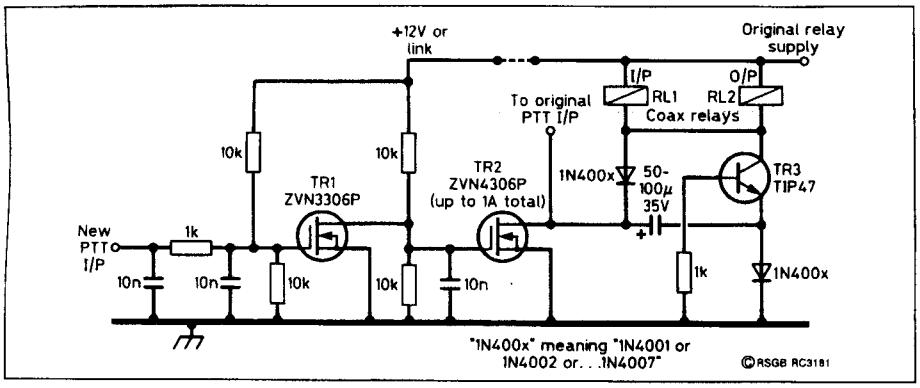

Fig 3: A more practical version of Fig 2 with an interface for fast, low-current keying from any transceiver. The rating of TR2 depends on the current demand of other keying circuits in the power amplifier.

to optimise C1 more carefully, and spend some time measuring the performance with an oscilloscope.

In order to have the relay contacts closed before the RF arrives, you *must* activate the speedup circuit from the transceiver's fastest PA control output, which is usually an open-collector npn transistor. If you key the PA through another relay inside the transceiver, you're losing valuable milliseconds while that relay changes over first. Every millisecond counts here, because the antenna relay contacts need to have changed over *and also stopped bouncing* before the RF arrives - otherwise you'll get RF arcing as the contacts bounce open again. The difficulty with using the transistor-switched output of many transceivers is that the transistor itself may be quite low-rated in terms of voltage and current. Often this transistor cannot handle the full load of one or two coaxial relays plus whatever else is connected to the power amplifier's PTT line. **Fig 3** is a more practical version of Fig 2, with a simple two-transistor interface that keys the power amplifier without delay, and allows you safely to use the fast PA control output of any transceiver. For the fastest possible response, you should check with a scope that the relay switching is not pulling down the supply rail and, if necessary, reinforce it with an additional reservoir capacitor close to the relays.

I've modified a few relay systems in power amplifiers using this speed-up circuit, and it has greatly reduced the incidence of RF arcing. In particular, it can speed-up the popular CX520 coaxial relays used at VHF/UHF, to bring them inside the typical 15ms deadline. It is still a race against time, so this modification is not guaranteed to work in every case (especially with older transceivers that do not have a deliberate delay before the RF appears). Obviously it isn't as good as a fully-sequenced changeover system that can sense when the relay contacts are fully settled, and also send a hold-off signal back to the transceiver until the amplifier is completely ready for the RF... but that's a much longer story.

Some relays used for antenna changeover in HF transceivers are really AC/DC power relays, with switching times of 30ms or even more. You may not be able to speed these up enough to prevent RF arcing, particularly because the contacts are very prone to bouncing. You may see arcs from time to time, but not always, which indicates either that the contacts are sometimes bouncing, or that the armature is sometimes sticking on its pivot (most relays are far from being precision mechanisms). The only solution is to replace these relays with something faster. The best solution up to 50MHz is probably to use small ceramic vacuum relays, most of which are very fast because of their special construction [1]. Many vacuum relays have switching times of less than 10ms, and this can be roughly halved by the speed-up circuit. The disadvantage is that most are designed for 24 - 28V operation, so you may require a new relay supply, and may also need to uprate the transistors in Fig 3.

SHORTENING SCREWS, AGAIN

THE DECEMBER 2001 item about shortening screws brought a number of practical comments and suggestions.

SEVERAL COMMENTS were about the technique for removing the raised lip that occurs when you run the nut over the sawn-off end to restore the damaged start to the thread. Ideally the aim is to re-create the shape of the original factory-made end... which is somewhere on the floor. You can make a fair effort at this by filing a chamfer all around and then cleaning out the start of the thread where it's squashed down. With a large steel screw, the knife-edged needle file that I suggested may be a bit too fragile for cleaning out the thread - try the edge of a small half-round file instead. If the screw is quite small and made of brass, the needle file is still probably your best bet - just take care, and don't be too heavy-handed. With small screws the best technique is probably to run the nut back over the cut end, rub off any sharp bits and repeat until the nut starts easily. (It's really much easier to do this than to read about it here.)

If you have a set of taps and suitable drills for common screw sizes such as 2BA, 4BA, 6BA, M5, M4 and M3, G3VTS suggested an alternative to holding the screw in the two nuts. Make a plate out of aluminium or mild steel as shown in **Fig 4**, and make a set of tapped holes near the edges of the plate in a range of useful sizes. Then slit each hole through the centre and the job is done. The slits make cheap-and-cheerful cutting edges which help to clean up the screw threads more effectively, so there is less filing to do. Although a set of proper split dies in these thread sizes would clean up the threads even better, Colin's idea saves you from the temptation to clamp your good dies in the vice and use them as a sawing guide.

For making the narrow slits as suggested in Fig 4, I'd recommend the X-Acto range of fine saw blades which are available from most model shops. These fit into the handle of an X-Acto knife, which most of the time can hold one of its excellent range of sharp, strong blades.

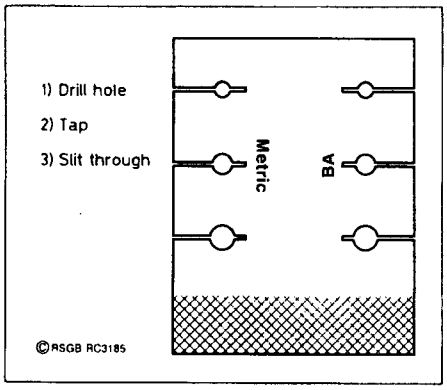

Fig 4: G3VTS suggests this simple idea for cleaning up a wide range of screw threads. Make tapped holes in the screw sizes you commonly use, and then slit them through. The plate is gripped (where shown) in a vice.

NOTE

[1] Vacuum relays sometimes appear as surplus in this country, particularly the small ITT Jennings RF1E types which are suitable for light HF use. The best source for surplus vacuum relays is probably Allen Bond, whose web pages offer many different types at very reasonable prices, including the popular Jennings RJ1A and Kilovac HC-1 types.

WWW.

Allen Bond **www.mgs4u.com/relay.htm**

The 'In Practice' website (see the previous page) contains a cumulative index from 1994-2001, and links to component suppliers, etc. ♦

If you have new questions, or any comments to add to this month's column, I'd be very pleased to hear from you by post or e-mail.

Please remember that I can answer questions through this column only, so they need to be on topics of general interest.