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Department of War
OFFICE OF PREPUBLICATION AND SECURITY REVIEW



A799/NFF/NEOFF/CND RATES AND V22 AWTS DATA COLLECTION EFFORT

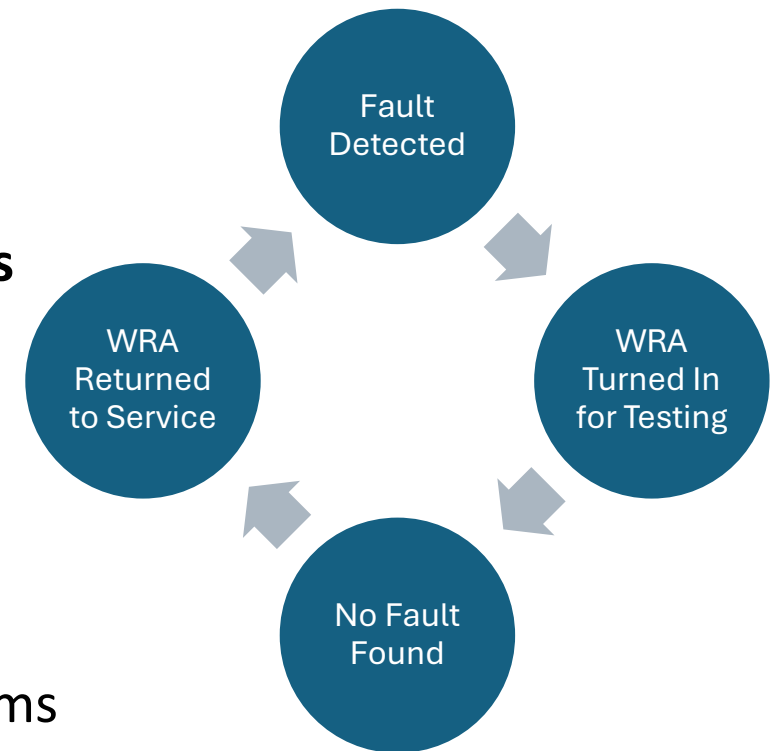
DISTROBUTION A: APPROVED FOR PUBLIC RELEASE

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Background

- Across all branches of DoD aviation, components are frequently removed and turned in due to perceived system faults that are:
 - **Not verified during intermediate/depot-level testing**
 - **Found to operate within spec**
 - **Returned to service without repair**
 - **Many of these are due to intermittent EWIS discrepancies**
- This phenomenon contributes to:
 - Excessive cost of logistics and supply chain burden
 - Unnecessary removals increasing aircraft downtime
 - Erosion of confidence in fault isolation procedures
 - Depletion of RFI (Ready For Issue) inventory
 - Premature condemnation or overhaul of functioning systems





Common DoD Aviation Codes for No Fault Found Conditions

- Each service uses different codes, but meaning is consistent across DoD:
 - Navy/USMC: CND (Cannot Duplicate), NFF (No Fault Found), A799 (Awaiting Dispo)
 - Army: FDI (Fault Did Not Recur), Z-codes, AVIM/Depot referrals, NEOFF
 - Air Force: NDN (No Discrepancy Noted), AWM (Awaiting Maintenance)
- Placeholder codes like A799 often hide systemic diagnostic gaps
- Consistently linked to high re-test pass rates and returned RFI components



DoD-Wide Impact of No Fault Found Turn-ins

- NFF/FDI/CND rates range from 25–45% across DoD aviation systems
- Common outcomes:
 - Excessive maintenance man-hours and operational delays
 - Unnecessary removals, depot inductions, and supply churn
 - Reduced confidence in BITE/BIT diagnostics
 - Lowered Aircraft Availability (Ao) and readiness metrics
- Air Force and Army have active NFF working groups
- Navy efforts supported by JSWAG and platform sustainment teams



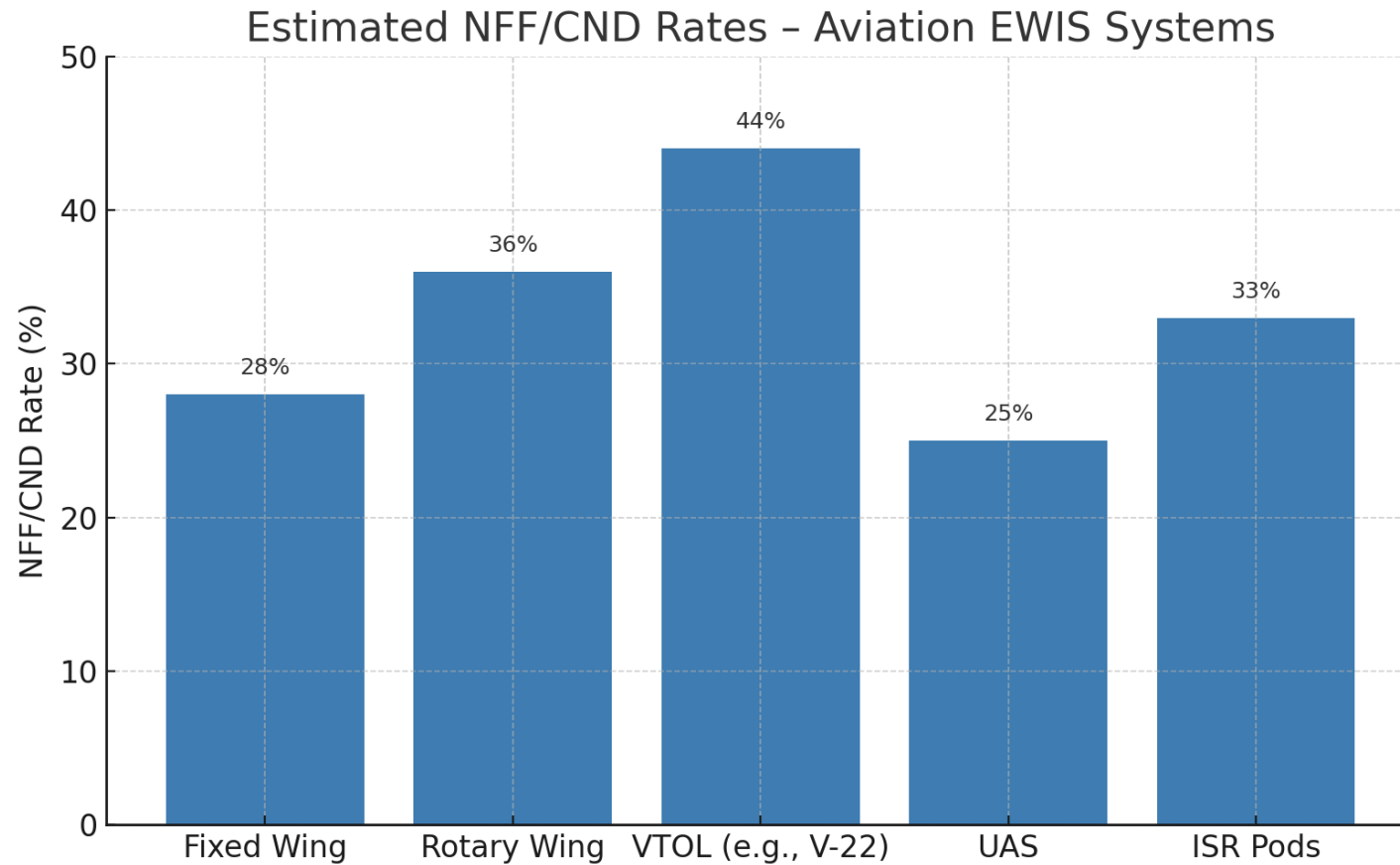
Cost Impact Examples

- In FY24, one Navy Type/Model/Series reported **over \$18 million** in annual NFF returns from avionics LRUs alone.
- AMCOM analysis of Army UH-60/S-70 components showed **FDI rates above 37%** for mission-critical boxes.
- USAF Sustainment data shows **\$50–70M/year** in unnecessary depot inductions due to NDN outcomes.





EWIS NFF/CDN





V-22 CND/A799 Rate over 2 Years

- 1,289 A799-coded MAFs logged on V-22 platforms over FY23–FY24
- Top 10 components account for over 50% of total labor burden
- Over 6,800 Direct Maintenance Man-Hours (DMMH) expended
- Common result: No Fault Found (NFF) or Cannot Duplicate (CND)
- Estimated labor cost: ~\$820,000 (does not include supply impact)



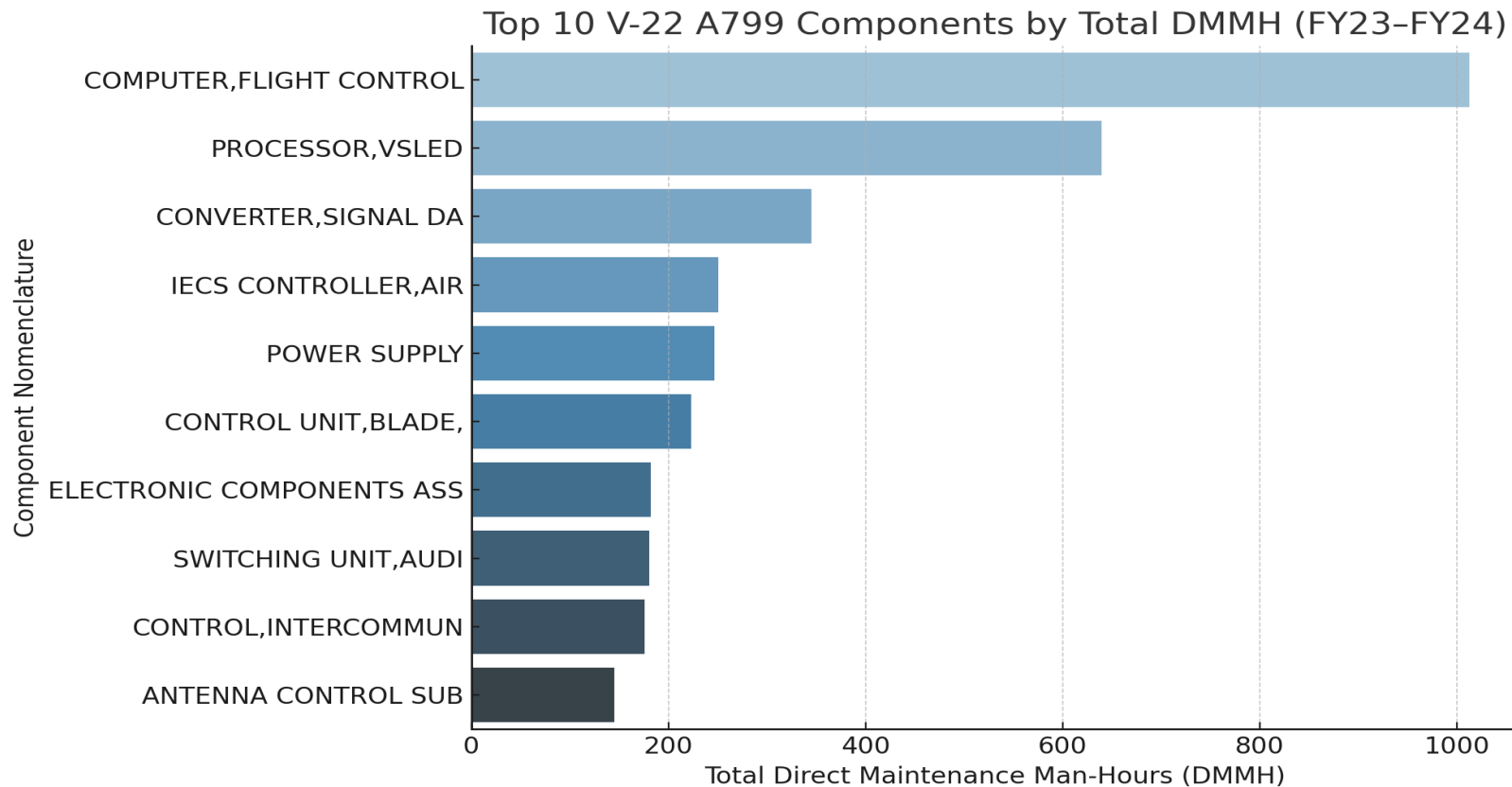
V-22 O-D Level Maintenance Plan

- During conceptual maintenance planning for the V-22, many of the WRAs were deemed an O to D-Level requirement.
 - Many of our turn in items go straight from O-Level to the vendor. This removes much of the fault data from the MAF Data.
 - Example Swashplate Actuator
 - High cost of Turn In when not Faulty



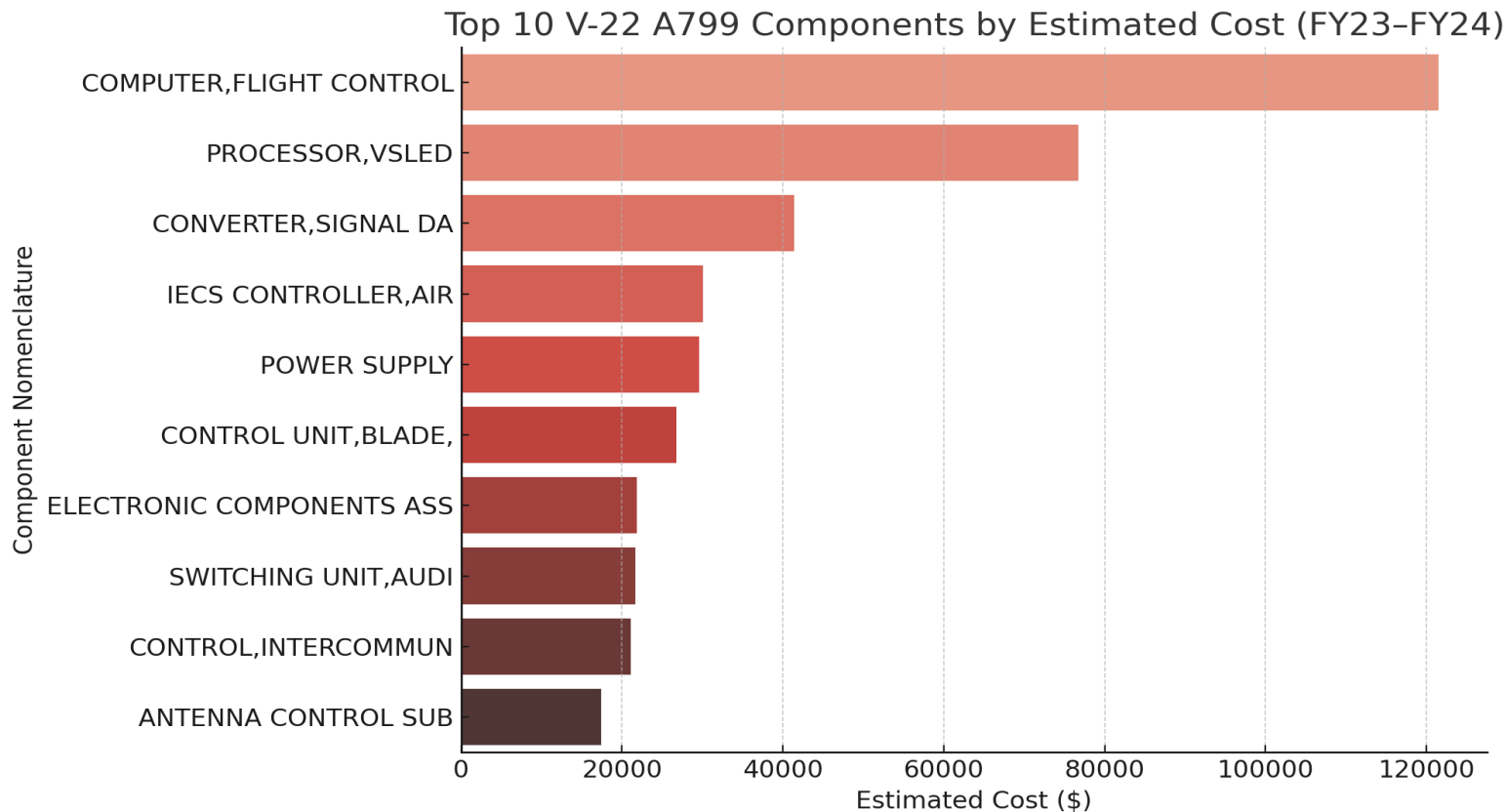


V-22 Top 10 A799 Components by DMMH (FY23–FY24)





V-22 Top 10 A799 Components by Estimated Cost (FY23–FY24)





MAF Narrative Examples – NFF / CND Trends

- "UUT PASSED TEST AND CHECK IAW RTCASS TESTING. RETURNED RFI."
- "WORKCENTER COULD NOT DUPLICATE GRIPE. NO FURTHER ACTION TAKEN."
- "WRA RAN RFI. SYSTEM TESTED GOOD. NO FAULT FOUND."
- "PERFORMED TEST/CHECK, NO FAULT VERIFIED."
- "SYSTEM CHECKED GOOD – COULD NOT DUPLICATE OPERATOR REPORTED ISSUE."
- "RETURNED UNIT TO FST WITH NO CORRECTIVE ACTION REQUIRED."



Root Cause Observations

- Limited O-level fault isolation tools for avionics and mission systems
- Over-reliance on BIT results without confirmatory diagnostics
- Operator-reported faults with no environmental or usage context
- Placeholder code A799 used broadly pending further disposition
- Minimal feedback loop between O-/I-/D-level and originating work centers



Recommendations

- Require tech assist or QA validation for top 10 components before removal
- Improve BIT logging and export to support actionable maintenance
- Establish a feedback loop from depot/I-level to fleet maintainers
- Implement NFF/CND tracking metrics at command and platform level
- Regularly review A799 MAFs for trend analysis and training opportunities



Backup – Part Number Cross-Reference

Component	Part Number	Total DMMH	Total Incidents
COMPUTER,FLIGHT CONTROL	901-305-150-111	1012.2999999999995	106
PROCESSOR,VSLED	901-305-900-105	380.6	36
PROCESSOR,VSLED	901-305-900-103	258.8	24
CONVERTER,SIGNAL DA	901-370-371-101	326.7999999999999	93
CONVERTER,SIGNAL DA	901-070-502-511	11.1	4
CONVERTER,SIGNAL DA	901-070-502-509	6.8	3
ECS CONTROLLER,AIR	901-325-116-103	206.7	39
ECS CONTROLLER,AIR	901-325-106-163	43.6	7
POWER SUPPLY	901-375-201-401	244.7	29
POWER SUPPLY	901-375-201-305	2.2	1



AWTS DATA COLLECTION



- **Overview of Use of AWTS on V-22**
 - **AWTS Phase Inspection**
 - **Equipment (Systems, Cables & Software)**
 - **Supplemental Instruction Guide (SIG)**
 - **Technical Publications**
- **Contract Overview and Purpose**
- **MAF Data**
- **AWTS Data Collection**
- **Findings**

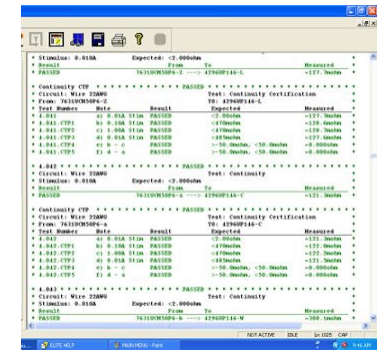




AWTS DATA COLLECTION



- **Provide a Periodic Wiring Health Assessment for FADEC and targeted Flight Control Wiring in the Nacelle and Conversion Area**
 - Utilizes the 500V AWTS + 1 Switching Module
- **O Level Tasks released Nov 2020 for V22 B and D Phase Intervals**
- **Testing will occur approx. every 560 flight hours**
 - Additional tasks for troubleshooting
- **Tests Targeted FADEC and Flight Control Wiring and WIAs**
- **Options to run TAC Loopback & Hookup Instructions**
- **Each Test utilizes:**
 - Unused Pin, Continuity, Backshell Continuity, Certification Test Protocol* (CTP), Isolation and Insulation
 - *4 Wire Test & Method for testing the health of the conductor and contacts using multiple stimulus to determine stability and linearity





AWTS DATA COLLECTION

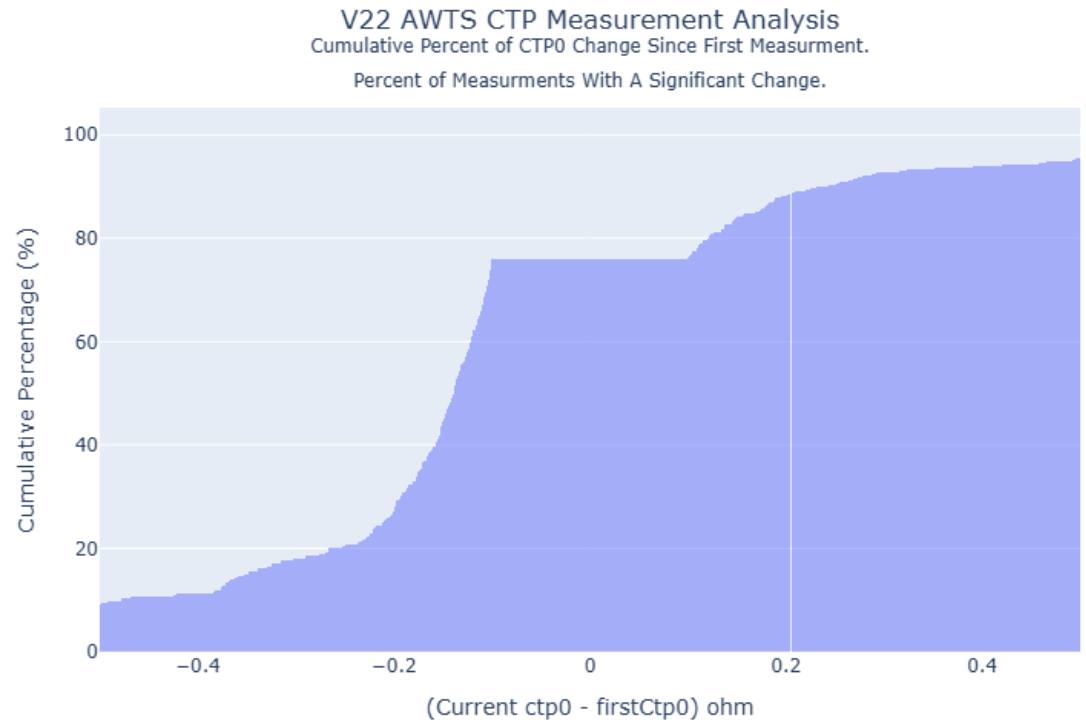
- PMA-275 in support of the V-22 platform and at the engineering request of the FST set in place a two year contract with quarterly delivery requirements of a report of AWTS use in the fleet.
 - Report relates MAF Data to AWTS test results from Phase.
 - It has been noted that even though the maintainers find faults while using the AWTS machine at Phases, they are not repairing the faults found. Since the aircraft has not yet reported these as failure, the maintainers are not considering them faults. However, the data of every test ever ran is recorded and saved to the machine.



AWTS DATA COLLECTION



- Benefits of Testing
 - Cleaning
 - Mil PRF 29608 Type 1 Class 3 Contact cleaner (6850-01-534-2919, or 6850-01-412-5579)
 - Have learned this is not always occurring
 - Scheduled maintenance
 - Wire Conditioning
 - Prevent Unscheduled Maintenance

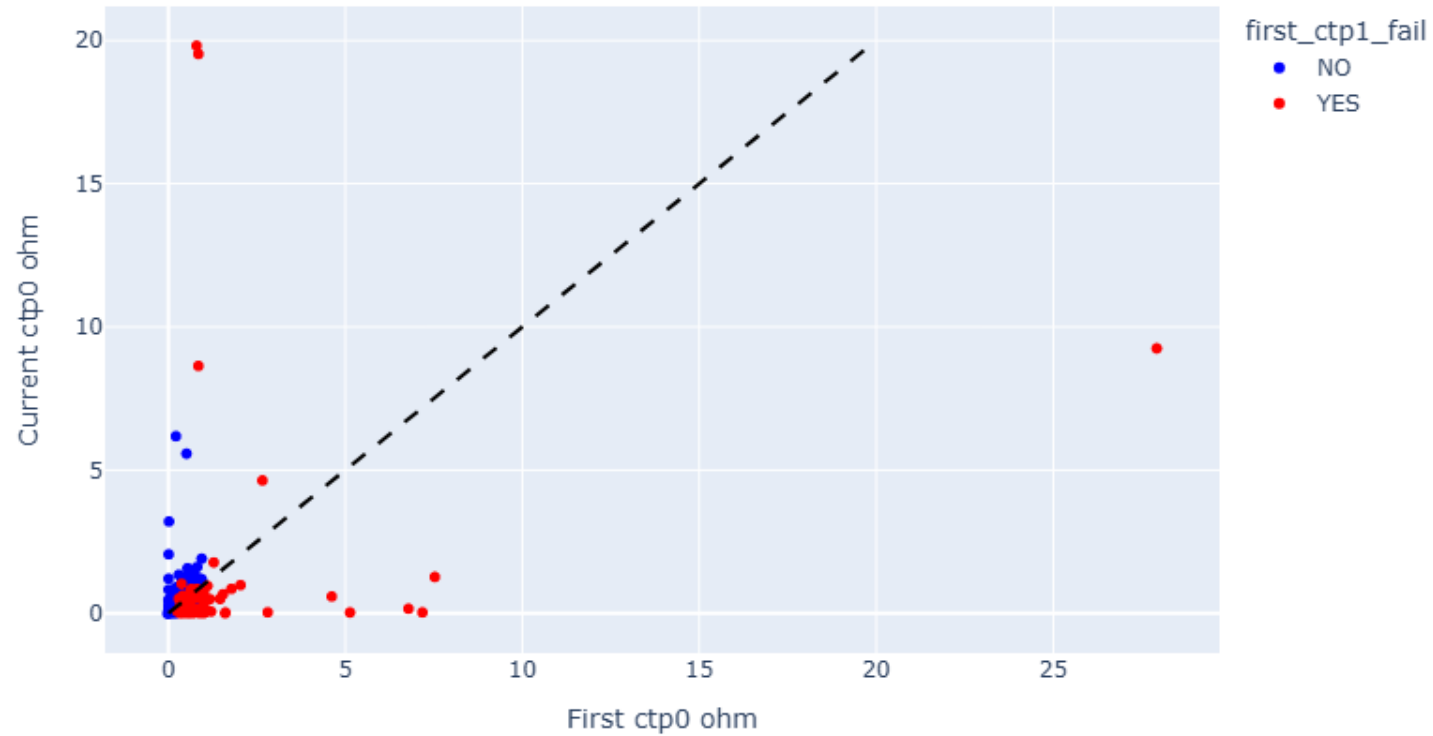




AWTS DATA COLLECTION



V22 AWTS CTP Measurement Analysis
Each dot represents data from 2 CTP measurements of same conductive path.
Filtered for Time Between CTP Measurements > 50 Days

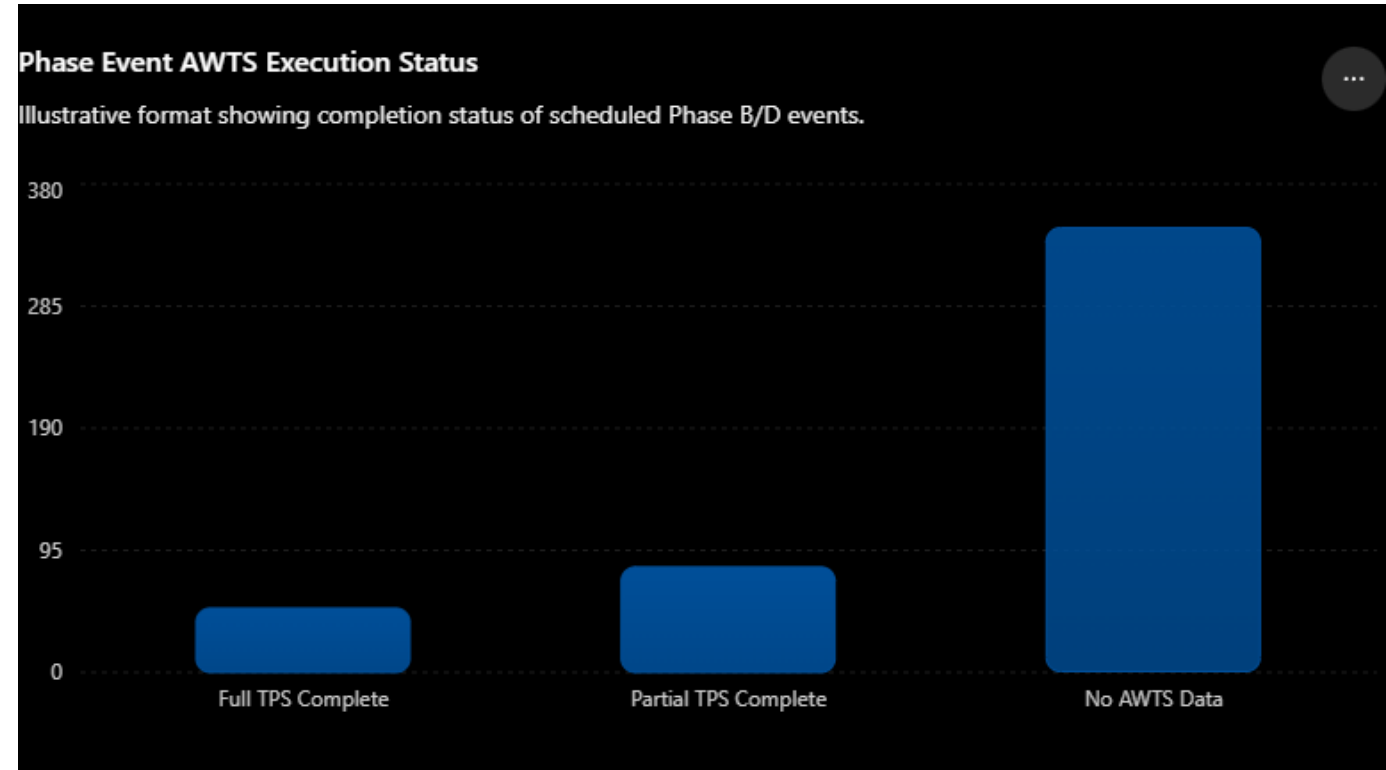




AWTS DATA COLLECTION



- Result data from Eclipse and NAVAIR Wiring analyst:
 - Evidence of Wire Conditioning
 - Squadrons not performing all tests or not testing at all
 - Outdated Software
 - Lack of communication b/w O & I
 - Updated FADEC programs to correct Thermocouple testing
 - Determined that TAC Loopback is not really being performed



Category	Percent
Full TPS Completion	10%
Partial TPS Completion	17%
No AWTS Data	72%

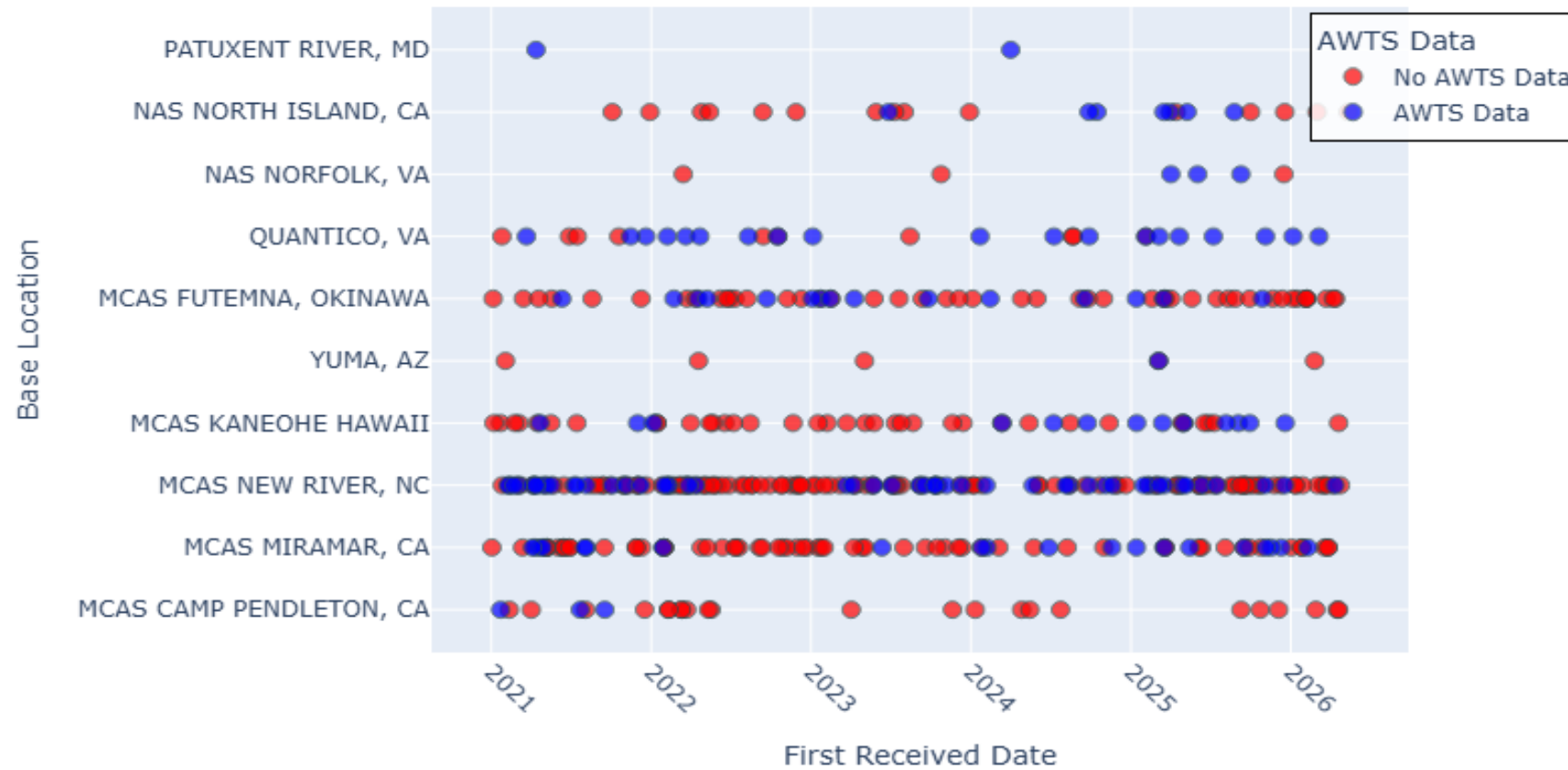
This is from 478 scheduled Phase B/D events.



AWTS DATA COLLECTION

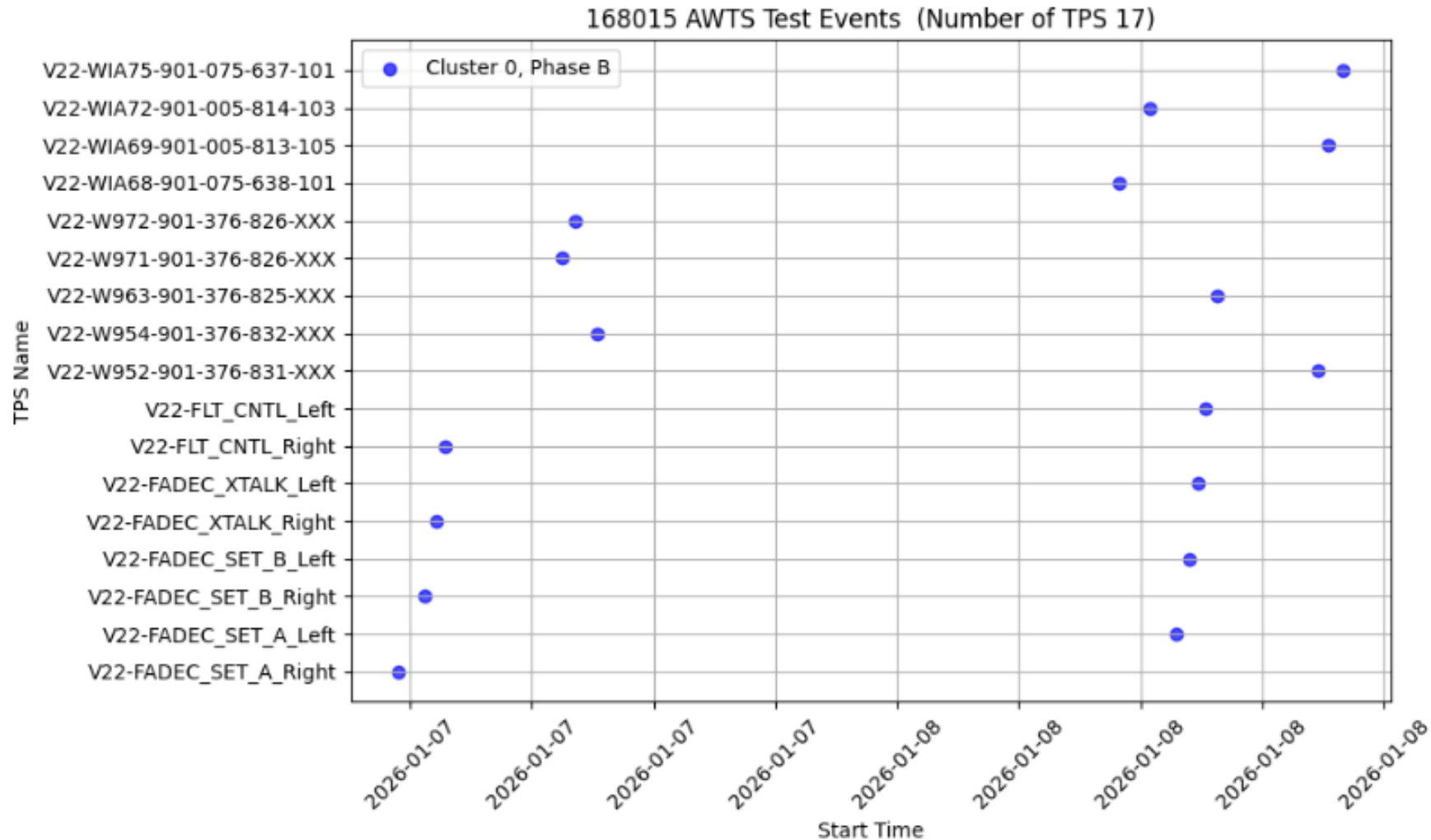


First Received Date vs Base Location
Colored by AWTS Data Presence



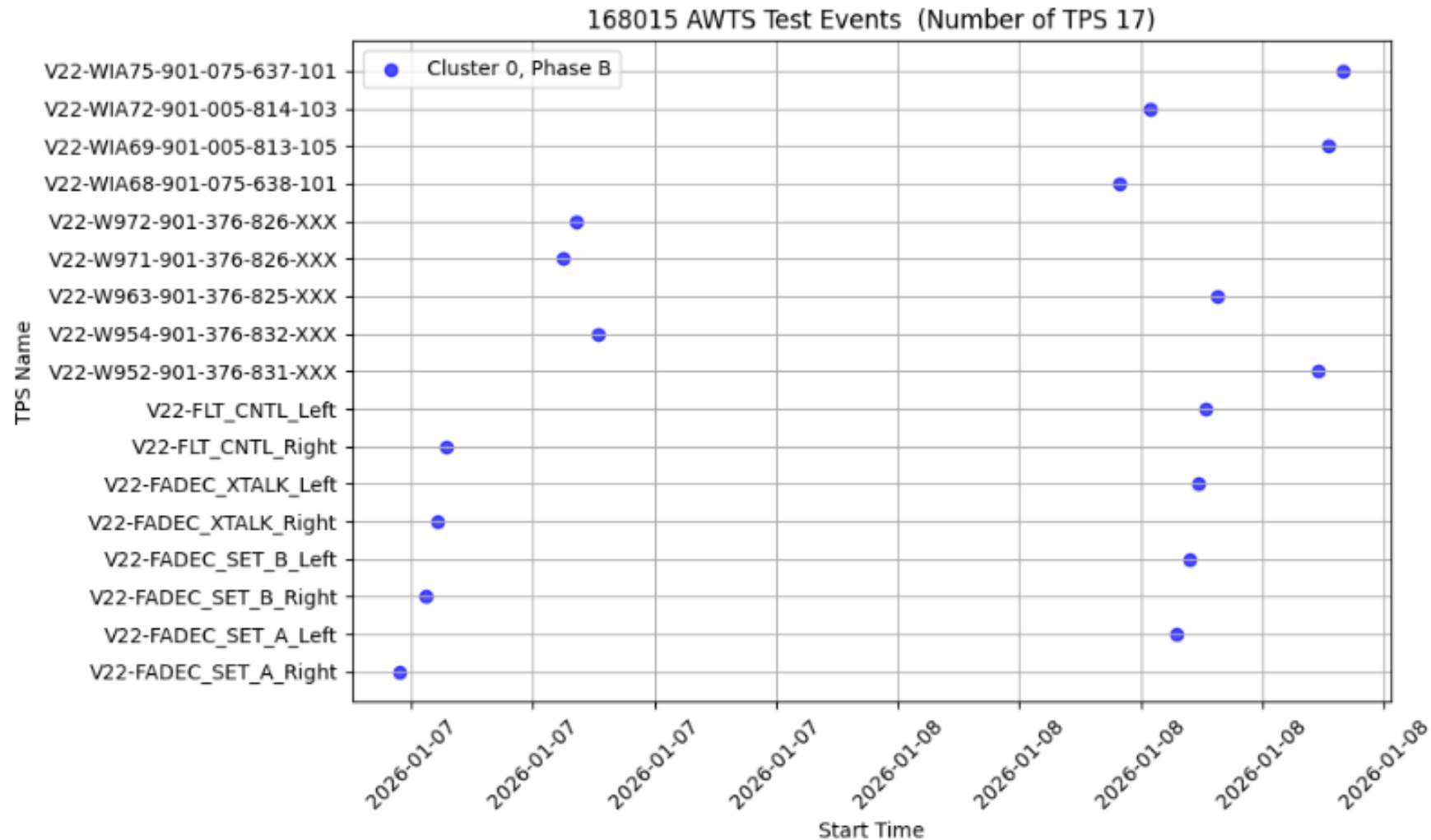


AWTS DATA COLLECTION





AWTS DATA COLLECTION





V22 CONDITIONING STATS



- 97 Total Aircraft Tested
- 139,404 Total Tests Ran
- Resistance improved by > 1 ohm: 171 measurements
- Resistance improved by > 0.1 ohm: 646 measurements
- 49 Aircraft Improved by > 1 ohm
- 78 Aircraft Improved by $>.1$ ohm



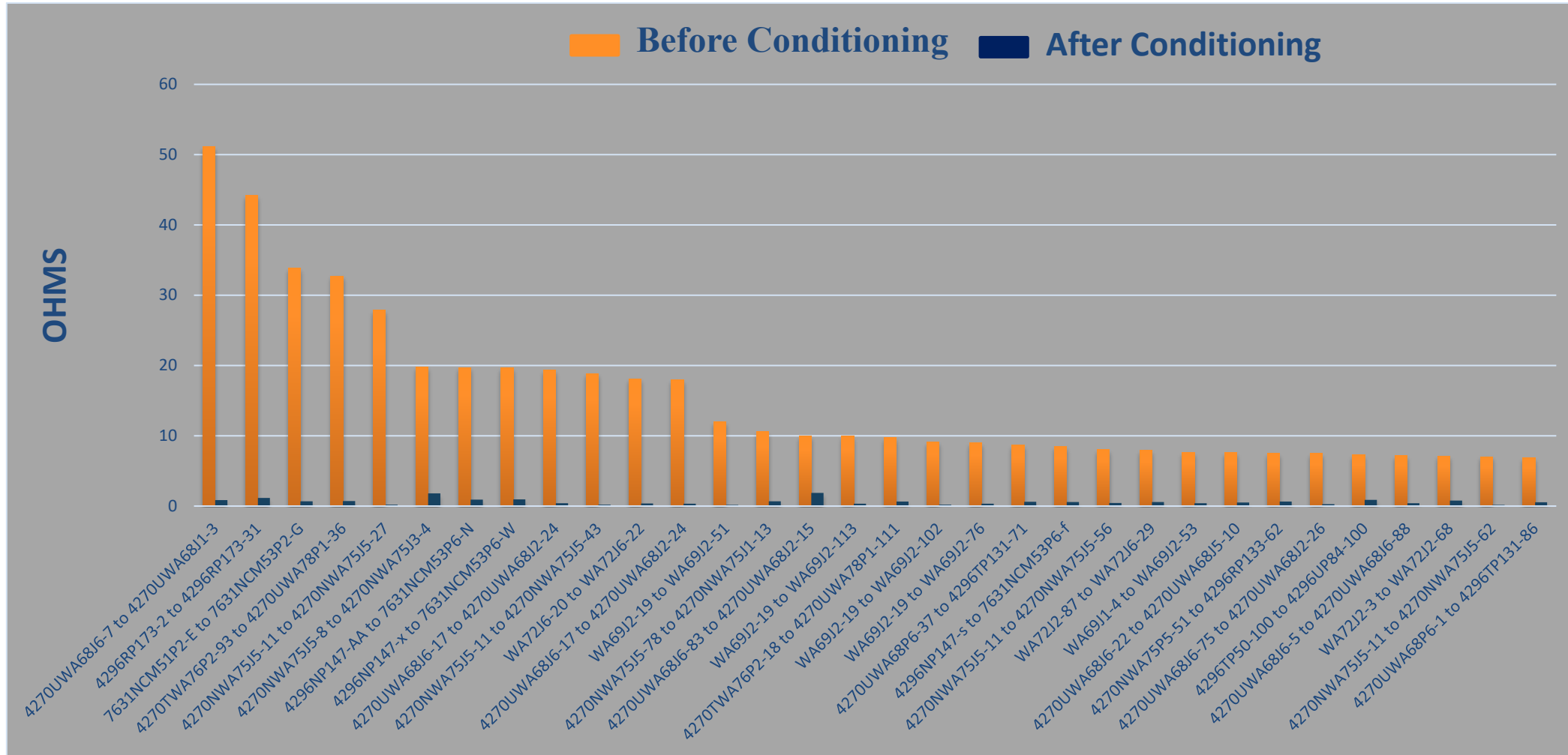
CV22 Conditioning Stats

- **131 Wires Greater than 2 ohms**
 - Average before Conditioning **6.18 ohms.**
 - Average after Conditioning **0.74 ohms.**
 - Average decrease after Conditioning **-5.45 Ohms.**
- **155 Wires Less than 2 ohms but greater than 1 ohm**
 - Average before Conditioning **1.37 ohms.**
 - Average after Conditioning **0.55 ohms.**
 - Average decrease after Conditioning **-.82 Ohms**





Wires Greater than 2 ohms before Conditioning





Wires Greater than 2 ohms before Conditioning

