

A Sneak Peek into the life of a Daycrew2 Summit Technician

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I began my career at Subaru Telescope on 5/08/2017. During my interview I was told about the long hours and weekend or Holiday work is normal to be summoned for snow removal, troubleshooting, or repairs. I was excited for the new job that I could get performing technical repairs, using advanced technology and being able to go atop Mauna Kea almost everyday of the year. I was told that I got the position and I began working within a couple weeks. Learning the job position was a bit challenging at first due to the elevation. It had taken me a while, maybe a few weeks to up to a couple months get used to going up and down the summit every day. This is the beginning of my journey, my career at the renowned Subaru Telescope. I am now apart of maintaining and performing instrument exchanges as well as learning new skills and gaining experience working with others. I would like to share some parts of this experience and the things that I've learned along the way working at this unique telescope in Hawaii.

To start, I begin my day at home and prepare to be on the summit for about 6-7 hours. This means I need to pack some food for breakfast and lunch as well as any snacks. I usually make myself eggs and oatmeal for breakfast and leftovers for my lunch. It is a far enough drive for me to leave my house around 6:30am in order to arrive at the Hilo base around 7:15am. I start my day at work by checking emails, which include the night log report, the road conditions of the summit and any work requests. It is now 8am and we have our morning meeting about what summit work plans are scheduled for this day along with any precautions or conflicts of work which include tagout areas or shared spaces. After we complete our morning meeting at the Hilo base, we depart for some food, gasoline, or sometimes we have some in town work to take care of before heading up to the Hale Pohaku. After reaching Hale Pohaku (HP), we usually eat our breakfast, hangout and acclimatize for at least 30 minutes. When we arrive at the summit, usually around 10am, Daycrew2 will perform the TWS Morning Check to see if there are any issues that need to be dealt with during the daytime as well as setup for testing requested by different divisions. If we have an TUE (Top Unit Exchange) or CUE (Cassegrain Unit Exchange) this is the time that we will prepare for it by initializing the CIAX cart for the CUE or preparing the Dome side by moving the Top Screen to the front and 3rd mirror out since we will be right above.

For our TUE work, Daycrew follows specific instructions on each exchange. This is a long process and requires everyone to focus on the task to prevent any accidents and successfully complete the exchange. During a TUE exchange, we are removing one instrument and replacing it with another. Currently at our telescope, there are 3 secondary mirror instruments and 2 different primary instruments that share the same lens (POpt2). POpt2 is also the heaviest and tallest instrument Subaru utilizes within it's collection. When I first learned TUE, I had to start with observing how others communicated and followed the procedures. I then started with the operator position as this gives insight on the current and future steps within the procedures. Following the operator position, I moved onto the UL (Unit Loader) which carries the instrument from the storage room up to be mounted onto the telescope. In this position, I learned communication skills as well as using my senses to make small adjustments for the proper fit and operation of the instrument. Next, I went and learned the Manbasket position which gives the user more freedom of movements and more responsibility of being in the correct position during the Auto mode functions of the procedure. Finally, learning to be a good

Safety Watch person requires knowing everyone's own responsibilities to confirm correct procedure is being followed. After TUE, we have to perform a balance recalibration of the Elevation counterweights. Sometimes we need to change the balancing parameters to match the top and bottom weights of the instruments currently on. As long as the parameters for the combination of instruments we have on the telescope match, then the balancing is completed with no issues.

When we begin our day doing a CUE, we'll prepare by initializing CIAX cart which is like a robot that drives to the instruments at the Cassegrain level and attaches to them and then moves them to their sleeping areas in either of the standby rooms at the front part of our Observation Floor. During this operation, I have learned to use a computer to control the movements of the CIAX cart as well as the parts of the Cassegrain unit of the telescope. Daycrew will also perform maintenance on this cart every couple of years to prevent any serious maintenance issues. This part of mechanical maintenance is what I specialize in so I look forward to perfecting this skill always. Completing the CUE, we perform a balance recalibration procedure from TWS in the Control Room. The CUE depending on the instrument, without any issues will usually take 1-2 hours.

Some other duties that Daycrew2 help with at the summit are assisting others whenever more manpower is needed or just availability. Since we are at the summit almost every day, it is very helpful to some departments to just ask us Daycrew of a favor instead of making a trip to the summit for some small work tasks. In mentioning this, Daycrew has acquired some maintenance and work items that we assist with on a scheduled basis. We will maintain SGB's (Silica Gel Bottles) that go on top of HSC (Hyper Suprime Cam) which help with the moisture content inside of the instrument. Without the SGB's, the vacuum system would dry out the o-rings and seals preventing proper functions of HSC. We will replace these bottles every 2-3 months. It takes one to two persons to perform this task which teaches us routine maintenance and data logging of the weights of the bottles before and after the installed period. We also work with an Instrument Division member to refill the SGB's using a manmade system with a controller, switches and sensors.

A big maintenance item that Daycrew2 has been assisting with since I started is the LGR's (Lateral Guide Roller's). We have been starting with measuring the gap between the LGR and the rail that the Dome Bogie Wheels ride on which bear the weight of the telescope above. The LGR's assist the telescope to stay centered and follow the rail. During the LGR maintenance we are taking measurements prior to removing them, cleaning and regreasing the parts. After we got the area cleaned and ready for reassembly, the parts receive new grease and then are installed with new parts if the old ones are broken or have too much use. Some times we need to have the parts machined due to some extreme wear like scoring of the bearing surfaces. In this case we will replace the bearing and refinish the surface utilizing our machinist from Daycrew1. During this maintenance work, we have to tagout the Dome rotation to prevent any movement. Testing the AZ/Dome movement after the installation of a regreased and calibrated LGR is crucial to prevent any possible issues that could arise during the night observations or catastrophic failure. This task usually takes us almost the whole year to complete. After it gets completed we are starting on maintenance again from the beginning and working our way around the Vent floor where we have 46 pairs on the inside and 46 pairs on the outside of the Dome bogie rail. This work takes a long time due to the tagout of this part of the telescope and the length of time it takes to do one pair. Depending on the person's expertise level, one person can do 1-2 LGR's at a time or even more a day. We usually don't get much days where we focus only on LGR maintenance and another department doesn't need our assistance. This task will require more planning to successfully complete in a timely manner.

Working as a Daycrew member, we have to come up to the summit on weekends and Holidays. It depends on what type of work is needed, how many workers should attend the summit work for the day. During most snow removal, we like to get everyone (about 8-10) workers to come to the summit for

snow removal of the entrances, exits, roof, main shutter, and catwalk. During this work we do our best to stay safe and work smart. We will begin with the entrance and exits throughout the summit facility. After making sure we are safe in case of an evacuation or emergency, we will begin with the roof or catwalk. The roof clearing will allow us to perform a Main shutter test after checking the lower rails. We will have to clear the snow or ice from the catwalk area in order to perform AZ/Dome rotation. This area is challenging due to the smaller space for shoveling and the ice buildup that occurs between the gap of the underside of the Dome and the catwalk. This could take up to a few days to clear all snow/ice. During this work, it helps a lot if the sun is out and it is not too windy. It is also dangerous on the catwalk due to falling ice from above that builds up onto the lightning cables or the side vents. During this process of snow removal, we have fall arrest gear and PPE to ensure we are being as safe as we can. We'll decide based on the conditions prior to putting ourselves into any situation that could be dangerous.

My work at Subaru is such a blessing to my family and myself. I enjoy coming to work and interacting with all persons I work with. I am always willing to learn new things and grow my skills and knowledge in order to be a better help to others. I am glad and excited for the future of Subaru Telescope- NAOJ. I enjoyed taking a trip to Japan for this Symposium and meeting all other person's and watching their presentations. I like the "fix forever, stop forever fixing" presentation, along with the Google AI and the Hawaiian History which was very informational. I would love to attend the Symposium again next year. It was great to tour the Mitaka Campus and also visit Nobeyama 45m Radio Telescope. I hope to return to Japan and do some work with other Daycrew members to help broaden our skills and understanding of other telescopes and their operations. This was a memorable time that I had and it was a great experience. Thank you very much!