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# Commonly Used XOB Guide

**Last Updated: 2026/02/20**

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*AEC1: regular  
exposure*

*AEC2: longer  
exposure*

*AEC3: shorter  
exposure*

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## Active Region Guide

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Please take care with the AR programs that you use for planning. Remember that we want the active region structure to be mostly unsaturated, so if during your DV work, you notice that all images in a particular filter are saturated over the majority of the active region, then it is time to switch programs!

XOBs should include G-band light-leak image (VLS close, 1x1 binned) and G-band image (1x1 binned) at least every hour. Here is a helpful guide for some of the most common "families" of 2-filter active region programs:

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**AR (Filter-Ratio with Al/Poly and thin-Be) with PFB, 512x512 at 1064, 1048, thick-Al context with G-band (1ms/1ms leak) XXX cad**

These are the programs that resulted in saturation being consistently seen in the Al/Poly images in late 2019. This program utilizes only the AEC 2. This is fine for fainter ARs but results in consistent saturation in the Al/Poly for moderate to bright ARs. These programs should only be used if the AR is known to be faint or if previous observations resulted in under-exposed images.

*Members: #1C6C (240s cad), #1C74 (150s cad), #1BDB (120s cad), #1BC4 (90s cad), #1B9D (72s cad), #1C60 (60s cad), #1BCB (30s cad), #1BED (20s cad)*

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**AR (Filter-Ratio with Al/Poly and thin-Be long/short pairs) with PFB,  
512x512 at 1064 1048, thick-Al context with G-band (1ms/1ms leak)  
XXX cad**

These programs take AL-POLY and BE-THIN images in long (AEC 2) and short (AEC 3) pairs. Thin-Be images are taken only as part of the pre-flare buffers. The loop structure is set up so that the images are taken in long/short pairs, so these programs should be used when getting the long/short pairs of just Al-Poly is the primary goal. NOTE: Update: AR 512x512 XOB replacements (SEQ 2DE8 → 2F23)

*Members: #1D3F (300s cad), #1D3E (240s cad), #1D40 (180s cad), #1D41 (120s cad), #1D42 (90s cad), #1D43 (72s cad)*

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**AR - Standard Core - (Filter-Ratio with Al/Poly and thin-Be long/short pairs) with PFB at 1064, 1048 thin-be, and Al/Poly context with G-band (1ms/1ms VLS=CLS), XXX cad**

These programs take a single long (AEC 2) and short (AEC 3) pair and will then mainly loop over images with AEC 1 set. AEC 1 should not have the same issues with saturation seen with AEC 2, but has a slightly less strict upper threshold than AEC 3. These programs should be used on moderate to bright ARs when a small set of long/short pairs is desired but the long/short pairs are not the main goal of the observations.

*Members: #1D1F (600s cad), #1BFE (300s cad), #1CD7 (180s), #1BBA (120s cad), #1BB9 (90s cad), #1BDE (72s cad), #1B89 (60s cad), #1BA9 (30s cad)*

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**AR Standard-A (Filter-Ratio with Al/Poly and thin-Be) with PFB,  
384x384 at 1064 1048, thin-Be, thick-Al, Al/Poly context with G-band**

### **(1ms/1ms leak) XXX cad**

These programs only use AEC 3 and loop over the filter set with just AEC 3. This should be used when the AR is known to be moderate to bright.

Note: 1BA4 is different in that it loops mainly with AEC 1 but the others loop with AEC 3. 1BA4 can still be used but be aware the upper threshold on AEC 1 is less strict than the AEC 3 threshold.

*Members: #1C50 (240s cad), #1BB8 (120s cad), #1BA3 (90s cad), #1C8B (60s), #1BA4 (30s cad)*

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### **AR Standard-B(Morphology) with PFB, thin-Be 384x384 at 1064 1048, XXs-cad, G-band (1ms/1ms VLS=CLS)**

These programs only use Thin-Be. Typically run at a higher cadence if Thin-Be is a specific science goal. Uses AEC3 and has a PFB.

*Members: #1C22 (120s cad), #1C25 (60s) #1CB5 (30s)*

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### **AR - Filter-Ratio with thin-Be (long/short pairs) and Med-Be (short) with PFB, 384x384 at 1064 1048, with G-band (1ms/1ms VLS=CLS), XX cad**

These programs take short and long Thin-Be images (AEC2 and AEC3) and then a Med-Be image with AEC 3. This should be used if the goal of the science is to capture images with Thin-Be and Med-Be instead of the typical Thin-Be and Al-Poly.

*Members: #1CE7 (180s cad), #1CA7 (120s cad), #1C97 (60s cad)*

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### **AR-(filter ratio Al/poly thin-Be), 256x256 at 1064 1048, with G-band 1ms, PFB, 30s cad**

These programs take Al/Poly and Thin-Be images with AEC 1 at 256x256.

*Members: #1CB8 (30s cad), #1CB9 (60s cad)*

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**AR-High cadence (10s thin-Be only) XXX x XXX at 1064 1048**

These programs only Thin-Be images with AEC 3 at a very high cadence (10 seconds)

*Members: #1CD5 (512x512), #1CD6 (384x384), #1CC2 (384x384 8s), #1CC3 (256x256)*

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**Regular Synoptics**

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Please ensure that AI-mesh is included in the synoptic program for continuity of full-sun observations throughout the Hinode mission. Planners can update the exposures, as needed, for the Synoptics. This may mean writing a new XOB instead of using an already existing XOB, though at this point in the mission the majority of combinations have been created.

As the Sun gets more and more active, we may need to modify some of the very short exposure time sets to utilize the correct G-band 1ms. Please be wary when using any of the synoptics not currently on this list as this covers everything used going back to 2017. Others not on this list will likely have a 3ms G-band or longer.

<b>Moderate ARs (Short Exposures)</b>			
<b>XOB</b>	<b>AI-Mesh (ms)</b>	<b>AI-Poly (ms)</b>	<b>Thin-be (ms)</b>
#1CC7	2/128/723	12/181/1443	24/512/3897
#1BC0	8/128/1024	12/181/1443	64/1024/5795
#1BA7	8/181/2897	16/181/4096	64/1024/11571

<b>Weak ARs (Medium Exposure Times)</b>
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<b>XOB</b>	<b>AI-Mesh (ms)</b>	<b>AI-Poly (ms)</b>	<b>Thin-be (ms)</b>
#1CA9	16/181/2048	24/362/4096	181/2048/11571
#1C52	16/181/2048	24/362/4096	362/3897/16384
#1C9E	24/256/2897	44/512/4096	362/2897/16384
#1B8B	64/512/2048	45/512/4096	362/3897/16384
#1BB4	24/256/2897	45/512/4096	1024/11571/23142
#1BD9	64/512/2897	45/512/4096	1024/11571/23142
#1C8F	64/512/2897	128/1024/4096	512/8192/23142
#1C6B	64/512/2897	128/1024/4096	1024/11571/23142
#1C31	64/512/2897	181/1024/8192	1024/11571/23412
#1C7C	181/1024/5795	256/2897/8192	1024/11571/23142
#1C2A	181/1024/5795	181/1024/8192	2897/16384/32768
#1C53	181/1024/5795	256/2897/8192	3897/16384/32768

<b>No ARs/Quiet Sun (Long Exposures)</b>			
<b>XOB</b>	<b>AI-Mesh (ms)</b>	<b>AI-Poly (ms)</b>	<b>Thin-be (ms)</b>
#1BE7	512/2048/4096	512/4096/8192	2897/16384/32768
#1C0C	512/2048/4096	512/4096/8192	3897/16384/32768
#1C1B	512/2048/5795	512/4096/8192	3897/16384/32768
#1C55	512/2048/5795	512/5795/11571	3897/16384/32768

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### **Regular 7-Filter Synoptics**

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7-filter synoptics XOB should be run at least twice a week. In order to keep the 7-filter synoptic program under 7 minutes, we take thick filter images only once in these programs (it was twice before). In compensation, we decided to run a 7-filter synoptic twice a week. Additional 7-filter synoptics can be taken whenever telemetry is available or if there is a specific science request for it (such as HOP 130).

All the XOBs below use a 1ms G-band exposure time. Synoptics not on this list should be examined carefully since they are likely to use an incorrect G-band exposure time.

<b>XOB</b>	<b>Al-Mesh (ms)</b>	<b>Al-Poly (ms)</b>	<b>Thin-Be (ms)</b>	<b>Thick-Be (ms)</b>	<b>Al Poly + Ti Poly (ms)</b>	<b>Med-Al (ms)</b>
#1CC9	2/128/723	12/181/1443	64/1024/5795	32768	128/2048	2897/32768
#1CED	5/128/723	12/181/1443	33/512/4096	32768		
#1CCC	5/128/723	12/181/1443	64/1024/5795	32768	128/2048	2897/32768
#1CCB	8/128/1024	12/181/1443	64/1024/5795	65536	64/2048	2048/23142
#1C9C	12/181/1024	24/362/4096	181/2048/11571	65536	128/2048	4096/65536
#1BDD	24/256/2897	24/362/4096	181/2048/11571	65536	256/5795	2897/32768
#1BA8	24/256/2897	45/512/4096	181/2048/11571	65536	256/5795	2897/32768
#1C9F	24/256/2897	45/512/4096	362/2897/16384	65536	256/5795	4096/65536
#1B8D	24/256/2897	45/512/4096	512/8192/23142	65536	256/5795	4096/65536
#1BD8	64/512/2897	45/512/4096	1024/11571/23142	65536	512/8192	5795/65536
#1C90	64/512/2897	128/1024/4096	512/8192/23142	65536	512/8192	5795/65536
#1C45	64/512/2897	128/1024/4096	1024/11571/23142	65536	512/8192	5795/65536
#1C7D	181/1024/5795	256/2897/8192	1024/11571/23142	65536	512/8192	5795/65536
#1C13	512/2048/4096	512/4096/8192	3897/16384/32768	65536	4096/23142	5795/65536
#1C56	512/2048/5795	512/5795/11571	3897/16384/32768	65536	4096/23142	5795/65536

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**7-Filter Synoptics (for HOP448)**

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<b>XOB</b>	<b>Al-Mesh (ms)</b>	<b>Al-Poly (ms)</b>	<b>Thin-Be (ms)</b>	<b>Thick-Be (ms)</b>	<b>Med-Al (ms)</b>	<b>Med-Be (ms)</b>
#1D08	2/128/723	5/181/1443	24/512/4096	32768	181/5795/32768	88/4096/23142
#1CED	5/128/723	12/181/1443	33/512/4096	32768	256/8192/32768	128/5795/23142
#1CEF	5/128/723	12/181/1443	33/512/4096	65536	256/8192/32768	128/5795/23142
#1CF6	12/181/1024	12/181/1443	64/512/4096	65536	512/8192/32768	256/5795/23142

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## 8-Filter Synoptics (for HOP448)

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XOB	Al-Mesh (ms)	Al-Poly (ms)	Thin-Be (ms)	Thick-Be (ms)	Med-Al (ms)	Med-Be (ms)	Al-Poly/Ti-Poly (ms)
#1D19	2/128/723	5/181/1443	24/512/4096	32768	181/5795/32768	88/4096/23142	12/2048
#1D07	5/128/723	8/181/1443	33/512/4096	32768	256/8192/32768	128/5795/23142	45/2048
#1CEE	5/128/723	12/181/1443	33/512/4096	32768	256/8192/32768	128/5795/23142	64/2048
#1CF0	5/128/723	12/181/1443	33/512/4096	65536	256/8192/32768	128/5795/23142	64/2048
#1D2F	5/181/1413	12/256/2048	45/1024/8192	65536	256/8192/32768	128/5795/23142	64/4096

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## CME Watch

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Please make sure the CME watch program contains G-band images that are 512x512, bin 1x1, 1ms exposures (VLS open/closed) taken roughly once per hour. No 2x2 binning, or exposures longer than 1ms.

When no active regions are on the disk, the short exposure (AEC3) is too short. It would be better to switch to taking long/medium pairs (AEC2/AEC1) for better results. However, if ARs are on the disk then the long/short pairs (AEC2/AEC3) are better.

If Hinode is going to follow Quiet Sun/Coronal Holes, with no HOP request to XRT, then run CME watch with long/medium/short exposure pairs if there are active regions.

Running CME watch programs through SAAs produces mixed results. For the higher cadence observations (~180s) the short exposure time decreased to near 0. However, for the lower cadence observations (~360s) the short and long exposure times tended to max out (16s for long and short pairs). Generally, the programs recovered after a few exposures, but it did create a few bad images.

**Thin-Be & Al-Poly long/short pairs:**

#1B95 (90s cadence)  
 #1BB5 (120s cadence)  
 #1B94 (180s cadence)  
 #1BD5 (180s cadence)  
 #1B96 (360s cadence)  
 #1B97 (360s cadence)  
 #1C92 (600s cadence)  
 #1BD6 (900s cadence)  
 #1BD7 (900s cadence)  
 #1D23 (1800s cadence)

**Single filter/AEC programs (HOP366):**

#1C10 (Al-poly, AEC2, 60s cadence)  
 #1C14 (Al-Poly, AEC2, 30s cadence)  
 #1C11 (Al-poly, AEC2, 90s cadence)  
 #1C0F (Al-poly, AEC2, 120s cadence)  
 #1C12 (Al-poly, AEC2, 180s cadence)  
 #1C39 (Thin-Be, AEC2, 40s cadence)  
 #1C37 (Thin-Be, AEC2, 60s cadence)  
 #1C19 (Thin-Be, AEC2, 180s cadence)

**Al-Poly medium/short/long pairs:**

#1BBE (30s cadence)  
 #1B8C (90s cadence)  
 #1BB6 (180s cadence)  
 #1BB7 (360s cadence)

**Al-Poly long/medium pairs:**

#1BCC (360s cadence)  
 #1BCF (180s cadence)

**Al-Poly long/short pairs, Thin-Be, AEC2:**

#1C86 (300s cadence)  
 #1C5D (360s cadence)

**Thin-Be & Al-Poly long/short pairs:**

#1B95 (90s cadence)  
 #1BB5 (120s cadence)

**Al-Poly long/short pairs:**

#1CA1 (120s cadence)

**Al-Poly Short/Shortest (AEC 1/0):**

#1CC4 (30s cadence)

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**HOP 349**


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When there is no conflict with other HOPs, run 2-6UT on a daily basis.

<b>XOB</b>	<b>Al-Mesh (ms)</b>	<b>Al-Poly (ms)</b>	<b>Thin-Be (ms)</b>	<b>Synoptic Cadence (mins)</b>	<b>CME Cadence (seconds)</b>
#1D09	2/128/723	5/181/1443	16/512/3893	80	600
#1CC8	2/128/723	12/181/1443	24/512/3897	72	240
#1CCF	2/128/723	12/181/1443	24/512/3897	72	360
#1D1A	2/128/723	12/181/1443	24/512/3897	120	1200

#1CD0	2/128/723	12/181/1443	24/512/3897	300	900
#1CD1	2/128/723	12/181/1443	24/512/3897	375	1500
#1D2E	5/177/1443	12/250/2048	24/707/5795	375	1500
#1D37	8/181/2897	16/362/4096	45/1024/8192	120	600
#1D24	8/181/2897	16/181/4096	64/1024/11571	120	90
#1D29	8/181/2897	16/181/4096	64/1024/11571	45	1200
#1D28	8/181/2897	16/181/4096	64/1024/11571	45	720
#1C47	8/181/2897	16/181/4096	64/1024/11571	45	180
#1C9B	8/181/2897	16/181/4096	64/1024/11571	45	360
#1CBD	24/256/2897	45/512/4096	181/2048/11571	45	480
#1C98	24/256/2897	45/512/4096	512/8192/23142	45	600
#1CB6	24/256/2897	45/512/4096	512/8192/23142	45	300
#1C2C	24/256/2897	45/512/4096	1024/11571/23142	45	600
#1C70	24/256/2897	45/512/4096	1024/11571/23142	45	150 (w med-Be)
#1BEA	24/256/2897	45/512/4096	1024/11571/23142	45	150
#1BE2	24/256/2897	45/512/4096	1024/11571/23142	90	300
#1C0B	64/512/2897	45/512/4096	1024/11571/23142	90	120
#1C08	64/512/2897	45/512/4096	1024/11571/23142	90	300
#1C30	64/512/2897	181/1024/8192	1024/11571/23142	50	600
#1C71	64/512/2897	181/1024/8192	1024/11571/23142	50	600 (w med-Be)
#1C51	128/1024/5795	256/4096/8192	2048/16384/32768	35	420
#1C4D	128/1024/5795	256/4096/8192	2048/16384/32768	45	450
#1C44	128/1024/5795	256/4096/8192	2048/16384/32768	45	180
#1BF1	512/2048/4096	512/4096/8192	3897/16384/32768	45	90
#1C21 #1BE8	512/2048/4096	512/4096/8192	3897/16384/32768	45	150
#1C75	512/2048/4096	512/4096/8192	3897/16384/32768	45	300
#1C1F	512/2048/4096	512/4096/8192	3897/16384/32768	50	600

#1C00	512/2048/4096	512/4096/8192	3897/16384/32768	90	300
#1C57	512/2048/5795	512/5795/11571	2048/16384/32768	35	420
#1C7B	512/2048/5795	512/5795/11571	3897/16384/32768	45	300

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### HOP 336 and 393

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Single filter Al-Poly short and long images run for HOPs 336 and 393.

**Please run for periods of high activity:**

**#1CD9:** HOP393 - 4x4 - Full Sun double long/short pair AEC 2/3 - Al-poly - Dark (512ms) - G-band (1x1,512x512,1ms) - Leak (1x1,512x512,1ms) - 360s cad

**#1CDE:** HOP393/336 - 4x4 - Full Sun double long/short pair AEC 2/3 - Al-poly - Dark (512ms) - G-band (1x1,512x512,1ms) - Leak (1x1,512x512,1ms) - 720s cad

**#1D25:** HOP393/336 - 4x4 - Full Sun double long/short pair AEC 2/3 - Al-poly - Dark (512ms) - G-band (1x1,512x512,1ms) - Leak (1x1,512x512,1ms) - 1200s cad

Standard Programs for low activity periods:

<b>XOB</b>	<b>Short (ms)</b>	<b>Long (ms)</b>	<b>Cadence (s)</b>
#1C9A	128	2048	60
#1CE2	181	N/A	20
#1CCA	256	2048	300
#1C3D	256	4096	60
#1BA1	512	4096	60
#1C63	1024	8192	20
#1C5A	1024	8192	60
#1C6E	1024	8192	300

#1C77	2048	16384	30
#1C79	2048	16384	45
#1C76	2048	16384	60

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## HOP 81

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Al-Poly and Al-Mesh images for HOP 81 and HOP 206.

**Please run for periods of high activity: #1CDF or #1CE6**

#1CDF: HOP81/206 1-filter - Al/poly 6s, 60s cadence, G-band -  
384x384 1ms

#1CE6: HOP81/206 1-filter - Al/poly 6s, 120s cadence, G-band -  
384x384 1ms

Standard Programs for low activity periods:

<b>XOB</b>	<b>Al-Poly (ms)</b>	<b>Al-Mesh (ms)</b>	<b>Cadence (s)</b>
#1C09	5795	4096	60
#1B93	5795	4096	30
#1BE9	11571	16384	30

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## Solar Orbiter Coordinated Observations – SOOPs

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This section summarizes recommended XRT XOBs for Solar Orbiter coordinated observations (SOOP-related HOPs), including main and flare programs used during coordination periods. This table is under active development and will continue to be updated. For detailed coordination, exposure justification, and planning context, see the relevant xrt\_co email threads.

<b>HOP</b>	<b>Previous HOP</b>	<b>Main XOB</b>	<b>Flare XOB</b>	<b>Notes</b>
523	492	#1BA9 (30s, Al/Poly + thin-Be long/short pairs)	-	Burst SOOP Coordination

521	476, 489, 500, 515	#1D0D (60s cad) #1D2D (90s cad)	#1D27 (2s) or #1D26 (6s)	If fixed exposure is used, verify CCD safety and telemetry limits. If not fixed exposure, use AEC3 (HOP 476/489 approach).
518	337	#1B88	-	Older XOB (AEC1); may require update. CME Watch (#1C10) for CCD protection if needed
520	429	QS: #1CCD AR: #1CCE	-	Verify exposures against synoptics to avoid CCD saturation
522	-	#1C36, #1B97, #1BD5 (CME Watch family)	-	Verify cadence and telemetry before use
512	-	#1CDF (60s) #1CE6 (120s)	Standard #1D35	Polar observations
513	-	CME Watch program	Standard #1D35	Prominence eruption
514	-	TBD – #1CF3 (30s Al-Poly) or #1CC3 (10s Thin-Be, modifiable)	Standard #1D35	Clarify single-filter request
515	476, 500	#1D0D (60s) #1D2D (90s)	#1D26 (6s) #1D27 (2s)	Use #1D35 outside flare windows