In this document, we will cover basic interfacing of the Daniels Subrack to the Arcom RC-210 controller by Arcom. Interfacing to most repeater controllers will be similar, and you can probably just take the signal names and work out the appropriate connections to your particular board.

Note: If all you have is the RF modules, and no subrack, you can still make this work.
Order the connectors from Digi-key, and simply wire in Ground, the 12V and 9.5V power supplies, and the control signals per the individual module pinouts.

If you don't have the appropriate DIN connectors, you can simply wire to the module pins on the subrack.
If you have the 96 pin female DIN connector for the P1 control socket, then you can make all your connections through it.
In my case, I had only the 48 pin DIN for the P2 Auxiliary control socket, so I had to make four connections directly to the module pins on the backplane.

These DIN connectors have three vertical columns of pins, labeled D, B, and Z, in that order, left to right. Pin numbers run top down. The 96 pin connector has every position, and the 48 pin has only even numbered positions.

Using the auxiliary control (P2) socket:

Take ground from the bottom three pins in the D, B, and Z columns.

Now, each radio has a few key signals that we will need.
I am going to take you through wiring both positions, "A", and "B", and if you are only implementing one or the other, simply omit the unused signals.

The Arcom RC-210 has two options for connections to the radio ports. I opted for DB-9 connectors, so that is the pinout that I will show here. If you are using the modular version, simply replace my pin numbers appropriately.

POWER:
If you like, you can pick up the 12V supply from the subrack on B2 and Z2.
WARNING: D2 is audio out from the system monitor, do NOT short to B2 or Z2.
Ground is available on D32,B32, and Z32.

I'll be connecting radio A to port 1, and radio B to port 2.

Arcom RC-210 DB-9 interface:
Colors are for common molded DB-9 serial cables.

1	Black	CTCSS Encode control out
2	Brown	CTCSS Decoder logic in
3	Red	TX PTT radio control out
4	Orange	TX Audio output to radio
5	Yellow	RX Audio input from radio
6	Green	Ground
7	Blue	RX COS input from radio
8	Violet	Ground
9	Grey	Ground

All the control signals in the Daniels system are "low true" ie: if you want to transmit, you ground that signal line, COR is also low true. Be sure to set up the jumpers on the RC-210 board to match.

As an initial adjustment point, set all the pots on the RC-210 to the middle of their ranges.
This works acceptably well with the Daniels rack, and you'll dial in the deviation adjustments later.

RADIO A to PORT 1
Wire Daniels B6 to Arcom pin 3 (PTT)
Wire Daniels B8 to Arcom pin 7 (COS)
Wire Daniels Z22 to Arcom pin 5 (RX Audio)
Wire Daniels B18 to Arcom pin 4 (TX Audio)

NOTE: Your TX module may have different options than mine, you may need to try other inputs.
Some pins to try would be:
B18 (bal Input 2), or B20 (Direct mod, this input will bypass the audio processor in the transmitter)

RADIO B to PORT 2
Wire Daniels Z6 to Arcom pin 3 (PTT)
Wire Daniels Z8 to Arcom pin 7 (COS)
Wire Daniels D14 to Arcom pin 5 (RX Audio)
Wire Daniels Z18 to Arcom pin 4 (TX Audio)

There you have it, the basic functions are in.
You can now fire up the controller, and set the levels per the Arcom docs.

If you like, you can also interface the following signals:

RX A squelch Disable, low to disable carrier squelch, on D10
RX B squelch Disable on B26

TXA Mic PTT, low when someone keys the local mic, on Z10
TXB Mic PTT on Z16

RXA Mute, low to kill audio out from RXA, on B22
RXB Mute on Z26

RXA Squelch Hysteresis override, low to enable, on D24
RXB Squelch Hysteresis override on D26

Now the fun part, picking up RSSI and AFC voltages from the backplane:

On J3, you will take RSSI for radio A from B24. This is a 0-5V signal that requires no real interfacing into the Arcom controller other than a wire. I used a series 1K resistor and 100uF cap on the controller side of the resistor as a low pass filter to average out flutter effects. I brought this into the Arcom on analog channel 1 on pin 1 of the DB-25 connector.

AFC voltage for radio A is present on Z24, right next door. If your TCXO is adjusted properly, an on-frequency transmitter will give you 3V output. Again, I use the 1K/100uF filter, and I bring this to the Arcom analog channel 2 on pin 3 of the DB-25 connector.

Over on J5, you can pick up RX B's signals on the same pins, and bring them to channels 3 and 4 of the Arcom.

See the Arcom docs on setting up the appropriate meter faces. There is nothing that really works for AFC, so I set up a voice macro that announces “A F C Voltage From Three Volts (pause)” followed by a meter face for voltage, so the full announcement is “A F C Voltage From Three Volts (pause) Three Volts” Ideally, I would prefer a meter face in Kilohertz, but that’s not available in the current version of the Arcom firmware. If it were, then I could scale the meter face to indicate the user’s frequency error in kHz directly.

I used channel 5 for monitoring the system battery, with a 10V zener diode in series with a 1k,10 turn pot, and 1K/100uF filter, to present a 0-5V signal covering 10-16V on the battery. I then implemented alarms for battery high, low, and critical, which output on both radios when tripped. See the Arcom docs on how to set the alarms per analog input. One thing that confused me initially is that the alarms have to be set to a port, so that they actually activate a transmitter. Otherwise, the alarm macro runs, and the default value is to trigger transmit on NO port, so you hear nothing, and it appears that the alarm does not work.

I added some other features like a cabinet door alarm and such, but those really have nothing to do with the Daniels gear, and so I won’t cover them here.

In my system, I added a 1U rack box with a prototyping PCB inside, so I do all my signal conditioning in this box, and just have interface cables coming out to the Daniels rack, and the Arcom controller. This is just a personal choice, I don’t like little “mystery boards” scattered through the system, but I’ve seen that done, and it does work.

Depending on what exact Daniels gear you have, you may have other interesting options to play with. Some of the transmitters and receivers have internal relays that you can interface to.
Some of the system control modules have RF relays that you could use to switch between main and backup RF modules. Some of the newer transmitters have SWR voltages output on the bus. But, I don’t have any of those modules at this time, so I can’t speak from experience there.

So, I’ve covered what you need to get the Daniels subrack in operation, and I hope you enjoy using this fine vintage gear from the great white north!