

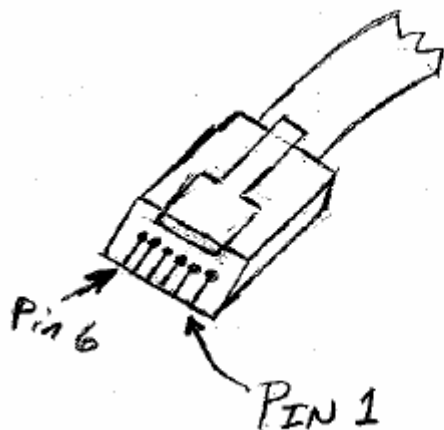
Programming the Kenwood TK-941 / TK-931

Part 1 – homebrew the cable

Myself, Bill (KE5BTZ) and others have been working to document how the Kenwood TK-9x1 series of commercial radios can be reprogrammed to talk in the 900mhz amateur band. I purchased a commercial-style programming cable from eBay for about \$25. It works ok, but I usually ‘roll my own’, and I know others would like a cable but would like to skip the cost and hassle of eBay.

The cable is known in the Kenwood manuals as a KPG-4. The radio ‘talks’ in TTL (0 to 5 volt) RS-232 serial. It needs what is known as a ‘level-shifter’ to produce the +9 to -9 volt swings to safely interface with a PC or Laptop. This is a common technique and can be recycled for other radios that need a TTL to RS-232 ‘full swing’ interface.

A home-brew version is provided in a schematic at <http://www.repeater-builder.com/kenwood/kenwood-index.html> by Paul (K9MN) Zawada who’s graciously given permission to use this out for our newsletter. I’ll present it’s elements here. First the TK-941/TK-931 Radio-pinout:



- 1 - Power Supply
- 2 - PTT GND
- 3 - PTT
- 4 - MIC
- 5 - MIC GND
- 6 - HOOKSWITCH

This is a 6-pin modular connector. Modular connectors are common on many newer rigs and I know a lot of folks don’t like this interface and prefer soldering to round mic plugs. However – there is a quick and cheap way to make this without using any cable crimping tools or soldering – buy one (1) 7 foot long, 6-pin modular phone cord (MJ-12) for about \$1.25 (Allelectronics -

CAT# MT-363, or Tanners) and now you can make TWO radio cables by cutting the phone cord in half.

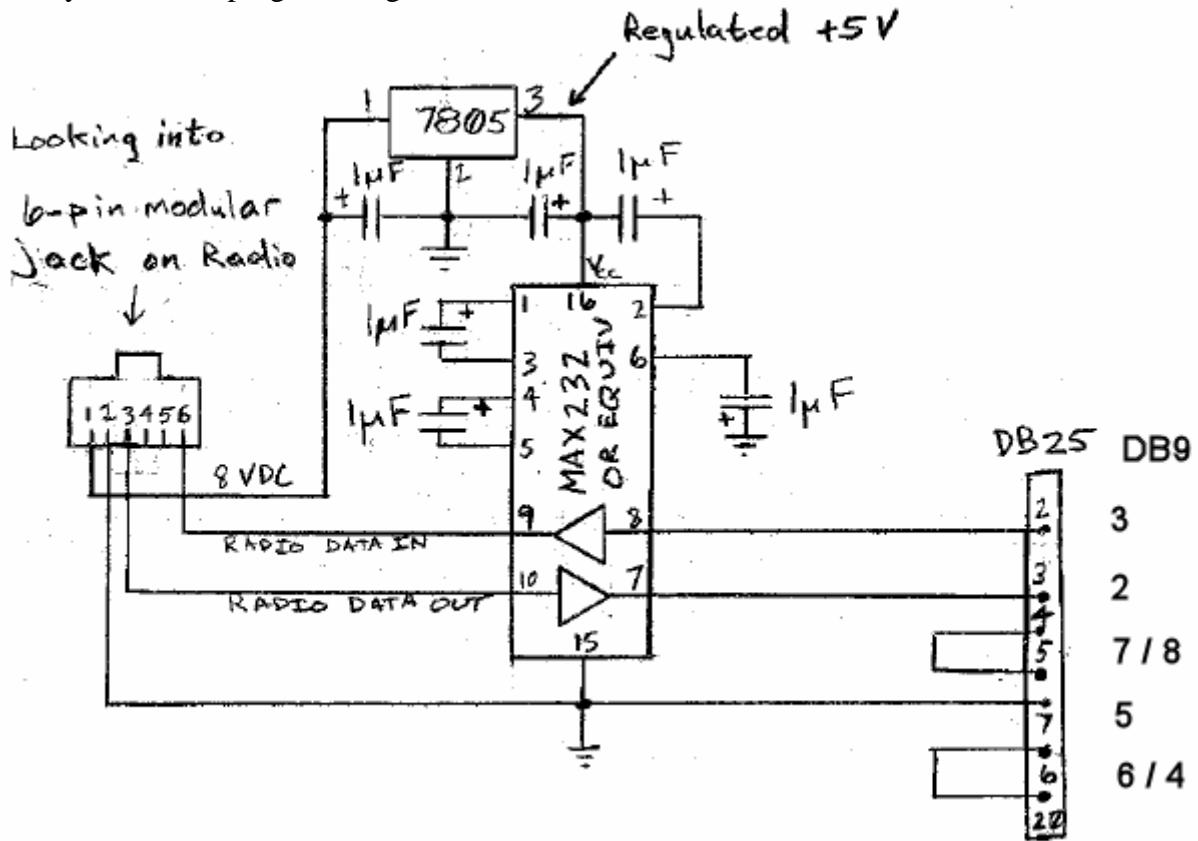
Parts: you’ll need a low-current 5 volt regulator (LM78L05 - \$0.30), and a Maxim TTL to RS232 chip (MAX232 - \$1.30), and six (6) 1.0 uf electrolytic capacitors (6 x \$0.15), plus the MJ-12 cable, and the flavor of serial plug that matches your computer – a DB9 or a DB25 (\$0.50). Toss in a 16-pin socket – I recommend soldering to the socket, testing the circuit under power, and only then inserting the MAX-232 chip. Total cost of all new parts is probably around \$5.00.

Only 4 of the 6 modular plug pins are used – power, ground, RX and TX. The MAX232 chip is magical in that it basically uses the several capacitors to turn 5 volts first into 10 volts, which it then inverts to -10 volts. With these two (+10 and -10 volts) we’re able to properly match an RS-232 port.

From here it’s fairly easy to match up the 4 pins from the radio to the regulator (78L05) and the MAX232 chip. Then wire the DB9 (or DB25) to the other side of the MAX232. I’ve provided the DB9 pinouts – only DB25 are on the original. Be sure that RTC and CTS are shorted together and that DSR and DTR are shorted together as shown (both DB9 and DB25).

This is an easy little project. I also put a low current (2ma) LED (plus a 2.2k resistor) between radio power and ground so you can tell when the circuit is energized. I’ve built two of these and I’ve actually

had better luck with this homebrew version of the cable than the commercial version (\$25), which continually causes the programming software to have 'timeout' errors.



Next month: programming the TK-941 and TK-931.