Supplementary Manual: Preparing Custom Transceiver Interface Cables

Each transceiver or receiver/transmitter pair you wish to control attaches to a twenty-five pin DB-25 connector on the StationPro's rear panel via a multiwire cable. The other end of the cable attaches to a mating connector on a breakout pod, which is customized for each particular rig. Vintage "boatanchor" rigs are likely to use only a handful of the available pins on the DB-25 connector – mic, PTT, key, amp relay, speaker – while modern transceivers may use most of them.

Most builders will be able to connect their rigs to the StationPro using inexpensive RS-232 "extension" computer cables, the kind with molded 25 pin D-Sub connectors (one male, one female) on each end. These cables are sold by Radio Shack, Office Depot, or any store that carries computer products. These ready-made cables are available in various lengths; for our purposes, the shorter the better, up to a maximum length of six feet.

Despite their convenience, ready-made cables are not suitable for all operating environments. In particular, problems can occur if the operator wants to transmit on SSB or AM while also using computer control of the transceiver (e.g., with programs such as Ham Radio Deluxe). In this situation, if *both* the serial data and microphone audio are routed through a ready-made cable, then crosstalk from the data signals can couple into the microphone audio lines in the cable, resulting in a "bzzt" sound in the transmitted signal every time the transceiver is polled by the computer. On the other hand, if the computer's serial port bypasses the StationPro entirely and is connected directly to the transceiver, or if the microphone is connected directly to the transceiver (as opposed to routing it through the StationPro) then ready-made cables can be used without any problems. Here, then, is a summary of the different situations that can arise:

<u>When can you use a ready-made RS-232 cable?</u>

1. You can use a ready-made cable with all CW–only rigs.
2. You can use a ready-made cable with all SSB/AM rigs, provided you do not intend to route *both* your computer serial port and your microphone audio through the StationPro. You can route one or the other through the StationPro, but not both. For instance, if your microphone is connected to the StationPro, but your computer's serial port is connected directly to the CAT input on your transceiver, then you can use a ready-made cable.

<u>When should you use a custom-prepared interface cable?</u>

1. You should use a custom cable when you want to operate SSB or AM while using computer control of your transceivers, AND you also want to route both the computer data and the microphone audio through the StationPro. For example, if you want the StationPro to transfer your station microphone to, say, a Ten-Tec Orion II, an Elecraft K-3, and an ICOM 7800, and you also want your computer to control each of the selected rigs using a single serial port, then you will need to

wire up your own cables.Obiously, most StationPro owners will not need this degree of flexibility.

When is it desirable (but not necessary) to use a custom-prepared interface cable?

1. When you are using a high impedance microphone (e.g., a non-amplified Astatic D-104) that you want to switch with the StationPro, rather than connecting the microphone directly to your transmitter. The problem is that inductive coupling and distributed capacitance between wires in ready-made cables *may* cause loss of high frequency response in the microphone audio, and the multiple wires in the cable may be prone to picking up hum.

Hint: You should always try a ready-made cable first, and change it only if you experience problems. There is no point spending several hours wiring cables if you don't have to! (It takes roughly 1-2 hours to make a custom cable.)

Instructions for Wiring a Custom Interface Cable

1. Collect the following parts (part numbers for the connectors are from Radio Shack, but these are also available from any computer or electronics store):

(1) 25 pin D-Sub male connector, with crimp terminals (p/n 276-1429)
(1) 25 pin D-Sub female connector with crimp terminals (p/n 276-1430)
(2) 25 pin shielded metallized D-Sub hood (p/n 276-1536)
-suitable length of shielded 2-conductor or 4-conductor cable. IMPORTANT: if 4-conductor cable is used, each *pair* of conductors should have its own shield. *(Hint: a common source of shielded 2-conductor cable is riser cable for security systems.)*
-electrical tape to wrap the completed assembly or, if you want a particularly neat looking finished cable, a suitable length of fiberglass or expanded polyester braid.

2. Inspect the connectors on the rear panel of your transceiver and decide how many of them you plan to use. Don't wire up more connections than you need. For instance, if you are not planning on using the Data, Rotor Control, and Amp ALC, then don't wire the cable to include these features. You can always add additional features later.

3. Note that each pin on the DB-25 connectors on the StationPro's back panel is assigned a unique function (e.g., Line In, Speaker, etc.). Make a list of the functions you will use and their corresponding pin numbers, and assign a wire in your 2- or 4- conductor cables to each pin. You will want to group the pairs of conductors together so as to minimize unwanted pickup. In other words, pair MIC+ and MIC- together, so that they share a common shield. Similarly, pair the data lines TXD and RXD together, and also LINE OUT-L and LINE OUT-R. It is okay to pair conductors that are active only on transmit (e.g., AMP ALC), with conductors that are active only on receive (e.g., LINE OUT). *Hint: you can mix and match cables, using a combination of single conductor, two conductor and four conductor cables, the only proviso being that each single conductor or pair of conductors must have its own shield.*

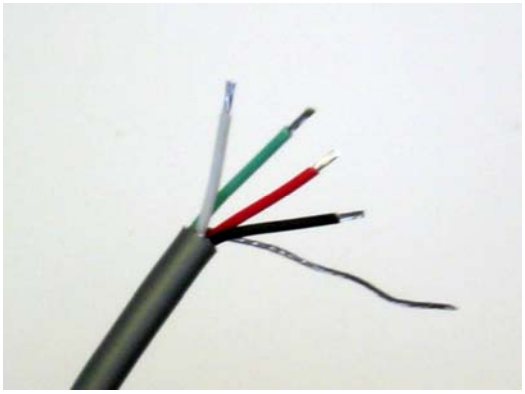
Below is the list I made for my Elecraft K3 transceiver. In preparing the cable for my K3, I used four 36 inch lengths of 4-conductor cable (eight shielded pairs of wires, or sixteen wires in all). Each shielded pair was color-coded with red/black wires and white/green wires. To keep track of all these wires, I identified each of the wires attached to the DB-25 connector by its cable number and color. For example, 3-WH means the white wire in the third cable. In the list below, 3-WH is connected to pin 10 (Line Out – Left) of the DB-25 connector.

Example: Cable Assembly for the Elecraft K3 Transceiver

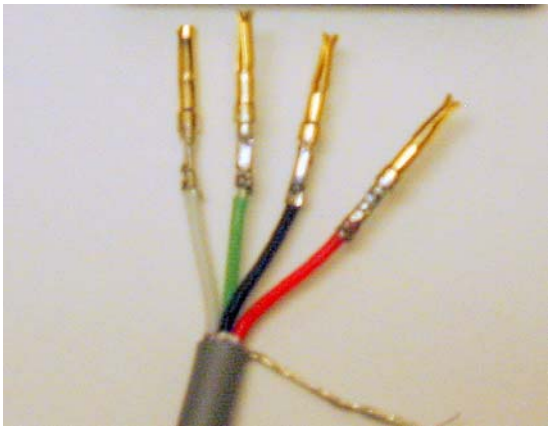
DB-25 Pin No.	Function	Wire
1	Mic +	1-BL
2	PTT	2-RE
3	Mic -	1-RE
4	Mic FN1(fast)	unused
5	Mic FN2(dwn)	unused
6	Mic FN3 (+5)	1-GR
7	Mic FN4(up)	unused
8	Paddle – Ring	2-GR
9	Paddle – Tip	2-WH
10	Line Out – L	3-WH
11	Line Out –R	3-GR
12	Spkr – L	3-RE
13	Spkr – R	3-BL
14	Amp Relay	2-BL
15	Amp ALC	unused
16	Aux 2	unused
17	Aux 1	unused
18	Aux 4	unused
19	Aux 3	unused
20	Line IN	1-WH
21	CAT – CTS	4-WH
22	CAT – TXD	4-RE
23	CAT – RTS	4-GR
24	CAT – RXD	4-BL
25	GND	all shields

4. Cut off the needed lengths of your multiwire cables, allowing an extra inch or two. For example, if you want your completed cable assembly to be 36 inches long, and you are using four lengths of 4-conductor cable (as in the above example), then cut off four lengths of cable, each about 38 inches long.

5. As shown below, carefully remove one inch of the outer sheath from *one end* of each of the four cables (eight cables, if you are using 2-conductor cables), and strip 1/8 inch of insulation from each exposed wire. Do not tin the wires.



6. Crimp a terminal onto each of the wires (but not onto the shield or drain wire). Crimp each terminal using small needle-nosed pliers. After the terminals are crimped, solder the connections, taking care not to let solder run into the body of the terminals.



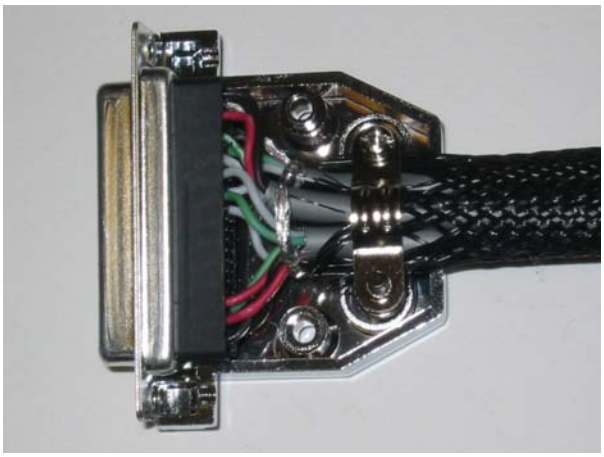
7. Take *one* of your cables and, following the assignments in your list, carefully insert each terminal into its appropriate pin of the DB-25 connector. Push each terminal into the connector until it clicks into place. IMPORTANT: Double check that you're inserting the terminal into the correct hole in the connector. It is very easy to make a mistake at this point, and once the terminal clicks into the connector it cannot be removed. You will probably need a magnifying glass to read the pin numbers on the connector body.

8. Cut this cable to the desired length and repeat steps 5-7 for the other end of the cable. The cable should be wired straight-through, with no crossover connections. For example, pin 4 on one end of the cable should be tied to pin 4 at the other end. If you intend to use a braided fiberglass or polyester cover around your completed cable assembly, then slip it over this cable *before* you insert the terminals into the connector body.

9. Now repeat the above steps for the remaining cables, trimming each to size so that all cables are the same length. Don't forget to slide each cable through the braided polyester or fiberglass cover, if you are using one.

10. Once you have inserted all the terminals from your cables into the connector body, tie all the shield and drain wires together and attach them to a terminal. Insert this terminal into pin 25 (ground) of the DB-25 connector. *Hint: as shown in the below photo, a length of small braid makes a convenient strap for connecting all the shield and drain wires together. A Ty-Wrap or piece of hookup wire can be used to bundle the cables together temporarily, until all the shields and drain wires are connected.*

11. Carefully position each connector body into a DB-25 hood, as shown below. If you are using an polyester or fiberglass braided cover, then slide this cover under the clamp on the hood.



12. Install the top cover on each hood, and you are done!

If you double-check each step and take your time, it will take 1-2 hours to complete a cable assembly. If you rush and do not double-check each step, it will take twice as long.