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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

PROCUREMENT, LOGISTICS,
AND READINESS DIVISION

B-209595

APRIL 28, 1983

The Honorable John O. Marsh, Jr.
The Secretary of the Army

Dear Mr. Secretary:

Subject: Black Hawk Logistics Support Should Have Been Better and Questions Exist Regarding Future Support (GAO/PLRD-83-60)

We made this review to evaluate how effectively the Army planned logistical support for the recently fielded UH-60A Black Hawk helicopter. The Army accepted the first production model Black Hawk in October 1978. As of January 31, 1983, the Army had accepted 356 Black Hawks. It plans to buy a total of 1,107 by 1990, at a cost of $7.7 billion, to replace the UH-1 Huey helicopter. These figures do not include 77 Black Hawks configured for electronic missions.

The Black Hawk has met important design criteria for mean time flight-hours between system failures and maintenance staff-hours per flight-hour and has nearly met the design criteria for reliability.

But the Army is having trouble supporting the Black Hawk. Supply and maintenance problems have prevented the helicopter from meeting the Army's 80 percent mission capable standard. The mission capable rates improved steadily to almost 80 percent during the contractor supply support period. However, the rate has steadily decreased since the Army began providing this support. For example, during the last 2 years of contractor support, the mission capable average rates increased from 67.8 to 76.8 percent. However, as of December 15, 1982, the rate had decreased to 71.5 percent, due mainly to Army supply support problems.

In May 1978, we reported to the Secretary of Defense that future Black Hawk support could be in jeopardy because logistics data was not up to date. This occurred because the Army did not provide funds for Sikorsky Aircraft, the airframe contractor, to continue its logistics support analysis for 14 months because available funds would not cover full-scale efforts on both the helicopter and the logistics support data base. Our current review confirmed these concerns and showed that logistics data problems have continued.

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Sikorsky Aircraft and General Electric generally did a good job of providing Black Hawk supply support for the airframe and engine, respectively, until the Army assumed this support on April 1, 1982. The contractors also are providing depot maintenance which the Army plans to take over in fiscal years 1985 and 1987 for the engine and airframe, respectively.

Many of the current Black Hawk support problems are due to managers not adequately carrying out their basic logistics responsibilities for (1) sufficiently monitoring contractors' operations to identify and correct problems in a timely manner, (2) emphasizing the importance of the contractors' logistics data analysis and getting good data in a timely manner, and (3) insuring that the contractors provide and that the Army maintains the data needed to accurately determine parts requirements.

In our opinion, the logistics support problems discussed in this report point up the need for close and continuing management attention to insure that the Army will be able to either meet or sustain acceptable mission capable rates for the Black Hawk in the near future. In addition, we believe the Army's experience on this program points up the importance of insuring that logistics managers fully carry out these and other responsibilities crucial to the support of new weapon systems in the future.

We are not making any specific recommendations regarding the matters discussed in this report because the Army has recognized the problems and is taking actions designed to prevent them from occurring in other major systems. However, we believe that this report will be useful to Department of Defense managers and to congressional oversight committees in monitoring progress in preventing or correcting logistics support and readiness problems for new military equipment.

Further details on our findings are contained in enclosure I.

During March 1983, we provided the Army Deputy Chief of Staff for Logistics, Aviation Logistics Office, draft copies of this report for review. We also provided Sikorsky draft copies of those portions of this report related to its performance on the Black Hawk. There were no major areas of disagreement with the report.

We are sending copies of this report to the Director, Office of Management and Budget; the Chairmen, House Committee on Government Operations, Senate Committee on Governmental Affairs, and House and Senate Committees on Appropriations and on Armed Services; the Secretary of Defense; the Director, Defense Logistics Agency; Sikorsky Aircraft; and General Electric.

Sincerely yours,

Donald J. Horan

Donald J. Horan
Director

Enclosure

ENCLOSURE I

BLACK HAWK LOGISTICS SUPPORT SHOULD HAVE BEEN BETTER, AND QUESTIONS EXIST REGARDING FUTURE SUPPORT

BACKGROUND

The UH-60A Black Hawk is a twin-engine helicopter designed to transport troops and equipment, evacuate casualties, and perform other combat support missions. The Army is procuring the Black Hawk as a new-generation utility helicopter to replace the UH-1 Huey.

The Army accepted delivery of the first production Black Hawk in October 1978. The first Black Hawk combat unit received its aircraft in May 1979 and achieved initial operational capability in November 1979. As of January 31, 1983, the Army had accepted 356 of the helicopters.

The Army plans to spend $7.7 billion to buy a total of 1,107 Black Hawks, not including 77 others configured for electronic missions. The Navy, the Marine Corps, and the Air Force also plan to buy versions of the Black Hawk.

The Army expects 15 Black Hawks to replace 23 Hueys in combat support units. Besides being larger than the Huey, the Black Hawk was designed to be more available, maintainable, reliable, survivable, and crashworthy.

INTEGRATED LOGISTICS SUPPORT SYSTEM

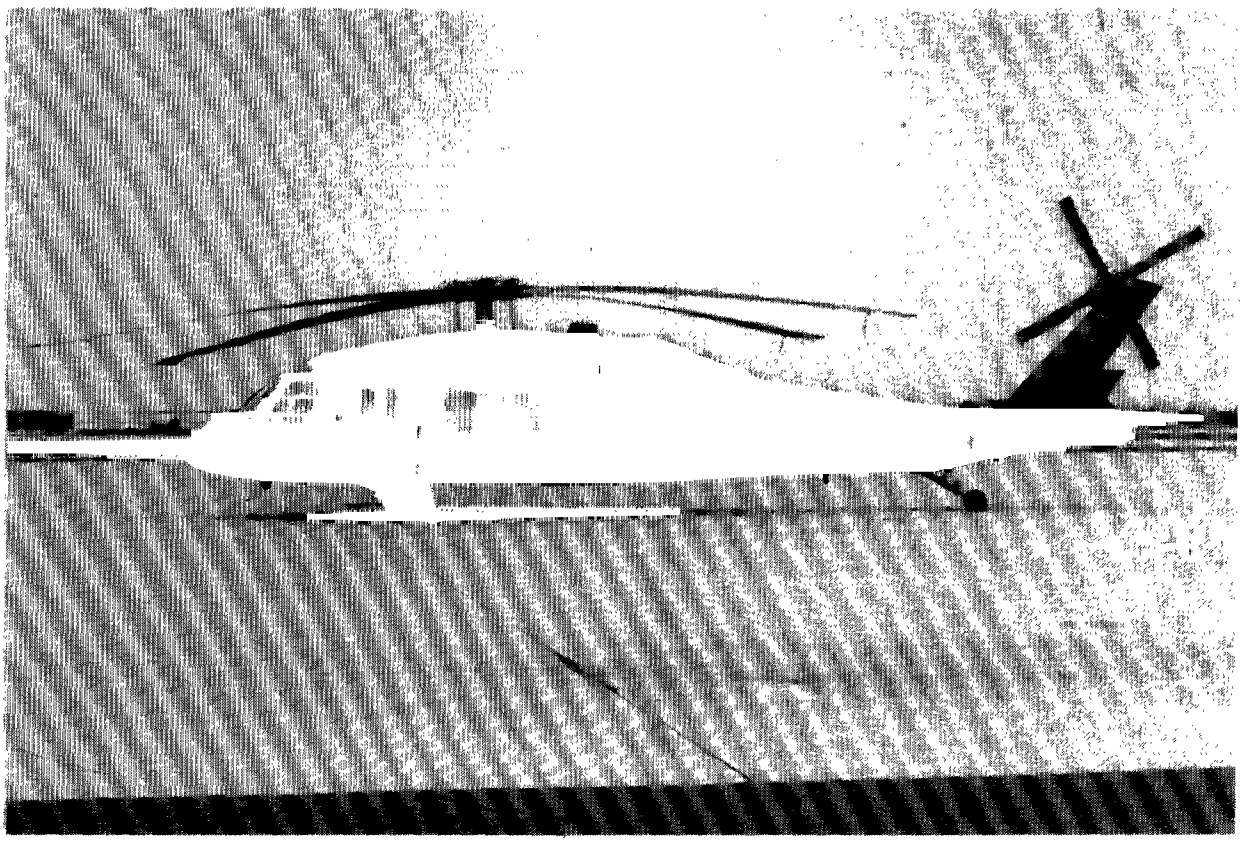
The Black Hawk was one of the first major Army weapon systems on which the integrated logistics support concept was used. This concept requires that logistics support be considered in weapon system design, development, testing, and operation to insure that the weapon system can be effectively and economically supported after it is operational.

CONTRACTOR SUPPLY SUPPORT

Sikorsky and General Electric provided supply support for Black Hawk-peculiar parts until April 1, 1982. They bought and stored, as Government property, the parts authorized by the Army. The users requisitioned the parts through the regular Army supply management system, and the contractors filled the requisitions.

The contractors also have depot maintenance responsibility for the engine and airframe. The Army plans to take over these responsibilities by fiscal year 1985 for the engine and fiscal year 1987 for the airframe. Depot maintenance is the highest level of maintenance, and Army field units perform lower level repairs, called unit and intermediate maintenance.

ENCLOSURE I



Courtesy of U.S. Army

Specifications

Performance at mission gross weight:	
Maximum cruise speed:	
4,000 feet at 95 degrees	146 knots
Sea level standard	160 knots
Vertical rate of climb:	
4,000 feet at 95 degrees	580 feet per minute
Sea level standard	2,460 feet per minute
Hover ceiling:	
95° day	5,850 feet
Standard day	11,000 feet
Service ceiling	19,300 feet
Empty weight	10,624 pounds
Mission gross weight	16,260 pounds
Engines--T700-GE-700 turboshaft	1,560 horsepower
Dimensions:	
Overall length	64.8 feet
Maximum height	16.8 feet
Fuselage width	7.8 feet

ENCLOSURE I

The Army's Black Hawk Project Manager's Office was part of the Army Materiel Development and Readiness Command until October 1, 1981, when the office became a part of TSARCOM. We reviewed records and interviewed officials in the office on its management of the logistics support program. Our principal efforts were in the Integrated Logistics Support Division and the Product Assurance Division. We also examined logistics support provisions of the Aviation Research and Development Command's contracts with the Black Hawk airframe and engine contractors to determine their responsibilities.

At TSARCOM, we interviewed officials and examined records on Black Hawk readiness reporting, maintenance history and trends, and efforts toward filling Army supply pipelines in preparation for the April 1, 1982, transition from contractor to Army supply support. In this latter area, we reviewed a nonrandom sample of supply items for indications of whether TSARCOM's procurements were timely and were in sufficient quantities to meet forecasted demands. We chose a nonrandom sample because we did not plan to project the results, but planned to use them to complement other data indicating future support problems.

At Forts Campbell, Lewis, and Rucker Black Hawk units, we examined aircraft maintenance, supply, and readiness-reporting records; interviewed maintenance and supply personnel; and observed Black Hawk maintenance activities. We selected the 101st Division for review because it had the most and the oldest Black Hawks, the 9th Division because it was one of the newest Black Hawk units, and Fort Rucker because it is the Army's helicopter-pilot-training base and has a contractor maintain all its aircraft.

At the Forces Command, we interviewed logistics officials about Black Hawk support problems and reviewed readiness reports the command receives from its field units.

We visited Sikorsky and interviewed officials, examined records, and observed operations dealing with Sikorsky's supply support and depot-level maintenance responsibilities for Black Hawk airframe parts. We did not visit General Electric because of indications there were no substantial problems with its engine supply support.

We did not review general and application controls of data processing systems that produced the data in this enclosure on aircraft mission capable rates and logistics. Such a review would have entailed an inordinate amount of audit effort in view of our limited audit objectives.

We performed our work in accordance with generally accepted government auditng standards.

THE BLACK HAWK HAS MET IMPORTANT LOGISTICS SUPPORTABILITY DESIGN CRITERIA BUT HAS NOT MET MISSION CAPABLE STANDARDS

The Black Hawk has met important logistics design criteria for mean time flight-hours between system failures and maintenance staff-hours per flight-hour. It also has almost met its design criteria for reliability. However, the helicopter has not met the Army's 80 percent mission capable standard, due to supply and maintenance problems. While logistical support improved steadily during the contractor supply support period, supply problems have increased since the Army began providing this support.

The Black Hawk has met the requirement for a 4-flight-hour mean time between system failures and a requirement for no more than 3.8 maintenance staff-hours per flight-hour. Another design criterion was that the Black Hawk have a 0.987 probability of being able to complete a 1-hour mission. As of March 31, 1982, it had achieved a 0.976 probability.

The Black Hawk mission capable standard requires that on the average no more than 20 percent of the aircraft be not mission capable due to supply and maintenance problems. Although, it has rarely met this standard, the overall rates improved steadily to almost 80 percent during the contractor supply support period. However, since the Army began providing this support on April 1, 1982, the mission capable rates have been decreasing steadily--mostly because of supply problems. For example, as shown in the following tables, during about the last 2 years of contractor support, the mission capable rate steadily increased to an average of 76.8 percent. As of December 15, 1982, the mission capable rate had dropped to 71.5 percent.

ENCLOSURE I

Black Hawk Mission Capable Rates
During Contractor Support Period
6-Month Average Percentages

	Not mission capable			Mission capable rate
	Supply	Maintenance	Total	
Standard	10.0	10.0	20.0	80.0
6-months ended:				
Sept. 15, 1980	17.2	15.0	32.2	67.8
Mar. 15, 1981	15.3	14.1	29.4	70.6
Sept. 15, 1981	13.5	12.5	26.0	74.0
Mar. 15, 1982	12.5	10.7	23.2	76.8

Black Hawk Mission Capable Rates
During Army Support Period
Monthly Percentages for 6-Month Period

	Not mission capable			Mission capable rate
	Supply	Maintenace	Total	
Standard	10.0	10.0	20.0	80.0
Month ended:				
Apr. 15, 1982 (note a)	10.1	11.0	21.1	78.9
May 15, 1982	11.3	11.0	22.3	77.7
June 15, 1982	13.0	8.3	21.3	78.7
July 15, 1982 (note b)	14.9	10.0	24.9	75.1
Aug. 15, 1982 (note b)	15.9	10.5	26.4	73.6
Sept. 15, 1982	16.4	10.9	27.3	72.7
Oct. 15, 1982	15.8	10.5	26.3	73.7
Nov. 15, 1982	16.2	11.4	27.6	72.4
Dec. 15, 1982	16.3	12.2	28.5	71.5

a/Contractor supported from Mar. 16 to Apr. 1, 1982.
b/Percentages do not include data for 15 helicopters in Germany.

The contractors were able to improve the Black Hawk's mission capable rates and almost met the 80-percent standard even though

--the units flew the Black Hawk more hours than planned;

--the Army increased the number of Black Hawk bases, which also increased the supply support required;

--parts failed more frequently than anticipated; and

--funding shortages restricted timely supply procurements.

FLIGHT-HOURS HIGHER THAN PLANNED

Army pilots flew the Black Hawk more hours during the first 2 years than the logistics support plan intended, in order to fully test its capabilities early in its deployment. Therefore, supply shortages and maintenance requirements increased. The logistics support provisions of the Black Hawk contract stated that supply requirements were to be based on each helicopter flying 25 hours monthly. During 1979 and 1980, Black Hawk units exceeded that rate, as shown below.

Quarter ended	Aircraft average monthly flight-hours 1979	1980
Mar. 15	(Not available)	27.3
June 15	53.3	37.6
Sept. 15	23.0	35.7
Dec. 15	30.0	25.3

The number of Black Hawks fielded through this period was about the same as that used in supply planning. The higher-than-planned flight-hours were due partially to an unanticipated special mission for certain Black Hawk units. In addition, the Black Hawk participated in numerous special exercises, including operations in Egypt, Panama, and Puerto Rico.

In December 1980, Army Headquarters noted that the added flying time had caused logistical support problems and instructed Black Hawk operational units to adhere to the 25-hour monthly limit.

REVISED FIELDING PLANS

In 1980, the Army decided to locate Black Hawks at more installations than it had anticipated in its logistics support planning. This was done in order to develop a better helicopter

deployment capability sooner, and it created requirements for additional base-level supply and maintenance resources to support unit and intermediate maintenance activities.

A 1976 fielding plan was the basis for initial logistics support requirements. The plan called for placing Black Hawks at two bases in the United States and one base in Europe during the 4-year contractor support period. The plan required about 12,000 supply items to support unit maintenance and intermediate maintenance activities.

In March 1980, the Army revised the plan and placed Black Hawks at several additional locations in the United States. This required about 21,000 supply items to support 22 unit maintenance and 14 intermediate maintenance activities. The plan also required staffing for the added intermediate maintenance units. This caused maintenance staffing shortages.

In October 1980, the Black Hawk Project Manager advised Army Headquarters that supplies would be insufficient to support the March 1980 plan.

PARTS REPLACED MORE FREQUENTLY THAN EXPECTED

Unanticipated parts replacements have caused supply shortages. This can be expected early in the life of a new weapon system because replacement rates must be projected on the basis of engineering estimates until sufficient actual usage data is available. As a result, some estimates proved to be too high and others too low.

Examples of forecasted and actual replacement frequencies for the year ended October 10, 1981, are shown below.

Name of part	Replacement frequency	
	Forecasted	Actual
	(flight-hours)	
Doorstop spring	10,000	3,318
Cable bracket	10,000	2,433
Door handle	10,000	1,738
Windshield	3,333	936
Roll trim servo	1,500	830
Rotor blade tip cap	500	415
Main rotor damper boot	194	70

The forecasted frequencies are from master data records. In some cases, earlier reports forecasted lower replacement frequencies. For example, the October 1980 record indicated the main rotor damper boot would fail every 300 hours, compared with 194 hours shown in the June 1981 record.

In addition to causing parts shortages, unexpectedly high replacement rates also cause added maintenance to remove, replace, and repair parts.

Parts failures and problems require corrective maintenance

The frequency of parts and subsystem failures affects the amount of time aircraft are not mission capable. Units report the aircraft as down for maintenance until the problems are corrected. But if maintenance is impossible because of supply shortages, they report the aircraft as down for supply until the needed part is received.

Some of the part and component problems that have contributed to maintenance downtime involve design or manufacturing defects. An August 1981 program review report identified the following 10 airframe parts or components as causing the most serious field problems.

--Auxiliary power unit reliability.

--Stabilator actuator reliability.

--Yaw trim servo reliability.

--Roll trim servo reliability.

--Airframe cracks.

--Aft facing troop seat supports.

--Windshield cracks.

--Chip light malfunctions.

--Cargo door track durability.

--Upper deck electrical connector moistureproofing.

Sikorsky is correcting the problems, although in some cases the corrections may apply only to new-production aircraft. For example, Sikorsky

--has been working with the auxiliary power unit vendor to correct its deficiencies and is also considering finding a second source;

--has identified the causes of the stabilator actuator failures and has gotten the vendor to improve its quality control and to comply with a specification that the vendor was not meeting;

--continues to work with the glass manufacturer and its own production lines to correct windshield cracks which have been a longstanding problem;

--remedied cracking in the stabilator, oil cooler door, engine exhaust, and firewalls by beefing up the parts and improving the manufacturing process; and

--plans to waterproof the upper deck electrical connectors and listed 17 additional actions to improve water integrity at various points on the Black Hawk.

SUPPLY FUND SHORTAGES

During the last 2 years of contractor support, Sikorsky recommended that the Army provide $19.2 million and $22 million for spare and repair parts for the third and fourth support years, respectively. However, the Army authorized $9 million less than recommended. Sikorsky also recommended additional buys from time to time to replenish depleted or low stocks. However, the Army did not authorize Sikorsky to buy all the recommended parts because of funding shortages, even though the Black Hawk project manager agreed the parts were needed to support the helicopter.

When the Army changed Black Hawk basing plans in 1980, the project manager advised Army Headquarters that supporting the 1980 plan would require an additional $12 million. The Army provided $9.5 million in about March 1981 and the remainder later from 1981 supplemental appropriations.

Overflying the Black Hawks by 33 percent and supporting a special mission increased Black Hawk logistical support requirements. An Army logistics report noted in about December 1980 that Sikorsky and General Electric needed $24.7 million to replace parts issued to support the special mission, replenish zero-balance stock items, and fill base-level inventory stocks. The zero-balance problems were primarily with Sikorsky parts. The following example shows the extent of Sikorsky's zero-balance items.

Date	Number of parts with zero balances
Feb. 28, 1980	578
July 8, 1980	581
Nov. 20, 1980	698
Feb. 17, 1981	626

Sikorsky's inventory list covered about 5,000 items; over 11 percent of the items had zero balances on the above dates.

Supplemental appropriations eventually satisfied the funding deficits; but Black Hawk program officials said that getting the funds late had resulted in delays in their purchasing long leadtime parts.

DELAYS IN ACCOMPLISHING MAINTENANCE AND FILLING SUPPLY REQUISITIONS

Sikorsky did not accomplish timely depot-level maintenance, and a mixup delayed filling supply requisitions for 3 months. Moreover, the Army was unaware of these problems until after they had occurred.

In July 1981, the Army noted that many repairable parts had been in the depot maintenance cycle longer than the scheduled 90 days and that some had been in the cycle over a year. Sikorsky took 3-1/2 months to inform the Army that extended maintenance delays were occurring due to vendor delays in supplying parts and parts failing quality tests. A September 1981 list of items in depot maintenance showed that 24 percent of the 1,185 items listed had been received more than 90 days earlier. For example, 10 vertical situation indicators had been in the repair cycle for periods ranging from 134 to 467 days.

Sikorsky's 3-month delay in filling regular field requisitions during the latter part of 1981 involved a change in procedures for handling the requisitions at its plant. The normal procedure was for the Naval Plant Representative Office to receive the requisitions and then call to have Sikorsky's Product Support Office pick them up. Product Support personnel took the requisitions to Sikorsky's Information Systems Office for processing into the contractor's automated data system. The requisitions were then returned to Product Support. Sikorsky used its automated data system in filling the requisitions.

Because of changes in Navy office equipment and Navy and contractor personnel in September 1981, the Navy office began mailing the requisitions to Sikorsky's Product Support Office. Product Support personnel erroneously assumed that the requisitions had already been processed into Sikorsky's automated data system. Accordingly, requisitions went unfilled until mid-December when the error was discovered. That 3-month period of not filling requisitions contributed to the not-mission-capable supply rate increasing from 12.8 percent to 14.4 percent for the 3 months ended December 15, 1981.

Sikorsky's monitoring of stock levels

The Army should have evaluated the adequacy of Sikorsky's system for identifying stock replenishment needs to insure that the system provided for timely and adequate replenishments. The contract required Sikorsky to establish such a system; however, the Black Hawk Project Manager's Office did not insure that an effective system was established.

Although Sikorsky reviewed stock levels from time to time, it did not have a system for automatically identifying need-to-reorder conditions and initiating reorder actions. In some cases, the units' unfilled requisition quantities exceeded quantites on hand and on order. A Sikorsky supply official said the contractor intended to develop an automated system for monitoring stock levels, but had not done so because of higher priority problems.

QUESTIONS REGARDING FUTURE SUPPLY SUPPORT

The Army may be unable to adequately support the Black Hawk in the near future because it did not adequately (1) emphasize the importance of the contractors' logistics data analysis and (2) insure that the contractors provided the data that the Army needed to accurately determine parts requirements. Accordingly, the Army must improve its supply support if the helicopter is to meet its mission capable standards.

As previously reported, the Army did not provide Sikorsky the funds it needed to continue logistics support analysis for 14 months because available funds would not cover full-scale efforts on both the helicopter and the logistics support data base. After resuming this analysis, Sikorsky experienced difficulties in providing the Army timely and accurate data. The causes for these difficulties included inadequate guidance and monitoring of the contractor's operations, Sikorsky's difficulties in operating the Army-developed computer program, and the limited capability of the computer program. These difficulties prevented the Army from placing timely and accurate orders for parts.

The engine logistics data base was so deficient that the Army could not use its automated system to determine requirements. Accordingly, manual methods were used which did not fully consider all the complex data normally considered. Moreover, the requirements computed for both engine and airframe parts generally were based on less accurate engineering estimates, rather than the historical demand data that the contractors were supposed to provide.

These problems raise serious doubts as to whether the Army will be able to adequately support the Black Hawk in the near future, especially since the helicopter's not-mission-capable supply rate has steadily increased to over 16 percent while the overall mission capable rate has dropped to 71.5 percent as of December 15, 1982. (See p. 6.)

SUPPLY REQUIREMENTS WERE BASED ON INADEQUATE LOGISTICS SUPPORT ANALYSIS

Sikorsky and General Electric were responsible for analyzing operational and logistics data and identifying the resources needed to support the Black Hawk. They were to document the results of their analyses in a logistics support analysis record (LSAR) and keep the data up to date.

The LSAR identified Black Hawk parts and contained information needed to determine requirements for stocking the parts. The requirements-related data included information on each part, such as expendability or repairability, expected failure frequency, production leadtime, overhaul data, and the next higher assembly requiring the part.

The contractors were responsible for compiling the data during the 4-year contractor support period and providing it to the Army in time to meet its supply support responsibilities. The Army's Materiel Readiness Support Activity (MRSA) developed the computer programs the contractors were to use in maintaining the data base and transferring it to the Army.

Sikorsky and General Electric were supposed to provide the LSAR as part of the integrated logistics support efforts their contracts required. Those efforts were costly as indicated by the $9.9 million contract target price for Sikorsky's logistics management efforts during the first 5 production years--fiscal years 1977-81. General Electric and the Army also incurred costs for integrated logistics support activities, but we did not try to identify their costs.

Army unable to meet original supply support schedule

Sikorsky did not provide the logistic data the Army needed to take over Black Hawk supply support on April 1, 1981, as originally planned. The Army jeopardized meeting that schedule in November 1975 when it allowed Sikorsky to discontinue work on the logistics support analysis data base until the end of December 1976 because available funds would not cover continued full-scale efforts on both the helicopter and the data base. We reported on this discontinuance previously, noting that future Black Hawk support could be in jeopardy because contractor data was not up to date.

Between January 1977 and July 1978, Sikorsky had problems compiling LSAR data because the Army had not provided adequate guidance on how the contractor was to carry out the LSAR documentation and processing responsibilities. Furthermore, the contractor had difficulty operating the Army-supplied LSAR computer program. Army Material Development and Readiness Command instructions state that the commodity commands, such as TSARCOM, are responsible for providing LSAR guidance to project managers and contractors.

In June 1978, MRSA representatives participated in a Project Manager's Office review of Sikorsky's integrated logistics support efforts. MRSA's report stated that, because TSARCOM had not provided the required guidance, the 7,000 records Sikorsky had processed to date contained errors. The report concluded that unless TSARCOM provided this guidance, the provisioning data scheduled for delivery in December 1978 would be useless. MRSA, TSARCOM, and Communications and Electronics Materiel Command representatives met with Sikorsky in August 1978 to provide the guidance.

The Army concluded in July 1978 that the contractors would be unable to provide the necessary provisioning data in time for it to take over supply support in April 1981 and in January 1979 extended the contractor support period 1 year through March 1982. The extension, however, did not solve the problem, because the Army continued to have problems getting timely and accurate provisioning data from the contractors, especially Sikorsky.

Sikorsky data was not timely, accurate, or complete

TSARCOM had difficulty purchasing parts in time to meet Army support requirements starting April 1, 1982, because Sikorsky did not provide timely, accurate, or complete data.

According to the timetable for the April 1982 conversion, Sikorsky was to begin providing TSARCOM with supply support data in January 1979 for parts having the longest leadtimes. Sikorsky also was to provide data on the remaining items in time for TSARCOM to make timely purchases. Sikorsky was 3 months late providing the long leadtime parts data, and TSARCOM records show that by November 1980, Sikorsky was 12 to 15 months late in providing other data. Sikorsky's difficulties with the MRSA LSAR program and TSARCOM's needs for changes to the program were factors in the delays and a factor in some other data problems.

LSAR program-related problems

Some of TSARCOM's problems in getting good requirements determination data concerned Sikorsky's difficulties in operating the LSAR computer program and getting correct data to TSARCOM. Moreover, TSARCOM's computer program could not handle all the LSAR data.

In April 1979, TSARCOM realized that the MRSA program did not provide for incorporating Army data changes into the contractors' logistics data bases. These were changes the Army made as a result of evaluating or further processing the contractor data. TSARCOM and MRSA discussed adding this capability to the LSAR program, and MRSA provided the revised program to Sikorsky in August 1979. In December 1979, TSARCOM requested MRSA to revise the LSAR program to provide output segregated by systems and their components. MRSA provided the revised programs to Sikorsky in February 1980. However, according to Sikorsky officials, they could not implement the program for incorporating Army changes in the LSAR until July 1980 because the Army did not provide the needed data and the program was deficient in that it caused the loss of data. Until then, the data was incomplete, thereby impairing TSARCOM's requirements determinations.

One of Sikorsky's early attempts to incorporate the Army changes into the LSAR resulted in the deletion of 60,000 Sikorsky records, thus delaying Sikorsky processing. MRSA officials said a misunderstanding between TSARCOM and MRSA had resulted in a program error that caused the computer to reject certain data. In two other instances, Sikorsky's running the MRSA program resulted in the deletion of the contractor's master record file. This also delayed Sikorsky's processing of logistics data. According to MRSA's assessment of the problem, Sikorsky operators ignored computer output messages concerning input of invalid data.

Other data accuracy and timeliness problems

Other Sikorsky data accuracy and timeliness problems delayed TSARCOM parts purchases. For example, in December 1979, Sikorsky sent data to TSARCOM on about 23,000 provisioning line item sequence numbers (numbers identifying each location on the aircraft where a particular part is used). TSARCOM's attempt to process the data resulted in about 1,400 rejects. Although TSARCOM records do not describe the specific data problems, they show that Sikorsky personnel helped TSARCOM resolve them.

In May 1980, Sikorsky sent TSARCOM massive amounts of logistics data updating and adding to previous submissions. This created a large backlog of work which took TSARCOM several months to process. TSARCOM examined the data and found problems such as missing unit prices, missing leadtime data, and no data at all for some parts. According to Sikorsky officials, this data was not always available due to part changes, etc.

During a July 1981 meeting, TSARCOM representatives noted a continuing problem of missing data and difficulties with

> "* * * taking a bad data base and trying to convert it into a reliable data base for TSARCOM to recognize (use in calculating) requirements."

They also noted that "The contractor has really failed in this area" and that this had impaired TSARCOM's ability to make timely requirements determinations and parts purchases.

INADEQUATE ENGINE PARTS DATA BASE

Although TSARCOM officials said that they had few problems with the LSAR data that General Electric provided, TSARCOM considered its engine parts data base too deficient to rely on the recommendations of its automated requirements determination system. The deficiencies primarily concerned data that TSARCOM was responsible for, such as helicopter overhaul program information.

Because of this concern, TSARCOM manually calculated all engine parts requirements. The accuracy of these requirements is questionable because the automated system makes more complex determinations and considers more data. For example, one of the automated system's functions is to apply a complex formula in calculating a safety-level stock requirement. The formula considers such variables as item cost, demand variation, leadtime, and acceptable risk of zero balances. TSARCOM's manual calculations included a safety level based solely on the dollar value of the item's annual demand.

TSARCOM did not give sufficient priority to correcting the data base problems. Therefore, it did not expect to be able to use the automated system until August 1982.

INADEQUATE USE OF ACTUAL DEMAND DATA

The quality of TSARCOM's requirements determinations also is questionable because it did not base the requirements on historical demand data to the extent that Army regulations require. It made little use of contractor-provided demand data because the data was neither timely nor accurate.

Regulations require logistics commands to begin using actual demand data in requirements computations 6 months after the weapon system has been fielded. TSARCOM planned to begin using some actual demand data in November 1979 and to gradually increase its use so that requirements computations after January 1982 would be based solely on actual demand data.

In a prior report, 3/ we stated that as of October 1980, TSARCOM was still using engineering estimates to compute requirements because the contractors had provided little demand data. In March 1982, TSARCOM was still using engineering estimates to compute most of its airframe requirements because little demand data was available.

TSARCOM officials said that Sikorsky had not furnished timely demand data, and TSARCOM had not recorded all the data provided. They said Sikorsky was not submitting demand data quarterly as scheduled and had provided no data between June and December 1981.

TSARCOM discovered in January 1982 that its files had not accepted some demand data because the files did not include the related management control numbers under which units had ordered the parts. TSARCOM planned to incorporate all management control numbers into its files and acquire the related 2-year demand data from Sikorsky.

TSARCOM Engine Section officials said demand data was incomplete because it did not include demands represented by open requisitions.

3/"Less Costly Ways To Budget and Provision Spares for New Weapon Systems Should Be Used" (PLRD-81-60, Sept. 9, 1981).

FUNDING SHORTAGES LIMIT PROCUREMENTS

TSARCOM requested $27.8 million for fiscal year 1980 funding for its Black Hawk supply support but received only $10.5 million. The funding shortage continued into fiscal year 1981 when TSARCOM received only $40.2 million, or 58 percent of $69.4 million requested for Black Hawk support. From September 1980 to July 1981, TSARCOM procured only 60 percent of the Black Hawk parts that it had determined were needed because sufficient funding was not available. In July 1981, the Army used supplemental appropriations to fund TSARCOM's unfunded Black Hawk requirements.

Increases in production leadtimes and unit prices created a need for more obligation authority sooner. Examples of such increases follow.

Part name	Production leadtime as of		Price	
	Oct. 1978	June 1980	Oct. 1978	June 1980
	(months)			
Main gearbox	28	51	$101,892	$218,229
Blade assembly	31	42	57,328	63,794
Auxiliary power unit	17	35	43,815	52,572
Blade assembly, tail	16	39	29,890	51,034
Input module	29	45	23,848	42,120
Swash plate assembly	25	34	18,638	29,983
Tail gearbox	34	57	16,241	29,374

WILL PARTS DELIVERIES MEET FIELD DEMANDS IN TIME?

To obtain further indications of whether parts will be available to meet demands, we reviewed requirements and delivery dates for a nonrandom sample of 83 airframe parts and 59 engine parts. According to this data, 53 percent of the airframe parts and 31 percent of the engine parts reviewed will be in short supply sometime during the 21 months ending September 30, 1983. The items include parts needed to fly the Black Hawk, such as rotor blades and flight controls.

The following table lists examples of items for which parts deliveries are not expected to be able to meet all field demands during fiscal year 1983.

Part name	Unit price	Procurement leadtime (months)	Quantity short
Airframe items:			
Gearbox assembly	$183,676	43	7
Main rotor blade	86,146	21	50
Flight control	16,124	37	5
Flight control servo	7,383	30	169
Relay panel assembly	5,864	33	19
Engine items:			
Turbine module	73,387	26	29
Turbine rotor	30,300	31	12
Inlet duct	2,128	25	7

Actual support may vary from that indicated by the data we reviewed because (1) requirements and demands will likely change as later data becomes available and (2) TSARCOM tries to expedite deliveries where necessary.

TSARCOM COMMENTS ON LESSONS LEARNED

TSARCOM's Integrated Logistics Support Office prepared a lessons-learned paper that discussed the problems that led to TSARCOM developing late and inaccurate supply support requirements. The paper stated that:

--The responsible Army supply support commands need full control over data entering the supply support computer system.

--Contractors should use the same programs and record data in the same format as the supply support commands use.

--A method is needed for verifying all data before it is entered into computer records.

--Computer systems must be more efficient and responsive to avoid the delays caused by having to manually calculate requirements.

--The Army should require contractors to provide data in a timely manner.

--The Army needs a better program for monitoring the contractors' daily activities, including stationing a program-monitoring staff at contractor sites.

--The Army needs to develop a better system for entering parts demand data compiled during the contractor support period into the Army's support data base.

These "lessons" are essentially acknowledgments that the Army did not effectively carry out some of its basic logistics responsibilities for insuring that (1) quality data is used in its programs, (2) program systems work properly, (3) program requirements, such as a requirement to use demand data, are followed, and (4) contractors' performance is monitored adequately and that they are held accountable for their contractual obligations.

TSARCOM has made its managers aware of these problems, and its lessons-learned paper has been widely disseminated within the Army and coordinated among its major commands to help prevent these same mistakes from being repeated in new weapon systems, such as the Apache Attack Helicopter and Patriot Tactical Air-Defense System.

There is also a general awareness within the Congress and the Department of Defense of the need to place greater attention on the logistics support and readiness aspects of major system acquisitions. For example, in April 1981, the Deputy Secretary of Defense introduced 32 initiatives to improve procurement and reduce waste. Six of the initiatives have been identified by the Department as relating directly to the goal of insuring that "readiness and sustainability of deployed weapons are primary objectives and must be considered from the start of weapon system programs."

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