

## The Cargo Helicopter (CH-47) System Plan

The CH-47D Chinook is the Army's primary heavy lift cargo helicopter. The CH-47 fleet has been enhanced and upgraded since its initial fielding in 1962. The results are five variant models with a sixth, the CH-47F currently scheduled for production in Fiscal Year (FY) 02. There are several programs that address Sustainment and Modernization. The Recapitalization (RECAP) effort and Army Total Ownership Cost Directorate (ARTOC) PILOT are the most significant.

Section I details the four Army RECAP program initiatives. Included are The Rebuild/Sustainment Program, The Engine Upgrade of the CH-47 D and CH-47F to the Honeywell T55-GA-714A engine, The CH-47 Improved Cargo Helicopter (ICH) selected upgrade to the CH-47F model, and the Recapitalization of selected CH-47D & F Depot Level Repairables (DLRs) items. ICI I selected upgrade of the CH-47F appears, as both RECAP and PILOT programs.

Section II outlines the five ARTOC PILOT Program initiatives. These program initiatives adhere to Section 912/816 the Office of the Secretary of Defense (OSD) mandate. Included are the Cargo Helicopter Life Cycle Management Program, CH-47F Improved Cargo Helicopter (ICH), Low Maintenance Rotor Hub, Scheduled Maintenance Re-engineering, and Training Enhancement Packages.

Performance-based measurements will track the success of each initiative and be evaluated by ARTOC. This information will form the basis for high-level tracking and reporting. Measurement will allow the Army to gauge the benefits of RECAP and PILOT program initiatives within a selected portion of the fleet, showing the affect they will have on the entire fleet performance if implemented. All reports to senior Army leadership will come from ARTOC and will be available to participating organizations on the web.

ARTOC will track the Cargo Helicopter System by:

a. Leveraging the CH-47D Baseline effort currently underway as part of the CH-47 ARTOC PILOT Program. It provides a baseline of maintenance events and costs. This effort will also provide the mechanism for assessing changes to maintenance events and costs that occur as a result of the implementation of RECAP.

b. In the very near future, this system will be replaced and improved by one of the ARTOC initiatives. The Advanced Maintenance Aid Chinook (AMAC), which will initiate tech data delivery and seamlessly collect maintenance management information for all maintenance actions, and will provide even greater insight into "at the aircraft" maintenance event frequencies and costs.

SECTION I.  
CARGO HELICOPTER RECAPITALIZATION PLAN

The Cargo Helicopter Recapitalization Program includes four initiatives:

a. The Rebuild/Sustainment Program: Overhauls CH-47D helicopters to a RECAP standard of “near zero-miles/zero-hours”. This will extend the useful life 20 years. Available/potential technology insertion opportunities will be identified using engineering analysis activities and programmed for application during the RECAP process.

b. The CH-47F Improved Cargo Helicopter (ICH) Selected Upgrade Program: Upgrades CH-47D models to a CH-47F configuration, creating the latest variant of the series. The newer model is expected to reduce operating and sustainment (O&S) costs, provide improvements in flight control, safety, readiness, and electronics capability. The following engineering improvements will extend the economic life of the aircraft:

1. Vibration Reduction
2. Airframe Remanufacture
3. Cockpit Redesign with Force XXI Digital Compatibility
4. Open Electronic Architecture

c. Engine Upgrade: All CH-47D and CH-47F model aircraft will have an Engine upgrade that will convert/replace the T55-L-712 engine to the Honeywell T55-GA-714A engine. The new engine will substantially increase performance capability and versatility.

d. Recapitalization of selected CH-47D & F Depot Level Repairables (DLRS): Performs the non-recurring engineering and economic analysis on 301 DLRs to establish the National Maintenance Program (NMP) standards for both the CH-47D and F model aircraft. The ongoing Engineering and Economic Analysis studies will assist in defining the Cargo Helicopter Program Management Office (CH-PMO) objective component Recapitalization program.

Success of the Cargo Helicopter Recapitalization program will be evaluated by ARTOC, using specific tracking metrics identified in the PPA. Individual components and systems will be tracked to determine if they are performing to expectations and tracked using existing data sources and Automated Information Technology (AIT). Data gathered during the collection process will be sent to the Army Tracking Information System (ARTIS) managed by the Office of the Deputy Chief Staff for Programs (ODCSPRO) to Mr. Bob Lane at Calibre, [blane@calibresys.com](mailto:blane@calibresys.com).

## CARGO HELICOPTER RECAPITALIZATION PERFORMANCE PLAN

### INITIATIVE 1: The Rebuild/Sustainment Program

The Cargo Helicopter Rebuild and Sustainment program involves depot overhaul of 131 CH-47Ds in the active and reserve components to a RECAP standard. Available/potential technology insertion opportunities will be identified thru engineering analysis activities, and will be programmed for application during the CH-47D RECAP process. All rebuild work will be performed at the Corpus Christi Army Depot.

#### Methods of Performance Measurement:

As part of the Cargo helicopter Pilot Program, a new set of Life Cycle Management metrics have been developed. The primary driver for this new initiative was the inability on the part of the PMO to understand the real O&S costs of the Chinook fleet and how those costs directly impacted fleet readiness. Even the commonly accepted metric "readiness" is one that comes into question when trying to judge the true standard of the fleet and its ability to "Go-to-War". For that reason the Cargo PMO has drawn from both the commercial sector and the other services to architect a new way of viewing fleet health and its capabilities.

As part of the Life Cycle Management program, the Cargo PMO has initiated near and far term fixes to the inability to have "fleet insight". Currently we have funded a manual data collection effort targeted at a single battalion to get the real manpower and consumption rates to understand costs and the aircraft.

While this effort provides great insight, it is narrow in scope and too costly to spread to the entire fleet. For that reason, a second effort, AMAC, has been initiated as part of a larger fleet management program. AMAC is focused to seamlessly collect P2T2 (people, parts, tools, time) data at the aircraft for all maintenance actions. This program will be the cornerstone to the data collection effort when it is fielded across the fleet.

As the initial program is providing results, it functions to establish the baseline against which we will measure the metrics on a fleet-wide basis. Several of these metrics are geared to assessing fleet health and will be used to evaluate the success of the Recapitalization effort. Examples of metrics are shown below. While some are shown to have specific quantitative improvement objectives, others are listed which we feel will have ancillary benefits e.g.,

- a. Fleet Half-Life. (10 years)
- b. Component cost per operating hour (Decreased)
- c. Component contribution to system downtime
- d. Mean Time Between Removal (MTBR) (Improvement goals specified by Pre Flight Abort Rate: Aircraft launched/Aircraft attempted)
- e. In Flight Abort Rate: Flight Aborted/Total Flights
- f. Maintenance Test Flight Hours.

The initial base line effort has provided insight to many of the O&S cost drivers that previously did not have PMO visibility. As an example, initial feedback indicates that our MMH/FH (maintenance man-hour per flight hour) figures may be three times their last measurement made some 8 years ago.

As the "at aircraft" data is made available, the benefits of the Rebuild and Sustainment Program are expected to reduce maintenance hours, increase system availability and reliability, as well as extend the economic life of the aircraft.

While there are other policies and processes that affect system reliability and availability, the following top 10 Cargo Helicopter cost drivers affected by the Rebuild Program will be tracked for specified performance. The projected MBTRs will provide the majority of the benefits to the fleet readiness:

(MTBR is subject to adjustment following trend analysis)

COMPONENT	NSN	MTBR (Projected)
1. T55-GA-714A Engine	2840-01-458-5361	2400
2. Transmissions (Fwd, Aft & Combining)	1615-01-315-4071	880
3. Main Rotor Heads (Fwd & Aft)	1615-01-391-4399	500
4. Main Rotor Blades (Fwd & Aft)	1615-01-145-7109	625
5. Swashplate Controls (Fwd & Aft)	1615-01-475-9838	840
6. Fuel Control	N/A	N/A
7. Flight Controls	1650-01-222-8087	2617
8. Landing Gear Drag Link	1620-00-869-2418	2617
9. Dampeners Flutter	1650-01-371-2475	2617
10. Automatic Flight Control Computer	6610-01-241-3334	TBD

INITIATIVE 2: The CH-47F Improved Cargo Helicopter (ICH) (Selected Upgrade Program) *(also an OSD Pilot 916/812 program)*

The CH-47 ICH Selected Upgrade Program will currently upgrade 277 CH-47D models to the newest CH-47F design standard, while rebuilding the common CH-47 components to the RECAP standard. The ICH upgrade has a partnership arrangement with Cargo Helicopter Project Management Office (CH-PMO), the Army Materiel Command, Corpus Christi Army Depot (CCAD), and Boeing.

Methods of Performance Measurement:

Similar to the analysis provided in Initiative #1 the Cargo helicopter Pilot Program has developed a new set of Life Cycle Management metrics. Several of these metrics are geared to assessing fleet health and will be used to evaluate the success of the Recapitalization effort. Several examples of metrics are shown below. While some are shown to have specific quantitative improvement objectives, others are listed which we feel will have ancillary benefits e.g.,

- a. Fleet Half-Life (10 years)
- b. System Operating and Support costs (25% Reduction)
- c. Vibration Levels (Identified in CH-47F System Specification)

The following top 10 Cargo Helicopter cost drivers affected by the Rebuild Program will be tracked for specified performance: (MTBR is subject to adjustment following trend analysis)

COMPONENT	NSN	MTBR (Projected)
1. T55-GA-714A Engine	2840-01-458-5361	2400
2. Transmissions (Fwd, Aft & Combining)	1615-01-315-4071	880
3. Main Rotor Heads (Fwd & Aft)	1615-01-391-4399	500
4. Main Rotor Blades (Fwd & Aft)	1615-01-145-7109	625
5. Swashplate Controls (Fwd & Aft)	1615-01-475-9838	840
6. Fuel Control	N/A	N/A
7. Flight Controls	1650-01-222-8087	2617
8. Landing Gear Drag Link	1620-00-869-2418	2617
9. Dampeners Flutter	1650-01-371-2475	2617
10. Automatic Flight Control Computer	6610-01-241-3334	TBD

#### INITIATIVE 3: The Engine Upgrade of CH-47D and CH-47F Aircraft

All CH-47D and CH-47F model aircraft will have an engine upgrade. The upgrade will convert/replace the T55-L-712 engine to the Honeywell T55-GA-714A engine. The new engine will substantially increase performance capability and versatility.

#### Methods of Performance Measurement:

I. As part of the Cargo Helicopter Pilot Program, a new set of Life Cycle Management metrics have been developed. Metrics are geared to assessing fleet health and will be used to evaluate the success of the RECAP effort, e.g.

- a. Mission Range (50nm w/16,000 lb payload)
- b. Component cost per operating hour. (Equal to predecessor system)
- c. Component contribution to system downtime
- d. Mean Time Between Removal (MTBR)
- e. Pre Flight Abort Rate is: Aircraft Launched/Aircraft Attempted
- f. In Flight Abort Rate: Flight Aborted/Total Flights
- g. Mean Time Between Depot Level Repair (MTBDLR) (25% improvement)

II. The GA-714A engine's intermittent and continuous shaft horsepower ratings will also satisfy the CH-47F (Improved Cargo Helicopter) lift/range requirements of 16,000 lb. external load for 50 nautical mile combat radius at 4,000 ft. and 95°F with a 30 minute fuel reserve.

The engine upgrade will be tracked for specified performance: (MTBR is subject to adjustment following trend analysis)

COMPONENT	NSN	MTBR (Projected)
Engine T55-GA-714A	2840-01-458-5361	2400

INITIATIVE 4: Recapitalization of selected CH-47D & F Depot Level Repairables:

The RECAP of CH-47 Depot Level Repairables (DLRs) items is a key component to achieving increased weapon system readiness, service life extension and reducing O&S cost. The CH-47 component RECAP program is divided into three processes/phases. DLR items may change in the future based upon the future Army Cost position.

a. Identification of all DLR items for the CH-47, which is currently comprised of 301 DLR components.

b. The 26 DLR items that will be part of the initial CH-47 component RECAP program based on an immediate assessment of current Depot Maintenance Work Requirements (DMWRs). They can be updated to The RECAP standard and will immediately impact current depot level maintenance practices. These components historically affect the CH-47 fleet the most in terms of cost and readiness.

c. The 113 DLR items have been selected for an in-depth 18-month engineering analysis. The analysis will include review of current Depot Maintenance Work Requirements (DMWRs) for conversion to National Maintenance Work Requirements (NMWRs)/RECAP standards. The 26 DLRs will also be part of the 113 DLRs in the Engineering and Economic Analysis. The remaining 188 components, consisting primarily of DLRs with commercial maintenance and overhaul requirements, and an average monthly demand (AMD) of less than 1, will be evaluated on a continuing basis.

COMPONENT	NSN	MTBR (Current)	MTBR (Projected)	% Increase
1. Aft Head Swashplate Assembly	1615-01-475-9838	569	840	48%
2. Aft Rotor Shaft (1)	1680-01-320-1191	975	1200	23%
3. Forward Head Swashplate Assembly	1615-01-473-4376	603	775	29%
4. Aft Transmission	1615-01-315-4071	821	880	7%
5. Combining Transmission	1615-01-464-3974	459	660	44%
6. Engine Transmission (2)	1615-01-315-4070	477	520	9%
7. Forward Transmission	1615-01-317-6446	676	740	9%
8. Servo Cylinder Pitch (1)	1650-01-222-8087	2379	2617	10%
9. Servo Cylinder Roll (1)	1650-01-222-8087	2379	2617	10%
10. Servo Cylinder Thrust (1)	1680-01-224-6666	6515	10467	10%
11. Servo Cylinder Yaw (1)	1650-01-222-8087	23798	2617	10%
12. Servocylinder, Pivoting (1)	1650-01-303-7897	605	800	32%
13. Servocylinder, Pivoting (1)	1650-01-303-7898	578	850	47%
14. Servocylinder Swiveling (1)	1650-01-302-0076	618	700	13%
15. Servocylinder Swiveling (1)	1650-01-304-9016	598	870	45%
16. Aft Rotor Head	1615-01-391-4399	408	500	23%
17. Fwd Rotor Head	1615-01-391-4398	418	465	11%
18. FWD LCT	1680-01-120-7641	952	1047	10%
19. AFT LCT	1680-01-120-7642	1189	1308	10%
20. Struts	1620-00-869-2418	2379	2617	10%
21. Ramp Cylinders	1650-00-929-8507	5947	6542	10%
22. Engine Start motor	2995-01-076-7732	9515	10467	10%
23. Lag Dampeners	1650-01-371-2475	1189	1308	10%
24. Auxiliary Power Unit	2835-01-469-3420	389	430	11%
25. Rotor Blades, Fwd	1615-01-145-7109	566	625	10%
26. Rotor Blades, Aft	1615-01-145-7110	613	675	10%

The 26 highest priority RECAP components are as follows:

NOTE: The T55-GA-714A Engine is a separate fully funded and managed program.

A Reliability Growth Model against the specific improvements identified in the table above will track these components for specified performance.

All signatories agree to the following:

- a. This is a living document and is current as of January 17, 2002. Any changes to the PPA will be coordinated with all parties concerned.
- b. The Methods of Performance Measurements outlined above.
- c. The HQDA ARTOC in coordination with all parties, will track results of Cargo Helicopter.
- d. The RECAP performance metrics established in this agreement.
- e. The HQDA ARTOC will supply tracking results to participating organizations via the ARTOC website and tailored reports.
- f. The HQDA ARTOC will report tracking results to Army Senior Staff.
- g. The PM Cargo Helicopter in coordination with all parties will assist with metric development to be used in tracking execution.
- h. The PM Cargo Helicopter in coordination with signatories will supply data to HQDA ARTOC.
  - i. Warfighters will ensure continued emphasis on accurate data reporting.
  - j. Warfighters will facilitate/authorize HQDA liaison visits when necessary.
  - k. Component/sub-component serial numbers will be linked prior to fielding.
  - l. The PM Cargo Helicopter/AMC will provide updates to induction/distribution schedules, performance standards and baselines whenever necessary to HQDA ARTOC.
  - m. The HQDA will furnish funding details as requested, but at least monthly.
  - n. The CEAC will validate cost and economic analyses of Recapitalization efforts that have been reviewed and accepted by the MACOM and Major Subordinate Command cost analysis organizations and perform independent evaluations and analyses when applicable.

Agreement Date: December 12, 2001

Approved By:

AMC

COL Michael B. Cervone/s-January 17, 2002

FORSCOM  
(Representing Warfighters)

James P. DeMartini/s-November 30, 2001

TRADOC System Management

NO TSM

USACEAC

COL Kenneth E. Ellis/s-December 20, 2001

CARGO HELICOPTER – PM

James T. Caudle/s- December 12, 2001

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04 APR 2002

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Claude M. Bolton Jr. /s- 09 APR 2002

## SECTION II.

### CARGO HELICOPTER OSD 912-816 PILOT PLAN

The Cargo Helicopter Project Management ARTOC PILOT Program includes five initiatives:

a. Cargo Helicopter Life Cycle Management Program (LCM): Will establish a quantitative baseline for current costs and system downtime using Advanced Technology Enablers. The LCM program will involve the application of commercial airline principles to a weapon system. This program will reduce O&S costs, and work to better understand and challenge costs. An additional benefit will be an increase in operational readiness.

b. Cargo Helicopter CH-47F Improved Cargo Helicopter [ICH]: Upgrades CH-47D models to CH-47F, the newest design standard, while rebuilding the common components to RECAP standards. This is an effort to reduce O&S costs, and improve readiness, and will be accomplished through a reduction of airframe vibration and a remanufacture of the airframe.

c. Cargo Helicopter Low Maintenance Rotor Hub: Will reduce O&S costs increase capability, increase fleet readiness, reduce unscheduled maintenance and parts demand through the use of elastomeric bearings. The new rotor head will be interchangeable with the existing Cargo Helicopter Hub, allowing for horizontal integration.

d. Cargo Helicopter Scheduled Maintenance Re-engineering: Is an effort to re-engineer Cargo Helicopter's scheduled maintenance process using an electronic Management Information System (MIS). The benefits of this system are rapid reaction time to abnormalities, reduced paper transfer, identifying training inconsistencies and manufacturer identification on components linked to end item for fewer fleet groundings.

e. Enhancement Training Packages: Will improve readiness and decrease maintenance requirements for the Cargo Helicopter, by linking training programs to unit performance. The training packages are computer based. In association with the Reimer Digital Library they will be the first component of the Cargo Helicopter Pilot Distance Learning Program.

Success of the Cargo Helicopter Project Management Pilot program will be evaluated by ARTOC using specific tracking metrics identified in the PPA. Program initiatives will be tracked to determine if they are performing to expectations using existing data sources and Automated Information Technology (AIT). Data gathered during the collection process will be sent to the Army Tracking Information System (ARTIS) managed by the Office of the Deputy Chief Staff for Programs (ODCSPRO), Mr. Bob Lane at Calibre, [blane@calibresys.com](mailto:blane@calibresys.com). Pilot Programs are required to report status through ARTOC to OSD quarterly. Reports to senior Army leadership will come from ARTOC and will be available to participating organizations on the web.

## CARGO HELICOPTER OSD 916-812 PILOT AGREEMENT

### INITIATIVE 1: Cargo Helicopter Life Cycle Management Program (LCM)

This initiative will reduce O&S costs, improve readiness and increase capability through business process reengineering. Following commercial airline examples, the Cargo Helicopter Program Management Office has implemented the following process changes:

- a. Partnership with AMCOM, for Team Redstone Approach
- b. Establish ongoing, detailed O&S baseline process:

Phase 1: Establishment of an initial baseline using existing databases augmented by historical Sample Data Collection (SDC) information and by limited data collection at Fort Campbell, KY.

Phase 2: Implementation of the Objective data system, enhanced by "at the aircraft" data collection. The Aviation Maintenance Aid-Chinook (AMAC) will be used as a maintenance aid that will transparently collect the data necessary for the maintenance of the baseline.

- c. Inclusion of non-hardware issues surrounding the three most important categories, cost events, maintenance events and downtime events.
- d. Flexibility in funding for ARTOC initiatives.
- f. Weapon System Centered Activity Based Management/Cost System to validate appropriate surcharges and repair costs.
- g. Reinvestment authority.
- h. Creating an Aviation Board of Directors.

#### Methods of Performance Measurement:

Cargo Helicopter LCM benefits will be a reduction in O&S costs and an increase in readiness.

As part of the Cargo helicopter Pilot Program, a new set of Life Cycle Management metrics have been developed. These metrics are geared to assessing fleet health and will be used to evaluate the success of the Pilot Program, e.g.

- a. System Operating and Support Cost. Achieve 20% reduction in costs and 5% increase in readiness. Current operating costs range from \$1,900.00 to \$2,800.00 per flying hour.
- b. Component cost per operating hour.
- c. Component contribution to system downtime.
- d. Mean Time Between Removal (MTBR).
- e. Pre Flight Abort Rate is: Aircraft Launched/Aircraft Attempted.
- f. In Flight Abort Rate: Flight Aborted/Total Flights.
- g. Maintenance Test Flight Hours.

INITIATIVE 2: The Cargo Helicopter CH-47F Improved Cargo Helicopter (ICH) (*also under Army Recapitalization Program*)

The CH-47F ICH Selected Upgrade Program currently consists of upgrading 277 CH-47D models to the newest CH-47F design standard, while rebuilding the common Cargo Helicopter components to RECAP standard. The ICH upgrade has a partnership arrangement between the Cargo Helicopter Program Management Office CH-PMO, Army Materiel Command, Corpus Christi Army Depot (CCAD), and Boeing.

Methods of Performance Measurement:

As part of the Cargo helicopter Pilot Program, a new set of Life Cycle Management metrics have been developed. Metrics are geared to assessing fleet health and will be used to evaluate the success of the Pilot Program. Several examples of metrics are shown below. While some are shown to have specific quantitative improvement objectives, others are listed which we feel will have ancillary benefits e.g.

- a. Fleet Half-Life (10 years)
- b. System Operating and Support costs (25% reduction)
- c. Component contribution to system downtime
- d. Mean Time Between Removal (MTBR) (improvement goals specified by components)

The benefits of this program are an increased useful life for the component, reduced maintenance hours, and an increased system availability and reliability. CH-47F unique parts will increase system capability and be more cost effective.

The following top 10 Cargo Helicopter cost drivers affected by the ICH Selected Upgrade Program will be tracked for specified performance:  
(MTBR is subject to adjustment following trend analysis)

COMPONENT	NSN	MTBR (Projected)
1. T55-GA-714A Engine	2840-01-458-5361	2400
2. Transmissions (Fwd, Aft & Combining)	1615-01-315-4071	880
3. Main Rotor Heads (Fwd & Aft)	1615-01-391-4399	500
4. Main Rotor Blades (Fwd & Aft)	1615-01-145-7109	625
5. Swashplate Controls (Fwd & Aft)	1615-01-475-9838	840
6. Fuel Control	N/A	N/A
7. Flight Controls	1650-01-222-8087	2617
8. Landing Gear Drag Link	1620-00-869-2418	2617
9. Dampeners Flutter	1650-01-371-2475	2617
10. Automatic Flight Control Computer	6610-01-241-3334	TBD

### INITIATIVE 3: Cargo Helicopter Low Maintenance Rotor Hub

This initiative will reduce O&S Costs and improve readiness. The new technology design, used on other advanced rotorcraft such as the Boeing AH-64D Apache Longbow and the RAH-66 Comanche armed reconnaissance helicopter, replaces lubricated or “wet” bearings, with elastomeric bearings that require no additional lubrication. The rotor head will be interchangeable with the existing Cargo Helicopter hub.

#### Methods of Performance Measurement:

As part of the Cargo helicopter Pilot Program, a new set of Life Cycle Management metrics have been developed. Metrics are geared to assessing fleet health and will be used to evaluate the success of the Pilot Program, e.g.,

- a. System Operating and Support Cost (\$200 M over 20 years)
- b. Component cost per operating hour
- c. Component contribution to system downtime
- d. Mean Time Between Removal (MTBR)
- e. Pre Flight Abort Rate is: Aircraft Launched/Aircraft Attempted
- f. In Flight Abort Rate: Flight Aborted/Total Flights
- g. Maintenance Test Flight Hours

The benefits of this program are that at least ten days of unscheduled Maintenance will be eliminated each year for every Cargo Helicopter fielded with the new system. The new hub will have about 55 percent fewer parts, a corresponding reduction in special tooling, and a projected 4500-hour life. All components will be field replaceable and will not require overhaul by the Depot. The new hub will be interchangeable with the existing hub and retain the same flight dynamics. It is expected that there will be a total \$194 million reduction in operating costs with this program. The Program Objective Savings (POM) for Fiscal Year 2002-2007 will be (\$11,715,775), and a Cost Avoidance outside the POM years is estimated at \$205,717,137 dollars.

The following cost drivers are affected by the Rotor Hub Program and will be tracked for specified performance: (MTBR is subject to adjustment following trend analysis)

COMPONENT	NSN	MTBR (Replacement)
1. Rotor Heads	1615-01-391-4399	500
2. Rotor Blades	1615-01-145-7109	625
3. Drive Systems	1615-01-320-1191	1200
4. Actuators	1650-01-303-7897	605

#### INITIATIVE 4: Cargo Helicopter Scheduled Maintenance Re-engineering

This initiative is an effort to develop a new approach to scheduled maintenance based on a foundation of current information systems technology from numerous programs and studies. An electronic MIS system will provide detailed technical data to the maintainer, tailored specifically to the task required. The electronic architecture of this environment will function as a surrogate logistics system. It will store all information, both technical and programmatic; in a common system ensuring information is available in a web-based architecture. The CH-47 PMO can use it for focused data collection in order to establish a technical or cost baseline to facilitate resolution or confirmation of specific fleet issues. The data is updated via the Internet daily (both directions) for immediate adjustment or long-term planning.

#### Methods of Performance Measurement:

As part of the Cargo helicopter Pilot Program, a new set of Life Cycle Management metrics have been developed. Several of these metrics are geared to assessing fleet health and will be used to evaluate the success of the Pilot Program, e.g.

a. Reduction in Scheduled Maintenance. Economic Operating Opportunity for AMAC establishes an opportunity for reducing the cost of scheduled maintenance events. Improvements are being managed via Economic Opportunity Operating Space and currently range from \$48.00 to \$180.00 per flight hour.

b. Maintenance Man Hours/Flight Hours (MMH/FH) for Scheduled Maintenance

c. Calendar time for Phase completion

d. System Readiness during Subsequent Operational Cycle

e. System Operating and Support Cost

The benefits of this system are based on rapid reaction time to abnormalities, and a reduced paper transfer. Additionally, identifying training inconsistencies and manufacturer identification on components linked to end items will result in fewer fleet groundings.

INITIATIVE 5: Training Improvement Initiative Packages:

This initiative presently consists of two packages. One is the Corrosion Aid Package and the other is the Rotor Blade Track/Balance Enhancement Training Package. The Cargo Helicopter PM has developed a Corrosion Compact Disc (CD) dealing with the recognition, differentiation, and treatment of corrosion on the CH-47D. A companion enhancement training package that is being developed, standardizes the corrosion training in resident training, provides a structured series of training programs and can be used for enhancement training in the field. Additionally, the CH-PMO as also developed a CD for flight crews and maintenance personnel on rotor blade tracking/balancing. The CD provides instruction on static blade balancing and painting and complete in-flight operating procedures for the Aviation Vibration Analysis (AVA).

Methods of Performance Measurement:

As part of the Cargo helicopter Pilot Program, a new set of Life Cycle Management metrics have been developed. Several of these metrics are geared to assessing fleet health and will be used to evaluate the success of the Pilot Program. Examples of metrics are shown below. While some are shown to have specific quantitative improvement objectives, others are listed which we feel will have ancillary benefits e.g.,

- a. Maintenance Test Flights (MTF) per tracking event. The objective is to reduce the MTF events from 6 to 3 per rotor tracking/balancing event
- b. Maintenance Test Flight Hours. Overall reduction in MTF hours per rotor tracking/balancing event.
- c. System Operating and Support Cost
- d. Component cost per operating hour
- e. Component contribution to system downtime
- f. Mean Time Between Removal (MTBR)
- g. Pre Flight Abort Rate is: Aircraft Launched/Aircraft Attempted
- h. In Flight Abort Rate: Flight Aborted/Total Flights

The Corrosion Aid and Rotor Blade Track/Balance Enhancement Training Package Program will increase reliability, significantly reduced maintenance hours for scheduled and unscheduled maintenance.

All signatories agree to the following:

a. This is a living document and is current as of January 17, 2002. Any changes to the PPA will be coordinated with all parties concerned.

a. The Methods of Performance Measurements outlined above.

b. The HQDA ARTOC in coordination with all parties will track results of Cargo Helicopter RECAP performance metrics established in this agreement.

c. HQDA ARTOC will supply tracking results to participating organizations via the ARTOC website and tailored reports.

d. HQDA ARTOC will report tracking results to Army Senior Staff.

e. PM Cargo Helicopter in coordination with all parties will assist with metric development to be used in tracking execution.

f. PM Cargo Helicopter in coordination with all parties will supply data to HQDA ARTOC.

g. Warfighter will ensure continued emphasis on accurate data reporting.

h. Warfighters will facilitate/authorize HQDA liaison visits when necessary.

i. Component/sub-component serial numbers will be linked prior to fielding.

j. PM Cargo Helicopter /AMC will provide updates to induction/distribution schedules, performance standards and baselines whenever necessary to HQDA ARTOC.

k. HQDA will furnish funding details as requested, but at least monthly.

l. CEAC will validate cost and economic analyses of Recapitalization efforts that have been reviewed and accepted by the MACOM and Major Subordinate Command cost analysis organizations and perform independent evaluations and analyses when applicable.

Agreement Date: December 12, 2001

Approved By:

AMC

COL Michael B. Cervone/s-January 17, 2002

FORSCOM  
(Representing Warfighters)

James P. DeMartini/s-November 30, 2001

TRADOC System Management

NO TSM

USACEAC

COL Kenneth E. Ellis/s-December 20, 2001

CARGO HELICOPTER – PM

James T. Caudle/s- December 12, 2001

PEO Aviation

MG Joseph L. Bergantz 04 APR 2002

ASA (ALT)

Claude M. Bolton Jr./s- 09 APR 2002

## ACRONYM LIST

AMAC	Aviation Maintenance Aid-Chinook
AMC	Army Materiel Command
AMD	Average Monthly Demand
AMSAA	Army Material Systems Analysis Activity
APA	Aircraft Procurement Army
ARTOC	Army Total Ownership Cost Directorate
ASA (ALT)	Assistant Secretary of the Army (Acquisition, Logistics and Technology)
ASA (FM&C)	Assistant Secretary of the Army (Financial Management and Comptroller)
AVA	Aviation Vibration Analysis
CBA	Cost-Benefit Analysis
CCAD	Corpus Christie Army Depot
CEAC	Cost and Economic Analysis Center
CH	Cargo Helicopter
CH-PMO	Cargo Helicopter-Program Management Office
COSIS	Cost of Supplies in Storage
DCSLOG	Deputy Chief of Staff for Logistics
DCSOPS	Deputy Chief of Staff for Operations
DCSPRO	Deputy Chief of Staff for Programs
DMWR	Depot Maintenance Work Requirement
DLR	Depot Level Repairable
DSA	Director for System Acquisition
FSR	Field Service Rep
FTR	Flight Hours Ratio
GOSC	General Officers Steering Committee
HQDA	Headquarters, Department of the Army
ICH	Improved Cargo Helicopter
IFAR	In Flight Abort Rate, Flight Aborted/Total Flights
LCM	Life Cycle Management
ME	Maintenance Events
MIS	Management Information System
MMH/FH	Maintenance Man Hours/Flight Hours
MTBDLR	Mean Time Between Depot Level Repairs
MTBR	Mean Time Between Removals
MTFH	Maintenance Test Flight Hours
MTTR	Maintenance Task Time Rate
MWO	Modification Work Order
NGB	National Guard Bureau
NMP	National Maintenance Plan
NM	Nautical Miles
NSN	National Stock Number
NEOF	No Evidence of Failure

O&S	Operation & Sustainment
OSD	Office of the Secretary of Defense
OMA	Operations and Maintenance, Army
OPTEMPO	Operations Tempo
PA	Procurement Appropriation
PEO	Program Executive Office
PFAR	Preflight Abort Rate, Aircraft Launched/Aircraft Attempted
PM	Program Manager
PMO	Project Management Office
POM	Program Objective Memorandum
RDA	Research, Development, Acquisition
RDT&E	Research, Development, Testing & Evaluation
RGB	Reduction Gear Box
SDC	Sample Data Collection
SDO	Supply Depot Operations
SDT	Second Destination Transportation
SSTS	Sustainment System Technical Support
STS	System Technical Support
TAP	Team Abrams Partnership
TPF	Total Package Fielding
TRADOC	Training and Doctrine Command
UFR	Unfunded Requirements
UIC	Unit Identification Code
USACEAC	US Army Cost and Economic Analysis Center
USAREUR	US Army Europe
VCSA	Vice Chief of Staff, Army