



# BARSCOM



G3XG

GX3XG

G6BRH

DUNMOW

STEBBING

RAYNE

HALSTEAD

COGGESHALL

NOTLEY

WITHAM

BRAINTREE

SILVER END

## Monthly Communication of the Braintree and District Amateur Radio Society

Part of the new  
equipment  
destined to  
replace the  
previous  
GB3BZ  
setup that  
failed during a  
cold spell.



January 2012

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## Design for minimum smoke

When making up any circuit remember that to ensure resistors do not over heat there is a minimum resistance you can have for any particular voltage and dissipation.

For equipment running in a car you should assume a supply of at least 14.8 Volts. This means that if there

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## GB2BZ

*Dave G8DEC*

This repeater had to be shut down mid-December following a power cut. The transmitter failed to restart due to the cold and the opportunity was taken to update it. Two new Icom transceivers have been brought in along with a Zetron repeater control panel. Additional circuitry has to be fitted and the repeater is not expected to be back on air until the new year.

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## Amateur Radio Survey

*RSGB*

The analysis of the survey, conducted between October and December 2010 can be downloaded from the RSGB website. Note that the download is around 1MB in size.

is a chance of the full supply voltage being applied to a component (e.g. fault conditions) the lowest preferred value resistance for given dissipations are:

125mW	1k8	500mw	470R
250mW	910R	1W	220R
330mW	680R	2W	120R
400mW	560R		

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## **Silent Key**

### **M6GGH**

The death of George “Graham” Heard, following a long illness, was reported at the December 19 meeting. The funeral arrangements for Graham have now been made:

Monday Jan 9th 11:15.am, at the Braintree Crematorium.

Please pass this information on to other members.

## **Video of 6 year old Radio Ham on TV**

Six year old radio ham Veronica Harrington KC6TQR appeared on the David Letterman TV show a month after getting her license in 1993.

During the interview Veronica demonstrated the use of one of two radios set up on David Letterman’s desk and had a contact with Jeanne Myers, ex-N2OVO (now AA2NK) of Brooklyn. It is understood that Veronica was 5 when she passed her Technician exam.

Watch the video ‘David Letterman Show 1993’

<http://www.youtube.com/watch?v=ZFB6jssAXAY>

Watch ‘Veronica Harrington KC6TQR Responds in 2009’

<http://www.youtube.com/watch?v=rJVWxFpPSE>

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## **PW-Sat to launch in January**

### **RSGB**

PW-Sat, a 1U CubeSat to be launched on the first VEGA flight in January, will carry a 145 to 435MHz amateur radio transponder with an FM uplink and DSB downlink. More information can be found at [www.uk.amsat.org](http://www.uk.amsat.org).

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## Club Meetings and Nets

**Club Net - 08.00pm local time**  
**2Mtrs (145.375Mhz)**  
**70cms (433.575Mhz)**

### January

- 2 Natter Night
- 9 Club Net - 2Mtrs
- 16 Equipment Testing - Part I (PAT)
- 23 Club Net - 70 cms

### February

- 6 Ham Radio Deluxe - Richard (2EØXRS)
- 13 Club Net - 2Mtrs
- 20 Construction Night - Previous construction entries & Wire Antennae
- 27 Club Net - 70cms

### March

- 5 HF Propagation - Melvin (GØEMK)
- 12 Club Net - 2Mtrs

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- 19 Operational Amplifiers (G8MKN)
  - 26 Club Net - 70cms

### April

- 2 Rig Clinic - Checking Working Sets (PROVISIONAL)
- 9 Club Net - 2Mtrs
- 16 Construction Contest
- 23 Club Net - 70cms

### May

- 7 Equipment Testing - Part II (PAT)
- 14 Club Net - 2Mtrs
- 21 AGM
- 28 Club Net - 70cms

### June

- 4 Rig Clinic - Fault Finding
- 11 Club Net - 2Mtrs
- 18 TBA

### July

- 2 Club BBQ
- 16 DF Hunt

## Next Month

Latest News from the RSGB

For Sale and Wanted

Op Amp History - Part 3

## **Plus the usual ...**

Events, Rallies, Contests, etc.

**???**

Your Photos

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## Polarising Filters

*Brian G3TGB*

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Recently one of our members wrote an article about stripping down a flat screen LCD TV. Among the items removed were three sheets of plastic. From the work I did in the late 1960's when I was making experimental LCD's (Liquid Crystal Display's) It was necessary to put a sheet of Polarizing film each side of the device with there polarizing planes parallel.

The Liquid Crystal layer between two glass sheets, between the plastic films, was orientated such that no light passed through but as soon as an electric field was applied to the liquid crystal layer the orientation of the twisted liquid crystal changed to allow light to pass.

These sheets are very good if you wish to view a solar eclipse because,

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if they are held crossed to each they appear opaque and will only allow a very small percentage of light through and therefore provide good eye protection from the sun.

As you turn one of the sheets they will gradually allow light through until they are parallel at which point they will appear clear and just a light grey colour.

The third sheet of plastic is on the front of the TV as an overall protection.

Keen photographers use single polarizing filters to cut glare from very shiny surfaces particularly water.

Unfortunately, unless you purchase a very expensive camera, these days it is not possible to fit any form of supplementary filter as there is no thread on the lens mount to screw on to.

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## Company reörganisation

*ARRL*

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After four years under the Motorola umbrella, Yaesu has split from that company. Motorola will keep the Vertex Standard Land-Mobile Division, while the amateur, marine

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and air-band will be under the Yaesu Musen banner. The new company will be known as Yaesu USA in the US.

The new company's name will be Yaesu Musen, "a name our business partners have been familiar with for over 50 years".

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## G-QRP Convention

*Dave G3PEN*

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As usual, I attended this year's G-QRP Convention, with Pat helping me run a sales stall - we had 3 tables this year. This event used to be at Rochdale, held in the church premises, but since George Dobbs, G3RJV, retired as vicar and moved to near Halifax, it has relocated to Rishworth School, a highly prestigious venue in Rishworth, also near Halifax. The timing of this event now relates to the half-term holiday of course - which is very close to the date the Rochdale event used to be on. As before, the event is on a Saturday, not Sunday.

For the organisers and hangers-on such as myself, the event starts at Friday lunch-time, in a nearby pub, with a good meal - necessary in view of the efforts required over the next few hours. We then move into the school, where the first job is to move most of the hundreds of chairs used in the assembly hall to suitable storage locations. A fair number are retained in the hall, for the stall-holders to use, and for the "meet & greet" area used by the attendees to the Convention. This is a Convention, not a rally, as part of the activity is a lunch period for

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everyone attending, with opportunity to sit and talk with others, and another part is a series of talks by eminent persons on a wide range of subjects close to QRPers' interests.

The second job on Friday is to move umpteen tables from the delivery lorry of an "events" supplier to the school hall, which unfortunately is up a flight of stairs - about 20 feet's worth of height gain! Bad enough for the tables, but even worse for everyone bringing stuff for sale - I had a number of very heavy boxes filled with transformers and chokes, which thankfully went home a lot lighter. Everyone there then helped in setting up tables and bringing up the sales goodies, and I was very grateful for all the help Pat and I received in this respect. Members from both the Halifax and Rochdale amateur radio clubs were very active throughout the whole event, and helped enormously.

After this work, most people retired to a fairly local hotel, the Premier Inn on the Huddersfield Road on the edge of Halifax, that was large enough to take the 21 members staying for the weekend. The hotel had allocated a separate function room for our use, and the evening was spent in the usual chat, eating and drinking, with some 40 members

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attending. However, a major evening event was a "Buildathon", where 17 members plus organisers were involved in building QRP-type Z-Match aerial tuning units, using kits of parts provided by the club (at a cost per unit of £15 to each builder). This took up most of the evening, with some being completed within the time available, and the rest being finished on the Saturday evening, or taken home for any final work required (as was my effort). The end-results were a set of very useful and versatile ATUs, which no doubt will be much-used in the future.

On the following day, the "do" opened at 10.00hrs, and was attended by around 260 visitors, I'm told. The traditional "pie and red cabbage plus apple pie" lunch was served on time by some of the distaff side of the QRP committee and helpers, and finally a well-stocked raffle was held just before the close of the day's events. The various talks took place as planned, but sadly I was unable to attend. Some day, I intend to get to all the talks, having been to very few in the past, due to the needs of the table sales. The best talk in my opinion is always that given by David Stockton, who discusses and answers technical

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questions from the floor on a very wide range of subjects. He is a "permanent" speaker, but all the other talks change each year. After the close of the event, a couple of hours was needed to tidy up the hall, re-load vehicles with "junk & jewels", and finish off the remaining food! Again, the evening was spent back at the hotel, with much cheer and discussion. Most of us left for home etc on Sunday morning, although several members intended to go sight-seeing around the area before leaving. The hotel and associated restaurant were excellent, adding to everyone's enjoyment.

If you can ever attend this event, I hope you will find it as interesting as I do, and worth the effort and petrol money. The local area is lovely at this time of year (weather permitting!) and well worth a longer stay. I am very grateful to the G-QRP club and its members for being able to be involved, which I have now been for about 20 years in total. Long may it continue! A number of members attending asked after Derek, GØIZW, and passed on their best wishes and regrets to him and Betty, which Pat and I also appreciated very much. ■

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## Revised EMC directive

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### *RSGB*

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Some members have read the latest revisions as extending the scope of the Directive to apply to kits and modified equipment. All that has been done is to move certain clauses around to make the structure of the

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## Know the Band Plans - I

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### *RSGB*

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### 1.8 Mhz (160m)

1,810-1,838 200 Hz CW  
1,838-1,840 500 Hz NB modes  
1,840-1,843 2.7 kHz All modes  
1,843-2,000 2.7 kHz CW/Fone #1

1,836 kHz QRP CoA  
1,960 kHz DF Contest beacons  
(14dBW)

#1: Lowest LSB carrier frequency  
(dial setting) should be 1,843 kHz.

AX25 packet should not be used on  
the 1.8 MHz band.

### LICENCE NOTES:

1,810-1,850 kHz Primary User:  
1,810-1,830 kHz on a non-  
interference basis to stations outside  
of the UK.  
1,850-2,000 kHz Secondary User.

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Directive a little more logical. The  
basic elements as applicable to  
equipment of interest to radio  
amateurs are unchanged.

The new Draft may be subject to  
further amendment. The RSGB will  
continue to endeavour to protect the  
interests of the Amateur Radio  
Services.

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Necessary bandwidth: For a given  
class of emission, the width of the  
frequency band which is just  
sufficient to ensure the transmission  
of information at the rate and with  
the quality required under specified  
conditions.

The use of Amplitude Modulation is  
acceptable in the all modes segments  
but users are asked to consider  
adjacent channel activity when  
selecting operating frequencies.

Foundation and Intermediate  
Licence holders are advised to check  
their licences for the permitted  
power limits and conditions  
applicable to their class of licence.

### **Key:**

CW - Telegraphy  
NB - Narrow Band  
Phone - Telephony  
CoA - Centre of Activity

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## Rallies

### 3 JANUARY

FRISKNEY & EAST LINCOLNSHIRE COMMUNICATIONS CLUB  
MID-WINTER TABLETOP SALE AND AUCTION - Friskney Village  
Hall, Church Road, Friskney, Lincolnshire PE22 8RR. OT 7.30pm, £1.50  
& Tables are 2 for 1 at £4.00. Free tea & coffee, 1 free entry to the raffle.  
Ian Donnelly, 2E0XOD, 07554 362 020 [[www.felcc.com](http://www.felcc.com)].

### 15 JANUARY

RED ROSE WINTER RALLY – George H Carnall Leisure Centre,  
Kingsway Park, M41 7FJ (easily accessible from Jct 9 of the M60 opposite  
the Trafford Centre). Free CP, B&B, C, OT 11am, TS, SIG, DF, RSGB  
bookstall. Details from Steve, 07502 295 141 [[www.wmrc.org.uk](http://www.wmrc.org.uk)].

### 15 JANUARY

DOVER AMATEUR RADIO CLUB RALLY – Whitfield Village Hall,  
Dover CT16 3LY. TS, B&B, TI via GB3KS, C.  
[[www.doverradiorally.com](http://www.doverradiorally.com)].

### 29 JANUARY

HORNCastle WINTER RALLY – Horncastle Youth Centre,  
Lincolnshire LN9 6DZ. OT 10.30am, £1.50, DF, C, free CP. Tables £5,  
free power. Tony, G3ZPU, 01507 527 835, G3ZPU@yahoo.co.uk.

### 5 FEBRUARY

27th CANVEY RADIO & ELECTRONICS RALLY – 'The Paddocks',  
Long Road, Canvey Island, Essex SS8 0JA (southern end of A130). Free  
CP, OT 10.30, C, DF, TS. Dave, G4UVJ, 01268 697 978 (evenings)  
[[www.southessex-ars.co.uk](http://www.southessex-ars.co.uk)].

### 5 FEBRUARY

RADIO-ACTIVE RALLY – Civic Hall, Nantwich, Cheshire CW5 5DG.  
CP, OT 10.30, TS, B&B, C. Simon Chettle G8ATB, 01270 841 506.  
[[www.midcars.org](http://www.midcars.org)].

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## The History of Op-Amps - Part 2

Ian G8MKN

The latest phase of op amp history began with the development of the first IC op amp in the mid 1960's. The desire for compactness and universality led to the development of general-purpose high gain blocks intended for use within a feedback loop, the op-amp idea that is "obvious" today.

The first op-amp was designed by Bob Widlar (pronounced "wide-lar"), an all-NPN op-amp built in a very early IC technology, was the 702 with an open-loop gain of 1000 and a useful bandwidth of 20-30MHz; a remarkable achievement that was not to be matched for another decade. Its initial retail price was approximately \$300, which limited sales to military and aerospace consumers.

Widlar returned to the drawing board and developed the first analog functional block that could be called a "hit." The 709 op-amp was wildly popular because it provided much larger open-loop gains (order of 60,000). The spectacular success of the 709 was associated with production demands high enough to cause rapid and steep price

reductions (despite yields that were mysteriously terrible for some reason). This op-amp, introduced at approximately \$70, was the first to break through the \$10 barrier (later, the \$5 barrier), guaranteeing extremely widespread use. By 1969, op-amps were selling for around \$2.

Widlar then moved to National Semiconductors and the first op-amp he designed (LM101) sought to repair several shortcomings of the 709. He wanted to improve further the input and make the part easier to use (requiring op-amp users to design compensators was asking a great deal, apparently). He also wanted to increase the open-loop gain to well over 100,000 under worst-case conditions. Finally, he wanted to protect the part against accidental output short-circuits, something that caused many 709s to die prematurely.

The LM301 tolerates short circuits to ground for any length of time and provides a nominal gain of over 500,000. However, it is important to observe that the op-amp is not necessarily protected against short circuits to the supplies. The part

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number 101 is for the military and 301 for the commercial temperature range.

Back at Fairchild, around 1968, it was Dave Fullagar who rose to the challenge and developed the 741.

The big appeal of the 741 is that it possesses a fixed internal compensation capacitor. Unlike the 301, the op-amp comes ready to use without requiring any external components.

It is compensated (its frequency response is tailored) to ensure that under most circumstances it won't produce unwanted spurious oscillations. This means it is easy to use, but the down-side of this is the poor speed/gain performance compared to more modern op-amps.

The open loop gain is about 200 000 but due to the frequency compensation, the 741's voltage gain falls rapidly with increasing signal frequency. Typically down to 1000 at 1kHz, 100 at 10kHz, and unity at about 1MHz. To make this easy to remember we can say that the 741 has a gain-bandwidth product of around one million (i.e. 1 MHz as the units of frequency are Hz).

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The OP-07 was first produced around 1975 by Precision Monolithics (now a part of Analog Devices)

Overall, the three stages confer a gain in excess of a million. In combination with the very small offsets, this amplifier is particularly well suited to high-precision applications. At the same time the dynamic performance is sufficiently similar to that of a 741 that the OP-07 may also be called a general purpose amplifier.

The LM318 achieved 15MHz unity gain bandwidths and 50V/ms slew rates. That is, the bandwidth improved by an order of magnitude, and the slew rate by two orders of magnitude. Improvements in process technology helped, of course, but often the greatest speed gains were the result of clever topological choices.

Many of the topologies used were the result of attempts to work around the lack of good PNPs in an inexpensive process technology. The alternative was simply to pay more for a complementary bipolar process technology to permit simpler circuit designs. Harris Semiconductor took just such an approach in many of



their designs, of which the HA-2539 high-speed op-amp is typical. The simplicity of this op-amp permitted exceedingly high bandwidths (600MHz in closed-loop gains of 10), and very high slew rates

(600V/ms). However, the internal compensation is insufficient to assure stability in follower connections, and the single gain stage only provides a DC gain of about 15,000.

To be continued... 

## Don't forget!

### Jan 16 Equipment Testing - Part I

**Have you bought any 2nd-hand gear or have any old rigs etc.?**

**Bring along your old gear and make sure its safe to use by you and your shack visitors!**

## Word Search

### Ian G8MKN

Cross off all the words in the grid on the list plus a number of others associated with Amateur Radio. Words go in ALL directions. This will leave some other letters that when re-arranged will make two more words. The 1<sup>st</sup> person to send a correct list of missing words (all longer than 6 letters) and the two hidden words will get free entrance to the next club meeting.

A	R	T	L	M	O	R	S	E	D	A	F
T	W	I	N	I	C	U	I	V	M	R	A
R	M	I	C	R	O	P	H	O	N	E	N
A	E	N	R	I	A	C	A	L	L	T	O
N	A	D	R	E	X	A	B	T	H	A	D
S	S	U	S	C	E	P	T	A	N	C	E
I	P	C	F	D	I	A	L	G	L	E	L
S	M	T	R	I	A	C	R	E	E	U	I
T	E	A	M	P	L	I	F	I	E	R	N
O	T	N	A	O	D	T	A	U	R	S	E
R	E	C	S	L	I	O	E	B	S	R	A
E	R	E	T	E	T	R	N	R	U	E	R

Anode  
Balun  
Call  
Coax  
Coil  
Dah

Dial  
Dipole  
Dit  
Fade  
Filter  
Fuse

Grid  
Linear  
Mast  
Meter  
Morse  
Reel

Triac  
Twin  
Wire

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## Contests

### VHF/UHF

#### February

- 5 0900-1300 432MHz Affiliated Societies Contest
- 7 2000-2230 144MHz UKAC
- 14 2000-2230 432MHz UKAC
  
- 21 2000-2230 1.3GHz UKAC
- 26 1000-1200 70MHz Cumulatives #1
- 28 2000-2230 50MHz UKAC
- 28 2000-2230 SHF UKAC

#### March

- 3-4 1400-1400 March 144 432MHz
- 6 2000-2230 144MHz UKAC
- 11 1000-1200 70MHz Cumulatives #2
- 13 2000-2230 432MHz UKAC
- 20 2000-2230 1.3GHz UKAC
- 27 2000-2230 50MHz UKAC
- 27 2000-2230 SHF UKAC

#### April

- 1 0900-1200 First 70MHz Contest
- 3 2000-2230 144MHz UKAC
- 10 2000-2230 432MHz UKAC
- 15 0900-1200 First 50MHz Contest
- 17 2000-2230 1.3GHz UKAC
- 24 2000-2230 50MHz UKAC
- 24 2000-2230 SHF UKAC

#### May

- 1 2000-2230 144MHz UKAC

### HF

#### January

- 2 2000-2130 80m CC CW LOW QRP
- 11 2000-2130 80m CC SSB LOW QRP
- 15 1400-1800 AFS Contest CW ALL-Affiliated Societies contest (S1)
- 19 2000-2130 80m CC DATA LOW QRP
- 21 1400-1800 AFS Contest PHONE ALL-Affiliated Societies

#### February

- 6 2000-2130 80m CC SSB LOW QRP
- 11-12 2100-0100 1st 1.8MHz Contest UK/Overseas DXCC & UK District Bonus (M3)
- 15 2000-2130 80m CC DATA LOW QRP
- 23 2000-2130 80m CC CW LOW QRP

#### March

- 5 2000-2130 80m CC DATA LOW QRP
- 10-11 1000-1000 Commonwealth Contest OPEN RESTRICTED Multi-Op HQ Commonwealth Contest (S2)
- 14 2000-2130 80m CC CW LOW QRP

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## Braintree and District Amateur Radio Society

Braintree and District A.R.S. meets every 1st and 3rd Monday of the month at The Clubhouse, Braintree Hockey Club, Church Street, Bocking. Doors open from 7.30 pm for an 8 pm start to the meeting. Prior to 8 pm, and during the refreshments break, when a cup of tea or coffee is available free of charge, members have the opportunity to sell or exchange equipment etc. Meetings normally finish at 10 pm.

A Club Net operates on the 2nd and 4th Mondays (excluding Bank Holidays) under the callsigns G6BRH and G3XG. The net commences at 20.00 clocktime on V30 (S15) - 145.375MHz and SU23 - 433.575MHz, unless QRM. In months with 5th Monday the net operates via GB3BZ 430.850Mhz.

The Club Membership fee is £16 annually; Senior members (State Retirement age) and Junior members (under 18) pay a reduced club subscription of £10. Door fees are payable per meeting. Rates are £1 for members, and £1 for visitors.

This magazine "BARSCOM" is issued free to members, usually at the first meeting of the month by e-mail. Members unable to attend club meetings may lodge S.A.E.s with the Editor for printed copies of BARSCOM. Usual deadline for copy is the 3rd weekend of each month.

Members advertisements are published free of charge.

The club operates a no smoking policy at it's meeting.

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## Old Component and Equipment Catalogues

*Dave G3PEN*

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When dismantling old equipment, you will accumulate a number of items that are useful, but about which you may not actually know much about. For example, the working capabilities (eg voltage/current ratings) of such items as fuse-holders, switches,

relays, lamps and holders, and small transformers can vary enormously, depending on make and vintage, and how you intend to use them.

It is therefore useful to collect a modest range of catalogues from the major component suppliers eg

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Rapid, Radio Spares, Expo, Main Line, Electro Value, Maplin, etc. It also pays to get some from a long time ago, as the components you are rescuing, by definition, are old and may have been produced decades ago. In fact, I have some catalogues from ITT, Electroniques and others which date back to the late 1960s, and these have been very useful. For instance, all my information about Selsyns comes from one catalogue produced by a shop in Tottenham Court Road - Z&I Aero - and where else could one obtain information about Electroniques or Denco coils and IF transformers (which turn up in old equipment - both home-built and commercial) than their catalogues?

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Of course, such a collection can be both physically large and very heavy. I therefore make a practice of only keeping the sections of the catalogues that are likely to apply to rescued components - in some cases this is only a fifth or less of the original catalogue - do keep the indexes though! As to the number of catalogues from one supplier that are worth keeping, several decades ago there was hardly any change from issue to issue, even over a number of years, but nowadays things change so rapidly that an issue from every two or three years may be needed. However, as noted above, you are dealing with old components, so the older catalogues are of greatest use at present.



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For more information and pictures of events and projects see our  
Web Site at [www.badars.co.uk](http://www.badars.co.uk)

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The next edition will be published on Monday **February 1**

The deadline for submissions for the next edition is **January 26**

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