Saguaro Astronomy Club

Metro Phoenix, Arizona

SACNEWS

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Some Notes on Chained Guiding

By Chris Schur

After about a year or two of playing around with the high speed superfilms, and getting fast but very grainy results, many astrophotographers decide to try their hand at the slower and finer grained emulsions. After all, to get the most detail out of each minute of hard earned exposure you can't let the grain of the film distort or limit the final results. But to the dismay of many, even the hypered 400 speed films require an hour exposure at $f/5$ to get anything decent, or at best, with an $f/2.8$ telephoto a good 15 minutes is needed.

For most, 15 minutes is a long time to be at the guide scope, let alone an hour or more! Now I m going to let you in on a secret. There is a way to guide for as long as you have to get those killer shots, yet still maintain your sanity. It s called Chained Guiding , and for myself and several of our local clubs astrophotographers, has allowed us to go over an hour exposure on the slow ultra fine grained films with my 14 inch $f/5$ Newtonian and their Schmidt Cassegrain systems and not get the least bit tired or saddle sore in the act. In fact, of the several club astrophotographers that have used this method in the past year, all of them have been able to achieve respectable results with their own equipment using the high resolution 2415 Technical Pan film for the very first time.

The principle of chain guiding is simple: break up the long exposure into smaller chunks — say four 15 minute exposures to achieve an hour long one. To do this in my newtonian, a shutter was installed in the main focuser so that the off axis guider could still see the star when the light to the film was shut off. Once set up on the subject, and I m ready to begin shooting, I start the timer, and begin. 15 minutes later, and before I get fatigued, the shutter is closed down and a five minute coffee break begins! After I've stretched a bit, the exposure is resumed for another 15 minutes.

This process is repeated until I have accumulated about an hours worth of exposure, which takes about an hour and a half. But its easy to do! I guide my best in 15 minute or less exposures, yet here is an hour exposure with my best guiding and I m not the least bit exhausted. One can do this trick all night long, and get those top rate photos with a minimum of effort. For Schmidt Cassegrain users who must use an off axis guider to obtain clean images, a small leaf type shutter must be inserted into the guider body. A small shaft protrudes, and either a knob or control cable then can be used to carefully rotate it. This lifts the internal shutter into place and interrupts the exposure. For a shutter, a small sheet metal or even balsa or plastic flap can be used, rounded in shape that flips up when the knob is turned.

The same method can be used of course for piggyback shots. Lets say for example that you haven't done much astrophotography before, and want to turn out a decently guided 15 minute exposure. By chaining three five minute shots together by covering the lens during your coffee (or tea) breaks, and resuming afterwards you can do it. This method allows individuals that have never in the past been able to go over five minutes or so to do those longer exposures, and perhaps for the first time use slower higher resolution films. There are several points to make to insure that you will be able to get the most from this method of tracking. First, make certain that your polar alignment is good. The extended exposures will show trailing around the edges of the frame, specifically rotating around the guide star if it is off significantly. You should be within 1/10 of a degree for large newtonians and one hour exposures.

Second, ensure that there is a rigid support on the 135mm and longer telephotos so that flexure is eliminated. Long exposures will cause the tube to rotate more against the starry background, and stress the camera support a greater amount.

Some interesting projects are possible with the extended exposures that are feasible with this technique. One that I have tried is skyshooting through nebular filters. For example, take the North America Nebula in Cygnus. It is of such low contrast that even a long exposure on a color film doesn't really show it well. What is needed is a contrast boost, like we get when the UHC filter is installed for visual observation. The photographic equivalent of the UHC is the Lumicon Deep Sky filter. It was designed with photography in mind and yields a 3x -

4x contrast gain. But you ve got to go an hour through the filter hypered Konika 1600 film with an $f/5$ system! The chained guiding saved the day for me here. Four fifteen minutes sessions, and three coffee cups later, I had it in the bag. The results? After I showed this shot at the Riverside Telescope Makers Conference a few years back at a talk on Konika films I was giving, the magazines were publishing quite a number of "Mexico Region" shots of NGC 7000 by other amateurs inspired by the this method of filter photography. I will have an article more fully describing the method with large Newtonians in an upcoming issue of Deep Sky Magazine.

Directions to SAC Events

SAC General Meetings 7:30 PM at Grand Canyon University, Fleming Building, Room 103 — 1 mile west of Interstate 17 on Camelback Rd., north on 33rd Ave., second building on the right.

SAC Star Parties at Buckeye Hills Recreation Area — Interstate 10 west to Exit 112 (30 miles west of Interstate 17), then south for 10.5 miles, right at entrance to recreation area, one-half mile, on the right. No water and only pit toilets. Please arrive before sunset; allow one hour from central Phoenix.

SAC Deep Sky Subgroup Meeting at John & Tom McGrath's, 11239 N. 75th St., Scottsdale, 998–4661 — Scottsdale Rd. north, Cholla St. east to 75th St., southeast corner.

Preliminary Survey

Remember your survey questions are due at the February meeting. If you have to mail it, send it to the SACNews Editor. The address is on the back page of this newsletter.

Looking back at the last survey taken in '89 has given me some ideas on what should be included in the survey. Ranking the meeting activites, suggesting new areas, asking about the varied interests of others in the club (e.g. astrophotography, scope building, deep sky observing, computers, etc.) are just some of the areas that can be touched upon. Here's your chance to include your area so it can be included in any ranking, maybe there are others interested in the same area but unless it gets included in the survey it will never get mentioned. Favorite speakers, perferred observing sites, suggestions for club projects, rating of the Deep Sky subgroup meetings and Novice group meetings are just some topics that could be touched by the survey. What has the club been doing that should be stopped or not doing and should be started. I am sure that there are more areas that weren't touched in that last survey that need to be mentioned.

I hope to have some form for your questions at the meeting, though it will be little more than a blank sheet of paper with an official looking title. I won't be bringing too many of these so try to bring your questions already written out. —*Paul Dickson, SAC Newsletter Editor*

SACNews Back Issues

There is a limited number of SACNews back issues available of random issues. They will be at the February meeting first come, first serve.

Pioneer 11 Going Deaf

From a JPL Status Report distributed via the Internet by Ron Baalke.

The Pioneer project at Ames Research Center cancelled the Pioneer 11 spacecraft's "State of Emergency" for DSN (Deep Space Network) service on October 29. The following is an outline of what happened and the present status of the spacecraft.

On October 7, 1990 the downlink communications failed beginning with noise and worsening to inability to lock-on to the downlink in a matter of a few minutes during a track of one-way signal (ie. with no uplink. Otherwise there is a 9 hour round trip time interval). Subsequent tracks by DSN permitted only sporadic bits of data which indicated nonresponsiveness to uplink commands and showed no reason for the failure mode. Emergency priority was necessary to provide for round-trip scheduling of high power uplinks with "real-time" monitoring of effects of attempts at correction, so a spacecraft emergency was declared on October 10. A series of trials has resulted in recovery of an operable condition and has disclosed the following interpretation of the problem:

Receiver-B, connected to the high gain antenna on the spacecraft, has developed an internal noise source. That source renders its receiver (B) inoperative in terms of receiving and decoding commands, and it intermittently signals the transponder and the receiver antenna switch logic that Receiver-B is operating. The noise also disrupted the down link via the transponder, as shown when the coherent mode was eventually commanded off. Furthermore, that noise is suspected as the source of signal which upset the logic in Receiver-A. Receiver-A is connected to the medium gain antenna, making it slightly beyond the the DSN's high power uplink according to link budget. However, Receiver-A has been successfully commanded several times after transmitting a logic reset code never previously used; and uplink of 200 KW or more appears successful at its present distance. The received signal strength is about 5 dB below specification sensitivity of the spacecraft. The command sequence to reverse antenna connections, to place Receiver-A on the spacecraft's high gain antenna has not been responded to in 5 attempts.

The current status of Pioneer 11 is that it is operable only with 200 KW (to be increased with distance) and

without coherent signal. Receiver-A developed a less troublesome noise in its coherent mode in 1983. Measurement of spin axis orientation is being attempted, and might be a continuing difficulty. Further investigation and possible attempts to improve configuration will be made in the coming weeks.

Ames hopes to complete related activities under normal scheduling, but subject to regular use of high powered uplink from 70 meter stations and to possible infrequent additional support for measuring orientation.

Comet Comments

by Don Machholz

One new faint comet has been realized lately, while a new bright one has been discovered. Still visible are Periodic Comet Wild 2 and Comet Levy.

The year 1990 was not a big one for comets. Three comets were found by amateurs, seven by professional astronomers, and six returning comets were recovered. Comet Austin, which held hopes of being a bright comet as we entered 1990, failed to live up to expectations.

Periodic Comet Wild 2 (1989t)

Date	RA-1950-Dec	RA-2000-Dec	Elong	Sky	Mag
01–24	15h31.5m −16°11'	15h34.3m −16°22'	68°	M	10.8
01–29	15h44.3m −16°47'	15h47.2m −16°57'	70°	M	10.8
02–03	15h56.8m −17°19'	15h59.6m −17°27'	72°	M	10.9
02–08	16h08.9m −17°45'	16h11.8m −17°53'	75°	M	10.9
02–13	16h20.6m −18°08'	16h23.4m −17°53'	77°	M	10.9
02–18	16h31.8m −18°26'	16h34.7m −18°32'	79°	M	10.9
02–23	16h42.4m −18°40'	16h45.4m −18°46'	82°	M	11.0
02–28	16h52.6m −18°51'	16h55.5m −18°55'	84°	M	11.0
03–05	17h02.1m −18°58'	17h05.0m −19°02'	87°	M	11.1
03–10	17h10.9m −19°02'	17h13.9m −19°06'	90°	M	11.1

Periodic Comet Shoemaker-Levy 2 (1990p): This was originally an asteroid discovered by Carolyn Shoemaker on plates exposed by herself, Eugene Shoemaker, and David Levy. However, in mid-December, CCD images showed a 29 arc-second long tail. So the asteroid is now declared to be a comet. This comet has an orbital period of 9.3 years and it was last closest to the sun on Sept. 25 at 1.84 AU. The number "2" follows the name because the comet discussed last month, found on plates by the Shoemakers and Levy, has an orbital period of 17.8 years and a perihelion distance of 1.53 AU. It now becomes known as Periodic Comet Shoemaker-Levy 1.

Comet Brewington (1991a): This new comet was discovered at ninth magnitude on the evening of Jan. 6 by Howard Brewington of New Mexico. I have no orbit for it yet.

Comet Levy (1990c)

Date	RA-1950-Dec	RA-2000-Dec	Elong	Sky	Mag
01–24	11h55.3m −35°56'	11h57.8m −36°13'	105°	M	7.3
01–29	11h31.5m −33°41'	11h34.0m −33°57'	114°	M	7.4
02–03	11h06.7m −30°46'	11h09.1m −31°02'	124°	M	7.4
02–08	10h41.8m −27°12'	10h44.1m −27°28'	133°	M	7.5
02–13	10h17.8m −23°07'	10h20.1m −23°22'	142°	M	7.1
02–18	09h55.5m −18°43'	09h57.9m −18°57'	149°	M	7.2
02–23	09h35.6m −14°15'	09h38.0m −14°29'	153°	M	7.2
02–28	09h18.3m −09°58'	09h20.8m −10°10'	153°	E	7.3
03–05	09h03.7m −06°00'	09h06.2m −06°12'	149°	E	7.3
03–10	08h51.6m −02°27'	08h54.1m −02°38'	143°	E	7.3

1991 SAC Meetings	1991 SAC Star Parties
February 1	February 9
March 1	March 9
April 26	April 6
May 24	May 4
June 21	June 8
July 26	July 6
August 23	August 3
September 20	September 7
October 25	October 5
November 22	November 9
December 14 Party	December 28

Universal Time and Date of Total Lunar Occultations for Phoenix (33.5° Lat., 112.1° Long.)

Date	Time[1]	Time[2]	Mag	Star Information	PH	PA[1]	PA[2]	PS	Elong	MAL	MAZ	SAL	SAL
03/20		05:11	4.6	ZC0440 (ϵ Ari)	DD		124	29	51	6	293	-43	307
03/21	22:46	22:45	3.0	ZC0552 (η Tau)	DD	74	64	35	62	78	139	33	224
03/21	00:12	00:12	3.0	ZC0552 (η Tau)	RB	258	263	35	62	76	231	17	258
04/03	11:16	11:17	4.8	ZC2268 (2A Sco)	RD	245	239	73	229	31	190	-24	66
05/01	06:07	06:06	3.1	ZC2349 (ρ Sco)	RD	298	284	83	211	17	137	-38	336
05/08	09:32		4.3	ZC3269 (θ Aqu)	RD	270		39	290	7	103	-31	37
06/17	02:58		4.9	ZC1468 (π Leo)	DD	75		37	67	40	251	-4	302
06/27	04:10		2.9	ZC2672 (λ Sgr)	DB	154		96	187	15	133	-16	313
06/27	04:45		2.9	ZC2672 (λ Sgr)	RD	203		96	187	19	139	-21	320
07/14		04:06	3.8	ZC1428 (O Leo)	DD		83	19	35	1	282	-16	311
07/29	05:12	05:12	4.3	ZC3269 (θ Aqu)	RD	196	200	92	165	37	160	-28	322
09/04	12:17	12:17	3.5	ZC1110 (δ Gem)	RD	295	302	29	307	42	89	-10	74
10/31		13:31	3.8	ZC1428 (O Leo)	RD		268	38	292	63	146	-3	105
11/17	02:13	02:11	4.9	ZC3453 (κ Psc)	DD	53	36	67	121	55	154	-23	262

NOTES:
Subtract 7 hours for correct Mountain Standard Time and Day.
Time[1] = Hrs:Min (Std Sta NM)
Time[2] = Hrs:Min (Std Sta LA)
PH = Phenomenon, i.e. RD = (R)eappearance on (D)ark Limb
PA[1] = Position Angle of star from north point of moon (90=East) (NM Std Sta)
PA[2] = Position Angle of star from north point of moon (90=East) (LA Std Sta)
PS = Percent Sunlit
Elong = Elongation of moon from sun (180 = full; 270 = 3rd Qtr)
MAL = Moon Altitude in degrees (90 = directly overhead)
MAZ = Moon Azimuth (90 = East)
SAL; SAZ = Sun Altitude; Azimuth
Blanks = Not Listed at Standard Station
Compiled by Brian K. Vorndam, for more info call him at 602–344–9841.