



## ***Supplemental Type Certificate Solutions***

### ***Introduction***

L2Consulting Services looks forward to an interactive working relationship with its customers throughout the STC certification process. Obtaining approval for the installation and operation of new systems can be, at the very least, challenging. Because of that, we would like to provide customers with this overview of the process involved in obtaining an STC. We hope that you will find, as others have, that L2Consulting Services offers a product and service unparalleled to that offered anywhere else in the industry.

### ***Customer Support***

The efforts of many certification companies focus on a project's engineering and certification in a closed environment. Any input from the customer is obtained at the beginning of the project. Traditionally, as the STC process progresses, little or no interaction occurs with the customer which results in a product that falls short of the customer's needs and requirements. All of this translates into increased costs to the customer through rework and lost revenue.

At L2, we prefer to use a different approach. Instead of focusing solely on producing the STC, we tune our efforts to the customer's desires. Working with the customer throughout the relationship produces a product that is more in line with the customer's vision of the project. By making the customer an integral part of the process, we prevent or minimize "surprises," which can manifest through the use of conventional STC methods. The process begins with our first contact with the customer. Together, we explore the customer's needs and focus on their integration goals. From the beginning, we weigh the customer's preferences against any restrictions or potential variables so that the "solid" plans are more easily realized in a timely and cost effective manner.

Keeping an open relationship with the customer is imperative throughout the certification process and beyond. Not only do we want our customers to contact us about a project or any other concern throughout our relationship, we encourage and expect it. As the customer, it is your aircraft in which the systems and components will be installed. Your input and feedback are very important; as they will help us realize the ultimate goal – your satisfaction with the product and our services.

### ***Background***

While we possess vast experience in the certification, engineering, and installation of current avionics systems, we don't operate in a vacuum, producing a product we feel the customer needs. Rather, we use our pool of experience to interact with the customer and provide them with the results they expect.

When L2 was launched as an engineering, consultation, and remote installation services company, we knew that to support certification projects there would be stringent requirements and possible challenges. L2 possesses a wealth of experience, which prepared us to meet the challenge; experience gained internationally from installations and systems maintenance on many different types of aircraft. L2 was founded upon this experience. Our collective resources enable us to understand that there is a fine line to walk when providing a product that is equally optimal for operators, installers, maintenance, and the FAA.



Starting with this international installation experience, we have added certification support, complex in-the-field system troubleshooting, operational approval assistance, as well as Supplemental Type Certificate design and integration. With this array of services, as well as unlimited aftermarket customer support, L2 provides customers with the ability to have a complete STC solution in one place.

### ***Planning***

Throughout the certification process, many challenges may arise and, because of this, a well-laid out plan is imperative. With a known sequence of events, the effects of changes that may arise can be known quickly. For example, if an operator changes the target aircraft, this change can be inserted into the process at any given stage, the downstream effect assessed, and the potential revision of target dates can be discussed in a simple and open environment. Just as customers will always know the status of a project, they will also be included in the decisions made as a result of any challenges that may arise along the way. L2 even offers a secure interactive website that provides our employees and customers with all the resources for any given project.

To begin the process of keeping the customer involved from the project's start, we offer the following outline of the Supplemental Type Certification process. It should help

answer basic questions and provide the customer with a basic idea of how the sequence of events will occur.

1. Contract finalized
2. STC Application to Federal Aviation Administration – Project number is assigned and FAA Project Manager appointed
3. Kick-off Meeting – Customer (similar meeting with the FAA may be required depending upon complexity of project and desires of the customer and/or FAA.)
  - A. Project Definition – Units to be installed, interfacing with existing systems discussed, primary target dates defined, target aircraft decided upon, potential installation sites and resources defined.
  - B. Statement of Work established
  - C. OEMs and other parties introduced
  - D. Preliminary FAA planning
  - E. Certification Plan discussed
  - F. Obtain aircraft-specific documentation from customer
4. Certification Plan submitted to FAA
5. L2Consulting Services establishes internal project definition and assignments. This includes set up of all engineering documentation, paperwork to support manufacturing and kitting, introduction of vendors into project, preliminary drafts of primary paperwork, etc.
6. Critical Design Review – If the customer desires, a critical design review will take place. This would be a meeting in which the customer can review major design and system interface parameters of the project.
7. Design Freeze – Usually will be set one week after the Critical Design Review. After the design freeze, any changes to the project could result in significant delays in re-engineering, new manufacturing, parts changes, installation and return-to-service dates, or certification timing.
8. Check process – L2Consulting Services internally performs completion, verification, and review of all engineering and support documentation.
9. Submit Type Inspection Authorization (TIA) to FAA - Establish final target dates with the FAA for Designated Engineering Representative (DER) approval of engineering, as well as target dates for installation, system testing, and project approval.
10. Arrange for Parts Manufacturing Approval (PMA) with the FAA and schedule kit conformity inspection.

11. Final package review with customer and pre-installation meeting. Discussion of potential challenges of installation, testing, facilities, and approval would be primary topics of this meeting.
12. Submit all engineering and documentation to DERs and subsequently to the FAA Project Manager for approval.
13. Perform installation kit conformity inspection.
14. The installation team is mobilized to the site of the customer's preference and is provided with information to become completely familiarized with the installation and testing of the system.
15. Installation of system in target aircraft, followed by installation conformity, DER witnessed system testing and return to airworthiness, and, if required, FAA flight test.
16. FAA issues 30-day temporary approval of STC.

Following the successful installation, conformity, testing, and issuance of the 30-day temporary certification, the operator can return the aircraft to revenue service. The FAA makes every attempt to issue the permanent STC within thirty days of that day. With an established rapport with the FAA, L2 can help insure that this STC is issued in a timely manner. Our commitment to the customer does not end with the installation, or when the STC is issued, but rather years later when the system on the aircraft is replaced. L2 is always available to assist in the training of operator staff, assist with the maintenance of our installations, or just support any related concerns the customers might have.

### ***Elements of the STC package***

The documentation package used to obtain an STC is something that is not easily or explicitly defined. According to the FAA, an STC is "The approval by the Administrator of and change in the type design of the product" and "The type certificate previously issued for the product." By reading this statement, no one can be quite sure what documentation is or is not required to support the installation of the system. Further investigation into the Federal Aviation Regulations would reveal that any "major change" to the aircraft requires an STC, and the applicant must show that the altered aircraft meets all applicable airworthiness requirements with respect to type design.



In an effort to make this process easier for its customers to understand, L2 has defined what items are usually required to be a part of the STC documentation package. The number of variables is somewhat extensive and depends, in part, on the complexity of the system and installation. Other variables can include the specific type of aircraft, as some are

found to be under more scrutiny than others, or the FAA office through which the approvals are being sought.

The following is a list of the components that may be required to create a documentation package for an STC. Certain parts of this list are almost always required material to gain certification. The necessity of others is assessed on a case by case basis. For example, if the goal is to gain an STC for the installation of a new stationary observer's seat, it is very unlikely that either an electrical load analysis or wiring diagrams would be required. Drawing from the experience we gained in working with STCs and prototype installations, we are providing a table that represents a very comprehensive picture of required elements needed to produce a solid STC engineering data package. However, given the quickly changing advances in technology and corresponding updates in FAA requirements, other items may need to be added to this outline on a case by case basis.

**Elements of the Supplemental Type Certificate Engineering Data Package**

<b>ITEM #</b>	<b>DOCUMENT</b>	<b>NOTE</b>
1	Master Drawing List	<i>Required</i>
2	Airplane Flight Manual Supplement	<i>Required</i>
3	Continued Airworthiness	<i>Required</i>
4	Ground Test Procedure	<i>Required</i>
5	Flight Test Procedure	
6	System Safety Analysis	<i>Required</i>
7	EMI/RFI Testing Procedure	
8	Configuration/Initial Operations	
9	System Interface Schematics	
10	Engineering Order	<i>Required</i>
11	Equipment Removal Instructions	
12	Equipment List	Line Replaceable Units
13	Parts List	
14	Wiring Diagrams	
15	Harness Routing Diagrams	
16	Wire List	
17	Electrical Load Analysis	
18	Structural Installation Drawings	
19	Weight & Balance	<i>Required</i>
20	Stress Analysis	
21	Damage Tolerance	Internal copy to FAA
22	Deactivation Procedures	Customer Request
23	Harness Fabrication Instructions	Internal
24	Bill of Materials	Internal – w/alternates
25	8110-3 Approvals	FAA provided
26	Supplemental Type Certificate	FAA provided
27	Maintenance Manual Upgrades	Customer Request
28	Wiring Diagram Manual Upgrades	Customer Request
29	Structural Repair Manual Upgrades	Customer Request
30	Integrated Parts Catalog Upgrades	Customer Request

Many of these items are components. That is to say, some items, such as a Ground Test Procedure or Continued Airworthiness, could be combined with other documents, such as the Engineering Order. This chart is meant to be used a guide that can provide an overview of what may be required to gain approval in the form of a Supplemental Type Certificate.

L2 will provide what the customer wants and needs in an STC engineering data package. Depending upon the requirements of the customer, supporting documentation packages will be created as simple or as comprehensive as necessary, depending upon the customer's requirements. The most basic package would usually include the items above marked as "required."

### ***Regulatory***

L2Consulting Services performs all STC engineering work within the parameters of FAR 21 and the applicable Federal Aviation Regulations under which the customer operates. Items not included in this discussion that may affect the scheduling of the STC are those items related to FAA scheduling. These items could include the issuance of an FAA project number, certification plan acceptance, TIA issuance, kit conformity, installation conformity, PMA, ground test witnessing, flight test designation/assignment, and release of the 30-day temporary certificate.

### ***Installation***



Throughout the last few years, L2 has worked hard to establish itself as the world's premier remote installation company. Before L2Consulting Services commenced operations in mid-1997, the installation of avionics systems could prove to be a long, extremely time-consuming event and, therefore, very costly. L2 has revolutionized the way in which avionics installations are performed by creating a new approach. We focus on working around the

customer's operational schedule, rather than having the customers' operations work around the installation schedule. This focus, along with hiring and retaining the most knowledgeable people in the industry to perform and support these installations, has created an unparalleled record of performance in the installation and modification industry.

Many new developments have occurred to help streamline efforts on the remote installations. Foremost, L2 has developed mobile workshops that can be shipped anywhere in the world. If work is performed on a freighter, the workshop can actually be loaded onto the aircraft so that everything the installation team needs is in the aircraft with them. This advantage eliminates almost one complete day of installation time.

L2 performs installations that have never been done before; the type which other companies may shy away from. With a staff that is very experienced in the installation of prototype systems, we are well prepared to deal with the inevitable challenges presented

by Supplemental Type Certificate installations. In addition to having a knowledgeable and adaptable installation team, L2 offers unparalleled support in the engineering and certification areas of the STC installation. A staff of specialists shows the team what needs to be done on the prototype installation, monitors all deviations and changes, provides complete engineering support to the certification company, and possesses the ability to handle any additional FAA approvals that may be required, ensuring that the prototype system goes into the aircraft correctly, the first time.

L2 does not stop with the first installation. Many engineering and STC service companies will support your project for the first, and occasionally through the second installation. L2 possesses the ability to take the entire STC project from start to finish, performing entire fleet installations of the newly certified system.

### ***The Full Solution***

At L2Consulting Services, we look forward to fulfilling your certification and consultation needs. We are happy to provide any range of services to our customers and look forward to offering complete systems integration service. Depending upon the requirements of the customer, we can offer any combination or variety of services. To L2Consulting Services, the development of an STC is not just an engineering package delivered in a box. It is a process that starts far in advance of the engineering and ends long after the STC prototype kit is installed in the first aircraft.

<b><i>L2Consulting Services, Inc.</i></b> <b><i>Full Solution to the certification challenge</i></b>
<b>Research of Various Potential System</b>
<b>OEM Selection Assistance</b>
<b>FAA Coordination</b>
<b>Engineering Data Package Development</b>
<b>Prototype Kit Creation</b>
<b>Prototype Installation</b>
<b>STC Approval</b>
<b>Deviation Reports</b>
<b>Follow-on Installations</b>
<b>Customer Employee Training</b>
<b>Customer Internal Documentation Upgrades</b>
<b>On-call Customer Support Throughout</b>

We look forward to supporting your project. Should you have any questions about our products or services or just need support of an existing project, feel free to contact us at (512) 894-3414, you can email us at [info@L2Aviation.com](mailto:info@L2Aviation.com), regular mail can reach us at:

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