

Ameritron QSK-5/Kenwood TS-570/Relay-free Ameritron AL-811H Use

After getting a used QSK-5, I studied up on the history and required convoluted interpretation of the manual for my application to the TS-570 and AL-811H. (A hand marked manual copy of unknown history, QSK-5.djvu is available on the web, requiring WinDjView-0.5 to view, at <http://bama.edebris.com/manuals/ameritrn/qs5>)

The obligatory discussion with Mike at Ameritron indicated this was readily doable using essentially the Figure 2a connection (no handshake is required, or possible, for the TS-570). Note that the “QSK line” from the TS-570 can be taken as the usual Amp relay activation line – more later. This QSK line (which goes low indicating entering the TX mode) is connected to the Key 2 input on the QSK-5. This keying line switches the QSK unit from its RX PIN diodes to its TX PIN diodes, with ~ 1 ms delay. (This delay is then reflected in the AUX output port on the QSK unit where it goes low and is available for reporting back to the Transceiver a readiness for RF to be applied since the TX PINs are now active. See copy the discussion from the 2003 posting by Jim Reid at the end for a fuller discussion of several related topics.)

The Amp relay, controlled through the QSK-5 by the Key 1 input, can be activated (but with the ~ 1 ms delay) with the Key 2 input going low if a line is run from the AUX port to the Key 1 port. This is recommended by Ameritron and is part of the Figure 2a. (Note that in the QSK schematic from the web-found manual, there is a hand drawn-in but neat direct connection, with a reverse blocking diode, from Key 2 to AUX. This does not exist in my unit.) In the manual in the AMP RELAY paragraph, it is said that: “This (i.e., AMP RELAY) line has no delay when activated by pulling Key 1 line to ground, it has a one ms delay when activated by the Key 2 line.” However, if you only connect a QSK line to Key 2, and leave Key 1 and AUX unused, the Amp Relay will not close. The above quote appears to refer to the Figure 2a hookup. So in this standard hookup, there is a (unnecessary and possibly even problematic) delay in keying the Amp Relay line. However, the one ms is probably insignificant for any normal keying rate (a dit is ~ 60 ms at 20 wpm) so it appears that the method of connecting AUX to Key 1 is just a convenience for use of standard cables with RCA plugs on the two ends. Note that both the alternate hookups (2b and 3c) do connect the “QSK line” directly to Key 1 and Key 2, but with isolation diodes.

With the Figure 2a configuration, the QSK-5 unit operates in the standard way and allows use of the full break in mode of the TS-570 with the 570 internal amp relay controlling the Key 2 input. Note that the timing of the Key 2 input activation and the delayed initiation of RF from the 570 is controlled by internal timing of the 570 amp control relay activation, with a claimed 25 ms delay. This is the reason that no handshake feedback is need in this case.

With this configuration, the 570 internal amp control relay is active, and follows (really surrounds) the actual keying for full break in. (The Kenwood internal relay closes before the actual keyed RF appears and opens after key up with a delay to avoid clipping/hot switching.) The 2 QSK relays and the AMP relay are activated on initiation of TX with

Key 2 going low and then open with a ~ 3 sec delay (internally generated in the QSK-5) at the end of the transmission. The magic of the QSK is that you can hear during all key up times (aside from the 25 ms delay) including during the 3 second time out period. However, the AMP (at least for the AL-811H) will draw its resting plate current until the time out occurs.

It turns out that my older AL-811H was prone to oscillate, giving receiver hash, during times when the resting plate current is on but the amp input is floating, i.e., the very QSK time of interest. Mike at Ameritron explains that the specs on 811 tubes now available are a bit lax and this oscillation has become an issue that is dealt with the an enlarged “butterfly” capacitor plate (and possibly adding bias via diodes in the cathode circuit). I purchased the bigger cap plate and this cured the problem of hash during the vital QSK period.

However, the dream of operation with QSK and no relay noise was yet to be met. One possibility is to simply ground the Key 1 input to the QSK-5 (instead of connecting to AUX). This has the effect of holding the QSK-5 relays and the amp relay closed all the time, at the cost of having the amp resting plate current active all the time. This has power consumption and, probably more importantly, additional heat generation and cooling issues and was not recommended by Ameritron.

However, Mike recommended that this resting place current can be solved (at least for some Ameritron AMPs) by biasing the AMP tubes off during non-TX times using the existing QSK-5 board’s MOSFET Q7 (labeled MTP4N08 on the schematic but actually an IRF530, a modern fix says Mike needed for legal limit amps) switching capability that follows AUX. This method is used with the internal version of the QSK unit (the QSK-PC) that uses the same board. The bad news is that this requires running a pair of wires between the QSK-5 and the AL-811H. These run from the (normally unused in QSK-5) I and J terminals of the QSK board (through ferrite RF blocking beads on both ends) over to appropriate points in the AMP (requiring a bit of unsoldering/insertion/soldering, see the manual for the QSK-PC and the AL-80B example). This was done here, inelegantly, without any drilling of the chassis using the vent holes in the cabinets to run two unshielded wires. This works brilliantly so you can now ground Key 1 and operate full break in QSK with no amp or QSK-5 relays every moving and no resting plate current.

But wait, there is one last relay still clattering away - the amp control relay in the 570 (turned on by 570 Menu item 39). It turns out that for the 570 (and some but apparently not all Kenwoods), there is an output on the REMOTE port, pin 7, that goes HIGH on transmit. In fact this is the exactly the voltage that powers the internal relay. It is available even when the menu 39 item is turned off, again this may not be true for all Kenwoods.

Thus the issue is to have an interface that can drive the QSK-5 Key 2 input low when the TS-570 REMOTE pin 7 goes high. (All the standard interface cables readily available for Kenwoods use the relay output off REMOTE pin 4 straight through, so beware. For completeness here, the AL-811H requires handling 12 V at 100 ma for its relay control.)

This is a straightforward task that is addressed on the Alpha website (<http://www.alpharadioproducts.com/knwood.asp>) and by K0BX (<http://www.qsl.net/k0bx/amp.html>) for those (few) not DIN plug soldering challenged. It turns out that Array Solutions has an assembled cable including ALC, though not advertised for non-SPE use, the TS2K, that does the job. Phil, AD5X, provided insight into this matter.

I am now fully QSK and relay-free.

Bill, N6MW

Below are first a note back from Kenwood Tech on a somewhat related relay question, and second a copy of the useful post from 2003 by Jim Reid with related material on another QSK-5 application.

As General Information, here is a Response Direct from Kenwood Tech Support on rating of the amp control relays:

The TS-570D/S(G)/TS-870S, TS-2000, and TS-480HX/TS-480SAT are capable of being connected to most HF amplifiers directly. The specifications on the internal relay for the TS-570D/S(G)/TS-870S are:

0.6 Amps at 125vAC

0.6 Amps at 110vDC

2 Amps at 30vDC

Amplifier hook up information for Kenwood TS-570D/S(G)/TS-870S, TS-2000, and TS-480 with the Remote 7 pin din plug. Pin 4 is Relay, Pin 2 is Ground, and Pin 6 is ALC. Amplifier Relay Jack on all HF radio's is 1/2 amp or 500 ma. The ALC is Negative Driven with a threshold of -6 to -20.

To: <tentec@contesting.com>
Subject: [TenTec] Ameritron QSK-5 switch
From: jimr.reid@verizon.net (Jim Reid)
Date: Fri Jan 31 13:47:12 2003

John, KE5C, wrote:

> If you've used this with an Omni vi+, please e-mail me with
> your success or failure.....

Here is my exact experience and success using the Omni VI+, Henry amplifier and a QSK-5. Your problem is the difficulty in deciphering the Ameritron manual, hi.

> What's with Key 1 and Key 2 on the QSK-5?

My use: my "fix" was to connect the key/ptt line directly to the "Key 1" input of the QSK-5, and the "External T/R" output on the back of the Omni VI+ is connected to the "Key 2" input of the QSK-5. I make NO connection to the QSK-5 AUX socket, no need (it is sort of an "after the fact" output signal that now the QSK-5 switch is activated, I could not find a use for it, hi).

Why this way--To quote a couple lines from the -5 manual:

" The transceiver MUST have the proper sequencing of the RF and QSK output lines. The transceiver QSK line must pull low BEFORE RF appears on the output connector and release AFTER the RF envelope reaches zero to operate with any QSK switch."

Note, in Ameritron's language, "QSK line" = the T/R relay output from your Omni VI+ transceiver.

Also, it seems the Key 1 input jack must go low immediately with key down as this is what closes the linear amp relays. A "ground" input signal to Key 2 is what changes the diode gates from rcv to xmit, and THEN AUX is pulled low.

Note, that now Ameritron is suggesting to some users that they simply short the Key 1 socket to ground! This means that whenever you have the QSK-5 in your rig set up, and the -5 power is switched on, your linear T/R relays are activated to the transmit position. All T/R switching will now be done only by the two sets of PIN diodes in the -5 unit. So there is no chance at all that your relays in the linear can be hot switched!

Some thoughts about the confusing -5 manual which comes along with the unit.

It seems to me to make no sense to wait for AUX to go low to generate an input signal to Key 1! Connecting Key 1 directly to the keyer, a la fig 2c, seems to me to be the correct connection. I am referring to the figures of suggested hook ups in the Ameritron manual for the -5 unit.

But, how do you get the transceiver to stop putting out RF BEFORE the QSK line goes low??? In both fig 2a and 2b connections, the QSK line is used as the input to Key 2! So, yes, this would keep the gates set to xmit until the QSK line went low.

In the case of figs 2a and 2b, your keyer connects directly to the key input of the transceiver. The Key 2 line connects to the transceiver QSK line. This QSK line must be a wire which goes low with the key signal, but somehow stays low until sometime after the key is up, and RF output from the transceiver has stopped.

What connection to/from the transceiver goes immediately low upon key down and stays down after key up for a time?

The only immediate low on key down is from the key itself. So, I am leaving the -5 Key 1 jack "diode connected" to the keyer output. But, after some thought I decided to go back to the T/R amp relay output jack on the back of the Omni VI+. This is a line that must go low before RF comes from the transceiver and stay low for a moment or so after RF stops; it is the only output from the rig I could imagine would fit the needed description of the "QSK line". So I tried it.

I connected the Key 2 input jack of the -5 to the T/R Relay output jack on the back of the Omni VI+ transceiver.....

Voila!! Now everything seems to work as it should. The fuse lamps do not flash. I have gradually increased output power up to about 300 watts and no sign of problem! Full rcv signal amplitude between CW elements using the fast QSK setting on the Omni.

But, I have left the AUX output from the -5 open, connected to nothing. Don't really see what the point of the direction in fig 2a is to connect that jack over to the Key 1 line; or maybe it is a way to operate SSB, but would have to find somewhere else to connect the Key 1/AUX lines. Figure 2a says to connect to the VOX relay. Isn't that the same T/R relay jack to which I now have Key 2 connected?

My "fix" now is to use my CW st. key as my PTT switch when operating in the CW mode, hi. Works fine, and avoids any possibility of hot switching somehow using SSB mode.

Hope this is helpful, and not confusing, hi.

Have fun with the QSK-5!

73, Jim KH7M
