

MEMORANDUM FOR: AFSC/ENRB

11 December 2012

FROM: AFSC/FZC

6038 Aspen Ave, BLDG 1289
Hill AFB, UT 84056-5805

SUBJECT: Management Memo of Intermittent Fault Detection and Isolation System (IFDIS)

1. Donald McClenny, AFSC/ENRB, DSN 777-5643 requested an independent evaluation of the estimated cost savings from the implementation of the IFDIS test system. This memo identifies the savings calculated.
2. The IFDIS is a LRU chassis intermittent fault tester that identifies continuity faults that happen intermittently during flight that cannot be identified through current test methods for Line Replaceable Units (LRU).
3. Current testing of the Modular Low Power Radio Frequency (MLPRF) LRU on the IFDIS tests 1,024 channels continuously while simulating vibration and temperature changes that would happen during flight. The two testers have been in operation since 2009 at a total cost of \$2.2M (FY12\$).
4. Since implementation the MLPRF test shop has tested 403 LRUs, to include those shelved as unrepairable (138 LRUs), that have been returned to service. Actual data from the effect of this implementation is used to identify previous savings and to estimate future savings.

Comments:

Total Investment to Date: **\$2.2M**

This includes the development of software and hardware, some of the costs include;

- \$2.2M for two MLPRF capable testers already in operation that test 1,024 channels

MLPRF Shop Personnel Reduction **\$0 .439M**

The MLPRF shop was able to reduce the number of personnel by 10 due to the effectiveness of the IFDIS tester. These personnel were placed in other locations avoiding hiring new personnel for these positions

MLPRF Shop Overtime Reduction **\$0 .028M**

The MLPRF shop was able to reduce the overtime by 646 hours per year due to the effectiveness of the IFDIS tester. (FY07-11 average overtime from the FY12 overtime identified in the Cost and Production Performance Module (CPPM) database for RCC MLABA)

A 10 year period was used to show savings using the estimated timeline for a new Radar System to upgrade the F-16 that is expected in 2020. The table shows a 10 year total savings.

MLPRF Manpower & Overtime Reduction estimated over 10 years

Manpower & Overtime savings FY11-20	FY11	FY12	FY13	FY14	FY15-20	Total over 10 yrs FY12\$
Reduction in personnel (10 WG11/3)	\$439,559	\$439,559	\$439,559	\$439,559	\$2,637,351	\$4,395,585
646 hour reduction in O/T @ a FY12 WG11/3 wage rate * 1.5 * burden factor	\$27,697	\$27,697	\$27,697	\$27,697	\$166,181	\$276,968
Total savings						\$4,672,554

Tangible savings validated: \$4.67M per year for Manpower and Overtime reduction

Other costs considered in the analysis of the data:

- Exchange Price - The cost charged to the customer for exchanging a repairable item for a serviceable one
 - Exchange price listed in the CPPM database is **\$39,903.11** for 2012
- The reduction value to the AF for assets having a longer Mean Operational Time Between Depot Repairs (MOTBDR).
 - It is estimated that the return to depot for repair has been extended up to 300% of the previous operational service life before repair (~290 days to ~926) of the MLPRF LRU over a three year period. Approximately 33% fewer returns each year for those LRUs tested on the IFDIS.
 - The number of MLPRFs returned each month has dropped from ~54 LRUs to ~17 LRUs, a 68% decrease. (54 @ \$39,903 = \$2.15M, 17 @ \$39,903 = \$0.68M, \$2.2M - \$0.68M = \$1.48M)
Customer cost avoided is **\$1.48M** per month (**\$17.72M / year**)

Increase in repair costs: Latest Repair Cost (LRC)

LRC costs increased on average **\$9,400** per MLPRF after implementation of the IFDIS. Using the 403 tested as the baseline this equates to **\$3.8M** in increased test costs to date. LRC data retrieved from the CPPM database and normalized to FY12\$. FY07 to FY09 represented before the IFDIS and FY10 to FY12 represented after IFDIS implemented. Costs were averaged and the difference is represented by the \$9,400. Using the new induction of 17 per month the projected annual cost increase is **\$1.93M** per year

Cost Avoidance (FY12\$)	FY11	FY12	FY13	FY14	FY15-20	Total over 10 yrs FY12\$
MOTBDR avoided	\$17,716,981	\$17,716,981	\$17,716,981	\$17,716,981	\$106,301,885	\$177,169,808
Increase in shop cost	\$3,807,818	\$1,927,531	\$1,927,531	\$1,927,531	\$11,565,185	\$21,155,596
Total avoided cost	\$13,909,163	\$15,789,450	\$15,789,450	\$15,789,450	\$94,736,700	\$156,014,213

These costs are an estimate only and reflect the changes in monthly inductions of the MLPRF LRU from 2007 to Mar 2012 (DRILS). An average induction rate for at least a three year period prior to 2007 would be needed for further comparison.

Total annual cost avoided from reduction in MOTBDR: **\$17.72M**

Total annual cost avoidance using the data available at the time of this document: **\$15.79M**

Total cost avoided over 10 years: **\$156.01M**

Intangible Benefits:

- Increase in efficiency by 300% for MLPRF LRUs shown in the average MOTBDR from 290 days to 926 days
- MLPRF caused Mission Incapable aircraft (MICAPS) eliminated
- 138 MLPRFs restored to service and put back into supply that had been identified as 'Bad Actors' or unrepairable. At the Latest Acquisition Cost (LAC) in the D043 the total value of these assets is \$46,602,946 in FY12\$, however, the last purchase recorded was 18 units in 1991. As these assets are no longer available to purchase only their current value in FY12\$ is identified.
 $138 * \$229,134 * 1.474 \text{ (inflation)} = \$46,602,946$
- Increase in reliability in MLPRFs tested on the IFDIS where greater than 58% of the MLPRFs tested, the IFDIS found at least one intermittent fault not identified with other testing equipment that showed No Fault Found (NFF).
- Relative low cost to develop additional TPSs for other LRUs on multiple weapon systems that experience NFF that the IFDIS would be able to identify continuity intermittent faults while simulating a flight profile.
- Provides testing for assets that have service life extension programs where age and obsolescence affect reliability.

5. Current IFDIS program status

- \$.600M to upgrade the IFDIS for 1,500 channels needed for testing the Central Air Data Computer (CADC)
- \$7M contract being funded for a 8,400 Plus channel testing capability for the Programmable Signal Processor (PSP) LRU on the F-16 radar system.

6. Future intent for the IFDIS is to expand this new testing support to all LRUs that can be identified as having intermittent faults where there would be a cost benefit for development of the TPS. This would encompass multi service support.

Other cost data not available or that is unknown include the transportation costs to ship the LRU to Hill AFB, LRU removal and install, and any additional depot charges not included in the D043 database. Costs were inflated / normalized to FY12 dollars for comparison purposes.

James Hundley
Cost Analyst
AFSC/FZC OL:FZH
DSN 777-5457