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THE JOURNAL OF THE CONSTRUCTOR'S CLUB

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Our wonderful hobby includes participants with a great deal of electronic knowledge as well as those just beginning their journey. Our quarterly newsletter tries to publish a little something for each!

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What current will blow a 3 amp fuse?

Depends… on which side of the Atlantic you are! Well, amongst several other important variables, that is: in Europe, a 3 amp fuse will carry 3 amps more or less forever; in the Americas, 3 amps in a 3 amp fuse will blow it - at some time in the future! This is only one difference you'll find 'across the pond', and it's one that caused much consternation when I commissioned US equipment in the UK, as I was responsible for safety checking any equipment used in the factory.
Then, of course, I had German, Scandinavian and Eastern Bloc machinery to contend with too: and you'd be amazed at the (pre-European Union) differences I came across. For instance, checking a bit of kit I found the feed cable cores coloured red, pink, green, black with white trace and white with black trace. Yes, 5 cores of unknown function! Obviously standard in Hotty-Potty Land, and complete unknown here in UK. A call to the importer brought a Hotty-Potty manual, in… Hotty-Potty language and alphabet, so of no practical purpose and the schematic was deliberately omitted, a blank page. So - back to basics! Following the wires, looking for earth studs, phase input fuses, neutral connection et al (assuming this was 3 phase).
The net result was Red, Pink and Green = phases (they went to 3 fuses); Black with white trace = Earth (it went to a hefty brass bolt in the chassis); White with black trace = neutral (it went to a buss bar with some spare ways). The fuses were rated at 28 amps, 560v which was about as much use in the UK as a chocolate teapot - ratings alien to anything I could find in those pre-Google days. To preserve the sanity of Technicians and Maintenance Engineers in the future, I proposed to replace the cable with UK standard, Red, Yellow, Blue, phases, Black neutral and Green/ Yellow Earth. Up to now, all clear - but what rating to put into the fuse holders to protect properly on UK 415v AC 3Φ?
Thus I learned from Stan M. just what made a fuse rating and how to work the weird graphs in the back of my copy of IEE Electrical Regulations, the I 2 T values of various British Standard fuses. In went 25 amp 600v rated fuses, selected to be of medium speed blowing. Job done, transformer tappings adjusted for 415v AC 3Φ, the machine safety

checked and in production. An example - of fuses far bigger than an amateur will likely meet - can be found at: **https://espm.co.uk/BS88%20fuse%20info.pdf**
...and you can see how time, as well as amps and voltage the fuse is capable of interrupting is a major part of fuse selection. It's a fact that the lower the voltage interrupted, the amps flowing pre-fusing and blowing to protect semiconductors is a very difficult, nigh on impossible, to specify: Bourns USA have lots of information, see: https://www.bourns.com/products/circuit-protection/singlfuse-smd-fuses

* Volt sticks and RF:

The modern 'volt stick' live cable detector pens are very popular, and can be a real boon if used sensibly and with realisation of their limitations. I make it a habit to give the 'business end' a vigorous rub on my sleeve before using it to find live cables; the synthetic material in most garments nowadays crates enough static electricity to cause the volt stick to flash. No flash? Then I don't use it until I've tested it on a known 'live' terminal.
The stick works by having a FET transistor gate pick up the electric field from a live conductor, thus switching an LED to indicate the presence of a field. The 'vigorous rubbing' both creates static charges and an AC signal; most volt sticks won't indicate a DC level - and this is where, as amateurs, we need to take extra care. The Electricity supply industry in the UK used 'pygmy lamp and series resistor' detectors (known as Martindale - Drummond):

These relied on a 10 watt (oven style) filament lamp and series 4k7 / 10 watt resistor, and were both AC and DC capable, which a lot of volt sticks most certainly aren't. The inclusion of a series 4k7 meant that 110 - 415 volt AC 3Φ could be detected for short periods.
Anyone who has a valve / tube power supply will immediately see the problem if your voltage detector won't detect DC! And don't think that the neon indicator(s) you've built in are fail-safe; they aren't. It's basic electrical safety that you double check BEFORE touching a possible live terminal, and the filament lamp / resistor approach is a good start, providing you test the device BEFORE and AFTER each test to be sure (as far as is reasonably possible) the thing is functional.
Volt sticks do respond to RF, as the 'open gate' FET will definitely pick up an RF field; but a PA tank circuit will radiate sufficient energy to blow out the extremely sensitive gate. Imagine the scene: Dopey Dave is playing about in his transmitter which has an HV power supply and valve / tube PA device; he notes on key down his volt stick lights up a treat - "wow" says D. Dave, "visual Morse indicator!" but - and here's the crunch - doesn't realise his volt stick has been stuffed by a hefty dose of RF. Dave then checks the HV DC power supply and gets no volt stick flash, and, assuming a loose terminal screw, inserts his screwdriver, and... you know the rest!
Those with solid state PA rigs may laugh… but keep to mind the RF volts found when poking around an ATU feeding a Hi-Z antenna. 100 watts is 100 watts, no matter how you generate it!

* **Amelia Earhart:** There is recent speculation that a Pacific Ocean sonar search might have accidentally found a sonar return that looks like her airplane. *Amateur Radio Weekly* reports that the U.S. Naval Institute has an interesting article **regarding her poor radio communications abilities** which might have led to her failure to obtain a position "fix" and determine how to navigate, near Howland Island.

* **Crystals: What's Going on in There?** ***Radio World*** **(1/24)** has an article that explains a great deal about **the history and technology of using crystals** in radio circuits. I didn't know, for instance, that the bulk of raw crystal material came from Brazil for many years.

* **Analog, Analog, Analog, Analog: The Franklin Oscillator and Multi-Q Circuits.** **The January, 2024 AWA Newsletter published by ZS6ADY** contains an article by VE7LCG that explains much about the Franklin and also the old Heath Q Multipliers. These still have a role to play if you have a tube receiver and even with certain solid-state designs and regenerative receivers. Who knew this old technology was still so useful? This issue also features the old Hallicrafters SX-28. I used one of these for years and it is still a favorite of mine. But I'm nearly 83 and it's too heavy! I traded it off for a Drake 2A which is less than half the weight of the Halli.

* Repairing relay switch and key contacts

If you've a specialised relay, switch or your favourite key developing "dodgy" contacts, as a last resort repair - or "get-you-going" - consider a couple of options; home made cross bar contacts or rescue some from a scrap (or otherwise no good) relay. Cross bar contacts are good for non-wiping jobs too, like repairing home made hacksaw blade paddle keys and the like.

Cross Bar contacts

These are miniature copper bars, made from salvaged transformer windings or similar that are decent quality enamelled copper. File the original damaged contacts down to allow extra metal to be fitted, and cut a fine groove in each mounting, "10 to 4" and "20 to 2" cross wise to support short lengths of copper wire soldered down with a spot of solder paste (or silver loaded conductive epoxy, if not carrying more than a couple of milliamps). You might have to remove all the old contacts; typically contacts are made from metal that won't tin.

Relays are designed to "wipe" the contacts together, so the cross-wise copper bars always present a clean face - but be aware these cross bar switches won't carry many Amps!

Salvaged contacts

Easy as that; find some similar sized contacts in a scrap relay with a burned out coil (or otherwise no good) and carefully cut out a replacement pair, saving the bronze back mounts. File out the damaged / useless contacts back to the original bronze mounts, then use some 60/40 solder paste with a brief touch of a hot iron to sweat down the replacement contacts. Hey-ho, off you go!

The trick is to avoid getting any solder on the contact faces. Sounds easy; but wait till you try it!

* **Artificial Intelligence Department:** On a whim, Frank asked ChatGPT to write a Japanese Haiku-style poem about Ham Radio. In seconds, it produced this result:

Waves in the still air
Morse code whispers through the night
Ham radio's dance

This ability is remarkable. And perhaps a little scary...

* **The AmateurLogic.tv website** teaches theory related to the Extra Class license questions and seems a good training source for your license upgrade, using a series of videos!

* On the Drake "groups.io" there has recently been a lot of discussion regarding the use and sourcing for 1N34A and other low-voltage diodes. These are commonly used in RF watt and SWR meters, crystal radios, etc. There are many sources for these, including Amazon (about 60 cents each, with free Amazon shipping if you are a Prime member). Greg, W9GB, posted an explanation of the different types and a copy of this is below:

Germanium Diodes are used for Rectification/Detection (RF—> DC)
in RF/SWR meters (and Antenna Tuners with Internal meters) due to low voltage drop (0.3V).
Common Germanium Diodes are: 1N34(A), 1N60, 1N270, and 1N295.

These Germanium Diodes DIFFER in their Voltage and Current Ratings.
DRAKE frequently used the 1N270 diode in many of their Antenna Tuners, Wattmeters.
==
Schottky Diodes (1N5819, BAT41, BAT43), can be Substituted for Germanium diodes
due to similar Low Voltage Drop (0.3-0.5V). Silicon not suitable (0.7 V drop).
**** At the millennium, with RoHS mfg. conversion, many types of Germanium diodes disappeared.**
******
Through-hole reduction, due to Surface Mount replacement, also a production issue.
—
Central Semiconductor CDSH270 was a Schottky Diode designed to replace the 1N270 Germanium diode.
100V, 100mA, through-hole, DO-35 package Schottky diode.
https://my.centralsemi.com/datasheets/CDSH270.PDF

Central Semi Discontinued, after a ~15 year production run.
Some advantages over the 1N270 are lower forward voltage, lower leakage current,
faster switching speed, and a more robust package.

* **Olivia** is a Multi-Frequency Shift Keying (MFSK) radioteletype digital mode. It's an amateur radioteletype protocol designed to work in low signal-to-noise conditions on HF bands. **Go here to find out more about it!**

* **Parts, Parts, Parts!** There's always a need for parts suppliers. WB0IQK has constructed an extensive list of parts and suppliers and WB4HFN has put it on a website. You can find a link to it by clicking on the "Parts Sources" selection of the drop-down "**Construction Resources**" menu of the W4NPN website.

* **Is this why some circuits just won't stabilize?** This story begins in the very early seventies. There was news in the technical press that there was a strange oscillation to be found "AT SOME ULTRASONIC FREQUENCY" in a small signal silicon planar transistor whose collector was shorted to its base.

* Cheery thought according to a recent Kim Kommando email: There is a 50% chance AI will beat us at everything by 2047: That's according to a survey of 2,778 AI experts. They also predict a 10% shot at total job automation by 2037 and a 10% risk of AI leading to human extinction. **Sleep well!**

* **The Random Wire has a comprehensive article** about using **AllStarLink.** Those whose primary interest lies in computerized ham radio and digital systems will likely enjoy this. **Also, note that Random Wire has created a "mirror" website of its Substack site. The mirror site has a nice layout and graphics.**

* Maplin Electronics (UK) published an electronics magazine from 1981 – 2001. **You can read these during the cold winter nights, at this link.**

* What's a **Transient Voltage Suppressor (TVS) and what should we do with them?** Semtech's blog explains it here!

* **Amateur Radio Weekly** has an article about ***QSOMate***, logging software for iPhone, iPad and MacOS desktops. This writer has not tried it and has no connection to the vendor.

* **Ham Radio YouTube channels**. I'm sure there are more but this is what I've found so far.

HB9BLA Wireless by Andreas Spiess HB9BLA

KM6LYW Radio by Craig Lamparter KM6LYW (home of the DigiPi project)

Modern Ham by Billy Penley KN4MKB

Tech Minds by Matthew Miller M0DQW

* Want to know about **Magnetic Loop Antennas** and why they work so well? Check out the link, provided by Zero Retries.

* Here's a website **dedicated to RTL-SDR**. Please tell Frank of others if you've found them. This link is courtesy of Zero Retries.

>>> **Mea Culpa Department:** In January, a subscriber sent the name of a Club Newsletter that might be one to add to the list below, and I not-so-cleverly lost the email. Please send it again if you read this!

Other Ham-related Newsletters (please let Frank know of others not listed here)
These should be news-type NL's and not club monthly newsletters unless they include interesting projects:

* **The Amateur Logic website** teaches the Extra Class questions as well as other ham-related information. Give it a look!

* An email newsletter called **"73 From G5DOC"** has been recommended. I have not tried it yet but you can subscribe (no cost) and see if you like it.

* **Experimental Radio News** synthesizes information from a multitude of sources into one easy-to-read email. Interesting stuff! Ten issues noted so far.

* **Zero Retries newsletter #134** has an article titled **Build a Ham Transmitter with a Raspberry Pi Pico** That sounds interesting, for those who like to play with this remarkable device.

* ***Amateur Radio Weekly***, curated by K4HCK, is more news-oriented than construction-oriented, but every issue seems to have at least one construction-oriented project. **You can link to the issues archive here**. It's free.

* **The Random Wire** is another ham-related website that Tom Salzer, KJ7T, operates. It addresses many facets of amateur radio, from high-tech to some construction techniques and seems to have something to everyone.

* **Here's a link to the ARRL newsletter**, which has many pages of news of interest to us hams.

* **DxZone publishes a substantial list** of amateur radio newsletters. Have a look!

* **The QRZ Forum** contains news, technical information, discussions and equipment evaluations; there is much to read here!

* **This DX Engineering website** has 31 pages of news and general information about ham radio. Many antenna and feedline articles are included.

* **Zero Retries is an independent newsletter** promoting technological innovation in Amateur Radio. The most recent edition has a number of articles of interest, including repurposing surplus portable light towers, SDR and much more.

* **QRP Guys** advertises kits and circuits

* **QRP ARCI** is a club for low power enthusiasts worldwide.

* **The American QRP Club** is for builders, experimenters, and low power enthusiasts.

* **VK3YE's QRP website** is not a club but it provides a lot of information about QRP operations.

* **The DXZONE** provides a list of QRP websites

* Check out the various sections of www.w4npn.net, the website where the *Hot Iron* newsletters are hosted. There is much more there! Another rabbit hole.

Future Quarterly Newsletter Content – some subjects we are considering:

Crystals and Crystal Oscillators, a VFO issue, Regenerative Receiver designs, Classic Xmtr designs, Power Supplies. What interests you? Let us know!

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