Digital back-end support in sched:

1. Patching:

We began a few sessions ago by providing PIs with experiment-specific patchings for stations with digital back-ends. This is introduced in the "setini" section in the file the PIs feed into sched. We also provided modified catalog files such that the new patchings would not cause complaints/crashes when encountering back-end specific checks. Once we were confident that we understood what the stations wanted, we introduced code/catalogs into sched to handle this automatically.

This process is complete for the R1002's at the KVAZAR stations since sched v10.1, with a typo for K-band Zelenchukskaya in the freq.dat file, which still required Zc to have a setini section at K-band. This was fixed in sched v11.0 (currently the most recent release).

The DBBC have had a longer evolution: EVN stations with DBBCs have had two prefered astro-mode patchings over the past few sessions. Different stations have moved slightly between the two camps, but things have seemed to stabalize in just completed Feb/Mar 2013 session (no station complained either before or after observing). To date, we've no DBBC experience yet on
Mc, Tr, Wb, Jb (Mc,Tr may be testing in the May/June session).

Let's call the two patching preferences for astro-mode "J" & "U":

```
"J":  IF_A = BBC 1-4   (rcp)
       IF_B = BBC 5-8   (lcp)
```

"U" is more complicated, using different pairs of IFs depending on the Nyquist-zone being used (i.e., LO vs. sky-frequency difference dependent):

```
   512-1024:   IF_A = BBC 1-4   (rcp)
               IF_C = BBC 5-8   (lcp)

    10-512:    IF_B = BBC 1-4   (rcp)
               IF_D = BBC 5-8   (lcp)
```

Currently Ef & On use "U", the others that we've tested so far (Hh,Nt,Mh,Ys)
use "J" (On at some point changed from "U" to "J", but then wanted to go back to "U").

At the TOG itself, I learned about the "astro2" preference (astro-mode with only 2 IF inputs), which currently applies now to Mh:

```
"astro2":  IF_A = BBC 1-4    (rcp)
            IF_B = BBC 9-12   (lcp)
```

We used this for Mh in the May/June 2013 schedules.

However, I learned quite recently (well after the TOG) that none of the above may actually be what stations want with the new FS 9.11.* that directly
controls the DBBC. The single-letter IF name would not suffice, without an additional {1,2,3,4} forming a 2-character name. So before I set people to work on coding, it looks like I'll have to go back a few steps with some experienced station friends.

2. 5B bit-streams/tracks

Another aspect in sched concerns 5B stations "tracks".
The bit-stream/channel mappings for the mark4-VSI & VSI-C boards are described in the Mark5 Memo 039. But up through sched v11.0, Mark5B stations got "tracks" sequentially increasing from 2-33.

Digression: this illustrates that sched is treating 5B bit-streams as fan-out=1 tracks in format=Mark5B, but keeping the historic 2-33 range for the 32 entries (i.e., "track" = bitstream + 2). The newer version of vex will have a separate 0-based $BITSTREAMS section, which we have been using at JIVE for correlation for quite a while:
*) playing back Mark5B via Mark5A+ required both $BITSTREAMS and $TRACKS (actual mark5a tracks) sections [obsolete by now]
*) for e-VLBI, we need the new feature in the $BITSTREAMS section in which each channel has 2 associated bit-streams: the first as the station would be observing (0-N), the second as we would be correlating (re-mapped into 0-M, M<=N). This allows us to do bespoke channel-dropping for a station that doesn't have the full e-bandwidth as other stations.

For astro-patching, the ordering scheme has a triply-nested structure:

```
USB
  BBC
    sign/mag
LSB
  BBC
    sign/mag
```

There are a couple exceptions to this:
Sh - when the firstLO is higher than sky (i.e., first mix = LSB), swap the meaning of USB/LSB in following the above rules (I'm not sure if this is a VSI-C feature or something local to Sh, since we've not yet had another example of an ex-VLBA4 station having this condition)

VERA stations - ignore the outer USB/LSB loop altogether
KVN stations - bitstreams increase with channel-order directly (0->N),
still with "sign then mag"
Of course, this just means there are many ways to program the output
of a digital back-end.....

VSI/geodesy mode would differ once you get beyond USB/BBC8 (bit-stream 15):
bit-stream 16-19 = 1Lsign 1Lmag 8Lsign 8Lmag
bit-stream 20-31 = BBCs 9-14 (all USB) with a sign/mag 'inner loop'
We have very little experience with this, but have yet to find an
exception.

The sched subroutine settrk.f has comments consistent with the VSI/astro scheme, but I never delved too deeply into why it wasn't outputting something
consistent with it, largely because the mark4-vsi & VSI-C boards had fixed schemes not yet controlled by the observing vexfile, and 5B stations, our log2vex program (makes the correlation-controlling vexfile from the observing
vexfile & station logs) introduced the not-yet standard $BITSTREAMS section and changed the $TRACKS section to match the Mark5A+ requirements.

The newest sched beta (26apr2013) does seem to have fixed this for 5B stations, at least for a couple tests with astro-mode.