User number 5005
AGC749237, observed June 22

-- YET ANOTHER ATTEMPT AT CALIBRATION USING COMMENTS FROM GREISEN:

Your query is falling between the cracks of our current help desk and I will send it around a bit.

I don't see any suggestion that something was done incorrectly by AIPS or any glaring user error. I would have run FRING before frequency averaging. If there are significant delays, then the frequency averaging causes a loss of amplitude which will not be corrected later (at least at present). Was there a phase slop before FRING that was then removed by FRING?

At L band there is almost always a lot of RFI and I do not see mention of that either. Is it possible that RFI is damaging the bandpass or fring or calib solutions? SPFLG may be painful but may be required to check for this.

I absolutely agree that the CALIB solutions cannot be right. L band at D array should have rock solid phases.

-- Responded that I will re-load at full resolution, and flag with
SPFLG. Asked if FRING gives better results with model or without.

- Greisen's response:

I doubt that a model will be needed for 3C286 in D array for FRING. These days FRING is not always needed - POSSMs early will show if there is a real phase slope across the band or not.

I did not realize how narrow band these data are until just now only 1 MHz. The last data I looked at went from 4 to 8 GHz! Perhaps you manage to avoid RFI entirely. Also FRING may not matter at all over such narrow bands. Small delays can be taken out with BPASS. So I am even shorter on ideas to explain the bad CALIB.

Forwarding this to Juergen

- Greisen comment:

If the user has managed to get 2 solutions from FRING then CLCAL may well interpolate/extrapolate them. With such a narrow bandwidth the solutions could be rather large as well without affecting the visible bandwidth much. Then CALIB would have to correct for the large FRING values. If one looked at the SN table rather than the calibrator net phases it could look like there were large phase jumps between cal scans.

I would suggest he start over with no FRING and see if the CALIB issue persists.

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XXXXXXXXXXXX Re-starting reductions; plan for NO FRING correction XXXXXXXXXXXX
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XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
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1. UVLOD: load data

```
default 'uvlod'; bcount 0;
ncount 0;
datain 'VLADATA:AC990_AGC749237B'; douvcomp -1;
outna 'AGC749237B'; outcl 'UVDATA'; outseq 0;
outdi 1; doall 1; npoints 0;
```

--> 2520531 visibilities

2. INDXR

```
task 'indxr'; getn 1;
infile ''; prtlev 0; cparm 0,0,0.5;
bparm 0,0; go
```

--> NOTE: using CPARM(3)=0.5, to match reduction guide
--> Writes BOTH CL and NX extensions

INDXR1: Warning: 0.400 percent of times not found in WX table
This may be a normal amount

3. LISTR

```
default 'listr'; getn 1;
optype 'scan'; docrt 132;
go
```

Scan summary listing

Scan	Source	Qual	Calcode	Sub	Timerange	FrqID	START VIS	END V
1	1331+305=3C286	: 0000		1	0/02:09:50 - 0/02:10:50	1	1	21060
2	1331+305=3C286	: 0000	K	1	0/02:10:51 - 0/02:19:48	1	21061	210249
3	J1221+2813	: 0000	D	1	0/02:19:49 - 0/02:23:47	1	210250	294138
4	AGC749237	: 0000		1	0/02:23:49 - 0/02:56:02	1	294139	973323
5	J1221+2813	: 0000	D	1	0/02:56:03 - 0/02:59:01	1	973324	1036152
6	AGC749237	: 0000		1	0/02:59:03 - 0/03:31:16	1	1036153	1715337

```
   7 J1221+2813      : 0000  D        1  0/03:31:17 -   0/03:34:16     1 1715338    1778166
   8 AGC749237       : 0000           1  0/03:34:17 -   0/04:06:30     1 1778167    2457351
   9 J1221+2813      : 0000  D        1  0/04:06:31 -   0/04:09:31     1 2457352    2520531

Source summary
Velocity type = '       '    Definition = '       '

  ID Source           Qual  Calcode RA(2000.0)      Dec(2000.0)  No. vis
   1 1331+305=3C286  : 0000          13:31:08.2880  30:30:32.959   21060
   2 1331+305=3C286  : 0000   K      13:31:08.2880  30:30:32.959  189189
   3 J1221+2813      : 0000   D     12:21:31.6905  28:13:58.500  272727
   4 AGC749237       : 0000         12:26:23.4000  27:44:44.000 2037555

  ID Source           Freq(GHz) Velocity(Km/s) Rest freq (GHz)
   1 All Sources         1.4204         0.0000          0.0000

Frequency Table summary
FQID IF#      Freq(GHz)      BW(kHz)   Ch.Sep(kHz)  Sideband
   1   1      1.42040575    1000.0001      3.9063      1


4. PTRAN
   task 'prtan'; optype 'scan'; docrt 132; go

                    Location of VLA antennas

                          N09 (18)*
                          N08 (28)*
                          N07 (13)*
                            ( )
                          N05 (20)*
                          N04 (22)*
                          N03 (10)*
                          N02 (25)*
                          N01 ( 8)*
                        *( 4) W01  E01 (21)*
                      *(16) W02      E02 ( 2)*
                    *(26) W03         E03 (27)*
                  *(19) W04             E04 (11)*
                *(24) W05                 E05 (14)*
              *(15) W06                     E06 ( 9)*
            *(17) W07                         E07 (23)*
          *( 5) W08                             E08 (12)*
        *( 1) W09                                 E09 ( 3)*
                     MAS      ( 6)
                            ( 7)
* => EVLA ANTENNA

5. VLANT
   task 'vlant';
   default 'vlant'; getn 1; go

   -No changes needed

********************************************************************************
**** BEGIN EXAMINING DATA NOW ****
****
**** EVLA OPERATOR LOG COMMENTS FOLLOW
****
**** Antenna(s):6 10 do not have good baseline positions
****
**** ANTENNAS 6, 10, 17, 20: DATA LOST, L-band receiver not yet installed.
****
********************************************************************************

6.  FLAG & EXAMINE DATA

**** FLAG ANTENNAS 6, 10, 17, 20 FOR ALL DATA, REASON = 'NO L RECEIVERS'

UVFLG - remove the data discussed above

task 'uvflg'; default uvflg;
getn 1; sources '';
subarray 0; selband -1; selfreq -1;
freqid -1; timerang 0; bchan 0; echan 0;
bif 0; eif 0;
antennas 6,10,17,20; baseline 0;
stokes ''; aparm 0;
opcode 'FLAG';
reason 'no l receivers';
dohist 1; inp

--> Done:
   tvreset; tvclear;
   task 'tvflg'; default tvflg;
   getn 1; docat -1;
   dohist -1; sources ''; calcode 'K';
   timerang 0; stokes 'RR'; selband -1;
   selfreq -1; freqid 1; bif 0; eif 0;
   bchan 157; echan 177; antennas 0;
   baseline 0; uvrange 0; subarray 0;
   docalib 1; gainuse 0; blver -1;
   flagver 0; doband -1; bpver -1;
   smooth 0; dparm(6)=1; baddisk 0;
   go

--> Ant 16 RR is systematically high

--> Done:
   tvreset; tvclear;
```

```
  task 'tvflg'; default tvflg;
  getn 1; docat -1;
  dohist -1; sources ''; calcode 'K';
  timerang 0; stokes 'LL'; selband -1;
  selfreq -1; freqid 1; bif 0; eif 0;
  bchan 197; echan 207; antennas 0;
  baseline 0; uvrange 0; subarray 0;
  docalib 1; gainuse 0; blver -1;
  flagver 0; doband -1; bpver -1;
  smooth 0; dparm(6)=1; baddisk 0;
  go
```

--> Ant 16 LL looks ok

--> Done:

```
  tvreset; tvclear;
  task 'tvflg'; default tvflg;
  getn 1; docat -1;
  dohist -1; sources 'J1221+2813';
  calcode 'D';
  timerang 0; stokes 'RR'; selband -1;
  selfreq -1; freqid 1; bif 0; eif 0;
  bchan 118; echan 138; antennas 0;
  baseline 0; uvrange 0; subarray 0;
  docalib 1; gainuse 0; blver -1;
  flagver 0; doband -1; bpver -1;
  smooth 0; dparm(6)=1; baddisk 0;
  go
```

--> Ants 16, 25 look deviant in RR

--> Done:

```
  tvreset; tvclear;
  task 'tvflg'; default tvflg;
  getn 1; docat -1;
  dohist -1; sources 'J1221+2813';
  calcode 'D';
  timerang 0; stokes 'LL'; selband -1;
  selfreq -1; freqid 1; bif 0; eif 0;
  bchan 157; echan 177; antennas 0;
  baseline 0; uvrange 0; subarray 0;
  docalib 1; gainuse 0; blver -1;
  flagver 0; doband -1; bpver -1;
  smooth 0; dparm(6)=1; baddisk 0;
  go
```

--> No major issues are apparent here.

--> Done

```
  tvreset; tvclear;
  task 'tvflg'; default tvflg;
  getn 1; docat -1; calcode '';
  dohist -1; sources 'AGC749237';
  timerang 0; stokes 'RR'; selband -1;
  selfreq -1; freqid 1; bif 0; eif 0;
  bchan 139; echan 159; antennas 0;
  baseline 0; uvrange 0; subarray 0;
  docalib 1; gainuse 0; blver -1;
  flagver 0; doband -1; bpver -1;
  smooth 0; dparm(6)=1; baddisk 0;
  go
```

--> ANT 25 is bad in RR (flagged; see below)

-->

```
  tvreset; tvclear;
  task 'tvflg'; default tvflg;
  getn 1; docat -1; calcode '';
  dohist -1; sources 'AGC749237';
  timerang 0; stokes 'LL'; selband -1;
  selfreq -1; freqid 1; bif 0; eif 0;
  bchan 118; echan 138; antennas 0;
  baseline 0; uvrange 0; subarray 0;
  docalib 1; gainuse 0; blver -1;
  flagver 0; doband -1; bpver -1;
  smooth 0; dparm(6)=1; baddisk 0;
  go
```

--> LL stokes looks good, except for Ant 19. FLAG IT

XXXXXXX Flag Antennas 16, 25, RR stokes:

```
task 'uvflg'; default uvflg;
getn 1; sources '';
subarray 0; selband -1; selfreq -1;
freqid -1; timerang 0; bchan 0; echan 0;
bif 0; eif 0;
antennas 16,25; baseline 0;
stokes 'RR'; aparm 0;
opcode 'FLAG';
reason 'Deviant Amplitudes'
dohist 1; inp
```

--> Antenna 19 has large segments flagged in both RR and LL.

XXXXX FLAGGING ANTENNA 19 LL & RR

```
task 'uvflg'; default uvflg;
getn 1; sources '';
subarray 0; selband -1; selfreq -1;
freqid -1; timerang 0; bchan 0; echan 0;
bif 0; eif 0;
antennas 19; baseline 0;
stokes ''; aparm 0;
opcode 'FLAG';
reason 'Misbehaving'
dohist 1; inp
```

7. SPFLG - edit line UV data using the TV display and cursor

```
======>> PRIMARY, RR:
   task 'spflg'; default spflg; tvreset; tvclear;
   getn 1; sources ''; calcode 'K'; timerang 0;
   stokes 'RR'; selband -1; selfreq -1;
   freqid -1; bif 0; eif 0; bchan 1; echan 0;
   antenn 0; baseli 0; docat -1;
   uvrange 0; subarray 0; docalib -1; gainuse 0;
   dopol -1; blver -1; flagver 0; outfgver 0;
   doband -1; bpver -1; smooth 0;
   dparm 0; antennas -6,-10,-16,-17,-19,-20,-25;
   baddisk 0; dparm(6)=1; go

======>> PRIMARY, LL:
   task 'spflg'; default spflg; tvreset; tvclear;
   getn 1; sources ''; calcode 'K'; timerang 0;
   stokes 'LL'; selband -1; selfreq -1;
   freqid -1; bif 0; eif 0; bchan 1; echan 0;
   antenn 0; baseli 0; docat -1;
   uvrange 0; subarray 0; docalib -1; gainuse 0;
   dopol -1; blver -1; flagver 0; outfgver 0;
   doband -1; bpver -1; smooth 0;
   dparm 0; antennas -6,-10,-17,-19,-20;
   baddisk 0; dparm(6)=1; go
```

-- Ant 2, LL, every 1/8 of bandpass is high. Flagged
-- Ant 3,4,11,12,14,15,18 - channel 22, flagged.

-- Ant 5 has wavy appearance in 1-5. Screenshots of some of the wavy artifacts in RR obtained.

```
======>> PHASE, RR:
   task 'spflg'; default spflg; tvreset; tvclear;
   getn 1; sources ''; calcode 'D'; timerang 0;
   stokes 'RR'; selband -1; selfreq -1;
   freqid -1; bif 0; eif 0; bchan 1; echan 0;
   antenn 0; baseli 0; docat -1;
   uvrange 0; subarray 0; docalib -1; gainuse 0;
   dopol -1; blver -1; flagver 0; outfgver 0;
   doband -1; bpver -1; smooth 0;
   dparm 0; antennas -6,-10,-16,-17,-19,-20,-25;
   baddisk 0; dparm(6)=1; go

======>> PHASE, LL:
   task 'spflg'; default spflg; tvreset; tvclear;
   getn 1; sources ''; calcode 'D'; timerang 0;
   stokes 'LL'; selband -1; selfreq -1;
   freqid -1; bif 0; eif 0; bchan 1; echan 0;
   antenn 0; baseli 0; docat -1;
   uvrange 0; subarray 0; docalib -1; gainuse 0;
   dopol -1; blver -1; flagver 0; outfgver 0;
   doband -1; bpver -1; smooth 0;
   dparm 0; antennas -6,-10,-17,-19,-20;
   baddisk 0; dparm(6)=1; go

======>> Source, RR (takes ~1.5 hours to load!)
   task 'spflg'; default spflg; tvreset; tvclear;
   getn 1; sources 'AGC749237'; calcode ''; timerang 0;
   stokes 'LL'; selband -1; selfreq -1;
   freqid -1; bif 0; eif 0; bchan 1; echan 0;
   antenn 0; baseli 0; docat -1;
   uvrange 0; subarray 0; docalib -1; gainuse 0;
   dopol -1; blver -1; flagver 0; outfgver 0;
   doband -1; bpver -1; smooth 0;
   dparm 0; antennas -6,-10,-17,-19,-20;
   baddisk 0; dparm(6)=1; go

======>> Source, LL (takes ~1.5 hours to load!)
   task 'spflg'; default spflg; tvreset; tvclear;
   getn 1; sources 'AGC749237'; calcode ''; timerang 0;
   stokes 'LL'; selband -1; selfreq -1;
   freqid -1; bif 0; eif 0; bchan 1; echan 0;
   antenn 0; baseli 0; docat -1;
   uvrange 0; subarray 0; docalib -1; gainuse 0;
   dopol -1; blver -1; flagver 0; outfgver 0;
   doband -1; bpver -1; smooth 0;
   dparm 0; antennas -6,-10,-17,-19,-20;
   baddisk 0; dparm(6)=1; go
```

---> RFI on short baselines

8. TVFLG to re-check all data.

```
-->
  tvreset; tvclear;
  task 'tvflg'; default tvflg;
  getn 1; docat -1;
  dohist -1; sources ''; calcode 'K';
```

```
timerang 0; stokes 'RR'; selband -1;
selfreq -1; freqid 1; bif 0; eif 0;
bchan 128; echan 128; antennas 0;
baseline 0; uvrange 0; subarray 0;
docalib 1; gainuse 0; blver -1;
flagver 0; doband -1; bpver -1;
smooth 0; dparm(6)=1; baddisk 0;
go

tvreset; tvclear;
task 'tvflg'; default tvflg;
getn 1; docat -1;
dohist -1; sources ''; calcode 'K';
timerang 0; stokes 'LL'; selband -1;
selfreq -1; freqid 1; bif 0; eif 0;
bchan 128; echan 128 antennas 0;
baseline 0; uvrange 0; subarray 0;
docalib 1; gainuse 0; blver -1;
flagver 0; doband -1; bpver -1;
smooth 0; dparm(6)=1; baddisk 0;
go

tvreset; tvclear;
task 'tvflg'; default tvflg;
getn 1; docat -1;
dohist -1; sources 'J1221+2813';
calcode 'D';
timerang 0; stokes 'RR'; selband -1;
selfreq -1; freqid 1; bif 0; eif 0;
bchan 128; echan 128; antennas 0;
baseline 0; uvrange 0; subarray 0;
docalib 1; gainuse 0; blver -1;
flagver 0; doband -1; bpver -1;
smooth 0; dparm(6)=1; baddisk 0;
go

tvreset; tvclear;
task 'tvflg'; default tvflg;
getn 1; docat -1;
dohist -1; sources 'J1221+2813';
calcode 'D';
timerang 0; stokes 'LL'; selband -1;
selfreq -1; freqid 1; bif 0; eif 0;
bchan 128; echan 128; antennas 0;
baseline 0; uvrange 0; subarray 0;
docalib 1; gainuse 0; blver -1;
flagver 0; doband -1; bpver -1;
smooth 0; dparm(6)=1; baddisk 0;
go

tvreset; tvclear;
task 'tvflg'; default tvflg;
getn 1; docat -1; calcode '';
dohist -1; sources 'AGC749237';
timerang 0; stokes 'RR'; selband -1;
selfreq -1; freqid 1; bif 0; eif 0;
bchan 129; echan 129; antennas 0;
baseline 0; uvrange 0; subarray 0;
docalib 1; gainuse 0; blver -1;
flagver 0; doband -1; bpver -1;
smooth 0; dparm(6)=1; baddisk 0;
go

tvreset; tvclear;
task 'tvflg'; default tvflg;
getn 1; docat -1; calcode '';
dohist -1; sources 'AGC749237';
timerang 0; stokes 'LL'; selband -1;
selfreq -1; freqid 1; bif 0; eif 0;
bchan 128; echan 128; antennas 0;
baseline 0; uvrange 0; subarray 0;
docalib 1; gainuse 0; blver -1;
flagver 0; doband -1; bpver -1;
smooth 0; dparm(6)=1; baddisk 0;
go
```

9. POSSM; examine bandpasses & identify reliable sections
   -- Using antennas 4, 8, 21 (center of array) for BPASS examination

```
tvreset;  tvclear;
task 'possm'; default 'possm'
getn 1; source '1331+305=3C286';
calcode 'K'; stokes ''; bchan 0; echan 0;
dotv 1; nplots 4; anten 4,8,21;
baseline 0; timerang 0;
docal 1; aparm 1,0;
```

   - Bandpass plots look ok between channels 40 and 216

   ----- EVLA REDUCTION MANUAL STATES THAT A STRAIGHTFORWARD APPLICATION OF BPASS
         ASSUMES THAT THE PHASES ARE CONSTANT ACROSS THE BANDPASS. HERE, APPLY
         THE ALTERNATIVE APPROACH: SPLIT/CALIB (SELF-CAL)/BPASS/TACOP
   ----- Note that the other techniques were also attempted [i.e., BPASSPRM(5)=0, as
         well as BPASSPRM(5)=1 & BPASSPRM(10)=3].

10. SPLIT - Use SPLIT to separate bandpass calibirator scans into a separate single-source file,
         applying any flags, delay calibrations, etc.
           -- Apply SMOOTH here, and forever after; use DOCAL -1

```
task 'SPLIT'; getn 1;
```

```
Sources '1331+305=3C286';
Qual -1; Calcode 'K'; Timerang 0;
Stokes ''; Selband -1; Selfreq -1;
Freqid 1; Bif 0; Eif 0; Bchan 1; Echan 0;
Subarray 0; Docalib -1; Gainuse 0; Dopol -1;
Blver -1; Flagver 0; Doband -1; Bpver 0;
Smooth 1 4 4;
Outclass ''; Outseq 1; outdisk 1;
Douvcomp 0; Aparm 0; Nchav 1; Chinc 1;
Ichansel 0; baddisk 0;
outname 'primary'; outclass 'split';
inp

--> 3 5005 PRIMARY     .SPLIT .    1
      --> 121506 visibilities

11.  CALIB = run CALIB on the SPLIT PRIMARY file,
     with a short SOLINT to determine and apply a phase-only self-calibration.

    task 'calib'; default 'calib'; getn 3;
    get2n 2; calcode 'K';  qual -1;
    timerang 0;
    refant 8; bpver 0; uvrange 0 18;
    docal -1; doband 0; solin 0.5; nmaps 1;
    calsour '1331+305=3C286';
    ichansel 40,216,1,0;
    Aparm 4,0,0,0,0,2;
    Minamper 10; smooth 1 4 4;
    Minphser 10; Cparm 0,0,10,10,1;
    snver 0; inp;

    --> 697 good, 32 failed

    --> Output: 4 5005 PRIMARY     .CALIB .    1

12.  BPASS - run BPASS on the output UV databse, with parameters as before.

    task 'bpass'; default 'bpass';
    getn 4; docal 0; solint 0; calcode 'K';
    timerang 0;
    get2n 2; smooth 1 4 4;
    calsour '1331+305=3C286'; ichansel 40,216,1,0;
    bpassprm(5)=1; bpassprm(10)=3; go

13.  TACOP - copy the BP file back to the original UV database.

task 'TACOP'; getn 4; geton 1;
Inext 'BP'; Invers 1; Ncount 0;
Keyword ''; Keyvalue 0 0; Keystrng ''


14.  POSSM - exmine bandpasses again, after alternatively-created
                BPASS extensions has been applied.

    tvreset;  tvclear;
    task 'possm'; default 'possm'
    getn 1; source '1331+305=3C286';
    calcode ''; stokes ''; bchan 0; echan 0;
    dotv 1; nplots 4;
    anten 4,8,21; baseline 4,8,21;
    docal 1; aparm 1,0; doband 3;
    go

-- Look ok

15. SETJY:  MAKE ABSOLUTELY SURE THAT calcode = '' (is blank)
    task 'setjy'; default 'setjy';
    getn 1; sources '1331+305=3C286';
    qual -1; bif 0; eif 0; zerosp 0;
    optype 'CALC'; calcode ''; sysvel 0;
    restfreq 0; veltyp ''; veldef '';
    freqid=1; aparm 0;
    go

    '1331+305=3C286  ' IF =  1 FLUX =14.7562 (Jy calcd)

16.  CALRD - read in a calibrator FITS image file
     task 'calrd';
     object '3c286'; band 'L'; go

17. CALIB; again applying same timerang as in BPASS and FRING.
    Note here that docal -1, instead of docal 1.

    task 'calib'; default 'calib'; getn 1;
    get2n 2; calcode 'K';  qual -1;
    timerang 0;
    refant 8; bpver 0; uvrange 0 18;
    docal -1; doband 3; solin 0; nmaps 1;
    calsour '1331+305=3C286';
    ichansel 40,216,1,0;
    Aparm 4,0,0,0,0,2;
    Minamper 10; smooth 1 4 4;
    Minphser 10; Cparm 0,0,10,10,1;
    snver 2; inp;

    ---- RESULTS:  Found 41 good solutions
    ---- NO FAILURES, no closure errors

18. CALIB on phase cals
```

```
   clr2name; nmaps 0; solin 0;
   soltype ''; timerang 0;
   calsour 'J1221+2813'; calcode 'D';
   refant 8; bpver 0; uvrange 0;
   ichansel 40,216,1,0;
   Aparm 4,0,0,0,0,2;
   Minamper 15; smooth 1 4 4;
   Minphser 15; Cparm 0,0,10,10,1;
   snver 2;

   go

   ---- RESULTS:   164  good solutions
                     6  failed solutions

19.  LISTR - examine solutions.  Amplitudes should be constant,
     gains should vary smoothly with time

Task 'LISTR'; getn 1; Optype 'Gain';
Inext 'SN'; Inver 0;  Sources '';
Calcode '*'; Timerang 0; Stokes '';
Selband -1; Selfreq -1; Freqid 1;
Bif 0; Eif 0; Bchan 1; Echan 0;
Antennas 0; Baseline 0; Uvrange 0;
Subarray 0; Docalib 2; Gainuse 0;
Dopol -1; Blver -1; Flagver 0;
Doband 3; Bpver 0; Smooth 0;
Dparm 5,0;  doacor 0; Factor 0;
Docrt -1; Outprint 'VLADATA:AGC749237.LISTR2';
baddisk 0;

--- OUTPUT:

File = AGC749237B  .UVDATA.   1 Vol = 1  Userid = 5005    IF =  1
Freq=  1.420405752 GHz   Ncor=  2   No. vis=   2520531
Polarization = R    Subarray =   0
Listing SN table, version   2
SN table has already been applied to a CL table

Gain amplitudes, 1000 =   100.000000
Stokes = R    IF =  1 Freq =  1.420405752 GHz

  Time   Source  --01--02--03--04--05--06--08--09--10--11--12--13--14--15--16--17--18--19--20--21--22--23--24--25--26--27--28

Day #   0
02:15:25 1331+305  80  94  90 105         82  96     80  93 105  87  98        81        84  87  87  97     85 100  87

02:23:15 J1221+28  83  92  90 107         87  97     78  87 101  87  97        86        84  84  93  97     84 101  84
02:57:37 J1221+28  81  93  88 103         85  94     76  95 108  90 104        80         81  85  89  95     84 102  86
03:32:52 J1221+28  79  91  91 101         86  96     76  91 101  87 102        86        84  82  93  93     83  96  88
04:08:06 J1221+28  85  94  89 101         84  94     75  91 100  87 102        82        81  82  96  98     86  99  85

File = AGC749237B  .UVDATA.   1 Vol = 1  Userid = 5005    IF =  1
Freq=  1.420405752 GHz   Ncor=  2   No. vis=   2520531
Polarization = L    Subarray =   0
Listing SN table, version   2
SN table has already been applied to a CL table

Gain amplitudes, 1000 =   100.000000
Stokes = L    IF =  1 Freq =  1.420405752 GHz

  Time   Source  --01--02--03--04--05--06--08--09--10--11--12--13--14--15--16--17--18--19--20--21--22--23--24--25--26--27--28

Day #   0
02:15:25 1331+305  80  95  93  99  91     81  88     78  92 100  88  90  93     79        101  88  75  92  83  74 107 112

02:23:15 J1221+28  84  92  95 101  97     86  91     78  87 101  87  89  98     83         99  86  82  89  81  74 108 106
02:57:37 J1221+28  82  92  92  99  94     82  89     75  93 100  91  93  91     81         95  88  80  90  82  75 105 110
03:32:52 J1221+28  80  90  94  97  92     86  89     76  89  99  88  95  92     85         98  84  81  88  82  75 106 113
04:08:06 J1221+28  84  91  95  98  92     83  88     77  89  98  88  95  94     82         96  85  82  90  81  76 102 108

File = AGC749237B  .UVDATA.   1 Vol = 1  Userid = 5005    IF =  1
Freq=  1.420405752 GHz   Ncor=  2   No. vis=   2520531
Polarization = R    Subarray =   0
Listing SN table, version   2
SN table has already been applied to a CL table

Gain phases in degrees
Stokes = R    IF =  1 Freq =  1.420405752 GHz

  Time   Source  --01--02--03--04--05--06--08--09--10--11--12--13--14--15--16--17--18--19--20--21--22--23--24--25--26--27--28

Day #   0
02:15:25 1331+305 -26-106  36-132          0  36     138  32 114-180-153        -101          2 -45-173 -93    -131  -2  79

02:23:15 J1221+28 -87-165 -15 174          0 -19      81 -24  57 116 143        -164        -55-107 129-151     171 -58  17
02:57:37 J1221+28-153 121 -99 101          0 -97       3-104 -17  44  74         126       -130-179  59 135      91-135 -51
03:32:52 J1221+28 -11 -98  46-118          0  40     148  41 118-178-147         -96         17 -36-160 -82    -125  14  83
04:08:06 J1221+28  60 -29 118 -45          0 111    -138 111-161-107 -66         -25         86  46 -87 -12     -56  80 159

File = AGC749237B  .UVDATA.   1 Vol = 1  Userid = 5005    IF =  1
Freq=  1.420405752 GHz   Ncor=  2   No. vis=   2520531
Polarization = L    Subarray =   0
Listing SN table, version   2
SN table has already been applied to a CL table

Gain phases in degrees
Stokes = L    IF =  1 Freq =  1.420405752 GHz

  Time   Source  --01--02--03--04--05--06--08--09--10--11--12--13--14--15--16--17--18--19--20--21--22--23--24--25--26--27--28
```

```
Day #   0
02:15:25 1331+305 153-163 -28-116 143       0  59      48 108 -98 -61 164 -53    -159         -59  26   5 167 172-135 -58  17

02:23:15 J1221+28  90 138 -83-175  80       0   1     -12  50-157-122 102-117     136        -119 -36 -52 107 110 167-118 -43
02:57:37 J1221+28  27  65-164 114  17       0 -76     -87 -28 129 162  30 170      65         167-110-122  36  33  87 168-113
03:32:52 J1221+28 168-155 -20-104 163       0  63      59 118 -93 -57 171 -51    -155          -48  35  19-180 178-129 -43  20
04:08:06 J1221+28-121 -86  53 -29-131       0 136     131-171 -13  15-109  19     -81          23 114  91-110-105 -58  24  98


20. GETJY
    default 'getjy'; getn 1; source 'J1221+2813';
    calsour '1331+305=3C286'; bif 0; eif 0;
    inp

localh> GETJY1: Calibrator robust averaging used     44 of     44 gain samples
localh> GETJY1:    Source:Qual      CALCODE IF  Flux (Jy)
localh> GETJY1: J1221+2813      :  0   D     1    0.69003 +/-   0.00605  0.00605
localh> GETJY1:    Source:Qual    CALCODE    used   total     bad used  tot  bad
localh> GETJY1: J1221+2813      :  0 D         176     176       0   44   44    0

-- CALIBRATOR MANUAL STATES 0.86 Jy at L-band.  Still a fair disagreement, but better than before.

21. CLCAL

    task 'clcal';
    default 'clcal'; getn 1; calcode '';
    snver 2; invers snver;
    BPARM 1 1 1 1 1 0;
    sources 'J1221+2813','AGC749237';
    calsour 'J1221+2813'; soucode '';
    freqid 1; interpol '2pt';
    samptype 'box'; icut 0;
    dobtween 0; refant 8;
    Opcode 'CALI'; Interpol '2PT'; Cutoff 0;
    Samptype 'BOX';


22.  LISTR:  print outputs for phase cals.  Amplitudes should be roughly constant,
             while phases should be close to zero.

Task 'LISTR'; getn 1; Optype 'matx';
Inext 'SN'; Inver 0;  Sources '';
Calcode 'D'; Timerang 0; Stokes '';
Selband -1; Selfreq -1; Freqid 1;
Bif 0; Eif 0; Bchan 1; Echan 0;
Antennas 0; Baseline 0; Uvrange 0;
Subarray 0; Docalib 2; Gainuse 0;
Dopol -1; Blver -1; flagver 0;
Doband 3; Bpver 0; Smooth 0;
Dparm 5,1,0;  doacor 0; Factor 0;
Docrt -1; baddisk 0;
Outprint 'VLADATA:AGC749237.B.LISTR.CLCAL';

-- Amplitudes look ok
-- Phases still look poor.
-- OUTPUT:

File = AGC749237B  .UVDATA.   1   Vol = 1  Userid = 5005   Chans=    1 -  256   IF = 1
Freq=  1.420405752 GHz   Ncor=  2   No. vis=    272727
Stokes = RRLL Subarray =   1
Applying calibration table   2
Applying flag table  13
Applying bandpass table   1


Time =   0/02:22:45 to   0/02:23:46   Source = J1221+2813      : 0000
Flux =  0.6900 Jy, Calcode = D   , Freq =  1.420405752 GHz
Amplitudes, 1000 =  10.000 Jy, averaging type = Ampscalar
RCP in upper right, LCP in lower left

Ant -- 1-- 2-- 3-- 4-- 5-- 6-- 8-- 9--10--11--12--13--14--15--16--17--18--19--20--21--22--23--24--25--26--27--28
  1|     629 620 643         600 644     640 638 629 684 604         638         672 656 630 661     610 718 642
  2| 640     583 609         571 609     605 611 602 647 573         608         638 628 603 624     580 674 606
  3| 634 608     599         570 604     596 605 593 637 568         591         634 622 590 620     572 669 607
  4| 625 608 611             586 624     614 626 610 653 583         615         657 634 607 639     590 694 616
  5| 677 647 646 640
  6|
  8| 603 580 578 576 617         581     576 580 580 614 545         578         615 599 577 596     559 651 584
  9| 640 620 612 611 652     588         614 625 617 660 584         616         657 634 610 641     590 694 615
 10|
 11| 639 613 619 613 655     586 620         614 613 653 572         611         646 629 604 641     588 687 611
 12| 656 632 626 617 669     600 636     640     614 659 578         620         653 640 609 636     592 697 626
 13| 650 628 626 622 671     592 635     636 648     648 579         606         643 626 604 631     581 682 615
 14| 670 641 640 637 685     614 649     641 661 663     614         652         689 682 650 676     623 737 659
 15| 601 579 574 573 612     548 585     585 597 596 609             577         613 600 575 599     557 650 583
 16| 662 639 629 625 672      606 642     640 656 655 672 602
 17|
 18| 612 589 585 579 624     556 592     585 604 603 613 552 606                 642 632 603 634     584 689 616
 19|
 20|
 21| 663 645 637 633 681     606 651     644 661 659 675 605 669     612             674 643 670     619 724 649
 22| 640 621 623 612 664     591 627     627 638 646 658 592 652     601         652     621 655     607 710 637
 23| 623 602 595 600 640     573 606     601 616 612 630 569 627     580         632 616     628     581 686 610
 24| 648 623 623 616 661     595 629     628 643 639 658 589 648     598         654 636 613         606 715 636
 25| 606 586 575 577 617     549 587     585 597 596 609 548 603     557         610 595 570 592
 26| 609 584 578 578 621     552 588     585 602 597 614 556 605     559         611 595 571 597 555     663 593
 27| 709 686 679 681 725     650 691     688 703 704 723 649 713     657         717 701 671 689 647 650     693
 28| 635 615 609 607 653     585 620     616 633 628 651 587 640     591         641 630 607 626 583 582 688
Ampscalar average of matrix    = 6.234E+00(1.800E-02) sigma = 3.605E-01
```

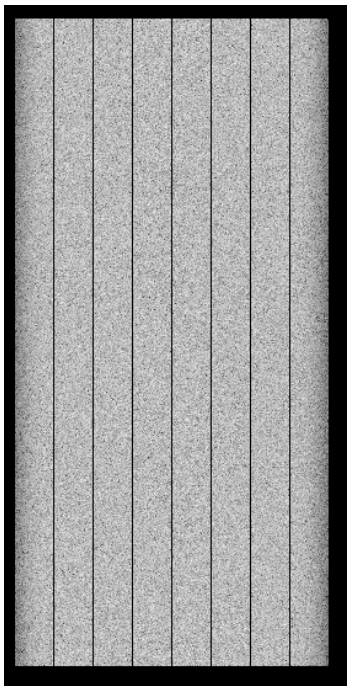
Ampscalar average of upper data= 6.243E+00 sigma = 3.390E+00
Ampscalar average of lower data= 6.233E+00 sigma = 3.380E+00
Phase, 1000 = 1000.00 degrees, averaging type = Vector
RCP in upper right, LCP in lower left

```
Ant -- 1-- 2-- 3-- 4-- 5-- 6-- 8-- 9--10--11--12--13--14--15--16--17--18--19--20--21--22--23--24--25--26--27--28
 1|    -17  8 15        15  9     9 -10  12 -15 -6       -7        18 -15  4  5    -7  8 -5
 2| -8      1 -4       -6 -10    -4  2 -2  8  2        0        12 -5  10 -5    -3  5 -5
 3| 17 -7     2        5  2     5  12 -3 -11 -6        5        -7  3 -20 -2     5 -8  2
 4| 10  3  2           8  5     6  5 -1 -5  2        -4       -22  0 -13  8     13 -22  4
 5|  5  8 -16 -4
 6|
 8|  9 -7  7  7  5         5    -7  8 -11  9  6        3       -12  10 -4 -2     5 -4  9
 9|  8 -3 -2  4  1     5         7  8 -3 -3  9       -5        -6 -1 -14 -4     8 -17  3
10|
11|  7 -5  0  5 17    -3  6         4 -2  2  8        7       -12  4 -18 -1     7 -14 16
12| -12 -9  7  0 -9     0 20      7    -8 13  1        3        -5  9  8 -7     2  0 -1
13| 21 -8  3 -1 15    -11 -2     -6 -13    -4 22      -16        -5  2 -23 -2     3 -8  6
14| -10  10 -3 -7 -5     1  4    -6  10  1    -8       3        16 -9  18 -11     2  14 -14
15| -11 -4  11  9 -8    15  8     10  5 13 -5          13        -1  6 13  3     1  10 -1
16|  8 21 -14  2 -3    -15 -19     -5  12 -15  5  8
17|
18| -9 -4  2 -9 -4      4  5      8  0 -7 -1  6 -9              14 -3 14  6    -13 10 -9
19|
20|
21| 17  13 -17 -13 18     -5 -10    -14 -12  4  15 -3  21      1          -2 -17  6     2 -11  2
22| -11  10  5 -8 -8     12 -7      9  5 -3 -2  3 -6     -7       -10     12  1    -6  17 -9
23|  1  11 -18 -15  3      6 -21    -13  2 -17  14  7  1      9       -13  16     19    -10 -1 -16
24| 11 -16  1  2  6      0 -2    -10 -14 -3 -1 -8 10     10        10 -7  11         6 -6  8
25| -8 -8  6 13 -2      2  3      8  1 14 -5 -1 -2     -9        12 -14  3  3
26| -7 -4  5 21  1     10  11     11 -3  6 -6 -1 -18    -16         14 -9 -1  9 -4     13 -4
27|  2  8 -12 -20  1     -5 -15    -4  1 -20  10  6  8     13         -5  16  3 -6  7  15     -9
28| -11 -11  9  19 -16      6  11     10 -2  14 -16 -10 -10     -4         8 -12 -3  5  4 -1  6
Ampscalar average of matrix    = 2.941E-01(4.681E-01) sigma = 9.415E+00
Vector    average of upper data= 2.685E-01 sigma = 5.020E+02
Vector    average of lower data= 3.131E-01 sigma = 4.994E+02

Time =   0/02:56:13 to   0/02:59:01   Source = J1221+2813      : 0000
Flux =  0.6900 Jy, Calcode = D   , Freq =  1.420405752 GHz
Amplitudes, 1000 =  10.000 Jy, averaging type = Ampscalar
RCP in upper right, LCP in lower left

Ant -- 1-- 2-- 3-- 4-- 5-- 6-- 8-- 9--10--11--12--13--14--15--16--17--18--19--20--21--22--23--24--25--26--27--28
 1|     618 590 599        573 601     604 680 656 676 624        567        629 650 585 613     594 707 645
 2| 615     586 591        566 597     598 672 652 670 619        561        626 648 579 608     587 698 637
 3| 595 592     568        540 572     572 644 622 637 588        539        598 618 553 580     563 670 606
 4| 597 595 576            549 583     580 653 632 649 599        549        606 624 561 593     572 681 617
 5| 633 629 610 609
 6|
 8| 557 560 541 541 574        552     553 625 600 618 569        521        577 602 534 564     544 646 587
 9| 603 601 584 584 618     549        583 657 631 652 602        548        606 631 563 593     574 681 621
10|
11| 590 589 573 574 606     538 581        658 637 652 603        548        609 633 566 595     573 682 621
12| 666 665 648 647 680     604 652     639     717 739 682        615        686 710 637 671     648 772 700
13| 626 625 605 605 643     568 611     602 681     708 654        596        664 684 616 644     623 743 680
14| 675 674 651 656 697     613 660     652 734 685     680        614        682 707 631 663     644 768 695
15| 607 606 582 585 621     550 593     582 659 616 667            567        629 653 584 612     592 707 643
16| 600 597 579 579 613     546 582     575 650 610 655 587
17|
18| 569 568 552 552 583     519 558     549 614 579 623 558 554                572 593 529 559     539 641 587
19|
20|
21| 618 616 599 600 633     565 605     596 671 630 681 609 605     570            659 591 620     601 713 648
22| 638 637 614 614 654     580 624     613 692 647 700 627 617     589         641     609 638     620 738 674
23| 593 588 572 575 608     538 577     566 641 598 646 582 572     543         594 611     571     558 663 603
24| 621 615 600 599 632     564 605     595 666 631 681 610 603     575         621 643 589         586 697 632
25| 595 591 576 577 609     542 584     574 645 603 654 587 579     555         599 619 570 600
26| 595 589 575 576 608     542 581     572 642 605 652 585 580     550         595 615 569 594 574     672 609
27| 667 661 646 646 683     605 650     639 721 677 731 657 645     617         670 690 638 670 646 639     729
28| 644 640 620 625 657     587 632     616 698 656 706 632 624     592         648 667 617 644 626 619 698
Ampscalar average of matrix    = 6.166E+00(2.268E-02) sigma = 4.541E-01

Ampscalar average of upper data= 6.219E+00 sigma = 3.399E+00
Ampscalar average of lower data= 6.127E+00 sigma = 3.333E+00
Phase, 1000 = 1000.00 degrees, averaging type = Vector
RCP in upper right, LCP in lower left

Ant -- 1-- 2-- 3-- 4-- 5-- 6-- 8-- 9--10--11--12--13--14--15--16--17--18--19--20--21--22--23--24--25--26--27--28
 1|    -11  14  4         3  8     13 -6  -4 -8 -16        4         0 -4 -6  0     11 -10 -3
 2| -12    -13 -13        -6 -12    -11  3 19  10  9       -13         8 -6  10 -8     -7  3  10
 3|  9 -15    -4          0  3    -6  8 -1  1 17        -3        -4  4 -8  1      8 -2 -6
 4|  9 -5  -3            6  3     4  7 -1 -6  1         1         2  5 -9  7      6 -24 -13
 5| -2  6 -2 -5
 6|
 8|  1 -7 -3 -8  14         6     -5  12 -9  9  7         6        -8  12 -4  5      7 -1 -13
 9|  4 -13 -1  4  15      7         2  14 -5  1  13        -4        -5  15 -7 -2     11 -20 -9
10|
11|  8 -7 -9  8  8      2 -1         6 -6  5 -2         -1        -9  14 -6  6      1  1  1
12| -3  7  10  5 -8     11  18      4     11  18  8        -8         5 -1  14 -10     1  10  1
13| -9  14 -3 -3 -7    -12 -1     -5  12    -10 -9         4         8 -15 -1  5    -10  3  14
14| -13   4   9 -10 -10     17  0     3  12 -15    -10         0        17 -11  8 -15     -5  11  15
15| -11   8  19   1 -14      6  13    -6  3 -12  -5           -13         6  -4  21  -9    -12  12  19
16| -14  14  -2  -4 -12    -19  -9     -3  8 -1  7  14
17|
18|  6 -15  -8  2  4      4 -4      1 -6  6  0 -12  12               -7  5 -10 -1      8 -6 -11
19|
20|
21|  1  14  -6 -6  6    -11 -4     -6  4  14  11  0  12    -10             1 -10  11      3  -4  -6
22| -4  -4  4 -1 -3     13  17     10  -5  -9 -12  -4  -7      7         0     18  2     -8  21  3
23| -4  11  -6  -5  -7     -4  -9     -8  14  -3  10  15  1    -10         -6  15      2    -10  -4  4
```

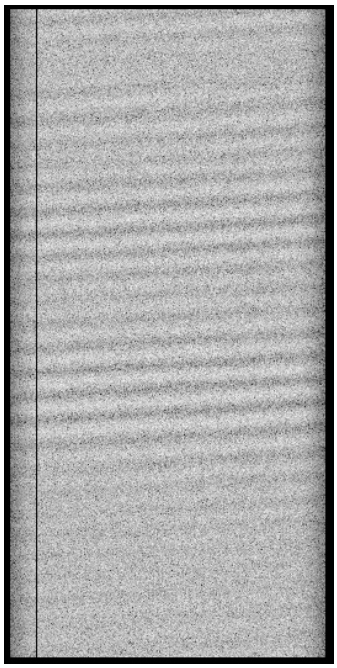
```
 24|  3 -6 -1  4  6     6 -7     7 -13  0 -10  0  6     -4        12 -3 -2        1  7 -5
 25|  10 -12  0 13 12     -2  5     7 -9  3 -6 -7 -20     7        8 -11  7 -3
 26|  15 -4  8 12 -6     11  9     2  2 -20 -4 -10 -26     10        1 -4 -11  0 -2     14  0
 27|  -5 -1  1 -20 -13     -5 -12     -3 15  5 11  7  2     -5        -7 24 -7  4  5  0     6
 28|  -3  8 -11 -12  5     -14 -10     -3  8 18 22 16 12     -14        -2 -7  4 -9  3  2 10
Ampscalar average of matrix    = 3.004E-01(4.481E-01) sigma = 9.011E+00
Vector    average of upper data= 4.987E-01            sigma = 5.095E+02
Vector    average of lower data= 1.289E-01            sigma = 5.004E+02

Time =   0/03:31:27 to   0/03:34:16   Source = J1221+2813      : 0000
Flux =  0.6900 Jy, Calcode = D   , Freq =  1.420405752 GHz
Amplitudes, 1000 =  10.000 Jy, averaging type = Ampscalar
RCP in upper right, LCP in lower left

Ant -- 1-- 2-- 3-- 4-- 5-- 6-- 8-- 9--10--11--12--13--14--15--16--17--18--19--20--21--22--23--24--25--26--27--28
  1|     599 598 582         570 606     601 637 601 643 599         602         638 614 595 597     576 651 638
  2| 605     599 586         571 607     604 641 604 645 599         603         639 619 601 602     582 657 643
  3| 586 601     584         567 603     596 631 601 640 589         595         636 612 592 594     569 647 639
  4| 569 583 574             556 590     583 620 585 624 578         582         622 599 580 580     559 635 626
  5| 594 612 601 583
  6|
  8| 575 584 574 560 583         577     572 604 574 610 567         570         609 587 568 567     546 617 609
  9| 587 602 590 573 596     574         605 639 608 651 602         603         646 618 600 605     580 655 648
 10|
 11| 585 600 585 568 592     571 583         640 604 641 598         601         639 616 598 598     575 655 643
 12| 630 643 633 612 640     614 628     627     644 686 633         639         678 653 634 636     611 693 681
 13| 603 620 608 589 611     590 602     604 650     646 600         603         641 617 598 600     577 655 647
 14| 631 645 636 616 640     615 633     626 679 650     640         646         683 659 641 640     617 698 690
 15| 595 612 601 584 609     585 598     595 643 618 651             598         635 610 593 593     569 648 639
 16| 586 602 588 573 597     571 589     585 629 607 635 604
 17|
 18| 584 600 586 571 596     569 585     584 630 605 637 605 589                 639 611 596 594     575 654 643
 19|
 20|
 21| 620 634 623 607 630     603 619     617 665 640 667 635 625     620             653 632 638     613 692 683
 22| 591 608 593 577 603     576 596     589 636 612 639 608 593     587         624     610 611     588 665 657
 23| 588 601 590 573 597     573 586     586 629 606 632 602 591     590         622 592     589     572 647 642
 24| 595 615 599 580 610     582 595     593 641 616 643 615 598     596         628 605 598         572 647 638
 25| 576 592 582 565 587     565 578     576 619 599 622 590 578     576         613 582 581 588
 26| 582 599 585 569 593     567 584     578 628 602 625 596 583     583         612 586 584 593 577     624 615
 27| 652 668 656 636 665     636 652     648 696 672 704 669 657     654         689 655 655 665 645 650     698
 28| 640 655 638 623 652     626 638     639 690 658 691 656 644     641         679 644 639 655 632 637 712
Ampscalar average of matrix    = 6.136E+00(1.563E-02) sigma = 3.130E-01
Ampscalar average of upper data= 6.163E+00            sigma = 3.341E+00
Ampscalar average of lower data= 6.116E+00            sigma = 3.312E+00
Phase, 1000 = 1000.00 degrees, averaging type = Vector
RCP in upper right, LCP in lower left

Ant -- 1-- 2-- 3-- 4-- 5-- 6-- 8-- 9--10--11--12--13--14--15--16--17--18--19--20--21--22--23--24--25--26--27--28
  1|     2 -2 -9         -7 -2     -5  11  14  10  0         -4         -6  4 -7  5      5  0  4
  2|  6     -2 -10         -1 -2     -3 -3  4  9  14         11         -26 -2  16  4      0 -2  15
  3|  3 -1     -3         -6 -2      0  2  3 -1 -3         -2         -6 -2 -9  11      14 -12  11
  4| -12 -9 -4              7  4      8 -3  1 -13 -20         -16         10  3 -16  10      10 -11 -10
  5| -10 -11  -1  6
  6|
  8| -11 -4 -9  2 -6          4      2  10  2 -1 -11         -16         -4  7 -13  13      15 -11 -7
  9|  -4 -1  0  9 -6      3          3  6  6 -1 -11         -14         -1  7 -10  12      6 -8  3
 10|
 11| -7 -3  0  1 -2      2  2          8  5 -4 -14         -8          1  10 -15  1      7  3 -3
 12|  12 -1  6  2  5      8  7      9      5  9  6         8          0 -3  7 -4      -3  10  3
 13|  14 -1  5  7  1      1  13      3  5      2  12         12          10 -5  13 -9      -9  8  9
 14|  12  5  9 -16  2      1 -3      -1  8  3      7         8          4 -5  7 -5      -3  5  4
 15|  0  8  1 -15 -8      -5 -11      -3  5  12  2             2         14 -7  1 -4      -7  1 -10
 16|  -2  11 -11  -8  -9      -22 -15      -11  17  12  12  3
 17|
 18|  -3  11  -1 -15  3      -11 -8      -4  15  15  5  0 -3                 12 -6  8 -7      -9  1 -18
 19|
 20|
 21| -10  -6  -9  -4 -10      -8  -4      -1  -1  11  3  5  11      13             7 -18  -6      6  -4  -3
 22|  -2  -2  0  8  -4      9  7      9  -8  -9  -9  -8  5      -10          7      10  7      -1  0  12
 23|  2  15 -11 -17  -6      -16 -12      -7  12  13  3  0  4      8          -14  7      -7      -4  -4 -14
 24|  7  4  6  12  6      12  11      -3  -6  -6  -7  1 -10      -6          2  2  -8          -2  9  13
 25|  -5  -4  1  9  -4      -3  1      1  -1  -6  5  3  7      5          5 -9  3  0
 26|  3  -7  14  6  12      13  6      0  -4  -7  -1  -4 -21      -11          9  -3  0 -1  5      10  9
 27|  1  -2  -7 -16  -2      -8 -10      0  12  12  4  3  -3      1          -11  6  -1  7  1  6      -9
 28|  6  10  11  -9  0      -4  9      -3  3  7  1  -9 -10      -17          -5  5 -11  12  2  9  -8
Ampscalar average of matrix    = 1.740E-01(4.035E-01) sigma = 8.106E+00
Vector    average of upper data= 5.385E-01            sigma = 5.070E+02
Vector    average of lower data= 4.568E-03            sigma = 4.987E+02

Time =   0/04:06:41 to   0/04:09:31   Source = J1221+2813      : 0000
Flux =  0.6900 Jy, Calcode = D   , Freq =  1.420405752 GHz
Amplitudes, 1000 =  10.000 Jy, averaging type = Ampscalar
RCP in upper right, LCP in lower left

Time =   0/04:06:41 to   0/04:09:31   Source = J1221+2813      : 0000
Ant -- 1-- 2-- 3-- 4-- 5-- 6-- 8-- 9--10--11--12--13--14--15--16--17--18--19--20--21--22--23--24--25--26--27--28

  1|     660 624 622         598 634     630 689 643 686 642         617         659 652 665 680     639 719 660
  2| 638     605 605         578 616     611 671 623 666 625         597         636 629 647 662     618 692 641
  3| 626 612     574         547 581     577 630 588 627 588         563         604 598 606 620     583 658 603
  4| 612 599 590             548 585     578 630 590 629 588         564         603 596 609 619     580 658 604
  5| 638 628 616 601
  6|
  8| 583 576 565 550 575         560     553 605 563 598 564         538         575 571 581 594     559 630 577
  9| 615 604 597 579 602     556         586 640 598 636 599         572         612 608 619 634     594 667 611
 10|
 11| 629 617 609 592 619     569 595         638 593 632 593         571         607 602 611 625     591 666 611
 12| 666 656 638 623 657     600 633     644     649 693 647         622         666 661 670 688     643 728 665
 13| 636 622 610 595 625     571 599     615 646     647 605         581         621 615 624 639     599 674 621
```

```
14| 670 658 643 628 660     599 632     647 682 651     646         614         664 655 669 684     640 723 659
15| 635 625 614 597 626     572 600     615 651 620 655             577         619 612 626 638     597 678 620
16| 646 633 624 606 637      580 609     625 657 626 663 628
17|
18| 597 588 575 561 589     537 566     578 611 583 614 583 592                 592 588 598 615     575 646 595
19|
20|
21| 639 631 618 605 630     577 607     624 653 625 655 629 633     590             628 638 654     613 689 634
22| 638 625 615 599 623     573 603     616 650 621 655 624 629     588         631     634 647     607 682 630
23| 631 618 606 590 619     567 593     608 641 613 648 615 623     575         620 616     662     621 701 641
24| 649 640 626 609 639     583 612     625 664 627 664 630 644     596         637 632 625         632 717 654
25| 607 595 586 570 591     544 573     587 618 590 623 594 601     555         597 592 587 605
26| 620 610 596 581 610     557 588     597 632 602 638 604 614     571         611 609 597 620 574     672 614
27| 670 654 644 626 660     600 629     643 679 649 690 654 662     614         657 653 647 667 621 638     695
28| 653 638 629 612 639     585 617     631 665 634 668 634 643     598         641 639 624 648 606 620 671
Ampscalar average of matrix    = 6.202E+00(1.653E-02) sigma = 3.311E-01
Ampscalar average of upper data= 6.240E+00            sigma = 3.390E+00
Ampscalar average of lower data= 6.173E+00            sigma = 3.339E+00
Phase, 1000 = 1000.00 degrees, averaging type = Vector
RCP in upper right, LCP in lower left

Ant -- 1-- 2-- 3-- 4-- 5-- 6-- 8-- 9--10--11--12--13--14--15--16--17--18--19--20--21--22--23--24--25--26--27--28
 1|    -16  10  12         10  15      18  -8  -6  -9  14        -14         13   0  -2 -14     -12 -10   3
 2| -16    -16 -15         -1  -4     -12   2  -9   2   9         -7          9  -4  13   7       4   5  -2
 3|  11  -5       0         1   1      -5   3   3   1  -9          3         -1   4  -5  -1      3  -9   5
 4|  11 -14  -1             6  -6      -1  10   5 -11  -3          7         -2   4 -15  -5      -1  -6   0
 5| -18   3   1  -7
 6|
 8|  10  -4   0   4  -5         -3      3  -3   1  -7 -10         13          0   2 -15   4       6  -7  14
 9|   7  -8  -1  -4  -8       3          4   0  12  -1  -6         4         -3   3 -16   0       0  -3  13
10|
11|  13  -2  -3  -2  -4      -2   1          5   2  -7 -10         8         -3   0  -3   3      11   4   0
12|  -5   0   6  10 -14       0  -3       6     -5   6  -5         -3         -7  -7  13   9       9  17 -10
13|  -2  -7   8   4  -3       2   9       3  -9       9   1         1        -10  -7   2   0       3   1   6
14| -10   6   5  -3   3      -1  -3      -3  -1  11      20        -13         11  -5   5  -6      -9   0 -12
15|  13   1 -13  -5  20     -12 -13       -7  -7   0  16             2         12   8  -9 -14      -3 -10   4
16|  -1   6  -5 -10  12     -23 -10      -15  12  -3  16 -16
17|
18|  -9  -2   1   8  -9      15   6      13  -3   3  -7   3 -16               -13  -5  13  10       6   9  -6
19|
20|
21|   8 -17  -3  -3  10      -4  -2      -4  -5 -14   8  10  23     -11             8  -9   0       3 -17   9
22|   0  -4   5   4  -3       3   5     -4 -11  -7  -7   7  13      -4          3    -14  -3       9  -6   8
23|  -9  11  -2 -12   6     -17  -7      -10   6   2   3 -10  -8       6         -8 -15     -17     -13  -4 -11
24| -14   4  -1   3  -6       7   4      -1   9   2  -6 -10 -18       9          2   4 -17         -7   6  -8
25|  12  -4   0   5   1      -6  -3      -2  -7  -4   7   4   1      -3         -3  -2   3   1
26| -11   9  10  -3 -11      14   6      19   3   1  -9   3 -21       7          9   5 -13  -7   1      13  -6
27|  -5  -2  -3  -8   2      -9   2      -2  17   4   1  -1  -7       6         -2  -2  -1  11 -10   6     -13
28|   6  -4   8   5  -3      15   5       3 -12   9 -13   1   4     -11          10   8  -8 -11   5  -6  -6
Ampscalar average of matrix    =-5.757E-01(4.135E-01) sigma = 8.310E+00
Vector    average of upper data=-3.973E-01            sigma = 5.147E+02
Vector    average of lower data=-7.674E-01            sigma = 5.047E+02
```

BASELINE 2-26:



BASELINE 5:15:



BASELINE 8-27: