Fuses 101

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FUSE CLUES

COMMO

AW, C'MON, MACON

A FUSE IS A FUSE IS A FUSE!

WELL YES, BUT...

BEFORE YOU SLAP THE FIRST ONE THAT FITS INTO THE FUSE HOLDER, HERE ARE SOME THINGS YOU SHOULD KNOW ABOUT THAT CIRCUIT SAVER...

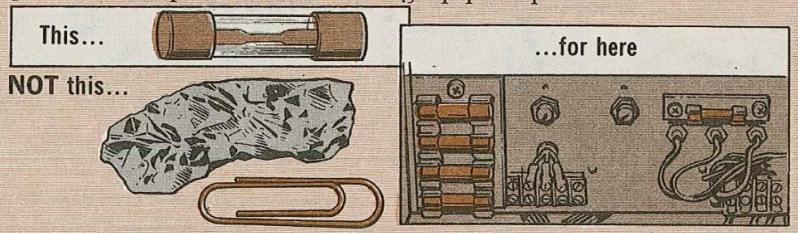
SPARKS

One quick way to set your gear up for trouble is to give it too much fuse. Your equipment's circuit was built with a weak link. The right fuse is it.

That bit of glass and metal is built to sacrifice itself so the more fragile (and expensive) parts of your equipment can go on working. When killing bolts of power try to zap the circuit, the fuse goes first.

Overfusing puts the whammy on that carefully-laid plan.

You know better than to put a paper clip or a piece of tin foil in the fuse's place. Sure, it might put you back in business...for a while. But it drops your protection to zip. Ever hear of blowing a paper clip?



A "field fix" like that puts your circuit at the mercy of whatever blew the fuse. It also ignores the warning signal the blown fuse gave you.

A blown fuse means there's a problem in the circuit. In other words, it's time to troubleshoot your gear.

There's another kind of overfusing, tho. One that seems innocent enough, but can do the same dirt to your equipment.

Fuses that look exactly alike may not be. Physically maybe, but electrically, no.

Putting 'em side by side to see if they match isn't the true test. Eyeball the voltage and amperage ratings on the fuse. You may have to check blow time, too.

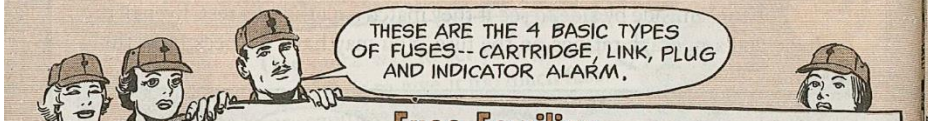
The fuse carries the clues you need. We'll get to the codes to solve the clues shortly.

For now, remember that you never use a fuse with an amp rating higher than the one it replaces. A fuse is built to carry only so much current. If the current goes above the rating and over the time limit, the metal link melts. A fuse with too high an amp rating would continue to carry killing current that will damage parts the original fuse was designed to protect. On the other hand, you can use a higher voltage rating if the amp rating is the same. Don't substitute fuses with lower volt ratings, tho.

PS MORE

When that fuse link melts, electricity can still arc across the gap. The link finally melts away, creating a gap too wide for arcing. Before the gap widens, electricity continues to arc. The voltage rating is the most volts the fuse will take without arcing over. Too low a rating, and arcing keeps the circuit closed.

If in doubt about which fuse your equipment needs, check your TM's. Not listed? Send your supply support an exception data request. Tell 'em what current and voltage rating you need, what the fuse is used in, etc. Give 'em as much info as possible.

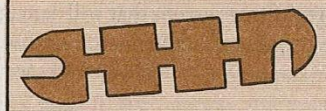


Fuse Families

CARTRIDGE—This is probably the most common fuse. So, it also causes most identity problems. It's a tube of glass, plastic or ceramic. Inside, there's a link attached to both cap ends (ferrules). They are low current capacity (.002-to 60-amp) fuses used in low-powered circuits, like those in radios, radar sets, test equipment and all types of vehicles. For higher-rated (over 60 amps) circuits, there is another type of cartridge fuse, called the knife-blade.

PLUG—Another common type of fuse, it's used in many house circuits. It has a mica or glass window to let you see its condition.

INDICATOR ALARM—These serve a dual purpose. Beside protecting the circuit like other fuses, they also give a noise and/or visual signal to show which one has blown.



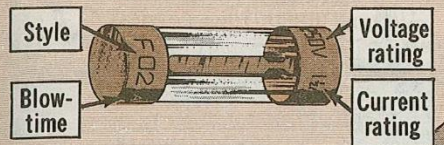
LINK—The simplest kind of fuse, it's a series of flat metal pieces, attached by thin metal necks. They are sometimes used as replacement links for reusable cartridge fuses.

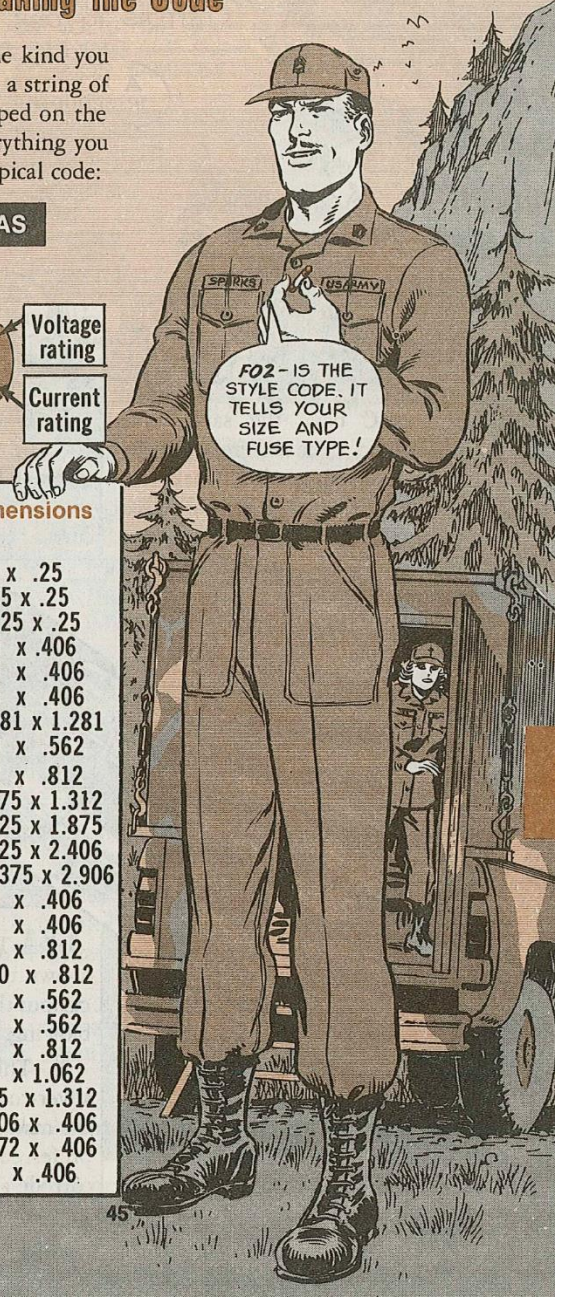
Breaking the Code

Each cartridge fuse—the kind you deal with most often—has a string of letters and numbers stamped on the ferrule. They tell you everything you need to know. Here's a typical code:

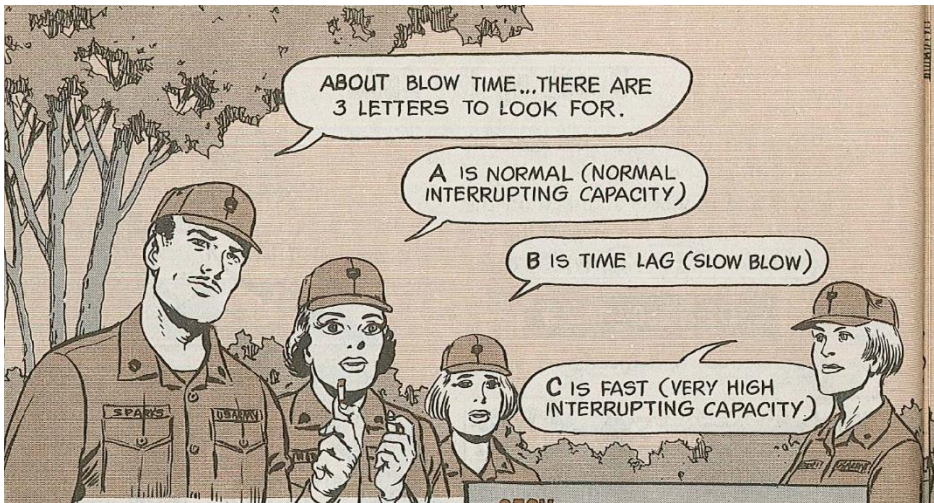
FO2 A 250V 1½AS

Broken down, it means:



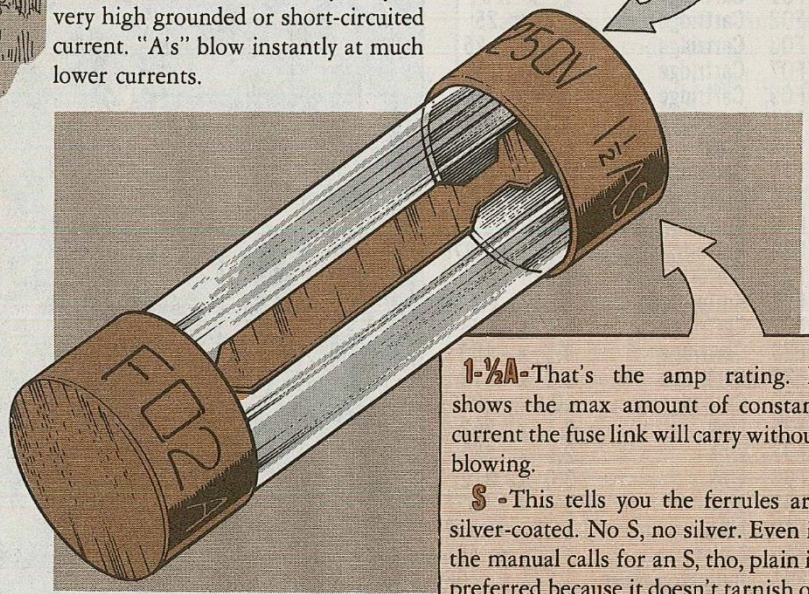


Style Code	Type	Dimensions
F01	Cartridge	1 x .25
F02	Cartridge	1.25 x .25
F03	Cartridge	1.125 x .25
F07	Cartridge	1.5 x .406
F09	Cartridge	1.5 x .406
F11	Cartridge	1.5 x .406
F14	Plug	1.281 x 1.281
F15	Cartridge	2.0 x .562
F16	Cartridge	3.0 x .812
F19	Knife-blade	5.875 x 1.312
F20	Knife-blade	7.125 x 1.875
F21	Knife-blade	8.625 x 2.406
F22	Knife-blade	10.375 x 2.906
F27	Cartridge	3.0 x .406
F28	Cartridge	4.5 x .406
F29	Cartridge	5.0 x .812
F30	Cartridge	10.0 x .812
F36	Link	2.5 x .562
F37	Link	2.5 x .562
F38	Link	3.0 x .812
F39	Link	3.5 x 1.062
F40	Link	1.75 x 1.312
F50	Link	1.406 x .406
F51	Indicator-alarm	1.672 x .406
F60	Cartridge	1.5 x .406



A and C have the same time characteristics. The difference is the amount of current needed to make 'em give way. A "C" fuse is normally used in high-powered (over 500 volts) circuits and blows instantly only at very high grounded or short-circuited current. "A's" blow instantly at much lower currents.

250V -That's voltage. Remember you can use a higher rating than the original, but only if the amp rating is the same. If you use a lower rating, current can arc across the melted link.



1-½A-That's the amp rating. It shows the max amount of constant current the fuse link will carry without blowing.

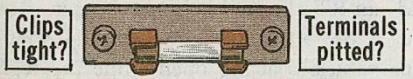
S -This tells you the ferrules are silver-coated. No S, no silver. Even if the manual calls for an S, tho, plain is preferred because it doesn't tarnish or corrode as easily as silver.

DESIGNATION	BLOW-TIME CHARACTERISTICS	DIMENSIONS (INCHES)
3AB	Slow-acting	
3AG	Normal	1¼ long x ¼ dia.
3AG Slo-Blo	Slow-acting	
4AG	Normal	
4AG Slo-Blo	Slow-acting	1¼ long x 9/32dia.
5AG	Normal	
5AG Slo-Blo	Slow-acting	1½ long x 13/32dia.
8AG	Fast-acting	1 long x ¼ dia.
ABC	Fast-acting	1¼ long x ¼ dia.
AGC	Fast-acting	
AGX	Fast-acting	1 long x ¼ dia.
FMN	Fast-acting	1 3/32 long x 1½ dia.
MDL	Slow-acting	
MDX	Slow-acting	1¼ long x ¼ dia.
MTH	Fast-acting	

Taking Care of Fuses

OK, you got the fuse you want and all is well. How do you keep it that way?

Slipping a fuse into a live circuit could create an arc. That burns ferrules or terminals and limits good contact by increasing resistance. Turn the circuit off first.



If terminals are already pitted or dirty, clean 'em with emery cloth.

Keep clips tight. Squeeze loose ones together. Still no go? Replace the clips.

Good tension means tight. It should take a pretty good push to seat your new fuse.

Finally, keep an eye on fuse ends for signs of over-heating or corrosion.

Want to know still more about those little circuit savers? Eyeball FM 11-60 Communications Electronics Fundamentals: Basic Principles (Feb 74). Appendix D is all about fuses.

END