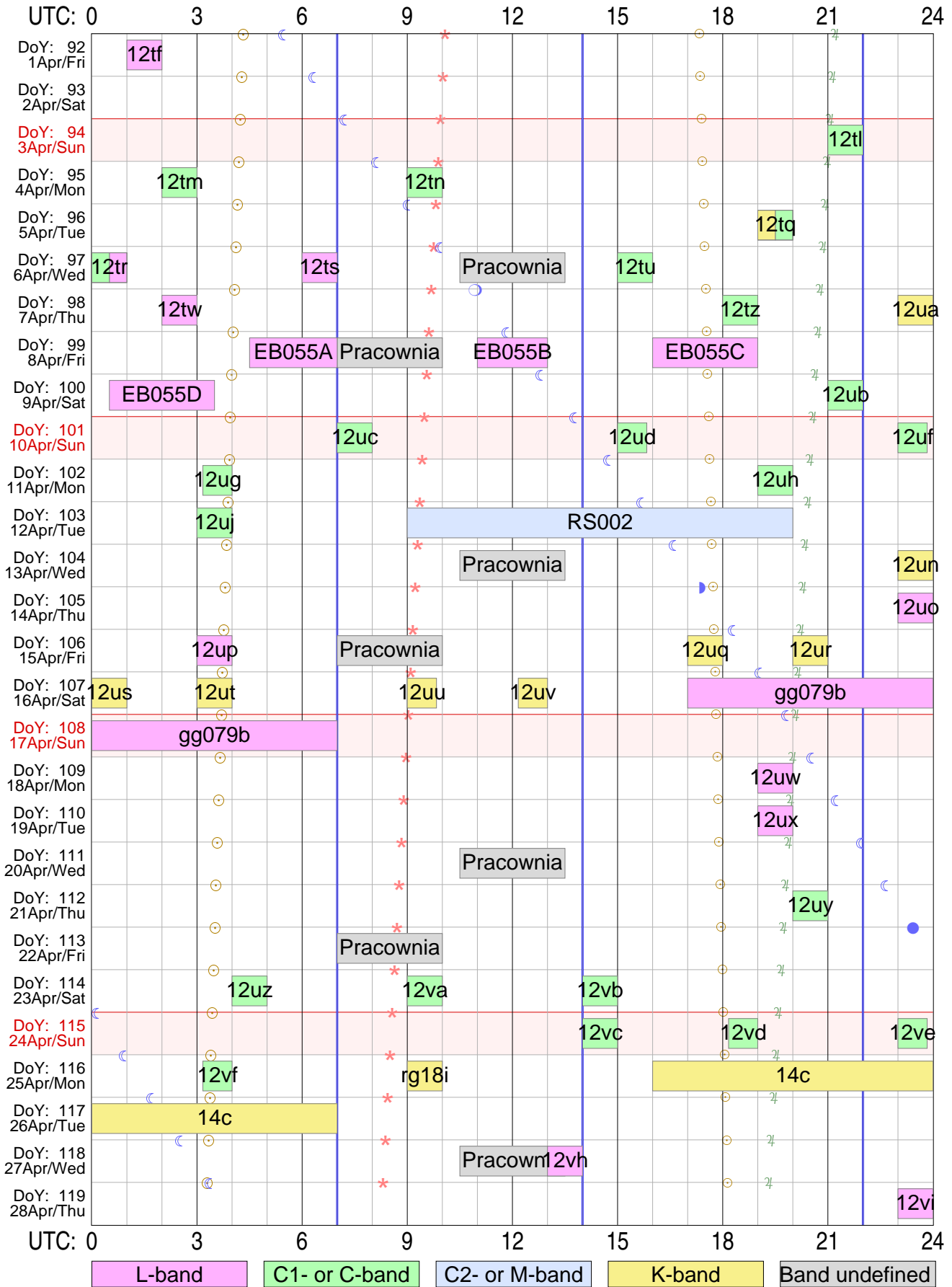


# Tr VLBI plan for Apr 2016



Version: 2016.04.15

Sky events at Tr: ☉ Sunrise & sunset ☾☽ Transit of Moon ♃ Transit of Jupiter ★ Transit of Aries (0h ST)

Vertical lines in blue mark operator shift times at Tr

Total observing time: 89.2 hours in 47 experiments scheduled

Initial characters 'rk' are omitted from RA experiment names!

Strona zostawiona celowo pusta

# RadioAstron & EVN Experiments

## Apr 2016

Uytkownik ftp dla logw i schedulw RA: grt

ftp://webinet.asc.rssi.ru

Przykad dla log files: cd GRT\_log\_files/2014\_09/2014\_09\_01\_raks08ak

Przykad dla sched files: cd schedule/grtsched/RAKS/rk08ak

Year	Date	UTstart	UTstop	Exper.	xxComment
2016	D M DoW	hh mm	hh mm	name	
32	1 02 Pon	10 00	11 00	rk12nv	"L "
35	4 02 Czw	2 00	3 00	rk12ob	"C "
35	4 02 Czw	7 00	8 00	rk12oc	"L "
36	5 02 Pia	0 00	1 00	rk12oe	"L "
36	5 02 Pia	3 00	4 00	rk12of	"L "
36	5 02 Pia	11 00	12 00	rk12og	"C "
36	5 02 Pia	20 00	21 00	rk12oh	"C "
36	5 02 Pia	23 10	24 00	rk12oi	"K>C "
37	6 02 Sob	2 20	3 00	rk12oj	"C "
37	6 02 Sob	5 20	6 00	rk12ok	"C "
38	7 02 Nie	22 00	23 00	rk12on	"C "
39	8 02 Pon	1 00	2 00	rk12oo	"L "
39	8 02 Pon	22 00	23 00	rk12oq	"L "
40	9 02 Wto	2 00	3 00	rk12or	"L "
41	10 02 Sro	1 00	2 00	rk12os	"L "
41	10 02 Sro	6 00	7 00	rk12ot	"L "
41	10 02 Sro	9 00	10 00	rk12ou	"L "
42	11 02 Czw	3 00	4 00	rk12ow	"C>L "
42	11 02 Czw	9 00	10 00	rk12ox	"L "
43	12 02 Pia	2 00	3 00	rk12oy	"L "
43	12 02 Pia	5 00	6 00	rk12oz	"C "
43	12 02 Pia	10 00	11 00	rk12pa	"C "
44	13 02 Sob	1 00	2 00	rk12pb	"C "
44	13 02 Sob	6 00	7 00	rk12pc	"L "
44	13 02 Sob	11 00	12 00	rk12pd	"L "
45	14 02 Nie	0 00	1 00	rk12pe	"C "
45	14 02 Nie	5 00	7 00	rg18e	"K "
46	15 02 Pon	2 00	3 00	rk12pf	"L "
46	15 02 Pon	5 00	6 00	rk12pg	"L "
47	16 02 Wto	12 00	13 00	rk12ph	"C "
47	16 02 Wto	15 00	16 00	rk12pi	"K "
47	16 02 Wto	21 00	22 00	rk12pj	"L "
48	17 02 Sro	0 00	1 00	rk12pk	"L "
49	18 02 Czw	1 00	2 00	rk12pl	"C>L "
49	18 02 Czw	21 00	22 00	rk12pm	"C "
50	19 02 Pia	2 00	4 00	rg18f	"K "
51	20 02 Sob	11 00	12 00	rk12po	"C "
51	20 02 Sob	23 00	24 00	rk12pp	"C "
52	21 02 Nie	4 00	5 00	rk12pq	"L "

52	21	02	Nie	9	00	10	00	rk12pr	"C"	"
52	21	02	Nie	22	00	23	00	rk12ps	"C"	"
53	22	02	Pon	22	30	23	30	rk12pt	"C"	"
54	23	02	Wto	5	00	6	00	rk12pu	"L"	"
54	23	02	Wto	8	00	9	00	rk12pv	"L"	"
54	23	02	Wto	13	00	14	00	rk12pw	"L"	"
54	23	02	Wto	20	00	21	00	rk12px	"L"	"
55	24	02	Sro	9	00	10	00	rk12py	"C"	"
55	24	02	Sro	13	00	23	00	rg14f	"C"	"
56	25	02	Czw	20	00	21	00	rk12qa	"C"	"
57	26	02	Pia	0	00	1	00	rk12qb	"L"	"
57	26	02	Pia	6	00	7	00	rk12qc	"L"	"
57	26	02	Pia	21	00	22	00	rk12qd	"C"	"
58	27	02	Sob	13	00	14	00	rk12qe	"L"	"
59	28	02	Nie	22	00	23	00	rk12qf	"C"	"

49	18	02	Czw	12	00	15	00	n16c1	"C"	1- EVN7 0.69
49	18	02	Czw	16	00	20	00	cl16c1	"C"	2- ---0 0.00
50	19	02	Pia	0	00	24	00	gf019a	"C"	3R EVN5 5.53
53	22	02	Pon	1	00	15	00	gm073b	"C"	4- EVN0 12.90
54	23	02	Wto	0	00	4	30	em119a	"C"	5R EVN6 2.07
55	24	02	Sro	0	00	4	30	em119b	"C"	6R EVN6 2.07
55	24	02	Sro	13	00	23	00	eg089c	"C"	7- EVN8 1.15
56	25	02	Czw	12	00	15	00	n16m1	"M"	8- EVN3 0.17
56	25	02	Czw	16	00	20	00	cl16m1	"M"	9- ---0 0.00
57	26	02	Pia	8	30	18	30	es079a	"M"	10- EVN7 1.15
58	27	02	Sob	2	30	11	30	em117a	"M"	11- EVN8 0.52
59	28	02	Nie	2	30	11	30	em117b	"M"	12- EVN8 0.52
60	29	02	Pon	2	30	11	30	em117c	"M"	13- EVN8 0.52
61	1	03	Wto	5	30	14	30	em117d	"M"	14- EVN8 0.52
63	3	03	Czw	12	00	15	00	n16l1	"L"	15- EVN7 0.69
63	3	03	Czw	17	30	24	00	ej016a	"L"	
64	4	03	Pia	0	00	0	30	"	"L"	16- EVN0 3.23
64	4	03	Pia	10	00	20	00	eg089d	"L"	17- EVN2 1.15
64	4	03	Pia	21	00	24	00	eg092a	"L"	
65	5	03	Sob	0	00	5	00	"	"L"	18- EVN6 3.69
65	5	03	Sob	11	00	13	00	ea057b	"L"	19- Bon0 0.92
65	5	03	Sob	17	30	24	00	ej016b	"L"	
66	6	03	Nie	0	00	0	30	"	"L"	20- EVN5 3.23
66	6	03	Nie	11	00	23	00	eg078d	"L"	21- EVN3 5.53
67	7	03	Pon	0	00	24	00	gf019b	"L"	22R EVN9 5.53
68	8	03	Wto	1	00	13	00	eg078e	"L"	23- EVN3 5.53
68	8	03	Wto	14	00	18	00	cl16l1	"L"	24- ---0 0.00
68	8	03	Wto	19	00	23	00	ey024b	"L"	25- EVN6 1.84
69	9	03	Sro	0	00	5	00	em119c	"L"	26R EVN5 2.30
70	10	03	Czw	0	00	5	00	em119d	"L"	27R EVN5 2.30
32	1	02	Pon	20	15	24	00	"rp024a	eVLBI"	"L"
33	2	02	Wto	0	00	2	15	"	"L"	28 eEVO 0.00
41	10	02	Sro	19	30	24	00	"rp024b	eVLBI"	"L"
42	11	02	Czw	0	00	1	30	"	"L"	29 eEVO 0.00
42	11	02	Czw	19	30	24	00	"rp024c	eVLBI"	"L"
43	12	02	Pia	0	00	1	30	"	"L"	30 eEVO 0.00

```
0 2.02/Wto 9 00 113 00 "eg082g eVLBI" "C" "
```

```
0 3.02/Sro 13 00 19 00 "eVLBI testy" "X" "
```

Summer time (DST): Mar 27 to Oct 30, 2016

Total observing time: 336.2 hours in 86 experiments

Plik pdf tego dokumentu jest dost/epny w sieci pod adresem:

<http://paulo.astro.uni.torun.pl/~pw/VLBI/schedules/apr16.pdf>

**rk12tfr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: L-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST       EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Fri    1 Apr 2016    Day 92 ---

----- L-band VLBI scans -----

Next scan frequencies:	1668.00	1668.00	1668.00	1668.00							
Next BBC frequencies:	732.00	732.00	732.00	732.00							
Next scan bandwidths:	16.00	16.00	16.00	16.00							
01 00 00	0851+202	14 53 34	16.2 -78.1	6.0		38.7	0	0	01 00 00		
01 14 30	---	15 08 06	14.1 -75.3	6.2		38.2	870	28	01 00 01		
01 15 00	0851+202	15 08 36	14.0 -75.2	6.2		38.2	24	28	01 15 00		
01 29 30	---	15 23 08	11.9 -72.4	6.5		37.5	870	56	01 15 01		
01 30 00	0851+202	15 23 39	11.9 -72.3	6.5		37.5	24	56	01 30 00		
01 44 30	---	15 38 11	9.8 -69.6	6.7		36.8	870	84	01 30 01		
01 45 00	0851+202	15 38 41	9.7 -69.5	6.7		36.8	24	84	01 45 00		
02 00 00	---	15 53 43	7.6 -66.6	7.0		35.9	900	112	01 45 01		

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra18cm2.set

Setup group:    2	Station: TORUN	Total bit rate:    256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor:    1.00

Disk used to record data.

```

1st LO= 2400.00 2400.00 2400.00 2400.00
Net SB=      L      L      U      U
IF SB =      L      L      L      L
Pol.  =      RCP     LCP     RCP     LCP
BBC   =      1      2      1      2
BBC SB=      U      U      L      L
IF    =      C      A      C      A

```

The following frequency sets based on these setups were used.

```

Frequency Set: 2 Setup file default. Used with PCAL = 1MHz
LO sum= 1668.00 1668.00 1668.00 1668.00
BBC fr= 732.00 732.00 732.00 732.00
Bandwd= 16.00 16.00 16.00 16.00
Matching frequency sets: 2

```

Track assignments are:

```

track1= 2, 18, 3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(Date)	Error (mas)	
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 56.702253	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 38.71497	0.00
	fake circumpolar target for a TS to look at			
* 0851+202	08 51 57.250618	* 08 54 48.874930	08 55 44.908923	0.00
J0854+2006	20 17 58.41733	* 20 06 30.64078	20 02 37.74103	0.00
OJ287	./rk12tf_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 213710 observations, RA-A03-04, RA-A03-			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

```

Source      Sun distance (deg)
0851+202    118.9

```

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

```

1.6 GHz      45. deg
2.3 GHz      36. deg
5.0 GHz      23. deg
8.4 GHz      17. deg
15.0 GHz     12. deg
22.0 GHz     9. deg

```

**rk12tltr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/L-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST       EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Sun    3 Apr 2016    Day 94 ---

----- C-band VLBI scans -----

Next scan frequencies:	4836.00	4836.00	4836.00	4836.00							
Next BBC frequencies:	736.00	736.00	736.00	736.00							
Next scan bandwidths:	16.00	16.00	16.00	16.00							
21 00 00	1514+197	11 04 44	31.4	99.4	-4.2		-38.9	0	0	21 00 00	
21 14 30	---	11 19 16	33.6	102.6	-4.0		-38.4	870	28	21 00 01	
21 15 00	1514+197	11 19 46	33.6	102.7	-4.0		-38.4	24	28	21 15 00	
21 29 30	---	11 34 19	35.8	106.0	-3.7		-37.8	870	56	21 15 01	
21 30 00	1514+197	11 34 49	35.8	106.1	-3.7		-37.7	24	56	21 30 00	
21 44 30	---	11 49 21	37.9	109.5	-3.5		-36.9	870	84	21 30 01	
21 45 00	1514+197	11 49 51	38.0	109.6	-3.5		-36.9	24	84	21 45 00	
22 00 00	---	12 04 54	40.1	113.3	-3.2		-35.8	900	112	21 45 01	

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra6cm2.set

Setup group:	3	Station:	TORUN	Total bit rate:	256
Format:	MKIV1:4	Bits per sample:	2	Sample rate:	32.000
Number of channels:	4	DBE type:		Speedup factor:	1.00

Disk used to record data.



1st LO=	4100.00	4100.00	4100.00	4100.00
Net SB=	L	L	U	U
IF SB =	U	U	U	U
Pol. =	RCP	LCP	RCP	LCP
BBC =	1	2	1	2
BBC SB=	L	L	U	U
IF =	C	A	C	A

The following frequency sets based on these setups were used.

Frequency Set: 3 Setup file default. Used with PCAL = 1MHz  
 LO sum= 4836.00 4836.00 4836.00 4836.00  
 BBC fr= 736.00 736.00 736.00 736.00  
 Bandwd= 16.00 16.00 16.00 16.00  
 Matching frequency sets: 3

Track assignments are:

track1= 2, 18, 3, 19  
 barrel=roll\_off

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(Date)	Error (mas)
* FAKERA	11 57 21.769299 * 12 00 00.000000	12 00 56.623672	0.00
	85 16 41.77889 * 85 00 00.000000	84 54 39.57038	0.00
	fake circumpolar target for a TS to look at		
* 1514+197	15 14 40.985841 * 15 16 56.796164	15 17 41.734017	0.00
J1516+1932	19 43 10.94234 * 19 32 12.99191	19 28 37.03224	0.00
	./rk12tl_sources.radioastron AGN, MASIV, rfc_2013d Petrov, 2013, unpublished 2439 observations, RA-A03-04, RA		

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun.  
 SCHED provides warnings at individual scans for distances less than 10 degrees.  
 The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
1514+197	136.5

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

**rk12tmtr**

RADIOASTRON AGN SURVEY  
PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/K-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST        EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Mon    4 Apr 2016    Day 95 ---

----- C-band VLBI scans -----

Next scan frequencies: 4836.00 4836.00 4836.00 4836.00  
Next BBC frequencies:    736.00    736.00    736.00    736.00  
Next scan bandwidths:    16.00    16.00    16.00    16.00

02 00 00	1510-089	16 05 33	26.8	194.4	0.9		8.7	0	0	02 00 00
02 14 30	---	16 20 06	26.2	198.3	1.1		11.0	870	28	02 00 01
02 15 00	1510-089	16 20 36	26.1	198.4	1.1		11.1	24	28	02 15 00
02 29 30	---	16 35 08	25.4	202.3	1.4		13.4	870	56	02 15 01
02 30 00	1510-089	16 35 38	25.3	202.5	1.4		13.4	24	56	02 30 00
02 44 30	---	16 50 10	24.4	206.3	1.6		15.6	870	84	02 30 01
02 45 00	1510-089	16 50 41	24.4	206.4	1.6		15.7	24	84	02 45 00
03 00 00	---	17 05 43	23.3	210.3	1.9		17.9	900	112	02 45 01

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra6cm2.set

Setup group:    4	Station: TORUN	Total bit rate:    256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor:    1.00

Disk used to record data.

```

1st LO=  4100.00  4100.00  4100.00  4100.00
Net SB=           L           L           U           U
IF SB =           U           U           U           U
Pol.  =          RCP          LCP          RCP          LCP
BBC   =           1           2           1           2
BBC SB=           L           L           U           U
IF    =           C           A           C           A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  2  Setup file default.  Used with PCAL = 1MHz
LO sum=  4836.00  4836.00  4836.00  4836.00
BBC fr=   736.00   736.00   736.00   736.00
Bandwd=   16.00   16.00   16.00   16.00
Matching frequency sets:  2

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 56.616631	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 39.63735	0.00
	fake circumpolar target for a TS to look at			
* 1510-089	15 10 08.900178	* 15 12 50.532926	15 13 44.040228	0.00
J1512-0905	-08 54 47.61965	*-09 05 59.82980	-09 09 35.29522	0.00
	./rk12tm_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 6315 observations, RA-A03-04, RA-A02-12			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

```

Source      Sun distance (deg)
1510-089    145.3

```

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

```

1.6 GHz     45. deg
2.3 GHz     36. deg
5.0 GHz     23. deg
8.4 GHz     17. deg
15.0 GHz    12. deg
22.0 GHz     9. deg

```

**rk12tntr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/L-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST        EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Mon    4 Apr 2016    Day 95 ---

----- C-band VLBI scans -----

Next scan frequencies:	4836.00	4836.00	4836.00	4836.00						
Next BBC frequencies:	736.00	736.00	736.00	736.00						
Next scan bandwidths:	16.00	16.00	16.00	16.00						
09 00 00	1817+387	23 06 42	40.4	-76.3	4.8	48.4	0	0	09 00 00	
09 14 30	---	23 21 15	38.3	-73.9	5.0	47.7	870	28	09 00 01	
09 15 00	1817+387	23 21 45	38.2	-73.8	5.0	47.7	24	28	09 15 00	
09 29 30	---	23 36 17	36.1	-71.4	5.3	46.9	870	56	09 15 01	
09 30 00	1817+387	23 36 47	36.0	-71.3	5.3	46.8	24	56	09 30 00	
09 44 30	---	23 51 19	34.0	-68.9	5.5	45.9	870	84	09 30 01	
09 45 00	1817+387	23 51 50	33.9	-68.8	5.5	45.9	24	84	09 45 00	
10 00 00	---	00 06 52	31.8	-66.4	5.8	44.9	900	112	09 45 01	

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra6cm2.set

Setup group:    1	Station: TORUN	Total bit rate:    256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor:    1.00

Disk used to record data.

1st LO=	4100.00	4100.00	4100.00	4100.00
Net SB=	L	L	U	U
IF SB =	U	U	U	U
Pol. =	RCP	LCP	RCP	LCP
BBC =	1	2	1	2
BBC SB=	L	L	U	U
IF =	C	A	C	A

The following frequency sets based on these setups were used.

Frequency Set: 2 Setup file default. Used with PCAL = 1MHz  
 LO sum= 4836.00 4836.00 4836.00 4836.00  
 BBC fr= 736.00 736.00 736.00 736.00  
 Bandwd= 16.00 16.00 16.00 16.00  
 Matching frequency sets: 2

Track assignments are:

track1= 2, 18, 3, 19  
 barrel=roll\_off

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 56.605904	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 39.73224	0.00
	fake circumpolar target for a TS to look at			
* 1817+387	18 17 46.175701	* 18 19 26.547379	18 19 59.360861	0.00
J1819+3845	38 43 40.47033	* 38 45 01.78611	38 45 20.45016	0.00
	./rk12tn_sources.radioastron			
	AGN, IDV, rfc_2013d Petrov, 2013, unpublished 89 observations, RA-A03-04, RA-A02			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
1817+387	93.1

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

rk12tqtr

RADIOASTRON AGN SURVEY

PI: Yuri Kovalev

Address: ASC Lebedev Profsoyuznaya 84/32 117997 Moscow, Russia  
Phone: +7-495-3332512 EMAIL: kirx@scan.sai.msu.ru  
Fax: +7-495-3332378 Phone during observation: +7-903-6614865

Observing mode: C/K-band, dual-pol

Schedule for TORUN (Code Tr ) Page 2  
RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start. Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are L0 sum (band edge).  
SYNC: Time correlator is expected to sync up.

-----  
Start UT Source Start / Stop Early Disk TPStart  
Stop UT LST EL AZ HA UP ParA Dwell GBytes SYNC  
-----

--- Tue 5 Apr 2016 Day 96 ---

----- K-band VLBI scans -----

Next scan frequencies: 22236.00 22236.00 22236.00 22236.00  
Next BBC frequencies: 736.00 736.00 736.00 736.00  
Next scan bandwidths: 16.00 16.00 16.00 16.00

19 00 00	1758+388	09 12 17	10.8	36.0	-8.8	-26.9	0	0	19 00 00
19 14 30	---	09 26 50	12.1	38.6	-8.6	-28.7	870	28	19 00 01
19 15 00	1758+388	09 27 20	12.1	38.7	-8.6	-28.8	24	28	19 15 00
19 25 00	---	09 37 21	13.1	40.4	-8.4	-30.0	600	47	19 15 01

----- C-band VLBI scans -----

Next scan frequencies: 4836.00 4836.00 4836.00 4836.00  
Next BBC frequencies: 736.00 736.00 736.00 736.00

19 30 00	1758+388	09 42 22	13.6	41.3	-8.3	-30.5	294	47	19 30 00
19 44 30	---	09 56 55	15.1	43.8	-8.1	-32.2	870	75	19 30 01
19 45 00	1758+388	09 57 25	15.1	43.8	-8.1	-32.3	24	75	19 45 00
20 00 00	---	10 12 27	16.7	46.4	-7.8	-33.9	900	104	19 45 01

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra1cm2.set

Matching groups in ./rk12tq\_freq.dat:  
tr1cm

Setup group: 8	Station: TORUN	Total bit rate: 256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor: 1.00

Disk used to record data.

1st LO=	21500.00	21500.00	21500.00	21500.00
Net SB=	L	L	U	U
IF SB =	U	U	U	U
Pol. =	RCP	LCP	RCP	LCP
BBC =	1	2	1	2
BBC SB=	L	L	U	U
IF =	C	A	C	A

The following frequency sets based on these setups were used.

Frequency Set:	4	Setup file default.	Used with PCAL = 1MHz
LO sum=	22236.00	22236.00	22236.00
BBC fr=	736.00	736.00	736.00
Bandwd=	16.00	16.00	16.00
Matching frequency sets:	4		

Track assignments are:  
 track1= 2, 18, 3, 19  
 barrel=roll\_off

==== Setup file: ra6cm2.set

Setup group:	3	Station: TORUN	Total bit rate:	256
Format:	MKIV1:4	Bits per sample:	2	Sample rate: 32.000
Number of channels:	4	DBE type:		Speedup factor: 1.00

Disk used to record data.

1st LO=	4100.00	4100.00	4100.00	4100.00
Net SB=	L	L	U	U
IF SB =	U	U	U	U
Pol. =	RCP	LCP	RCP	LCP
BBC =	1	2	1	2
BBC SB=	L	L	U	U
IF =	C	A	C	A

The following frequency sets based on these setups were used.

Frequency Set: 6 Setup file default. Used with PCAL = 1MHz  
 LO sum= 4836.00 4836.00 4836.00 4836.00  
 BBC fr= 736.00 736.00 736.00 736.00  
 Bandwd= 16.00 16.00 16.00 16.00  
 Matching frequency sets: 6

Track assignments are:

track1= 2, 18, 3, 19  
 barrel=roll\_off

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 56.533874	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 40.20869	0.00
	fake circumpolar target for a TS to look at			
* 1758+388	17 58 44.703952	* 18 00 24.765361	18 00 57.616249	0.00
J1800+3848	38 48 32.47341	* 38 48 30.69739	38 48 22.78538	0.00
	./rk12tq_sources.radioastron AGN, rfc_2013d Petrov, 2013, unpublished 3569 observations, RA-A03-04, RA-A02-12			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
1758+388	97.4

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg



**rk12trtr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/L-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST            EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Wed    6 Apr 2016    Day 97 ---

----- C-band VLBI scans -----

Next scan frequencies: 4836.00 4836.00 4836.00 4836.00  
Next BBC frequencies:    736.00    736.00    736.00    736.00  
Next scan bandwidths:    16.00    16.00    16.00    16.00

00 00 00	1652+398	14 13 07	59.7	99.7	-2.7	-50.3	0	0	00 00 00
00 14 30	---	14 27 39	61.8	103.4	-2.4	-49.4	870	28	00 00 01
00 15 00	1652+398	14 28 09	61.9	103.5	-2.4	-49.4	24	28	00 15 00
00 25 00	---	14 38 11	63.3	106.3	-2.3	-48.6	600	47	00 15 01

----- L-band VLBI scans -----

Next scan frequencies: 1668.00 1668.00 1668.00 1668.00  
Next BBC frequencies:    732.00    732.00    732.00    732.00

00 30 00	1652+398	14 43 11	64.1	107.7	-2.2	-48.1	293	47	00 30 00
00 44 30	---	14 57 44	66.1	112.2	-1.9	-46.3	870	75	00 30 01
00 45 00	1652+398	14 58 14	66.2	112.4	-1.9	-46.2	24	75	00 45 00
01 00 00	---	15 13 16	68.2	117.7	-1.7	-43.8	900	104	00 45 01

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra6cm2.set

Setup group:    2	Station: TORUN	Total bit rate:    256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor:    1.00

Disk used to record data.

1st LO=	4100.00	4100.00	4100.00	4100.00
Net SB=	L	L	U	U
IF SB =	U	U	U	U
Pol. =	RCP	LCP	RCP	LCP
BBC =	1	2	1	2
BBC SB=	L	L	U	U
IF =	C	A	C	A

The following frequency sets based on these setups were used.

Frequency Set: 5 Setup file default. Used with PCAL = 1MHz  
 LO sum= 4836.00 4836.00 4836.00 4836.00  
 BBC fr= 736.00 736.00 736.00 736.00  
 Bandwd= 16.00 16.00 16.00 16.00  
 Matching frequency sets: 5

Track assignments are:  
 track1= 2, 18, 3, 19  
 barrel=roll\_off

==== Setup file: ra18cm2.set

Setup group:	8	Station: TORUN	Total bit rate:	256
Format:	MKIV1:4	Bits per sample:	2	Sample rate: 32.000
Number of channels:	4	DBE type:		Speedup factor: 1.00

Disk used to record data.

```

1st LO= 2400.00 2400.00 2400.00 2400.00
Net SB=      L      L      U      U
IF SB =      L      L      L      L
Pol.  =      RCP     LCP     RCP     LCP
BBC   =      1      2      1      2
BBC SB=      U      U      L      L
IF    =      C      A      C      A

```

The following frequency sets based on these setups were used.

```

Frequency Set: 6 Setup file default. Used with PCAL = 1MHz
LO sum= 1668.00 1668.00 1668.00 1668.00
BBC fr= 732.00 732.00 732.00 732.00
Bandwd= 16.00 16.00 16.00 16.00
Matching frequency sets: 6

```

Track assignments are:

```

track1= 2, 18, 3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 56.519882	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 40.28016	0.00
	fake circumpolar target for a TS to look at			
* 1652+398	16 52 11.729418	* 16 53 52.216683	16 54 25.519184	0.00
J1653+3945	39 50 25.15723	* 39 45 36.60881	39 43 56.76498	0.00
MRK501	./rk12tr_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 6490 observations, RA-A03-04, RA-A03-09			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
1652+398	109.2

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

**rk12tstr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: L-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.

Early: Seconds between end of slew and start.    Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are LO sum (band edge).

SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST       EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Wed    6 Apr 2016    Day 97 ---

----- L-band VLBI scans -----

Next scan frequencies: 1668.00 1668.00 1668.00 1668.00  
Next BBC frequencies:    732.00    732.00    732.00    732.00  
Next scan bandwidths:    16.00    16.00    16.00    16.00

06 00 00	1502+106	20 14 06	16.0	266.1	5.1	37.5	0	0	06 00 00
06 14 30	---	20 28 38	13.8	269.0	5.4	37.6	870	28	06 00 01
06 15 00	1502+106	20 29 08	13.7	269.1	5.4	37.6	24	28	06 15 00
06 29 30	---	20 43 41	11.5	272.0	5.6	37.6	870	56	06 15 01
06 30 00	1502+106	20 44 11	11.5	272.1	5.6	37.6	24	56	06 30 00
06 44 30	---	20 58 43	9.3	275.0	5.9	37.5	870	84	06 30 01
06 45 00	1502+106	20 59 13	9.2	275.1	5.9	37.5	24	84	06 45 00
07 00 00	---	21 14 16	7.0	278.1	6.2	37.2	900	112	06 45 01

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra18cm2.set

Setup group:    3	Station: TORUN	Total bit rate:    256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor:    1.00

Disk used to record data.

```

1st LO=  2400.00  2400.00  2400.00  2400.00
Net SB=           L           L           U           U
IF SB =           L           L           L           L
Pol.  =          RCP          LCP          RCP          LCP
BBC   =           1           2           1           2
BBC SB=           U           U           L           L
IF    =           C           A           C           A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  3  Setup file default.  Used with PCAL = 1MHz
LO sum=  1668.00  1668.00  1668.00  1668.00
BBC fr=   732.00   732.00   732.00   732.00
Bandwd=   16.00   16.00   16.00   16.00
Matching frequency sets:  3

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 56.502575	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 40.36259	0.00
	fake circumpolar target for a TS to look at			
* 1502+106	15 02 00.157714	* 15 04 24.979783	15 05 12.931599	0.00
J1504+1029	10 41 17.73982	* 10 29 39.19840	10 25 51.46248	0.00
	./rk12ts_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 15421 observations, RA-A03-04, RA-A02-1			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
1502+106	145.0

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

**rk12tutr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/L-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST       EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Wed    6 Apr 2016    Day 97 ---

----- C-band VLBI scans -----

Next scan frequencies:	4836.00	4836.00	4836.00	4836.00						
Next BBC frequencies:	736.00	736.00	736.00	736.00						
Next scan bandwidths:	16.00	16.00	16.00	16.00						
15 00 00	1641+399	05 15 34	3.1	6.2-11.5	-4.8	0	0	15 00 00		
15 14 30	---	05 30 07	3.4	8.9-11.2	-7.0	870	28	15 00 01		
15 15 00	1641+399	05 30 37	3.4	9.0-11.2	-7.0	24	28	15 15 00		
15 29 30	---	05 45 09	3.8	11.8-11.0	-9.2	870	56	15 15 01		
15 30 00	1641+399	05 45 39	3.8	11.9-11.0	-9.3	24	56	15 30 00		
15 44 30	---	06 00 12	4.3	14.7-10.7	-11.4	870	84	15 30 01		
15 45 00	1641+399	06 00 42	4.4	14.8-10.7	-11.5	24	84	15 45 00		
16 00 00	---	06 15 44	5.0	17.6-10.5	-13.7	900	112	15 45 01		

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra6cm2.set

Setup group:    1	Station: TORUN	Total bit rate:    256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor:    1.00

Disk used to record data.

```

1st LO=  4100.00  4100.00  4100.00  4100.00
Net SB=           L           L           U           U
IF SB =           U           U           U           U
Pol.  =          RCP          LCP          RCP          LCP
BBC   =           1           2           1           2
BBC SB=          L           L           U           U
IF    =           C           A           C           A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  2  Setup file default.  Used with PCAL = 1MHz
LO sum=  4836.00  4836.00  4836.00  4836.00
BBC fr=   736.00   736.00   736.00   736.00
Bandwd=   16.00   16.00   16.00   16.00
Matching frequency sets:  2

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 56.472112	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 40.49474	0.00
	fake circumpolar target for a TS to look at			
* 1641+399	16 41 17.606226	* 16 42 58.809963	16 43 32.403360	0.00
J1642+3948	39 54 10.81479	* 39 48 36.99385	39 46 42.77754	0.00
3C345	./rk12tu_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 51938 observations, RA-A03-04, RA-A03-0			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

```

Source          Sun distance (deg)
1641+399        111.3

```

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

```

1.6 GHz        45. deg
2.3 GHz        36. deg
5.0 GHz        23. deg
8.4 GHz        17. deg
15.0 GHz       12. deg
22.0 GHz        9. deg

```

rk12twtr

RADIOASTRON AGN SURVEY  
PI: Yuri Kovalev

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: L-band, dual-pol

Schedule for TORUN              (Code Tr )    Page 2  
   RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time.    Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

```
-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST        EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----  
  
--- Thu    7 Apr 2016    Day 98 ---  
  
----- L-band VLBI scans -----  
  
Next scan frequencies: 1668.00 1668.00 1668.00 1668.00  
Next BBC frequencies:    732.00    732.00    732.00    732.00  
Next scan bandwidths:    16.00    16.00    16.00    16.00  
  
02 00 00 1504-166    16 17 23 18.4 197.5 1.2        10.9    0        0    02 00 00  
02 14 30 ---        16 31 55 17.7 201.1 1.4        13.0    870        28    02 00 01  
  
02 15 00 1504-166    16 32 25 17.6 201.2 1.4        13.1    24        28    02 15 00  
02 29 30 ---        16 46 58 16.8 204.7 1.6        15.2    870        56    02 15 01  
  
02 30 00 1504-166    16 47 28 16.8 204.8 1.7        15.3    24        56    02 30 00  
02 44 30 ---        17 02 00 15.8 208.3 1.9        17.3    870        84    02 30 01  
  
02 45 00 1504-166    17 02 30 15.7 208.4 1.9        17.4    24        84    02 45 00  
03 00 00 ---        17 17 33 14.6 212.0 2.2        19.4    900        112    02 45 01
```

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

===== Setup file: ra18cm2.set

Setup group:    2                      Station: TORUN                      Total bit rate:    256  
Format: MKIV1:4                      Bits per sample: 2                      Sample rate: 32.000  
Number of channels: 4                      DBE type:                      Speedup factor:    1.00

Disk used to record data.



```

1st LO= 2400.00 2400.00 2400.00 2400.00
Net SB=      L      L      U      U
IF SB =      L      L      L      L
Pol.  =      RCP     LCP     RCP     LCP
BBC   =      1      2      1      2
BBC SB=      U      U      L      L
IF    =      C      A      C      A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  2  Setup file default.  Used with PCAL = 1MHz
LO sum= 1668.00 1668.00 1668.00 1668.00
BBC fr=  732.00 732.00  732.00  732.00
Bandwd=  16.00 16.00  16.00  16.00
Matching frequency sets:  2

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(Date)	Error (mas)	
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 56.431650	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 40.65096	0.00
	fake circumpolar target for a TS to look at			
* 1504-166	15 04 16.415562	* 15 07 04.786961	15 08 00.648264	0.00
J1507-1652	-16 40 59.36701	*-16 52 30.26713	-16 56 10.54971	0.00
	./rk12tw_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 1595 observations, RA-A03-04, RA-A02-12			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
1504-166	148.4

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

**rk12tztr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/L-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.

Early: Seconds between end of slew and start.    Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are LO sum (band edge).

SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST        EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Thu    7 Apr 2016    Day 98 ---

----- C-band VLBI scans -----

Next scan frequencies: 4836.00 4836.00 4836.00 4836.00  
Next BBC frequencies:    736.00    736.00    736.00    736.00  
Next scan bandwidths:    16.00    16.00    16.00    16.00

18 00 00	1055+018	08 20 01	28.8	133.1	-2.7	-26.0	0	0	18 00 00
18 14 30	---	08 34 33	30.3	136.8	-2.4	-24.3	870	28	18 00 01
18 15 00	1055+018	08 35 03	30.4	137.0	-2.4	-24.2	24	28	18 15 00
18 29 30	---	08 49 35	31.8	140.9	-2.2	-22.3	870	56	18 15 01
18 30 00	1055+018	08 50 05	31.9	141.0	-2.2	-22.2	24	56	18 30 00
18 44 30	---	09 04 38	33.2	145.0	-1.9	-20.1	870	84	18 30 01
18 45 00	1055+018	09 05 08	33.2	145.2	-1.9	-20.1	24	84	18 45 00
19 00 00	---	09 20 10	34.4	149.4	-1.7	-17.8	900	112	18 45 01

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra6cm2.set

Setup group:    1	Station: TORUN	Total bit rate:    256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor:    1.00

Disk used to record data.

1st LO=	4100.00	4100.00	4100.00	4100.00
Net SB=	L	L	U	U
IF SB =	U	U	U	U
Pol. =	RCP	LCP	RCP	LCP
BBC =	1	2	1	2
BBC SB=	L	L	U	U
IF =	C	A	C	A

The following frequency sets based on these setups were used.

Frequency Set: 2 Setup file default. Used with PCAL = 1MHz  
 LO sum= 4836.00 4836.00 4836.00 4836.00  
 BBC fr= 736.00 736.00 736.00 736.00  
 Bandwd= 16.00 16.00 16.00 16.00  
 Matching frequency sets: 2

Track assignments are:

track1= 2, 18, 3, 19  
 barrel=roll\_off

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 56.365436	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 40.87379	0.00
	fake circumpolar target for a TS to look at			
* 1055+018	10 55 55.313729	* 10 58 29.605207	10 59 20.576408	0.00
J1058+0133	01 50 03.53709	* 01 33 58.82359	01 28 36.03258	0.00
	./rk12tz_sources.radioastron AGN, rfc_2013d Petrov, 2013, unpublished 8183 observations, RA-A03-04, RA-A02-12			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
1055+018	146.8

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

**rk12uatr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: K-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST       EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Thu    7 Apr 2016    Day 98 ---

----- K-band VLBI scans -----

Next scan frequencies:	22236.00	22236.00	22236.00	22236.00							
Next BBC frequencies:	736.00	736.00	736.00	736.00							
Next scan bandwidths:	16.00	16.00	16.00	16.00							
23 00 00	0851+202	13 20 50	30.1	263.6	4.4		39.4	0	0	23 00 00	
23 14 30	---	13 35 22	27.9	266.6	4.7		39.6	870	28	23 00 01	
23 15 00	0851+202	13 35 52	27.8	266.7	4.7		39.7	24	28	23 15 00	
23 29 30	---	13 50 25	25.6	269.7	4.9		39.7	870	56	23 15 01	
23 30 00	0851+202	13 50 55	25.6	269.8	4.9		39.7	24	56	23 30 00	
23 44 30	---	14 05 27	23.4	272.6	5.2		39.7	870	84	23 30 01	
23 45 00	0851+202	14 05 57	23.3	272.7	5.2		39.7	24	84	23 45 00	
23 59 59	---	14 21 00	21.1	275.7	5.4		39.5	899	112	23 45 01	

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra1cm2.set

Matching groups in ./rk12ua\_freq.dat:

tr1cm

Setup group:    3	Station: TORUN	Total bit rate:    256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor:    1.00

Disk used to record data.

```

1st LO= 21500.00 21500.00 21500.00 21500.00
Net SB=      L      L      U      U
IF SB =      U      U      U      U
Pol.  =      RCP     LCP     RCP     LCP
BBC   =      1      2      1      2
BBC SB=      L      L      U      U
IF    =      C      A      C      A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  2  Setup file default.  Used with PCAL = 1MHz
LO sum= 22236.00 22236.00 22236.00 22236.00
BBC fr=  736.00  736.00  736.00  736.00
Bandwd=  16.00  16.00  16.00  16.00
Matching frequency sets:  2

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 56.344310	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 40.93864	0.00
	fake circumpolar target for a TS to look at			
* 0851+202	08 51 57.250618	* 08 54 48.874930	08 55 44.786979	0.00
J0854+2006	20 17 58.41733	* 20 06 30.64078	20 02 38.33382	0.00
OJ287	./rk12ua_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 213710 observations, RA-A03-04, RA-A03-			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

```

Source      Sun distance (deg)
0851+202    112.1

```

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

```

1.6 GHz      45. deg
2.3 GHz      36. deg
5.0 GHz      23. deg
8.4 GHz      17. deg
15.0 GHz     12. deg
22.0 GHz     9. deg

```

M81 JET FINE-STRUCTURE IMAGING  
PI: M. Bietenholz

Address: Hartebeesthoek Radio Astronomy Observatory

Observing mode: L-band, dual-pol  
Schedule for TORUN (Code Tr )

Page 2

M81 jet fine-structure imaging

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start. Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

```
-----
Start UT  Source          Start / Stop      Early  Disk  TPStart
Stop UT          LST    EL    AZ    HA  UP    ParA  Dwell  GBytes  SYNC
-----
```

```
--- Fri   8 Apr 2016   Day 99 ---
----- Ground-only segment 01 -----
```

```
Next scan frequencies: 1668.00 1668.00 1668.00 1668.00
Next BBC frequencies:   632.00  632.00  632.00  632.00
Next scan bandwidths:   16.00   16.00   16.00   16.00
```

```
04 30 00 0951+693    18 51 44 36.7 -18.9 8.9    32.8    0    0    04 30 00
04 39 30 ---          19 01 16 36.3 -18.0 9.1    31.1   570    18    04 30 01

04 40 00 0951+693    19 01 46 36.2 -17.9 9.1    31.0    25    18    04 40 00
04 49 30 ---          19 11 17 35.8 -17.0 9.2    29.3   570    37    04 40 01

04 50 00 0951+693    19 11 47 35.8 -16.9 9.2    29.2    24    37    04 50 00
04 59 30 ---          19 21 19 35.4 -16.0 9.4    27.5   570    55    04 50 01
```

```
----- Space-ground segment 01 -----
```

```
05 00 00 0951+693    19 21 49 35.4 -16.0 9.4    27.5    24    55    05 00 00
05 17 00 ---          19 38 52 34.7 -14.3 9.7    24.4  1020    87    05 00 01

05 17 30 0951+693    19 39 22 34.7 -14.2 9.7    24.3    24    87    05 17 30
05 34 10 ---          19 56 05 34.1 -12.6 10.0   21.4  1000   120    05 17 31

05 34 40 0951+693    19 56 35 34.1 -12.5 10.0   21.3    24   120    05 34 40
05 51 20 ---          20 13 17 33.6 -10.8 10.3   18.3  1000   152    05 34 41

05 51 50 0951+693    20 13 47 33.5 -10.8 10.3   18.3    24   152    05 51 50
06 08 30 ---          20 30 30 33.1  -9.1 10.6   15.3  1000   184    05 51 51

06 09 00 0951+693    20 31 00 33.1  -9.0 10.6   15.2    24   184    06 09 00
06 25 40 ---          20 47 43 32.7  -7.3 10.8   12.3  1000   216    06 09 01

06 26 10 0951+693    20 48 13 32.7  -7.2 10.9   12.2    24   216    06 26 10
06 42 50 ---          21 04 56 32.5  -5.5 11.1    9.2  1000   248    06 26 11

06 43 20 0951+693    21 05 26 32.5  -5.4 11.1    9.1    24   248    06 43 20
07 00 00 ---          21 22 09 32.3  -3.7 11.4    6.2  1000   280    06 43 21
```

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
 ===== Setup file: ra18cm2.set

Setup group:	5	Station:	TORUN	Total bit rate:	256
Format:	MARK5B	Bits per sample:	2	Sample rate:	32.000
Number of channels:	4	DBE type:	DBBC_DDC	Speedup factor:	1.00

Disk used to record data.

1st LO=	2300.00	2300.00	2300.00	2300.00
Net SB=	U	U	L	L
IF SB =	L	L	L	L
Pol. =	RCP	LCP	RCP	LCP
BBC =	1	5	1	5
BBC SB=	L	L	U	U
IF =	A1	B1	A1	B1

The following frequency sets based on these setups were used.

Frequency Set: 7 Setup file default. Used with PCAL = 1MHz  
 LO sum= 1668.00 1668.00 1668.00 1668.00  
 BBC fr= 632.00 632.00 632.00 632.00  
 Bandwd= 16.00 16.00 16.00 16.00  
 Matching frequency sets: 7

Track assignments are:  
 track1= 6, 8, 2, 4  
 barrel=roll\_off

POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 56.318488	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 41.01473	0.00
	fake circumpolar target for a TS to look at			
* 0951+693	09 51 27.310821	* 09 55 33.173065	09 56 52.951694	0.00
J0955+6903	69 18 08.14417	* 69 03 55.06083	68 59 23.10908	0.00
M81	./eb055a_sources.radioastron			
	rfc_2013d Petrov, 2013, unpublished 3429 observations, RA-A03-07			

M81 JET FINE-STRUCTURE IMAGING  
PI: M. Bietenholz

Address: Hartebeesthoek Radio Astronomy Observatory

Observing mode: L-band, dual-pol  
Schedule for TORUN (Code Tr )

Page 2

M81 jet fine-structure imaging

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are LO sum (band edge).

SYNC: Time correlator is expected to sync up.

```
-----
Start UT  Source                Start / Stop          Early  Disk  TPStart
Stop UT                LST   EL   AZ   HA  UP   ParA  Dwell  GBytes  SYNC
-----
```

--- Fri 8 Apr 2016 Day 99 ---

----- Ground-only segment 01: EB055B -----

```
Next scan frequencies: 1668.00 1668.00 1668.00 1668.00
Next BBC frequencies:   632.00  632.00  632.00  632.00
Next scan bandwidths:   16.00   16.00   16.00   16.00
```

```
11 00 00 0951+693    01 22 48 37.8 20.8 -8.6   -36.5    0      0   11 00 00
11 09 30 ---          01 32 20 38.3 21.6 -8.4   -38.2   570    18   11 00 01

11 10 00 0951+693    01 32 50 38.3 21.7 -8.4   -38.2   25     18   11 10 00
11 19 30 ---          01 42 21 38.8 22.5 -8.2   -39.9   570    37   11 10 01
```

----- Space-ground segment 01: EB055B -----

```
11 20 00 0951+693    01 42 51 38.9 22.6 -8.2   -40.0   24     37   11 20 00
11 37 55 ---          02 00 49 39.9 24.1 -7.9   -43.2  1075    71   11 20 01

11 38 25 0951+693    02 01 19 40.0 24.2 -7.9   -43.3   24     71   11 38 25
11 56 20 ---          02 19 17 41.1 25.7 -7.6   -46.5  1075   105   11 38 26

11 56 50 0951+693    02 19 47 41.1 25.7 -7.6   -46.6   24    105   11 56 50
12 14 45 ---          02 37 45 42.3 27.2 -7.3   -49.9  1075   140   11 56 51

12 15 15 0951+693    02 38 15 42.4 27.2 -7.3   -50.0   24    140   12 15 15
12 33 10 ---          02 56 13 43.6 28.6 -7.0   -53.2  1075   174   12 15 16

12 33 40 0951+693    02 56 43 43.7 28.6 -7.0   -53.3   24    174   12 33 40
12 51 35 ---          03 14 41 45.0 29.9 -6.7   -56.6  1075   209   12 33 41

12 52 05 0951+693    03 15 11 45.0 29.9 -6.7   -56.7   24    209   12 52 05
13 10 00 ---          03 33 09 46.4 31.1 -6.4   -60.0  1075   243   12 52 06
```

----- Ground-only segment 02: EB055B -----

```
13 10 30 0951+693    03 33 40 46.4 31.2 -6.4   -60.1   24    243   13 10 30
13 20 00 ---          03 43 11 47.2 31.8 -6.2   -61.9   570    262   13 10 31

13 20 30 0951+693    03 43 41 47.2 31.8 -6.2   -62.0   24    262   13 20 30
13 30 00 ---          03 53 13 48.0 32.4 -6.1   -63.8   570    280   13 20 31
```



SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
 ===== Setup file: ra18cm2.set

Setup group:	5	Station:	TORUN	Total bit rate:	256
Format:	MARK5B	Bits per sample:	2	Sample rate:	32.000
Number of channels:	4	DBE type:	DBBC_DDC	Speedup factor:	1.00

Disk used to record data.

1st LO=	2300.00	2300.00	2300.00	2300.00
Net SB=	U	U	L	L
IF SB =	L	L	L	L
Pol. =	RCP	LCP	RCP	LCP
BBC =	1	5	1	5
BBC SB=	L	L	U	U
IF =	A1	B1	A1	B1

The following frequency sets based on these setups were used.

Frequency Set: 7 Setup file default. Used with PCAL = 1MHz  
 LO sum= 1668.00 1668.00 1668.00 1668.00  
 BBC fr= 632.00 632.00 632.00 632.00  
 Bandwd= 16.00 16.00 16.00 16.00  
 Matching frequency sets: 7

Track assignments are:  
 track1= 6, 8, 2, 4  
 barrel=roll\_off

POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 56.288040	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 41.10066	0.00
	fake circumpolar target for a TS to look at			
* 0951+693	09 51 27.310821	* 09 55 33.173065	09 56 52.937845	0.00
J0955+6903	69 18 08.14417	* 69 03 55.06083	68 59 23.16084	0.00
M81	./eb055b_sources.radioastron			
	rfc_2013d Petrov, 2013, unpublished 3429 observations, RA-A03-07			

**eb055ctr**

M81 JET FINE-STRUCTURE IMAGING  
PI: M. Bietenholz

Address: Hartebeesthoek Radio Astronomy Observatory

Observing mode: L-band, dual-pol  
Schedule for TORUN (Code Tr )

Page 2

M81 jet fine-structure imaging

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start. Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

-----  
Start UT Source Start / Stop Early Disk TPStart  
Stop UT LST EL AZ HA UP ParA Dwell GBytes SYNC  
-----

--- Fri 8 Apr 2016 Day 99 ---

----- Ground-only segment 01: EB055C fringe finder -----

Next scan frequencies: 1668.00 1668.00 1668.00 1668.00  
Next BBC frequencies: 632.00 632.00 632.00 632.00  
Next scan bandwidths: 16.00 16.00 16.00 16.00

16 00 00	0954+658	06 23 37	60.9	43.7	-3.6	-88.7	0	0	16 00 00
16 09 30	---	06 33 09	61.9	43.7	-3.4	-90.8	570	18	16 00 01

----- Ground-only segment 01: EB055C M81 -----

16 10 00	0951+693	06 33 39	61.9	36.2	-3.4	-98.3	0	18	16 10 00
16 19 30	---	06 43 11	62.8	35.9	-3.2	-100.7	570	37	16 10 01

16 20 00	0951+693	06 43 41	62.8	35.9	-3.2	-100.9	24	37	16 20 00
16 29 30	---	06 53 12	63.7	35.5	-3.1	-103.5	570	55	16 20 01

16 30 00	0951+693	06 53 42	63.7	35.5	-3.1	-103.6	24	55	16 30 00
16 39 30	---	07 03 14	64.5	35.0	-2.9	-106.3	570	73	16 30 01

16 40 00	0951+693	07 03 44	64.6	34.9	-2.9	-106.4	24	73	16 40 00
16 49 30	---	07 13 15	65.4	34.3	-2.7	-109.2	570	91	16 40 01

----- Ground-only segment 01: EB055C fringe finder -----

16 50 00	0954+658	07 13 46	66.1	42.7	-2.8	-100.9	-2	91	16 50 00
16 59 30	---	07 23 17	67.0	42.2	-2.6	-103.6	568	110	16 50 01

----- Space-ground segment 01: EB055C fringe finder -----

17 00 00	0954+658	07 23 47	67.1	42.2	-2.6	-103.7	24	110	17 00 00
17 11 00	---	07 34 49	68.2	41.4	-2.4	-107.0	660	131	17 00 01

----- ground only scan: EB055C M81 -----

17 11 30	0951+693	07 35 19	67.2	32.4	-2.4	-116.1	-3	131	17 11 30
17 14 30	---	07 38 20	67.5	32.1	-2.3	-117.1	177	137	17 11 31

----- Space-ground segment 01: EB055C M81 -----

17 15 00	0951+693	07 38 50	67.5	32.1	-2.3	-117.2	24	137	17 15 00
17 31 20	---	07 55 12	68.8	30.1	-2.0	-122.9	980	168	17 15 01

17 31 50	0951+693	07 55 42	68.8	30.0	-2.0	-123.1	24	168	17 31 50
17 48 30	---	08 12 25	70.0	27.5	-1.7	-129.3	1000	200	17 31 51

Schedule for TORUN (Code Tr ) Page 3

M81 jet fine-structure imaging

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

```
-----
Start UT  Source          Start / Stop          Early  Disk  TPStart
Stop UT   LST      EL  AZ  HA  UP  ParA Dwell  GBytes  SYNC
-----
```

--- Fri 8 Apr 2016 Day 99 ---

```
17 49 00 0951+693    08 12 55  70.1  27.4 -1.7   -129.5   24    200  17 49 00
18 05 40 ---          08 29 38  71.1  24.3 -1.5   -136.3  1000    232  17 49 01

18 06 10 0951+693    08 30 08  71.2  24.2 -1.4   -136.5   24    232  18 06 10
18 22 50 ---          08 46 51  72.1  20.6 -1.2   -143.9  1000    264  18 06 11

18 23 20 0951+693    08 47 21  72.2  20.5 -1.2   -144.1   24    264  18 23 20
18 40 00 ---          09 04 04  73.0  16.2 -0.9   -152.1  1000    296  18 23 21
```

----- Ground-only segment 02: EB055C -----

```
18 40 30 0951+693    09 04 34  73.0  16.1 -0.9   -152.3   24    296  18 40 30
18 50 00 ---          09 14 05  73.3  13.4 -0.7   -157.1   570    314  18 40 31

18 50 30 0951+693    09 14 35  73.4  13.3 -0.7   -157.4   24    314  18 50 30
19 00 00 ---          09 24 07  73.7  10.5 -0.5   -162.3   570    333  18 50 31
```

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

==== Setup file: ra18cm2.set

```
Setup group:    7          Station: TORUN          Total bit rate:  256
Format: MARK5B          Bits per sample:  2          Sample rate: 32.000
Number of channels:  4    DBE type: DBBC_DDC          Speedup factor:  1.00
```

Disk used to record data.

```

1st LO= 2300.00 2300.00 2300.00 2300.00
Net SB=      U      U      L      L
IF SB =      L      L      L      L
Pol.  =      RCP     LCP     RCP     LCP
BBC   =      1      5      1      5
BBC SB=      L      L      U      U
IF    =      A1     B1     A1     B1
    
```

The following frequency sets based on these setups were used.

```

Frequency Set: 7 Setup file default. Used with PCAL = 1MHz
LO sum= 1668.00 1668.00 1668.00 1668.00
BBC fr= 632.00 632.00 632.00 632.00
Bandwd= 16.00 16.00 16.00 16.00
Matching frequency sets: 7
    
```

```

Track assignments are:
track1= 6, 8, 2, 4
barrel=roll_off
    
```

POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 56.264164	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 41.16562	0.00
	fake circumpolar target for a TS to look at			
* 0951+693	09 51 27.310821	* 09 55 33.173065	09 56 52.927330	0.00
J0955+6903	69 18 08.14417	* 69 03 55.06083	68 59 23.19931	0.00
M81	./eb055c_sources.radioastron			
	rfc_2013d Petrov, 2013, unpublished 3429 observations, RA-A03-07			
* 0954+658	09 54 57.847936	* 09 58 47.245116	10 00 01.772321	0.00
J0958+6533	65 48 15.53882	* 65 33 54.81801	65 29 19.82966	0.00
	./eb055c_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 13350 observations, fringe-finder and c			

M81 JET FINE-STRUCTURE IMAGING  
 PI: M. Bietenholz

Address: Hartebeesthoek Radio Astronomy Observatory

Observing mode: L-band, dual-pol  
 Schedule for TORUN (Code Tr )

Page 2

M81 jet fine-structure imaging

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
 Early: Seconds between end of slew and start. Dwell: On source seconds.  
 Disk: GBytes recorded to this point.  
 TPStart: Recording start time. Frequencies are LO sum (band edge).  
 SYNC: Time correlator is expected to sync up.

```
-----
Start UT  Source          Start / Stop          Early  Disk  TPStart
Stop UT          LST    EL    AZ    HA  UP    ParA  Dwell  GBytes  SYNC
-----
```

```
--- Sat   9 Apr 2016   Day 100 ---
----- Ground-only segment 01: EB055D M81 -----
```

```
Next scan frequencies: 1668.00 1668.00 1668.00 1668.00
Next BBC frequencies:   632.00  632.00  632.00  632.00
Next scan bandwidths:   16.00   16.00   16.00   16.00
```

```
00 30 00 0951+693    14 55 01  53.5 -35.5  5.0      76.7    0      0    00 30 00
00 39 30 ---          15 04 33  52.7 -35.2  5.1      74.7   570     18    00 30 01

00 39 30 0951+693    15 04 33  52.7 -35.2  5.1      74.7    -5     18    No stop
00 49 00 ---          15 14 04  51.9 -34.8  5.3      72.8   565     37    00 39 31
```

```
----- Ground-only segment 01: EB055D fringe-finder -----
```

```
00 49 30 0954+658    15 14 34  51.0 -40.2  5.2      69.2    4     37    00 49 30
00 59 00 ---          15 24 06  50.0 -39.6  5.4      67.4   570     55    00 49 31
```

```
----- Space-ground segment 01: EB055D fringe finder -----
```

```
01 00 00 0954+658    15 25 06  49.9 -39.6  5.4      67.3   54     55    01 00 00
01 11 00 ---          15 36 08  48.9 -38.9  5.6      65.3   660     76    01 00 01
```

```
----- ground only scan: EB055D M81 -----
```

```
01 11 30 0951+693    15 36 38  49.9 -33.7  5.7      68.4    5     76    01 11 30
01 14 30 ---          15 39 38  49.7 -33.6  5.7      67.8   180     82    01 11 31
```

```
----- Space-ground segment 01: EB055D M81 -----
```

```
01 15 00 0951+693    15 40 09  49.7 -33.5  5.7      67.7   24     82    01 15 00
01 33 20 ---          15 58 32  48.2 -32.5  6.0      64.2  1100    117    01 15 01
```

```
01 33 50 0951+693    15 59 02  48.1 -32.5  6.0      64.1   24    117    01 33 50
01 52 40 ---          16 17 55  46.6 -31.3  6.4      60.5  1130    153    01 33 51
```

```
01 53 10 0951+693    16 18 25  46.6 -31.3  6.4      60.4   24    153    01 53 10
02 12 00 ---          16 37 18  45.1 -30.0  6.7      56.9  1130    189    01 53 11
```

```
02 12 30 0951+693    16 37 48  45.1 -30.0  6.7      56.8   24    189    02 12 30
02 31 20 ---          16 56 41  43.7 -28.6  7.0      53.4  1130    226    02 12 31
```

```
02 31 50 0951+693    16 57 11  43.7 -28.6  7.0      53.3   24    226    02 31 50
02 50 40 ---          17 16 04  42.3 -27.2  7.3      49.9  1130    262    02 31 51
```

Schedule for TORUN (Code Tr ) Page 3

M81 jet fine-structure imaging

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are LO sum (band edge).

SYNC: Time correlator is expected to sync up.

```
-----
Start UT  Source          Start / Stop          Early  Disk  TPStart
Stop UT   LST      EL  AZ  HA  UP  ParA  Dwell  GBytes  SYNC
-----
```

--- Sat 9 Apr 2016 Day 100 ---

----- Ground-only segment 02: EB055D -----

02 51 10	0951+693	17 16 34	42.3	-27.1	7.3	49.8	24	262	02 51 10
03 10 00	---	17 35 27	41.0	-25.6	7.6	46.4	1130	298	02 51 11
03 10 30	0951+693	17 35 57	41.0	-25.6	7.7	46.3	24	298	03 10 30
03 20 00	---	17 45 29	40.4	-24.8	7.8	44.6	570	316	03 10 31
03 20 30	0951+693	17 45 59	40.4	-24.7	7.8	44.5	24	316	03 20 30
03 30 00	---	17 55 31	39.8	-23.9	8.0	42.8	570	335	03 20 31

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

==== Setup file: ra18cm2.set

Setup group: 8	Station: TORUN	Total bit rate: 256
Format: MARK5B	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type: DBBC_DDC	Speedup factor: 1.00

Disk used to record data.

```

1st LO= 2300.00 2300.00 2300.00 2300.00
Net SB=      U      U      L      L
IF SB =      L      L      L      L
Pol.  =      RCP     LCP     RCP     LCP
BBC   =      1      5      1      5
BBC SB=      L      L      U      U
IF    =      A1     B1     A1     B1
    
```

The following frequency sets based on these setups were used.

```

Frequency Set: 7 Setup file default. Used with PCAL = 1MHz
LO sum= 1668.00 1668.00 1668.00 1668.00
BBC fr= 632.00 632.00 632.00 632.00
Bandwd= 16.00 16.00 16.00 16.00
Matching frequency sets: 7
    
```

```

Track assignments are:
track1= 6, 8, 2, 4
barrel=roll_off
    
```

POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 56.222953	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 41.27366	0.00
	fake circumpolar target for a TS to look at			
* 0951+693	09 51 27.310821	* 09 55 33.173065	09 56 52.909809	0.00
J0955+6903	69 18 08.14417	* 69 03 55.06083	68 59 23.26210	0.00
M81	./eb055d_sources.radioastron			
	rfc_2013d Petrov, 2013, unpublished 3429 observations, RA-A03-07			
* 0954+658	09 54 57.847936	* 09 58 47.245116	10 00 01.757596	0.00
J0958+6533	65 48 15.53882	* 65 33 54.81801	65 29 19.89276	0.00
	./eb055d_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 13350 observations, fringe-finder and c			





```

1st LO=  4100.00  4100.00  4100.00  4100.00
Net SB=           L           L           U           U
IF SB =           U           U           U           U
Pol.  =          RCP          LCP          RCP          LCP
BBC   =           1           2           1           2
BBC SB=           L           L           U           U
IF    =           C           A           C           A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  2  Setup file default.  Used with PCAL = 1MHz
LO sum=  4836.00  4836.00  4836.00  4836.00
BBC fr=   736.00   736.00   736.00   736.00
Bandwd=   16.00   16.00   16.00   16.00
Matching frequency sets:  2

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 56.122348	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 41.52274	0.00
	fake circumpolar target for a TS to look at			
* 0951+693	09 51 27.310821	* 09 55 33.173065	09 56 52.869724	0.00
J0955+6903	69 18 08.14417	* 69 03 55.06083	68 59 23.40218	0.00
M81	./rk12ub_sources.radioastron			
	rfc_2013d Petrov, 2013, unpublished 3429 observations, RA-A03-07			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

```

Source      Sun distance (deg)
0951+693    95.7

```

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

```

1.6 GHz      45. deg
2.3 GHz      36. deg
5.0 GHz      23. deg
8.4 GHz      17. deg
15.0 GHz     12. deg
22.0 GHz     9. deg

```

**rk12uctr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/L-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST       EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Sun 10 Apr 2016    Day 101 ---

----- C-band VLBI scans -----

Next scan frequencies:	4836.00	4836.00	4836.00	4836.00							
Next BBC frequencies:	736.00	736.00	736.00	736.00							
Next scan bandwidths:	16.00	16.00	16.00	16.00							
07 00 00	0951+693	21 30 02	32.2	-2.8	11.6		4.8	0	0	07 00 00	
07 14 30	---	21 44 34	32.1	-1.3	11.8		2.2	870	28	07 00 01	
07 15 00	0951+693	21 45 04	32.1	-1.2	11.8		2.1	24	28	07 15 00	
07 29 30	---	21 59 37	32.1	0.3-12.0			-0.5	870	56	07 15 01	
07 30 00	0951+693	22 00 07	32.1	0.3-11.9			-0.6	24	56	07 30 00	
07 44 30	---	22 14 39	32.1	1.9-11.7			-3.1	870	84	07 30 01	
07 45 00	0951+693	22 15 09	32.1	1.9-11.7			-3.2	24	84	07 45 00	
08 00 00	---	22 30 12	32.2	3.5-11.4			-5.9	900	112	07 45 01	

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra6cm2.set

Setup group:	1	Station:	TORUN	Total bit rate:	256
Format:	MKIV1:4	Bits per sample:	2	Sample rate:	32.000
Number of channels:	4	DBE type:		Speedup factor:	1.00

Disk used to record data.

```

1st LO=  4100.00  4100.00  4100.00  4100.00
Net SB=           L           L           U           U
IF SB =           U           U           U           U
Pol.  =          RCP          LCP          RCP          LCP
BBC   =           1           2           1           2
BBC SB=           L           L           U           U
IF    =           C           A           C           A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  2  Setup file default.  Used with PCAL = 1MHz
LO sum=  4836.00  4836.00  4836.00  4836.00
BBC fr=   736.00   736.00   736.00   736.00
Bandwd=   16.00   16.00   16.00   16.00
Matching frequency sets:  2

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(Date)	Error (mas)	
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 56.074344	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 41.63777	0.00
	fake circumpolar target for a TS to look at			
* 0951+693	09 51 27.310821	* 09 55 33.173065	09 56 52.851608	0.00
J0955+6903	69 18 08.14417	* 69 03 55.06083	68 59 23.46540	0.00
M81	./rk12uc_sources.radioastron			
	rfc_2013d Petrov, 2013, unpublished 3429 observations, RA-A03-07			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
0951+693	95.5

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

**rk12udtr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                              Profsoyuznaya 84/32                              117997 Moscow, Russia  
Phone:    +7-495-3332512                              EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                              Phone during observation: +7-903-6614865

Observing mode: C/L-band, dual-pol

Schedule for TORUN                              (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

```
-----  
Start UT    Source                              Start / Stop                              Early    Disk    TPStart  
Stop UT                              LST        EL    AZ    HA   UP    ParA   Dwell   GBytes   SYNC  
-----
```

--- Sun 10 Apr 2016 Day 101 ---

----- C-band VLBI scans -----

```
Next scan frequencies: 4836.00 4836.00 4836.00 4836.00  
Next BBC frequencies:  736.00  736.00  736.00  736.00  
Next scan bandwidths:  16.00  16.00  16.00  16.00
```

15 00 00	0829+046	05 31 21	28.9	125.9	-3.0		-29.2	0	0	15 00 00
15 12 00	---	05 43 23	30.3	129.0	-2.8		-27.9	720	23	15 00 01
15 12 30	0829+046	05 43 53	30.4	129.1	-2.8		-27.9	24	23	15 12 30
15 24 30	---	05 55 55	31.7	132.2	-2.6		-26.5	720	46	15 12 31
15 25 00	0829+046	05 56 25	31.8	132.3	-2.6		-26.4	24	46	15 25 00
15 37 00	---	06 08 27	33.1	135.5	-2.4		-24.9	720	69	15 25 01
15 37 30	0829+046	06 08 57	33.1	135.7	-2.4		-24.9	24	69	15 37 30
15 50 00	---	06 21 29	34.4	139.1	-2.2		-23.2	750	93	15 37 31

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

===== Setup file: ra6cm2.set

```
Setup group:     2                              Station: TORUN                              Total bit rate:    256  
Format: MKIV1:4                              Bits per sample: 2                              Sample rate: 32.000  
Number of channels: 4                              DBE type:                                              Speedup factor:    1.00
```

Disk used to record data.

```

1st LO=  4100.00  4100.00  4100.00  4100.00
Net SB=           L           L           U           U
IF SB =           U           U           U           U
Pol.  =          RCP          LCP          RCP          LCP
BBC   =           1           2           1           2
BBC SB=           L           L           U           U
IF    =           C           A           C           A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  2  Setup file default.  Used with PCAL = 1MHz
LO sum=  4836.00  4836.00  4836.00  4836.00
BBC fr=   736.00   736.00   736.00   736.00
Bandwd=   16.00   16.00   16.00   16.00
Matching frequency sets:  2

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 56.037028	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 41.72691	0.00
	fake circumpolar target for a TS to look at			
* 0829+046	08 29 10.894139	* 08 31 48.876958	08 32 40.339709	0.00
J0831+0429	04 39 50.82946	* 04 29 39.08580	04 26 05.86010	0.00
	./rk12ud_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 1604 observations, RA-A03-04			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

```

Source      Sun distance (deg)
0829+046    107.7

```

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

```

1.6 GHz      45. deg
2.3 GHz      36. deg
5.0 GHz      23. deg
8.4 GHz      17. deg
15.0 GHz     12. deg
22.0 GHz     9. deg

```

**rk12uftr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/L-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST       EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Sun 10 Apr 2016    Day 101 ---

----- C-band VLBI scans -----

Next scan frequencies:	4836.00	4836.00	4836.00	4836.00							
Next BBC frequencies:	736.00	736.00	736.00	736.00							
Next scan bandwidths:	16.00	16.00	16.00	16.00							
23 00 00	1502+106	13 32 39	43.5	147.8	-1.5		-19.0	0	0	23 00 00	
23 12 00	---	13 44 41	44.4	151.7	-1.3		-16.8	720	23	23 00 01	
23 12 30	1502+106	13 45 12	44.4	151.9	-1.3		-16.7	24	23	23 12 30	
23 24 30	---	13 57 13	45.2	155.9	-1.1		-14.4	720	46	23 12 31	
23 25 00	1502+106	13 57 44	45.2	156.1	-1.1		-14.3	24	46	23 25 00	
23 37 00	---	14 09 46	45.9	160.2	-0.9		-11.9	720	69	23 25 01	
23 37 30	1502+106	14 10 16	45.9	160.4	-0.9		-11.8	24	69	23 37 30	
23 50 00	---	14 22 48	46.5	164.8	-0.7		-9.2	750	93	23 37 31	

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra6cm2.set

Setup group:	2	Station:	TORUN	Total bit rate:	256
Format:	MKIV1:4	Bits per sample:	2	Sample rate:	32.000
Number of channels:	4	DBE type:		Speedup factor:	1.00

Disk used to record data.

```

1st LO=  4100.00  4100.00  4100.00  4100.00
Net SB=           L           L           U           U
IF SB =           U           U           U           U
Pol.  =          RCP          LCP          RCP          LCP
BBC   =           1           2           1           2
BBC SB=           L           L           U           U
IF    =           C           A           C           A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  2  Setup file default.  Used with PCAL = 1MHz
LO sum=  4836.00  4836.00  4836.00  4836.00
BBC fr=   736.00  736.00  736.00  736.00
Bandwd=   16.00  16.00  16.00  16.00
Matching frequency sets:  2

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(Date)	Error (mas)	
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 56.000513	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 41.81468	0.00
	fake circumpolar target for a TS to look at			
* 1502+106	15 02 00.157714	* 15 04 24.979783	15 05 13.003157	0.00
J1504+1029	10 41 17.73982	* 10 29 39.19840	10 25 51.98833	0.00
	./rk12uf_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 15421 observations, RA-A03-04, RA-A02-1			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

```

Source          Sun distance (deg)
1502+106        147.7

```

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

```

1.6 GHz        45. deg
2.3 GHz        36. deg
5.0 GHz        23. deg
8.4 GHz        17. deg
15.0 GHz       12. deg
22.0 GHz        9. deg

```

**rk12ugtr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
 Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
 Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/L-band, dual-pol

Schedule for TORUN            (Code Tr )    Page    2  
                                       RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
 Early: Seconds between end of slew and start.    Dwell: On source seconds.  
 Disk: GBytes recorded to this point.  
 TPStart: Recording start time. Frequencies are LO sum (band edge).  
 SYNC: Time correlator is expected to sync up.

---

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC

---

--- Mon 11 Apr 2016    Day 102 ---

----- C-band VLBI scans -----

Next scan frequencies: 4836.00 4836.00 4836.00 4836.00  
 Next BBC frequencies: 736.00 736.00 736.00 736.00  
 Next scan bandwidths: 16.00 16.00 16.00 16.00

03 10 00	1442+101	17 43 21	34.1	236.2	3.0		30.4	0	0	03 10 00
03 22 00	---	17 55 22	32.6	239.3	3.2		31.6	720	23	03 10 01
03 22 30	1442+101	17 55 53	32.5	239.4	3.2		31.6	24	23	03 22 30
03 34 30	---	18 07 55	30.9	242.3	3.4		32.7	720	46	03 22 31
03 35 00	1442+101	18 08 25	30.9	242.5	3.4		32.7	24	46	03 35 00
03 47 00	---	18 20 27	29.3	245.3	3.6		33.6	720	69	03 35 01
03 47 30	1442+101	18 20 57	29.2	245.4	3.6		33.7	24	69	03 47 30
04 00 00	---	18 33 29	27.5	248.3	3.8		34.5	750	93	03 47 31

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

==== Setup file: ra6cm2.set

Setup group:    2	Station: TORUN	Total bit rate: 256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor: 1.00

Disk used to record data.



```

1st LO=  4100.00  4100.00  4100.00  4100.00
Net SB=           L           L           U           U
IF SB =           U           U           U           U
Pol.  =          RCP          LCP          RCP          LCP
BBC   =           1           2           1           2
BBC SB=           L           L           U           U
IF    =           C           A           C           A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  3  Setup file default.  Used with PCAL = 1MHz
LO sum=  4836.00  4836.00  4836.00  4836.00
BBC fr=   736.00   736.00   736.00   736.00
Bandwd=   16.00   16.00   16.00   16.00
Matching frequency sets:  3

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 55.982820	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 41.85763	0.00
	fake circumpolar target for a TS to look at			
* 1442+101	14 42 50.483804	* 14 45 16.465253	14 46 04.902197	0.00
J1445+0958	10 11 12.14439	* 09 58 36.07265	09 54 29.89533	0.00
QQ172	./rk12ug_sources.radioastron			
	AGN, HIGHz, rfc_2013d Petrov, 2013, unpublished 1336 observations, RA-A03-04, RA			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

```

Source      Sun distance (deg)
1442+101    151.8

```

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

```

1.6 GHz      45. deg
2.3 GHz      36. deg
5.0 GHz      23. deg
8.4 GHz      17. deg
15.0 GHz     12. deg
22.0 GHz     9. deg

```

**rk12uhtr**

RADIOASTRON AGN SURVEY  
PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/L-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST       EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Mon 11 Apr 2016    Day 102 ---

----- C-band VLBI scans -----

Next scan frequencies:	4836.00	4836.00	4836.00	4836.00						
Next BBC frequencies:	736.00	736.00	736.00	736.00						
Next scan bandwidths:	16.00	16.00	16.00	16.00						
19 00 00	0951+693	09 35 57	73.9	6.8	-0.3		-168.6	0	0	19 00 00
19 14 30	---	09 50 29	74.1	2.1	-0.1		-176.5	870	28	19 00 01
19 15 00	0951+693	09 50 59	74.1	1.9	-0.1		-176.8	24	28	19 15 00
19 29 30	---	10 05 31	74.1	-2.8	0.1		175.3	870	56	19 15 01
19 30 00	0951+693	10 06 02	74.1	-3.0	0.2		175.0	24	56	19 30 00
19 44 30	---	10 20 34	73.9	-7.6	0.4		167.1	870	84	19 30 01
19 45 00	0951+693	10 21 04	73.9	-7.8	0.4		166.9	24	84	19 45 00
20 00 00	---	10 36 06	73.5	-12.4	0.7		158.9	900	112	19 45 01

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra6cm2.set

Setup group:	1	Station:	TORUN	Total bit rate:	256
Format:	MKIV1:4	Bits per sample:	2	Sample rate:	32.000
Number of channels:	4	DBE type:		Speedup factor:	1.00

Disk used to record data.

```

1st LO=  4100.00  4100.00  4100.00  4100.00
Net SB=           L           L           U           U
IF SB =           U           U           U           U
Pol.  =          RCP          LCP          RCP          LCP
BBC   =           1           2           1           2
BBC SB=           L           L           U           U
IF    =           C           A           C           A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  2  Setup file default.  Used with PCAL = 1MHz
LO sum=  4836.00  4836.00  4836.00  4836.00
BBC fr=   736.00   736.00   736.00   736.00
Bandwd=   16.00   16.00   16.00   16.00
Matching frequency sets:  2

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 55.914107	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 42.02884	0.00
	fake circumpolar target for a TS to look at			
* 0951+693	09 51 27.310821	* 09 55 33.173065	09 56 52.793286	0.00
J0955+6903	69 18 08.14417	* 69 03 55.06083	68 59 23.68134	0.00
M81	./rk12uh_sources.radioastron			
	rfc_2013d Petrov, 2013, unpublished 3429 observations, RA-A03-07			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
0951+693	94.6

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

rk12ujtr

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev	Profsoyuznaya 84/32	117997 Moscow, Russia
Phone: +7-495-3332512	EMAIL: kirx@scan.sai.msu.ru	
Fax: +7-495-3332378	Phone during observation: +7-903-6614865	

Observing mode: C/L-band, dual-pol

Schedule for TORUN (Code Tr ) Page 2  
 RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
 Early: Seconds between end of slew and start. Dwell: On source seconds.  
 Disk: GBytes recorded to this point.  
 TPStart: Recording start time. Frequencies are L0 sum (band edge).  
 SYNC: Time correlator is expected to sync up.

---

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC

---

--- Tue 12 Apr 2016 Day 103 ---

----- C-band VLBI scans -----

Next scan frequencies:	4836.00	4836.00	4836.00	4836.00
Next BBC frequencies:	736.00	736.00	736.00	736.00
Next scan bandwidths:	16.00	16.00	16.00	16.00

03 00 00	1502+036	17 37 15	31.4	225.8	2.5	25.6	0	0	03 00 00
03 14 30	---	17 51 48	29.8	229.6	2.8	27.3	870	28	03 00 01
03 15 00	1502+036	17 52 18	29.7	229.7	2.8	27.3	24	28	03 15 00
03 29 30	---	18 06 50	28.0	233.4	3.0	28.9	870	56	03 15 01
03 30 00	1502+036	18 07 20	27.9	233.5	3.0	28.9	24	56	03 30 00
03 44 30	---	18 21 53	26.1	237.0	3.3	30.3	870	84	03 30 01
03 45 00	1502+036	18 22 23	26.1	237.2	3.3	30.4	24	84	03 45 00
04 00 00	---	18 37 25	24.1	240.7	3.5	31.6	900	112	03 45 01

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

==== Setup file: ra6cm2.set

Setup group: 3	Station: TORUN	Total bit rate: 256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor: 1.00

Disk used to record data.

1st LO=	4100.00	4100.00	4100.00	4100.00
Net SB=	L	L	U	U
IF SB =	U	U	U	U
Pol. =	RCP	LCP	RCP	LCP
BBC =	1	2	1	2
BBC SB=	L	L	U	U
IF =	C	A	C	A

The following frequency sets based on these setups were used.

Frequency Set: 4 Setup file default. Used with PCAL = 1MHz  
 LO sum= 4836.00 4836.00 4836.00 4836.00  
 BBC fr= 736.00 736.00 736.00 736.00  
 Bandwd= 16.00 16.00 16.00 16.00  
 Matching frequency sets: 4

Track assignments are:

track1= 2, 18, 3, 19  
 barrel=roll\_off

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 55.881711	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 42.11298	0.00
	fake circumpolar target for a TS to look at			
* 1502+036	15 02 35.669002	* 15 05 06.477156	15 05 56.508045	0.00
J1505+0326	03 38 07.37337	* 03 26 30.81249	03 22 45.22294	0.00
	./rk12uj_sources.radioastron AGN, MASIV, rfc_2013d Petrov, 2013, unpublished 5451 observations, RA-A03-04, RA			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
1502+036	151.8

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

## 6.7 GHz CH3OH MASERS AND S255

PI: *Alberto Sanna*

Address: Max-Planck-Institut fuer Radioastronomie

Observing mode: Phase referencing obs. of 1 source at 6.7 GHz

Schedule for TORUN (Code Tr )

Page 2

6.7 GHz CH3OH masers and S255

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are LO sum (band edge).

SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC
-----										
--- Tue 12 Apr 2016 Day 103 ---										
Next scan frequencies:		6664.49	6664.49	6664.49	6664.49	6664.49	6668.49	6668.49	6668.49	6668.49
		6672.49	6672.49	6672.49	6672.49	6672.49	6676.49	6676.49	6676.49	6676.49
Next BBC frequencies:		764.49	764.49	764.49	764.49	764.49	768.49	768.49	768.49	768.49
		772.49	772.49	772.49	772.49	772.49	776.49	776.49	776.49	776.49
Next scan bandwidths:		2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
		2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
-----										
09 00 00	0234+285	23 38 15	49.2	108.2	-3.0		-40.6	0	0	09 00 00
09 10 00	---	23 48 16	50.6	110.8	-2.8		-39.9	600	10	09 00 01
09 10 40	0234+285	23 48 56	50.7	111.0	-2.8		-39.8	34	10	09 10 40
09 25 00	---	00 03 19	52.7	114.9	-2.6		-38.5	860	23	09 10 41
09 25 40	0234+285	00 03 59	52.8	115.1	-2.6		-38.4	34	23	09 25 40
09 40 00	---	00 18 21	54.7	119.3	-2.3		-36.7	860	37	09 25 41
09 40 40	0234+285	00 19 01	54.8	119.5	-2.3		-36.6	34	37	09 40 40
09 55 00	---	00 33 24	56.6	124.1	-2.1		-34.6	860	51	09 40 41
09 55 40	0234+285	00 34 04	56.7	124.3	-2.1		-34.5	34	51	09 55 40
10 10 00	---	00 48 26	58.4	129.2	-1.8		-32.1	860	65	09 55 41
10 10 40	0234+285	00 49 06	58.5	129.4	-1.8		-32.0	34	65	10 10 40
10 25 00	---	01 03 29	60.1	134.7	-1.6		-29.1	860	79	10 10 41
10 25 40	0234+285	01 04 09	60.2	135.0	-1.6		-29.0	33	79	10 25 40
10 40 00	---	01 18 31	61.6	140.7	-1.3		-25.7	860	92	10 25 41
10 40 40	0234+285	01 19 11	61.7	141.0	-1.3		-25.6	33	92	10 40 40
10 55 00	---	01 33 33	63.0	147.2	-1.1		-21.8	860	106	10 40 41
10 58 00	J0530+1331	01 36 34	29.3	107.5	-3.9		-36.1	39	106	10 58 00
11 10 00	---	01 48 36	31.0	110.2	-3.7		-35.4	720	118	10 58 01
11 10 40	J0530+1331	01 49 16	31.1	110.4	-3.7		-35.4	34	118	11 10 40
11 25 00	---	02 03 38	33.1	113.8	-3.5		-34.4	860	131	11 10 41
11 25 40	J0530+1331	02 04 19	33.2	113.9	-3.5		-34.4	34	131	11 25 40
11 40 00	---	02 18 41	35.1	117.4	-3.2		-33.2	860	145	11 25 41
11 40 40	J0530+1331	02 19 21	35.2	117.6	-3.2		-33.2	34	145	11 40 40
11 55 00	---	02 33 43	37.1	121.2	-3.0		-31.9	860	159	11 40 41

Schedule for TORUN (Code Tr )

Page 3

6.7 GHz CH3OH masers and S255

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop					Early	Disk	TPStart		
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC	
-----											
---	Tue 12 Apr 2016	Day 103					---				
11 55 40	J0530+1331	02 34 23	37.2	121.4	-3.0		-31.8	34	159	11 55 40	
12 10 00	---	02 48 46	39.0	125.2	-2.7		-30.3	860	173	11 55 41	
12 10 40	J0530+1331	02 49 26	39.1	125.4	-2.7		-30.2	34	173	12 10 40	
12 25 00	---	03 03 48	40.8	129.4	-2.5		-28.5	860	187	12 10 41	
12 25 40	J0530+1331	03 04 28	40.9	129.6	-2.5		-28.4	34	187	12 25 40	
12 40 00	---	03 18 51	42.5	133.7	-2.2		-26.5	860	200	12 25 41	
12 40 40	J0530+1331	03 19 31	42.6	133.9	-2.2		-26.4	34	200	12 40 40	
12 55 00	---	03 33 53	44.1	138.2	-2.0		-24.3	860	214	12 40 41	
12 55 15	J0530+1331	03 34 08	44.1	138.3	-2.0		-24.2	9	214	12 55 15	
12 59 15	---	03 38 09	44.5	139.6	-1.9		-23.6	240	218	12 55 16	
13 00 28	S255	03 39 22	43.9	124.6	-2.6		-31.3	28	218	13 00 28	
13 02 48	---	03 41 52	44.2	125.3	-2.5		-31.0	140	220	13 00 29	
13 02 48	J0603+1742	03 41 42	45.1	128.2	-2.4		-29.7	-21	220	No stop	
13 05 48	---	03 44 43	45.4	129.1	-2.3		-29.3	159	223	13 02 49	
13 05 48	S255	03 44 43	44.5	126.1	-2.5		-30.7	-20	223	No stop	
13 08 18	---	03 47 13	44.8	126.8	-2.4		-30.4	130	225	13 05 49	
13 08 18	J0603+1742	03 47 13	45.7	129.9	-2.3		-28.9	-21	225	No stop	
13 11 18	---	03 50 14	46.1	130.8	-2.2		-28.5	159	228	13 08 19	
13 11 18	S255	03 50 14	45.2	127.7	-2.4		-30.0	-21	228	No stop	
13 13 48	---	03 52 44	45.5	128.4	-2.4		-29.6	129	231	13 11 19	
13 13 48	J0603+1742	03 52 44	46.4	131.5	-2.2		-28.2	-21	231	No stop	
13 15 18	---	03 54 14	46.5	132.0	-2.2		-27.9	69	232	13 13 49	
13 15 33	J0603+1742	03 54 30	46.6	132.1	-2.2		-27.9	9	232	13 15 33	
13 17 03	---	03 56 00	46.7	132.5	-2.1		-27.7	90	234	13 15 34	
13 17 03	S255	03 56 00	45.9	129.4	-2.3		-29.2	-21	234	No stop	
13 19 33	---	03 58 30	46.2	130.1	-2.3		-28.9	129	236	13 17 04	
13 19 33	J0603+1742	03 58 30	47.0	133.3	-2.1		-27.3	-21	236	No stop	
13 22 33	---	04 01 31	47.3	134.2	-2.0		-26.8	159	239	13 19 34	
13 22 33	S255	04 01 31	46.5	131.0	-2.2		-28.4	-21	239	No stop	
13 25 03	---	04 04 01	46.8	131.8	-2.2		-28.1	129	241	13 22 34	
13 25 03	J0603+1742	04 04 01	47.6	135.0	-2.0		-26.5	-21	241	No stop	
13 28 03	---	04 07 02	47.9	136.0	-2.0		-26.0	159	244	13 25 04	

Schedule for TORUN (Code Tr )

Page 4

6.7 GHz CH3OH masers and S255

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC
-----										
--- Tue 12 Apr 2016 Day 103 ---										
13 28 03	S255	04 07 02	47.1	132.7	-2.1		-27.6	-21	244	No stop
13 30 33	---	04 09 32	47.4	133.5	-2.1		-27.3	129	247	13 28 04
13 30 33	J0603+1742	04 09 32	48.2	136.8	-1.9		-25.6	-21	247	No stop
13 32 03	---	04 11 02	48.3	137.3	-1.9		-25.3	69	248	13 30 34
13 32 18	J0603+1742	04 11 17	48.4	137.4	-1.9		-25.3	9	248	13 32 18
13 33 48	---	04 12 48	48.5	137.8	-1.9		-25.0	90	250	13 32 19
13 33 48	S255	04 12 48	47.7	134.5	-2.0		-26.7	-21	250	No stop
13 36 18	---	04 15 18	48.0	135.3	-2.0		-26.4	129	252	13 33 49
13 36 18	J0603+1742	04 15 18	48.8	138.7	-1.8		-24.6	-22	252	No stop
13 39 18	---	04 18 18	49.1	139.7	-1.8		-24.1	158	255	13 36 19
13 39 18	S255	04 18 18	48.3	136.3	-1.9		-25.9	-21	255	No stop
13 41 48	---	04 20 49	48.6	137.1	-1.9		-25.5	129	257	13 39 19
13 41 48	J0603+1742	04 20 49	49.3	140.5	-1.7		-23.6	-22	257	No stop
13 44 48	---	04 23 49	49.6	141.5	-1.7		-23.1	158	260	13 41 49
13 44 48	S255	04 23 49	48.9	138.1	-1.8		-24.9	-21	260	No stop
13 47 18	---	04 26 20	49.1	138.9	-1.8		-24.5	129	262	13 44 49
13 47 18	J0603+1742	04 26 20	49.8	142.4	-1.6		-22.6	-22	262	No stop
13 48 48	---	04 27 50	49.9	142.9	-1.6		-22.4	68	264	13 47 19
13 49 03	J0603+1742	04 28 05	50.0	143.0	-1.6		-22.3	9	264	13 49 03
13 50 33	---	04 29 35	50.1	143.5	-1.6		-22.0	90	265	13 49 04
13 50 33	S255	04 29 35	49.5	140.0	-1.7		-23.9	-21	265	No stop
13 53 03	---	04 32 06	49.7	140.8	-1.7		-23.5	129	268	13 50 34
13 53 03	J0603+1742	04 32 06	50.3	144.3	-1.5		-21.6	-22	268	No stop
13 56 03	---	04 35 06	50.6	145.4	-1.5		-21.0	158	271	13 53 04
13 56 03	S255	04 35 06	50.0	141.9	-1.6		-23.0	-22	271	No stop
13 58 33	---	04 37 37	50.2	142.7	-1.6		-22.5	128	273	13 56 04
13 58 33	J0603+1742	04 37 37	50.8	146.3	-1.4		-20.5	-22	273	No stop
14 01 33	---	04 40 37	51.0	147.3	-1.4		-19.9	158	276	13 58 34
14 01 33	S255	04 40 37	50.5	143.7	-1.6		-21.9	-22	276	No stop
14 04 03	---	04 43 07	50.7	144.6	-1.5		-21.4	128	278	14 01 34



Schedule for TORUN (Code Tr )

Page 5

6.7 GHz CH3OH masers and S255

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC
--- Tue 12 Apr 2016 Day 103 ---										
14 05 23	J0530+1331	04 44 28	49.3	162.2	-0.8		-10.9	30	278	14 05 23
14 09 13	---	04 48 28	49.5	163.6	-0.7		-10.0	230	282	14 05 24
14 10 32	S255	04 49 38	51.3	146.9	-1.4		-20.2	30	282	14 10 32
14 12 52	---	04 52 08	51.5	147.8	-1.4		-19.7	140	284	14 10 33
14 12 52	J0603+1742	04 51 58	51.9	151.4	-1.2		-17.5	-22	284	No stop
14 15 52	---	04 54 59	52.1	152.6	-1.2		-16.9	158	287	14 12 53
14 15 52	S255	04 54 59	51.7	148.8	-1.3		-19.1	-22	287	No stop
14 18 22	---	04 57 29	51.9	149.8	-1.3		-18.5	128	290	14 15 53
14 18 22	J0603+1742	04 57 29	52.3	153.5	-1.1		-16.3	-23	290	No stop
14 21 22	---	05 00 30	52.5	154.6	-1.1		-15.7	157	292	14 18 23
14 21 22	S255	05 00 30	52.1	150.9	-1.2		-17.9	-22	292	No stop
14 23 52	---	05 03 00	52.3	151.8	-1.2		-17.4	128	295	14 21 23
14 23 52	J0603+1742	05 03 00	52.7	155.6	-1.0		-15.1	-23	295	No stop
14 25 22	---	05 04 30	52.7	156.1	-1.0		-14.8	67	296	14 23 53
14 25 37	J0603+1742	05 04 45	52.8	156.2	-1.0		-14.7	9	296	14 25 37
14 27 07	---	05 06 16	52.9	156.8	-1.0		-14.4	90	298	14 25 38
14 27 07	S255	05 06 16	52.5	153.0	-1.1		-16.7	-22	298	No stop
14 29 37	---	05 08 46	52.7	153.9	-1.1		-16.1	128	300	14 27 08
14 29 37	J0603+1742	05 08 46	53.0	157.8	-0.9		-13.8	-23	300	No stop
14 32 37	---	05 11 46	53.2	158.9	-0.9		-13.1	157	303	14 29 38
14 32 37	S255	05 11 46	52.9	155.1	-1.0		-15.4	-22	303	No stop
14 35 07	---	05 14 17	53.0	156.0	-1.0		-14.9	128	305	14 32 38
14 35 07	J0603+1742	05 14 17	53.3	159.9	-0.8		-12.5	-23	305	No stop
14 38 07	---	05 17 17	53.4	161.1	-0.8		-11.8	157	308	14 35 08
14 38 07	S255	05 17 17	53.2	157.2	-0.9		-14.2	-22	308	No stop
14 40 37	---	05 19 48	53.3	158.1	-0.9		-13.6	128	311	14 38 08
14 40 37	J0603+1742	05 19 48	53.6	162.1	-0.7		-11.2	-23	311	No stop
14 42 07	---	05 21 18	53.6	162.6	-0.7		-10.8	67	312	14 40 38
14 42 22	J0603+1742	05 21 33	53.6	162.7	-0.7		-10.8	9	312	14 42 22
14 43 52	---	05 23 03	53.7	163.3	-0.7		-10.4	90	314	14 42 23

Schedule for TORUN (Code Tr )

Page 6

6.7 GHz CH3OH masers and S255

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC
-----										
--- Tue 12 Apr 2016 Day 103 ---										
14 43 52	S255	05 23 03	53.5	159.4	-0.8		-12.8	-22	314	No stop
14 46 22	---	05 25 34	53.6	160.4	-0.8		-12.2	128	316	14 43 53
14 46 22	J0603+1742	05 25 34	53.8	164.3	-0.6		-9.8	-23	316	No stop
14 49 22	---	05 28 34	53.9	165.5	-0.6		-9.1	157	319	14 46 23
14 49 22	S255	05 28 34	53.8	161.6	-0.8		-11.5	-23	319	No stop
14 51 52	---	05 31 05	53.9	162.6	-0.7		-10.9	127	321	14 49 23
14 51 52	J0603+1742	05 31 05	54.0	166.5	-0.6		-8.4	-23	321	No stop
14 54 52	---	05 34 05	54.1	167.7	-0.5		-7.7	157	324	14 51 53
14 54 52	S255	05 34 05	54.0	163.8	-0.7		-10.2	-23	324	No stop
14 57 22	---	05 36 36	54.1	164.8	-0.6		-9.5	127	327	14 54 53
14 57 22	J0603+1742	05 36 36	54.2	168.8	-0.5		-7.1	-23	327	No stop
14 58 52	---	05 38 06	54.2	169.4	-0.4		-6.7	67	328	14 57 23
14 59 07	J0603+1742	05 38 21	54.2	169.5	-0.4		-6.6	9	328	14 59 07
15 00 37	---	05 39 51	54.3	170.1	-0.4		-6.2	90	329	14 59 08
15 00 37	S255	05 39 51	54.3	166.1	-0.6		-8.7	-23	329	No stop
15 03 07	---	05 42 21	54.4	167.1	-0.5		-8.1	127	332	15 00 38
15 03 07	J0603+1742	05 42 21	54.4	171.1	-0.4		-5.6	-23	332	No stop
15 06 07	---	05 45 22	54.4	172.3	-0.3		-4.8	157	335	15 03 08
15 06 07	S255	05 45 22	54.4	168.3	-0.5		-7.4	-23	335	No stop
15 08 37	---	05 47 52	54.5	169.3	-0.4		-6.7	127	337	15 06 08
15 08 37	J0603+1742	05 47 52	54.5	173.3	-0.3		-4.2	-23	337	No stop
15 11 37	---	05 50 53	54.5	174.6	-0.2		-3.4	157	340	15 08 38
15 11 37	S255	05 50 53	54.6	170.5	-0.4		-6.0	-23	340	No stop
15 14 07	---	05 53 23	54.7	171.6	-0.3		-5.3	127	342	15 11 38
15 15 32	J0530+1331	05 54 48	50.2	188.7	0.4		5.4	36	342	15 15 32
15 19 22	---	05 58 49	50.1	190.2	0.4		6.3	230	346	15 15 33
15 20 45	S255	06 00 02	54.8	174.3	-0.2		-3.6	36	346	15 20 45
15 23 05	---	06 02 33	54.8	175.3	-0.2		-2.9	140	348	15 20 46
15 23 05	J0603+1742	06 02 23	54.6	179.3	-0.0		-0.4	-23	348	No stop
15 26 05	---	06 05 23	54.6	180.5	0.0		0.3	157	351	15 23 06

Schedule for TORUN (Code Tr )

Page 7

6.7 GHz CH3OH masers and S255

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC
-----										
--- Tue 12 Apr 2016 Day 103 ---										
15 26 05	S255	06 05 23	54.8	176.5	-0.1		-2.2	-23	351	No stop
15 28 35	---	06 07 54	54.9	177.5	-0.1		-1.6	127	354	15 26 06
15 28 35	J0603+1742	06 07 54	54.6	181.6	0.1		1.0	-23	354	No stop
15 31 35	---	06 10 54	54.6	182.8	0.1		1.8	157	357	15 28 36
15 31 35	S255	06 10 54	54.9	178.8	-0.0		-0.8	-23	357	No stop
15 34 05	---	06 13 25	54.9	179.8	-0.0		-0.1	127	359	15 31 36
15 34 05	J0603+1742	06 13 25	54.6	183.8	0.2		2.4	-23	359	No stop
15 35 35	---	06 14 55	54.5	184.4	0.2		2.8	67	360	15 34 06
15 35 50	J0603+1742	06 15 10	54.5	184.5	0.2		2.9	9	360	15 35 50
15 37 20	---	06 16 40	54.5	185.2	0.2		3.3	90	362	15 35 51
15 37 20	S255	06 16 40	54.9	181.2	0.0		0.7	-23	362	No stop
15 39 50	---	06 19 10	54.9	182.2	0.1		1.4	127	364	15 37 21
15 39 50	J0603+1742	06 19 10	54.5	186.2	0.3		3.9	-23	364	No stop
15 42 50	---	06 22 11	54.4	187.4	0.3		4.7	157	367	15 39 51
15 42 50	S255	06 22 11	54.8	183.4	0.1		2.2	-23	367	No stop
15 45 20	---	06 24 41	54.8	184.5	0.2		2.8	127	370	15 42 51
15 45 20	J0603+1742	06 24 41	54.4	188.4	0.3		5.3	-23	370	No stop
15 48 20	---	06 27 42	54.3	189.7	0.4		6.1	157	372	15 45 21
15 48 20	S255	06 27 42	54.8	185.7	0.2		3.6	-22	372	No stop
15 50 50	---	06 30 12	54.7	186.8	0.3		4.3	128	375	15 48 21
15 50 50	J0603+1742	06 30 12	54.2	190.7	0.4		6.7	-23	375	No stop
15 52 20	---	06 31 43	54.2	191.3	0.5		7.1	67	376	15 50 51
15 52 35	J0603+1742	06 31 58	54.2	191.4	0.5		7.2	9	376	15 52 35
15 54 05	---	06 33 28	54.1	192.0	0.5		7.5	90	378	15 52 36
15 54 05	S255	06 33 28	54.7	188.1	0.3		5.1	-22	378	No stop
15 56 35	---	06 35 58	54.6	189.1	0.4		5.7	128	380	15 54 06
15 56 35	J0603+1742	06 35 58	54.1	193.0	0.5		8.2	-23	380	No stop
15 59 35	---	06 38 59	54.0	194.2	0.6		8.9	157	383	15 56 36
15 59 35	S255	06 38 59	54.5	190.3	0.4		6.5	-22	383	No stop
16 02 05	---	06 41 29	54.5	191.4	0.5		7.1	128	385	15 59 36

Schedule for TORUN (Code Tr )

Page 8

6.7 GHz CH3OH masers and S255

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC
-----										
--- Tue 12 Apr 2016 Day 103 ---										
16 02 05	J0603+1742	06 41 29	53.9	195.2	0.6		9.5	-23	385	No stop
16 05 05	---	06 44 30	53.7	196.4	0.7		10.3	157	388	16 02 06
16 05 05	S255	06 44 30	54.4	192.6	0.5		7.9	-22	388	No stop
16 07 35	---	06 47 00	54.3	193.6	0.6		8.5	128	391	16 05 06
16 07 35	J0603+1742	06 47 00	53.6	197.4	0.7		10.9	-23	391	No stop
16 09 05	---	06 48 30	53.6	198.0	0.7		11.2	67	392	16 07 36
16 09 20	J0603+1742	06 48 45	53.5	198.1	0.7		11.3	9	392	16 09 20
16 10 50	---	06 50 16	53.5	198.7	0.8		11.6	90	394	16 09 21
16 10 50	S255	06 50 16	54.2	194.9	0.6		9.3	-22	394	No stop
16 13 20	---	06 52 46	54.1	195.9	0.6		10.0	128	396	16 10 51
16 13 20	J0603+1742	06 52 46	53.4	199.7	0.8		12.2	-23	396	No stop
16 16 20	---	06 55 46	53.2	200.8	0.9		13.0	157	399	16 13 21
16 16 20	S255	06 55 46	53.9	197.1	0.7		10.7	-22	399	No stop
16 18 50	---	06 58 17	53.8	198.1	0.7		11.3	128	401	16 16 21
16 18 50	J0603+1742	06 58 17	53.1	201.8	0.9		13.5	-22	401	No stop
16 21 50	---	07 01 17	52.9	203.0	1.0		14.2	158	404	16 18 51
16 21 50	S255	07 01 17	53.7	199.3	0.8		12.0	-22	404	No stop
16 24 20	---	07 03 48	53.6	200.3	0.8		12.6	128	407	16 21 51
16 25 45	J0530+1331	07 05 13	46.3	213.9	1.6		20.2	43	407	16 25 45
16 29 35	---	07 09 14	46.0	215.2	1.6		20.9	230	410	16 25 46
16 30 57	S255	07 10 26	53.2	202.8	0.9		14.2	41	410	16 30 57
16 33 17	---	07 12 56	53.0	203.8	1.0		14.8	140	412	16 30 58
16 33 17	J0603+1742	07 12 46	52.2	207.3	1.1		16.8	-22	412	No stop
16 36 17	---	07 15 47	51.9	208.4	1.2		17.4	158	415	16 33 18
16 36 17	S255	07 15 47	52.9	204.9	1.0		15.4	-22	415	No stop
16 38 47	---	07 18 17	52.7	205.8	1.1		16.0	128	418	16 36 18
16 38 47	J0603+1742	07 18 17	51.8	209.3	1.2		18.0	-22	418	No stop
16 41 47	---	07 21 18	51.5	210.4	1.3		18.6	158	421	16 38 48
16 41 47	S255	07 21 18	52.5	207.0	1.1		16.6	-21	421	No stop
16 44 17	---	07 23 48	52.3	207.9	1.2		17.2	129	423	16 41 48

Schedule for TORUN (Code Tr )

Page 9

6.7 GHz CH3OH masers and S255

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC
-----										
--- Tue 12 Apr 2016 Day 103 ---										
16 44 17	J0603+1742	07 23 48	51.3	211.3	1.3		19.1	-22	423	No stop
16 45 47	---	07 25 18	51.2	211.9	1.4		19.4	68	425	16 44 18
16 46 02	J0603+1742	07 25 33	51.2	212.0	1.4		19.5	9	425	16 46 02
16 47 32	---	07 27 03	51.1	212.5	1.4		19.8	90	426	16 46 03
16 47 32	S255	07 27 03	52.1	209.1	1.2		17.9	-21	426	No stop
16 50 02	---	07 29 34	51.9	210.0	1.3		18.4	129	428	16 47 33
16 50 02	J0603+1742	07 29 34	50.9	213.4	1.4		20.3	-22	428	No stop
16 53 02	---	07 32 34	50.6	214.4	1.5		20.9	158	431	16 50 03
16 53 02	S255	07 32 34	51.7	211.1	1.3		19.0	-21	431	No stop
16 55 32	---	07 35 05	51.5	212.0	1.4		19.6	129	434	16 53 03
16 55 32	J0603+1742	07 35 05	50.4	215.3	1.5		21.4	-21	434	No stop
16 58 32	---	07 38 05	50.2	216.4	1.6		21.9	159	437	16 55 33
16 58 32	S255	07 38 05	51.2	213.1	1.4		20.2	-21	437	No stop
17 01 02	---	07 40 36	51.0	214.0	1.4		20.7	129	439	16 58 33
17 01 02	J0603+1742	07 40 36	49.9	217.2	1.6		22.4	-21	439	No stop
17 02 32	---	07 42 06	49.8	217.7	1.6		22.7	69	440	17 01 03
17 02 47	J0603+1742	07 42 21	49.8	217.8	1.6		22.7	9	440	17 02 47
17 04 17	---	07 43 51	49.6	218.3	1.7		23.0	90	442	17 02 48
17 04 17	S255	07 43 51	50.8	215.1	1.5		21.3	-21	442	No stop
17 06 47	---	07 46 22	50.5	216.0	1.5		21.8	129	444	17 04 18
17 06 47	J0603+1742	07 46 22	49.4	219.2	1.7		23.5	-21	444	No stop
17 09 47	---	07 49 22	49.1	220.2	1.8		24.0	159	447	17 06 48
17 09 47	S255	07 49 22	50.3	217.1	1.6		22.4	-21	447	No stop
17 12 17	---	07 51 53	50.0	217.9	1.6		22.8	129	450	17 09 48
17 12 17	J0603+1742	07 51 53	48.9	221.0	1.8		24.4	-21	450	No stop
17 15 17	---	07 54 53	48.6	222.0	1.8		24.9	159	452	17 12 18
17 15 17	S255	07 54 53	49.8	218.9	1.7		23.4	-20	452	No stop
17 17 47	---	07 57 23	49.5	219.8	1.7		23.8	130	455	17 15 18
17 17 47	J0603+1742	07 57 23	48.3	222.8	1.9		25.4	-21	455	No stop
17 19 17	---	07 58 54	48.1	223.3	1.9		25.6	69	456	17 17 48

Schedule for TORUN (Code Tr )

Page 10

6.7 GHz CH3OH masers and S255

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC
-----										
--- Tue 12 Apr 2016 Day 103 ---										
17 19 32	J0603+1742	07 59 09	48.1	223.4	1.9		25.7	9	456	17 19 32
17 21 02	---	08 00 39	48.0	223.9	1.9		25.9	90	458	17 19 33
17 21 02	S255	08 00 39	49.2	220.9	1.8		24.4	-20	458	No stop
17 23 32	---	08 03 09	49.0	221.7	1.8		24.8	130	460	17 21 03
17 23 32	J0603+1742	08 03 09	47.7	224.7	2.0		26.3	-21	460	No stop
17 26 32	---	08 06 10	47.4	225.6	2.0		26.8	159	463	17 23 33
17 26 32	S255	08 06 10	48.7	222.7	1.9		25.3	-20	463	No stop
17 29 02	---	08 08 40	48.4	223.5	1.9		25.8	130	465	17 26 33
17 29 02	J0603+1742	08 08 40	47.1	226.4	2.1		27.2	-20	465	No stop
17 32 02	---	08 11 41	46.8	227.3	2.1		27.6	160	468	17 29 03
17 32 02	S255	08 11 41	48.1	224.5	2.0		26.2	-20	468	No stop
17 34 32	---	08 14 11	47.8	225.2	2.0		26.6	130	471	17 32 03
17 35 48	J0530+1331	08 15 27	38.9	234.9	2.7		30.4	29	471	17 35 48
17 39 38	---	08 19 28	38.4	236.0	2.8		30.8	230	474	17 35 49
17 40 50	S255	08 20 31	47.1	227.2	2.1		27.6	26	474	17 40 50
17 43 10	---	08 23 01	46.9	228.0	2.2		28.0	140	477	17 40 51
17 43 10	J0603+1742	08 22 51	45.5	230.7	2.3		29.2	-20	477	No stop
17 46 10	---	08 25 51	45.2	231.6	2.4		29.6	160	479	17 43 11
17 46 10	S255	08 25 51	46.5	228.9	2.2		28.4	-20	479	No stop
17 48 40	---	08 28 22	46.3	229.6	2.2		28.7	130	482	17 46 11
17 48 40	J0603+1742	08 28 22	44.9	232.3	2.4		29.9	-20	482	No stop
17 51 40	---	08 31 22	44.5	233.2	2.5		30.3	160	485	17 48 41
17 51 40	S255	08 31 22	45.9	230.5	2.3		29.2	-19	485	No stop
17 54 10	---	08 33 53	45.6	231.3	2.3		29.5	131	487	17 51 41
17 54 10	J0603+1742	08 33 53	44.2	233.9	2.5		30.6	-20	487	No stop
17 55 40	---	08 35 23	44.0	234.3	2.5		30.8	70	489	17 54 11
17 55 55	J0603+1742	08 35 38	44.0	234.4	2.5		30.8	9	489	17 55 55
17 57 25	---	08 37 08	43.8	234.8	2.6		31.0	90	490	17 55 56
17 57 25	S255	08 37 08	45.2	232.2	2.4		29.9	-19	490	No stop
17 59 55	---	08 39 39	44.9	233.0	2.4		30.3	131	492	17 57 26

Schedule for TORUN (Code Tr )

Page 11

6.7 GHz CH3OH masers and S255

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC
-----										
--- Tue 12 Apr 2016 Day 103 ---										
17 59 55	J0603+1742	08 39 39	43.5	235.5	2.6		31.3	-20	492	No stop
18 02 55	---	08 42 39	43.1	236.4	2.6		31.7	160	495	17 59 56
18 02 55	S255	08 42 39	44.6	233.8	2.5		30.6	-19	495	No stop
18 05 25	---	08 45 10	44.3	234.5	2.5		30.9	131	498	18 02 56
18 05 25	J0603+1742	08 45 10	42.8	237.1	2.7		31.9	-19	498	No stop
18 08 25	---	08 48 10	42.4	237.9	2.7		32.3	161	501	18 05 26
18 08 25	S255	08 48 10	43.9	235.4	2.6		31.3	-19	501	No stop
18 10 55	---	08 50 40	43.6	236.1	2.6		31.6	131	503	18 08 26
18 10 55	J0603+1742	08 50 40	42.1	238.6	2.8		32.5	-19	503	No stop
18 12 25	---	08 52 11	41.9	239.0	2.8		32.7	71	504	18 10 56
18 12 40	J0603+1742	08 52 26	41.9	239.1	2.8		32.7	9	504	18 12 40
18 14 10	---	08 53 56	41.7	239.5	2.8		32.9	90	506	18 12 41
18 14 10	S255	08 53 56	43.2	237.0	2.7		32.0	-19	506	No stop
18 16 40	---	08 56 26	42.9	237.7	2.7		32.3	131	508	18 14 11
18 16 40	J0603+1742	08 56 26	41.4	240.1	2.9		33.1	-19	508	No stop
18 19 40	---	08 59 27	41.0	240.9	2.9		33.4	161	511	18 16 41
18 19 40	S255	08 59 27	42.5	238.5	2.8		32.6	-19	511	No stop
18 22 10	---	09 01 57	42.2	239.2	2.8		32.8	131	514	18 19 41
18 22 10	J0603+1742	09 01 57	40.6	241.6	3.0		33.7	-19	514	No stop
18 25 10	---	09 04 58	40.2	242.4	3.0		33.9	161	517	18 22 11
18 25 10	S255	09 04 58	41.8	240.0	2.9		33.1	-19	517	No stop
18 27 40	---	09 07 28	41.4	240.7	2.9		33.4	131	519	18 25 11
18 27 40	J0603+1742	09 07 28	39.9	243.0	3.1		34.2	-19	519	No stop
18 29 10	---	09 08 58	39.7	243.4	3.1		34.3	71	520	18 27 41
18 29 25	J0603+1742	09 09 14	39.7	243.5	3.1		34.3	9	520	18 29 25
18 30 55	---	09 10 44	39.5	243.8	3.1		34.5	90	522	18 29 26
18 30 55	S255	09 10 44	41.0	241.5	2.9		33.7	-19	522	No stop
18 33 25	---	09 13 14	40.7	242.2	3.0		33.9	131	524	18 30 56
18 33 25	J0603+1742	09 13 14	39.1	244.5	3.2		34.7	-19	524	No stop
18 36 25	---	09 16 15	38.7	245.2	3.2		34.9	161	527	18 33 26

Schedule for TORUN (Code Tr )

Page 12

6.7 GHz CH3OH masers and S255

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC
-----										
--- Tue 12 Apr 2016 Day 103 ---										
18 36 25	S255	09 16 15	40.3	243.0	3.0		34.2	-19	527	No stop
18 38 55	---	09 18 45	39.9	243.6	3.1		34.4	131	529	18 36 26
18 38 55	J0603+1742	09 18 45	38.4	245.9	3.2		35.1	-20	529	No stop
18 41 55	---	09 21 46	38.0	246.6	3.3		35.3	160	532	18 38 56
18 41 55	S255	09 21 46	39.5	244.4	3.1		34.7	-19	532	No stop
18 44 25	---	09 24 16	39.2	245.0	3.2		34.9	131	535	18 41 56
18 45 35	J0530+1331	09 25 26	29.5	252.1	3.9		36.0	20	535	18 45 35
18 49 25	---	09 29 26	29.0	253.0	4.0		36.2	230	538	18 45 36
18 50 34	S255	09 30 25	38.4	246.5	3.3		35.4	20	538	18 50 34
18 52 54	---	09 32 56	38.0	247.2	3.3		35.6	140	541	18 50 35
18 52 54	J0603+1742	09 32 46	36.4	249.3	3.5		36.1	-20	541	No stop
18 55 54	---	09 35 46	36.0	250.0	3.5		36.3	160	544	18 52 55
18 55 54	S255	09 35 46	37.6	247.9	3.4		35.8	-19	544	No stop
18 58 24	---	09 38 16	37.3	248.5	3.4		36.0	131	546	18 55 55
18 58 24	J0603+1742	09 38 16	35.7	250.6	3.6		36.5	-20	546	No stop
19 01 24	---	09 41 17	35.2	251.3	3.6		36.7	160	549	18 58 25
19 01 24	S255	09 41 17	36.8	249.2	3.5		36.2	-19	549	No stop
19 03 54	---	09 43 47	36.5	249.8	3.5		36.3	131	551	19 01 25
19 03 54	J0603+1742	09 43 47	34.9	251.9	3.7		36.8	-20	551	No stop
19 05 24	---	09 45 18	34.7	252.2	3.7		36.9	70	553	19 03 55
19 05 39	J0603+1742	09 45 33	34.6	252.3	3.7		36.9	9	553	19 05 39
19 07 09	---	09 47 03	34.4	252.6	3.7		37.0	90	554	19 05 40
19 07 09	S255	09 47 03	36.0	250.6	3.6		36.5	-20	554	No stop
19 09 39	---	09 49 33	35.7	251.2	3.6		36.7	130	557	19 07 10
19 09 39	J0603+1742	09 49 33	34.1	253.2	3.8		37.1	-20	557	No stop
19 12 39	---	09 52 34	33.6	253.9	3.8		37.3	160	559	19 09 40
19 12 39	S255	09 52 34	35.2	251.9	3.6		36.9	-20	559	No stop
19 15 09	---	09 55 04	34.9	252.4	3.7		37.0	130	562	19 12 40
19 15 09	J0603+1742	09 55 04	33.3	254.5	3.8		37.4	-20	562	No stop
19 18 09	---	09 58 05	32.8	255.1	3.9		37.5	160	565	19 15 10



Schedule for TORUN (Code Tr )

Page 13

6.7 GHz CH3OH masers and S255

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC
-----										
--- Tue 12 Apr 2016 Day 103 ---										
19 18 09	S255	09 58 05	34.5	253.1	3.7		37.2	-20	565	No stop
19 20 39	---	10 00 35	34.1	253.7	3.8		37.3	130	567	19 18 10
19 20 39	J0603+1742	10 00 35	32.5	255.7	3.9		37.6	-20	567	No stop
19 22 09	---	10 02 05	32.2	256.0	4.0		37.7	70	569	19 20 40
19 22 24	J0603+1742	10 02 20	32.2	256.1	4.0		37.7	9	569	19 22 24
19 23 54	---	10 03 51	32.0	256.4	4.0		37.8	90	570	19 22 25
19 23 54	S255	10 03 51	33.6	254.4	3.8		37.5	-20	570	No stop
19 26 24	---	10 06 21	33.3	255.0	3.9		37.6	130	572	19 23 55
19 26 24	J0603+1742	10 06 21	31.6	257.0	4.0		37.9	-20	572	No stop
19 29 24	---	10 09 22	31.2	257.6	4.1		38.0	160	575	19 26 25
19 29 24	S255	10 09 22	32.8	255.7	3.9		37.7	-20	575	No stop
19 31 54	---	10 11 52	32.5	256.2	4.0		37.8	130	578	19 29 25
19 31 54	J0603+1742	10 11 52	30.8	258.2	4.1		38.1	-20	578	No stop
19 34 54	---	10 14 52	30.4	258.8	4.2		38.2	160	581	19 31 55
19 34 54	S255	10 14 52	32.0	256.9	4.0		37.9	-20	581	No stop
19 37 24	---	10 17 23	31.7	257.5	4.1		38.0	130	583	19 34 55
19 37 24	J0603+1742	10 17 23	30.0	259.4	4.2		38.3	-20	583	No stop
19 38 54	---	10 18 53	29.8	259.7	4.2		38.3	70	584	19 37 25
19 39 09	J0603+1742	10 19 08	29.7	259.8	4.3		38.3	9	584	19 39 09
19 40 39	---	10 20 38	29.5	260.1	4.3		38.4	90	586	19 39 10
19 40 39	S255	10 20 38	31.2	258.2	4.1		38.2	-20	586	No stop
19 43 09	---	10 23 09	30.8	258.7	4.2		38.3	130	588	19 40 40
19 43 09	J0603+1742	10 23 09	29.1	260.6	4.3		38.5	-20	588	No stop
19 46 09	---	10 26 09	28.7	261.3	4.4		38.5	160	591	19 43 10
19 46 09	S255	10 26 09	30.4	259.4	4.2		38.4	-20	591	No stop
19 48 39	---	10 28 40	30.0	259.9	4.2		38.4	130	594	19 46 10
19 48 39	J0603+1742	10 28 40	28.3	261.8	4.4		38.6	-20	594	No stop
19 51 39	---	10 31 40	27.9	262.4	4.5		38.7	160	596	19 48 40
19 51 39	S255	10 31 40	29.5	260.6	4.3		38.5	-20	596	No stop
19 54 09	---	10 34 11	29.2	261.1	4.3		38.6	130	599	19 51 40

Schedule for TORUN (Code Tr )

Page 14

6.7 GHz CH3OH masers and S255

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

```
-----
Start UT  Source          Start / Stop          Early   Disk   TPStart
Stop UT          LST      EL   AZ   HA  UP   ParA Dwell  GBytes  SYNC
-----
```

--- Tue 12 Apr 2016 Day 103 ---

```
19 55 20  J0530+1331  10 35 22  19.2 267.0  5.1      38.1   21     599  19 55 20
19 59 10  ---          10 39 23  18.6 267.8  5.1      38.1  230     603  19 55 21
```

## SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

==== Setup file: sess116.M128

```
Setup group:      7          Station: TORUN          Total bit rate:  128
Format: MARK5B    Bits per sample:  2     Sample rate:    4.000
Number of channels: 16    DBE type: DBBC_DDC     Speedup factor:  1.00
```

Disk used to record data.

1st LO=	5900.00	5900.00	5900.00	5900.00	5900.00	5900.00	5900.00	5900.00	5900.00
	5900.00	5900.00	5900.00	5900.00	5900.00	5900.00	5900.00	5900.00	5900.00
Net SB=	L	L	U	U	L	L	U	U	U
	L	L	U	U	L	L	U	U	U
IF SB =	U	U	U	U	U	U	U	U	U
	U	U	U	U	U	U	U	U	U
Pol. =	RCP	LCP	RCP	LCP	RCP	LCP	RCP	LCP	LCP
	RCP	LCP	RCP	LCP	RCP	LCP	RCP	LCP	LCP
BBC =	1	5	1	5	2	6	2	6	6
	3	7	3	7	4	8	4	8	8
BBC SB=	L	L	U	U	L	L	U	U	U
	L	L	U	U	L	L	U	U	U
IF =	A1	B1	A1	B1	A1	B1	A1	B1	B1
	A1	B1	A1	B1	A1	B1	A1	B1	B1

The following frequency sets based on these setups were used.

Frequency Set:	7	Based on FREQ, BW, and/or DOPPLER in schedule. Used with PCAL = off						
LO sum=	6664.49	6664.49	6664.49	6664.49	6668.49	6668.49	6668.49	6668.49
	6672.49	6672.49	6672.49	6672.49	6676.49	6676.49	6676.49	6676.49
BBC fr=	764.49	764.49	764.49	764.49	768.49	768.49	768.49	768.49
	772.49	772.49	772.49	772.49	776.49	776.49	776.49	776.49
Bandwd=	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Matching frequency sets:	7							

Track assignments are:

track1= 18, 26, 2, 10, 20, 28, 4, 12, 22, 30, 6, 14, 24, 32, 8, 16

barrel=roll\_off

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* S255	06 09 58.602173	* 06 12 54.020000	06 13 50.388429	0.00
	18 00 12.98253	* 17 59 23.000000	17 58 53.57034	0.00
	Doppler based on LSR frame and radio definition. Velocities:			
	5.00	5.00	5.00	5.00
	5.00	5.00	5.00	5.00
* J0603+1742	06 00 14.060250	* 06 03 09.130264	06 04 05.348040	0.00
	17 42 24.20529	* 17 42 16.81046	17 42 00.98478	0.00
	Doppler based on other sources.			
* J0530+1331	05 28 06.759218	* 05 30 56.416749	05 31 50.764224	0.00
	13 29 42.28877	* 13 31 55.14944	13 32 23.29273	0.00
	Doppler based on other sources.			
J0237+2848	02 34 55.589591	* 02 37 52.405678	02 38 48.686647	0.11
* 0234+285	28 35 11.40773	* 28 48 08.98998	28 52 09.53687	0.10
J0237+28	/home/guest/rmc/SCHED/sched11.4/catalogs/sources.vlba.2012jul			
	rfc_2012b Petrov, 2012, unpublished 56811 observations			
	Doppler based on other sources			

**rk12untr**

RADIOASTRON AGN SURVEY

PI: Yuri Kovalev

Address: ASC Lebedev Profsoyuznaya 84/32 117997 Moscow, Russia  
Phone: +7-495-3332512 EMAIL: kirx@scan.sai.msu.ru  
Fax: +7-495-3332378 Phone during observation: +7-903-6614865

Observing mode: K-band, dual-pol

Schedule for TORUN (Code Tr ) Page 2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start. Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

```
-----
Start UT   Source                Start / Stop              Early   Disk   TPStart
Stop UT          LST    EL    AZ    HA    UP    ParA Dwell  GBytes SYNC
-----
```

--- Wed 13 Apr 2016 Day 104 ---

----- K-band VLBI scans -----

```
Next scan frequencies: 22236.00 22236.00 22236.00 22236.00
Next BBC frequencies:   736.00   736.00   736.00   736.00
Next scan bandwidths:  16.00   16.00   16.00   16.00

23 00 00 0851+202    13 44 29 26.5 268.5 4.8      39.7   0       0 23 00 00
23 14 30 ---        13 59 02 24.3 271.4 5.1      39.7  870     28 23 00 01

23 15 00 0851+202    13 59 32 24.3 271.5 5.1      39.7   24      28 23 15 00
23 29 30 ---        14 14 04 22.1 274.3 5.3      39.6  870     56 23 15 01

23 30 00 0851+202    14 14 34 22.0 274.4 5.3      39.6   24      56 23 30 00
23 44 30 ---        14 29 06 19.8 277.2 5.6      39.4  870     84 23 30 01

23 45 00 0851+202    14 29 37 19.8 277.3 5.6      39.3   24      84 23 45 00
23 59 59 ---        14 44 39 17.5 280.2 5.8      39.0  899    112 23 45 01
```

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra1cm2.set  
Matching groups in ./rk12un\_freq.dat:  
tr1cm

Setup group: 2 Station: TORUN Total bit rate: 256  
Format: MKIV1:4 Bits per sample: 2 Sample rate: 32.000  
Number of channels: 4 DBE type: Speedup factor: 1.00

Disk used to record data.

```

1st LO= 21500.00 21500.00 21500.00 21500.00
Net SB=          L          L          U          U
IF SB =          U          U          U          U
Pol.  =          RCP         LCP         RCP         LCP
BBC   =          1          2          1          2
BBC SB=          L          L          U          U
IF    =          C          A          C          A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  2  Setup file default.  Used with PCAL = 1MHz
LO sum= 22236.00 22236.00 22236.00 22236.00
BBC fr=  736.00  736.00  736.00  736.00
Bandwd=  16.00  16.00  16.00  16.00
Matching frequency sets:  2

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 55.721222	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 42.57670	0.00
	fake circumpolar target for a TS to look at			
* 0851+202	08 51 57.250618	* 08 54 48.874930	08 55 44.707659	0.00
J0854+2006	20 17 58.41733	* 20 06 30.64078	20 02 38.53673	0.00
OJ287	./rk12un_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 213710 observations, RA-A03-04, RA-A03-			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

```

Source          Sun distance (deg)
0851+202        106.3

```

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

```

1.6 GHz        45. deg
2.3 GHz        36. deg
5.0 GHz        23. deg
8.4 GHz        17. deg
15.0 GHz       12. deg
22.0 GHz        9. deg

```

rk12uotr

RADIOASTRON AGN SURVEY

PI: Yuri Kovalev

Address: ASC Lebedev Profsoyuznaya 84/32 117997 Moscow, Russia
Phone: +7-495-3332512 EMAIL: kirx@scan.sai.msu.ru
Fax: +7-495-3332378 Phone during observation: +7-903-6614865

Observing mode: L-band, dual-pol

Schedule for TORUN (Code Tr) Page 2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.
Early: Seconds between end of slew and start. Dwell: On source seconds.
Disk: GBytes recorded to this point.
TPStart: Recording start time. Frequencies are LO sum (band edge).
SYNC: Time correlator is expected to sync up.

Start UT Source Start / Stop Early Disk TPStart
Stop UT LST EL AZ HA UP ParA Dwell GBytes SYNC

--- Thu 14 Apr 2016 Day 105 ---

----- L-band VLBI scans -----

Next scan frequencies: 1668.00 1668.00 1668.00 1668.00
Next BBC frequencies: 732.00 732.00 732.00 732.00
Next scan bandwidths: 16.00 16.00 16.00 16.00

Table with columns for time, source name, LST, EL, AZ, HA, UP, ParA, Dwell, GBytes, and SYNC. It lists scan times from 23:00:00 to 23:59:59.

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

==== Setup file: ra18cm2.set

Setup group: 4 Station: TORUN Total bit rate: 256
Format: MKIV1:4 Bits per sample: 2 Sample rate: 32.000
Number of channels: 4 DBE type: Speedup factor: 1.00

Disk used to record data.

1st LO=	2400.00	2400.00	2400.00	2400.00
Net SB=	L	L	U	U
IF SB =	L	L	L	L
Pol. =	RCP	LCP	RCP	LCP
BBC =	1	2	1	2
BBC SB=	U	U	L	L
IF =	C	A	C	A

The following frequency sets based on these setups were used.

Frequency Set: 3 Setup file default. Used with PCAL = 1MHz  
 LO sum= 1668.00 1668.00 1668.00 1668.00  
 BBC fr= 732.00 732.00 732.00 732.00  
 Bandwd= 16.00 16.00 16.00 16.00  
 Matching frequency sets: 3

Track assignments are:

track1= 2, 18, 3, 19  
 barrel=roll\_off

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 55.637842	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 42.84529	0.00
	fake circumpolar target for a TS to look at			
* 0851+202	08 51 57.250618	* 08 54 48.874930	08 55 44.694296	0.00
J0854+2006	20 17 58.41733	* 20 06 30.64078	20 02 38.60699	0.00
OJ287	./rk12uo_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 213710 observations, RA-A03-04, RA-A03-			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
0851+202	105.3

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

**rk12uptr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address:	ASC Lebedev	Profsoyuznaya 84/32	117997 Moscow, Russia
Phone:	+7-495-3332512	EMAIL:	kirx@scan.sai.msu.ru
Fax:	+7-495-3332378	Phone during observation:	+7-903-6614865

Observing mode: C/L-band, dual-pol

Schedule for TORUN (Code Tr ) Page 2  
RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start. Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are L0 sum (band edge).  
SYNC: Time correlator is expected to sync up.

---

Start UT	Source	Start / Stop				Early	Disk	TPStart		
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC

---

--- Fri 15 Apr 2016 Day 106 ---

----- L-band VLBI scans -----

Next scan frequencies:	1668.00	1668.00	1668.00	1668.00
Next BBC frequencies:	732.00	732.00	732.00	732.00
Next scan bandwidths:	16.00	16.00	16.00	16.00

03 00 00	1602-115	17 49 05	21.6	207.2	1.7	16.3	0	0	03 00 00
03 14 30	---	18 03 37	20.5	210.8	2.0	18.3	870	28	03 00 01
03 15 00	1602-115	18 04 08	20.5	211.0	2.0	18.4	24	28	03 15 00
03 29 30	---	18 18 40	19.3	214.5	2.2	20.3	870	56	03 15 01
03 30 00	1602-115	18 19 10	19.2	214.6	2.2	20.4	24	56	03 30 00
03 44 30	---	18 33 42	18.0	218.1	2.5	22.3	870	84	03 30 01
03 45 00	1602-115	18 34 12	17.9	218.3	2.5	22.3	24	84	03 45 00
04 00 00	---	18 49 15	16.5	221.8	2.7	24.1	900	112	03 45 01

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

===== Setup file: ra18cm2.set

Setup group: 9	Station: TORUN	Total bit rate: 256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor: 1.00

Disk used to record data.



1st LO=	2400.00	2400.00	2400.00	2400.00
Net SB=	L	L	U	U
IF SB =	L	L	L	L
Pol. =	RCP	LCP	RCP	LCP
BBC =	1	2	1	2
BBC SB=	U	U	L	L
IF =	C	A	C	A

The following frequency sets based on these setups were used.

Frequency Set: 5 Setup file default. Used with PCAL = 1MHz  
 LO sum= 1668.00 1668.00 1668.00 1668.00  
 BBC fr= 732.00 732.00 732.00 732.00  
 Bandwd= 16.00 16.00 16.00 16.00  
 Matching frequency sets: 5

Track assignments are:

track1= 2, 18, 3, 19  
 barrel=roll\_off

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 55.623962	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 42.89075	0.00
	fake circumpolar target for a TS to look at			
* 1602-115	16 02 31.767572	* 16 05 17.531656	16 06 12.435429	0.00
J1605-1139	-11 31 20.63036	*-11 39 26.83121	-11 41 59.44908	0.00
	./rk12up_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 1740 observations, RA-A03-04, RA-A02-12			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
1602-115	142.8

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

**rk12uqtr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev	Profsoyuznaya 84/32	117997 Moscow, Russia
Phone: +7-495-3332512	EMAIL: kirx@scan.sai.msu.ru	
Fax: +7-495-3332378	Phone during observation: +7-903-6614865	

Observing mode: C/K-band, dual-pol

Schedule for TORUN (Code Tr ) Page 2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are LO sum (band edge).

SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop					Early	Disk	TPStart
Stop UT		LST	EL	AZ	HA	UP	ParA Dwell	GBytes	SYNC

--- Fri 15 Apr 2016 Day 106 ---

----- K-band VLBI scans -----

Next scan frequencies:	22236.00	22236.00	22236.00	22236.00					
Next BBC frequencies:	736.00	736.00	736.00	736.00					
Next scan bandwidths:	16.00	16.00	16.00	16.00					

17 00 00	1055+018	07 51 23	25.5	125.9	-3.1		-29.1	0	0	17 00 00
17 14 30	---	08 05 55	27.2	129.5	-2.9		-27.6	870	28	17 00 01
17 15 00	1055+018	08 06 26	27.3	129.6	-2.9		-27.6	24	28	17 15 00
17 29 30	---	08 20 58	28.9	133.3	-2.6		-25.9	870	56	17 15 01
17 30 00	1055+018	08 21 28	28.9	133.4	-2.6		-25.9	24	56	17 30 00
17 44 30	---	08 36 00	30.5	137.2	-2.4		-24.1	870	84	17 30 01
17 45 00	1055+018	08 36 30	30.5	137.4	-2.4		-24.0	24	84	17 45 00
18 00 00	---	08 51 33	32.0	141.4	-2.1		-22.0	900	112	17 45 01

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra1cm2.set

Matching groups in ./rk12uq\_freq.dat:  
tr1cm

Setup group: 7	Station: TORUN	Total bit rate: 256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor: 1.00

Disk used to record data.

```

1st LO= 21500.00 21500.00 21500.00 21500.00
Net SB=      L      L      U      U
IF SB =      U      U      U      U
Pol.  =      RCP     LCP     RCP     LCP
BBC   =      1      2      1      2
BBC SB=      L      L      U      U
IF    =      C      A      C      A

```

The following frequency sets based on these setups were used.

```

Frequency Set: 5 Setup file default. Used with PCAL = 1MHz
LO sum= 22236.00 22236.00 22236.00 22236.00
BBC fr= 736.00 736.00 736.00 736.00
Bandwd= 16.00 16.00 16.00 16.00
Matching frequency sets: 5

```

Track assignments are:

```

track1= 2, 18, 3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 55.574462	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 43.05251	0.00
	fake circumpolar target for a TS to look at			
* 1055+018	10 55 55.313729	* 10 58 29.605207	10 59 20.535196	0.00
J1058+0133	01 50 03.53709	* 01 33 58.82359	01 28 36.04793	0.00
	./rk12uq_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 8183 observations, RA-A03-04, RA-A02-12			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
1055+018	139.1

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

**rk12urtr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/K-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST       EL       AZ       HA    UP       ParA    Dwell    GBytes    SYNC  
-----

--- Fri 15 Apr 2016    Day 106 ---

----- K-band VLBI scans -----

Next scan frequencies:	22236.00	22236.00	22236.00	22236.00							
Next BBC frequencies:	736.00	736.00	736.00	736.00							
Next scan bandwidths:	16.00	16.00	16.00	16.00							
20 00 00	1045-188	10 51 53	17.7	180.7	0.0		0.5	0	0	20 00 00	
20 14 30	---	11 06 25	17.6	184.3	0.3		2.8	870	28	20 00 01	
20 15 00	1045-188	11 06 55	17.5	184.5	0.3		2.8	24	28	20 15 00	
20 29 30	---	11 21 28	17.3	188.0	0.5		5.1	870	56	20 15 01	
20 30 00	1045-188	11 21 58	17.3	188.2	0.6		5.2	24	56	20 30 00	
20 44 30	---	11 36 30	16.9	191.7	0.8		7.4	870	84	20 30 01	
20 45 00	1045-188	11 37 00	16.9	191.9	0.8		7.5	24	84	20 45 00	
21 00 00	---	11 52 03	16.4	195.5	1.1		9.8	900	112	20 45 01	

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra1cm2.set

Matching groups in ./rk12ur\_freq.dat:

tr1cm

Setup group:    10	Station: TORUN	Total bit rate:    256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor:    1.00

Disk used to record data.

```

1st LO= 21500.00 21500.00 21500.00 21500.00
Net SB=      L      L      U      U
IF SB =      U      U      U      U
Pol.  =      RCP     LCP     RCP     LCP
BBC   =      1      2      1      2
BBC SB=      L      L      U      U
IF    =      C      A      C      A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  6 Setup file default. Used with PCAL = 1MHz
LO sum= 22236.00 22236.00 22236.00 22236.00
BBC fr=  736.00  736.00  736.00  736.00
Bandwd=  16.00  16.00  16.00  16.00
Matching frequency sets:  6

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 55.563608	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 43.08771	0.00
	fake circumpolar target for a TS to look at			
* 1045-188	10 45 40.093264	* 10 48 06.620604	10 48 55.304701	0.00
J1048-1909	-18 53 44.08720	*-19 09 35.72683	-19 14 59.04722	0.00
	./rk12ur_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 2578 observations, RA-A03-04, RA-A02-12			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
1045-188	138.3

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

# rk12ustr

## RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone: +7-495-3332512                      EMAIL: kirx@scan.sai.msu.ru  
Fax: +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/K-band, dual-pol

Schedule for TORUN (Code Tr )                      Page 2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are LO sum (band edge).

SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop	Early	Disk	TPStart
Stop UT	LST	EL AZ HA UP	ParA Dwell	GBytes	SYNC
----- Sat 16 Apr 2016 Day 107 -----					
----- K-band VLBI scans -----					
Next scan frequencies:	22236.00	22236.00	22236.00	22236.00	
Next BBC frequencies:	736.00	736.00	736.00	736.00	
Next scan bandwidths:	16.00	16.00	16.00	16.00	
00 00 00	0851+202	14 52 32 16.4 -78.3 5.9	38.7 0	0	00 00 00
00 14 30	---	15 07 04 14.3 -75.5 6.2	38.2 870	28	00 00 01
00 15 00	0851+202	15 07 35 14.2 -75.4 6.2	38.2 24	28	00 15 00
00 29 30	---	15 22 07 12.1 -72.6 6.4	37.6 870	56	00 15 01
00 30 00	0851+202	15 22 37 12.0 -72.5 6.4	37.6 24	56	00 30 00
00 44 30	---	15 37 09 9.9 -69.8 6.7	36.8 870	84	00 30 01
00 45 00	0851+202	15 37 39 9.9 -69.7 6.7	36.8 24	84	00 45 00
01 00 00	---	15 52 42 7.8 -66.8 6.9	36.0 900	112	00 45 01

### SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra1cm2.set

Matching groups in ./rk12us\_freq.dat:

tr1cm

Setup group:	6	Station: TORUN	Total bit rate:	256
Format:	MKIV1:4	Bits per sample:	2	Sample rate: 32.000
Number of channels:	4	DBE type:		Speedup factor: 1.00

Disk used to record data.

```

1st LO= 21500.00 21500.00 21500.00 21500.00
Net SB=          L          L          U          U
IF SB =          U          U          U          U
Pol.  =          RCP         LCP         RCP         LCP
BBC   =          1          2          1          2
BBC SB=          L          L          U          U
IF    =          C          A          C          A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  2  Setup file default.  Used with PCAL = 1MHz
LO sum= 22236.00 22236.00 22236.00 22236.00
BBC fr=  736.00  736.00  736.00  736.00
Bandwd=  16.00  16.00  16.00  16.00
Matching frequency sets:  2

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 55.548969	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 43.13491	0.00
	fake circumpolar target for a TS to look at			
* 0851+202	08 51 57.250618	* 08 54 48.874930	08 55 44.677823	0.00
J0854+2006	20 17 58.41733	* 20 06 30.64078	20 02 38.69346	0.00
OJ287	./rk12us_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 213710 observations, RA-A03-04, RA-A03-			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
0851+202	104.3

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

**rk12uttr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/K-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST       EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Sat 16 Apr 2016    Day 107 ---

----- K-band VLBI scans -----

Next scan frequencies:	22236.00	22236.00	22236.00	22236.00							
Next BBC frequencies:	736.00	736.00	736.00	736.00							
Next scan bandwidths:	16.00	16.00	16.00	16.00							
03 00 00	1222+216	17 53 02	21.7 276.9	5.5		39.8	0		0	03 00 00	
03 14 30	---	18 07 34	19.6 279.7	5.7		39.4	870		28	03 00 01	
03 15 00	1222+216	18 08 04	19.5 279.8	5.7		39.4	24		28	03 15 00	
03 29 30	---	18 22 37	17.3 282.6	5.9		39.0	870		56	03 15 01	
03 30 00	1222+216	18 23 07	17.3 282.7	6.0		39.0	24		56	03 30 00	
03 44 30	---	18 37 39	15.1 285.4	6.2		38.4	870		84	03 30 01	
03 45 00	1222+216	18 38 09	15.1 285.5	6.2		38.4	24		84	03 45 00	
04 00 00	---	18 53 12	12.9 288.4	6.5		37.7	900		112	03 45 01	

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

==== Setup file: ra1cm2.set

Matching groups in ./rk12ut\_freq.dat:

tr1cm

Setup group:    8	Station: TORUN	Total bit rate:    256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor:    1.00

Disk used to record data.



```

1st LO= 21500.00 21500.00 21500.00 21500.00
Net SB=          L          L          U          U
IF SB =          U          U          U          U
Pol.  =          RCP         LCP         RCP         LCP
BBC   =           1          2          1          2
BBC SB=          L          L          U          U
IF    =           C          A          C          A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  5  Setup file default.  Used with PCAL = 1MHz
LO sum= 22236.00 22236.00 22236.00 22236.00
BBC fr=  736.00  736.00  736.00  736.00
Bandwd=  16.00  16.00  16.00  16.00
Matching frequency sets:  5

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 55.537854	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 43.17053	0.00
	fake circumpolar target for a TS to look at			
* 1222+216	12 22 23.408709	* 12 24 54.458394	12 25 44.426097	0.00
J1224+2122	21 39 23.03696	* 21 22 46.38857	21 17 20.08824	0.00
	./rk12ut_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 406 observations, RA-A03-04, RA-A02-12			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

```

Source      Sun distance (deg)
1222+216    143.7

```

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

```

1.6 GHz     45. deg
2.3 GHz     36. deg
5.0 GHz     23. deg
8.4 GHz     17. deg
15.0 GHz    12. deg
22.0 GHz     9. deg

```

**rk12uutr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
 Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
 Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/K-band, dual-pol

Schedule for TORUN        (Code Tr )    Page 2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
 Early: Seconds between end of slew and start. Dwell: On source seconds.  
 Disk: GBytes recorded to this point.  
 TPStart: Recording start time. Frequencies are L0 sum (band edge).  
 SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC

--- Sat 16 Apr 2016 Day 107 ---

----- K-band VLBI scans -----

Next scan frequencies: 22236.00 22236.00 22236.00 22236.00  
 Next BBC frequencies: 736.00 736.00 736.00 736.00  
 Next scan bandwidths: 16.00 16.00 16.00 16.00

09 00 00	1641+399	23 54 01	21.8	-52.1	7.2	38.1	0	0	09 00 00
09 12 00	---	00 06 03	20.4	-50.1	7.4	36.8	720	23	09 00 01
09 12 30	1641+399	00 06 33	20.4	-50.1	7.4	36.8	24	23	09 12 30
09 24 30	---	00 18 35	19.0	-48.1	7.6	35.5	720	46	09 12 31
09 25 00	1641+399	00 19 05	19.0	-48.0	7.6	35.5	24	46	09 25 00
09 37 00	---	00 31 07	17.6	-46.0	7.8	34.2	720	69	09 25 01
09 37 30	1641+399	00 31 37	17.6	-45.9	7.8	34.1	24	69	09 37 30
09 50 00	---	00 44 09	16.3	-43.8	8.0	32.7	750	93	09 37 31

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

==== Setup file: ra1cm2.set

Matching groups in ./rk12uu\_freq.dat:

tr1cm

Setup group: 5	Station: TORUN	Total bit rate: 256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor: 1.00

Disk used to record data.

```

1st LO= 21500.00 21500.00 21500.00 21500.00
Net SB=      L      L      U      U
IF SB =      U      U      U      U
Pol.  =      RCP     LCP     RCP     LCP
BBC   =      1      2      1      2
BBC SB=      L      L      U      U
IF    =      C      A      C      A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  2  Setup file default.  Used with PCAL = 1MHz
LO sum= 22236.00 22236.00 22236.00 22236.00
BBC fr=  736.00  736.00  736.00  736.00
Bandwd=  16.00  16.00  16.00  16.00
Matching frequency sets:  2

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 55.515400	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 43.24177	0.00
	fake circumpolar target for a TS to look at			
* 1641+399	16 41 17.606226	* 16 42 58.809963	16 43 32.672787	0.00
J1642+3948	39 54 10.81479	* 39 48 36.99385	39 46 44.58408	0.00
3C345	./rk12uu_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 51938 observations, RA-A03-04, RA-A03-0			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
1641+399	114.2

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

**rk12uvtr**

RADIOASTRON AGN SURVEY  
PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/K-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

```
-----
Start UT    Source                      Start / Stop                      Early    Disk    TPStart
Stop UT                      LST       EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC
-----
```

--- Sat 16 Apr 2016 Day 107 ---

----- K-band VLBI scans -----

Next scan frequencies: 22236.00 22236.00 22236.00 22236.00  
Next BBC frequencies:    736.00    736.00    736.00    736.00  
Next scan bandwidths:    16.00    16.00    16.00    16.00

12 10 00	1800+440	03 04 32	14.3	-31.2	9.0		25.7	0	0	12 10 00
12 22 00	---	03 16 34	13.4	-29.2	9.2		24.1	720	23	12 10 01
12 22 30	1800+440	03 17 04	13.4	-29.1	9.3		24.0	24	23	12 22 30
12 34 30	---	03 29 06	12.6	-27.1	9.5		22.4	720	46	12 22 31
12 35 00	1800+440	03 29 36	12.5	-27.0	9.5		22.3	24	46	12 35 00
12 47 00	---	03 41 38	11.7	-25.0	9.7		20.6	720	69	12 35 01
12 47 30	1800+440	03 42 08	11.7	-24.9	9.7		20.6	24	69	12 47 30
13 00 00	---	03 54 40	10.9	-22.7	9.9		18.8	750	93	12 47 31

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

==== Setup file: ra1cm2.set

Matching groups in ./rk12uv\_freq.dat:

tr1cm

Setup group:    5	Station: TORUN	Total bit rate:    256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor:    1.00

Disk used to record data.

```

1st LO= 21500.00 21500.00 21500.00 21500.00
Net SB=      L      L      U      U
IF SB =      U      U      U      U
Pol.  =      RCP     LCP     RCP     LCP
BBC   =      1      2      1      2
BBC SB=      L      L      U      U
IF    =      C      A      C      A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  2  Setup file default.  Used with PCAL = 1MHz
LO sum= 22236.00 22236.00 22236.00 22236.00
BBC fr=  736.00  736.00  736.00  736.00
Bandwd=  16.00  16.00  16.00  16.00
Matching frequency sets:  2

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 55.503245	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 43.27989	0.00
	fake circumpolar target for a TS to look at			
* 1800+440	18 00 03.197727	* 18 01 32.314821	18 02 02.021738	0.00
J1801+4404	44 04 18.35293	* 44 04 21.90023	44 04 16.22133	0.00
	./rk12uv_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 5984 observations, RA-A03-04, RA-A02-12			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

```

Source      Sun distance (deg)
1800+440    99.7

```

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

```

1.6 GHz      45. deg
2.3 GHz      36. deg
5.0 GHz      23. deg
8.4 GHz      17. deg
15.0 GHz     12. deg
22.0 GHz     9. deg

```

RADIOASTRON AGN POLARIZATION IMAGING

PI: Jose L. Gomez, Andrei Lobanov

Address: Instituto de Astrofisica de Andalucia-CSIC

Observing mode: L-band, dual-pol  
 Schedule for TORUN (Code Tr )

Page 2

RadioAstron AGN polarization imaging

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
 Early: Seconds between end of slew and start. Dwell: On source seconds.  
 Disk: GBytes recorded to this point.  
 TPStart: Recording start time. Frequencies are L0 sum (band edge).  
 SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC
-----										
--- Sat 16 Apr 2016 Day 107 ---										
----- L-band VLBI scans. Space segment 01: 0851+202 -----										
Next scan frequencies: 1636.00 1636.00 1636.00 1636.00 1668.00 1668.00 1668.00 1668.00										
Next BBC frequencies: 664.00 664.00 664.00 664.00 632.00 632.00 632.00 632.00										
Next scan bandwidths: 16.00 16.00 16.00 16.00 16.00 16.00 16.00 16.00										
17 00 00	0851+202	07 55 20	55.0	154.8	-1.0	-15.8	0	0	17 00 00	
17 16 20	---	08 11 42	55.9	161.3	-0.7	-11.8	980	63	17 00 01	
17 16 50	0851+202	08 12 12	55.9	161.6	-0.7	-11.7	24	63	17 16 50	
17 33 10	---	08 28 35	56.5	168.4	-0.5	-7.4	980	126	17 16 51	
17 33 40	0851+202	08 29 05	56.6	168.6	-0.4	-7.3	23	126	17 33 40	
17 50 00	---	08 45 28	56.9	175.6	-0.2	-2.8	980	188	17 33 41	
----- 10 min L-band scan on fringe finder -----										
17 59 00	0716+714	08 54 29	69.2	339.6	1.5	139.2	196	188	17 59 00	
18 09 00	---	09 04 31	68.7	338.0	1.7	135.3	600	227	17 59 01	
----- L-band scans: 0851+202 -----										
18 14 00	0851+202	09 09 32	56.8	185.9	0.2	3.8	-19	227	18 14 00	
18 23 30	---	09 19 03	56.6	190.0	0.4	6.4	551	263	18 14 01	
18 24 30	0851+202	09 20 04	56.6	190.4	0.4	6.6	53	263	18 24 30	
18 33 30	---	09 29 05	56.3	194.2	0.6	9.0	540	298	18 24 31	
18 34 00	0851+202	09 29 35	56.3	194.4	0.6	9.2	23	298	18 34 00	
18 43 30	---	09 39 07	55.9	198.4	0.7	11.6	570	335	18 34 01	
18 44 00	0851+202	09 39 37	55.9	198.6	0.7	11.8	24	335	18 44 00	
18 53 30	---	09 49 08	55.4	202.4	0.9	14.1	570	371	18 44 01	
18 54 00	0851+202	09 49 38	55.4	202.6	0.9	14.2	24	371	18 54 00	
19 03 30	---	09 59 10	54.8	206.4	1.1	16.5	570	408	18 54 01	
19 04 00	0851+202	09 59 40	54.7	206.6	1.1	16.6	24	408	19 04 00	
19 13 30	---	10 09 12	54.0	210.3	1.2	18.8	570	444	19 04 01	
19 14 00	0851+202	10 09 42	54.0	210.5	1.2	18.9	24	444	19 14 00	
19 23 30	---	10 19 13	53.2	214.0	1.4	20.9	570	481	19 14 01	

Schedule for TORUN (Code Tr )

Page 3

RadioAstron AGN polarization imaging

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

```

-----
Start UT  Source          Start / Stop          Early  Disk  TPStart
Stop UT   LST    EL    AZ    HA  UP  ParA  Dwell  GBytes  SYNC
-----
--- Sat 16 Apr 2016  Day 107 ---
19 24 00 0851+202  10 19 43 53.2 214.2  1.4    21.0   24    481  19 24 00
19 33 30 ---      10 29 15 52.4 217.6  1.6    23.0  570    517  19 24 01

19 34 00 0851+202  10 29 45 52.3 217.8  1.6    23.1   24    517  19 34 00
19 43 30 ---      10 39 17 51.4 221.1  1.7    24.8  570    554  19 34 01

19 44 00 0851+202  10 39 47 51.4 221.3  1.7    24.9   24    554  19 44 00
19 53 30 ---      10 49 18 50.4 224.5  1.9    26.6  570    590  19 44 01

19 54 40 0851+202  10 50 28 50.3 224.9  1.9    26.8   63    590  19 54 40
20 04 10 ---      11 00 00 49.2 227.9  2.1    28.3  570    627  19 54 41

20 04 40 0851+202  11 00 30 49.2 228.1  2.1    28.4   24    627  20 04 40
20 14 10 ---      11 10 02 48.1 231.0  2.2    29.8  570    663  20 04 41

20 14 40 0851+202  11 10 32 48.0 231.2  2.2    29.9   24    663  20 14 40
20 19 40 ---      11 15 32 47.4 232.7  2.3    30.6  300    683  20 14 41

----- L-band VLBI scans. Space segment 02 -----
20 20 00 0851+202  11 15 53 47.4 232.8  2.3    30.6   14    683  20 20 00
20 36 20 ---      11 32 15 45.4 237.6  2.6    32.6  980    746  20 20 01

20 36 50 0851+202  11 32 45 45.3 237.7  2.6    32.7   24    746  20 36 50
20 53 10 ---      11 49 08 43.2 242.2  2.9    34.4  980    808  20 36 51

20 53 40 0851+202  11 49 38 43.1 242.3  2.9    34.5   24    808  20 53 40
21 10 00 ---      12 06 01 40.9 246.5  3.2    35.9  980    871  20 53 41

----- Ground-only segment 02: 10 min L-band scan on fringe finder -----
21 10 30 0716+714  12 06 31 55.2 328.0  4.7    83.1 -148    871  21 10 30
21 27 30 ---      12 23 34 53.8 328.4  5.0    79.4  872    937  21 10 31

----- Back to the target source -----
21 32 30 0851+202  12 28 34 37.7 252.0  3.5    37.4  131    937  21 32 30
21 42 00 ---      12 38 06 36.4 254.2  3.7    38.0  570    973  21 32 31

----- Back to the target source -----
21 42 00 0851+202  12 38 06 36.4 254.2  3.7    38.0   -5    973  No stop
21 51 30 ---      12 47 38 35.0 256.4  3.9    38.4  565   1010  21 42 01

21 52 00 0851+202  12 48 08 34.9 256.5  3.9    38.4   24   1010  21 52 00
22 01 30 ---      12 57 39 33.5 258.6  4.0    38.8  570   1046  21 52 01

```

Schedule for TORUN (Code Tr )

Page 4

RadioAstron AGN polarization imaging

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

```

-----
Start UT  Source          Start / Stop          Early  Disk  TPStart
Stop UT          LST      EL  AZ  HA  UP  ParA  Dwell  GBytes  SYNC
-----

```

--- Sat 16 Apr 2016 Day 107 ---

22 02 00	0851+202	12 58 09	33.4	258.7	4.0	38.8	24	1046	22 02 00
22 11 30	---	13 07 41	32.0	260.8	4.2	39.1	570	1083	22 02 01
22 12 00	0851+202	13 08 11	32.0	260.9	4.2	39.1	24	1083	22 12 00
22 21 30	---	13 17 42	30.5	262.9	4.4	39.4	570	1119	22 12 01
22 22 00	0851+202	13 18 13	30.5	263.0	4.4	39.4	24	1119	22 22 00
22 31 30	---	13 27 44	29.0	265.0	4.5	39.6	570	1156	22 22 01
22 32 00	0851+202	13 28 14	29.0	265.1	4.5	39.6	24	1156	22 32 00
22 41 30	---	13 37 46	27.5	267.1	4.7	39.7	570	1192	22 32 01
22 42 00	0851+202	13 38 16	27.5	267.2	4.7	39.7	24	1192	22 42 00
22 51 30	---	13 47 47	26.0	269.1	4.9	39.7	570	1229	22 42 01
22 52 00	0851+202	13 48 17	26.0	269.2	4.9	39.7	24	1229	22 52 00
23 01 30	---	13 57 49	24.5	271.1	5.0	39.7	570	1265	22 52 01
23 02 00	0851+202	13 58 19	24.5	271.2	5.0	39.7	24	1265	23 02 00
23 10 00	---	14 06 20	23.2	272.8	5.2	39.7	480	1296	23 02 01
23 10 30	0851+202	14 06 51	23.2	272.9	5.2	39.7	24	1296	23 10 30
23 18 30	---	14 14 52	22.0	274.5	5.3	39.6	480	1327	23 10 31

----- 10 min L-band scan on fringe finder 3C345 -----

23 19 00	3C345	14 15 22	61.6	102.9	-2.5	-49.6	-325	1327	23 19 00
23 28 30	---	14 24 53	63.0	105.5	-2.3	-48.8	245	1363	23 19 01

----- L-band VLBI scans. Space segment 03 -----

23 40 00	0851+202	14 36 25	18.8	278.7	5.7	39.2	331	1363	23 40 00
23 56 20	---	14 52 48	16.3	281.8	6.0	38.7	980	1426	23 40 01

--- Start: Sat 16 Apr 2016 Day 107 -- Stop: Sun 17 Apr 2016 Day 108 ---

23 56 50	0851+202	14 53 18	16.3	281.9	6.0	38.7	24	1426	23 56 50
00 13 10	---	15 09 41	13.9	285.0	6.2	38.1	980	1489	23 56 51
00 13 40	0851+202	15 10 11	13.8	285.1	6.2	38.1	24	1489	00 13 40
00 30 00	---	15 26 34	11.4	288.2	6.5	37.4	980	1552	00 13 41



Schedule for TORUN (Code Tr )

Page 5

RadioAstron AGN polarization imaging

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

```
-----
```

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC
-----										
--- Sun 17 Apr 2016 Day 108 ---										
----- 10 min L-band scan on fringe finder -----										
00 34 00	0716+714	15 30 34	41.0	338.8	8.1		42.6	115	1552	00 34 00
00 54 00	---	15 50 38	40.0	340.4	8.4		38.9	1200	1629	00 34 01
----- EVN scans on calibrators -----										
01 00 00	3C345	15 56 38	74.5	144.3	-0.8		-27.1	-46	1629	01 00 00
01 09 30	---	16 06 10	75.2	150.7	-0.6		-22.5	524	1665	01 00 01
01 10 00	1633+382	16 06 40	74.2	158.5	-0.5		-16.2	-1	1665	01 10 00
01 17 30	---	16 14 11	74.5	163.8	-0.4		-12.3	449	1694	01 10 01
01 18 00	3C345	16 14 41	75.8	156.8	-0.5		-17.9	1	1694	01 18 00
01 27 30	---	16 24 13	76.3	164.2	-0.3		-12.3	570	1731	01 18 01
01 28 00	1633+382	16 24 43	74.9	171.6	-0.2		-6.4	0	1731	01 28 00
01 36 20	---	16 33 04	75.0	177.9	-0.0		-1.6	500	1763	01 28 01
01 36 50	3C345	16 33 35	76.6	171.7	-0.2		-6.5	2	1763	01 36 50
01 46 20	---	16 43 06	76.7	179.6	-0.0		-0.3	570	1799	01 36 51
01 46 50	1633+382	16 43 36	74.9	185.9	0.1		4.5	3	1799	01 46 50
01 55 10	---	16 51 58	74.7	192.1	0.3		9.2	500	1831	01 46 51
01 55 40	3C345	16 52 28	76.6	187.4	0.1		5.8	5	1831	01 55 40
02 05 10	---	17 01 59	76.3	195.1	0.3		11.8	570	1868	01 55 41
02 05 40	1633+382	17 02 29	74.3	199.7	0.4		14.9	6	1868	02 05 40
02 14 00	---	17 10 51	73.8	205.5	0.6		19.2	500	1900	02 05 41
02 14 30	3C345	17 11 21	75.9	202.4	0.5		17.3	8	1900	02 14 30
02 24 00	---	17 20 52	75.2	209.3	0.6		22.5	570	1937	02 14 31
02 24 30	1633+382	17 21 22	73.1	212.2	0.8		24.0	8	1937	02 24 30
02 32 50	---	17 29 44	72.4	217.2	0.9		27.5	500	1969	02 24 31
02 33 20	3C345	17 30 14	74.5	215.5	0.8		27.0	8	1969	02 33 20
02 42 50	---	17 39 45	73.6	221.4	0.9		31.1	570	2005	02 33 21
02 43 20	1633+382	17 40 15	71.3	223.0	1.1		31.4	8	2005	02 43 20
02 51 40	---	17 48 37	70.4	227.2	1.2		34.1	500	2037	02 43 21
02 52 10	3C345	17 49 07	72.6	226.6	1.1		34.6	8	2037	02 52 10
03 01 40	---	17 58 38	71.5	231.4	1.3		37.6	570	2074	02 52 11

```
-----
```

Schedule for TORUN (Code Tr )

Page 6

RadioAstron AGN polarization imaging

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC
-----										
--- Sun 17 Apr 2016 Day 108 ---										
03 02 10	1633+382	17 59 09	69.2	232.1	1.4		37.0	8	2074	03 02 10
03 10 30	---	18 07 30	68.2	235.7	1.5		39.1	500	2106	03 02 11
03 11 00	3C345	18 08 00	70.4	235.7	1.4		40.2	8	2106	03 11 00
03 20 30	---	18 17 32	69.2	239.7	1.6		42.4	570	2142	03 11 01
03 21 00	1633+382	18 18 02	66.9	239.8	1.7		41.3	8	2142	03 21 00
03 29 20	---	18 26 23	65.8	242.9	1.8		42.8	500	2174	03 21 01
03 29 50	3C345	18 26 53	68.0	243.2	1.7		44.2	8	2174	03 29 50
03 39 20	---	18 36 25	66.7	246.6	1.9		45.8	570	2211	03 29 51
03 39 50	1633+382	18 36 55	64.4	246.4	2.0		44.4	8	2211	03 39 50
03 48 10	---	18 45 16	63.2	249.1	2.2		45.5	500	2243	03 39 51
03 48 40	3C345	18 45 46	65.4	249.6	2.0		47.1	8	2243	03 48 40
03 58 10	---	18 55 18	64.0	252.5	2.2		48.2	570	2279	03 48 41
03 58 40	1633+382	18 55 48	61.7	252.2	2.3		46.6	8	2279	03 58 40
04 07 00	---	19 04 09	60.5	254.5	2.5		47.3	500	2312	03 58 41
04 07 30	3C345	19 04 39	62.7	255.2	2.4		49.1	8	2312	04 07 30
04 17 00	---	19 14 11	61.3	257.7	2.5		49.8	570	2348	04 07 31
04 17 30	1633+382	19 14 41	59.0	257.3	2.6		48.1	8	2348	04 17 30
04 25 50	---	19 23 02	57.7	259.4	2.8		48.6	500	2380	04 17 31
04 30 00	3C345	19 27 13	59.4	261.0	2.7		50.5	228	2380	04 30 00
04 39 30	---	19 36 45	57.9	263.2	2.9		50.9	570	2417	04 30 01
04 40 00	1633+382	19 37 15	55.6	262.7	3.0		49.2	8	2417	04 40 00
04 48 20	---	19 45 36	54.4	264.6	3.2		49.4	500	2449	04 40 01
04 48 50	1633+382	19 46 06	54.3	264.7	3.2		49.4	24	2449	04 48 50
04 57 10	---	19 54 27	53.1	266.5	3.3		49.6	500	2481	04 48 51
04 57 40	3C345	19 54 58	55.2	267.2	3.2		51.3	8	2481	04 57 40
05 07 10	---	20 04 29	53.8	269.1	3.3		51.4	570	2517	04 57 41
05 07 40	1633+382	20 04 59	51.5	268.7	3.5		49.7	8	2517	05 07 40
05 16 00	---	20 13 21	50.2	270.4	3.6		49.7	500	2549	05 07 41
05 16 30	3C345	20 13 51	52.4	271.0	3.5		51.4	8	2549	05 16 30
05 26 00	---	20 23 22	51.0	272.9	3.7		51.3	570	2586	05 16 31

Schedule for TORUN (Code Tr )

Page 7

RadioAstron AGN polarization imaging

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

```
-----
Start UT  Source          Start / Stop          Early  Disk  TPStart
Stop UT          LST    EL    AZ    HA  UP  ParA  Dwell  GBytes  SYNC
-----
```

--- Sun 17 Apr 2016 Day 108 ---

05 26 30	1633+382	20 23 52	48.7	272.4	3.8	49.7	8	2586	05 26 30
05 34 50	---	20 32 14	47.4	274.0	3.9	49.6	500	2618	05 26 31
05 35 20	3C345	20 32 44	49.5	274.6	3.8	51.2	8	2618	05 35 20
05 44 50	---	20 42 15	48.1	276.4	4.0	50.9	570	2654	05 35 21
05 45 20	1633+382	20 42 45	45.8	276.0	4.1	49.4	8	2654	05 45 20
05 53 40	---	20 51 07	44.6	277.5	4.3	49.2	500	2687	05 45 21
05 54 10	1633+382	20 51 37	44.5	277.6	4.3	49.1	24	2687	05 54 10
06 01 10	---	20 58 38	43.5	278.8	4.4	48.9	420	2713	05 54 11
06 10 00	3C345	21 07 29	44.4	280.8	4.4	50.1	508	2713	06 10 00
06 19 30	---	21 17 01	43.0	282.4	4.6	49.7	570	2750	06 10 01
06 20 00	1633+382	21 17 31	40.7	282.2	4.7	48.2	8	2750	06 20 00
06 28 20	---	21 25 52	39.5	283.6	4.8	47.9	500	2782	06 20 01
06 28 50	3C345	21 26 23	41.6	284.0	4.7	49.3	8	2782	06 28 50
06 38 20	---	21 35 54	40.2	285.6	4.9	48.8	570	2819	06 28 51
06 38 50	1633+382	21 36 24	37.9	285.4	5.0	47.4	8	2819	06 38 50
06 47 10	---	21 44 46	36.7	286.8	5.1	46.9	500	2851	06 38 51
06 47 40	3C345	21 45 16	38.9	287.2	5.0	48.3	8	2851	06 47 40
07 00 00	---	21 57 38	37.1	289.2	5.2	47.6	740	2898	06 47 41

## SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

==== Setup file: ra18cm2.set

Setup group: 19	Station: TORUN	Total bit rate: 512
Format: MARK5B	Bits per sample: 2	Sample rate: 32.000
Number of channels: 8	DBE type: DBBC_DDC	Speedup factor: 1.00

Disk used to record data.

1st LO=	2300.00	2300.00	2300.00	2300.00	2300.00	2300.00	2300.00	2300.00	2300.00
Net SB=	U	U	L	L	U	U	L	L	L
IF SB =	L	L	L	L	L	L	L	L	L
Pol. =	RCP	LCP	RCP	LCP	RCP	LCP	RCP	LCP	LCP
BBC =	1	5	1	5	2	6	2	6	6
BBC SB=	L	L	U	U	L	L	U	U	U
IF =	A1	B1	A1	B1	A1	B1	A1	B1	B1

The following frequency sets based on these setups were used.

Frequency Set: 7 Setup file default. Used with PCAL = 1MHz  
 LO sum= 1636.00 1636.00 1636.00 1636.00 1668.00 1668.00 1668.00 1668.00  
 BBC fr= 664.00 664.00 664.00 664.00 632.00 632.00 632.00 632.00  
 Bandwd= 16.00 16.00 16.00 16.00 16.00 16.00 16.00 16.00  
 Matching frequency sets: 7

Track assignments are:

track1= 10, 14, 2, 6, 12, 16, 4, 8  
 barrel=roll\_off

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* 0235+164	02 35 52.630215	* 02 38 38.930107	02 39 31.772115	0.00
J0238+1636	16 24 04.01610	* 16 36 59.27452	16 40 57.53786	0.00
	./gg079b_sources.radioastron			
	AGN, IDV, rfc_2013d Petrov, 2013, unpublished 65224 observations, RA-A03-04, RA-			
0316+413	03 16 29.567283	* 03 19 48.160114	03 20 51.499663	0.00
J0319+4130	41 19 51.91847	* 41 30 42.10559	41 34 03.15833	0.00
* 3C84	./gg079b_sources.radioastron			
0355+508	03 55 45.261370	* 03 59 29.747271	04 00 41.417188	0.00
J0359+5057	50 49 20.28584	* 50 57 50.16179	51 00 28.15118	0.00
* NRA0150	./gg079b_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 19270 observations, RA-A03-04, RA-A02-1			
* 0716+714	07 16 13.029739	* 07 21 53.448474	07 23 42.151649	0.00
J0721+7120	71 26 15.17406	* 71 20 36.36340	71 18 48.85325	0.00
	./gg079b_sources.radioastron			
* 0851+202	08 51 57.250618	* 08 54 48.874930	08 55 44.665021	0.00
J0854+2006	20 17 58.41733	* 20 06 30.64078	20 02 38.75769	0.00
0J287	./gg079b_sources.radioastron			
* 1633+382	16 33 30.625100	* 16 35 15.492975	16 35 50.554035	0.00
J1635+3808	38 14 10.08266	* 38 08 04.50043	38 06 02.23933	0.00
4C38.41	./gg079b_sources.radioastron			
1641+399	16 41 17.606226	* 16 42 58.809963	16 43 32.680895	0.00
J1642+3948	39 54 10.81479	* 39 48 36.99385	39 46 44.64413	0.00
* 3C345	./gg079b_sources.radioastron			

rk12uwtr

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev	Profsoyuznaya 84/32	117997 Moscow, Russia
Phone: +7-495-3332512	EMAIL: kirx@scan.sai.msu.ru	
Fax: +7-495-3332378	Phone during observation: +7-903-6614865	

Observing mode: C/L-band, dual-pol

Schedule for TORUN (Code Tr ) Page 2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
 Early: Seconds between end of slew and start. Dwell: On source seconds.  
 Disk: GBytes recorded to this point.  
 TPStart: Recording start time. Frequencies are L0 sum (band edge).  
 SYNC: Time correlator is expected to sync up.

-----  

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC

-----

--- Mon 18 Apr 2016 Day 109 ---

----- L-band VLBI scans -----

```

Next scan frequencies: 1668.00 1668.00 1668.00 1668.00
Next BBC frequencies:   732.00  732.00  732.00  732.00
Next scan bandwidths:   16.00   16.00   16.00   16.00

```

19 00 00	0851+202	10 03 32	54.5	208.1	1.1		17.5	0	0	19 00 00
19 14 30	---	10 18 05	53.3	213.6	1.4		20.7	870	28	19 00 01
19 15 00	0851+202	10 18 35	53.3	213.8	1.4		20.8	24	28	19 15 00
19 29 30	---	10 33 07	52.0	219.0	1.6		23.7	870	56	19 15 01
19 30 00	0851+202	10 33 37	52.0	219.2	1.6		23.8	24	56	19 30 00
19 44 30	---	10 48 10	50.5	224.1	1.9		26.4	870	84	19 30 01
19 45 00	0851+202	10 48 40	50.5	224.3	1.9		26.5	24	84	19 45 00
20 00 00	---	11 03 42	48.8	229.1	2.1		28.9	900	112	19 45 01

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

==== Setup file: ra18cm2.set

Setup group: 7	Station: TORUN	Total bit rate: 256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor: 1.00

Disk used to record data.

```

1st LO=  2400.00  2400.00  2400.00  2400.00
Net SB=      L      L      U      U
IF SB =      L      L      L      L
Pol.  =      RCP     LCP     RCP     LCP
BBC   =      1      2      1      2
BBC SB=      U      U      L      L
IF    =      C      A      C      A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  3  Setup file default.  Used with PCAL = 1MHz
LO sum=  1668.00  1668.00  1668.00  1668.00
BBC fr=   732.00  732.00  732.00  732.00
Bandwd=   16.00  16.00  16.00  16.00
Matching frequency sets:  3

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 55.261575	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 43.96130	0.00
	fake circumpolar target for a TS to look at			
* 0851+202	08 51 57.250618	* 08 54 48.874930	08 55 44.621646	0.00
J0854+2006	20 17 58.41733	* 20 06 30.64078	20 02 38.95022	0.00
OJ287	./rk12uw_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 213710 observations, RA-A03-04, RA-A03-			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

```

Source      Sun distance (deg)
0851+202    101.5

```

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

```

1.6 GHz      45. deg
2.3 GHz      36. deg
5.0 GHz      23. deg
8.4 GHz      17. deg
15.0 GHz     12. deg
22.0 GHz     9. deg

```

RADIOASTRON AGN SURVEY  
PI: *Yuri Kovalev*

Address: ASC Lebedev                              Profsoyuznaya 84/32                              117997 Moscow, Russia  
Phone:    +7-495-3332512                              EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                              Phone during observation: +7-903-6614865

Observing mode: C/L-band, dual-pol

Schedule for TORUN            (Code Tr )                              Page    2  
    RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time.    Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

Start UT	Source		Start / Stop				Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC

--- Tue 19 Apr 2016    Day 110 ---

----- L-band VLBI scans -----

Next scan frequencies: 1668.00    1668.00    1668.00    1668.00  
Next BBC frequencies:    732.00    732.00    732.00    732.00  
Next scan bandwidths:    16.00    16.00    16.00    16.00

19 00 00	0851+202	10 07 29	54.2	209.6	1.2	18.4	0	0	19 00 00
19 14 30	---	10 22 01	53.0	215.0	1.4	21.5	870	28	19 00 01
19 15 00	0851+202	10 22 31	53.0	215.2	1.4	21.6	24	28	19 15 00
19 29 30	---	10 37 04	51.6	220.3	1.7	24.4	870	56	19 15 01
19 30 00	0851+202	10 37 34	51.6	220.5	1.7	24.5	24	56	19 30 00
19 44 30	---	10 52 06	50.1	225.4	1.9	27.1	870	84	19 30 01
19 45 00	0851+202	10 52 36	50.0	225.5	1.9	27.1	24	84	19 45 00
20 00 00	---	11 07 39	48.4	230.3	2.2	29.5	900	112	19 45 01

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

===== Setup file: ra18cm2.set

Setup group:    6                              Station: TORUN                              Total bit rate:    256  
Format: MKIV1:4                              Bits per sample: 2                              Sample rate: 32.000  
Number of channels: 4                              DBE type:                              Speedup factor:    1.00

Disk used to record data.

1st LO=	2400.00	2400.00	2400.00	2400.00
Net SB=	L	L	U	U
IF SB =	L	L	L	L
Pol. =	RCP	LCP	RCP	LCP
BBC =	1	2	1	2
BBC SB=	U	U	L	L
IF =	C	A	C	A

The following frequency sets based on these setups were used.

Frequency Set: 4 Setup file default. Used with PCAL = 1MHz  
 LO sum= 1668.00 1668.00 1668.00 1668.00  
 BBC fr= 732.00 732.00 732.00 732.00  
 Bandwd= 16.00 16.00 16.00 16.00  
 Matching frequency sets: 4

Track assignments are:

track1= 2, 18, 3, 19  
 barrel=roll\_off

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 55.134818	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 44.26332	0.00
	fake circumpolar target for a TS to look at			
* 0851+202	08 51 57.250618	* 08 54 48.874930	08 55 44.599106	0.00
J0854+2006	20 17 58.41733	* 20 06 30.64078	20 02 39.03488	0.00
OJ287	./rk12ux_sources.radioastron AGN, rfc_2013d Petrov, 2013, unpublished 213710 observations, RA-A03-04, RA-A03-			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
0851+202	100.5

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg



**rk12uytr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                  Profsoyuznaya 84/32                  117997 Moscow, Russia  
Phone: +7-495-3332512                  EMAIL: kirx@scan.sai.msu.ru  
Fax: +7-495-3332378                  Phone during observation: +7-903-6614865

Observing mode: C/L-band, dual-pol

Schedule for TORUN      (Code Tr )                                  Page 2  
                                RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.      Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

---

Start UT	Source	Start / Stop				Early	Disk	TPStart		
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC

---

--- Thu 21 Apr 2016    Day 112 ---

----- C-band VLBI scans -----

Next scan frequencies: 4836.00 4836.00 4836.00 4836.00  
Next BBC frequencies: 736.00 736.00 736.00 736.00  
Next scan bandwidths: 16.00 16.00 16.00 16.00

20 00 00	0851+202	11 15 32	47.4	232.7	2.3		30.6	0	0	20 00 00
20 14 30	---	11 30 04	45.6	236.9	2.6		32.4	870	28	20 00 01
20 15 00	0851+202	11 30 34	45.6	237.1	2.6		32.4	24	28	20 15 00
20 29 30	---	11 45 07	43.7	241.1	2.8		34.0	870	56	20 15 01
20 30 00	0851+202	11 45 37	43.6	241.2	2.8		34.1	24	56	20 30 00
20 44 30	---	12 00 09	41.7	245.0	3.1		35.4	870	84	20 30 01
20 45 00	0851+202	12 00 39	41.6	245.2	3.1		35.5	24	84	20 45 00
21 00 00	---	12 15 42	39.6	248.9	3.3		36.6	900	112	20 45 01

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

==== Setup file: ra6cm2.set

Setup group: 1	Station: TORUN	Total bit rate: 256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor: 1.00

Disk used to record data.

```

1st LO=  4100.00  4100.00  4100.00  4100.00
Net SB=           L           L           U           U
IF SB =           U           U           U           U
Pol.  =          RCP          LCP          RCP          LCP
BBC   =           1           2           1           2
BBC SB=           L           L           U           U
IF    =           C           A           C           A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  2  Setup file default.  Used with PCAL = 1MHz
LO sum=  4836.00  4836.00  4836.00  4836.00
BBC fr=   736.00   736.00   736.00   736.00
Bandwd=   16.00   16.00   16.00   16.00
Matching frequency sets:  2

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 54.839238	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 44.86079	0.00
	fake circumpolar target for a TS to look at			
* 0851+202	08 51 57.250618	* 08 54 48.874930	08 55 44.554044	0.00
J0854+2006	20 17 58.41733	* 20 06 30.64078	20 02 39.17334	0.00
OJ287	./rk12uy_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 213710 observations, RA-A03-04, RA-A03-			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
0851+202	98.6

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

**rk12uztr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/K-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST       EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Sat 23 Apr 2016 Day 114 ---

----- C-band VLBI scans -----

Next scan frequencies:	4836.00	4836.00	4836.00	4836.00							
Next BBC frequencies:	736.00	736.00	736.00	736.00							
Next scan bandwidths:	16.00	16.00	16.00	16.00							
04 00 00	1546+027	19 20 47	23.6	240.0	3.5		31.4	0	0	04 00 00	
04 14 30	---	19 35 20	21.7	243.3	3.8		32.5	870	28	04 00 01	
04 15 00	1546+027	19 35 50	21.6	243.5	3.8		32.5	24	28	04 15 00	
04 29 30	---	19 50 22	19.6	246.7	4.0		33.5	870	56	04 15 01	
04 30 00	1546+027	19 50 52	19.5	246.8	4.0		33.5	24	56	04 30 00	
04 44 30	---	20 05 25	17.5	250.0	4.3		34.4	870	84	04 30 01	
04 45 00	1546+027	20 05 55	17.4	250.1	4.3		34.4	24	84	04 45 00	
05 00 00	---	20 20 57	15.3	253.3	4.5		35.2	900	112	04 45 01	

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra6cm2.set

Setup group:	3	Station:	TORUN	Total bit rate:	256
Format:	MKIV1:4	Bits per sample:	2	Sample rate:	32.000
Number of channels:	4	DBE type:		Speedup factor:	1.00

Disk used to record data.

```

1st LO=  4100.00  4100.00  4100.00  4100.00
Net SB=           L           L           U           U
IF SB =           U           U           U           U
Pol.  =          RCP          LCP          RCP          LCP
BBC   =           1           2           1           2
BBC SB=           L           L           U           U
IF    =           C           A           C           A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  2  Setup file default.  Used with PCAL = 1MHz
LO sum=  4836.00  4836.00  4836.00  4836.00
BBC fr=   736.00   736.00   736.00   736.00
Bandwd=   16.00   16.00   16.00   16.00
Matching frequency sets:  2

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 54.628088	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 45.22376	0.00
	fake circumpolar target for a TS to look at			
* 1546+027	15 46 58.292171	* 15 49 29.436845	15 50 19.648480	0.00
J1549+0237	02 46 06.07581	* 02 37 01.16316	02 34 06.76124	0.00
	./rk12uz_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 15857 observations, RA-A03-04, RA-A02-1			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

```

Source          Sun distance (deg)
1546+027        149.7

```

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

```

1.6 GHz        45. deg
2.3 GHz        36. deg
5.0 GHz        23. deg
8.4 GHz        17. deg
15.0 GHz       12. deg
22.0 GHz        9. deg

```



1st LO=	4100.00	4100.00	4100.00	4100.00
Net SB=	L	L	U	U
IF SB =	U	U	U	U
Pol. =	RCP	LCP	RCP	LCP
BBC =	1	2	1	2
BBC SB=	L	L	U	U
IF =	C	A	C	A

The following frequency sets based on these setups were used.

Frequency Set: 3 Setup file default. Used with PCAL = 1MHz  
 LO sum= 4836.00 4836.00 4836.00 4836.00  
 BBC fr= 736.00 736.00 736.00 736.00  
 Bandwd= 16.00 16.00 16.00 16.00  
 Matching frequency sets: 3

Track assignments are:

track1= 2, 18, 3, 19  
 barrel=roll\_off

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 54.594486	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 45.27802	0.00
	fake circumpolar target for a TS to look at			
* 1846+322	18 46 29.612036	* 18 48 22.088579	18 48 59.222680	0.00
J1848+3219	32 15 36.66027	* 32 19 02.60367	32 20 04.62127	0.00
	./rk12va_sources.radioastron AGN, MASIV, rfc_2013d Petrov, 2013, unpublished 15923 observations, RA-A03-04, R			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
1846+322	98.8

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

**rk12vbtr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/K-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST       EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Sat 23 Apr 2016 Day 114 ---

----- C-band VLBI scans -----

Next scan frequencies:	4836.00	4836.00	4836.00	4836.00							
Next BBC frequencies:	736.00	736.00	736.00	736.00							
Next scan bandwidths:	16.00	16.00	16.00	16.00							
14 00 00	0851+202	05 22 26	37.7	107.9	-3.6		-37.5	0	0	14 00 00	
14 14 30	---	05 36 58	39.7	111.4	-3.3		-36.5	870	28	14 00 01	
14 15 00	0851+202	05 37 28	39.8	111.5	-3.3		-36.5	24	28	14 15 00	
14 29 30	---	05 52 01	41.8	115.1	-3.1		-35.4	870	56	14 15 01	
14 30 00	0851+202	05 52 31	41.9	115.3	-3.1		-35.3	24	56	14 30 00	
14 44 30	---	06 07 03	43.8	119.1	-2.8		-34.0	870	84	14 30 01	
14 45 00	0851+202	06 07 33	43.9	119.2	-2.8		-33.9	24	84	14 45 00	
15 00 00	---	06 22 36	45.8	123.4	-2.6		-32.3	900	112	14 45 01	

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra6cm2.set

Setup group:    4	Station: TORUN	Total bit rate:    256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor:    1.00

Disk used to record data.

```

1st LO=  4100.00  4100.00  4100.00  4100.00
Net SB=           L           L           U           U
IF SB =          U           U           U           U
Pol.  =          RCP          LCP          RCP          LCP
BBC   =           1           2           1           2
BBC SB=          L           L           U           U
IF    =           C           A           C           A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  2  Setup file default.  Used with PCAL = 1MHz
LO sum=  4836.00  4836.00  4836.00  4836.00
BBC fr=   736.00   736.00   736.00   736.00
Bandwd=   16.00   16.00   16.00   16.00
Matching frequency sets:  2

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(Date)	Error (mas)	
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 54.560819	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 45.33160	0.00
	fake circumpolar target for a TS to look at			
* 0851+202	08 51 57.250618	* 08 54 48.874930	08 55 44.520246	0.00
J0854+2006	20 17 58.41733	* 20 06 30.64078	20 02 39.25145	0.00
OJ287	./rk12vb_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 213710 observations, RA-A03-04, RA-A03-			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

```

Source          Sun distance (deg)
0851+202        96.9

```

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

```

1.6 GHz        45. deg
2.3 GHz        36. deg
5.0 GHz        23. deg
8.4 GHz        17. deg
15.0 GHz       12. deg
22.0 GHz        9. deg

```



**rk12vctr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/K-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST        EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Sun 24 Apr 2016    Day 115 ---

----- C-band VLBI scans -----

Next scan frequencies:	4836.00	4836.00	4836.00	4836.00							
Next BBC frequencies:	736.00	736.00	736.00	736.00							
Next scan bandwidths:	16.00	16.00	16.00	16.00							
14 00 00	0851+202	05 26 23	38.2	108.8	-3.5		-37.2	0	0	14 00 00	
14 14 30	---	05 40 55	40.3	112.3	-3.2		-36.2	870	28	14 00 01	
14 15 00	0851+202	05 41 25	40.3	112.5	-3.2		-36.2	24	28	14 15 00	
14 29 30	---	05 55 57	42.3	116.2	-3.0		-35.0	870	56	14 15 01	
14 30 00	0851+202	05 56 27	42.4	116.3	-3.0		-35.0	24	56	14 30 00	
14 44 30	---	06 11 00	44.3	120.2	-2.7		-33.5	870	84	14 30 01	
14 45 00	0851+202	06 11 30	44.4	120.3	-2.7		-33.5	24	84	14 45 00	
15 00 00	---	06 26 32	46.3	124.5	-2.5		-31.8	900	112	14 45 01	

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra6cm2.set

Setup group:	4	Station:	TORUN	Total bit rate:	256
Format:	MKIV1:4	Bits per sample:	2	Sample rate:	32.000
Number of channels:	4	DBE type:		Speedup factor:	1.00

Disk used to record data.

1st LO=	4100.00	4100.00	4100.00	4100.00
Net SB=	L	L	U	U
IF SB =	U	U	U	U
Pol. =	RCP	LCP	RCP	LCP
BBC =	1	2	1	2
BBC SB=	L	L	U	U
IF =	C	A	C	A

The following frequency sets based on these setups were used.

Frequency Set: 2 Setup file default. Used with PCAL = 1MHz  
 LO sum= 4836.00 4836.00 4836.00 4836.00  
 BBC fr= 736.00 736.00 736.00 736.00  
 Bandwd= 16.00 16.00 16.00 16.00  
 Matching frequency sets: 2

Track assignments are:

track1= 2, 18, 3, 19  
 barrel=roll\_off

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 54.399386	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 45.57922	0.00
	fake circumpolar target for a TS to look at			
* 0851+202	08 51 57.250618	* 08 54 48.874930	08 55 44.503823	0.00
J0854+2006	20 17 58.41733	* 20 06 30.64078	20 02 39.28342	0.00
OJ287	./rk12vc_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 213710 observations, RA-A03-04, RA-A03-			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
0851+202	95.9

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

rk12vdtr

RADIOASTRON AGN SURVEY

PI: Yuri Kovalev

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/K-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST       EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Sun 24 Apr 2016    Day 115 ---

----- C-band VLBI scans -----

Next scan frequencies: 4836.00 4836.00 4836.00 4836.00  
Next BBC frequencies:    736.00    736.00    736.00    736.00  
Next scan bandwidths:    16.00    16.00    16.00    16.00

18 10 00	1045-188	09 37 04	16.0	162.4	-1.2	-11.1	0	0	18 10 00
18 22 00	---	09 49 06	16.5	165.3	-1.0	-9.3	720	23	18 10 01
18 22 30	1045-188	09 49 36	16.5	165.4	-1.0	-9.2	24	23	18 22 30
18 34 30	---	10 01 38	16.9	168.3	-0.8	-7.4	720	46	18 22 31
18 35 00	1045-188	10 02 08	16.9	168.5	-0.8	-7.3	24	46	18 35 00
18 47 00	---	10 14 10	17.3	171.4	-0.6	-5.5	720	69	18 35 01
18 47 30	1045-188	10 14 40	17.3	171.5	-0.6	-5.4	24	69	18 47 30
19 00 00	---	10 27 12	17.5	174.6	-0.4	-3.4	750	93	18 47 31

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

===== Setup file: ra6cm2.set

Setup group:    4                      Station: TORUN                      Total bit rate:    256  
Format: MKIV1:4                      Bits per sample: 2                      Sample rate: 32.000  
Number of channels: 4                      DBE type:                      Speedup factor:    1.00

Disk used to record data.

1st LO=	4100.00	4100.00	4100.00	4100.00
Net SB=	L	L	U	U
IF SB =	U	U	U	U
Pol. =	RCP	LCP	RCP	LCP
BBC =	1	2	1	2
BBC SB=	L	L	U	U
IF =	C	A	C	A

The following frequency sets based on these setups were used.

Frequency Set: 2 Setup file default. Used with PCAL = 1MHz  
 LO sum= 4836.00 4836.00 4836.00 4836.00  
 BBC fr= 736.00 736.00 736.00 736.00  
 Bandwd= 16.00 16.00 16.00 16.00  
 Matching frequency sets: 2

Track assignments are:

track1= 2, 18, 3, 19  
 barrel=roll\_off

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 54.371836	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 45.62023	0.00
	fake circumpolar target for a TS to look at			
* 1045-188	10 45 40.093264	* 10 48 06.620604	10 48 55.180351	0.00
J1048-1909	-18 53 44.08720	*-19 09 35.72683	-19 14 59.37246	0.00
	./rk12vd_sources.radioastron AGN, rfc_2013d Petrov, 2013, unpublished 2578 observations, RA-A03-04, RA-A02-12			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
1045-188	131.3

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

**rk12vetr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/K-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.

Early: Seconds between end of slew and start.    Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are LO sum (band edge).

SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST       EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Sun 24 Apr 2016    Day 115 ---

----- C-band VLBI scans -----

Next scan frequencies:	4836.00	4836.00	4836.00	4836.00							
Next BBC frequencies:	736.00	736.00	736.00	736.00							
Next scan bandwidths:	16.00	16.00	16.00	16.00							
23 00 00	1846+322	14 27 51	39.8	87.1	-4.4		-45.2	0	0	23 00 00	
23 12 00	---	14 39 53	41.6	89.5	-4.2		-45.3	720	23	23 00 01	
23 12 30	1846+322	14 40 23	41.7	89.6	-4.1		-45.3	24	23	23 12 30	
23 24 30	---	14 52 25	43.5	92.0	-3.9		-45.3	720	46	23 12 31	
23 25 00	1846+322	14 52 55	43.5	92.1	-3.9		-45.3	24	46	23 25 00	
23 37 00	---	15 04 57	45.3	94.6	-3.7		-45.1	720	69	23 25 01	
23 37 30	1846+322	15 05 27	45.4	94.7	-3.7		-45.1	24	69	23 37 30	
23 50 00	---	15 17 59	47.3	97.4	-3.5		-44.8	750	93	23 37 31	

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra6cm2.set

Setup group:	4	Station:	TORUN	Total bit rate:	256
Format:	MKIV1:4	Bits per sample:	2	Sample rate:	32.000
Number of channels:	4	DBE type:		Speedup factor:	1.00

Disk used to record data.

```

1st LO=  4100.00  4100.00  4100.00  4100.00
Net SB=           L           L           U           U
IF SB =           U           U           U           U
Pol.  =          RCP          LCP          RCP          LCP
BBC   =           1           2           1           2
BBC SB=           L           L           U           U
IF    =           C           A           C           A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  2  Setup file default.  Used with PCAL = 1MHz
LO sum=  4836.00  4836.00  4836.00  4836.00
BBC fr=   736.00  736.00  736.00  736.00
Bandwd=   16.00  16.00  16.00  16.00
Matching frequency sets:  2

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 54.339687	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 45.66774	0.00
	fake circumpolar target for a TS to look at			
* 1846+322	18 46 29.612036	* 18 48 22.088579	18 48 59.271296	0.00
J1848+3219	32 15 36.66027	* 32 19 02.60367	32 20 04.90850	0.00
	./rk12ve_sources.radioastron			
	AGN, MASIV, rfc_2013d Petrov, 2013, unpublished 15923 observations, RA-A03-04, R			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

```

Source      Sun distance (deg)
1846+322    99.7

```

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

```

1.6 GHz      45. deg
2.3 GHz      36. deg
5.0 GHz      23. deg
8.4 GHz      17. deg
15.0 GHz     12. deg
22.0 GHz     9. deg

```



```

1st LO=  4100.00  4100.00  4100.00  4100.00
Net SB=           L           L           U           U
IF SB =           U           U           U           U
Pol.  =          RCP          LCP          RCP          LCP
BBC   =           1           2           1           2
BBC SB=           L           L           U           U
IF    =           C           A           C           A

```

The following frequency sets based on these setups were used.

```

Frequency Set:  4  Setup file default.  Used with PCAL = 1MHz
LO sum=  4836.00  4836.00  4836.00  4836.00
BBC fr=   736.00   736.00   736.00   736.00
Bandwd=   16.00   16.00   16.00   16.00
Matching frequency sets:  4

```

Track assignments are:

```

track1=  2, 18,  3, 19
barrel=roll_off

```

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 54.313426	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 45.70629	0.00
	fake circumpolar target for a TS to look at			
* 1655+077	16 55 43.951808	* 16 58 09.011465	16 58 57.078559	0.00
J1658+0741	07 45 59.75697	* 07 41 27.54032	07 40 01.88192	0.00
	./rk12vf_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 1094 observations, RA-A03-04, RA-A02-12			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

```

Source          Sun distance (deg)
1655+077        133.6

```

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

```

1.6 GHz        45. deg
2.3 GHz        36. deg
5.0 GHz        23. deg
8.4 GHz        17. deg
15.0 GHz       12. deg
22.0 GHz        9. deg

```





## SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra1cm2.set

Matching groups in ./rg18i\_freq.dat:  
tr1cm

Setup group:	3	Station:	TORUN	Total bit rate:	256
Format:	MKIV1:4	Bits per sample:	2	Sample rate:	32.000
Number of channels:	4	DBE type:		Speedup factor:	1.00

Disk used to record data.

1st LO=	21500.00	21500.00	21500.00	21500.00
Net SB=	L	L	U	U
IF SB =	U	U	U	U
Pol. =	RCP	LCP	RCP	LCP
BBC =	1	2	1	2
BBC SB=	L	L	U	U
IF =	C	A	C	A

The following frequency sets based on these setups were used.

Frequency Set:	4	Setup file default.	Used with PCAL = off	
LO sum=	22172.00	22172.00	22172.00	22172.00
BBC fr=	672.00	672.00	672.00	672.00
Bandwd=	16.00	16.00	16.00	16.00
Matching frequency sets:	4			

Track assignments are:

track1= 2, 18, 3, 19  
barrel=roll\_off

## POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 54.275256	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 45.76199	0.00
	fake circumpolar target for a TS to look at			
* 1030+611	10 30 32.672472	* 10 33 51.429000	10 34 55.857026	0.00
	61 06 36.56099	* 60 51 07.33500	60 46 12.35764	0.00
* NGC3079	09 58 35.011191	* 10 01 57.802000	10 03 03.390717	0.00
NGC3079_H2O	55 55 15.50111	* 55 40 47.26000	55 36 10.26609	0.00
	./rg18i_sources.radioastron			
	H2O maser; positions from 2005ApJ...618K, RA-A03-10, RA-A02-13			
* 0917+624	09 17 40.306860	* 09 21 36.231074	09 22 52.040799	0.00
J0921+6215	62 28 38.64009	* 62 15 52.18031	62 11 48.78334	0.00
	./rg18i_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 7902 observations, RA-A03-04, RA-A02-12			

RADIOASTRON AGN POLARIZATION IMAGING

PI: Jose L. Gomez, Andrei Lobanov

Address: Instituto de Astrofisica de Andalucia-CSIC

Observing mode: K-band, dual-pol  
 Schedule for TORUN (Code Tr )

Page 2

RadioAstron AGN polarization imaging

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
 Early: Seconds between end of slew and start. Dwell: On source seconds.  
 Disk: GBytes recorded to this point.  
 TPStart: Recording start time. Frequencies are L0 sum (band edge).  
 SYNC: Time correlator is expected to sync up.

---

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC

---

--- Mon 25 Apr 2016 Day 116 ---

----- K-band VLBI scans. Space segment 01: 0851+202 -----

Next scan frequencies:	22236.00	22236.00	22236.00	22236.00	22268.00	22268.00	22268.00	22268.00	22268.00
Next BBC frequencies:	736.00	736.00	736.00	736.00	768.00	768.00	768.00	768.00	768.00
Next scan bandwidths:	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00

16 00 00	0851+202	07 30 39	53.1	145.4	-1.4		-21.3	0	0	16 00 00
16 10 00	---	07 40 40	53.9	149.1	-1.3		-19.1	600	38	16 00 01
16 10 30	0851+202	07 41 11	54.0	149.3	-1.2		-19.0	24	38	16 10 30
16 20 00	---	07 50 42	54.6	153.0	-1.1		-16.9	570	75	16 10 31
16 20 30	0851+202	07 51 12	54.7	153.2	-1.1		-16.8	24	75	16 20 30
16 30 00	---	08 00 44	55.3	156.9	-0.9		-14.5	570	112	16 20 31
16 30 30	0851+202	08 01 14	55.3	157.1	-0.9		-14.4	24	112	16 30 30
16 40 00	---	08 10 45	55.8	161.0	-0.7		-12.0	570	148	16 30 31
16 40 30	0851+202	08 11 15	55.9	161.2	-0.7		-11.9	24	148	16 40 30
16 50 00	---	08 20 47	56.3	165.1	-0.6		-9.5	570	185	16 40 31
16 50 30	0851+202	08 21 17	56.3	165.3	-0.6		-9.3	23	185	16 50 30
17 00 00	---	08 30 49	56.6	169.3	-0.4		-6.8	570	221	16 50 31

----- Ground-only segment 01: K-band scans on target source -----

17 04 30	0851+202	08 35 19	56.7	171.2	-0.3		-5.6	262	221	17 04 30
17 11 00	---	08 41 50	56.8	174.0	-0.2		-3.8	390	246	17 04 31
17 11 30	0851+202	08 42 21	56.8	174.2	-0.2		-3.7	23	246	17 11 30
17 21 00	---	08 51 52	56.9	178.3	-0.1		-1.1	570	283	17 11 31
17 21 30	0851+202	08 52 22	56.9	178.5	-0.1		-0.9	23	283	17 21 30
17 31 00	---	09 01 54	56.9	182.6	0.1		1.7	570	319	17 21 31
17 31 30	0851+202	09 02 24	56.9	182.9	0.1		1.8	23	319	17 31 30
17 41 00	---	09 11 55	56.8	187.0	0.3		4.4	570	356	17 31 31
17 41 30	0851+202	09 12 25	56.8	187.2	0.3		4.6	23	356	17 41 30
17 46 00	---	09 16 56	56.7	189.1	0.4		5.8	270	373	17 41 31

Schedule for TORUN (Code Tr )

Page 3

RadioAstron AGN polarization imaging

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

```

-----
Start UT  Source          Start / Stop          Early  Disk  TPStart
Stop UT   LST      EL  AZ  HA  UP  ParA  Dwell  GBytes  SYNC
-----
--- Mon 25 Apr 2016 Day 116 ---
----- Ground-only segment 01: K-band scans: 0851+202 -----
17 46 30 0851+202    09 17 26 56.7 189.3 0.4      5.9   23    373 17 46 30
17 58 30 ---      09 29 28 56.3 194.4 0.6      9.1  720    419 17 46 31

18 01 30 0851+202    09 32 29 56.2 195.6 0.6      9.9  173    419 18 01 30
18 11 00 ---      09 42 00 55.8 199.6 0.8     12.4  570    456 18 01 31

18 11 30 0851+202    09 42 30 55.7 199.8 0.8     12.5   24    456 18 11 30
18 21 00 ---      09 52 02 55.2 203.6 0.9     14.8  570    492 18 11 31

18 21 30 0851+202    09 52 32 55.2 203.8 0.9     14.9   24    492 18 21 30
18 31 00 ---     10 02 04 54.6 207.5 1.1     17.2  570    529 18 21 31

18 31 30 0851+202    10 02 34 54.5 207.7 1.1     17.3   24    529 18 31 30
18 41 00 ---     10 12 05 53.8 211.4 1.3     19.4  570    565 18 31 31

18 41 30 0851+202    10 12 35 53.8 211.5 1.3     19.5   24    565 18 41 30
18 51 00 ---     10 22 07 53.0 215.1 1.4     21.5  570    602 18 41 31

18 51 30 0851+202    10 22 37 53.0 215.2 1.4     21.6   24    602 18 51 30
19 01 00 ---     10 32 09 52.1 218.6 1.6     23.5  570    638 18 51 31

19 01 30 0851+202    10 32 39 52.0 218.8 1.6     23.6   24    638 19 01 30
19 11 00 ---     10 42 10 51.1 222.1 1.8     25.4  570    675 19 01 31

19 11 30 0851+202    10 42 40 51.1 222.3 1.8     25.5   24    675 19 11 30
19 18 30 ---     10 49 41 50.3 224.6 1.9     26.7  420    702 19 11 31

----- K-band VLBI scans. Space segment 02: 0851+202 -----

19 20 00 0851+202    10 51 12 50.2 225.1 1.9     26.9   83    702 19 20 00
19 30 00 ---     11 01 13 49.1 228.3 2.1     28.5  600    740 19 20 01

19 30 30 0851+202    11 01 43 49.0 228.5 2.1     28.6   24    740 19 30 30
19 40 00 ---     11 11 15 47.9 231.4 2.3     30.0  570    777 19 30 31

19 40 30 0851+202    11 11 45 47.9 231.6 2.3     30.0   24    777 19 40 30
19 50 00 ---     11 21 17 46.7 234.4 2.4     31.3  570    813 19 40 31

19 50 30 0851+202    11 21 47 46.7 234.5 2.4     31.4   24    813 19 50 30
20 00 00 ---     11 31 18 45.5 237.3 2.6     32.5  570    850 19 50 31

20 00 30 0851+202    11 31 48 45.4 237.4 2.6     32.6   24    850 20 00 30
20 10 00 ---     11 41 20 44.2 240.1 2.8     33.6  570    887 20 00 31

20 10 30 0851+202    11 41 50 44.1 240.2 2.8     33.7   24    887 20 10 30
20 20 00 ---     11 51 21 42.9 242.8 2.9     34.6  570    923 20 10 31

```

Schedule for TORUN (Code Tr )

Page 4

RadioAstron AGN polarization imaging

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

```
-----
```

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC
-----										
--- Mon 25 Apr 2016 Day 116 ---										
----- Ground-only segment 02: K-band scans on fringe-finder source -----										
20 21 00	0716+714	11 52 22	56.3	327.8	4.5		86.3	-125	923	20 21 00
20 24 00	---	11 55 22	56.1	327.9	4.5		85.6	55	935	20 21 01
----- Ground-only segment 02: K-band scans on target source -----										
20 24 30	0851+202	11 55 52	42.3	243.9	3.0		35.0	-152	935	20 24 30
20 31 00	---	12 02 23	41.4	245.6	3.1		35.6	238	960	20 24 31
----- EVN+VLBA K-band scans on target source -----										
20 31 30	0851+202	12 02 53	41.3	245.7	3.1		35.6	24	960	20 31 30
20 41 00	---	12 12 25	40.0	248.1	3.3		36.4	570	996	20 31 31
20 41 30	0851+202	12 12 55	39.9	248.3	3.3		36.4	24	996	20 41 30
20 51 00	---	12 22 27	38.6	250.6	3.4		37.1	570	1033	20 41 31
20 51 30	0851+202	12 22 57	38.5	250.7	3.5		37.1	24	1033	20 51 30
21 01 00	---	12 32 28	37.2	252.9	3.6		37.7	570	1069	20 51 31
21 01 30	0851+202	12 32 58	37.1	253.1	3.6		37.7	24	1069	21 01 30
21 11 00	---	12 42 30	35.7	255.2	3.8		38.2	570	1106	21 01 31
----- EVN+VLBA K-band scans on target source -----										
21 11 30	0851+202	12 43 00	35.7	255.4	3.8		38.2	24	1106	21 11 30
21 20 30	---	12 52 01	34.3	257.4	3.9		38.6	540	1140	21 11 31
----- EVN+VLBA K-band scans on target source -----										
21 21 30	0851+202	12 53 02	34.2	257.6	4.0		38.6	54	1140	21 21 30
21 31 00	---	13 02 33	32.8	259.7	4.1		39.0	570	1177	21 21 31
21 31 30	0851+202	13 03 03	32.7	259.8	4.1		39.0	24	1177	21 31 30
21 41 00	---	13 12 35	31.3	261.9	4.3		39.3	570	1213	21 31 31
21 41 30	0851+202	13 13 05	31.2	262.0	4.3		39.3	24	1213	21 41 30
21 51 00	---	13 22 36	29.8	264.0	4.4		39.5	570	1250	21 41 31
21 51 30	0851+202	13 23 07	29.7	264.1	4.5		39.5	24	1250	21 51 30
22 01 00	---	13 32 38	28.3	266.0	4.6		39.6	570	1287	21 51 31
22 01 30	0851+202	13 33 08	28.2	266.2	4.6		39.6	24	1287	22 01 30
22 07 30	---	13 39 09	27.3	267.4	4.7		39.7	360	1310	22 01 31

```
-----
```

Schedule for TORUN (Code Tr )

Page 5

RadioAstron AGN polarization imaging

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

```
-----
Start UT  Source          Start / Stop          Early  Disk  TPStart
Stop UT   LST      EL  AZ  HA  UP  ParA  Dwell  GBytes  SYNC
-----
```

--- Mon 25 Apr 2016 Day 116 ---

```
22 08 00  0851+202    13 39 39  27.3 267.5  4.7      39.7   24   1310  22 08 00
22 17 30  ---          13 49 11  25.8 269.4  4.9      39.7  570   1346  22 08 01
```

----- Ground-only U,Q,K-band scans on fringe-finder 0716+71 -----

```
22 21 00  0716+714    13 52 41  47.2 332.1  6.5      61.2   70   1346  22 21 00
22 25 00  ---          13 56 42  46.9 332.4  6.6      60.4  240   1362  22 21 01

22 26 00  0851+202    13 57 42  24.5 271.1  5.0      39.7  -77   1362  22 26 00
22 39 30  ---          14 11 14  22.5 273.8  5.3      39.6  733   1413  22 26 01
```

----- K-band VLBI scans. Space segment 03: 0851+202 -----

```
22 40 00  0851+202    14 11 44  22.4 273.9  5.3      39.6   24   1413  22 40 00
22 50 00  ---          14 21 46  20.9 275.8  5.4      39.5  600   1452  22 40 01

22 50 30  0851+202    14 22 16  20.9 275.9  5.4      39.5   24   1452  22 50 30
23 00 00  ---          14 31 48  19.4 277.8  5.6      39.3  570   1488  22 50 31

23 00 30  0851+202    14 32 18  19.4 277.9  5.6      39.3   24   1488  23 00 30
23 10 00  ---          14 41 49  18.0 279.7  5.8      39.1  570   1525  23 00 31

23 10 30  0851+202    14 42 20  17.9 279.8  5.8      39.0   24   1525  23 10 30
23 20 00  ---          14 51 51  16.5 281.6  5.9      38.8  570   1562  23 10 31

23 20 30  0851+202    14 52 21  16.4 281.7  5.9      38.7   24   1562  23 20 30
23 30 00  ---          15 01 53  15.0 283.5  6.1      38.4  570   1598  23 20 31

23 30 30  0851+202    15 02 23  14.9 283.6  6.1      38.4   24   1598  23 30 30
23 40 00  ---          15 11 54  13.6 285.4  6.3      38.0  570   1635  23 30 31

23 45 30  1633+382    15 17 25  69.8 130.1 -1.3     -35.7   4   1635  23 45 30
23 49 30  ---          15 21 26  70.3 132.0 -1.2     -34.6  240   1650  23 45 31

23 50 00  3C345       15 21 56  70.8 125.6 -1.4     -39.4   2   1650  23 50 00
23 59 30  ---          15 31 28  71.9 130.1 -1.2     -36.7  570   1687  23 50 01
```

--- Tue 26 Apr 2016 Day 117 ---

```
00 00 00  1633+382    15 31 58  71.4 137.3 -1.1     -31.2   1   1687  00 00 00
00 09 30  ---          15 41 29  72.3 142.5 -0.9     -27.7  570   1723  00 00 01

00 10 00  3C345       15 41 59  73.1 135.6 -1.0     -33.1   1   1723  00 10 00
00 19 30  ---          15 51 31  74.0 141.1 -0.9     -29.4  570   1760  00 10 01
```

Schedule for TORUN (Code Tr )

Page 6

RadioAstron AGN polarization imaging

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC
-----										
--- Tue 26 Apr 2016 Day 117 ---										
00 20 00	1633+382	15 52 01	73.2	148.8	-0.7		-23.3	0	1760	00 20 00
00 29 30	---	16 01 32	73.9	155.0	-0.6		-18.8	570	1796	00 20 01
00 30 00	3C345	16 02 03	74.9	147.9	-0.7		-24.6	1	1796	00 30 00
00 39 30	---	16 11 34	75.6	154.5	-0.5		-19.6	570	1833	00 30 01
00 40 00	1633+382	16 12 04	74.5	162.3	-0.4		-13.4	0	1833	00 40 00
00 49 30	---	16 21 36	74.8	169.2	-0.2		-8.2	570	1869	00 40 01
00 50 00	3C345	16 22 06	76.2	162.5	-0.4		-13.6	1	1869	00 50 00
00 59 30	---	16 31 37	76.5	170.1	-0.2		-7.7	570	1906	00 50 01
01 00 00	1633+382	16 32 07	75.0	177.2	-0.1		-2.2	1	1906	01 00 00
01 09 30	---	16 41 39	75.0	184.4	0.1		3.4	570	1942	01 00 01
01 10 00	3C345	16 42 09	76.7	178.8	-0.0		-0.9	4	1942	01 10 00
01 19 30	---	16 51 41	76.6	186.8	0.1		5.3	570	1979	01 10 01
01 20 00	1633+382	16 52 11	74.7	192.3	0.3		9.4	4	1979	01 20 00
01 29 30	---	17 01 42	74.4	199.2	0.4		14.5	570	2015	01 20 01
01 30 00	3C345	17 02 12	76.3	195.3	0.3		11.9	7	2015	01 30 00
01 39 30	---	17 11 44	75.8	202.7	0.5		17.5	570	2052	01 30 01
01 40 00	1633+382	17 12 14	73.7	206.4	0.6		19.8	8	2052	01 40 00
01 49 30	---	17 21 46	73.0	212.5	0.8		24.2	570	2088	01 40 01
01 50 00	3C345	17 22 16	75.1	210.2	0.6		23.2	8	2088	01 50 00
01 59 30	---	17 31 47	74.4	216.5	0.8		27.7	570	2125	01 50 01
02 00 00	1633+382	17 32 17	72.1	218.7	0.9		28.5	8	2125	02 00 00
02 09 30	---	17 41 49	71.2	223.8	1.1		31.9	570	2162	02 00 01
02 10 00	3C345	17 42 19	73.3	222.8	1.0		32.1	8	2162	02 10 00
02 19 30	---	17 51 51	72.3	228.0	1.1		35.5	570	2198	02 10 01
02 20 00	1633+382	17 52 21	70.0	229.0	1.3		35.2	8	2198	02 20 00
02 29 30	---	18 01 52	68.9	233.3	1.4		37.7	570	2235	02 20 01
02 30 00	3C345	18 02 22	71.1	233.1	1.3		38.7	8	2235	02 30 00
02 39 30	---	18 11 54	69.9	237.3	1.5		41.1	570	2271	02 30 01
02 40 00	1633+382	18 12 24	67.6	237.7	1.6		40.1	8	2271	02 40 00
02 49 30	---	18 21 55	66.4	241.3	1.8		42.0	570	2308	02 40 01

Schedule for TORUN (Code Tr )

Page 7

RadioAstron AGN polarization imaging

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
 Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC
--- Tue 26 Apr 2016 Day 117 ---										
02 50 00	3C345	18 22 26	68.6	241.6	1.6		43.4	8	2308	02 50 00
02 59 30	---	18 31 57	67.3	245.1	1.8		45.1	570	2344	02 50 01
03 00 00	1633+382	18 32 27	65.0	245.0	1.9		43.7	8	2344	03 00 00
03 09 30	---	18 41 59	63.7	248.1	2.1		45.1	570	2381	03 00 01
03 11 00	3C345	18 43 29	65.7	248.9	2.0		46.8	68	2381	03 11 00
03 15 30	---	18 48 00	65.1	250.3	2.1		47.4	270	2398	03 11 01
03 16 00	1633+382	18 48 30	62.7	250.1	2.2		45.8	8	2398	03 16 00
03 20 30	---	18 53 01	62.1	251.4	2.3		46.3	270	2415	03 16 01
03 21 00	3C345	18 53 31	64.3	252.0	2.2		48.0	8	2415	03 21 00
03 25 30	---	18 58 01	63.6	253.3	2.2		48.5	270	2433	03 21 01
03 26 00	1633+382	18 58 31	61.3	253.0	2.4		46.9	8	2433	03 26 00
03 30 30	---	19 03 02	60.7	254.2	2.5		47.2	270	2450	03 26 01
03 31 00	3C345	19 03 32	62.8	254.9	2.3		49.0	8	2450	03 31 00
03 35 30	---	19 08 03	62.2	256.1	2.4		49.3	270	2467	03 31 01
03 36 00	1633+382	19 08 33	59.9	255.7	2.5		47.7	8	2467	03 36 00
03 40 30	---	19 13 04	59.2	256.9	2.6		48.0	270	2485	03 36 01
03 41 00	3C345	19 13 34	61.4	257.6	2.5		49.7	8	2485	Stopped
03 50 30	---	19 23 06	60.0	260.0	2.7		50.3	570	2485	
03 51 00	1633+382	19 23 36	57.7	259.5	2.8		48.6	8	2485	Stopped
04 00 30	---	19 33 07	56.3	261.8	3.0		49.0	570	2485	
04 01 00	3C345	19 33 37	58.4	262.5	2.8		50.8	8	2485	Stopped
04 10 30	---	19 43 09	57.0	264.6	3.0		51.1	570	2485	
04 11 00	1633+382	19 43 39	54.7	264.1	3.1		49.4	8	2485	Stopped
04 20 30	---	19 53 10	53.3	266.2	3.3		49.6	570	2485	
04 21 00	3C345	19 53 41	55.4	266.9	3.2		51.3	8	2485	Stopped
04 30 30	---	20 03 12	54.0	268.9	3.3		51.4	570	2485	
04 31 00	1633+382	20 03 42	51.7	268.4	3.5		49.7	8	2485	Stopped
04 40 30	---	20 13 14	50.3	270.3	3.6		49.7	570	2485	
04 41 00	3C345	20 13 44	52.4	271.0	3.5		51.4	8	2485	Stopped
04 50 30	---	20 23 15	51.0	272.8	3.7		51.3	570	2485	



Schedule for TORUN (Code Tr )

Page 8

RadioAstron AGN polarization imaging

UP: D =&gt; Below limits; H =&gt; Below horizon mask; W =&gt; still slewing at end; blank =&gt; Up.

Early: Seconds between end of slew and start. Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are L0 sum (band edge).

SYNC: Time correlator is expected to sync up.

Start UT	Source	Start / Stop					Early	Disk	TPStart	
Stop UT		LST	EL	AZ	HA	UP	ParA	Dwell	GBytes	SYNC
-----										
--- Tue 26 Apr 2016 Day 117 ---										
04 51 00	1633+382	20 23 45	48.7	272.4	3.8		49.7	8	2485	Stopped
05 00 30	---	20 33 17	47.2	274.2	4.0		49.6	570	2485	
05 01 00	3C345	20 33 47	49.4	274.8	3.8		51.1	8	2485	Stopped
05 10 30	---	20 43 19	48.0	276.6	4.0		50.9	570	2485	
05 11 00	1633+382	20 43 49	45.7	276.2	4.1		49.3	8	2485	Stopped
05 20 30	---	20 53 20	44.3	277.9	4.3		49.1	570	2485	
05 21 00	3C345	20 53 50	46.4	278.4	4.2		50.6	8	2485	Stopped
05 30 30	---	21 03 22	45.0	280.1	4.3		50.3	570	2485	
05 31 00	1633+382	21 03 52	42.7	279.8	4.5		48.8	8	2485	Stopped
05 40 30	---	21 13 24	41.3	281.4	4.6		48.4	570	2485	
05 41 00	3C345	21 13 54	43.4	281.9	4.5		49.9	8	2485	Stopped
05 50 30	---	21 23 25	42.0	283.5	4.7		49.4	570	2485	
05 51 00	1633+382	21 23 55	39.7	283.3	4.8		48.0	8	2485	Stopped
06 00 30	---	21 33 27	38.4	284.9	5.0		47.5	570	2485	
06 01 00	3C345	21 33 57	40.5	285.3	4.8		48.9	8	2485	Stopped
06 10 30	---	21 43 29	39.1	286.9	5.0		48.4	570	2485	
06 11 00	1633+382	21 43 59	36.8	286.6	5.1		47.0	8	2485	Stopped
06 20 30	---	21 53 30	35.5	288.2	5.3		46.4	570	2485	
06 21 00	3C345	21 54 00	37.6	288.6	5.2		47.8	8	2485	Stopped
06 30 30	---	22 03 32	36.3	290.1	5.3		47.2	570	2485	
06 31 00	1633+382	22 04 02	34.0	290.0	5.5		45.8	8	2485	Stopped
06 40 30	---	22 13 33	32.6	291.6	5.6		45.2	570	2485	
06 41 00	3C345	22 14 04	34.8	291.8	5.5		46.5	8	2485	Stopped
06 50 30	---	22 23 35	33.5	293.4	5.7		45.8	570	2485	
06 51 00	1633+382	22 24 05	31.2	293.3	5.8		44.5	8	2485	Stopped
07 00 30	---	22 33 37	29.9	294.8	6.0		43.8	570	2485	

## SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
 ===== Setup file: ra1cm2.set

```

Setup group:   15          Station: TORUN          Total bit rate:   512
Format: MARK5B          Bits per sample:  2          Sample rate: 32.000
Number of channels:  8    DBE type: DBBC_DDC        Speedup factor:   1.00
  
```

Disk used to record data.

```

1st LO=  21500.00  21500.00  21500.00  21500.00  21500.00  21500.00  21500.00  21500.00
Net SB=           U           U           L           L           U           U           L           L
IF SB =           U           U           U           U           U           U           U           U
Pol.  =           RCP          LCP          RCP          LCP          RCP          LCP          RCP          LCP
BBC   =           1           5           1           5           2           6           2           6
BBC SB=           U           U           L           L           U           U           L           L
IF    =           A1          B1          A1          B1          A1          B1          A1          B1
  
```

The following frequency sets based on these setups were used.

```

Frequency Set:  7  Setup file default.  Used with PCAL = 1MHz
LO sum=  22236.00  22236.00  22236.00  22236.00  22268.00  22268.00  22268.00  22268.00
BBC fr=   736.00   736.00   736.00   736.00   768.00   768.00   768.00   768.00
Bandwd=   16.00   16.00   16.00   16.00   16.00   16.00   16.00   16.00
Matching frequency sets:  7
  
```

Track assignments are:

```

track1=  2,  6, 10, 14,  4,  8, 12, 16
barrel=roll_off
  
```

## POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 54.228301	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 45.83009	0.00
	fake circumpolar target for a TS to look at			
* 0059+581	00 59 43.470970	* 01 02 45.762378	01 03 43.932811	0.00
J0102+5824	58 08 04.84745	* 58 24 11.13660	58 29 12.08599	0.00
	./gg079c_sources.radioastron			
	AGN, MASIV, rfc_2013d Petrov, 2013, unpublished 319479 observations, RA-A03-04,			
* 0716+714	07 16 13.029739	* 07 21 53.448474	07 23 41.581091	0.00
J0721+7120	71 26 15.17406	* 71 20 36.36340	71 18 48.34423	0.00
	./gg079c_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 42370 observations, RA-A03-04, RA-A02-1			
* 0851+202	08 51 57.250618	* 08 54 48.874930	08 55 44.488404	0.00
J0854+2006	20 17 58.41733	* 20 06 30.64078	20 02 39.31337	0.00
OJ287	./gg079c_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 213710 observations, RA-A03-04, RA-A03-			
* 1633+382	16 33 30.625100	* 16 35 15.492975	16 35 50.735816	0.00
J1635+3808	38 14 10.08266	* 38 08 04.50043	38 06 04.33594	0.00
4C38.41	./gg079c_sources.radioastron			

AGN, rfc\_2013d Petrov, 2013, unpublished 16451 observations, RA-A03-04, RA-A03-0

1641+399	16 41 17.606226	* 16 42 58.809963	16 43 32.872709	0.00
J1642+3948	39 54 10.81479	* 39 48 36.99385	39 46 46.74911	0.00

\* 3C345  
./gg079c\_sources.radioastron

AGN, rfc\_2013d Petrov, 2013, unpublished 51938 observations, RA-A03-04, RA-A03-0

* 2351+456	23 51 49.972507	* 23 54 21.680217	23 55 10.238966	0.00
J2354+4553	45 36 22.77745	* 45 53 04.23639	45 58 16.29707	0.00

./gg079c\_sources.radioastron

AGN, rfc\_2013d Petrov, 2013, unpublished 2579 observations, RA-A03-04, RA-A02-12

**rk12vhtr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: L-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.

Early: Seconds between end of slew and start.    Dwell: On source seconds.

Disk: GBytes recorded to this point.

TPStart: Recording start time. Frequencies are LO sum (band edge).

SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST       EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Wed 27 Apr 2016    Day 118 ---

----- L-band VLBI scans -----

Next scan frequencies: 1668.00 1668.00 1668.00 1668.00  
Next BBC frequencies:    732.00    732.00    732.00    732.00  
Next scan bandwidths:    16.00    16.00    16.00    16.00

13 00 00	0851+202	04 38 02	31.2	98.0	-4.3		-39.3	0	0	13 00 00
13 14 30	---	04 52 35	33.3	101.1	-4.1		-38.8	870	28	13 00 01
13 15 00	0851+202	04 53 05	33.4	101.2	-4.0		-38.8	24	28	13 15 00
13 29 30	---	05 07 37	35.5	104.4	-3.8		-38.2	870	56	13 15 01
13 30 00	0851+202	05 08 07	35.6	104.6	-3.8		-38.2	24	56	13 30 00
13 44 30	---	05 22 40	37.7	107.9	-3.6		-37.5	870	84	13 30 01
13 45 00	0851+202	05 23 10	37.8	108.0	-3.5		-37.4	24	84	13 45 00
14 00 00	---	05 38 12	39.9	111.7	-3.3		-36.4	900	112	13 45 01

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra18cm2.set

Setup group:    4	Station: TORUN	Total bit rate:    256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor:    1.00

Disk used to record data.

1st LO=	2400.00	2400.00	2400.00	2400.00
Net SB=	L	L	U	U
IF SB =	L	L	L	L
Pol. =	RCP	LCP	RCP	LCP
BBC =	1	2	1	2
BBC SB=	U	U	L	L
IF =	C	A	C	A

The following frequency sets based on these setups were used.

Frequency Set: 3 Setup file default. Used with PCAL = 1MHz  
 LO sum= 1668.00 1668.00 1668.00 1668.00  
 BBC fr= 732.00 732.00 732.00 732.00  
 Bandwd= 16.00 16.00 16.00 16.00  
 Matching frequency sets: 3

Track assignments are:

track1= 2, 18, 3, 19  
 barrel=roll\_off

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 53.948220	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 46.23637	0.00
	fake circumpolar target for a TS to look at			
* 0851+202	08 51 57.250618	* 08 54 48.874930	08 55 44.465639	0.00
J0854+2006	20 17 58.41733	* 20 06 30.64078	20 02 39.37247	0.00
OJ287	./rk12vh_sources.radioastron AGN, rfc_2013d Petrov, 2013, unpublished 213710 observations, RA-A03-04, RA-A03-			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
0851+202	93.0

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

**rk12vitr**

RADIOASTRON AGN SURVEY

PI: *Yuri Kovalev*

Address: ASC Lebedev                      Profsoyuznaya 84/32                      117997 Moscow, Russia  
Phone:    +7-495-3332512                      EMAIL:    kirx@scan.sai.msu.ru  
Fax:       +7-495-3332378                      Phone during observation: +7-903-6614865

Observing mode: C/L-band, dual-pol

Schedule for TORUN                      (Code Tr )    Page    2

RadioAstron AGN Survey

UP: D => Below limits; H => Below horizon mask; W => still slewing at end; blank => Up.  
Early: Seconds between end of slew and start.    Dwell: On source seconds.  
Disk: GBytes recorded to this point.  
TPStart: Recording start time. Frequencies are LO sum (band edge).  
SYNC: Time correlator is expected to sync up.

-----  
Start UT    Source                      Start / Stop                      Early    Disk    TPStart  
Stop UT                      LST       EL    AZ    HA    UP    ParA    Dwell    GBytes    SYNC  
-----

--- Thu 28 Apr 2016 Day 119 ---

----- L-band VLBI scans -----

Next scan frequencies:	1668.00	1668.00	1668.00	1668.00							
Next BBC frequencies:	732.00	732.00	732.00	732.00							
Next scan bandwidths:	16.00	16.00	16.00	16.00							
23 00 00	0851+202	14 43 37	17.7 -80.0	5.8		39.0	0	0	23 00 00		
23 14 30	---	14 58 10	15.6 -77.2	6.0		38.6	870	28	23 00 01		
23 15 00	0851+202	14 58 40	15.5 -77.1	6.0		38.5	24	28	23 15 00		
23 29 30	---	15 13 12	13.4 -74.3	6.3		38.0	870	56	23 15 01		
23 30 00	0851+202	15 13 42	13.3 -74.2	6.3		38.0	24	56	23 30 00		
23 44 30	---	15 28 15	11.2 -71.5	6.5		37.3	870	84	23 30 01		
23 45 00	0851+202	15 28 45	11.1 -71.4	6.6		37.3	24	84	23 45 00		
23 59 59	---	15 43 47	9.0 -68.5	6.8		36.5	899	112	23 45 01		

SETUP FILE INFORMATION:

NOTE: If DOPPLER, FREQ, or BW were used, see the individual scans for the final BBC settings.

=====  
Setup file: ra18cm2.set

Setup group:    6	Station: TORUN	Total bit rate:    256
Format: MKIV1:4	Bits per sample: 2	Sample rate: 32.000
Number of channels: 4	DBE type:	Speedup factor: 1.00

Disk used to record data.

1st LO=	2400.00	2400.00	2400.00	2400.00
Net SB=	L	L	U	U
IF SB =	L	L	L	L
Pol. =	RCP	LCP	RCP	LCP
BBC =	1	2	1	2
BBC SB=	U	U	L	L
IF =	C	A	C	A

The following frequency sets based on these setups were used.

Frequency Set: 4 Setup file default. Used with PCAL = 1MHz  
 LO sum= 1668.00 1668.00 1668.00 1668.00  
 BBC fr= 732.00 732.00 732.00 732.00  
 Bandwd= 16.00 16.00 16.00 16.00  
 Matching frequency sets: 4

Track assignments are:

track1= 2, 18, 3, 19  
 barrel=roll\_off

#### POSITIONS OF SOURCES USED IN RECORDING SCANS

Source	Source position (RA/Dec) (B1950)	(J2000)	(Date)	Error (mas)
* FAKERA	11 57 21.769299	* 12 00 00.000000	12 00 53.753700	0.00
	85 16 41.77889	* 85 00 00.000000	84 54 46.53409	0.00
	fake circumpolar target for a TS to look at			
* 0851+202	08 51 57.250618	* 08 54 48.874930	08 55 44.449140	0.00
J0854+2006	20 17 58.41733	* 20 06 30.64078	20 02 39.43886	0.00
OJ287	./rk12vi_sources.radioastron			
	AGN, rfc_2013d Petrov, 2013, unpublished 213710 observations, RA-A03-04, RA-A03-			

#### EFFECT OF SOLAR CORONA

The solar corona can cause unstable phases for sources too close to the Sun. SCHED provides warnings at individual scans for distances less than 10 degrees. The distance from the Sun to each source in this schedule is:

Source	Sun distance (deg)
0851+202	91.6

Barry Clark estimates from predictions by Ketan Desai of IPM scattering sizes that the Sun will cause amplitude reductions on the longest VLBA baselines at a solar distance of  $60 \text{ deg } F^{-0.6}$  where  $F$  is in GHz.

For common VLBI bands, this is:

1.6 GHz	45. deg
2.3 GHz	36. deg
5.0 GHz	23. deg
8.4 GHz	17. deg
15.0 GHz	12. deg
22.0 GHz	9. deg

# Contents

Graphical Plan of Experiments in Apr 2016 .....	1
Experiment Listing .....	3
rk12tftr – RadioAstron AGN Survey .....	6
rk12t1tr – RadioAstron AGN Survey .....	8
rk12tmtr – RadioAstron AGN Survey .....	10
rk12tntr – RadioAstron AGN Survey .....	12
rk12tqtr – RadioAstron AGN Survey .....	14
rk12trtr – RadioAstron AGN Survey .....	17
rk12tstr – RadioAstron AGN Survey .....	20
rk12tutr – RadioAstron AGN Survey .....	22
rk12twtr – RadioAstron AGN Survey .....	24
rk12tztr – RadioAstron AGN Survey .....	26
rk12uatr – RadioAstron AGN Survey .....	28
eb055atr – M81 jet fine-structure imaging .....	30
eb055btr – M81 jet fine-structure imaging .....	32
eb055ctr – M81 jet fine-structure imaging .....	34
eb055dtr – M81 jet fine-structure imaging .....	37
rk12ubtr – RadioAstron AGN Survey .....	40
rk12uctr – RadioAstron AGN Survey .....	42
rk12udtr – RadioAstron AGN Survey .....	44
rk12uftr – RadioAstron AGN Survey .....	46
rk12ugtr – RadioAstron AGN Survey .....	48
rk12uhtr – RadioAstron AGN Survey .....	50
rk12ujtr – RadioAstron AGN Survey .....	52
rs002tr – 6.7 GHz CH <sub>3</sub> OH masers and S255 .....	54
rk12untr – RadioAstron AGN Survey .....	68
rk12uotr – RadioAstron AGN Survey .....	70
rk12uptr – RadioAstron AGN Survey .....	72
rk12uqtr – RadioAstron AGN Survey .....	74
rk12urtr – RadioAstron AGN Survey .....	76
rk12ustr – RadioAstron AGN Survey .....	78
rk12uttr – RadioAstron AGN Survey .....	80
rk12uutr – RadioAstron AGN Survey .....	82
rk12uvtr – RadioAstron AGN Survey .....	84
gg079btr – RadioAstron AGN polarization imaging .....	86
rk12uwtr – RadioAstron AGN Survey .....	93
rk12uxtr – RadioAstron AGN Survey .....	95
rk12uytr – RadioAstron AGN Survey .....	97
rk12uztr – RadioAstron AGN Survey .....	99
rk12vatr – RadioAstron AGN Survey .....	101
rk12vbtr – RadioAstron AGN Survey .....	103
rk12vctr – RadioAstron AGN Survey .....	105
rk12vdtr – RadioAstron AGN Survey .....	107
rk12vetr – RadioAstron AGN Survey .....	109
rk12vftr – RadioAstron AGN Survey .....	111
rg18itr – RadioAstron Megamaser observations .....	113
gg079ctr – RadioAstron AGN polarization imaging .....	115
rk12vhtr – RadioAstron AGN Survey .....	124
rk12vitr – RadioAstron AGN Survey .....	126