

CHANGES TO AIRCRAFT

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Changes to aircraft come about for three reasons:

1. A product improvement.
2. To correct a deficiency.
3. To suit marketing.

Obviously, a manufacturer will not change a product that is working well, selling well and is profitable, unless something can be done to improve the product. This may be in the form of a "product improvement" fix. These generally enhance the product in one or more of the following ways:

1. By adopting a newer technology.
2. By making a safer product.
3. By making the widget cheaper while maintaining the same utility.
4. Increasing the utility while maintaining the same cost.
5. Deleting some undesirable feature without decreasing utility.
6. To suit marketing.

In the military context, once an aircraft audit is complete and the machine is "base lined" no change may be undertaken by the manufacturer that changes form, fit or function. The only way to change is to obtain government approval of such a change. In the military scenario it is easy to discover how changes come about. The typical contract calls for the manufacturer to design improvements and to fix defects.

The military tracks aircraft maintenance and reliability performance by computerized systems, and generally the major manufacturer is a user of the same computer. (Sometimes the manufacturer is contracted to actually program and run such a computer tracking system.)

The manufacturer will also track field performance of his product through an incident reporting system. This is sometimes called a service difficulty reporting system or service incident reporting program. Generally speaking, a major company provides technical representatives to the user squadrons. These tech reps report all problems to the company in the form of field service representative reports. Additionally, it is common that such a representative makes a monthly field service summary. Back at the factory, it is usual that the Field Service Representative Office promulgate a Field Service Digest monthly.

Whenever an incident is reported to the factory from the government, it is customary that the manufacturer is expected to reply in some fashion. It is typical that they conduct an investigation and / or an engineering evaluation. This data and results thereof are stored on the same computer. (Service incident reporting)

It is usual to see words like :

- a. Investigation in progress.
 - b. An investigative report with the words - Thought to be an isolated incident....no further action recommended--considered closed item by manufacturer.
- or,
- c. An investigative report with words - manufacturer has determined that a fix should be initiated----Further action recommended--Manufacturer will submit a “product improvement E.C.P.” or manufacturer will submit a “correction of defect E.C.P.” The company forwards the Engineering Change Proposal to the government for approval. An E.C.P. may be submitted by the manufacturer simply because the manufacturer has thought up a better product or because the manufacturer has discovered a shortcoming in his product.

The government can also suggest the need for a change or an improvement by asking or demanding that the manufacturer create a E.C.P. for a specific improvement desired by the military. Once such an improvement is designed by the manufacturer it can not be installed unless it is approved by the government. In the Air Force, this approval is in the form of an Air Force Technical Order. In the Navy, it is called a Engineering Order.

Sometimes a problem arises in a military product that is pervasive, hard to define, troublesome, and potentially dangerous. The government may determine that such a situation exists and it may create an Independent Review Team,(I.R.T.) or Review Board to attempt to identify and solve the problem. These boards usually meet regularly and the keep minutes of their progress as well as generate reports and recommendations.

By proper discovery an attorney can obtain all of these records. It is not at all unusual to be able to track a certain incident directly to a company investigation, to a company recommendation for a fix in the form of an E.C.P., and to a government adoption of that fix in the form of an Engineering Order or a Tech Order.

A manufacturer will attach adjectives to his E.C.P. that create a sense of urgency to the proposal. Words like emergency, urgent action, safety of flight, mission essential, and routine delineate the severity of the hazard. All product improvement E.C.P.s cost money from the governments budget, therefore not all E.C.P.s are approved. In fact a large number of proposals are rejected by the government for numerous reasons including cost and little benefit derived. As would be expected emergency, urgent action and safety of flight items are acted upon more favorably and with more speed.

MilSpec 882b requires a manufacturer to create a Systems Safety Engineering Staff in house. This staff is required to compile certain safety studies predicting the products performance from a safety standpoint. These documents may be discovered.

After the aircraft is in the field the manufacturer is required to participate in a joint systems safety committee that tracks the aircraft in the field from a safety standpoint. The joint system safety committee meets regularly and keeps minutes.

They sometimes form study groups and they make recommendations for safety. Sometimes as they perceive the need, they will recommend the formation of an I.R.T. Documents created by the systems safety committee are discoverable subject to the normal objections. When one deals with advanced state of the art equipments it is not unusual to run into National Security objections.

The Civilian Counterpart

In the civilian world changes may come about for the same reasons, but the mechanics of the change are less formalized and less restrictive. Any proposal that changes the airworthiness of the aircraft must be submitted to the F.A.A. and approved.

Within a company the usual vehicle for the manufacturer to create such a change is through an engineering change proposal. The proposal is handled in house and approved or disapproved by the company. Multitudes of proposals are made and many are not adopted. When such a proposal effects airworthiness it is submitted to the F.A.A. for approval. Sometimes this can be handled in house if the manufacturer is a Delegated Option Authority manufacturer and the delegated engineers sign off for the F.A.A. If the change is small this occurs frequently. The larger the change the greater the likelihood of full F.A.A. involvement. Regardless, the F.A.A. is provided documentation of any such change. An attorney can obtain the changes from either the manufacturer or the F.A.A.

The manufacturer keeps engineering change proposals that have not been acted upon for a period of time. The manufacturer will keep all documents that he is required to provide the F.A.A.

Many civilian manufacturers have a routine "DOCUMENT RETENTION" program in place that is in reality a document destruction program. As a company policy, they destroy unneeded documents and engineering reports after a period of time. The rationale is that maintaining such a large volume of data is cost ineffective to the company. In view of the recent holdings in spoliation of evidence I do not know if the manufacturers are rethinking this established policy.

Manufacturers of civilian products have a consumer complaint department. These departments receive complaints from owners, operators, field maintenance depots and users. These documents may be discovered. Generally speaking, new equipment comes with some express maintenance warranties, warranty work can be discovered.

Additionally the F.A.A. at Oklahoma City has a computer tracking maintenance problems of aircraft components. This is called the voluntary Service Difficulty Reporting system formerly known as the Malfunction and Defect reporting system. Most manufacturers are subscribers to this system either by modem or subscription. An attorney may get this information through discovery from the manufacturer and through F.O.I.A. from the F.A.A. at Oklahoma City.

Changes may be forced on the manufacturer by the F.A.A. through a vehicle known as an Airworthiness Directive. When the F.A.A. discovers a problem it may order that a change be made.

The Directive may be in many forms:

- a. It may simply require an inspection and repair as needed I.R.A.N.
- b. It may establish new inspection schedules.

- c. It may establish more stringent inspections.
- d. It may change the flight envelope of the airplane.
- e. It may require a mechanical repair.
- f. It may require a retrofit of a new improved part.
- g. It may require warnings in manuals and placards in aircraft.

Compliance with Airworthiness Directives is sometimes time compliant and sometimes immediate action. Compliance is mandatory.

All owners are notified of the Airworthiness directive.

These documents may be obtained from the government or the manufacturer. They are generally admissible since they are a government record, generally trustworthy, and they do not fall into the category of a subsequent remedial measure for safety since it was government ordered rather than company instituted.

Changes Part II

A manufacturer may learn that a subcomponent is malfunctioning within the confines of the prime manufacturer's airframe. Simultaneously the subcontractor may become concerned that his component is not interfacing well within the prime's airframe. When such an event occurs much correspondence and joint engineering will occur before a fix is decided upon. Such correspondence and resulting documentation is discoverable. Generally, the interface of a previously qualified subcomponent with a new airframe is the responsibility of the prime contractor. It is usual for such efforts to be joint.

Changes that are required by the F.A.A. in the form of Airworthiness Directives are mandatory. Other changes may be instituted in production models and offered to the flying public as retrofit optional items. A manufacturer may advertise these new options through: media advertisements, company brochures, company suppliers, service letters, and service bulletins. All such materials are discoverable.

Often new changes may include state of the art advances that were patentable. A patent gives the patent holder a business advantage that is valuable. Therefore, a manufacturer will patent its good new ideas. When one attempts to patent a new idea he must make claims concerning the advances in technology and the advantages of the new design. These are discoverable documents.

No manufacturer whether civilian or military is free of oversight by the government. Usually the oversight entities are well known and established. In the military context, they are delineated in the contract, and usually start with the group or agencies that initiated the contract and control the purse strings.

In some form except the blackest of programs, the funding may be traced from the budget through to the military system command and then through the division within the command responsible for contracting. Within the Air Force it is likely that a Special Programs Office S.P.O. will be established for oversight of the program. As an example there was an F-16, F-15, ACES TWO ejection seat S.P.O. etc.

Once these units are set up it is mandated that they interface with the manufacturer, and become the approval authority to them. These S.P.O.'s correspond with, and are the repository for innumerable engineering and technical reports written by the manufacturer. Unless National Security is a consideration, they are discoverable.

In the civilian context the Certification branch at a Regional Office of the

F.A.A. is the oversight authority for the manufacturers who reside within the region. Thus, the Northwest Region of the F.A.A. oversees Boeing Seattle. Certification, qualification and application documents relating to products and product changes are initially handled and stored at the regional level. For certification and qualification, a manufacturer is required to turn in specific compliance documents.

All such documentation between manufacturer and the F.A.A. is discoverable. Often much of the material may be obtained through F.O.I.A. instead of regular court ordered discovery.

TERMINOLOGY

The terms utilized here comprise names given to specific varieties of documents that are in widespread and common usage throughout the aviation industry. The precise and current names and definitions must be ascertained within the context of each individual case since the terminology may change slightly with time and in some cases with each manufacturer.

R.F.P. Request for Proposal: This is a government-contracting device that invites or solicits manufacturers to submit proposals for the design or development of a product. It is part of the competitive bidding rules of D.O.D.

R.F.Q. Request for Quote: This is a government contracting device that solicits competitive pricing. It is sort of a sealed bid. Once a single contractor is selected the price becomes negotiable for follow on items.

C.D.R.L. Contract Data Requirement List: This is a list made part of a government contract that delineates requirements that must be adhered to.

P.I.D.S. Prime Item Development Specification: This is a specification, usually authored by the prime contractor to a subcomponent manufacturer for the design and development of a new item.

C.I.D.S. Critical Item Development Specification: This is a specification for the design and development of a new and required item not contemplated in the original contract, but critical to it.

Study Contract : A type of contract for the design of a new item in the paperwork stage.

Development Contract : A type of contract that creates a hardware prototype or several models of the new product.

Aircraft Audit(configuration audit) : Should a development of a new aircraft be successful, and should procurement of many such aircraft be planned the development aircraft will undergo an audit. This audit specifies exactly what each subsequent aircraft will be equipped with.

Aircraft baseline: When the audit is complete the aircraft is said to be base lined. All aircraft subsequently built and delivered will be identical to the baseline aircraft.

From this point forward the manufacturer can do nothing to change the form, fit or function of the baseline aircraft without first obtaining government permission.

Procurement Contract: A procurement contract simply purchases a number of the previously baseline aircraft.

Military Specifications: Books of current military guidelines that the military expects designers to accomplish as a minimum in their design proposals. The individual contract states which specifications and which issue of specs will be applicable to the existing contract. These specifications tell what must be accomplished, but not how

it is to be achieved.

Military Standards: Books of standards that the military expect the designer to adhere to. These will be delineated in the contract.

Military Design Handbook Criteria: General guidelines of the military stating some current design philosophy and criteria.

F.S.D.R.: Field Service Difficulty Reports. These may have different names within the manufacturers' nomenclature. In military contract situations it is normal for the manufacturer to provide technical representatives to the user commands. These tech reps. report field service difficulties individually to the factory field service support division.

Field Service Monthly Reports: Generally speaking, the manufacturer requires its tech reps to write monthly summaries of their activities. This includes summations of problems encountered.

Field Service Digest: It is usual for the manufacturer to print and disseminate a digest compiled from the tech reps and from in house service reps' reports. This is standard but may be hidden under many different names.

S.D.R.: Service difficulty reports are an F.A.A. voluntary maintenance reporting system. These reports can be obtained by F.O.I.A. request to the F.A.A. in Oklahoma City. If you are interested in RS5-aD1 fuel injector failures, you simply request all Bendix fuel injector problems for a time period and you are provided the data at cost.

M.D.R.: Malfunction and Defect Reports is the old name for S.D.R. as described above. It is the older reporting format, but if you ask you will receive these as well. Consumer complaints: In civilian aviation the manufacturer has a customer service division to which consumer complaints are routed, answered and stored. These are discoverable.

M.T.B.F. Mean Time Between Failure Reports: In military contracting and in conjunction with system safety it is often a requirement of the manufacturer to predict time to failure of his design. Later as part of the contract and "lessons learned " he may be required to track his part in the field to see if it actually is performing as to the requirement and prediction. Sometimes the military provides this function through its logistics and overhaul programs. Sometimes the manufacturer is tasked to do it. Either way, if it exists, it is discoverable.

Warranty work invoices: In the civilian context warranty work is recorded and available through discovery.

Maintenance records: In either the military or in civilian practice complete maintenance records are to be kept by the owner. In the military context the government keeps the records in a computerized format. These are discoverable.

Ship file or Ship log: In both civilian practice and in the military a log is begun at the factory for every airplane produced. Starting with the keel beam every operation is signed off as it is completed and every major step is Q.C.'d. These signatures delineate the workers and the dates each step was completed and who the work was done by. It culminates in the final inspections and test flights.

Airworthiness Directives: An F.A.A. issued mandatory order that may change parts, procedures or inspection methods or frequency.

F.A.A. Advisory Circulars: F.A.A. method of disseminating materials concerning

aviation related matters that are advisory in nature. They contain recommendations only, they are never mandatory.

COMPANY DOCUMENTS: May include: Company Letters, Company Service Letters, Company Service Bulletins, Company Service Instructions, Company Advertisements, and Company

Company Final Compliance Documents: These are the documents required of the manufacturer by the government in a military contract, which the contractor must supply to the military in accordance with the provisions of the contract. They signify completion of milestones and completion of requirements. In total these documents and the final specification when completed and approved by the government make up the basis of saying the military manufacturer has gained the approval of the military for a reasonably precise set of specifications. The form that a plant representative of the government signs when he accepts delivery of an individual aircraft has nothing to do with the "approval of a reasonably precise set of specifications". In fact a government plant rep has very, very little approval authority at all. It is usual that all such required reports, required milestones and required witnessing of successful tests and final approvals are signified by letter from the government to the manufacturer. In milestone contracts, it is not uncommon for funding to be held up until the milestone is accomplished.

Within the civilian context, the F.A.A. requires submission of documents, tests and analysis as part of the certification process for new airplanes, and for substantial changes in old already approved aircraft. These compliance documents are kept both by the F.A.A. and by the manufacturer.

Company witnessed verification tests: Often these are called for within the contract. In the military case the military often is a viewer of certain compliance tests. The current contracting rules allow that the military can watch any test it wishes to unannounced. With regard to a sub manufacturer the prime contractor may be the only witness to their required tests although again the government can watch any test it wants to.

Company testing in preparation for verification tests. A fallacy of demonstrated testing is that it is almost never done to worst case situations. A manufacturer will almost never invite the military to witness a test that it knows it will fail.

Engineering Change proposal: E.C.P.s are used both in military and civilian context. They are simply a proposal to make a change. The group making the proposal does not have the authority to institute the change. These are usually kept and are discoverable.

Engineering Changes: Engineering changes are what result in the civilian world when an E.C.P. is approved and the product is changed.

Engineering Orders. Engineering orders are the Navy terminology for an approved change.

Technical Orders: Is the Air Force name for an Air Force issued Change.
System Safety Group. This is a safety department common to most major manufacturers. In the military context in a big development contract the manufacturer must have such a group or form one.

System Safety Development Plan. In large government contracts the company must

have a complete systems safety development plan.

Systems safety Plan. In a large government procurement contract, it is usual for the manufacturer to have to continue the development plan with lessons learned and continuing systems safety analysis group.

Systems Safety Studies: It is usual that a manufacturer will do the following studies of his developing product. The Military requires it. Large manufacturers do it in the civilian world because a safe product is good economics. These studies are discoverable:

- A. Systems Safety Failure Mode and Effect Studies.
- B. Systems Safety Fault Tree Analysis.
- C. Systems Safety Hazard Analysis.
- D. Systems Safety Lessons Learned Tracking.
- E. Systems Safety Committee Meetings.
- F. Systems Safety Updates to studies.
- G. Systems safety Common Cause Failure studies.

Independent Review Teams: This is an Air Force name for an Independent study group formed to study a specific problem.

The idea behind such a group is that persons not in the manufacturers design group are tasked to investigate a problem area that has been reported from the field service histories. If the solution is not evident then such a group may be formulated. The very existence of such a group is an admission of an unsolved problem. For instance there was an independent review team for F-16 wire chaffing and for A-10 flight controls. Most of the documents and work of such a team is discoverable.

Incident Reporting System: The military and the manufacturers keep track of incidents and the outcome thereof. They do this through a computerized system . Typically there will be the narrative report of the incident, a manufacturers investigation, status and recommendation as well as "How Mal" codes. This computerized system is in place in the military and is shared with the manufacturer. What it is called changes with manufacturer. Data from such a computerized system is discoverable from the manufacturer or from the government.

N.O.D., Notice of Deficiency: This is a recent government contracting section that requires the manufacturer to report (fess up) to the government for any parts or designs that fail to meet the original specification and original contract requirements. It is a semi warranty. The manufacturer is supposed to fix these defects free of charge. Often such N.O.D. results in mediation or arbitration where the cost of the fix is negotiated.

C.O.D. A Correction of Defect or Deficiency is a descriptive title for the actual Technical Order that in fact orders the change implemented. It is usual to see words to the effect. "This is a Correction of Deficiency Technical Order. PURPOSE: "This Technical Order was needed in order to bring the aircraft into compliance with contract specification -----paragraph-----"

Form DOD 2050: This form was the acceptance check form of the delivery of a separate singular aircraft to the military. It is signed by the local military plant representative, and it acknowledges that the military aircraft appears and is accepted in conformance with some contract and some military specifications. Some judges have been fooled into believing that this document is the proof of the

existence of reasonably precise military specifications.

Reliability Studies: Studies concerning the reliability of aircraft parts and components.

Maintainability studies: Within each contract for a military aircraft is the requirement that it be easily maintained. These requirement set out maintenance guidelines and design criteria.

Vulnerability Studies: Studies concerning the vulnerability of aircraft to be lost due to outside damage inflicted upon the machine. Generally a classified military study.

Form 337 S.T.C.: This is the F.A.A. form that must be submitted and approved by the F.A.A. before any significant change or modification can be made to an aircraft.

Waiver: A waiver is what is granted by the military when a manufacturer asks to deviate from a contract requirement or a specification.

Deviation: A deviation is a request by a manufacturer for the right to deviate and not comply with a contract requirement or specification.