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**STRUCTURE OF DLR PRICES**

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A sale takes place when maintenance personnel draw a DLR from supply. Depending on the nature of the transaction, customers face three different prices for DLRs: standard price, exchange price, and carcass price. The standard price is paid when the customer purchases a serviceable DLR without turning in an unserviceable one. The exchange price is paid when a customer exchanges an unserviceable DLR for a serviceable one. The carcass price is then paid if the customer fails to return the unserviceable DLR within 60 days of receiving the serviceable unit.<sup>1</sup> The interrelationships among these prices are depicted in Figure 4.

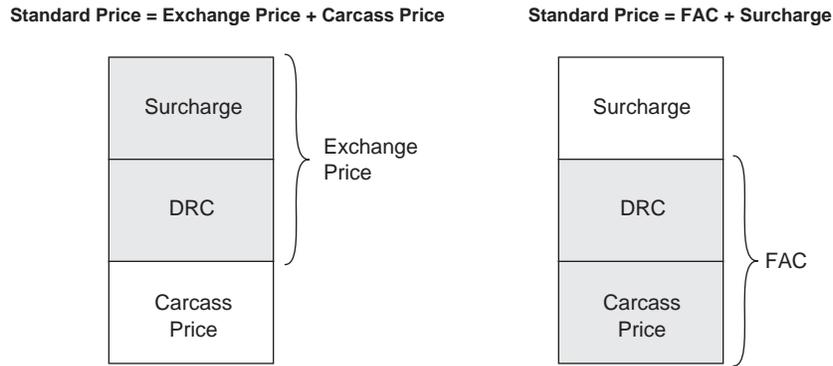
The three fund prices associated with DLR transactions are designed to recover from customers the full costs associated with stock funding for depot-level repair. The FAC is intended to recover the acquisition cost of a new DLR; it is calculated as the “last representative acquisition cost brought up to current day dollars.”<sup>2</sup> The depot repair cost is intended to recover direct and certain indirect costs associated with depot-level component repair. The surcharge is intended to recover various other types of expenses associated with the fund. The depot repair cost and the surcharge are discussed in more detail below.

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<sup>1</sup>Similarly, the customer receives a credit equal to the standard price when returning a serviceable DLR and receives a credit equal to the carcass price when returning an unserviceable DLR without purchasing a replacement.

<sup>2</sup>Department of the Air Force, *Air Force Final Implementation Plan Stock Funding Depot Level Repairables*, draft, January 1993, p. 5-9.

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**Figure 4—Relationship Between Standard, Exchange, and Carcass Prices and FAC**

Standard price = Forecast acquisition cost (FAC) + surcharge

Carcass price = FAC – depot repair cost (DRC)

Exchange price = Standard price – carcass price  
= DRC + surcharge.

### DEPOT REPAIR COST

For the *kth* type DLR (referenced by national stock number, NSN) repaired at the depot, the depot repair cost is composed of direct costs, production overhead, and general and administrative (G&A) costs. The direct costs include average direct labor costs such as technicians and other shop-level personnel (calculated as cost per hour times standard repair hours) and the average cost of materials that go directly onto the specific end item being repaired. Included in the average direct material cost of each type of LRU are the costs of any of its component SRUs that must be replaced. The costs of the SRUs that are DLRs include (a) the exchange prices for those items purchased from the fund and (b) the direct labor and materials

(other than DLRs), production overhead, and G&A costs for those that are job routed.<sup>3</sup>

$$\begin{aligned} \text{Depot repair cost}_k &\equiv \text{average direct materials}_k \\ &+ \text{average direct labor}_k + \text{production overhead}_k + \text{G\&A}_k. \end{aligned}$$

Production overhead and G&A are costs associated with DMAG. Production overhead includes costs of all indirect activities controlled by the item's product directorate (e.g., indirect labor, scheduling, planning, indirect materials, and equipment depreciation).<sup>4</sup> The hourly rate for these costs is constructed at the shop level, and costs are allocated based on direct product actual hours (DPAH).<sup>5</sup> G&A costs include all costs not tied to a single product directorate (e.g., utilities, base support, and headquarters costs). With few exceptions, these rates are constructed at the directorate level. G&A costs are also allocated based on DPAH.

$$\text{Production overhead}_k \equiv \text{Production overhead rate} \times \text{DPAH}_k,$$

where

$$\begin{aligned} \text{Production overhead rate} &\equiv \text{hourly cost of (indirect labor} \\ &+ \text{schedulers + planners + indirect materials} \\ &+ \text{equipment depreciation} \\ &+ \text{other indirect product directorate activities)} \end{aligned}$$

$$\text{G\&A}_k \equiv \text{G\&A rate} \times \text{DPAH}_k,$$

<sup>3</sup>That is, the DRC does not include a surcharge for SRUs that are job routed.

<sup>4</sup>A product directorate is a major division of an ALC devoted to support of a specified group of NSNs. NSN groups are defined by major subsystem, weapon system, etc.; for example, the F-16 avionics product directorate at Ogden ALC.

<sup>5</sup>Direct product actual hours is an estimate of the actual time spent performing a direct labor task. The DPAH for a given NSN is calculated by dividing the direct product standard hours for that item by the direct labor efficiency (DLE) for that repair shop. The DLE for a repair shop is the total standard hours for all work in the shop divided by the actual hours for all work in the shop, that is, an average efficiency. See *Requirements/Funding Handbook*, Directorate of Financial Management, Hill Air Force Base, subsection 7-A.

where

G&A rate  $\equiv$  hourly cost of (utilities + base support + HQ  
+ other costs not tied to a single product directorate).

The depot repair cost portion of the DLR exchange price is subject to various errors. First, the calculation of direct labor cost is based on infrequently updated work standards and on average, rather than NSN-specific, efficiencies. Second, many indirect and G&A costs are not incurred in proportion to DPAH despite being allocated in this way. Third, the depot repair cost is based on data from two years earlier (see Chapter Four). For example, the depot repair cost portion of the FY 1996 DLR exchange price was calculated in FY 1995 and was based on FY 1994 data. The 1994 cost data were adjusted for inflation, pay raises, and other cost changes to the extent they were known.

For DLRs repaired by contractors, the depot repair cost is the estimated average price paid to the contractor.

### **SURCHARGE**

Support system costs associated with the SMAG are recovered from customers through a DLR price surcharge. These costs—totaling \$1.8 billion in FY 1995—include first destination transportation, inventory maintenance, depreciation, the Cost of Operations Division (COD), condemnations, inflation, and over/underrecovery of costs from the previous year (price stabilization).<sup>6</sup> These costs are allocated to an NSN's repair price in proportion to its FAC. The proportion,  $P$ , is the same for all DLRs and is calculated as

$$P = \frac{\text{total costs to be recovered}}{\sum_i n_i \text{FAC}_i},$$

where  $n_i$  is the forecasted demand for serviceables of NSN type  $i$ . Thus, the exchange price of a DLR of NSN type  $k$  is

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<sup>6</sup>United States Air Force, *Defense Business Operations Fund: Fiscal Year 1997 Defense Budget Review*, September 22, 1995, p. 244.

$$\text{Exchange price of DLR}_k = \text{depot repair cost}_k + \text{surcharge}_k,$$

where

$$\text{Surcharge}_k = P * \text{FAC}_k.$$

Table 2 displays the breakdown of the surcharge by element for FY 1994–FY 1996. The three largest cost categories are the COD, condemnations, and price stabilization. The COD is a division of the Air Force Working Capital Fund. Its surcharge covers the costs of people, materials, and transactions supporting the Repairable Support Division of SMAG. Significant expenditures in the COD are for Defense Logistics Agency (DLA) issues and receipts, item managers, and other inventory control point costs. The condemnation surcharge covers the predicted annual cost of replacing all condemned DLRs, that is, those that cannot be repaired. The price stabilization surcharge recovers the difference between total SMAG costs and total SMAG revenues from the previous year and, in some years, recovers other costs as mandated by the Office of the Secretary of Defense (OSD) (Comptroller). It is typically positive when total costs were underrecovered during the previous year and negative when total costs were overrecovered.

**Table 2**  
**Elements of the RSD Surcharge**  
**(in percentage)**

Element	FY 1994	FY 1995	FY 1996
First destination transportation	0.48	0.01	0.01
Inventory maintenance	0.63	0.00	0.65
Depreciation	0.31	0.48	0.18
Cost of Operations Division	5.63	3.40	3.81
Condemnations	5.84	3.82	5.74
Price stabilization	1.46	3.81	-1.73
Inflation index	0.30	0.38	0.00
P	14.65	11.90	8.66

NOTE: The FY 1996 inventory maintenance surcharge recovers costs for the Joint Logistics Systems Center and certain software costs. These costs were not recovered by this surcharge in previous years.

In FY 1995, surcharge revenues were 47 percent of total RSD revenues. Because the ratio of an item's FAC to its depot repair cost varies greatly among NSNs, the surcharge as a percentage of the exchange price also varies greatly. For example, among a sample of avionics DLRs repaired at Ogden Air Logistics Center, we found that the FY 1995 surcharge ranged from 29 to 94 percent of the exchange price. To illustrate further, Tables 3 and 4 contain FY 1996 exchange prices and associated surcharges for a broad sample of relatively high-demand F-16 and C-130 DLRs. The first and last F-16 DLRs in Table 3 are noteworthy. For the receiver-transmitter in LANTIRN targeting pods, the depot repair cost is \$6,509 and the FAC is \$207,517, leading to a surcharge that is 73 percent of the item's exchange price. Conversely, the depot repair cost for the 20-millimeter automatic gun is \$8,046 and the FAC is \$8,476, leading to a surcharge that is only 8 percent of the item's exchange price.

### **EXCHANGE PRICES ARE ARTIFICIALLY HIGH**

The Air Force has incorporated broad categories of costs into DLR exchange prices that are unrelated to depot-level repair. In particular, the surcharge and, to a lesser extent, the depot repair cost for any DLR include elements that are unrelated to its rate of repair.

The price stabilization surcharge recovers costs that are unrelated to any repair performed during the current year. The COD surcharge includes many costs that are fixed with respect to rate of repair—for example, database managers. Furthermore, the COD costs that are related to rate of repair are not allocated directly to the items generating the charges. Instead, they are allocated in proportion to the FAC of each repaired item. For example, second destination transportation charges and DLA issues and receipts charges are incorporated into the COD surcharge rather than allocated directly to the items generating the charges.

Unlike the price stabilization and the COD surcharges, the condemnation surcharge recovers costs that are driven *entirely* by the rate of repair; however, the condemnation surcharge does not match the costs of the replacements with the types of DLRs that are condemned.

**Table 3**  
**FY 1996 Exchange Prices: F-16 DLRs**

DLR	Exchange Price (EP)	Depot Repair Cost (DRC)	Surcharge <sup>a</sup>	Surcharge as % of DRC	Surcharge as % of EP
Receiver-transmitter, LANTIRN targeting pod	\$24,480	\$6,509	\$17,971	276	73
Interface for bombing fire-control component	2,547	782	1,765	226	69
Oscillator, AN/ALQ-184 electronic counter-measures pod	12,395	6,441	5,954	92	48
LANTIRN computer module	18,296	9,571	8,725	91	48
Low-pressure turbine, F110 engine	39,103	20,724	18,379	89	47
Horizontal stabilizer	10,458	6,700	3,758	56	36
Brake stack kit	2,018	1,386	632	46	31
Power supply, AMRAAM	1,641	1,167	474	41	29
High-voltage power supply, AN/ALQ-184 electronic counter-measures pod	11,414	8,801	2,613	30	23
Aircraft leading edge	4,890	4,097	793	19	16
Augmentor nozzle flap, F-16 engine	770	681	89	13	12
High-pressure exhaust nozzle seal, gas turbine engine	693	613	80	13	12
20-millimeter automatic gun	8,780	8,046	734	9	8

<sup>a</sup>Surcharge = FAC \* .0866.

**Table 4**  
**FY 1996 Exchange Prices: C-130 DLRs**

DLR	Exchange Price (EP)	Depot Repair Cost (DRC)	Surcharge <sup>a</sup>	Surcharge as % of DRC	Surcharge as % of EP
Receiver-transmitter, RT-1504, AN/ARC-164 radio set	\$1,579	\$719	\$860	120	54
Radio receiver R101/A, ARN-6	1,077	651	426	66	40
Signal data converter, AN/ARC-164 radio set	172	103	69	66	40
Circuit card assembly, AN/ARC-164 radio set	447	289	158	55	35
Electronic control amplifier, E-4 automatic pilot	1,827	1,198	629	53	34
T-1307A radio transmitter, AN/ARC-164 radio set	811	574	237	41	29
7000 channel synthesizer, AN/ARC-164 radio set	736	556	180	32	24
Beam-scanning antenna, ARA-25	2,275	1,740	535	31	24
Altitude transmitting function, control, altitude, automatic pilot	684	521	163	31	24
Circuit card A10, control input, ARN-11	119	94	25	27	21
Cable assembly, AN/ARC-164	401	333	68	21	17

<sup>a</sup>Surcharge = FAC \* .0866.

$$\text{FAC}_k \times \frac{\text{Condemnation surcharge}_k = \sum_i \text{cost of replacements for NSN}_i}{\sum_i n_i \text{FAC}_i}.$$

As a result, low condemnation rate items are overcharged, and high condemnation rate items are undercharged. For example, avionics LRUs are rarely condemned and often have high acquisition costs. This combination of factors guarantees that the exchange prices for avionics DLRs reflect the costs of replacing other types of DLRs such as mechanical items. In the sample of avionics LRUs repaired at Ogden referred to above, the condemnation surcharge ranged from 9 to 30 percent of the exchange price.

Production overhead and G&A costs in the depot repair cost include elements such as base support and headquarters costs that are unrelated to the rate of repair.<sup>7</sup> Other elements of production overhead and G&A costs *are* related to the rate of repair and should not cause DLR exchange prices to be artificially high, on average. However, all production overhead and G&A costs are arbitrarily allocated to depot repair cost in proportion to direct product actual hours. Costs that are related to the number of repairs rather than the number of labor hours, for example, may be overallocated to repair activities that are relatively labor-intensive and underallocated to repair activities that use relatively few labor hours.<sup>8</sup>

We are unaware of any costs that have been left out of the exchange price other than pipeline inventory costs (discussed below). However, we do not believe that the exclusion of this cost category is sufficient to offset the inclusion of the non-repair-related costs. Thus,

<sup>7</sup>At Ogden ALC for FY 1995, the average direct cost per DPAH was \$45.08, the average G&A cost per hour was \$10.21, and the average production overhead cost per hour was \$26.75.

<sup>8</sup>For a clear discussion of the problems caused by inappropriate cost allocations and how the problems were solved in a relatively small organization, see Kovac and Troy (1991). (This paper is summarized in Appendix A.)

for the typical DLR, the exchange price will exceed the cost of depot repair.<sup>9</sup>

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<sup>9</sup>It is unclear whether or not exchange prices for items repaired by contractors are higher or lower than the costs associated with the transaction. Certainly the depot repair cost portion of the exchange price accurately reflects the marginal/variable cost incurred by the support system. However, the surcharge may over- or underrecover the contracting, management, and replacement costs that would be incurred.