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**Stock Funding Depot Level
Reparable Parts:
Implementation in a Contracted
Out Aircraft Maintenance
Environment**

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93-06345



98 3 29 012

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a REPORT SECURITY CLASSIFICATION Unclassified			1b RESTRICTIVE MARKINGS		
2a SECURITY CLASSIFICATION AUTHORITY N/A			3 DISTRIBUTION/AVAILABILITY OF REPORT Distribution Statement A: Approved for public release; distribution is unlimited.		
2b DECLASSIFICATION/DOWNGRADING SCHEDULE N/A			5 MONITORING ORGANIZATION REPORT NUMBER(S) Same		
4 PERFORMING ORGANIZATION REPORT NUMBER(S) NDU-ICAF-92-			7a NAME OF MONITORING ORGANIZATION National Defense University		
6a NAME OF PERFORMING ORGANIZATION Industrial College of the Armed Forces		6b OFFICE SYMBOL (If applicable) ICAF-FAP	7b ADDRESS (City, State, and ZIP Code) Fort Lesley J. McNair Washington, D.C. 20319-6000		
6c ADDRESS (City, State, and ZIP Code) Fort Lesley J. McNair Washington, D.C. 20319-6000		7c ADDRESS (City, State, and ZIP Code) Fort Lesley J. McNair Washington, D.C. 20319-6000			
8a NAME OF FUNDING/SPONSORING ORGANIZATION		8b OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER		
8c ADDRESS (City, State, and ZIP Code)		10 SOURCE OF FUNDING NUMBERS			
		PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.
11 TITLE (Include Security Classification)					
12 PERSONAL AUTHOR(S)					
13a. TYPE OF REPORT Research		13b TIME COVERED FROM Aug 91 TO Apr 92		14 DATE OF REPORT (Year Month Day) April 92	
15 PAGE COUNT					
16 SUPPLEMENTARY NOTATION					
17 COSATI CODES			18 SUBJECT TERMS (Continue on reverse if necessary and identify by block numbers)		
FIELD	GROUP	SUB-GROUP			
19. ABSTRACT (Continue on reverse if necessary and identify by block number)					
SEE ATTACHED					
20 DISTRIBUTION/AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION Unclassified		
22a. NAME OF RESPONSIBLE INDIVIDUAL Judy Clark			22b TELEPHONE (Include Area Code) (202) 475-1889		22c OFFICE SYMBOL ICAF-FAP

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EXECUTIVE SUMMARY

At the beginning of FY-93, the Air Force will begin stock funding depot level reparable. This is one of the most fundamental changes to spare parts management in their history. Stock funding of depot level reparable means that aircraft maintenance will now have to buy reparable parts from a supply stock fund. Formerly, they received these parts free issue. The whole idea stems from Defense Management Review Decision 904. Its prime directive is to force greater efficiency throughout the repair process, but especially at base level. At Air Training Command's pilot training bases, new operations and maintenance accounts, valued at approximately \$7-8 million each, will be established and managed by aircraft maintenance. While this will be a tremendous challenge to manage, it also presents significant opportunities and incentives to increase efficiency and save money. This paper discusses potential opportunities for savings in ATC that has "contractor operated" or "Civil Service" only maintenance organizations. In addition to addressing contractor incentives and sharing savings, this paper presents four specific recommendations for ATC. They are: (1) Concentrate on repair differences between bases first; (2) Identify potential candidates for repair improvements; (3) Consolidate maintenance and logistics functions at geographically close bases; and (4) Develop a decision model to determine if it is less expensive to repair an item only at the depot vs. limited repair by a contractor at base level.

STOCK FUNDING DEPOT LEVEL REPARABLE PARTS:
IMPLEMENTATION IN A CONTRACTED OUT AIRCRAFT
MAINTENANCE ENVIRONMENT

I. INTRODUCTION.

Why is Stock Funding of Air Force Depot Level Reparables ("DLR") important? From a maintenance and supply perspective:

"Stock Funding of Depot Level Reparables represents one of the most fundamental changes in spares management philosophy ever seen in the Air Force. This concept will radically change the way recoverable spares are funded and bought at base and depot level, and will force DLR users to look beyond just mission needs. While mission accomplishment will remain the number one priority, cost accountability will drive Air Force managers at all levels to adopt a more business like approach in their day-to-day activities."¹

This fundamental change in Air Force spares management presents the Air Training Command ("ATC") an opportunity to increase base repair rates, improve productivity of their aircraft maintenance contractors, and save money. Before I discuss how ATC can take advantage of the DLR concept, some important background information is necessary.

II. BACKGROUND.

Since the DLR concept is new, a short explanation of some of its components and why the Air Force is making this spares management change is essential. This background will include: (1) the definition of a DLR, (2) Air Force stock fund concept, (3) why

¹United States Air Force. Base Level Implementation Training Package for Stock Funding Depot Level Reparables, DMRD904, AFLMC, Gunter AFB, Alabama, 22 July 1991: 1-1.

the Air Force is making this change, (4) Defense Management Review Decision 904, and (5) DLR funding in ATC.

A. What is a depot level reparable? They are parts a maintenance technician can normally repair and reinstall or repair and turn back into base supply for future use. In the aircraft repair business, DLRs are commonly referred to as "line replacement units" and "shop replacement units." They are assigned an expendability, recoverability, reparability cost designator ("ERRC") of XD1 or XD2 and comprise a wide range of assets including:¹

- (1) Electronics and telecommunications spares,
- (2) Aircraft spares,
- (3) Missile spares,
- (4) Other base maintenance spares, and
- (5) Vehicular spares.

Prior to DLR Stock Funding, these items were bought with central procurement appropriations managed by the Air Force Logistics Command ("AFLC").

B. What is the Air Force Stock Fund Concept? A stock fund is a system for financing the acquisition of inventory and holding it until a customer needs the item. A stock fund starts out with inventory and cash which in total is called the funds capital. The stock fund sells items to customers and receives cash in return to

¹United States Air Force. AFM 67-1, Volume Two, Part Two, Chapter 3., p. 27.

replace inventory. Figure 1 shows how a stock fund transaction would flow. Figure 2 depicts the eight Air Force Stock Funds ("AFSF") that presently exist.³ The Reparable Stock Fund Division (RSD) has been specifically created to fund for DLRs. When a maintenance activity draws a DLR from base supply, their operations and maintenance account reimburses the RSD for the cost of the part. Prior to stock funding, DLR's aircraft maintenance was receiving these parts free-of-charge.

C. Why is the Air Force making such a radical change in the way they do business? According to Alan K. Olsen, Headquarters U.S.A.F. Associate Director, Logistics Plans and Policy:

"The Air Force proposed stock funding DLRs as a DMR [Defense Management Review] initiative because we believe there are important benefits to be gained. Logistics managers will gain additional flexibility in the use of stock fund authority for procurement and depot level repair. A single account will replace the five procurement and one O&M [Operations and Maintenance] accounts we use for these items today. Improved efficiency in air base repair cycle and more timely return of unserviceable assets also should occur. Finally, the cost of operating our weapon systems will be more accurate."⁴

While the above statement may sound enlightened, the Air Force

³Ibid 1, pp. 1-2.

⁴United States Air Force Memorandum for Distribution. Implementation Plan for the Stock Funding of Depot Level Reparables--Information Memorandum, HQ USAF, Logistics Plans and Policy. Washington, D. C., 19 Nov. 1990.

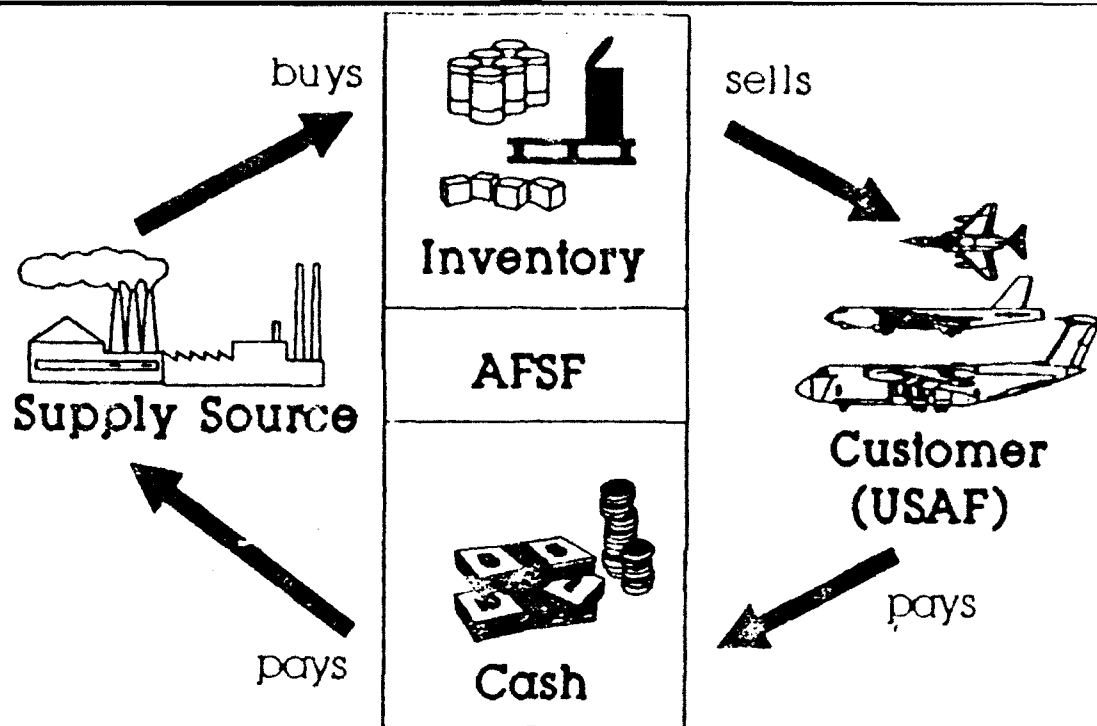


Figure 1. Stock Fund Cycle

B. STOCK FUND DIVISIONS: There is only one Air Force Stock Fund (AFSF). There are, as depicted in Figure 2, eight administrative divisions within the AFSF.

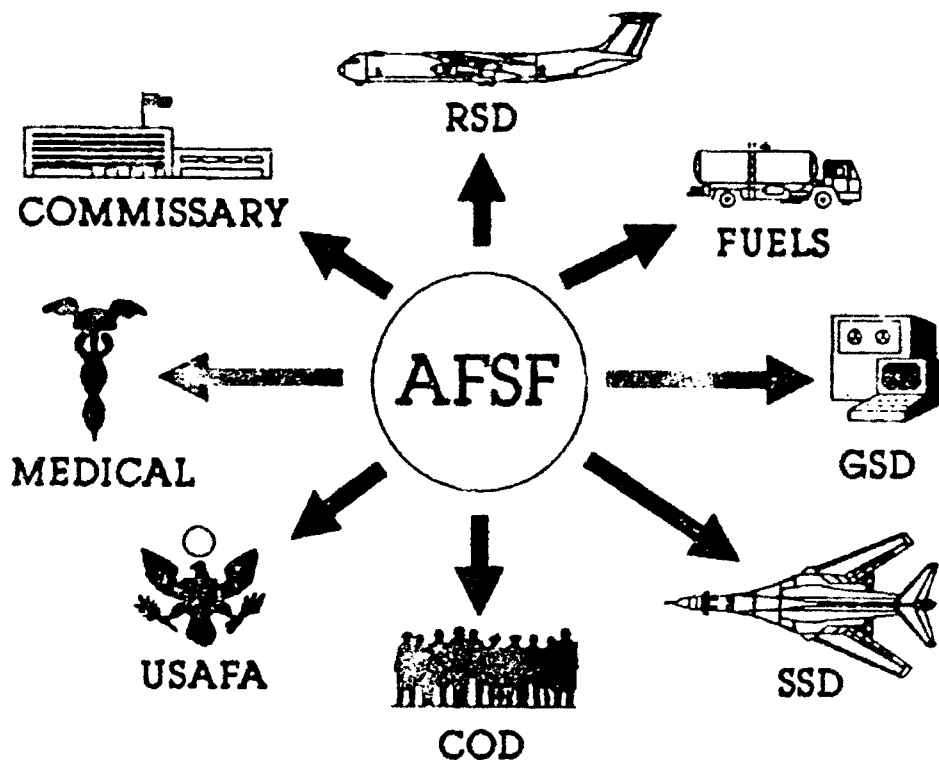


Figure 2. Air Force Stock Fund Divisions

has actually been resisting the DLR concept as far back as 1979.³ The Navy was first to test DLR stock funding by managing non-aviation spares under this concept beginning in April, 1981.⁴

D. Defense Management Review Decision ("DMRD") 904. Under DMRD 904, 9 November 1989, the Secretary of Defense directed the Air Force and Army to stock fund their DLRs. The Navy had already converted to this system in the middle eighties and was showing a 20-25% reduction in demands as a result of users having to pay for DLRs with their O&M money. The Office of the Secretary of Defense estimated stock funding of DLRs would save \$13.4 billion in budget authority over the FY 1991-FY 1995 period, but later revised savings down to \$10.5 billion.⁵ The Air Force plans to fully implement DLR stock funding at base level on 1 October 1992.

E. Funding for Depot Level Reparables at Base Level in ATC. ATC currently uses the T-37 and T-38 jet aircraft in its Undergraduate Pilot Training Program ("UPT"). They also use these aircraft at Randolph AFB, Texas, for Pilot Instructor Training ("PIT"). In late 1990, Brig Gen George Babbitt, Deputy Chief of Staff, Logistics, made the proposal to his staff that we needed to

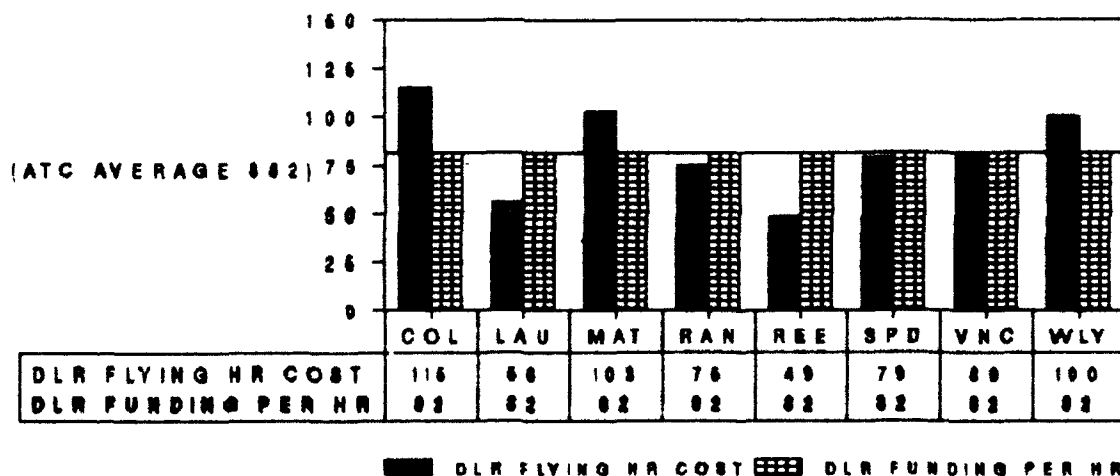
³United States Air Force. LEXW message (R231455 2 Jul 1982), Stock Funding of Depot Level Reparables. HQ USAF, Washington, D.C., 2 July 1982.

⁴Ibid p.1

⁵United States Department of Defense. Defense Management Review Decision 904, Stock Funding of Reparables. Office of the Secretary of Defense, Washington, D.C., 9 November 1989: p A-1.

develop a DLR cost per flying hour concept. This would enable the Command to allocate DLR money based on each base's flying hour program. This is similar to how money is allocated for expendable items. It also provides a mechanism to adjust funding levels if flying hours are increased or decreased. However, this presented a significant dilemma. Since DLRs were free issue in the past, historical expense records, which could be easily used, were not available in any budget, maintenance management, or supply data system.

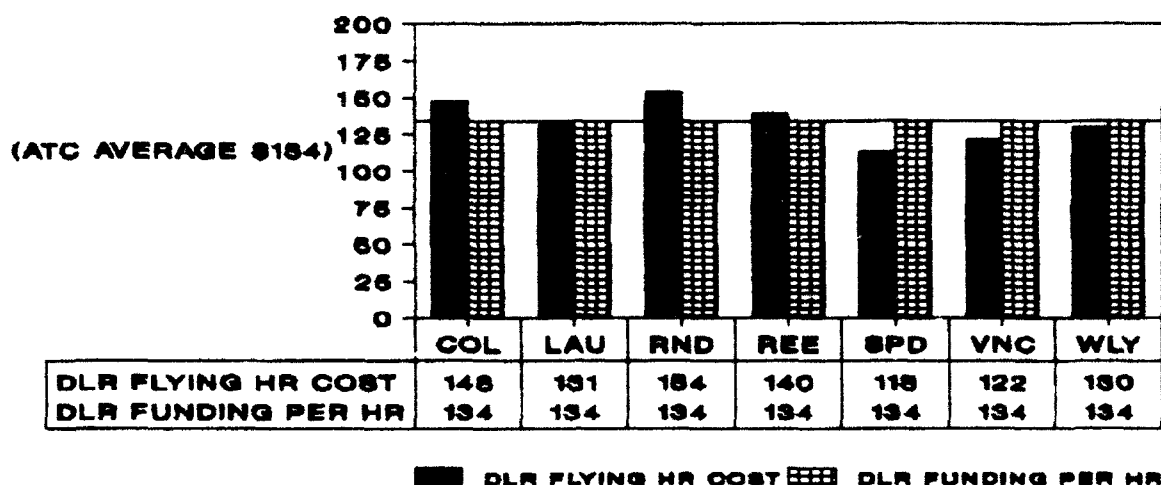
To solve this dilemma, it was decided to use the last four quarters of not-reparable-this-station (NRTS) and condemned data from the base supply computer system. The last four quarters of NRTS or condemned turn-ins were then calculated by aircraft type and applied to a cost formula. (Note: Serviceable turn-ins receive full credit so they are not counted.) This generated the total



Per Flying Hour FY 81

FIGURE 3: T-37 DLR FLYING HOUR COST

dollars lost by maintenance per type aircraft at each base.



Per Flying Hour FY 81

FIGURE 4: T-38 DLR FLYING HOUR COST

Applying this figure to annual flying hours and number of aircraft assigned, the DLR cost per flying hour was calculated. Figures 3 and 4 represent DLR costs per base for the T-37 and T-38.

Note the DLR flying hour cost differences between the various bases in figures 3 and 4. Bases range from a high DLR flying hour cost of \$115 down to \$49. If equipment and manpower are proportional to the number of aircraft assigned, some bases appear more efficient than others. Also, look at the ATC average of \$82. ATC clearly feels the bases above the Command average are more inefficient than those below the average line. For this reason, ATC is funding all bases at the Command average per DLR flying hour. This penalizes inefficiency and rewards those bases currently performing below the Command average. This is the intent

behind DMRD 904--force efficiency. This issue will be discussed in greater detail under the "Contractor Incentives" portion of this paper.

One last bit of background information is essential before discussing how ATC maintenance can take advantage of the RSD concept. Under RSD, a serviceable item was originally going to be issued at standard price. This standard price included the acquisition forecast cost and inflation. If maintenance made a serviceable turn-in they basically received all their money back. If an item was turned in NRTS or condemned they would lose the repair cost value of the asset plus a 14 percent surcharge. This is still the basic underlying way the RSD calculates credit for the turn-in of assets. The one major change to this system is the actual amount of money charged at the time of issue. DLRs are now issued at the exchangeable cost price. This change was required to reduce the amount of O&M cash needed to start DLR operations. Figure 5 is designed to explain how this works:

FIGURE 5
DLR ISSUE COST

FORECAST ACQUISITION COST	=	\$100 + 3.4% INFLATION	=	\$103.4
STANDARD PRICE	=	103.4 + 8%	=	111.67
REPAIR COST	=	25.0 + 14%	=	28.50
CARCASS VALUE	=	103.4 - 28.50	=	74.90
EXCHANGEABLE COST (ISSUE)	=	111.67 - 74.90	=	36.77

If an item is issued at an exchangeable price of \$36.77 and subsequently turned in serviceable all \$36.77 is refunded. If the item is NRTSed or condemned all \$36.77 is lost.

III.IMPROVING EFFICIENCY.

As I stated in the introduction to this paper, I think the DLR concept presents ATC an opportunity to increase base repair, improve productivity and save money. Why do I think this?

First, ATC logistics has a highly motivated, highly skilled cadre of people from the bottom up. The only major anomaly is that aircraft maintenance at all UPT bases is contracted out with one exception. Laughlin maintenance is Civil Service only. This does not present any major problems in improving efficiency under the DLR concept. However, it does drive the need for close teamwork between the contractor, ATC Quality Assurance Evaluators, the contract administrator, and base budget and supply people. Team work will be the key to success.

Profit incentive is the second reason I think bases can identify, develop and implement efficiencies. ATC maintenance contractors are in business to make a profit.¹ By sharing DLR savings, which I will address in later paragraphs, the contractor has an opportunity for increasing profits. It is absolutely critical the contract Chief of Maintenance, workers and "parent company" understand that pushing DLR efficiencies is not an attack on their performance. It is an opportunity for all to profit. Contractor costs for improving repair should be paid for out of savings generated from repair increases. The Base Contracting Officer may also suggest to the parent company that

¹Baumol, William J. and Alan S. Blinder. Economic Principles and Policy. New York: Harcourt Brace Jovanovich, 1991, p.514.

they review their internal rewards procedures to stimulate employee involvement. This will overcome the problem of contractor personnel not being able to receive cash awards under the USAF Suggestion Program.'

Profit motive is also available to each UPT Base. If the base stays under their DLR budget, the savings may be available to reprogram into base improvement projects. Even the pilot cadre can potentially save DLR money by reducing unnecessary stress on aircraft systems. Action taken to extend the landing roll during a recent brake pad shortage is a good example of how the flying community can help save maintenance money.

A. Identifying Items with the Greatest Potential for Increasing Repair. It is important to note here that selection of potential items for increased repair IS NOT a budgeteer or supply function. Only aircraft maintenance people have the skills and knowledge to identify potential repair increase candidates. Support people can help in the evaluation process once the potentials are identified. With this firmly stated, there are several ways of identifying DLRs with the potential for repair improvements. One common thread in all approaches is the necessity for "Team Work." Unless the maintenance contractors and parent companies see how this process will benefit them, many good opportunities will be missed.

'United States Air Force. Air Force Suggestion Program AFR 900-4.

1. A first possible approach is to ask all maintenance technicians which items they feel have potential for repair increases. This can be done by base, work center, shop, et. using a computer generated questionnaire. This initial questionnaire should be a simple yes/no with one added twist: use an ordinal, interval or ratio scale for both answers.¹¹

Figure 6 is a possible example:

Figure 6
Potential Candidates
for Increasing Repair Rate

In your judgment can repair be increased at base level on the following DLRs? (check mark answer)

NSN	Noun	Yes	No
-----	------	-----	----

XXX-XXX-XXXX	Gear Box	_____	
--------------	----------	-------	--

If yes, how certain are you? (skip if no)

0-25%____ 26-/50%____ 51-75%____ 76-100%____

If no, how certain are you?

0-25%____ 26-/50%____ 51-75%____ 76-100%____

If no, what is the one main reason? (check only one)

Lack of technical data _____

Lack of test equipment _____

Lack of skills _____

Lack of repair parts _____

Other (write in) _____

The questionnaire should be designed for use in a data base at each UPT base and for merging at ATC level. The merged information should then be provided to each base for comparison purposes. Initial cost evaluation could then be prepared at base

¹¹Clover, Vernom T. and Howard L. Balsley. Business Research Methods. New York: John Wiley & Sons, 1984,p.59.

level for items with potential savings. The information generated by "no" answers is equally as important as "yes" answers and should be evaluated in depth. It might be more fruitful to pursue a solution on a \$20,000 "no" item as to increase repair by 1% on a \$2,000 "yes" item.

2. A second possible method of selecting items for increasing repair falls under the Total Quality Management ("TQM") concept.¹¹ Develop a TQM seminar which focuses on the process of identifying items for increased repair. This would be an interactive process between instructors and people involved in the repair process at each base. After the process becomes understood, teams can be formed to work specific problems or areas.¹²

Teams could:

- a. Identify best potential candidates (a maintenance function);
- b. Identify policies and procedures that inhibit repair;
- c. Identify cost and funding strategies;
- d. Identify short, medium and long range repair objectives;
- e. Identify new equipment and skills required to increase repair;
- f. Identify and record lessons learned for use when evaluating other DLR items;
- g. Identify items with greatest mission impact resulting from increased repair; and
- h. Identify items with greatest financial payback in the short and long run.

¹¹Mann, Nancy R. The Keys to Excellence: The Story of the Deming Philosophy. Los Angeles: Prestwick, 1987, p.43.

¹²Juran, J.M. Juran on Leadership for Quality, And Executive Handbook. New York: Free Press, 1989.

The first few DLR reviews will be time consuming, but a learning curve is always present with any new undertaking.¹³ One possible way to shorten the learning curve would be to send a technician, contracting, and supply person to the depot or contract repair center after potential items are identified. This fact finding mission could identify new equipment, technical order data and repair parts requirements. It could also be invaluable in helping to write an AFTO Form 135 Repair Change Request. If the item is repaired by a commercial source, one of the maintenance contractors or parent companies should be given the opportunity to develop a higher level of repair, especially since they already have some repair capability at base level.

3. A third method for selecting items with potential for increases in repair would be to build a master file that compares bases by percentage of base repair for each DLR. Criteria could be developed to exclude items with only a few repairs each quarter. Reports could be generated showing a multitude of facts such as:

- Highest and lowest base PBR for each DLR;
- Funds lost by not repairing at highest rate;
- Repair percentages by work center;
- Items which cause a base to lose the most money, compared by base.

This information is already available to a limited extent on the J-21 ATC Repair Analysis Report. J-21 data or data from some type of accumulating data base can be very useful in identifying

¹³Burgelman, Robert A., and Modesto A. Maidique. Strategic Management of Technology Innovation. Illinois, 1988, p. 228.

high potential payback vs. low payback candidates for increasing repair. Figure 7 is a high cost item:

Figure 7

Repair Data by 5 Quarters
NSN 1680-00-660-0843 Actuator
Repair data from 19 July 1991 J-21

Exchangeable cost = \$4,215 (hypothetical)

NRTS lose = \$4,215

CON = Condemned
NRTS = Not Repaired this Station
RTS = Repaired this Station
PBR = Percentage of Base Repair

CON	NRTS	RTS	PBR	BASE
0	1	2	.66	Columbus
0	1	41	.97	Laughlin
0	4	11	.73	Mather
0	0	45	1.00	Randolph
0	6	38	.86	Reese
0	1	66	.98	Sheppard
0	13	53	.80	Vance
0	<u>17</u>	<u>66</u>	.78	Williams
	43	319		

- The 43 NRTS items represent a loss of \$181,245 to the ATC DLR Operations and Maintenance Account.
- ATC PBR, excluding the highest and lowest base PBR, is 85%. (Calculated by using raw numbers, not an average of percentages.)
- If Mather, Vance and Williams had repaired at the command average, ATC would have saved by base:

(1) Mather	NRTS = 1, RTS = 14 =	\$ 4,215 loss vs. \$16,860
(2) Vance	NRTS = 10, RTS = 56 =	42,150 loss vs. 54,795
(3) Williams	NRTS = 12, RTS = 68 =	<u>50,580</u> loss vs. <u>71,655</u>
		\$96,945 \$143,310

- Savings of \$46,365 if above bases had repaired at ATC average of 85%.
- If all bases had repaired at or close to the highest PBR, savings would have been tremendous.

Figure 8 is a low cost item:

Figure 8

Repair Data by 5 Quarters
NSN 2840-00-086-76280RS Tank Oil
Repair Data from 19 July J-21

Exchangeable cost = \$375 (Hypothetical)

NRTS lose = \$375

CON	NRTS	RTS	PBR	BASE
0	12	1	.07	Columbus
0	9	37	.80	Laughlin
0	24	18	.42	Randolph
0	20	87	.81	Reese
0	9	10	.52	Sheppard
0	8	6	.42	Vance
0	<u>14</u>	<u>21</u>	.60	Williams
	96	180		

- a. The 96 NRTS items represent a loss of \$36,000 to the ATC DLR Operations and Maintenance Account.
- b. ATC PBR, excluding the highest and lowest base PBR, is 59% (calculated using raw numbers, not an average of percentages).
- c. If Randolph, Sheppard and Vance had repaired at the Command average, ATC would have saved:

(1)	Randolph NRTS = 18, RTS = 24 = \$6,750 loss vs. \$9,000
(2)	Sheppard NRTS = 8, RTS = 11 = \$3,000 loss vs. \$3,375
(3)	Vance NRTS = 6, RTS = 8 = <u>\$2,250</u> loss vs. <u>\$3,000</u>
	\$12,000 \$15,375

- d. Savings of \$3,375 if above bases had repaired at ATC average of 59%.
- e. If all bases had repaired at or close to the highest PBR, savings would be much greater.

As you can see from these two examples, repair rates swing widely at different bases for the same item. This is an area that needs exploring by a Process Action Team or quality circle

approach.¹⁴ The cost data appears to show that big savings can be gained by increasing repair on the actuator. However, cost savings alone as a criteria is misleading. Other factors such as costs to obtain new equipment, additional bench stock, time and skills must be considered before making a decision.

A decision tree analysis or model would be helpful in organizing the data before making a choice.¹⁵ Once the factors of labor, technical data, money, materials and equipment are identified for these items, you should decide on a strategy to: (1) tackle quick fix, small payback items; (2) concentrate on potential big payback, long term investment items; or (3) a combination of both. Buying equipment with more capabilities than you initially need should also be a consideration to help with long range repair improvements. If too many items are picked to work on at once frustration, labor costs and man hour availability will become problems.

4. A fourth possible method of selecting items for increased repair is to hire a contractor, consulting firm or university. They could be tasked to develop a model, decision support system or expert system to help identify items and provide a cost vs. benefit analysis. This would be a good project for a group of AFIT students or an officer working on a government funded PhD. The use of DLR funds to pay a contractor

¹⁴Hutchins, David. Quality Circles Handbook. New York: Nichols, 1986, p.8.

¹⁵Turban, Efraim. Decision Support and Expert Systems. New York: Macmillan. 1988, p. 32.

for his services would be justified, since his work is directly connected with methods of increasing DLR repair.

5. A fifth selection possibility is to look at repair by stock group. The J-21 program breaks out repair performance by percent of base repair for each base within stock groups. Again, some bases appear more efficient than others. The most efficient base in each stock group could be tasked to develop increased repair procedures for all the other bases. Figure 9 is an example from the 29 July 1991, J-21.

Figure 9

Stock Group	Con	NRTS	RTS	PBR	BASE
XXXX	0	162	91	.35	Columbus
	0	352	126	.36	Laughlin
	0	21	5	.19	Mather
	0	267	64	.19	Randolph
	0	142	74	.34	Reese
	0	73	286	.79	Sheppard
	0	393	105	.21	Vance
	0	120	25	.16	Williams
Average PBR				.33	All

In Figure 9, Sheppard AFB would be the initial choice to concentrate on this stock group. At 79%, whatever they are doing is significantly different from what everyone else is doing, because the ATC average PBR is only 33%. ATC should capitalize on Sheppard's strengths in repairing this stock group.

6. One other possible way to select potential items is the Blue Suit Option. If the contractors want too much money or don't want to cooperate, use the maintenance people at Randolph to identify repair efficiencies. They are eligible to submit AF

Form 1000 under the suggestion program and cash recognition would be a big motivator. Using Randolph might also reduce duplication of effort on the same items by several bases.

7. A spin off of the Blue Suit Option is the White Card Option. Use the Civil Service maintenance organization at Laughlin to achieve significant repair efficiencies. Information from this action could be exported to all UPT bases without additional contractor charges for level of effort. Civil Service employees are additionally eligible for cash awards under the Air Force Suggestion Program. A liberal cash awards program could be a big incentive. A combination Randolph and Laughlin program might also be a winning strategy. Large gains in efficiency at Laughlin might also change the future competitiveness of Civil Service only maintenance bids on future contracts.

B. Approaches to Increasing Repair. In the book, Made in America, the authors and the MIT Commission on Industrial Productivity list six recurring patterns of weakness in American productivity.¹⁶ They are:

1. Outdated strategies;
2. Short time horizons;
3. Technological weakness in development and production;
4. Neglect of human resources;
5. Failure of cooperation;
6. Government and industry at cross purposes.

¹⁶Dertouzos, Michael L., Richard K. Lester and Robert M. Solow. Made in America. New York: MIT Press, 1990, p.117.

The authors also list six emerging patterns of the best industrial practices. These are:

1. A focus on simultaneous improvement in cost, quality and delivery;
2. Closer links to customers;
3. Closer relationships to suppliers;
4. The effective use of technology for strategic advantage;
5. Less hierarchical and less compartmentalized organizations for greater flexibility;
6. Human-resource policies that promote continuous learning, teamwork, participation and flexibility.

While not all these pros and cons specifically apply to ATC aircraft repair, some do. For example, is the model we use to support aircraft and fix parts outdated? Does DLR funding provide the opportunity to change our business strategy? Is anyone thinking through this issue with an eye on where we should be in the year 2000?

ATC's current aircraft support and repair strategy is to become as self-sufficient as possible at base level. This means ATC will have basically four duplicate UPT maintenance operations. The main thrust of DMRD 904 and stock funding DLRs is to become more efficient. From a financial standpoint, ATC has already become more efficient with full contractor or Civil Service maintenance at UPT bases. Even though contracting out maintenance lowers costs, it does require setting aside a great deal of money at the beginning of each fiscal year to cover duplicate contract obligations at each UPT base. As the ATC budget shrinks, money reserved to pay for contract obligations up front will become a larger piece of the pie. What options are available to change this

equation and still provide good maintenance repair support under the DLR concept?

1. First, some level of consolidation could be viable. For bases close to each other such as Laughlin and Randolph or Vance and Sheppard, one base could have only flight line maintenance (satellite base), while the other could have full back shop capabilities. Daily truck runs could move parts both ways according to computed supply levels. With a slightly larger and possibly more sophisticated back shop complex at the full support base, fewer items would be returned to the depot.

Savings in manpower costs under this concept could far out weight increased transportation and handling charges. Money invested in bench stock might also be reduced. Supply overhead at the flight line maintenance only base could similarly be shifted. Only a storage and issue, forward warehouse and small customer support unit would be necessary. All other functions could be consolidated into the back shop repair base supply account. A feasibility study could provide some useful insight into the utility of this concept.

2. A second option is to develop a specialized consolidated repair activity (CRA) for specific DLRs. If the base cannot fix the item, then it goes to the CRA before being returned to the depot. If the CRA does repair the item, the shipping base gets the appropriate financial credit and the item is shipped or stored depending on need. A variation of this option would be to delete the repair capability of high cost,

complex items at all but the CRA. This would save manpower costs to offset CRA operations and transportation costs.

3. A third approach is to stop repairing certain items at base level. It might be less expensive to send the item back to the depot than to pay for limited and expensive contractor repair at each UPT base. The Two-Level maintenance concept some Commands are experimenting with might reduce ATC contractor related expenses.¹⁷ I realize this approach will initially receive a great deal of negative reaction from old time maintainers but our business equation has changed under DMRD 904. A cost model, using this approach, should be developed and applied before making any significant investments in new equipment.

IV. FUNDING FOR PRODUCTIVITY IMPROVEMENTS.

Improving repair efficiency at base level, through a repair base and satellite concept or CRA, will take money. What are possible sources of funds?

1. One possible source of funds for new equipment is the base operations and maintenance account. However, this is usually the thinnest part of the base budget and probably a last resort.

2. A second source would be DLR operations and maintenance funds. If expending these funds for equipment or training has a payback equal to or greater than the initial investment,

¹⁷Smith, Michael. "Two Level Maintenance Tested At Two Bases." The Air Force Times, 20 January 1992, p.,8.

justification exists to use DLR funds. However, investing large sums of DLR money for future capability in any one year has its pit falls. If you run out of DLR funds before the end-of-year, serious mission complications will follow.

3. Budget Code Z, base peculiar investment equipment, is another possible source of funds. These funds are normally allocated annually and are separate from operations and maintenance. Equipment in this category must have a unit cost of more than \$15,000.¹⁸

4. A fourth and quite often overlooked source of funding are the Productivity Enhancing Capital Investment (PECI) programs.¹⁹ Fast Payback Capital Investment Program (FASCAP) is an Air Force program for funding productivity enhancing capital investments in equipment. This type investment must have a unit cost of at least \$3,000, but not more than \$150,000. The same program at different bases can be consolidated to take advantage of quantity discounts. A complete return on investment is required within two years of the equipment becoming operational.

Productivity Investment Fund (PIF) is an Office of the Secretary of Defense PECI program that provides the Air Force an opportunity to compete for DOD funds to finance investments in equipment and facilities valued at \$150,000 or more. MAJCOMs can group projects, which use the same justification, together for a

¹⁸United States Air Force. Air Force Manual 67-1, Volume One, Part One. Chapter 29, Section H.

¹⁹United States Air Force. Air Force Productivity Improvement Program (AFR 25-3). Washington, D. C.: GPO, 1989.

single submission to take advantage of quantity discounts.

Payback benefits must be accumulated within four years.

A third PEGI program is called Component Sponored Investment Program (CSIP). It is an Air Force program providing an opportunity to compete for funds to finance investments in equipment and facilities over \$150,000. Payback for this type program is five years from operational date.

V. CONTRACTOR INCENTIVES.

As identified earlier, there are a few fundamental differences between aircraft maintenance in ATC versus other major commands. Maintenance at all UPT bases, except Laughlin, is contracted out to private companies. Laughlin's maintenance is completely Civil Service. What drives the maintenance contractors to be in the business of fixing ATC aircraft?

Donald L. Losman and Shu-Jan Liang in "The Promise of American Industry" say, "The profit motive is the driving force that leads market participation to take risks and try new business undertakings." They also state, "Unless a normal rate of return or better can be earned, a firm is unlikely to survive for long."²⁰ This means, if ATC asks its contractors to expend man hours in a level of effort not already contracted for, two facts are clear. One, the contractor will ask for more money. He has a right to make a reasonable profit. Secondly, if ATC

²⁰Losman, Donald L. and Shu-Jan Liang: The Promise of American Industry. New York: Quorum, 1990, p. 174.

asks the contractor to increase repair efforts and he does, the government will be obligated to pay. This is why it is absolutely critical that ATC have the flexibility to fund repair efficiency improvement projects with DLR operations and maintenance money. If real savings exceed all costs, then everyone comes out a winner. How can ATC share savings generated from repair efficiencies?

A. Establish a Baseline. Based on the theory that a contractor is in business to make a reasonable profit, ATC must develop a plan to pass on some of the DLR money savings generated from repair efficiencies. Using the projected flying hour program for FY-93, ATC can calculate the amount of DLR funds needed to support the year's maintenance effort. This dollar value then becomes the baseline to judge performance, unless the actual program is not completely funded. In that case, the baseline becomes the actual funded amount. The baseline would also be adjusted if the flying hour program changes.

B. A percentage sharing system. A system to share savings needs to be developed by ATC and discussed with the contractors. For example, if Reese AFB has a DLR budget of \$7,000,000 and only spends \$6,900,000, the contractor would get a percentage of the \$100,000 savings. Savings would be defined as DLR money available at the end-of-year, minus expenses in labor and equipment directly associated with the repair improvement program. The percentage awarded to the contractors must be at least equal to the expected profit on the original aircraft

maintenance contract. However, the idea is to motivate the contractor with the potential for a higher than expected profit. For this reason, a profit rate of say 10% higher than the original contract rate might be very effective in motivating the contractor to actively seek repair efficiencies. A scale also could be developed to increase the contractors share as savings increase. An incremental award fee clause is another option.

C. Status checks. Whatever the sharing ratio turns out to be, a quarterly meeting is needed to discuss DLR expenditures and repair efficiencies. This will give the contractor an idea of potential profits as the year progresses. The fact that more flying is done in certain quarters should be factored into quarterly goals for DLR expenses. These quarterly meetings will give the contractor time to adjust if repair savings are not visible based on current expenses.

IV. RECOMMENDATIONS.

My thought process has led me to believe a four phase approach is the best way to address increasing repair. First, ATC should concentrate on known facts and resolve repair differences between bases. Second, ATC should "identify" candidates for increasing repair and proceed with a systematic repair improvement process. Third, ATC should consolidate repair activities. Finally, ATC should develop a decision model to decide if base repair is the best option.

A. Concentrate on the Facts. The only facts we know are that some bases repair DLRs at higher rates than others. I recommend that ATC first concentrate on repair differences between bases. We have ignored these differences in the past because "our" money was not involved. We cannot afford to ignore these items under the DLR concept. Based on reviewing the differences in PBR that stick out on the J-21, the potential exists for tremendous savings ATC wide. If one base repairs an item at 98% and another at 73%, with approximately the same volume, something is wrong. ATC has people smart enough to figure out what that something is. The main reason to concentrate on these items first is that expenses should be minimal. Repair authorization, test equipment, technical data, and bench stock lists already exist.

B. Identify Candidates for Repair Improvement. My second step would be to identify new candidates using the questionnaire technique mentioned in Section III. Once this information is tabulated, stock numbers should be assigned to each base for extensive evaluation using a team process approach. The reason I suggest assigning stock numbers by base is to reduce duplication of effort. A standard format for reporting process evaluation results should be developed for ease in relaying information to all bases. The bases should be allowed to implement findings immediately, if savings are projected to exceed cost in the same fiscal year. ATC is already conducting "Repair Fairs" with AFLC.

This is a good start but does not reduce duplication of effort or provide for an organized plan-of-attack.

Don't forget that the Air Force Materiel Command might change the ERRC on DLR items to XF3/XB3 if ATC becomes too efficient. They have the authority to do this without coordination if the total impact to any one Command is less than \$100,000. This would move the item to a different budget code. Automated checks should be put into place to catch these budget code changes so money can be reprogrammed. The implication of ERRC changes to DLR incentive programs must also be thought out. Contractors may have invested considerable effort on these items and be expecting a return on investment.

C. Consolidate Activities. ATC should consolidate maintenance and logistics functions at geographically close bases. Defense spending is going to be reduced and ATC cannot afford to do business as usual. This consolidation can take the form of main repair and satellite bases, consolidated repair activities or some combination of both. Duplication of effort is not the most efficient method of operation. If ATC bases deployed as a unit, I would not make this recommendation, but they do not. A corporate effort must be undertaken concerning the necessity for change and potential opportunities identified to improve the way we do business.

D. Is Base Level Repair Cost Effective? My final recommendation is for ATC to develop a decision model that helps answer the question: "Should I repair this items at base level or

can I reduce contract costs by using depot level repair alone?" This is not simply a cost decision. Many base level maintenance and supply people have little confidence in our depot support system. In reality, the depots do a fairly good job on the majority of the items they manage. If ATC decides to rely exclusively on depot repair for some items, it will be up to the professional supply and maintenance people in command to hold the depot system's feet-to-the-fire.

V. CONCLUSION.

The DLR concept is definitely a fundamental change to the way business has been conducted in the past. A change of this magnitude is going to be very difficult for many people to understand and deal with. Change makes people uncomfortable and often results in negative reactions. That is why the "team approach" to implementing this concept is so important. Parochialism and protectionism must be overcome by allowing everyone to participate in creating a new business strategy for fixing reparable in ATC.