5/16" UHF Mobile Mount ,4dBd Mobile Colinear, 2 Heavy Duty Padlocks
(All the patch leads were of a special double-shielded coax).

To get the rptr & WIA broadcast system basically back on the air, we needed 15 BNC plugs, 3 metres of the special coax & the rather expensive Heliax N-plug. We also consulted with Graeme (CAG), our "silent partner", to confirm the lengths for the diplexer patch leads, as they have to be an exact length for the diplexer to work. Ken also designed & made up, out of some very heavy metal, protection for the cubicle door & locks to prevent future intrusions. All the special patch leads were made up before leaving for Mt Murray, as their construction had to be very precise & reliable. Chris (XBC) met us at the rptr site to assist with the installation & oxy welding. All went well, albeit slowly & after testing left the site in total darkness at 1845. (Our recently installed cubicle fluoro proved to be very handy indeed). The rptr was back on the air in time for the evening's WIA Broadcast & was only off the air for less than 24 hours since the break-in. The incident was reported to the Police that morning while a group of IARS members happened to be inspecting the Warilla Police Station. (Thanks John). Assessing what was taken & how, Ken & I believe that the culprits possibly inhabit the 27 &/or 477MHz RF bands. This is not meant as "finger-pointing", but if any readers have access to these bands, an occasional listen may be revealing.

VK2RIL (147.275) - Last report we had hoped to reinstall the rptr's high-gain colinear after it had been repaired. This wasn't to be. On the 2/5/93 my XYL, harmonic & myself went to Sublime Point, under the guise of a picnic, to reinstall said antenna. The 27' long antenna was removed from atop the car & taken across to the tower only to find the top & bottom arms that hold the antenna out from the side of the tower, had been removed & thrown to the ground below. Also the brackets to hold these arms to the tower were nowhere to be found, so we were unable to put the colinear back on the tower. Tied the antenna & brackets onto the car & headed home. I contacted the tower owners the next day. They apologised for what had happened & explained that a sub-contractor had been to the site

in the last week & "cleaned-up" the tower (this included our antenna arms & brackets). Before attempting re-installation, the arms are to be cleaned of rust & repainted. Meanwhile the dipole is apparently working sufficiently well enough to not justify any critical comments.

VK2RUW (438.225) - The rptr & link to Goulburn working fine. The only problem has been what appears to be some type of audio interference to weaker RXed signals. The interference comes across as a static scratching sound & matches perfectly with the voice peaks & music beats coming from Power FM on 94.9MHz. Their antenna system is about 50' above 8225's. DOTC & their techs have been informed of the problem, but as yet we don't know if the interference is from their TX system or our RX system. It has been occuring now for around 2 months & varies in it's severity from unoticeable to quite obvious, although the rptr is still useable. Hopefully a solution will be found soon.

VK2RIL (438.725) - Nothing to report, all OK.

VK2RUW (144.775) - The ROSE Packet system working fine, although Michael (XCE) has had to reload the software twice in the last month due to an unknown reason. To be investigated.

VK2RUW (29.620) - Work progressing slowly, the 6850 break-in contributing to delays. We are presently working on re-establishing the 10m rptr as a simplex "gateway" into the UHF network of VK2RUW, VK2RGN & VK1RGI. This idea would allow Amateur UHF users from VK1, Goulburn & the South Coast to QSO with assorted Amateurs from places like VK4, 6 & 8, ZL, P29, JA & W's. When (& if) the new DOTC regs come out, this will allow Limited Ops to QSO via 10m FM. Also, the WIA Broadcasts from both VK1 & VK2 would be relayed onto 10m for local, interstate or overseas SWL's.

Courtesy of the mini-auction at last month's meeting, this report has been typed on my new $35 computer. Hopefully it won't be long before I'll be let loose on that new-fangled mode called Packet...watch out John!

Till next time - Rob VK2MT

***** For Sale *****

I wish to include in the propagator the following ad for some surpus equipment that I have lying around here.

Microwave dishes, 2 by 1 meter diameter, 1 by 2 meters dia, 1 by 2.3 meters dia, 1 by 3.5 meters dia. In addition there are a number of Left hand and right hand polarised helical feedpoints and mounting brackets etc. The resonant frequencies for the hardware is 421 Mhz. (Ex PMG 421 Mhz link gear). The 1 meter and 3.5 meter dishes are of aluminium, the 2 meter disk is in a frame with its 421 Mhz feed already bolted on and is fiberglass, the 2.3 meter dish is a stainless steel type with 12 petals that bolt together. I also have a couple of lengths of 1 inch helical coax to suit the dishes about 60 foot long. The feedpoints are useful on their own as there are also a munber of s type brackets to bolt them to a mast of some kind. I also have a number of self supporting tower lenghts about 6 to 8 feet long, that could make a decent tower. (The PMG didnt underdesign anything in those days !!). I would prefer to get rid of the lot in one go, but I will break it up. There are also a couple of conventional feedpoints for 10 gigs, about 7 foot long shaped as a big question mark and made of solid copper square section with a minature N connector on the coax end. They fit real well into the 3.5 meter dish....Anyone want to get into microwaves, radio astronomy moonbounce etc, go for it this is your chance. $1,000 the lot. I can deliver it for you if you wish. (Coastal areas only). Lyle Patterson says technology now is allowing 10 gigs reasonably easy moonbounce with the 3.5 meter dish. 24 gigs moonbounce is easy, even with the 2.3 meters its within the current range of technology.

Hoping you can help, Peter Laughton VK2XAN. Ph 042 566186 after 6PM but before 8 PM or 042 753836 8.30 AM to 5PM. Albion Park Area.

***** Again! *****

Another issue without a back page. Sorry about it, but it's a problem with not enough time or not enough material to add another three pages. Anyhow, I'm sure you'd rather read my ramblings rather than look at the back page anyway. Although, I need the back page to find out who does what - damned if I can remember.

I'd like to mention the elections again. No, not government ones, but the important ones. The ones to be held in July. The ones that affect our future. I hope you put some thought into what you want out of Our Club, what you can put back in, what direction it should take what's needed, who can do the job. Personally, I feel there is something missing in Our Club. What it is I can't put a finger on, but there's just something not right. Can you help?