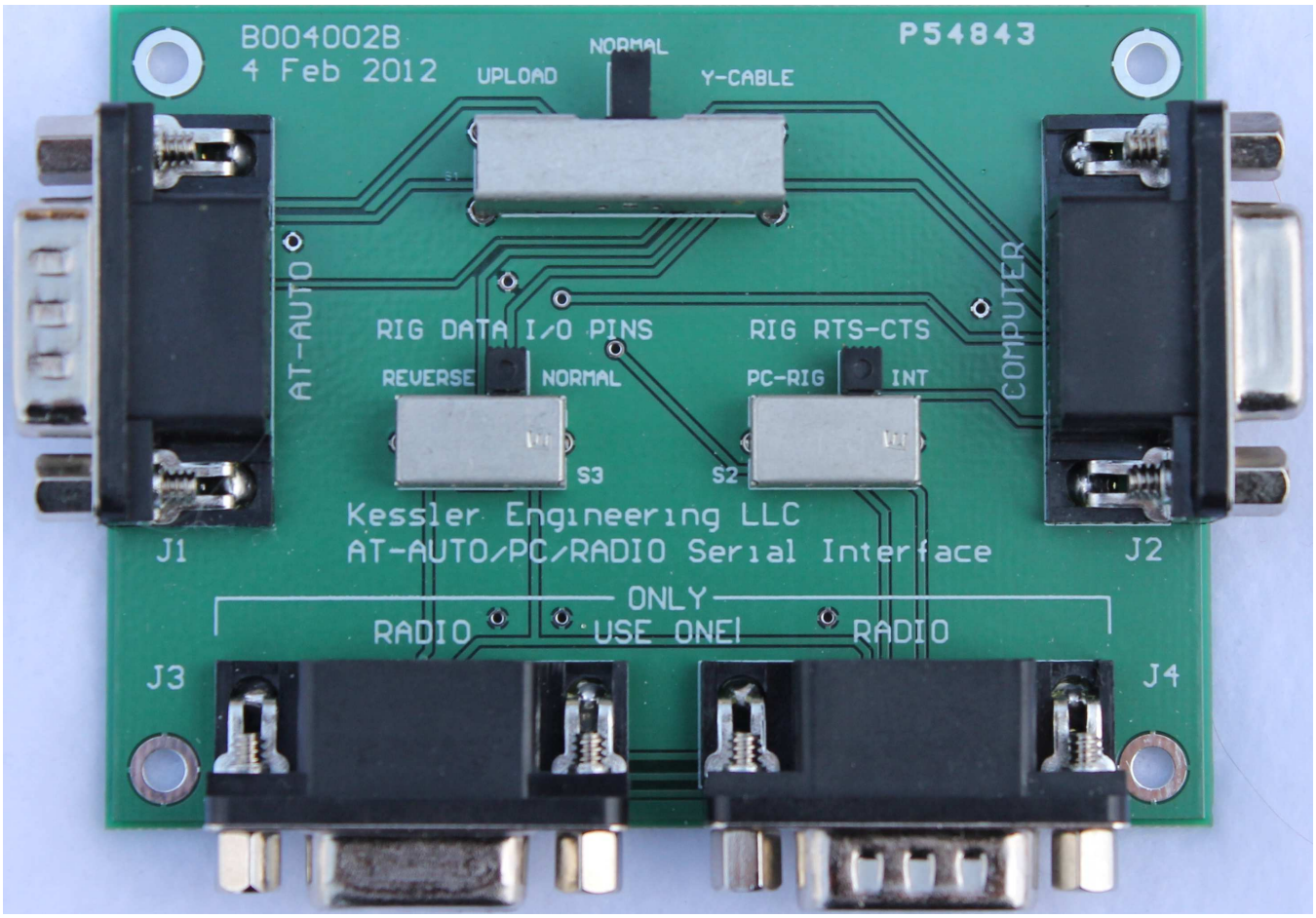
AT-AUTO$_{(tm)}$ Universal Serial Interface



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Thank-You!

At Kessler Engineering, we endeavor to make your ham radio hobby more enjoyable and trust that our products will bring you many years of faithful service. We ***Thank-You*** for the confidence that you have placed in us and in our products. *73!*

Dr. Donald J. Kessler, Ph.D.,
President, Kessler Engineering, LLC

Introduction

The AT-AUTO$_{(tm)}$ is an automatic antenna tuner capable of utilizing frequency information available from the serial data ports of most modern amateur HF radios. While the RS-232 protocol is itself well defined, there exists significant variation amongst the various amateur radio equipment manufacturers in their respective radio's implementations of RS-232 serial data ports. For example, some manufacturers swap the transmit and receive data pins, some use male connectors, others use female connectors. Some radios require hardware handshaking (RTS/CTS) while others ignore it completely. In short, there has been no consistent or "standard" serial data port implementation with respect to amateur radio manufacturers. In order to support a growing number of radio types, serial data cables unique to a particular brand or model had to be made available.

The Universal Serial Interface (USI) is Kessler Engineering's attempt to address the radio - serial port variations and make it consistent and simple to interface the AT-AUTO$_{(tm)}$ with any of these radios, without requiring special cabling. The USI uses "standard" 9-pin serial data cables and is switch-configurable to work with any of these various radio serial port configurations.

The USI also permits uploading new AT-AUTO$_{(tm)}$ without the need to physically disconnect any of the RS-232 data cables. It also includes a built-in "Y-Cable" capability, whereby a switch setting enables sharing the radio's serial data with several devices (PC and AT-AUTO$_{(tm)}$), etc.

1.1 Overview

A schematic diagram of the Universal Serial Interface is shown in Figure 1.1 and a connection diagram is shown in Figure 1.2.

The USI features three switches: The USI **Function** switch, the **Data I/O** switch, and the **Data Handshake** switch.

The **Function** switch is located at the top of the USI and has three settings: ***UPLOAD***, ***NORMAL***, and ***Y-CABLE*** and operates as follows:

UPLOAD connects the AT-AUTO$_{(tm)}$ directly to the PC's RS-232 serial port and electrically isolates them from the radio's serial data port, permitting the user to upload new AT-AUTO$_{(tm)}$ firmware without the need to physically remove any of the serial data cables.

NORMAL connects the AT-AUTO$_{(tm)}$ directly to the radio's RS-232 serial port and electrically isolates them from the PC's serial data port, enabling the AT-AUTO$_{(tm)}$ to directly query and follow changes in the radio's operating frequency.

Y-CABLE connects the PC's serial port directly to the radio's RS-232 serial port and also connects the AT-AUTO's$_{(tm)}$ serial data receive line. In this setting the PC is able to directly control the radio via the radio's serial data port, and enables the AT-AUTO$_{(tm)}$ to intercept serial data sent from the radio to the PC, permitting it to automatically follow changes in the radio's operating frequency.

The USI **Data I/O** switch is located below and to the left of the **Function** switch. This switch is enables electrically swapping the serial data transmit and serial data receive pins for those radios that do so. Place this switch to the ***REVERSE*** position when attempting to use a radio with swapped data pins.

The USI **Data Handshake** switch is located below and to the right of the **Function** switch. This switch has two positions labled ***PC-RIG***, ***INT***. The AT-AUTO$_{(tm)}$ does not employ serial data handshaking, however some radios will not respond to any commands unless the radio's cleared-to-send (CTS) input is asserted. Placing this switch to the ***INT*** (internal) position will electrically connect the radio's request-to-send (RTS) output directly to the radio's CTS input and thereby enable the radio to send serial data (if waiting for CTS to be asserted). This is the "normal" recommended position. Setting the **Data Handshake** switch to ***PC-RIG***, enables RTS/CTS control between the PC and the radio.

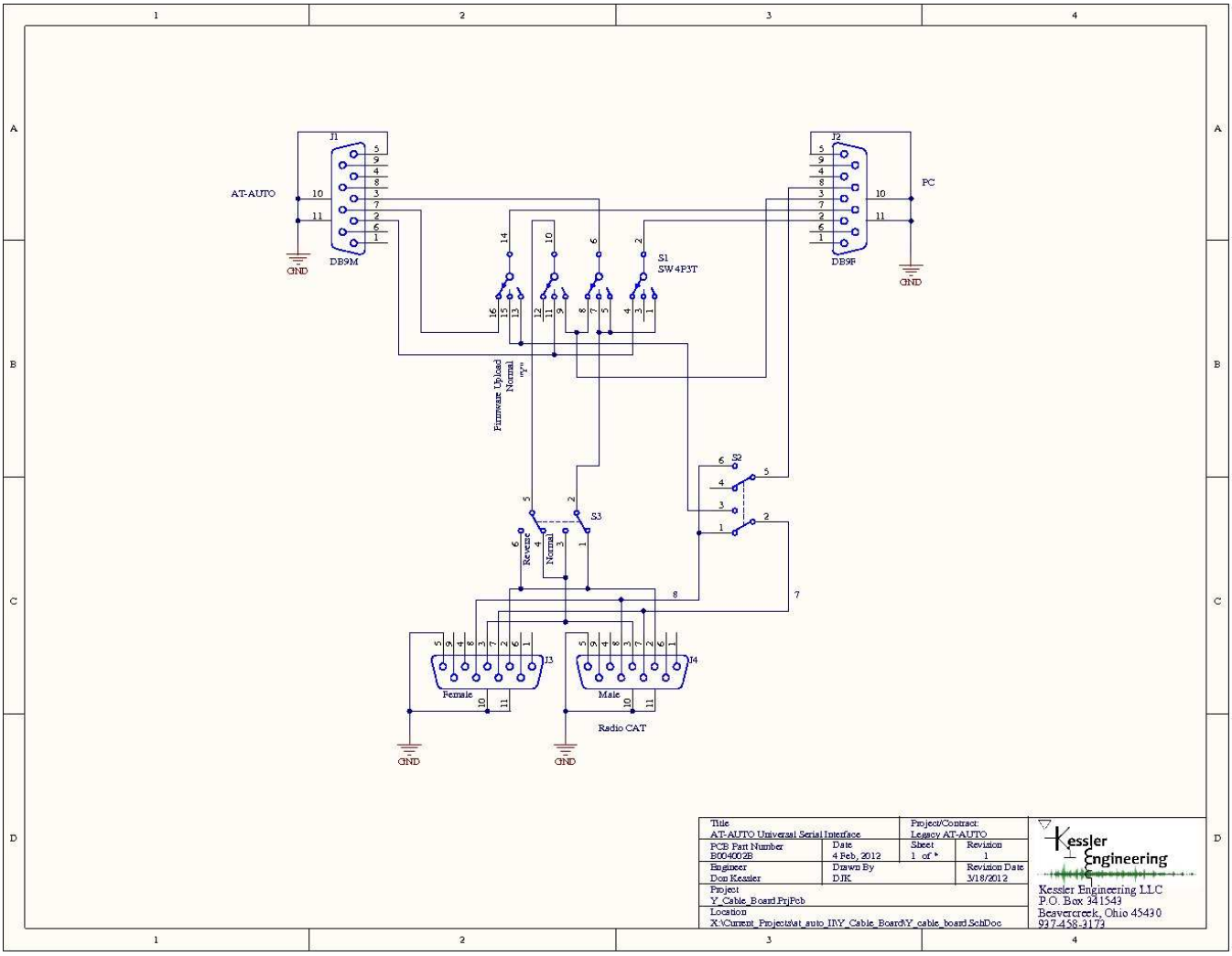

Figure 1.1: AT-AUTO$_{(tm)}$ Universal Serial Interface

1.2 Connecting the USI

The USI is delivered with three identical 9-pin straight-through serial cables. Use only straight-through serial cables with the USI. Begin by connecting one of the serial cables to the radio's serial port (often labeled "CAT"). Then connect the free end of that cable to either of the USI's connectors marked "RADIO."

Using the two remaining serial cables, connect the AT-AUTO$_{(tm)}$ to the connector marked "AT-AUTO", and the computer to the connector marked "COMPUTER."

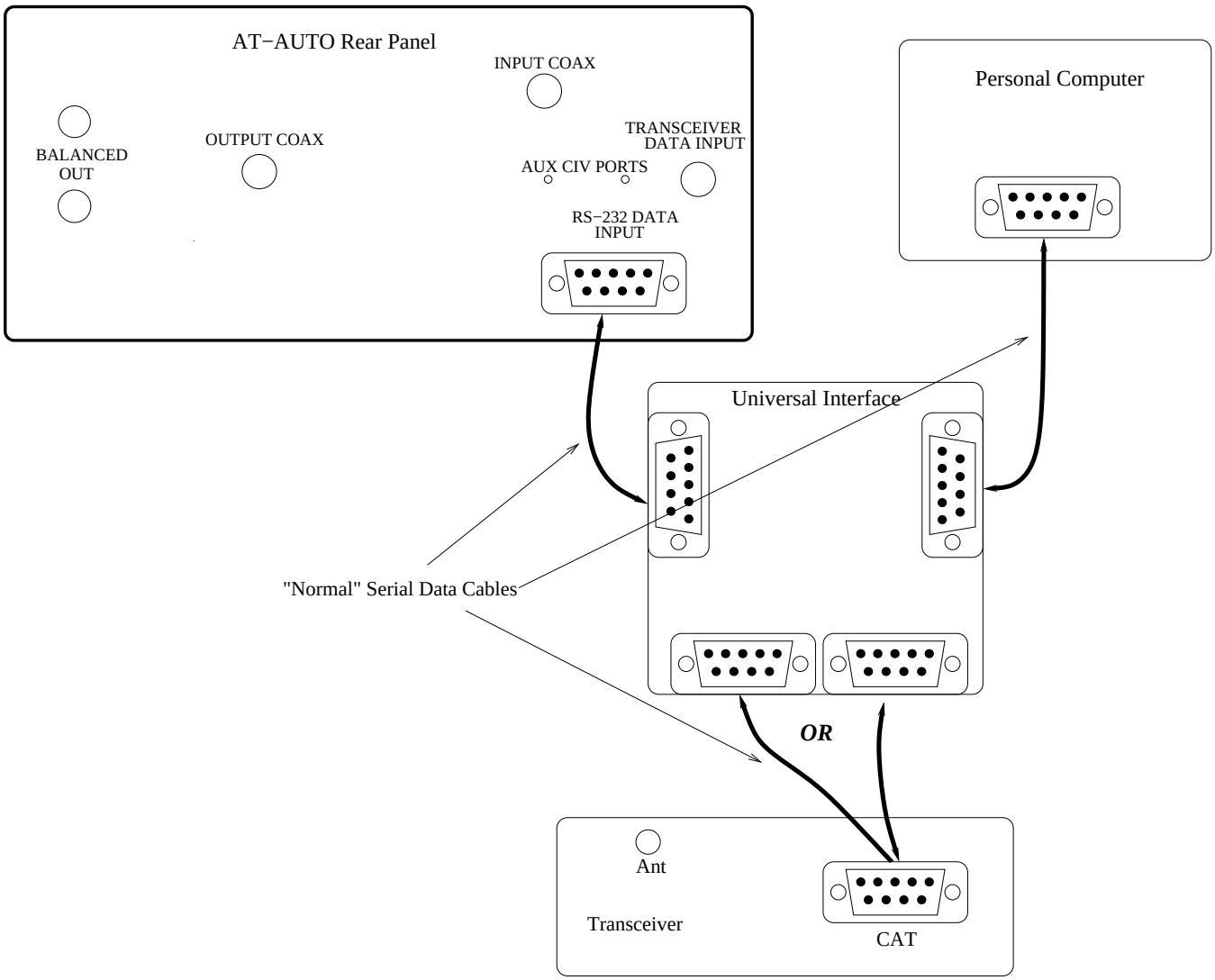

Figure 1.2: Universal Serial Interface Hookup Diagram

1.3 Suggested Switch Settings

Under normal circumstances the **Data I/O** switch should be set to ***NORMAL***. If the radio's serial data I/O pins are swapped, place this switch in the ***REVERSE*** position. You will need to consult your radio's instruction manual for this information.

The AT-AUTO$_{(tm)}$ does not issue hardware flow control signals (RTS/CTS). Therefore **Data Handshake** should be switched to ***INT*** whenever the AT-AUTO$_{(tm)}$ is to send query commands to the radio. However, when the radio is to be under computer control, this switch may be set to ***PC-RIG*** position if necessary to prevent data buffer problems.

To upload firmware to the AT-AUTO$_{(tm)}$, switch the **Function** switch to the ***UPLOAD*** position. When set to the ***UPLOAD***, the settings of the **Data I/O** and **Data Handshake** switches will have no effect.

When using just the AT-AUTO$_{(tm)}$ and the radio, place the **Function** switch to the ***NORMAL*** position. This enables the AT-AUTO$_{(tm)}$ to query the radio's frequency. When in this position, the computer will not have any effect on the operation of the AT-AUTO$_{(tm)}$ or the radio. Place the **Function** switch to the ***Y-CABLE*** position to enable the computer to control the radio and permit the AT-AUTO$_{(tm)}$ to "intercept" and follow the radio's frequency data sent to the computer.

NOTE: Some radios such as the Yaesu FT-990, and FT-1000 are incompatible with ***Y-CABLE*** operation and yield erratic and unpredictable results. Do not use the ***Y-CABLE*** setting when using the FT-1000, etc.

NOTE: The Elecraft K2 uses a NON-standard serial port. Damage to the K2 will result if connecting the K2 to a standard serial port. DO NOT use the USI with the Elecraft K2.

Service and Warranty

Warranty

Kessler Engineering, LLC. warrants all of our products to be free from defects in material and workmanship under normal use for a period of one year from the date of purchase. During this one-year warranty period, Kessler Engineering will either repair or replace the product at it's option at the Kessler Engineering facility in Beavercreek, Ohio.

This warranty will be void if the product has been repaired or altered by anyone other than the staff at Kessler Engineering. This warranty does not apply to products damaged due to improper installation or abuse/misuse.

Repair Policy

Please contact our service department for return authorization and shipping instructions prior to sending any product for service or repair. All items shipped to Kessler Engineering, must be packed appropriately and insured against damage. Kessler Engineering is not responsible for merchandise damaged in shipment. Be sure to include a note describing the problem in detail and include your contact information (phone number and e-mail).

Return Policy

All returns must receive prior authorization. Returned items must also include a copy of the original sales receipt and be returned with the original box, manuals, and accessories. Returns must be received within 7 days of purchase and are subject to a restocking fee. Shipping expenses are not refundable.