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This is the Airframe Condition Evaluation and Aircraft Analytical Corrosion Evaluation (ACE/AACE) inspection and analysis handbook which was prepared to provide U.S. Army Aviation Systems Command (AVSCOM) managers, commanders of operational units, engineers, team members, and others with a practical reference document of criteria, guidelines, and other information applicable to the ACE/AACE program. The handbook is in three parts: Part I-Management, Part II-Engineering, and Part III-Profiling.

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ACE/AACE INSPECTION AND ANALYSIS HANDBOOK

PART II - ENGINEERING

DEPOT ENGINEERING
AND RCM SUPPORT
OFFICE

CORPUS CHRISTI, TX.

Prepared as a Special Task under the auspices of the
Nondestructive Testing Information Analysis Center
for

U.S. ARMY AVIATION SYSTEMS COMMAND

APRIL 1985

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1.0 INTRODUCTION TO PART II - ENGINEERING

The Airframe Condition Evaluation (ACE)/Aircraft Analytical Corrosion Evaluation (AACE) program is implemented through detailed engineering planning and analysis. The methodology used is a sequential process consisting of the following: indicator selection, condition code determination, indicator ranking, indicator weighting, aircraft profiling, profile index determination, threshold determination, and candidate aircraft identification. Application of this methodology performs the on-condition maintenance action required in AVSCOM Regulation 750-7 for first line/mission essential aircraft in order to maintain an optimum readiness posture and aircraft flight safety level. This second part of the handbook provides specific guidelines for using the ACE/AACE methodology, selecting and revising indicators, analyzing field profiling data, and determining the optimum engineering threshold.

This part is designed to be compatible with the two other parts of this handbook. Part I delineates the various interrelated management aspects of reliability-centered maintenance, on-condition maintenance, and ACE/AACE. Part III delineates the various aspects of implementing the ACE/AACE aircraft profiling examination.

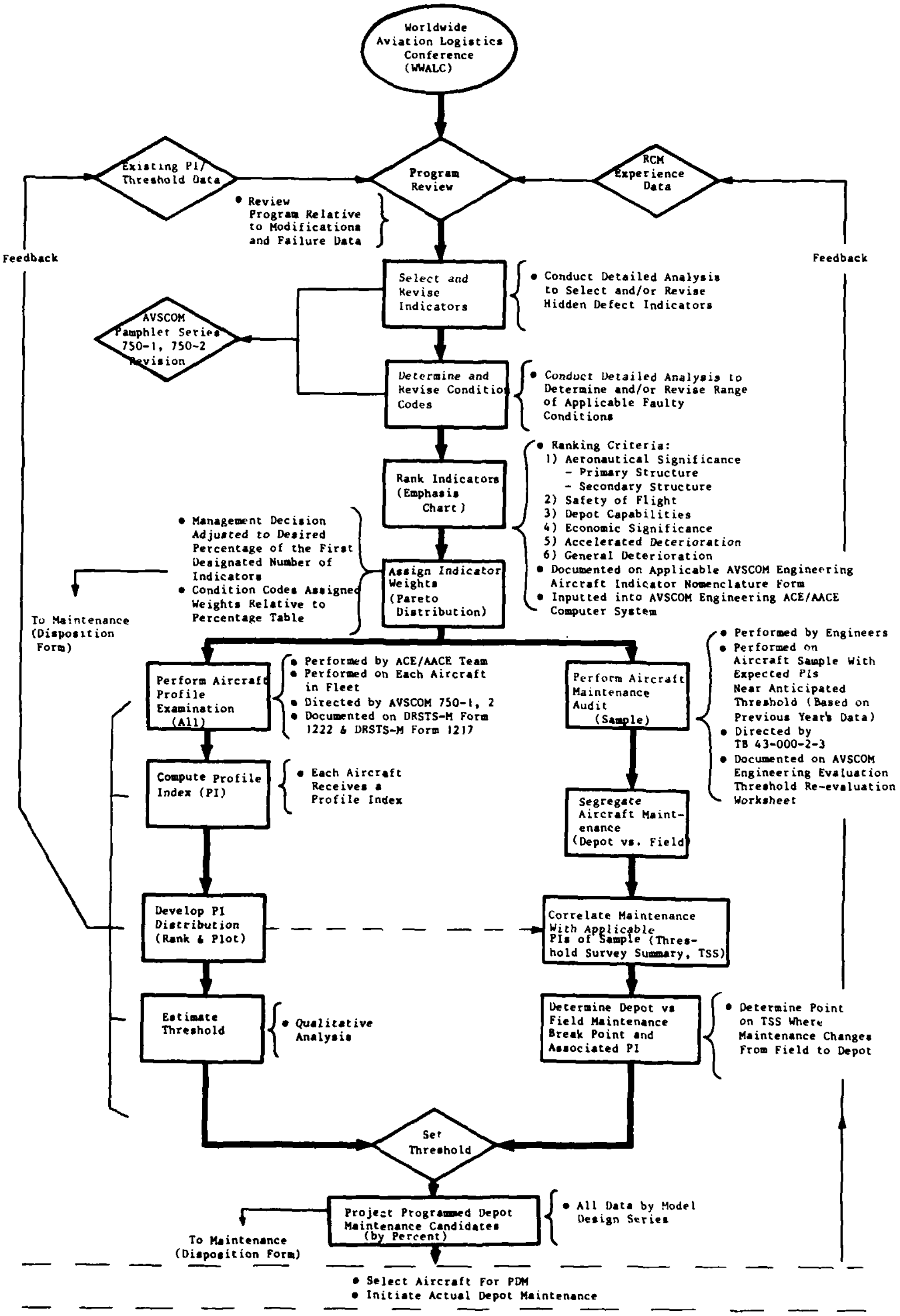


Figure 2-1 ACE/AACE Program Cycle

2.0 ACE/AACE METHODOLOGY

Airframe Condition Evaluation (ACE) is an airframe structure evaluation with emphasis on structural members that are not replaceable at maintenance levels below depot. Aircraft Analytical Corrosion Evaluation (AACE) is a special corrosion inspection pertaining principally to fuselage structural members that are replaceable at the depot and also to dynamic components and component structure (for example, tailboom, vertical fin, and horizontal stabilizer). ACE and AACE are performed in conjunction with each other by a trained ACE/AACE team. The difference between the two is that ACE is considered an evaluation, whereby airframe condition is based on the relative condition of specified indicators, while AACE is considered an inspection, whereby practically all visible surfaces of the aircraft are examined for corrosion relative to predefined condition levels. AACE also addresses dynamic components whereas ACE does not.

ACE/AACE uses a selective list of indicators of structural deterioration for a specific aircraft type and assigns weights, based on criticality, to each indicator. Using this list of indicators, the ACE/AACE team annually profiles every aircraft in the Army fleet using applicable AVSCOM 750-1 and 750-2 Pamphlets. The indicators are noted by their worst condition code (or varying degree of degradation) on worksheets. Completed worksheets are then summarized and sent daily to a main data collection center where the summed weights of the profile are determined to develop a profile index (PI) for each aircraft. The PI is a numerical representation of the condition of an aircraft. Aircraft with a PI exceeding a specified threshold are identified as candidates for depot level maintenance. This process ensures that the aircraft most in need of depot maintainance are removed from the field and sent to the depot.

ACE/AACE is performed through the course of a yearly cycle illustrated in Figure 2-1. The process begins with the Worldwide Aviation Logistics Conference (WWALC) and ends with the selection of aircraft maintenance candidates (and the subsequent initiation of phased depot maintenance) during the following year's WWALC. During the course of the year, the Depot Engineering and RCM Support Office reviews the ACE/AACE program for improvements using readily available data sources to maintain an optimum level of program effectiveness. This includes updating the AVSCOM Pamphlet series 750-1 and 750-2, as necessary.

From Figure 2-1 it is seen that application of the ACE/AACE methodology involves the following eight steps:

STEP 1: Select Indicators
STEP 2: Determine Condition Codes
STEP 3: Rank Indicators
STEP 4: Assign Weights to Indicators
STEP 5: Examine Aircraft (ACE/AACE Team)
STEP 6: Compute Profile Index for Each Aircraft
STEP 7a: Estimate Threshold by Qualitative Analysis
STEP 7b: Set Threshold by Aircraft Maintenance Audit
STEP 8: Identify Candidate Aircraft

Each of these steps is an integral part of ACE/AACE engineering planning and analysis. Application of this methodology and the resulting depot maintenance ensures that aircraft structures remain in good condition and, consequently, are able to fully support mission requirements.

Step One: Select Indicators

Indicators are selected by experienced ACE/AACE engineers who conduct a thorough aircraft analysis to determine the airframe symptoms of distress (i.e., indicators) that are appropriate for profiling. This analysis also considers the impact on structural integrity of not repairing an identified section of airframe deterioration. The number of indicators for a specific aircraft type ranges from 40 to 50. These indicators are annually reviewed and revised, as needed, to reflect current experience and changing depot capability.

The selection of suitable indicators takes into account the following four criteria:

(1) Aeronautical significance,
(2) Depot capability,
(3) Accelerated deterioration, and
(4) General deterioration.

The indicator selection process based on the above criteria is described in Section 3.0.

Step Two: Determine Condition Codes

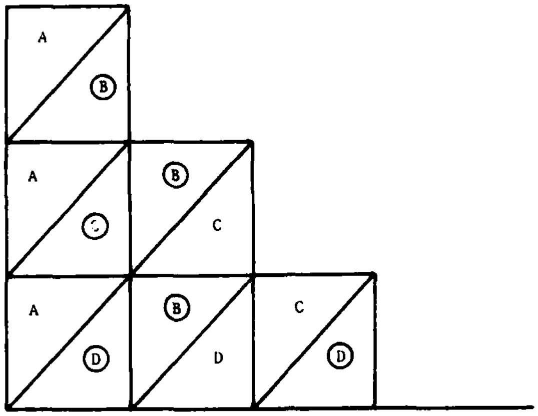
A list of condition codes is developed for each indicator to denote its varying degree of degradation, such as dented, delaminated, and corroded, or good, fair, and poor. The number of condition codes for each indicator varies from 1 to 9. Condition codes are also reviewed and revised, along with the indicators, to reflect current experience factors. The selection and specification of condition codes is done in conjunction with the indicator selection process discussed in Section 3.0.

Step Three: Rank Indicators and Condition Codes

The ranking of indicators is performed by listing each indicator and then comparing it against each of the other indicators involved. This ranking procedure is carried out using an "emphasis chart" (Figure 2-2). The comparison of each indicator against each other indicator is based upon the following criteria:

- Could one of the conditions indicated itself be hazardous or could it progress to become hazardous?
- Could one of the indicators be the cause of customer rejection?
- Which of the indicators better shows accelerated airframe deterioration or consumption of components?
- Which of the indicators better shows fair wear and tear?
- The relative cost of item replacement.

In Figure 2-2, using these criteria, indicator A is compared against indicator B; then, indicator A is compared against indicator C; etc. In each case, the more critical indicator is circled and, when all indicators have been compared, the number of times an indicator has been circled is counted and noted. These numbers reflect the rank or importance of each item in relation to the other indicators with respect to the criteria.



Indicators		Ranking	
A.	Corrosion Protection	1.	Main Lift Beam (Circled 3 times)
B.	Main Lift Beam	2.	Upper Aft Bulkhead (Circled 2 times)
C.	Nose Fuse, Skin	3.	Nose Fuse, Skin (Circled 1 time)
D.	Upper Aft Bulkhead	4.	Corrosion Protection (Not Circled)

Figure 2-2 Emphasis Chart

Step Four: Assign Weights to Indicators

Indicator weights are assigned utilizing Pareto's Principle of Maldistribution. Pareto's concept is that a small portion of the indicators will lead to a large portion of aircraft problems. Figure 2-3 illustrates the Pareto curve and the weight assignment process.

Pareto's distribution is expressed mathematically as a hyperbolic curve of the form $xy = A$ where x is indicator rank, y is A/(indicator rank), and A determines the shape of the curve and how significant the lower ranking indicators are. By proper choice of the constant A, weighting of the indicators can be adjusted to achieve the balance desired. This choice of A is a management decision and it is usually related to the desired weight percentage of the first designated number of indicators. The weight distribution for the indicators is determined by the ratio of the area under the curve in the respective indicator interval to the total area under the curve with truncation at x = number of indicators and y = number of indicators. The sum of all indicator weights is normalized to 1000. The following equation is used to determine the indicator weights:

$$\text{Indicator Weight} = \frac{\text{indicator interval area}}{\text{total truncated area}} \times 1000$$

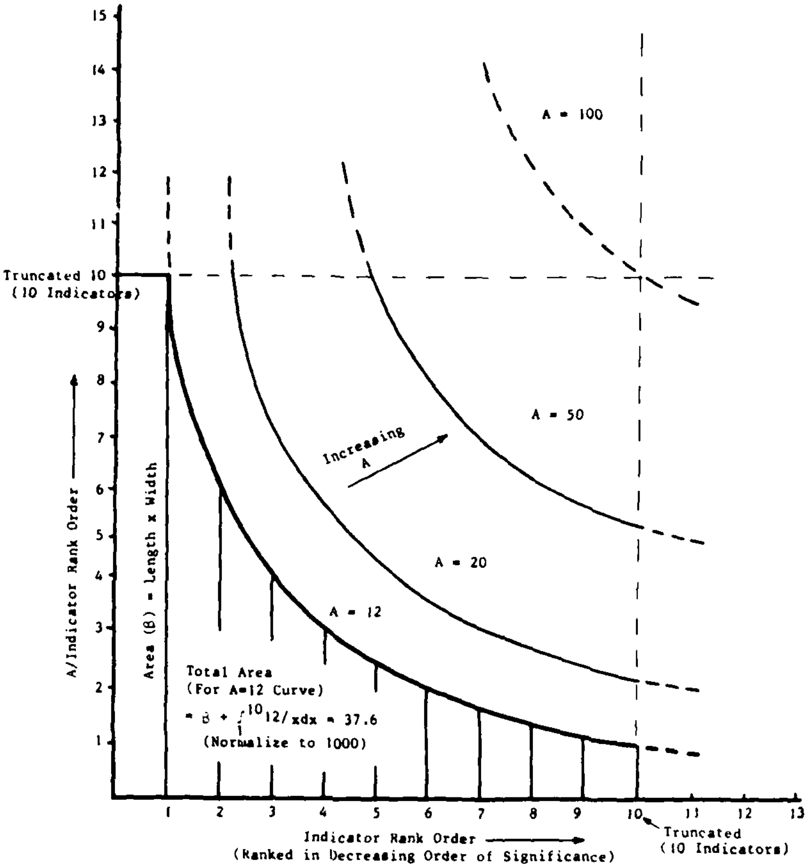


Figure 2-3 Pareto Distribution Curve

From the example illustrated in Figure 2-3 with 10 total indicators, a shape factor, A, of 12, and normalization to 1000:

W_1 = area (β) of indicator with rank order 1 $= 10 \times 1 = 266$

W_2 = area under curve of indicator with rank order 2 $\approx \int_1^2 12/x \, dx = 221$

W_3 = area under curve of indicator with rank order 3 $= \int_2^3 12/x \, dx = 129$

and so on.

The total weight distribution for this example is:

Indicator (Rank Order)	Weight, Wi
1	266
2	221
3	129
4	92
5	71
6	58
7	49
8	43
9	38
10	34

Figure 2-3 also shows that, as the shape factor A increases, the weight distribution becomes more even. When A = (number of indicators)^2, all indicators have the same weight.

The weights established by the Pareto process represents the maximum possible values. If, during examination by the profiling team, an indicator shows the worse condition, then 100% of the indicator weight is applied to PI determination. If the aircraft indicator shows a nonfaulty condition, then 0% of the weight is applied to PI determination. The determination of condition code weights is discussed in Section 4.0.

Step Five: Examine Aircraft (ACE/AACE Team)

Once the indicators have been selected and weights assigned, then each aircraft within the fleet is profiled in accordance with the AVSCOM Pamphlet series 750-1 and 750-2. This profile assigns the applicable condition codes, recording them on ACE/AACE worksheets for subsequent PI computation. This aircraft profiling is performed by a carefully selected, well trained ACE/AACE team. The team members are generally provided by an outside contractor, but trained by AVSCOM ACE/AACE engineers. A training course takes place once a year at the Corpus Christi Army Depot (CCAD) shortly before the team is sent throughout the world to examine the Army aircraft fleet. The current number of trainees is 26; 20 contractor personnel comprise the team and 6 Army personnel remain at CCAD as "in-house" reserve.

The engineering objective of training is to develop a team capable of providing uniform and consistent profiling data. This minimizes profiling discrepancies while achieving an efficient, consistent, and cost-effective profile. The data compiled by the team create a data base whereby optimum management decisions and actions can be derived through engineering analysis. Part III of this handbook describes the ACE/AACE aircraft profiling process and provides guidelines to aid in its conduct.

Step Six: Compute Profile Index for Each Aircraft

The ACE/AACE engineers sum the weights of the indicator condition codes selected for each aircraft to give the profile index (PI) for that aircraft. This PI then is a numerical representation of the condition of the aircraft. Guidelines for computation of PI are given in Section 4.0.

Step Seven: (A) Estimate Threshold by Qualitative Analysis, and (B) Set Threshold by Aircraft Maintenance Audit

To be selected for programmed depot maintenance, an aircraft must surpass a specified threshold PI. Various criteria can be used to establish a threshold, such as safety, mission capability, availability, reliability, economic, and depot capabilities. A threshold can be established such that any desired percentage of the fleet is returned for depot repair. It should be established based on past depot maintenance and field experience data. The threshold is a powerful decision point since it dictates the condition of the entire fleet as well as the amount of money allocated for aircraft depot repair. Section 4.0 further describes threshold establishment.

The engineering threshold determined is then scrutinized by appropriate management personnel and, based on budget limitations, a management threshold PI is established which dictates the aircraft to be actually inducted into the depot. This threshold PI difference between engineering (necessary overhaul) and management (approved overhaul) develops a readiness gap which identifies the aircraft between the two thresholds as being potentially not mission available. Figure 2-4 illustrates the readiness gap on a profile index distribution.

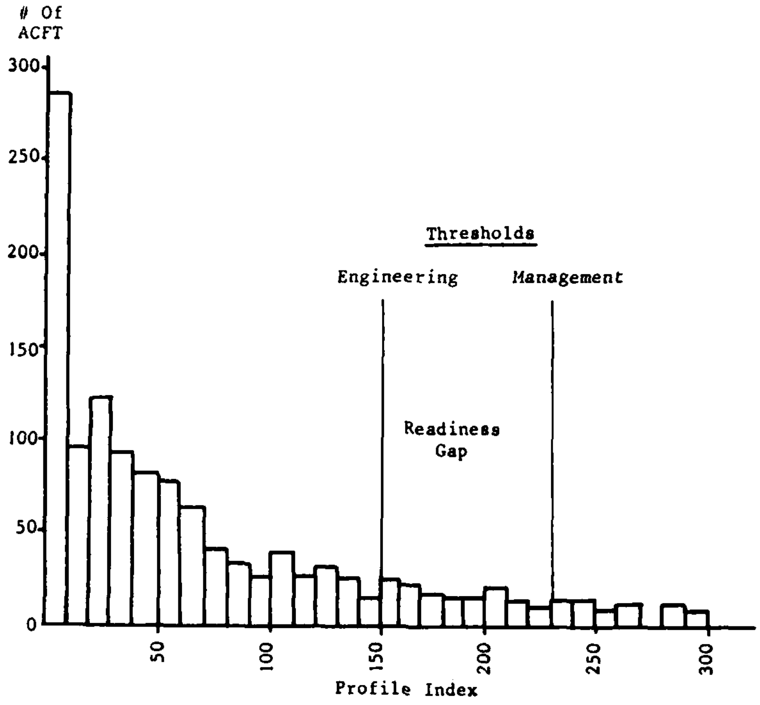


Figure 2-4 Profile Index Distribution and Thresholds

Step Eight: Identify Candidate Aircraft

Aircraft with a PI exceeding the engineering threshold are identified as candidates for depot level maintenance. The actual selection of aircraft for depot repair is made by management (Part I of this handbook).

Interrelationship of ACE/AACE Program Elements

ACE/AACE program elements are interrelated. Changes in one must be carefully considered to determine if a corresponding change is necessary in another. For example, if new indicators are developed, then the current indicator ranking must be reevaluated to correctly reflect the additions. This dictates that the Pareto curve be replotted and the weights recalculated. This further dictates that the applicable PI threshold be reevaluated. Likewise, the addition of condition codes to indicators may warrant threshold reevaluation.

3.0 INDICATOR SELECTION

Indicators are used to provide an accurate projection of airframe condition with minimum disassembly. Aircraft condition indicators are selected through disciplined engineering analysis of aircraft design and historical repair and failure data. This includes interacting with depot line personnel to capture the wealth of information that is derived from actual "hands on" aircraft maintenance experience.

The selection is performed using a five step process based on a set of criteria designed to provide optimum cost effectiveness and aircraft availability. Figure 3-1 illustrates the indicator selection process used by ACE/AACE engineers. Following this process, a set of indicators for a specific type of aircraft is selected and compiled for an airframe in a format suitable for ACE/AACE aircraft profiling. This process is also used to annually review and revise, as needed, the AVSCOM 750-1 and 750-2 Pamphlet series to reflect changes in indicators. Along with updating the current pamphlet series, new pamphlets are developed reflecting indicators selected for aircraft new to the ACE/AACE program.

Selection Criteria

The following criteria are used to guide the selection of indicators:

1. Aeronautical Importance - The criticality of the deficiency to aircraft availability. This includes assessing the impact of the deficiency on:

    a. Safety of Flight
    b. Mission Essentiality
    c. Interchangeability

2. Depot Capability - The need and economic impact of performing maintenance at the depot. This includes:

    a. Man hours and material
    b. Tools
    c. Facilities
    d. Procedures and processes
    e. Expertise
    f. Maintenance Allocation Chart (MAC)
    g. Experience Data

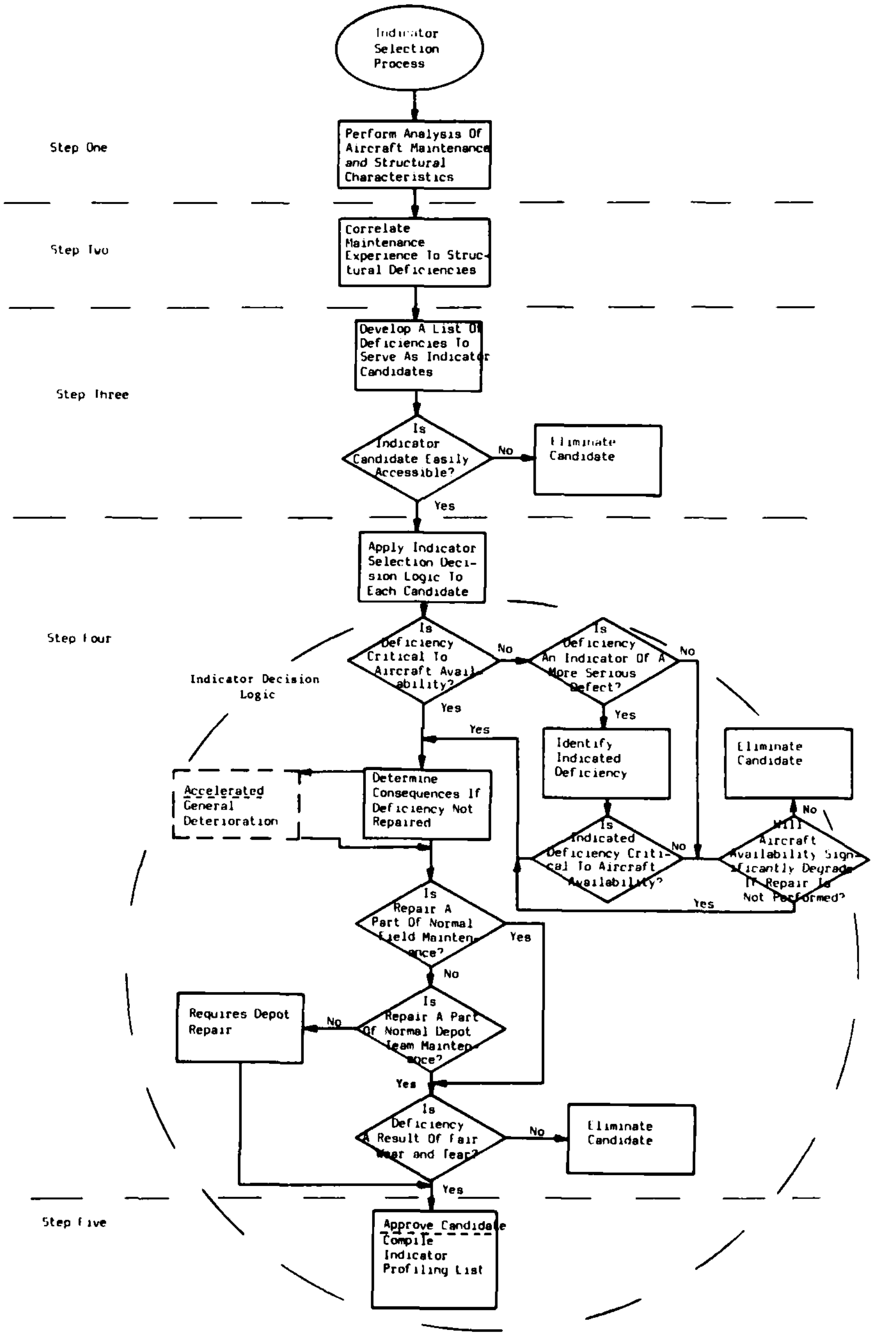


Figure 3-1 Overall Indicator Selection Process

3. Accelerated Deterioration - The increase in deterioration if a needed repair is not performed.

4. General Deterioration - The expected deterioration if aircraft remains in the field until next profile.

Selection Process

The selection of indicators is a systematic process consisting of five steps:

STEP ONE: Aircraft Familiarization - Perform a detailed and thorough analysis of significant aircraft characteristics pertaining to maintenance and structural design. Compile and document information relevant to the selection criteria (as defined previously) and the specific areas delineated below for use in Steps Two, Three, and Four.

Some of the significant maintenance items that should be reviewed include:

1. Interchangeable aircraft points - The basic attach points providing for quick and easy component removal/replacement.

2. Tool controlled aircraft structure - The structural components requiring specialized equipment for inspection, alignment, etc. Repair for these components may require depot attention as the only applicable maintenance level.

3. Aircraft major assembly tools - The specialized equipment needed to perform assembly and disassembly of the basic aircraft. For example, jigs and fixtures used to position parts during their formation of a sheet metal assembly.

4. Aircraft portable alignment tools - Any applicable portable equipment which are used to control parts locations while performing repair by depot teams sent to field units.

5. Aircraft assembly procedures - The general aircraft assembly procedures including any specialized equipment needed to perform such action.

6. Maintenance man hours needed to repair and replace items - The estimation of man hours and costs needed to perform basic repair tasks which frequently arise. The evaluation of costs is done relative to the depot, AVIM, and AVUM.

7. Structural component replacement procedures - The examination of various modular design points (as identified in point one (1) above) and the prescribed action taken by each maintenance level. For example, a component removed from an aircraft at AVUM may need to be sent to AVIM; if AVIM cannot perform needed repair on the component, then the component is sent to the depot for repair or rebuild.

8. Structural component repair procedures - The examination of the various maintenance levels capability to perform a specific repair procedure taking into account skills available, man hours needed, costs, etc.

9. Aircraft Maintenance Allocation Chart (MAC) - The use of MACs to identify maintenance assigned functions for AVUM, AVIM, and the depot based on skills available, time required, and tools and test equipment required and/or available.

10. Maintenance tasks for the three levels of maintenance - The maintenance tasks applicable to each maintenance level are identified in the appropriate technical manual (TM) which is directed towards a specific aircraft system/equipment. A TM normally contains a MAC which delineates the various repair task that can be performed on said system/equipment and the applicable maintenance level.

11. Depot level tools

12. Depot level facilities

13. Depot level procedures and processes

14. Depot level expertise

The identification of various depot capabilities (for points 11-14 above) and specific repair tasks which must be performed at the depot or by a depot team sent to the field unit.

Some of the significant structural and aeronautical items that should be reviewed include:

1. Primary structure and failures - The identification of structure and deficiencies that directly affect alignment of major dynamic components and receive the primary structural loads.

2. Secondary structure and failures - The identification of structure and deficiencies that do not directly affect the alignment of major dynamic components, and yet support the primary structure.

3. Electrical and avionics problems - The evaluation of historically frequent deficiencies.

4. Armament problems - The evaluation of historically frequent deficiencies.

5. Flight envelope - The various flight phases through which the aircraft passes during mission conduct. Phases are start-up and taxi, take-off, ascent, cruise-out, mission, cruise-in, descend, land and taxi, and shut-down for fixed wing aircraft and start-up, hover-out, take-off, climb-out and cruise, mission, cruise-in and descend, landing approach, hover-in, and shut-down for rotary wing aircraft.

6. Corrosion - The various corrosion characteristics plaguing a specific aircraft, including types, direct impact, and geographical influence.

7. Flight hours - The flight time between maintenance actions.

8. Type of design - The various design parameters such as modularity, system size, composite bonding, etc.

The origin and mode of all aeronautical failures should be reviewed in detail. The pie charts presented in Figures 3-2 and 3-3 identify the various aircraft components historically contributing to flight safety incidents and direct maintenance costs. For a specific aircraft, experience data should be examined to highlight various aeronautical failure modes and origin.

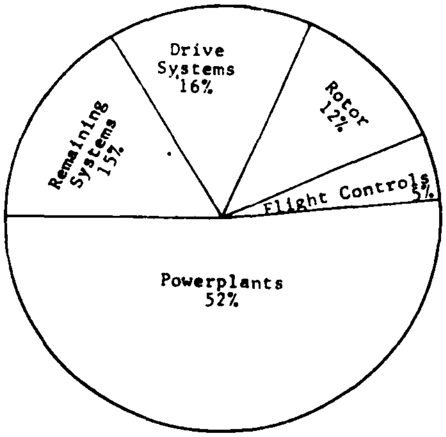


Figure 3-2 Components Contributing to Flight Safety Incidents

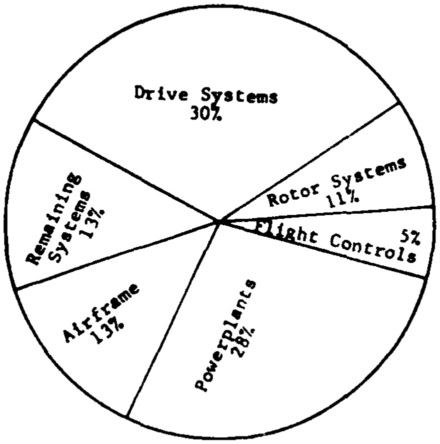


Figure 3-3 Components Contributing to Direct Maintenance Costs

STEP TWO: Maintenance Experience/Structural Deficiency Correlation - Correlate maintenance experience to aircraft locations which may display a deficiency indicative of a potentially more serious hidden structural deficiency. Correlations are made based on the information compiled in Step One.

STEP THREE: Indicator Candidate List Development - Develop a list of indicator candidates based on the aircraft maintenance characteristic/correlation data from Steps One and Two. Review each candidate to determine if they are easily accessible and discernible by a trained ACE/AACE profiler. Those candidates that are not easily accessible and discernible are removed from the list.

STEP FOUR: Indicator Selection Decision Logic Application - Apply the selection decision logic delineated in Figure 3-1 to systematically approve or disapprove each indicator candidate. The information compiled during Steps One and Two are used to help answer the decision logic questions.

STEP FIVE: Aircraft Indicator List Compilation - Approve indicator candidates and compile indicator profiling list.

When selecting new indicators, similar aircraft designs should be addressed, as appropriate, to assist in identifying symptoms of airframe distress. This reduces analysis time and promotes uniform profiling results. Table 3-1 provides examples of various aircraft indicators and what the indicators actually indicate if a deficiency exists at the location. Prudent indicator selection will follow if the process described previously and delineated in Figure 3-1 is systematically followed using accurate and well documentated engineering data.

All information generated during the selection process should be well documented identifying each indicator, the deficiencies to be observed, and what the deficiencies are indicating, i.e., what structural defects may exist elsewhere in the aircraft based on the immediate observable deficiencies. Also, the general characteristic nature of an indicator should be documented to assist in the assignment of condition codes. Condition codes are used to identify the condition of the indicators being evaluated. These codes identify "what can go wrong" and/or "how bad it is" in reference to a specific indicator. This documentation is vital to maintaining a consistent and accurate engineering planning and analysis effort.

Table 3-1 Examples of Indicators and What They Indicate

Aircraft	Indicator	Indication
UH-1	Aft Fuselage Skin, Exhibiting Buckling	• Misalignment of the Longerons that Support the Tailboom • High Local Stresses
	Cargo Door Tracks, Exhibiting Cracking and Excessive Wear	• Excessive Vibration • High Landing Loads • Extreme Helicopter Usage
	Pylon Assembly, Exhibiting Cracking, Buckling, and Looseness	• Repetitive Landing at or Near the Design Limits • The Shaking Response from the Incoming Twice Per Rev Frequency
OH-58	Transmission Support, Exhibiting Cracking and Looseness	• Excessively Hard Landing • Excessive Rotor Vibration
	Center Post Assy, Exhibiting Buckling, Cracking, and Looseness	• Hard Landing • Repeated Landings Exceeding Design Loads Over a Prolonged Period of Time
	Door Posts, Exhibiting Looseness and Cracking	• Degree of Helicopter Service • Possible Twisting of Cabin Structure
	Fuel Cell Exterior Honeycomb, Exhibiting Delamination Deterioration, Puncture, Corrosion and Dents	• Passenger Seat Belts Banging and Cutting into the Honeycomb during Flight with Doors Removed
	Tailcone Structure, Exterior, Exhibiting Looseness, Buckling, and Cracking	• Hard Landing • Repetitive Loads in Excess of Design Parameters
	Tailboom Skin 1st and 2nd Bays, Exhibiting Looseness, Buckling, and Cracking	• Possible Hard Landing
U-21	Nose Landing Gear Attach Fittings Exhibiting Looseness, Cracking, Corrosion, and Scratchings	• *Uneven Loading*
	Formers F.S. 57.5 and F.S. 84.0, Exhibiting Corrosion, Buckling, Looseness, and Cracking	• Hard Landing • High Landing Loads
	Left and Right Main Spar F.S. 160 Exhibiting Corrosion, Buckling, Looseness, and Cracking	• Excessive Reactive Loads from the Main Landing Gear • High Landing Loads • Excessive Engine Vibration
	Engine Firewall, Exhibiting Corrosion, Buckling, Looseness, and Cracking	• Excessive Engine Vibration
OH-6	Cabin Doors, Exhibiting Cracking and Misalignment	• Hard Landing
	Battery Compartment, Exhibiting Corrosion and Looseness	• Battery Spillage • Poor Servicing Techniques
CH-47	The Nose Section, Exhibiting Looseness, Cracking, Improper Hardware, and Buckling	• Severe Structural Vibration
	Center Section, Exhibiting Looseness, Cracking, Buckling and Improper Hardware	• Excessive In-flight Loads • Hard Landing
	Upper Pylon, Exhibiting Looseness, Cracking, Buckling, and Improper Hardware	• Excessive Power Train Loading • Hard Landing • Abnormal Flight Loads • High Landing Loads
	Upper Tunnel, Exhibiting Looseness and Cracking	• Out of Balance Drive Shafting
	Cockpit Transparencies, Exhibiting Various Degrees of Deterioration	• Severity of Helicopter Service

4.0 DETERMINATION OF PROFILING INDEX AND THRESHOLD

The selection of an indicator condition code by the ACE/AACE team dictates the numerical value for that indicator used in formulating the aircraft profile index (PI). The proportion of the indicator weight used in formulating the PI depends on the total number of faulty condition codes for that indicator and the order of severity of the condition. Table 4-1 presents the weight distribution (by percent) associated with condition codes.

Table 4-1 Condition Code Weight Distribution

No. of Faulty Codes	% of Total Indicator Weight for Codes (listed worst to best)					
	First Code	Second Code	Third Code	Fourth Code	Fifth Code	Sixth Code
6	100	50	20	15	10	5
5	100	50	25	15	10	0
4	100	50	30	20	0	0
3	100	60	40	0	0	0
2	100	60	0	0	0	0
1	100	0	0	0	0	0

EXAMPLE: OH-6 Indication - Paint Condition Has Weight of 79

Condition Code	Numerical Value Used in Formulating PI
C - Deteriorated	79 (100% of 79)
K - Poor	47 (60% of 79)
L - Fair	32 (40% of 79)
M - Good	0 (0% of 79)

After the numerical values are set for each indicator by condition code (for a specific aircraft), these values are summed over the entire aircraft to obtain a profile index (PI) value for the aircraft. The PI provides a quantification or numerical ranking of the condition of each aircraft as compared to other aircraft and thereby provides a means to rank the fleet in terms of need of programmed depot maintenance (PDM). For example, an aircraft with a PI of 100 is in greater need of depot repair than one with a PI of 50. It should be recognized that an aircraft with only one major faulty indicator may outrank an an aircraft with several faulty indicators because of the Pareto principle.

With the aircraft ranked by their need for repair, criteria for determining which aircraft are depot candidates are developed. The establishment of a threshold for the induction of aircraft into depot maintenance is a key part of the ACE/AACE program since it determines the operational acceptance level for the airframes of the active fleet. A threshold is expressed in terms of PI and, once an aircraft's PI reaches or exceeds the threshold, it becomes a candidate for depot repair.

In determining the engineering threshold PI, a general trend cut-off point becomes evident through analysis of the aircraft PI distribution. To pinpoint the exact threshold PI, an experienced ACE/AACE engineering team conducts an audit of sample aircraft with PIs expected to be near the anticipated threshold PI (based on previous year's data). These engineers conduct a thorough and detailed examination of the aircraft to provide an approximate overhaul/repair cost of the aircraft and to also determine if needed maintenance must be performed at the depot or if it can be performed at the field unit with or without assistance from a depot team. The worksheets used to perform this examination are given in Appendix C of this handbook part. Once the sample aircraft are segregated by maintenance need, i.e., depot or field, a Threshold Survey Summary (TSS) is developed which correlates the applicable PIs resulting from the ACE/AACE team's profile with the engineering team's maintenance determination. The aircraft are ranked by PI on the TSS and the point at which maintenance changes from field to depot identifies the audit threshold PI. Table 4-2 illustrates this distinct point. These audits should be conducted within thirty (30) days after the ACE/AACE team has profiled the aircraft in order to maintain a valid PI. Upon comparison of the audit and the general trend cut-off point of the PI distribution, a threshold PI can be set which accurately depicts the aircraft most in need of PDM.

Table 4-2 Threshold Survey Summary Threshold PI Determination (UH-1 Example)

Aircraft Serial Number	P.I.	Maint. Level	Aircraft Location
69-15345	192	F	USAREUR
66-16103	197	F	USAREUR
68-16203	210	F	USAREUR
74-22453	213*	F	Ft. Campbell
69-15543	216	D	USAREUR
71-20123	216	D	Korea
71-20041	237	D	Hawaii, 25th
73-22072	237	D	Korea
66-16599	238	D	Hawaii, 25th

*The Audit Threshold PI
F - Field Maintenance
D - Depot Maintenance

Aircraft Threshold PI Cost Considerations

With the current engineering threshold criteria being based primarily on economic and depot requirements, experienced ACE/AACE engineering personnel are able to provide general cost estimates for the depot induction of an aircraft in the ACE/AACE program and ascertain if maintenance expenditure limits are in danger of being exceeded in accordance with TB 43-0002-3. No direct correlation has yet been established between depot induction cost and aircraft PI but efforts are ongoing to develop such a correlation.

The major costs impacting the ACE/AACE program consist of the following:

(1) Transportation - The costs involved in moving an aircraft to and from the depot (for example, from Frankfurt, Germany to the Corpus Christi Army Depot). If aircraft is unflyable, transport aircraft are used (usually the C-5A or C-141).

(2) Overhaul/Repair - The costs involved in performing the needed maintenance (for example, manhours, material, facilities, level of expertise, and processes).

(3) Acquisition - The current cost of acquiring a new aircraft. If cost of repair/overhaul exceeds sixty five percent (65%) of the current acquisition cost, then aircraft disposition is recommended.

APPENDIX A

ARMY AIRCRAFT LOGBOOK LIST

This appendix contains a listing of various forms used within Army aviation having information and data appropriate for use in the planning and analysis of the ACE/AACE program; specifically, in the selection of indicators. This appendix is also included in Part III - Profiling.

Army Aircraft Logbook Forms

Form number	Title	Use	Disposition
DA Form 2408	Equipment Log Assembly (Records)	Gives a reference to symbols used in logbook.	Remains in front of logbook.
DA Form 2408-4	Weapon Record Data	To provide a continuous record of firings and component replacements on armament system and subsystem(s). Maintained in the aircraft logbook on which the armament is mounted.	Form attached to weapon when evacuated or stored. Form destroyed and new one initiated upon overhaul or rebuild of weapon. Form filed, data transferred to new form. Filled form retained 90 days or until new form is filled, whichever occurs first, then destroyed.
DA Form 2408-5	Equipment Modification Record	To record data about modification on assemblies or components.	In logbook for equipment on which assembly is installed. Accompanies assembly when it is removed and placed on another end item.
DA Form 2408-9	Equipment Control Record	To provide initial basic equipment acceptance and identification information. Also provides means for updating information on ownership, location, usage, transfers, gains, losses, overhaul and rebuild, and disposition.	Disposition varies in accordance with form use. Instructions contained in TM 38-750 and TM 38-760-1.
DA Form 2408-12	Army Aviator's Flight Record	To record aircraft time and mission, and to record duty and type of flight performed by the aviator and crew.	Sent to the operations office at the end of each day. Destroyed after 3 months.
DA Form 2408-13	Aircraft Inspection and Maintenance Record	To record aircraft faults and action taken to correct them; to show flying hours, maintenance performed, and when inspections become due.	Sent at the end of each day to the aircraft maintenance office of the activity maintaining the aircraft. Destroyed after 6 months.
DA Form 2408-14	Uncorrected Fault Record	To list uncorrected faults on aircraft, including overdue replacement of components.	Destroyed 6 months after date of last entry.
DA Form 2408-15	Historical Record for Aircraft	To record historical data about an aircraft.	Permanent record in logbook, accompanies aircraft on transfer.
DA Form 2408-16	Aircraft Component Historical Record	To record historical data about aircraft components.	Permanent record in aircraft logbook; accompanies component on transfer.
DA Form 2408-17	Aircraft Inventory Record	Lists all property assigned to an aircraft, used to record periodic inventories of property.	A permanent part of the aircraft logbook.
DA Form 2408-18	Equipment Inspection List	To record most inspections on aircraft and components; provides record of component replacement.	Permanent record in logbook; accompanies aircraft on transfer.
DA Form 2408-19	Aircraft Engine Turbine Wheel Historical Record	To determine whether the turbine wheel can be overhauled or not and which of its parts should be replaced.	Retained with the turbine wheel throughout its service life.

APPENDIX B

AIRCRAFT AUDIT WORKSHEETS

This appendix contains the worksheets used by the ACE/AACE engineers during the sample aircraft audit performed to assist in setting the engineering threshold.

Example

ENGINEERING EVALUATION
OH-58A/C
THRESHOLD RE-EVALUATION

DATE: ____________________ A/C SERIAL NO: ____________________

LOCATION: ____________________ DATE LAST ACE: ____________________

CORROSION TOTAL

1. ______ ______ estimate of hours (ref TB 43-0002-3 dtd 18 Dec 80), subject: Maintenance (OH-58A-800 M/Hrs, OH-58C-1000 M/Hrs) expenditure limits for Army aircraft.

2.* ______ ______ maintenance allocation chart * if depot mark M/Hrs to repair, aero severity and item.

______ ______

______ ______

______ ______

3.** ______ ______ item requires depot ____________________

______ ______ item requires depot ____________________

______ ______ item requires depot ____________________

______ ______ item requires depot ____________________

______ ______ item requires depot ____________________

______ ______ item requires depot ____________________

** Fill in item needing depot maintenance. Then depot requirement (i.e., tools, facilities equipment, expertise and processes).

Recommendation: D F

(circle one)
D-for depot overhaul
F-for field repair

Profile Index No. ______________

____
Engineering Evaluator
AVSCOM Aircraft Engineering Assessment Team

DATE ____________________ LOCATION ____________________________

==========================

AIRCRAFT TYPE ____________

==========================

AIRCRAFT S/N _____________________ P.I. NO. _________

ESTIMATED M/Hs
REQUIRED

PHASE NO. ______ PHASE DUE ___________ _________

AIRCRAFT TIME ___________

TIME REMAINING ___________

MWOs REQUIRED

1. ____ _________
2. ____ _________
3. ____ _________
4. ____ _________
5. ____ _________
6. ____ _________
7. ____ _________

TBO ITEMS

1. ____ _________
2. ____ _________
3. ____ _________
4. ____ _________
5. ____ _________
6. ____ _________
7. ____ _________
8. ____ _________
9. ____ _________
10. ____ _________

TOTAL M/Hs _________

THRESHOLD ANALYSIS

WORK SHEET

MODEL ______________________ LOCATION ______________

AIRCRAFT SERIAL NO. ______________ UNIT ______________

ACE/AACE DATE ________ P.I.# ________ DATE ______________

Man/Hours Corrosion/Total

1. Man/hour Backlog
   - a. AVUM Airacraft Repair ______ ______
   - b. AVIM Airacraft Repair ______ ______
   - c. Depot Aircraft Repair ______ ______
   - d. Modification Work Order Incorporation ______ ______
   - e. Phase Maintenance Inspection ______ ______
   - f. Paint ______ ______
2. Maintenance Allocation Chart (MAC) Items
   - a. AVUM Aircraft Replace ______ ______
   - b. AVIM Aircraft Replace ______ ______
   - c. Depot Aircraft Replace ______ ______
3. Aircraft Requires the Following for Repair or Replace
   - a. Depot Tools ______ ______
   - b. Depot Facilities ______ ______
   - c. Depot Equipment ______ ______
   - d. Depot Expertise ______ ______
   - e. Depot Processes ______ ______
   - f. Depot Engineering ______ ______
4. Shipping
   - a. Flight Hrs to Depot ______ ______
   - b. Man/hours for Preparation ______ ______
   - c. Replacement Impact ______ ______
5. Observations

____
ENGINEERING EVALUATOR
(CCM)(ACE)(AACE)

NOTE: Repair and Repairables

	MAN-HOURS CORROSION /	TOTAL
1. Structures:		
a. Tail number portion (hard points, sheet metal, panels).		
b. Structure accessories (tailboom, pylon wings, stabilizers, etc.).		
c. Doors, cowling, skids, or landing gear and tires.		
d. Transparencies.		
2. Electrical:		
a. Wire bundles (insulating heating and deterioration).		
b. Connectors, racks, terminals (corrosion).		
c. Avionics (malfunction).		
d. Electro-mechanical components (malfunction, corrosion).		
3. Hydraulics:		
a. Components (corrosion).		
b. Lines and tubing (defective and leaks).		
c. Systems (contaminated).		
4. Flight Controls:		
a. Main or Fwd Rotor -		
(1) in fuselage (wear/corrosion).		
(2) exterior (corrosion/wear).		
b. Tail or Aft Rotor -		
(1) in fuselage (wear).		
(2) in tail boom (wear).		
(3) exterior (corrosion).		
5. Fuel:		
a. Lines and tubing (defective and leaking).		
b. System (contamination or mal-function).		
c. Fuel cells (leaking and deterioration).		

Man-Hours
Corrosion/Total

6. Powertrain:

a. Rotor head and blades or propellers (corrosion, separation) ________ ________

b. Main transmission and mast (time, defects). ________ ________

c. Short shaft, tail rotor drive shaft or shafting and hangar brackets. ________ ________

d. 42 Degree and 90 Degree Gear Boxes, OR Foward and APt, Engine and Combiner transmissions (time, defects). ________ ________

e. Alignment (unusual wear, buckling). ________ ________

7. Armament and Furnishings:

a. Interior (soundproofing blankets, seats). ________ ________

b. Mechanical and electrical interfaces. ________ ________

c. Alignment (unusual wear). ________ ________

8. Engine: (Single or Right and Left)

a. Time (replace). ________ ________

b. Performance (reduce power, heating, etc.). ________ ________

c. Corrosion (exterior). ________ ________

d. Mounts (structural defects). ________ ________

9. Paint:

a. Paint coverage complete. Few cracks on paint or river heads-----GOOD. (Touch up). ________ ________

b. General cracking of paint on river heads. Most river heads still covered. Flat surfaces nearly completely covered-----FAIR. (Touch up). ________ ________

c. Most river heads partly bare. Some chipping of paint on approximately 1/3 of exterior surface. Paint checkered on flat surfaces on 1/3 of exterior-----POOR. (Strip/Repaint). ________ ________

d. More than 1/3 of exterior exhibits chipping of paint. Most rivet heads bare. Paint oxidized with a whitish coat to it. Extensive cracking-----DETERIORATED. (Strip/Repaint). ________ ________

10. Instruments:

a. Component (Malfunction) ________ ________

b. Panel ________ ________

c. Interior Lights ________ ________

APPENDIX C

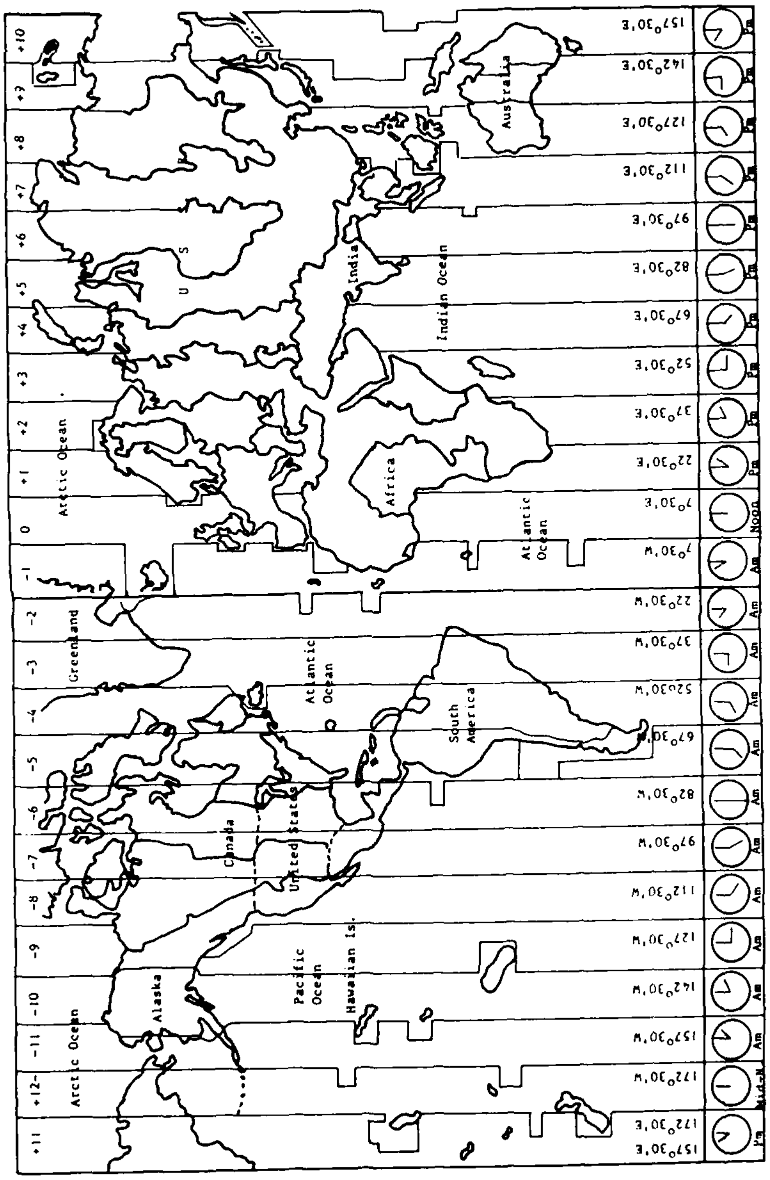
WORLD TRAVELER DATA

This appendix contains selected data to assist in the travel required for ACE/AACE. This appendix is also included in Part III - Profiling.

Included are:

- World Time Zone Map
- World Monetary Systems List
- Unit Conversion Tables
- World Army Aircraft Deployment Matrix

World Time Zones



Monetary Systems

COUNTRY	MONETARY UNIT	COUNTRY	MONETARY UNIT
Afghanistan	Afghani	Laos	New Kip
Albania	Lek	Lebanon	Pound
Algeria	Dinar	Lesotho	Loti
Argentina	New Peso	Liberia	Dollar
Australia	Dollar	Libya	Dinar
Austria	Schilling	Liechtenstein	Franc
Bahamas	Dollar	Luxembourg	Franc
Bahrain	Dinar	Madagascar	Franc
Bangladesh	Taka	Malawi	Kwacha
Barbados	Dollar	Malaysia	Ringgit
Belgium	Franc	Maldives	Rupee
Belize	Dollar	Mali	Franc
Benin	CFA Franc	Malta	Pound
Bermuda	Dollar	Mauritania	Ouguiya
Bolivia	Peso	Mauritius	Rupee
Botswana	Pula	Mexico	Peso
Brazil	Cruzeiro	Monaco	Franc
Bulgaria	Lev	Mongolia	Tugrik
Burma	Kyat	Morocco	Dirham
Burundi	Franc	Mozambique	Metical
Cameroon	CFA Franc	Nepal	Rupee
Canada	Dollar	Netherlands	Guilder
Central African Emp.	CFA Franc	New Zealand	Dollar
Chad	CFA Franc	Nicaragua	Cordoba
Chile	Peso	Niger	CFA Franc
China	Yuan	Nigeria	Naira
Colombia	Peso	Norway	Krone
Congo	CFA Franc	Oman	Rial
Costa Rica	Colon	Pakistan	Rupee
Cuba	Peso	Panama	Balboa
Cyprus	Pound	Paraguay	Guarani
Czechoslovakia	Koruna	Peru	Sol
Denmark	Krone	Philippines	Peso
Dominican Rep.	Peso	Poland	Zloty
Ecuador	Sucre	Portugal	Escudo
Egypt	Pound	Qatar	Riyal
El Salvador	Colon	Rumania	Leu
Equat. Guinea	Ekuele	Rwanda	Franc
Ethiopia	Birr	Saudi Arabia	Riyal
Fiji	Dollar	Senegal	CFA Franc
Finland	Markka	*Sierra Leone*	*Leone*
France	Franc	Singapore	Dollar
Gabon	CFA Franc	Somalia	Shilling
Gambia	Dalasi	South Africa	Rand
Germany, East	D-Mark	Spain	Peseta
Germany, West	D-Mark	Sri Lanka	Rupee
Ghana	Cedi	Sudan	Pound
Greece	Drachma	Swaziland	Lilangeni
Grenada	Dollar	Sweden	Krona
Guatemala	Quetzal	Switzerland	Franc
Guinea	Syli	Syria	Pound
Guinea-Bissau	Escudo	Taiwan	Dollar
Guyana	Dollar	Tanzania	Shilling
Haiti	Gourde	Thailand	Baht
Honduras	Lempira	Togo	CFA Franc
Hong Kong	Dollar	Trinidad and Tobago	Dollar
Hungary	Forint	Tunisia	Diner
Iceland	Krona	Turkey	Lira
India	Rupee	Uganda	Shilling
Indonesia	Rupiah	United Arab Emirates	Dirham
Iran	Rial	United Kingdom	Pound
Iraq	Dinar	United States	Dollar
Ireland	Pound	Upper Volta	CFA France
Israel	Shekel	Uruguay	Peso
Italy	Lira	USSR	Ruble
Ivory Coast	CFA Franc	Venezuela	Bolivar
Jamaica	Dollar	Vietnam	Dong
Japan	Yen	Western Samoa	Tala
Jordan	Dinar	Yemen	Dinar
Kampuchea	Riel	Yemen, Dem.	Dinar
Kenya	Shilling	Yugoslavia	Dinar
Korea, North	Won	Zaire	Zaire
Korea, South	Won	Zambia	Kwacha
Kuwait	Dinar	Zimbabwe	Dollar

Standard Conversion Tables

U.S. English Units to SI Units

TO CONVERT FROM	TO	MULTIPLY BY
(Acceleration)		
foot/second^2 (ft/s^2)	meter/second^2 (m/s^2)	3.048×10^{-1}*
inch/second^2 (in/s^2)	meter/second^2 (m/s^2)	2.54×10^{-2}*
(Area)		
foot^2 (ft^2)	meter^2 (m^2)	9.2903×10^{-2}
inch^2 (in^2)	meter^2 (m^2)	6.4516×10^{-4}*
yard^2 (yd^2)	meter^2 (m^2)	8.3613×10^{-1}
(Density)		
pound mass/inch^3 (lbm/in^3)	kilogram/meter^3 (kg/m^3)	2.7680×10^{4}
pound mass/foot^3 (lbm/ft^3)	kilogram/meter^3 (kg/m^3)	1.6018×10
(Energy, Work)		
British thermal unit (Btu)	joule (J)	1.0544×10^{3}
foot-pound force (ft · lbf)	joule (J)	1.3558
kilowatt-hour (kw · h)	joule (J)	3.60×10^{6}*
(Force)		
kip (1000 lbf)	newton (N)	4.4482×10^{3}
pound force (lbf)	newton (N)	4.4482
ounce force	newton (N)	2.7801×10^{-1}
(Length)		
foot (ft)	meter (m)	3.048×10^{-1}*
inch (in)	meter (m)	2.54×10^{-2}*
mile (mi), (U S statute)	meter (m)	1.6093×10^{3}
mile (mi), (international nautical)	meter (m)	1.852×10^{3}*
yard (yd)	meter (m)	9.144×10^{-1}*
(Mass)		
pound mass (lbm)	kilogram (kg)	4.5359×10^{-1}
slug (lbf · s^2/ft)	kilogram (kg)	1.4594×10
ton (2000 lbm)	kilogram (kg)	9.0718×10^{2}
(Power)		
foot-pound/minute (ft · lbf/min)	watt (W)	2.2597×10^{-2}
horsepower (550 ft · lbf/s)	watt (W)	7.4570×10^{2}
(Pressure, stress)		
atmosphere (std) (14.7 lbf/in.^{2})	newton/meter^2 (N/m^2 or Pa)	1.0133×10^{5}
pound/foot^2 (lbf/ft^2)	newton/meter^2 (N/m^2 or Pa)	4.7880×10
pound/inch^2 (lbf/in^2 or psi)	newton/meter^2 (N/m^2 or Pa)	6.8948×10^{3}
(Velocity)		
foot/minute (ft/min)	meter/second (m/s)	5.08×10^{-3}*
foot/second (ft/s)	meter/second (m/s)	3.048×10^{-1}*
knot (nautical mi/h)	meter/second (m/s)	5.1444×10^{-1}
mile/hour (mi/h)	meter/second (m/s)	4.4704×10^{-1}*
mile/hour (mi/h)	kilometer/hour (km/h)	1.6093
mile/second (mi/s)	kilometer/second (km/s)	1.6093
(Viscosity)		
foot^2/second (ft^2/s)	meter^2/second (m^2/s)	9.2903×10^{-2}
pound-mass/foot-second (lb$_m$/ft · s)	pascal-second (Pa · s)	1.4882
pound-force-second/foot^2 (lb$_f$ · s/ft^2)	pascal-second (Pa · s)	4.788×10

* Exact value

UNITS OF TEMPERATURE

TO CONVERT FROM	TO	MULTIPLY BY
(Fahrenheit)	$^{\circ}F = (9/5)\ ^{\circ}C + 32$	
(Celcius)	$^{\circ}C = (5/9)\ (^{\circ}F - 32)$	
(Kelvin)	$^{\circ}K = ^{\circ}C + 273.16$	
(Rankine)	$^{\circ}R = ^{\circ}F + 459.69$	

UNITS OF TORQUE

lb. in.	gram cm.	1152.128
lb. ft.	gram cm.	13.826
lb. ft.	kp meter	0.1383
oz. in.	gram cm.	72.008
oz. in.	lb. ft.	0.005208

FRACTION AND DECIMAL EQUIVALENTS

1/64	.015625
1/32	.03125
3/64	.046875
1/16	.0625
5/64	.078125
3/32	.09375
7/64	.109375
1/8	.125
9/64	.140625
5/32	.15625
11/64	.171875
3/16	.1875
13/64	.203125
7/32	.21875
15/64	.234375
1/4	.25
17/64	.265625
9/32	.28125
19/64	.296875
5/16	.3125
21/64	.328125
11/32	.34375
23/64	.359375
3/8	.375
25/64	.390625
13/32	.40625
27/64	.421875
7/16	.4375
29/64	.453125
15/32	.46875
31/64	.484375
1/2	.5
33/64	.515625
17/32	.53125
35/64	.546875
9/16	.5625
37/64	.578125
19/32	.59375
39/64	.609375
5/8	.625
41/64	.640625
21/32	.65625
43/64	.671875
11/16	.6875
45/64	.703125
23/32	.71875
47/64	.734375
3/4	.75
49/64	.765625
25/32	.78125
51/64	.796875
13/16	.8125
53/64	.828125
27/32	.84375
55/64	.859375
7/8	.875
57/64	.890625
29/32	.90625
59/64	.921875
15/16	.9375
61/64	.953125
31/32	.96875
63/64	.984375
1	1.

SI Units and Symbols

BASE UNITS

QUANTITY	UNIT	SI SYMBOL	FORMULA
length	meter	m	...
mass	kilogram	kg	...
time	second	s	...
electric current	ampere	A	...
thermodynamic temperature	kelvin	K	...
amount of substance	mole	mol	...
luminous intensity	candela	cd	...

SUPPLEMENTARY UNITS:

QUANTITY	UNIT	SI SYMBOL	FORMULA
plane angle	radian	rad	...
solid angle	steradian	sr	...

DERIVED UNITS:

QUANTITY	UNIT	SI SYMBOL	FORMULA
acceleration	meter per second squared	...	m/s^2
angular acceleration	*radian per second* squared	...	rad/s^2
angular velocity	radian per second	...	rad/s
area	square *meter*	...	m^2
density	kilogram per cubic meter	...	kg/m^3
electric potential difference	*volt*	V	W/A
electric resistance	ohm	Ω	V/A
energy	*joule*	J	$N \cdot m$
entropy	joule per kelvin	...	J/K
force	*newton*	N	$kg \cdot m/s^2$
frequency	hertz	Hz	$1/s$
magnetomotive *force*	ampere	A	...
power	watt	W	J/s
pressure	pascal	Pa	N/m^2
quantity of electricity	coulomb	C	$A \cdot s$
quantity *of heat*	*joule*	J	$N \cdot m$
radiant intensity	watt per steradian	...	W/sr
specific *heat*	joule *per kilogram*-kelvin	...	$J/kg \cdot K$
stress	pascal	Pa	N/m^2
thermal conductivity	watt per meter-kelvin	...	$W/m \cdot K$
velocity	meter per second	...	m/s
viscosity, dynamic	pascal-second	...	$Pa \cdot s$
viscosity, kinematic	square meter per second	...	m^2/s
volume	cubic *meter*	...	m^3
work	joule	J	$N \cdot m$

SI PREFIXES

MULTIPLICATION FACTORS	PREFIX	SI SYMBOL
$1\ 000\ 000\ 000\ 000 = 10^{12}$	tera	T
$1\ 000\ 000\ 000 = 10^{9}$	giga	G
$1\ 000\ 000 = 10^{6}$	mega	M
$1\ 000 = 10^{3}$	kilo	k
$100 = 10^{2}$	hecto	h
$10 = 10^{1}$	deka	da
$0.1 = 10^{-1}$	deci	d
$0.01 = 10^{-2}$	centi	c
$0.001 = 10^{-3}$	milli	m
$0.000\ 001 = 10^{-6}$	micro	μ
$0.000\ 000\ 001 = 10^{-9}$	nano	n
$0.000\ 000\ 000\ 001 = 10^{-12}$	pico	p
$0.000\ 000\ 000\ 000\ 001 = 10^{-15}$	femto	f
$0.000\ 000\ 000\ 000\ 000\ 001 = 10^{-18}$	atto	a

Army Aircraft Deployment

Location Aircraft	A/TH-1G	AH-1S	AH-64A	CH-47A	CH-47B	CH-47C	CH-47D	CH-54A	CH-54B	OH-58A	OH-58B	OH-58C	OH-6A	OV-6A	OV-1C	OV-1D	RV-1D	U-21A	U-21F	U-21G	RU-21A	RU-21B	RU-21C	RU-21H	UH-1B	UH-1C	UH-1H	UH-1M	UH-1V	UH-60A	Total
UNITED STATES																															
ALABAMA		66					15					73				6		7									333		8	17	525
Ft. Rucker													6														19				25
Montgomery												3															7				10
St. Clair Co. Airport												3						3													6
Anniston Calhoun Co.									10				8														13				31
Birmingham Muni Airport	4																							2			6	1			13
Redstone AAF													2														12				14
Bates Field																															
ALASKA		9		16				4		26																	79		6		140
Alaska																															
ARIZONA		8										12															26	13			59
Papago AAF												4				11		1									10				26
Libby AAF		1																1									8				10
Laguna AAF																															
ARKANSAS											13																27		6		46
Camp Robinson AAF																											7				7
Adams Field																															
CALIFORNIA							3					31						1									59	9			90
Los Alamitos AFRC		45										55						2									70				172
Fritzsche AAF		1					2					1			3			1									6				14
Edwards AFB												3															2				3
Fresno Airport																1															1
Fresno Airport																		1									7		5		13
Hamilton AFB				15								7															4				26
Stockton Metro Airport												2															13		14		29
Mather AFB																											3				3
Amedde AAF																		1									8		6		15
Dagget Airport																															
COLORADO		26				10						37						1									36				110
Butts AAF																		1													1
Buckley ANGB	1	7											18														5	9			40
Buckley ANGB																															

Army Aircraft Deployment (Cont'd)

Location Aircraft	A/TH-1C	AH-1S	AH-64A	CH-47A	CH-47B	CH-47C	CH-47D	CH-54A	CH-54B	OH-58A	OH-58B	OH-58C	OH-6A	OV-6A	OV-1C	OV-1D	RV-1D	U-21A	U-21F	U-21G	RU-21A	RU-21B	RU-21C	RU-21H	UH-1B	UH-1C	UH-1H	UH-1M	UH-1V	UH-60A	Total
CONNECTICUT																															
Groton/New London Airport																											2				2
Bradley Intl. Airport									10																		24				34
DELAWARE																															
Greater Wilminton Airport														3													26				29
FLORIDA																															
Craig Field Municipal Airport	2	13											23						1								29	6			74
Orlando Jetpt																			11								6				17
McDill AFB																					2						4				6
Opalocka Airport																											1		5		6
GEORGIA																															
Bush Field																			1								2				3
Winder-Barrow																14															14
Dobbins AFB													3			14											4				21
Charlie Brown Airport																			4								4				8
Hunter AAF & Ft. Stewart		30		16				10					40			12			10								31			16	165
Lawson AAF Ft. Benning													8						1								15		26	6	56
HAWAII																															
Hawaii		51					16			60									1								70		6		237
IDAHO																															
Boise Muni Airport										14									1								18	12			45
ILLINOIS																															
Decatur Airport										10																	14				24
Midway Airport										8																	16				24
Clenview NAS										4																	34				38
Glenview NAS																			1								3				4
Scott ARB																											26				26
Parks Bi-State Airport																											6				8
INDIANA																															
Shelby Co. Airport										32																	17				49
Indianapolis Intl. Airport																			1								2				3
IOWA																															
Davenport Muni Airport																											21				21
Waterloo Muni Airport										10																	7	8			25

Army Aircraft Deployment (Cont'd)

Location / Aircraft	A/TH-1G	AH-1S	AH-64A	CH-47A	CH-47B	CH-47C	CH-47D	CH-54A	CH-54B	OH-58A	OH-58B	OH-58C	OH-6A	OV-6A	OV-1C	OV-1D	RV-1D	U-21A	U-21F	U-21G	RU-21A	RU-21B	RU-21C	KU-21H	UH-1B	UH-1C	UH-1H	UH-1M	UH-1V	UH-60A	Total
IOWA CONT'D																															
Boone Airport										4																	7				25
Des Moines Muni Airport										4																	5				9
Marshall AAF		30								37								1									50		6		124
Industrial Airport				13																							1				14
Forbes AFB								10		6																	9				25
KENTUCKY																															
Capital City Airport										6																	31			2	39
Goodman AAF										6								3									13				22
Campbell AAF		90					54			30		66	26					1									58			131	456
Bowman Field																											7				7
LOUISIANA																															
Lakefront Airport										12																	19				31
Acadiana Regional Airport																											11				11
Polk AAF		9								20								2									23		6		60
MAINE																															
Bangor Intl. Airport										3																	29				32
MARYLAND																															
Phillips AAF																		1									5				6
Weide AAF		7																1									11	10		22	51
Tipton AAF				6	4					15																	14				39
Hagerstown Muni Airport										4																	6				10
MASSACHUSETTS																															
Moore AAF										13								2									19				34
Otis ANGB																											12			24	36
Westover AFB																											8			5	13
MICHIGAN																															
Abrams Muni Airport										18								1									34	9			62
Selfridge ANGB																											5				5
Oakland Pontiac Airport																											1				1
MINNESOTA																															
Downtown Airport										24								1									12				37
Downtown Airport										11																	12				23

Army Aircraft Deployment (Cont'd)

Location Aircraft	A/TH-1G	AH-1S	AH-64A	CH-47A	CH-47B	CH-47C	CH-47D	CH-54A	CH-54B	OH-58A	OH-58B	OH-58C	OH-6A	OV-6A	OV-1C	OV-1D	RV-1D	U-21A	U-21F	U-21G	RU-21A	RU-21B	RU-21C	RU-21H	UH-1B	UH-1C	UH-1H	UH-1M	UH-1V	UH-60A	Total
MISSISSIPPI																															
Key Field									10																		1				11
Hawkins Field														17													11				28
Vicksburg Muni Airport											3																2				5
Gulfport Muni Airport													1														3				4
CD Lemmons Muni Airport													13														14				27
MISSOURI																															
Forney AAF										1								2									3				6
Springfield Muni Airport																															---
Springfield Muni Airport																											6				6
Memorial Airport										3																	16				19
Whiteman AFB	1	5								12																	3	11			32
MONTANA																															
Helena Muni Airport										14																	19	9			42
NEBRASKA																															
Lincoln Airport										7																	27				34
NEVADA																															
Reno-Stead Airport								5																			7				12
NEW HAMPSHIRE																															
Concord Muni Airport										6																	7		1		14
NEW JERSEY																															
Morristown Muni Airport																								1			2	1			6
Picatinny Arsenal Heliport														10													7	9			26
Mercer Co. Airport														22													11				33
McGuire AFB																			2								3				5
Lakehurst NAS		1								1		1	2				1	1						1			12			1	21
Lakehurst NAS																											1				1
NEW MEXICO																															
Santa Fe Muni Airport										2																	8				10
Holloman AFB										10								2									7				19
NEW YORK																															
Niagara Falls Muni Airport														3													27				30
Hancock Field										5																	6				11
Albany Co. Airport													12														4				16
Stewart Airport										5								1									11				14

Army Aircraft Deployment (Cont'd)

Aircraft Location	A/TH-1G	AH-1S	AH-64A	CH-47A	CH-47B	CH-47C	CH-47D	CH-54A	CH-54B	OH-58A	OH-58B	OH-58C	OH-6A	OV-6A	OV-1C	OV-1D	RV-1D	U-21A	U-21F	U-21G	RU-21A	RU-21B	RU-21C	RU-21H	UH-1B	UH-1C	UH-1H	UH-1M	UH-1V	UH-60A	Total
NEW YORK CONT'D																															
Long Island McArthur Airport Hgr A													34														16				50
Wheeler-Sack AAF																											2				2
Seneca AAF																											2				2
NORTH CAROLINA																															
Rowan Co. Airport										11																	4	10			25
Raleigh-Durham Airport		4								11																	8	5			25
Simmons AAF		48				14				41		42						7									62			64	286
NORTH DAKOTA																															
Bismarck Muni Airport													5														11				16
OHIO																															
Lorain Co. Regional Airport																											5		1		6
Akron-Canton Airport										18																2	20	9		2	51
Don Scott Field		7								23																	12	13			55
Columbus Muni Airport										3																	5				8
OKLAHOMA																															
Gen Howell Muldrow Airport										10																	28				38
Max Westheimer Airport										4																1	6				11
Henry Post AAF					16					20																	17		6		59
Tulsa Intl Airport													24																		24
OREGON																															
McNary Field										10						11											8				29
PENNSYLVANIA																															
Washington County Airport													13														9	9			31
Muir AAF				4				10					29					2									38				83
Chambersburg Muni Airport																											1				1
Willow Grove NAS										6																	9				15
RHODE ISLAND																															
Quonset Airport													11														7	9			27
SOUTH CAROLINA																															
McEntire ANGB										17																	15	9			41
Columbia Metro Airport																											3	4	6		13
SOUTH DAKOTA																															
Rapid City Regional Airport													6														11				17

Army Aircraft Deplc m' it (Cont'd)

Aircraft Location	A/TH-1G	AH-1S	AH-64A	CH-47A	CH-47B	CH-47C	CH-47D	CH-54A	CH-54B	OH-58A	OH-58B	OH-58C	OH-6A	OV-6A	OV-1C	OV-1D	RV-1D	U-21A	U-21F	U-21G	RU-21A	RU-21B	RU-21C	RU-21H	UH-1B	UH-1C	UH-1H	UH-1M	UH-1V	UH-60A	Total
TENNESSEE																															
Smyrna Airport													24														18	11			58
McGee-Tyson ANGB		5											6														7	9			22
TEXAS																															
Dallas NAS				13						13																	31				57
Hooks Airport																											1		6		7
Easterwood Fld													1														2				3
Hood AAF & Robert Gray AAF		118				16				71		65				10		5									123		5		413
R. E. Mueller Muni Airport	3									16																	11	6			38
Ellington AFB				5						3																	2	2			12
Martindale AAF										16																	10				26
Randolph AFB																											3				3
San Antonio Int. Airport																											6				6
Kelly Heliport																											3		5		8
Biggs AAF										10		10						1									27				57
New Braunfels Airport																															--
NAS Corpus Christi																				1							1				2
UTAH																															
Salt Lake City Intl Airport																		1									7				8
Airport #2	1	7											16														12	9			45
Michael AAF																		1									3				4
VERMONT																															
Burlington Intl Airport													11														8				19
VIRGINIA																															
Davidson AAF		2									6		1					6	5					3			44			3	70
Byrd Intl Airport													13														36				49
Petersburg Muni Airport																											3				3
Langley AFB																		3													3
Felker AAF		4					7						6														20			4	41
Felker AAF												2															4				6
WASHINGTON																															
Snohomish Co. *Paine Field*				22															1								4				27
Gray AAF		50			16					30		44						3									25		7	31	206
Gray AAF		5								12																	5	12			34

Army Aircraft Deployment (Cont'd)

Location Aircraft	A/TH-1G	AH-1S	AH-64A	CH-47A	CH-47B	CH-47C	CH-47D	CH-54A	CH-54B	OH-58A	OH-58B	OH-58C	OH-6A	OV-6A	OV-1C	OV-1D	RV-1D	U-21A	U-21F	U-21G	RU-21A	RU-21B	RU-21C	RU-21H	UH-1B	UH-1C	UH-1H	UH-1M	UH-1V	UH-60A	Total
WASHINGTON CONT'D																															
Spolkane Intl Airport																											6				6
WEST VIRGINIA																															
Wood City Arp										5																	16				21
WISCONSIN																															
Truax Field										6																	4	16			26
West Bend Airport										9																	6				15
Waukesha Airport																															--
WYOMING																															
Cheyenne Muni Airport												6															7				13
JAPAN																															
Camp Zama AAF																											8				8
KOREA																															
Seoul		29					32					53				12													63	100	289
KWAJALEIN																															
Kwajalein Island																											3				3
PANAMA CANAL ZONE																															
Albrook AFS							8					8						1									29		4		50
PUERTO RICO																															
Isla Grande Airport													8					1									5	3			17
Christiansted St. Croix																											2				2
Ft. Buchanan																											1				1
EUROPE																															
Casteau Belgium																											2				2
Heidleberg																											7				7
Sandofen Coleman BRS											15							5									14				34
Sandhofen Coleman BRA										3																	11				14
Sandhofen Coleman BRS										4											3						5				12
Sandhofen Coleman BRA						19																					1				20
Pirmasens																											10				10
Landstuhl																													6		6
Ramstein																								7							7
Berlin																		1									5				6
Bad Kreuznach										23																	13				36
Finthen		21								13																	3				37

Army Aircraft Deployment (Cont'd)

Location Aircraft	A/TH-1G	AH-1S	AH-64A	CH-47A	CH-47B	CH-47C	CH-47D	CH-54A	CH-54B	OH-58A	OH-58B	OH-58C	OH-6A	OV-6A	OV-1C	OV-1D	RV-1D	U-21A	U-21F	U-21G	RU-21A	RU-21B	RU-21C	RU-21H	UH-1B	UH-1C	UH-1H	UH-1M	UH-1V	UH-60A	Total
EUROPE CONT'D																															
Finthen		22								12																	3				37
Finthen										4																	3				7
Finthen																														15	15
Finthen						20																					1			6	27
Baumholder										4																					4
Hanau		1										1															6				8
Hanau										7																	1				8
Hanau																											2				2
Hanau										24																	17				41
Hanau		20								11																	3				34
Hanau		21								12																	3				36
Hanau										3																	2				5
Hanau																														15	15
Weisbaden										4																					4
Nellingen		1								5		1															12				19
Nellingen																														6	6
Nellingen																														1	1
Schweinfurt										12																	3			6	21
Darmstadt																														6	6
Fulda										6		10															13				29
Fulda		21										12															3				36
Bonamse										20								1									19				40
Giebelstadt										36																	24			15	75
Wertheim																											17			15	32
Katterbach										16																	20				36
Katterbach		21								17																	3				41
Katterbach		21								16																	3				40
Katterbach										5																	5				10
Katterbach																											5			8	13
Katterbach																											2				2
Feucht		21										12															13				37
Feucht										6		10															13				29
Grafenwoehr																												6			6
Grafenwoehr																			1								3				4

Army Aircraft Deployment (Cont'd)

Location / Aircraft	A/TH-1G	AH-1S	AH-64A	CH-47A	CH-47B	CH-47C	CH-47D	CH-54A	CH-54B	OH-58A	OH-58B	OH-58C	OH-6A	OV-6A	OV-1C	OV-1D	RV-1D	U-21A	U-21F	U-21G	RU-21A	RU-21B	RU-21C	RU-21H	UH-1B	UH-1C	UH-1H	UH-1M	UH-1V	UH-60A	Total
EUROPE CONT'D																															
Bremmen										4																	3				7
Bremmen																											6				6
Bad Tole																											2				2
Echterdingen										20																					20
Echterdingen																		1									4				5
Echterdingen															26																26
Schwaebisch Hall							20																					2			21
Schwaebisch Hall																		1									3				4
Goppingen										4																	2				6
Schwaebisch, Gmuend																											15				15
Augsburg																													7		7
Augsburg																											3				3