Bob's Shop Notes: Alternatives to RG58 in Lightspeed Ignition Wiring

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Instructions for the popular and capable electronic ignition system from Lightspeed recommends RG58 coaxial cable for wiring between the ignition control module and high tension coils on the engine. In this writer's opinion, it's difficult to pick a wire less suited to this task. I base this opinion upon the types of materials used for this venerable coax.

RG58 has been around for nearly 60 years. It was a popular coaxial cable in World-War II era aircraft. The insulation materials were the best we had available at the time: polyvinylchloride (PVC) and polyethylene. Originally designed for use in relatively low temperature areas, this wire was widely specified into antenna feedline systems for airborne and ground communications.

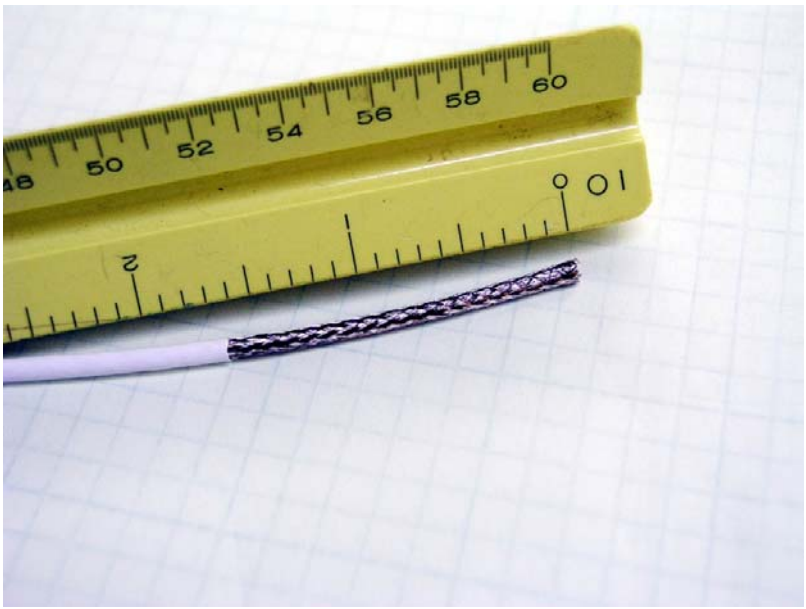
Six decades later, our operating frequencies of interest have gone up by at least ten-fold. Modern insulations with names like teflon, tefzel, kevlar, and kapton have been offered as having superior characteristics at radio frequencies and much more robust characteristics with respect to abrasion and environmental temperature.

I'm not privy to details of why this now obsolete cable is recommended for the ignition system wiring. I suspect it was to take advantage of the very neat, low cost, easy to apply, bayonet locking BNC connectors designed for coaxial cable termination. While RG58 mates up nicely with BNC style connectors, use in the engine compartment is not

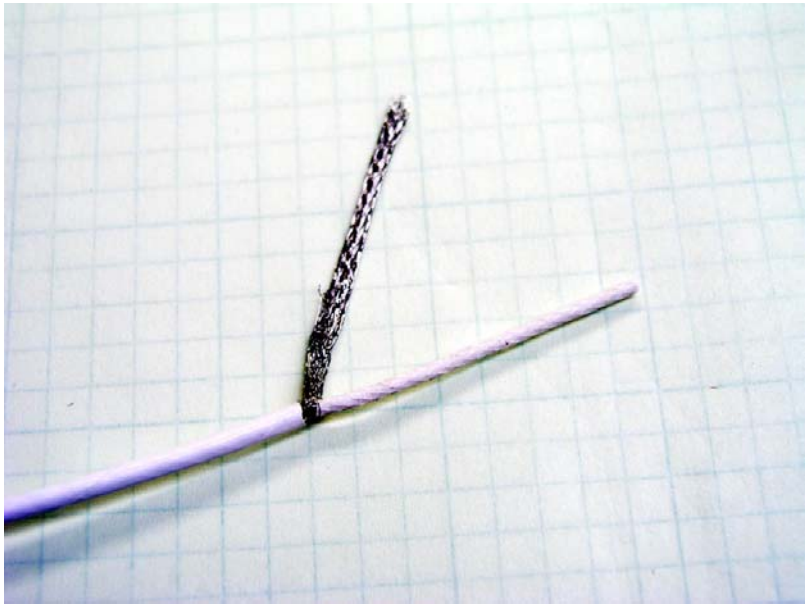
recommended. Both insulations used in fabricating RG58 are particularly susceptible to ozone and heat induced deterioration. This wire was never intended for use in proximity of engines. A more modern coax like RG-400 could be considered but allow me to suggest an low cost, very robust alternative to coaxial transmission line in this application.

Step 1

Click Here for larger image. Consider this modern 20AWG shielded wire. Here's a wire I stock that features Teflon wrap over Kapton for the outer insulation. I'm unsure about the inner insulation, it shrugs off the heat of a soldering iron. I suspect it's Tefzel.



Start by stripping back about 1.5" of outer insulation

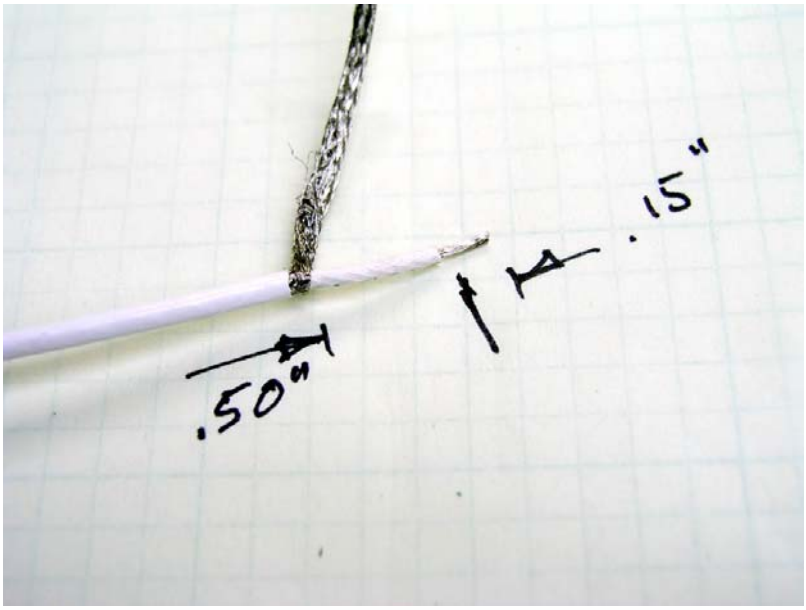


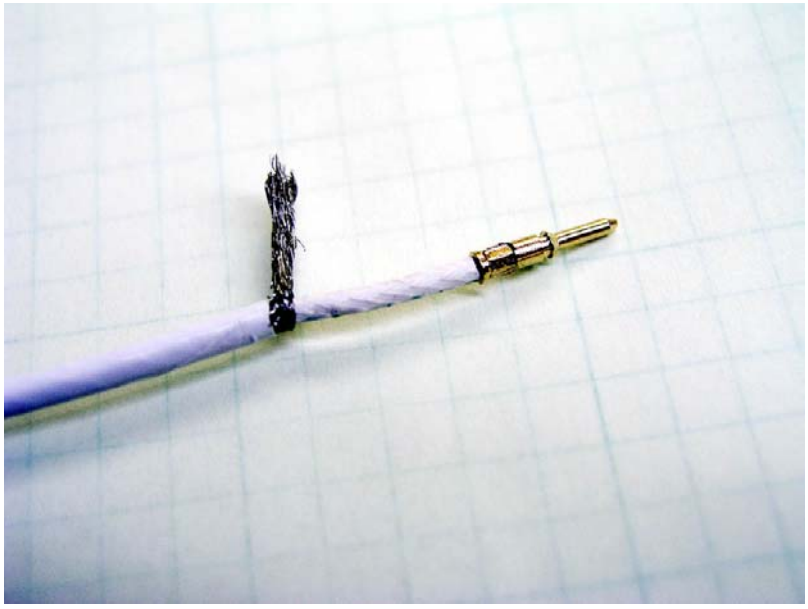
Step 2

Click Here for larger image. This particular wire lends itself to shield separation technique described elsewhere on this website.

Step 3

Click Here for larger image. Trim the inner conductor for 0.5" exposed insulation and 0.15" exposed strands of wire.





Step 4

Click Here for larger image. Install center conductor BNC connector pin on exposed strands. Trim outer conductor braid to 0.4" length.

Step 5

Click Here for larger image. Push center pin into place from the rear of the BNC connector. If you're using the connectors supplied by B&C, the pin will "snap" into final position. Note that the end of the pin is just flush with the connector housing.

Step 6

Click Here for larger image. Slide shield grip sleeve down over rear of connector with tail of shield braid inside and crimp with proper die of the tool.

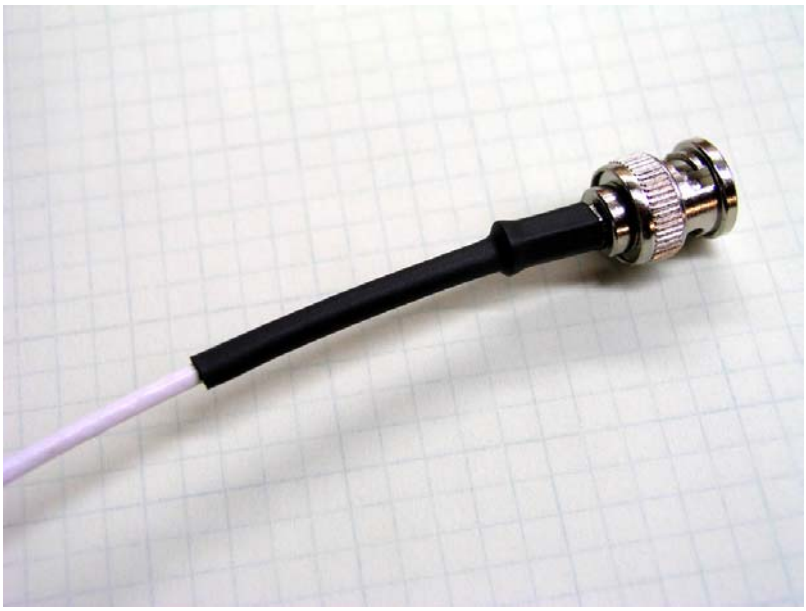
Since this connector was NOT designed for use with undersized, fake-coax it's a good idea to support the installed connector wire-up and drip 5-minute epoxy into the back. Put a drop in place and "stir" it down by wiggling the wire. When the epoxy has completely enveloped the circumference of the wire, you can suck on the connector to pull epoxy inside. Keep adding drops of epoxy and combinations of wiggle-and-suck until you are assured of center conductor retention.

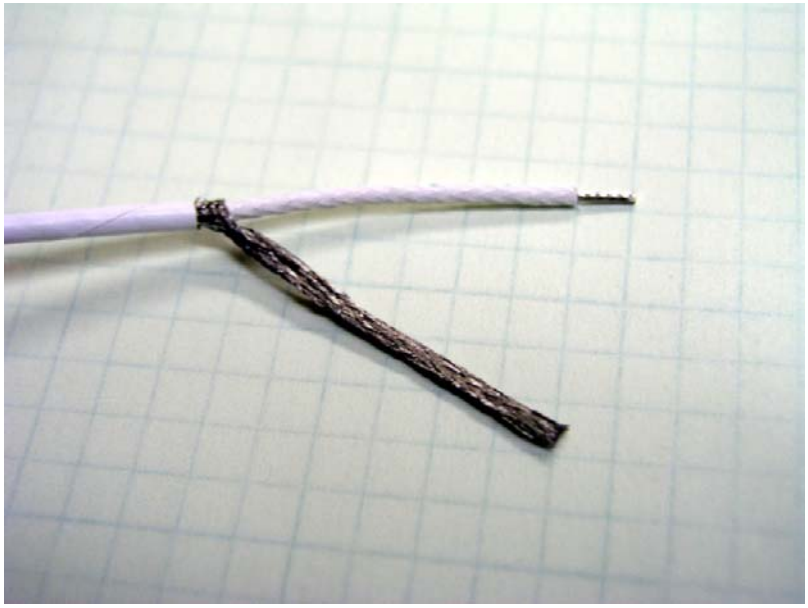
It's not necessary to totally fill the void with epoxy. We're only making sure that a tug on the wire doesn't jerk the center conductor out of its proper resting place in

the connector.

Step 7

Click Here for larger image. Instructions that come with the LSE system suggest that you do not use heat-shrink on any of the finished joints for RG58 . . . this is because materials used will melt at even the ordinary temperatures used to apply heat-shrink . . . there is risk of displacing enough center conductor insulation that the wire shorts out to the shield. Given that there is no such risk with this wire, a heat-shrink segment over the joint adds bend support to the finished connector installation.



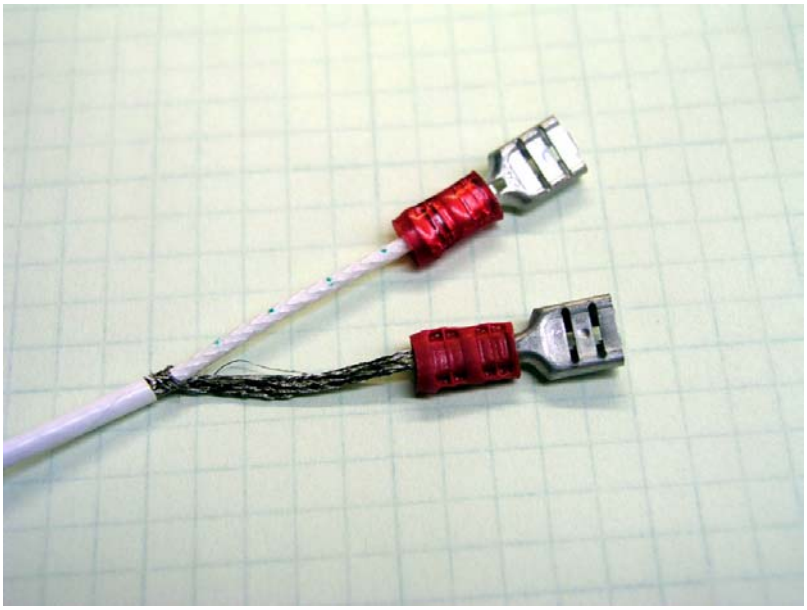


Step 8

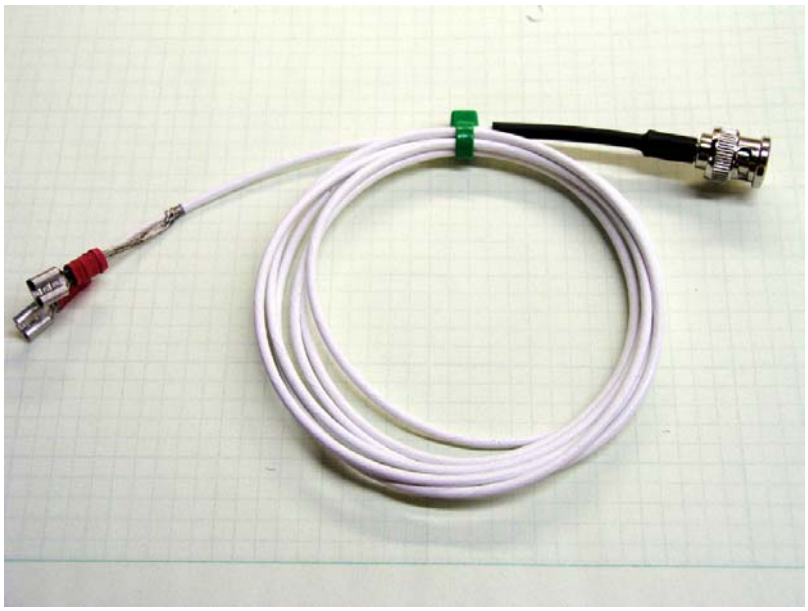
Click Here for larger image. Prepare the coil end of the wire just like we did at the control box end.

Step 9

Click Here for larger image. Install PIDG style Fast-On connectors to mate with the coil assembly.



Step 10



Click Here for larger image. I understand the attraction of RG-58/BNC combinations. Years ago I used RG58 as signal cables in data acquisition systems for accident analysis. We worked a lot with the cast-iron and diesel fuel environment of railroads. The RG58 was relatively inexpensive. A pulled-off or stepped-on BNC connector could be easily and quickly replaced in the field. Custom length data cables were quickly fabricated. I didn't carry RG58 spools on the airline . . . I just bought a spool at the local Radio Shack when I got there. A crimp tool and a few dozen loose connectors made sure that if we had any problems with data gathering, it WASN'T going be be caused by sensor cables.

These cables were EXPECTED to receive damage and if a full set of cables lasted only one job,

the convenience and time savings made them good value for the task. However, for wiring Klaus' fine ignition system we'd like to see the wiring go in easy, be well rated to the environment and last a very long time with no maintenance. If it were my airplane, it would be wired as described above . . .

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