Innovation Cell
Engineering Solutions for Fleet Readiness Centers

William Birurakis
Senior Vice President, Engineering
Pioneering Decisive Solutions, Inc.
240-298-7124

Background

- The US Navy's NAE has in it's inventory slightly more than 3,700 aircraft (we had over 6500 in 1990). There are more than 90 T/M/S (type/model/series) aircraft in the Navy and US Marine Corps inventory.
- The NAE (both Navy & Marine Corps) fly more than 1.2 Million flight hours per year at a cost averaging a bit over $4,400 dollars per hour.
- From a sustainment standpoint, the cost to provide everything it takes to enable and provide this level of operations and associated maintenance, logistics and engineering exceeds $ 6 Billion dollars per year (not including new /replacement aircrafts and associated systems) and many thousands of highly skilled people of various skills

Challenge

- The Naval Aviation Enterprise (NAE) is under extreme pressure to achieve ‘more Cost-Wise-Readiness’. This is a result of a clear understanding that the strain on our Navy / Marine Corps NAE during current times is extreme and that many of our aircraft, associated weapons systems, and the systems that support them are getting older and must be replaced and/or modernized. With this in mind, it is imperative that the Navy, and specifically the NAE, seek innovative ways to change the way things are done in order to achieve more ‘effectiveness and efficiency’ in a manner such that resource dollars can be freed up for modernization. The objective has to be to achieve exactly the right degree of readiness; i.e, not too much, not too little. The NAE ‘is’ in fact doing this.

Transformation to FRCs

- he Naval Aviation Enterprise (NAE) is transforming the way it performs its Depot and non-deployable Intermediate levels of maintenance by adopting the Fleet Readiness Center (FRC) concept. In fact, this initiative was a part of the Base Realignment And Closure (BRAC) process accomplished 2005.
- Per GAO analysis, the FRC initiative, if fully implemented in a successful manner, will provide the highest recurring cost saving of any of the 198 DoD BRAC 2005 initiatives (ref: GAO-rpt-159 dated Dec2007 see page 54).
- he FRC initiative, during it's first two years of implementation, has achieved it savings / cost avoidance targets and these have been reported to Navy leadership as well the GAO.
- hat said, the FY09 target increases dramatically and the FRC initiative will require significant efforts to actually 'do' all that is required.
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Avionics Rapid Action Team

- ddressing the thinking and efforts of the NAE (Naval Aviation Enterprise) to improve the way we are ‘providing timely engineering and logistics support’ to aviation Fleet Readiness Centers that accomplish the level II and level III aviation maintenance that supports the Navy’s operating aircraft and the associated weapon and support systems.
- he ‘Imagineering’ associated with the ARAT (Avionics - Rapid Action Team) is to deliver to the FRC’s, ‘expedited and focused engineering’ based upon ‘boots in the shop’ and a direct and symbiotic relationship that changes the way we identify, then correct deficiencies including the alteration of the associated business and maintenance processes. This includes ‘enhancing cost effectiveness’, but also ‘system performance’ plus ‘system reliability’ or ‘time-on-wing’.
- ey to this effort is the ‘measurement’ of what is or is not being accomplished as well as how the changes were made and can be replicated and sustained.

Exploration

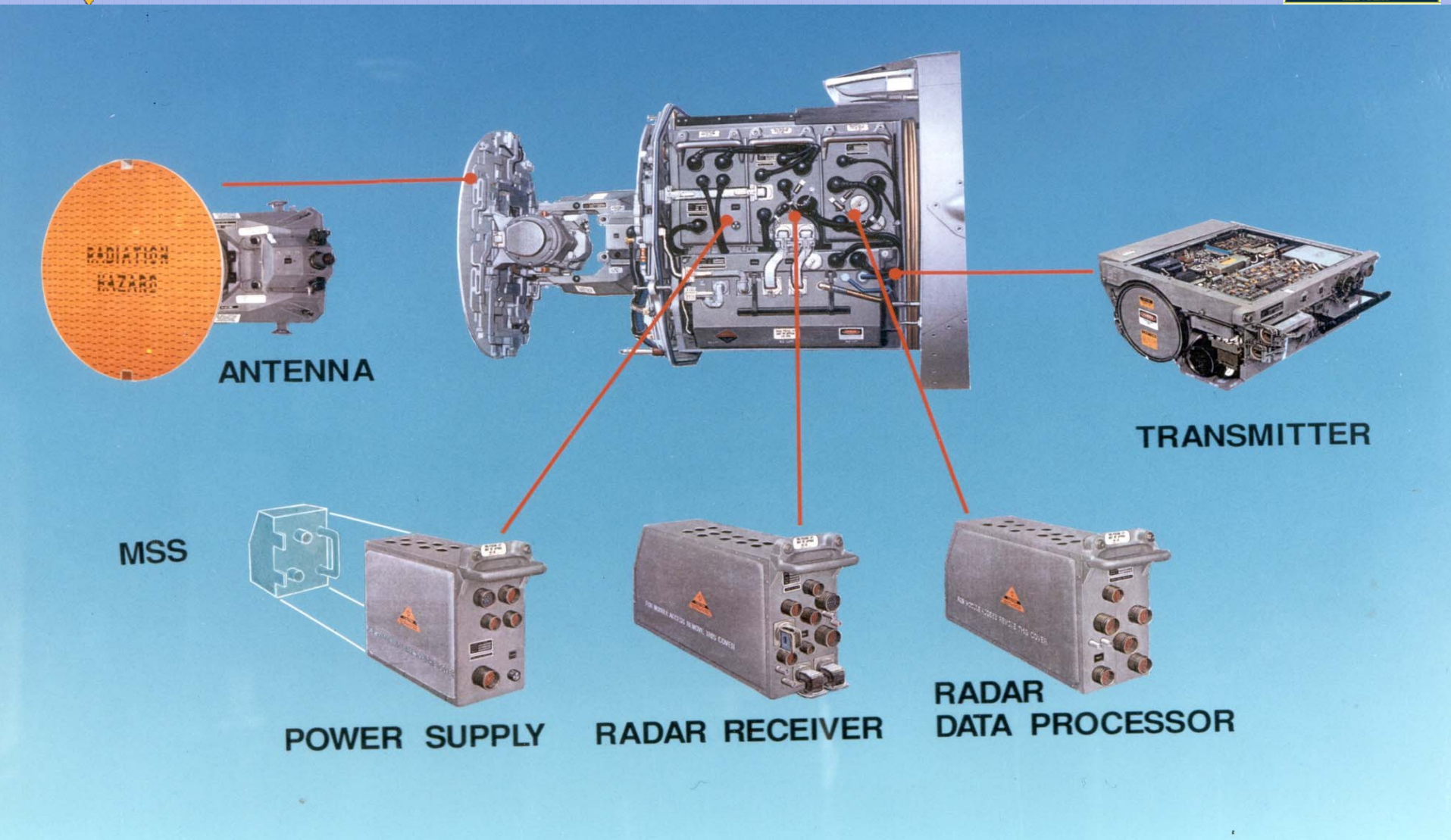
- ill provide an explanation of what has been achieved through ARAT at FRC West located at Lemoore California while working on FA-18 radar systems

- hile ARAT ‘is’ focused on specific achievements related to improvements in the domain of the FA-18 Hornet radar, the prime objective is to prove the hypothesis that improvements are possible to the methods the NAE uses to provide logistics, engineering and maintenance support.

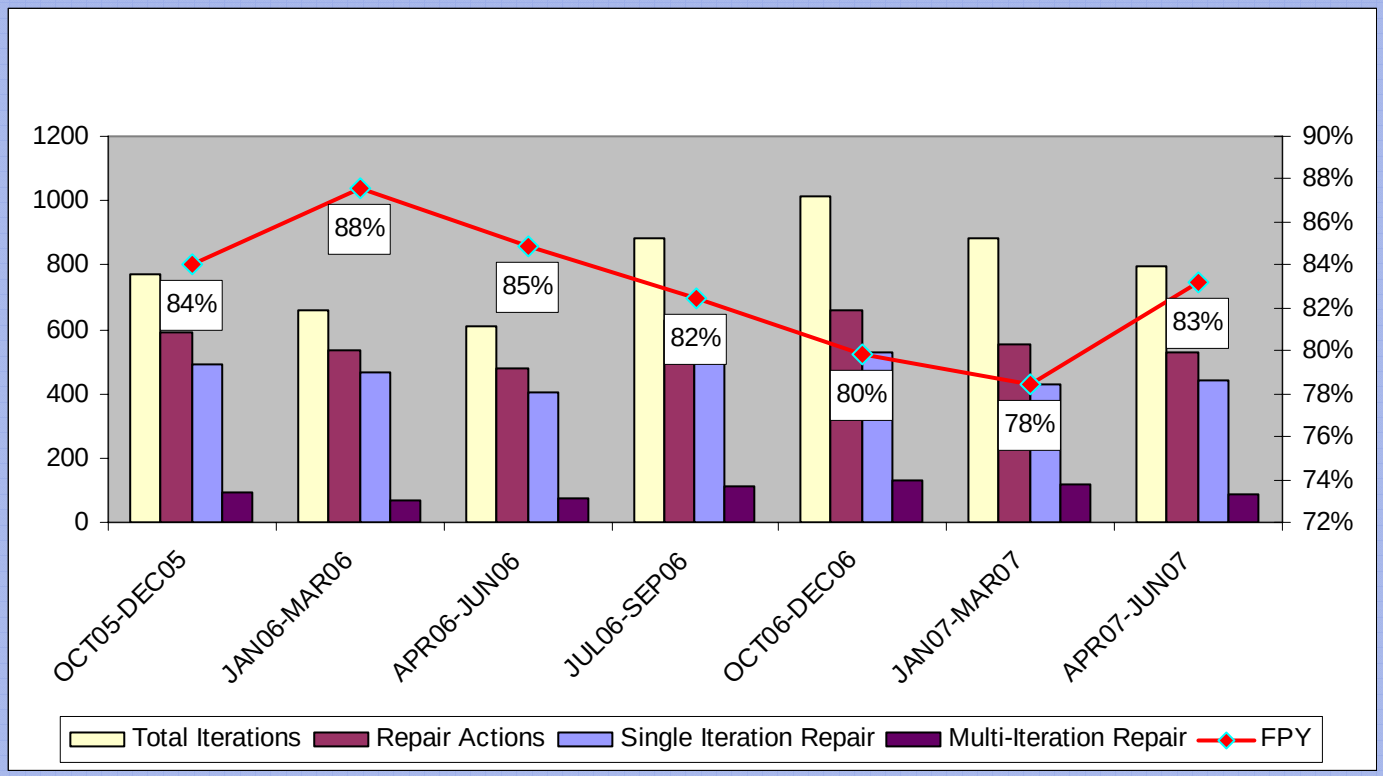
ARAT Innovation Cell Approach

- Innovation Cell was created to:
  - Identify/Solidify Objectives
  - Determine Appropriate Means of Measurements
  - Generate Approaches to meet Objectives
  - Measure Results
- Many areas covered for Objectives and were boiled down to two primary measure of effectiveness:
  - Time On Wing (TOW) & affects to RFT
  - Cost Avoidance /Savings

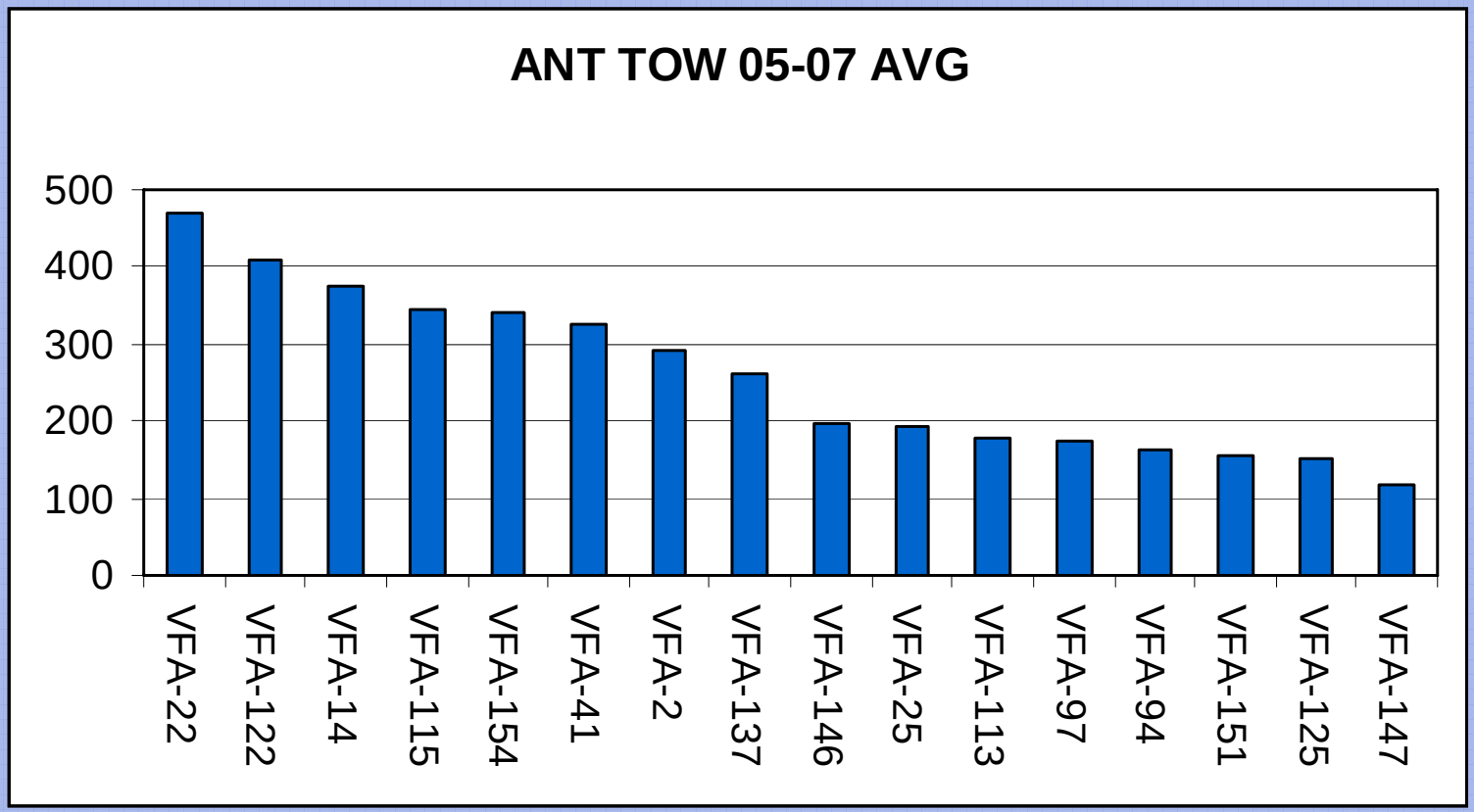
ARAT/COE Benefits


RADIATION
HAZARD
ANTENNA
TRANSMITTER
MSS
POWER SUPPLY
RADAR RECEIVER
RADAR
DATA PROCESSOR

First Pass Yields



ANT Time On Wing Example



***FY-07 QTR2**

ANT Bad Actors example

SERNO	MHRS	IMAs
TFG857	341.1	11
PUV938	56.6	10
RLP327	103.4	8
SVG709	173.4	8
TAC756	159.3	8
PDR863	71	7
PUV887	58	7
QGR158	36.7	7
RLP349	58.7	7
SQW670	66.4	7
TNW153	203.9	7
TNW999	136.2	7
NUD579	198.7	6
RLP346	267.8	6
RTP388	139.5	6
SAZ461	79	6
QGR017	107.6	5
QXC129	76.1	5
REU307	23.6	5
RLP320	108.7	5
RLP328	178	5
SAZ475	440.9	5
SAZ512	22.1	5
TFG838	277	5
TFG868	57.2	5
TNW041	27.8	5
TNW050	49.8	5
TNW116	61.2	5
TNW229	19.3	5

Only Top ANT Bad Actor Serial Numbers are indicated in this slide.

Bad Actors = 13.1% of total ANT S/Ns processed, 33.6% of ANT IMAs, and 33.5% of ANT IMA MHRs.

Poor Performers = 22.6% of total ANT S/Ns processed, 31.3% of ANT IMAs, and 34.4% of ANT IMA MHRs.

Total = 35.7% of ANT S/Ns processed, 64.9% of ANT IMAs, and 67.9% of ANT MHRs.

MA Mean	2.461538	
MA Median	2	
Std Deviation	1.864651	
Bad Ac tors	#MA > Mean +1 Std Deviation	4.326189
Poor Performers	Mean + Std >= MA > Mean	Between 3 AND 4
R Population	MA <= Mean	<= 2

Group	#S/N	%S/N	#MA	%MA	#Mhrs	%Mhrs	
Bad Ac tors	29	13.1%	183	33.6%	3599	33.5%	greater than 4
Poor Performers	50	22.6%	170	31.3%	3698	34.4%	3 to 4
R Population	142	64.3%	191	35.1%	3452	32.1%	2 and below
Total	221	100%	544	100%	10749	100%	

ANT I-Level Repair Data 2005-QTR3 to 2007-QTR2

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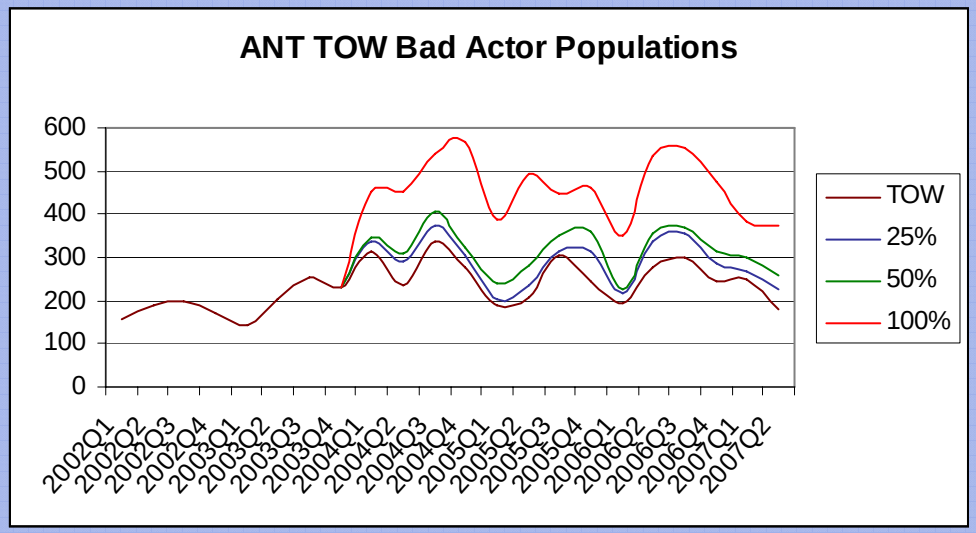
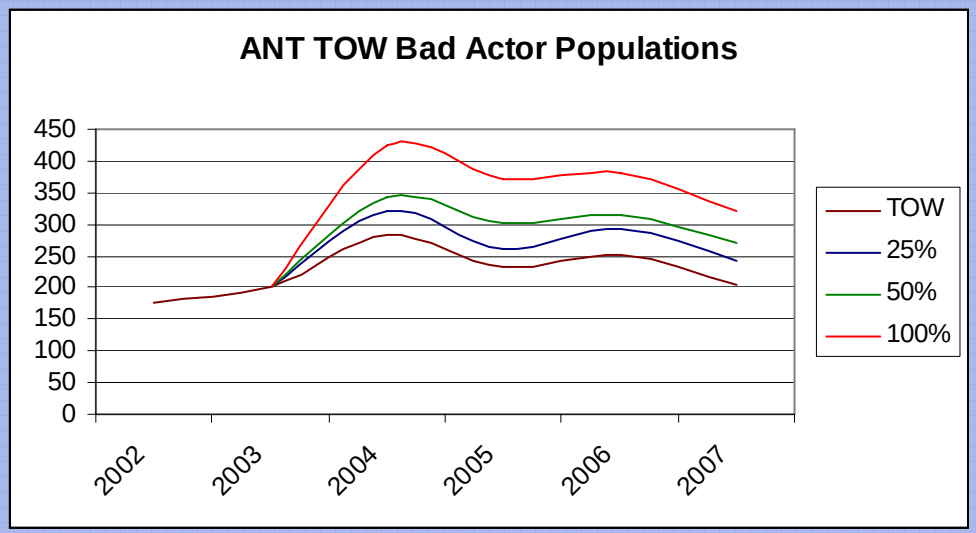
ANT Time On Wing (CONT)





ANT Bad Actor S/N were removed from Time on Wing calculations based on top 25% of ANT Bad Actor population and at the 50% and 100% populations from FY2004-FY2007 QTR2. FY2002-FY2003 was used for baseline comparison of trend.

***FY-07 QTR2**

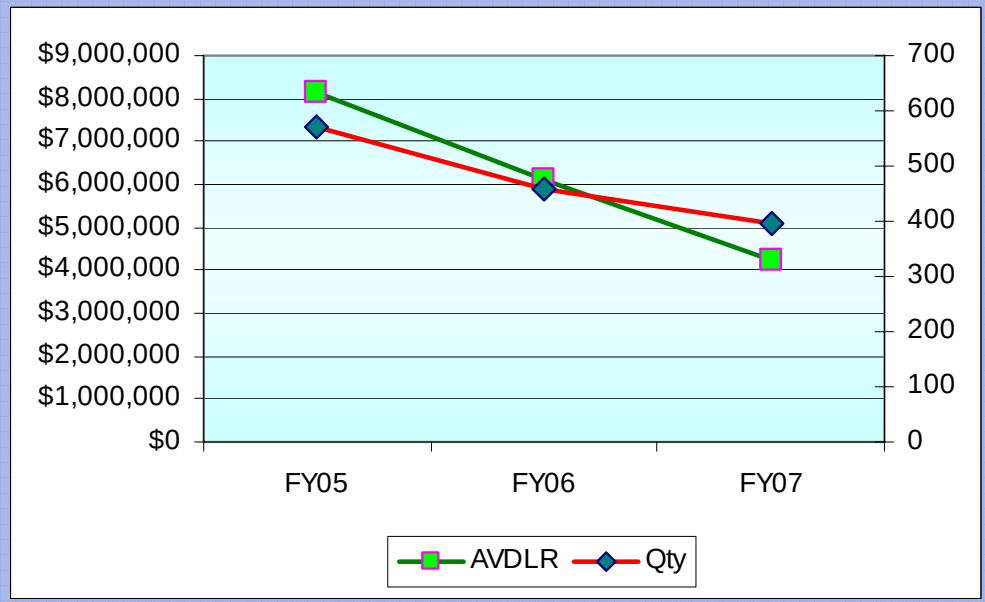
A799 Rates Unacceptable & Opportunity for EVHMS

- XMTRs: A799s + Reseat Actions = 51.4 % of IMAs.
- ANTs: A799s + Adjust/boresight/aligned Actions = 55.2 % of IMAs.
- RRs: A799s + Reseats + 2A9s alignments = 54.5 % of IMAs.
- R/Es: A799s + Reseats + 2A3s alignments = 69.4 % of IMAs.
- RDPs: A799s + Reseats = 51.2% of IMAs.
- PSUs: A799s + Reseats = 71 % of IMAs.
- CPSs: A799s + Reseats = 55.4 % of IMAs.

BCM Cost Savings

BCM Cost Summary

- FY07 AVDLR prices used in calculations
- Does not include R&R Support to other Sites

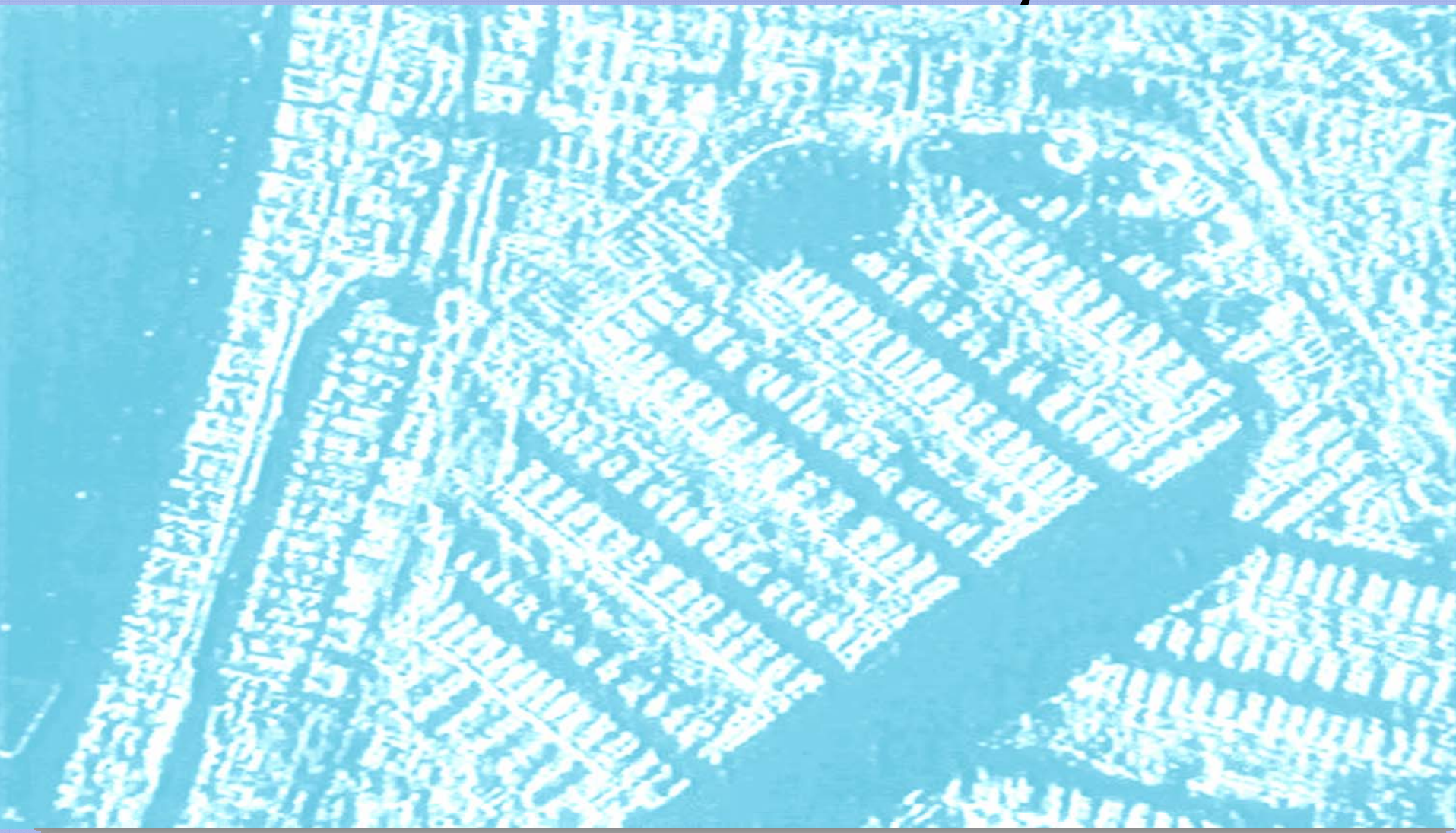


	What	Qty	AVDLR	MHRS	
FY05	WRA	101	$3,570,179	5,695	
	SRA	471	$4,598,637	2,525	$8,168,816
FY06	WRA	56	$2,189,037	1,833	
	SRA	404	$3,936,383	2,866	$6,125,420
FY07	WRA	14	$586,879	301	
	SRA	383	$3,627,909	160	$4,214,788

Data Source: DECKPLATE

Bad Actors Program

Bad Actors = Bad Eyes

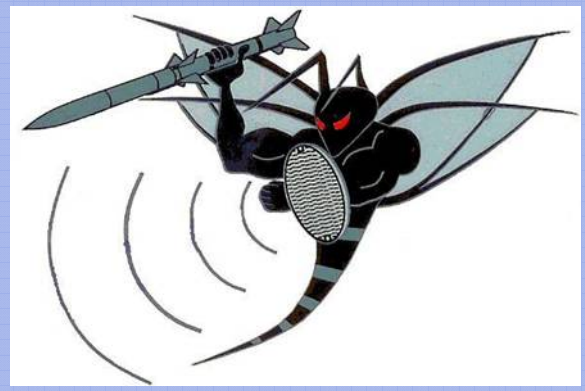


Tx MQJ-618

- Number one Bad Actor transmitter in the fleet FY05-FY07
  - 24 Failures in two years
  - Reworked by artisans May 07
- Stayed in aircraft 11 months before failure
  - >260 transmit hours
  - Previous 5 maint. actions had a total of 11 operating hours

Example RR TNW-608

- **RR TNW 618**
- 23 effective Y-Codes (never stayed out)
- Reworked stayed out 11months
- $140,024.00 Cost avoidance by avoiding continuation of scenario.

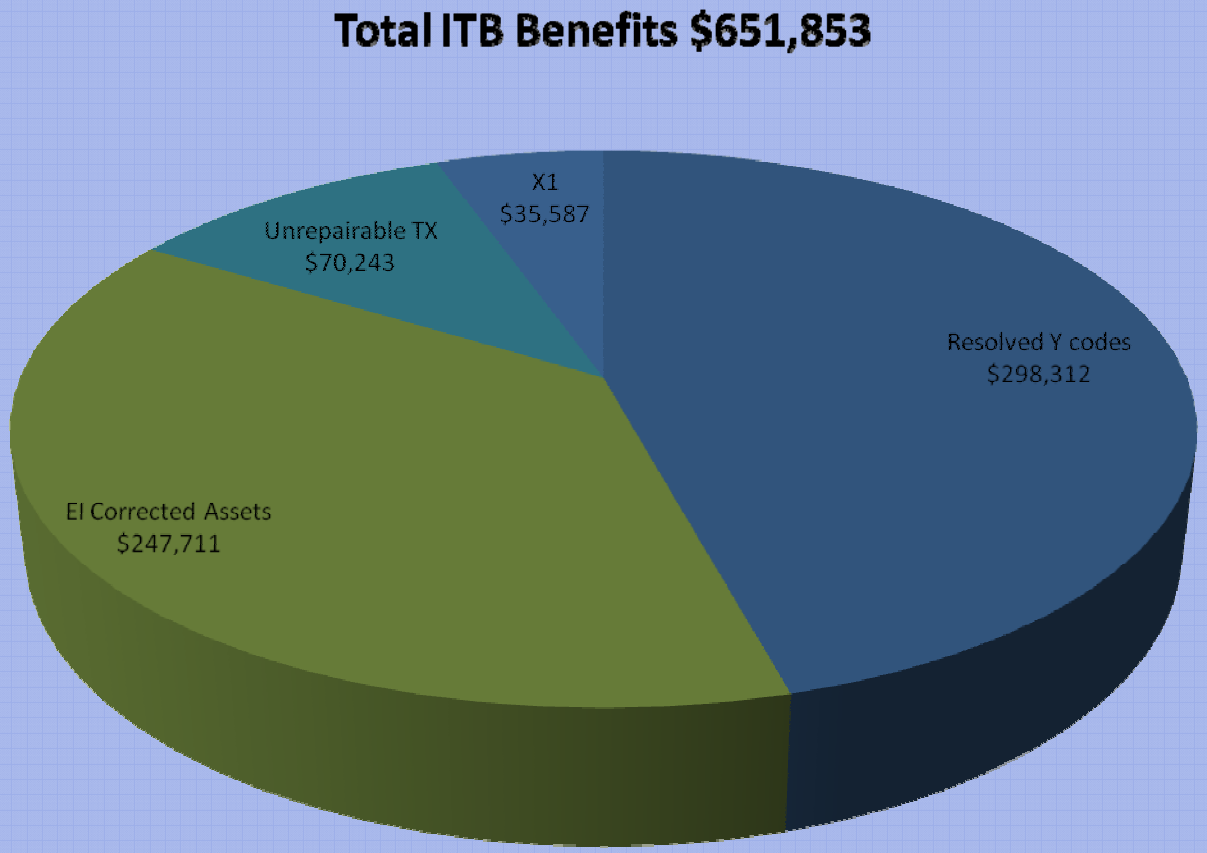


Integrated Test Bench (ITB) Benefits
FRC West Lemoore

ITB Uses

- Y-coded WRA's (Repeat offenders for same fails).
- CASS TPS not available but supported by ITB.
- Data/Arithmetic problems undetected by CASS simulation.
- Bad Actor processing.
- CASS improvement through ITB test validation.

Integrated Test Bench Statistics: Total Cost Savings from 12/5/08.



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FRC Mid Atlantic Critical EI

- EI Investigation
  - 1 yr from fleet intro of Spur Corrections (FST Lead Time). FRC East will be eliminating spurs from their RRs while in repair cycle.
  - RADAR Receiver Spur Root Cause Analysis (Troy Gordish). Local Oscillator failure mechanism.

TOW Savings

Quantity to Quality based maintenance and benefits

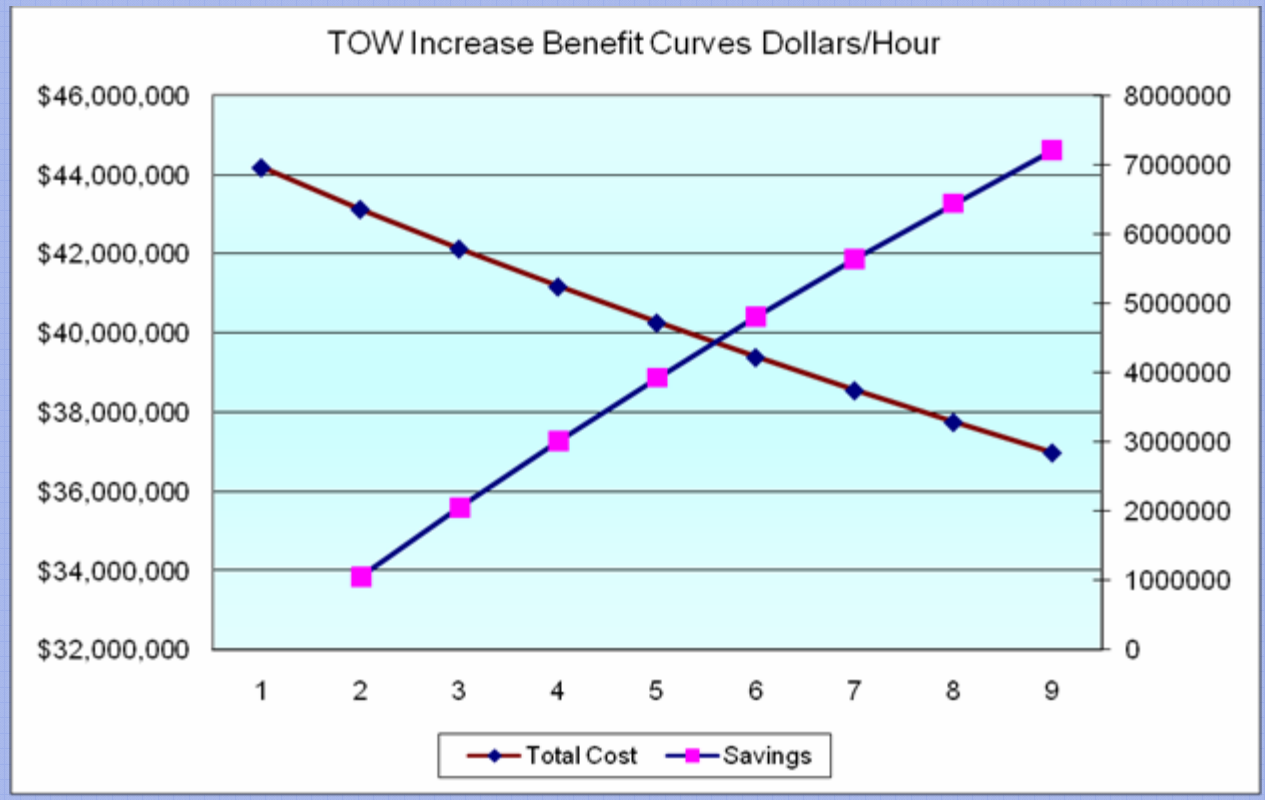
TOW Benefit

- TOW Cost = Total Cost of Repair = $44M
- TOW Increase = Reduction in Repairs
- Example = 100% Increase in TOW = 50% Reduction in annual cost of repair = $22M.

TOW Benefit

- Can maintenance practices change TOW
- Yes COE supported systems are running approx 20% higher TOW than rest of Fleet which yields approximately $2M/year savings
- COE supported systems are costing the fleet less from BCM interdiction savings and reduced cost based on higher TOW
- Y code removals, Bad Actor Program etc.

FRC TOW Increase Benefit about $1M/Hr



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Changing the Deployed Fleet Cost

- Can the COE and ARAT efforts change the cost of Fleet Repair
- Yes, thru local EI driven SW changes which improve Fleet Repair Capabilities

APPROACHES & Actions Taken

- **Incorporated Innovation Cell Findings**
- **Baselined TOW & Cost**
- **TOW Baseline**
  - **TOW completed**
  - **MTBD Lemoore Card Deck**
  - **Bad Actor Determination (By SN)**
    - **TOW**
    - **A799 (CND)**

APPROACHES & Actions Taken

- **Cost Baseline**
  - **Establish Cost/Repair/PN (in work)(in MYs)**
  - **WIP (in work) (MYs)**
  - **FPY (in work) (MYs)**
  - **BCM Interdiction (in work)($)**

APPROACHES & Immediate Actions for Effect

- **Bad Actor Elimination**
  - Remove small percentage for initial significant reduction
  - FRACAS (i.e., perform Root Cause Analysis)
- **Change SM&R Codes/ICRL**
  - Example Transmitter Auto BCM for Transmitter Chassis & 1A2 PSs
- **Instill process for History Cards**
  - **NAMP Change for ETI on MAFs (LT Penrod)**
- **Scrap Rate**
  - Investigate Scrap Rate from ARF
  - Hard Line Manufacturing (FRC)
  - Micro Min instructions and training
  - Potted Chip Removal & Card Trace Repair

APPROACHES & Immediate Actions for Effect

- **Training**
  - Teach SMEs how to read CASS digital code
  - Recommendation, CWO3 Daniels approach for troubleshooting publications
  - PMA-265 Training Initiatives
- **CND Reductions**
  - Supplier CNDs under investigation (Tom Henderson, Kevin Odel)
- **A799 Reductions**
  - Feedback to O-level
  - Feedback to SRA Repair
  - BOA ECT evaluation

APPROACHES & Actions Moderate Term

- **Cooperative FRACAS**
- **ADSR/Smart TPS**
- **Process Flow Modifications**
  - **Primary Highway**
  - **Rework Lane**
  - **Feedback Loop for Improvement**

The Way Its Supposed to Be

Bottom Line

Results:

-RE/RR/XMTR/ANT TOWs(MTBDs) have increased and FY08 levels are currently being calculated by FST. Expectations are in the range of 2-3 hrs/Radar = $2-3M FY09 targets another 4 hrs/radar=$8M *

-Cost Reductions in AVDLR from BCMI to date> $14M

-Radar COE is transitioning from Quantity Driven Repair to Quality Driven Repair Meeting Demand

-The approach utilized for Radar Transformation is now being utilized for other commodities.

-We are now looking into integration with and implementation of EVHMS

*calculations based on 2007 NAVICP AVDLR Costs

Questions?

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