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# AP0 Target Status and Plans

Ralph Ford, Yun He  
TSD Topical Meeting  
Jan. 17, 2019

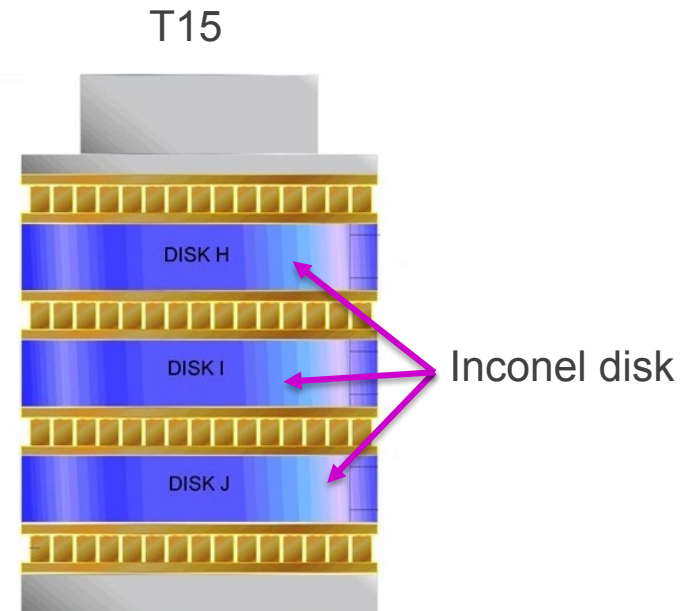
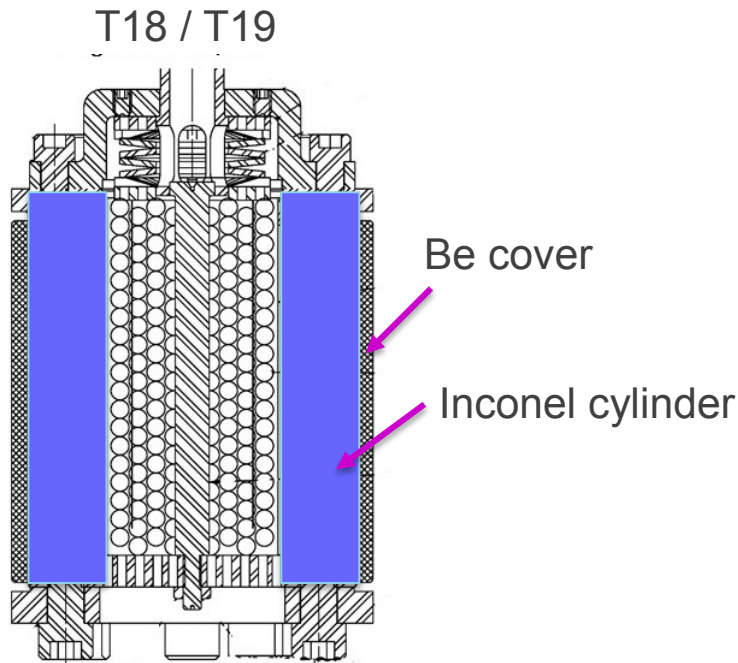
# Outline

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- ❖ AP0 Target Status
- ❖ T18 in AP0 Alcove
- ❖ Modifications to T19 Target Design
- ❖ Fabrication and Assembling Process
- ❖ T19 Rotation Testing on Test Stand
- ❖ T18 Testing with Jog-motion Control Program
- ❖ Current Plans & Pending Issues

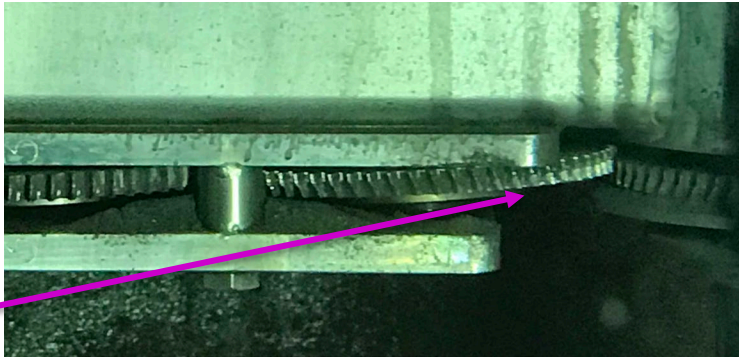
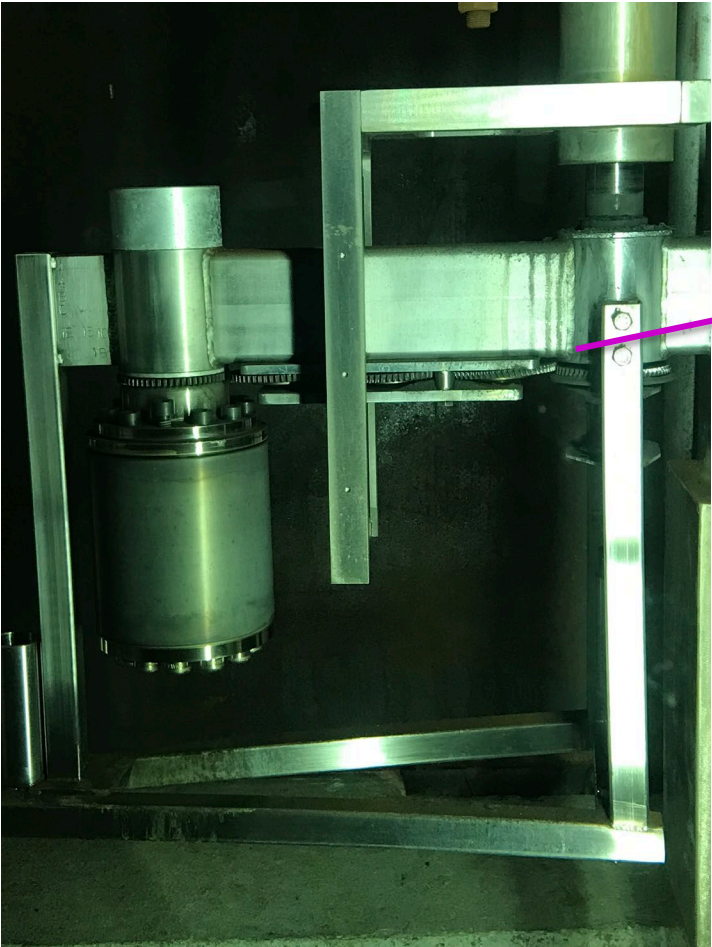
# AP0 Target Status

Target #	Style	Status in December 2018	Status in January 2019
T18	Solid Inconel	Operating target, rotation gear drive transmission failed. Removed from Lower Vault to Alcove.	A control system is being readied that can provide a modified target rotation jog pattern to allow for a limited operational period
T15	Disk-style	Ready spare, but a less desirable style target in terms of the performance and operation	Support frame is removed for T19, target itself resides in a cabinet as a last-resort spare
T19	Solid Inconel	Has all parts, but no Beryllium cover on hand (20-week lead time)	Assembled with a Carbon-Carbon cover, rotation tested, ready to be installed

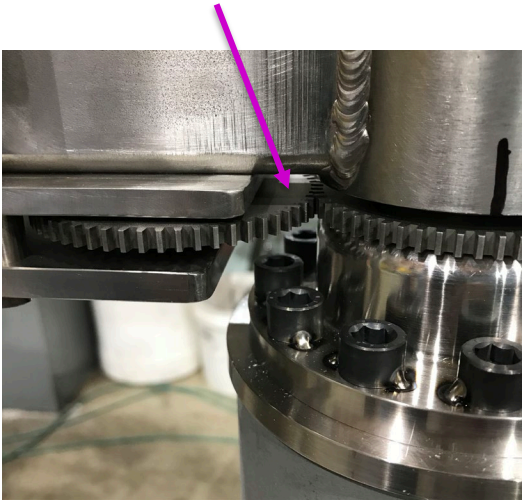


# T18 in AP0 Alcove

Rotation gear drive transmission failure  
turns freely in the CCW direction but freezes at times in the normal CW direction



New gear looks like this

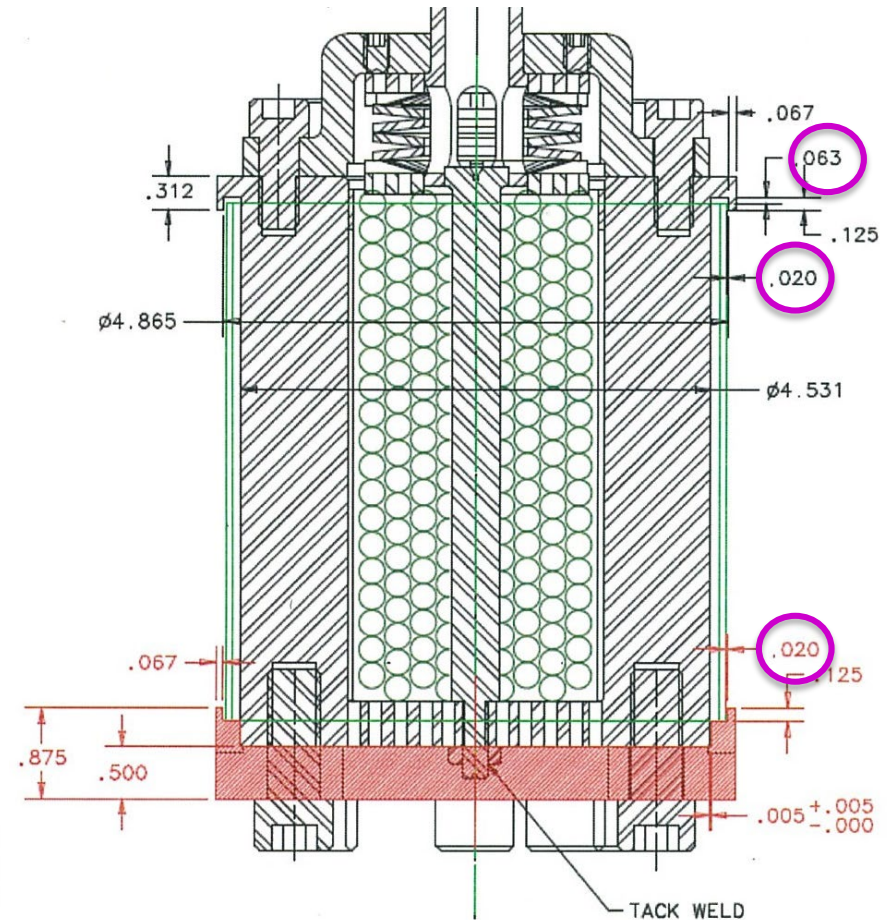
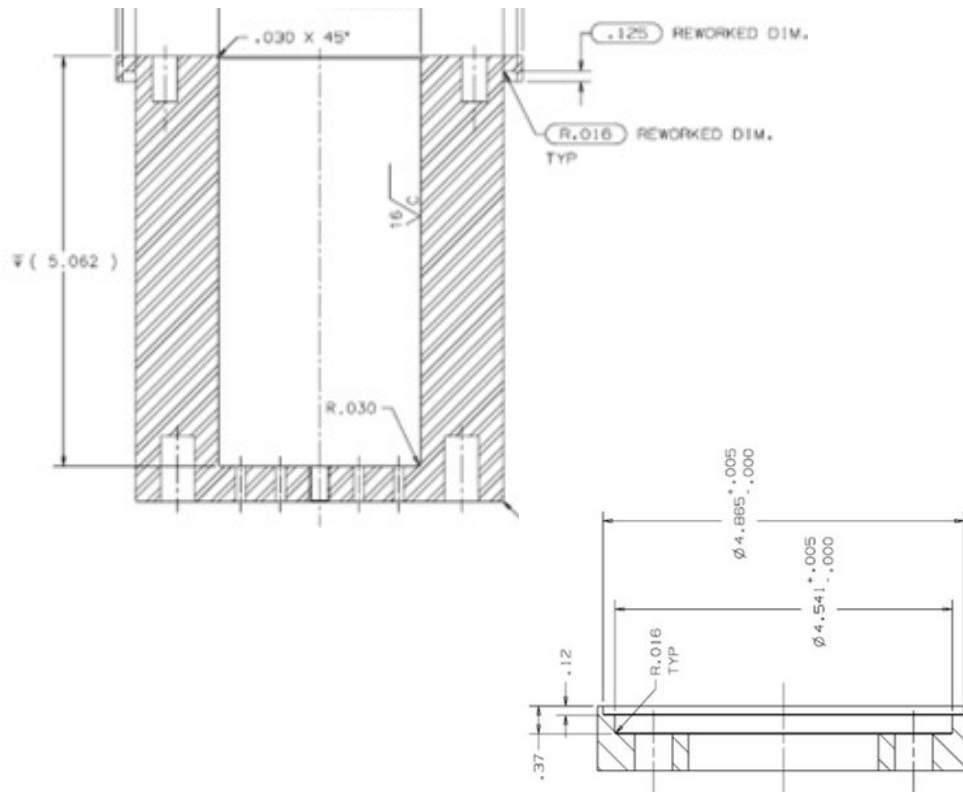




# Modifications to T19 Target Design (Kris Anderson)

Modifications to fit the Carbon-Carbon cover over the Inconel target cylinder  
0.020" + 0.020" radial clearance / 0.063" axial clearance at room temperature  
0.010" + 0.010" radial clearance / 0.038" axial clearance at 350° C

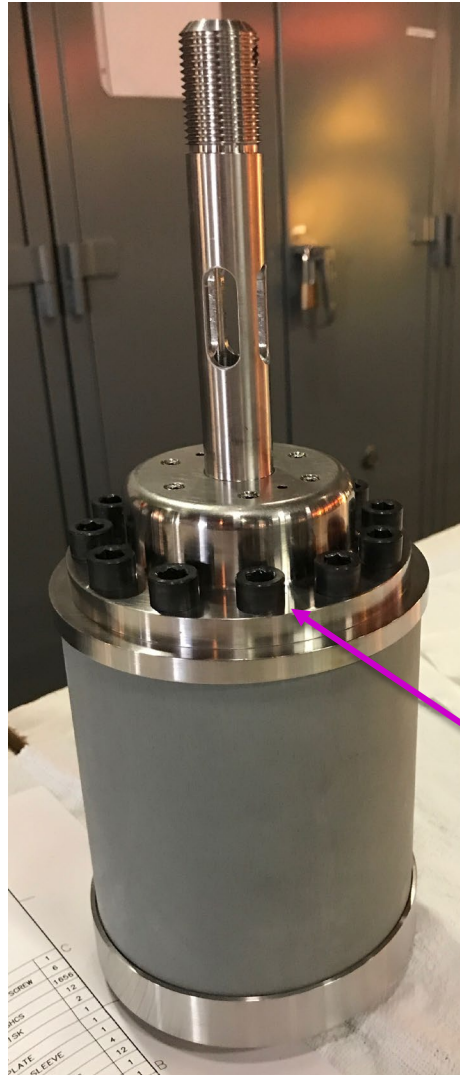
- F10113926 (Inconel cylinder)
- F10113914 (Bottom plate)



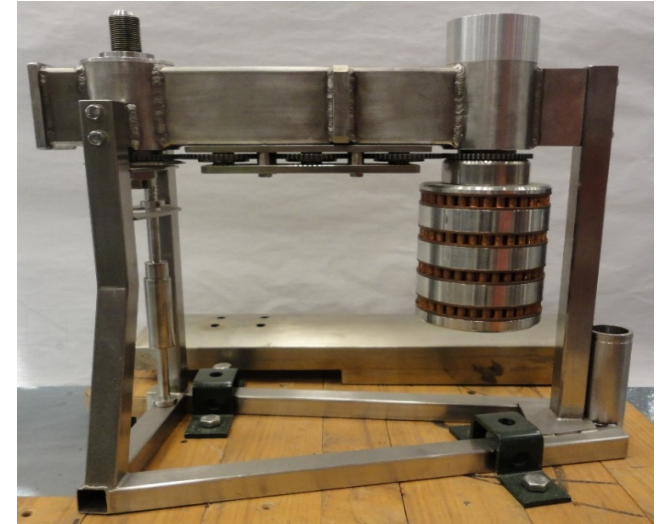
# Fabrication and Assembling Process (Ron LeBeau)



Shrink fit shaft to clamp nut



Target #15 support frame is used for Target #19



Bolts are tack welded (Top & Bottom)



# T19 Rotation Testing on Test Stand

Motor



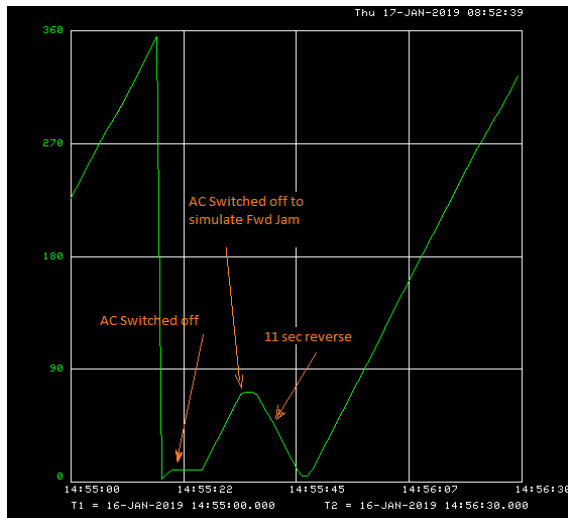
Motor temperature readout (65° C)

Target #19

# T18 Testing with Jog-motion Control Program (Dave Peterson)

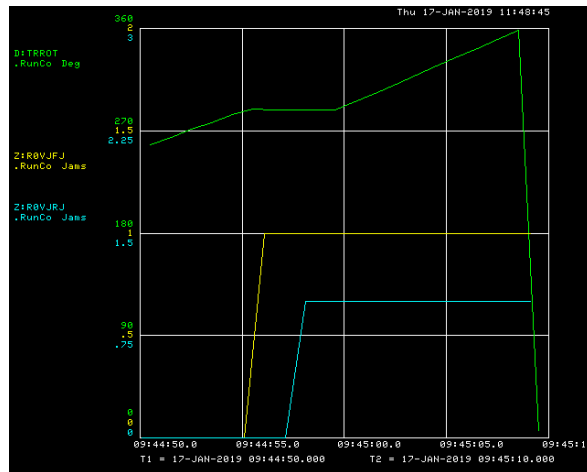
- The PLC is monitoring resolver bit 5 of 0-15 to determine if rotation stalls.
- If rotation stalls, the PLC switches motor drive to "Reverse" for 11 seconds which should be about 1/4 turn of the drive shaft. The PLC will switch back to Forward after the reverse move is complete or if the reverse rotation stalls during the 11 second period.
- The jam recovery sequence will repeat whenever forward motion stalls. If the total number of jams for either Fwd or Rev exceeds a preset limit then PLC will disengage the motor power. The user must then reset the jam counters on Acnet and re-enable the motor power.

Jan. 16 14:55:00 – 14:56:30pm



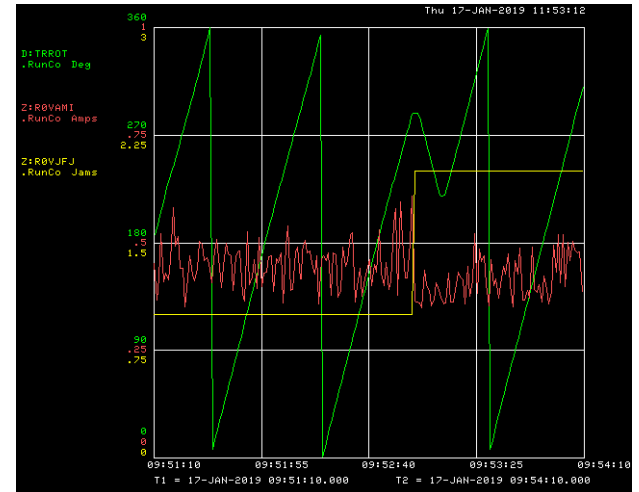
Jan. 17 9:44:50 – 9:45:10am

A forward jam with a reverse jam



Jan. 17, 9:51:10 – 9:54:10am

A single forward jam, followed by the reverse motion for 1/4 turn and then back to normal operation. [AD Elog 147153](#)





# Current Plans & Pending Issues

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- ❖ The Muon g-2 experiment will not request beam until mid-February at the earliest, though the Muon Department is ready to perform studies with muons produced from the target.
- ❖ T19 is scheduled to be installed in the beamline on Jan. 22.
- ❖ Procure parts to make two more spares T20 & T21 of solid-style targets
  - Beryllium covers are preferred over no cover or a Carbon-Carbon cover
    - its effectiveness has been proven through operation
    - it provides protection for the Lithium Lens from target spalling / sputtering
    - Qty. 2 Be cover to be ordered, 20-week lead time
    - Qty. 2 sets of support frame parts for T21 & T15, parts for T20 frame are on hand
- ❖ T19 graphite cover should receive a periodic visual inspection while in service.
- ❖ Rotation is required to maintain target integrity at full power and should be integrated into the Machine Protection System. Failure of rotation of T19 would risk permanent damage.