U.S. AIR FORCE

AIR FORCE LCMC

United States Air Force Standard Process

For

Automatic Test System Selection Analysis

4/18/2017

X Jimmy C. Bailey

JIMMY C. BAILEY, NH-04, DAF
Chief, Automatic Test Systems Program Office
Signed by: BAILEY.JIMMY.C.1065997548

Process Owner: AFLCMC/WNA
Version: 1.0

Record of Changes		
Version	**Effective Date**	**Summary**
1.0	20 April 2016	Initial draft of document
2.0	10 February 2017	Incorporates changes by ATS Leadership

Foreword

Prior to entering into the Automatic Test Systems (ATS) Selection Analysis Process, Requirement Owners (ROs) should be aware that the selection analysis process does not provide approval to procure. Once an ATS determination has been issued by the Automatic Test Systems Program Office (AFLCMC/WNA), ROs are responsible for securing local purchase authority from the equipment Operational Safety, Suitability and Effectiveness (OSS&E) authority before contracting for the procurement.

1.0. Introduction. The standard process for ATS selection includes the activities necessary to obtain an ATS selection determination from AFLCMC/WNA. AFI 63-101/20-101, para. 6.17.2.2, states that the RO shall "*Coordinate SE/ATS development, procurement, and modification requirements with the SE/ATS PGMs, who will ensure that DoD processes for SE and ATS selection are followed.*"

2.0. Background.

    2.1. Automatic Test Systems (ATS). An automatic test system is an apparatus that performs tests on a device, known as the unit under test (UUT), using automation to quickly perform measurements and evaluate the test results.

        2.1.1. Purpose. The ATS Selection Analysis Process (Figure 1) provides a streamlined means of evaluating an ATS requirement for eventual solution determination.

        2.1.2. Why the ATS Selection Analysis process?

            2.1.2.1. The ultimate goal of the ATS Selection Analysis process is to reduce the proliferation of unique automatic test systems. By ensuring that common test equipment is utilized where possible, the DoD actively reduces costs associated with long-term sustainment of the ATS infrastructure.

            2.1.2.2. The ATS selection analysis process provides a streamlined avenue for making the ATS solution determination.
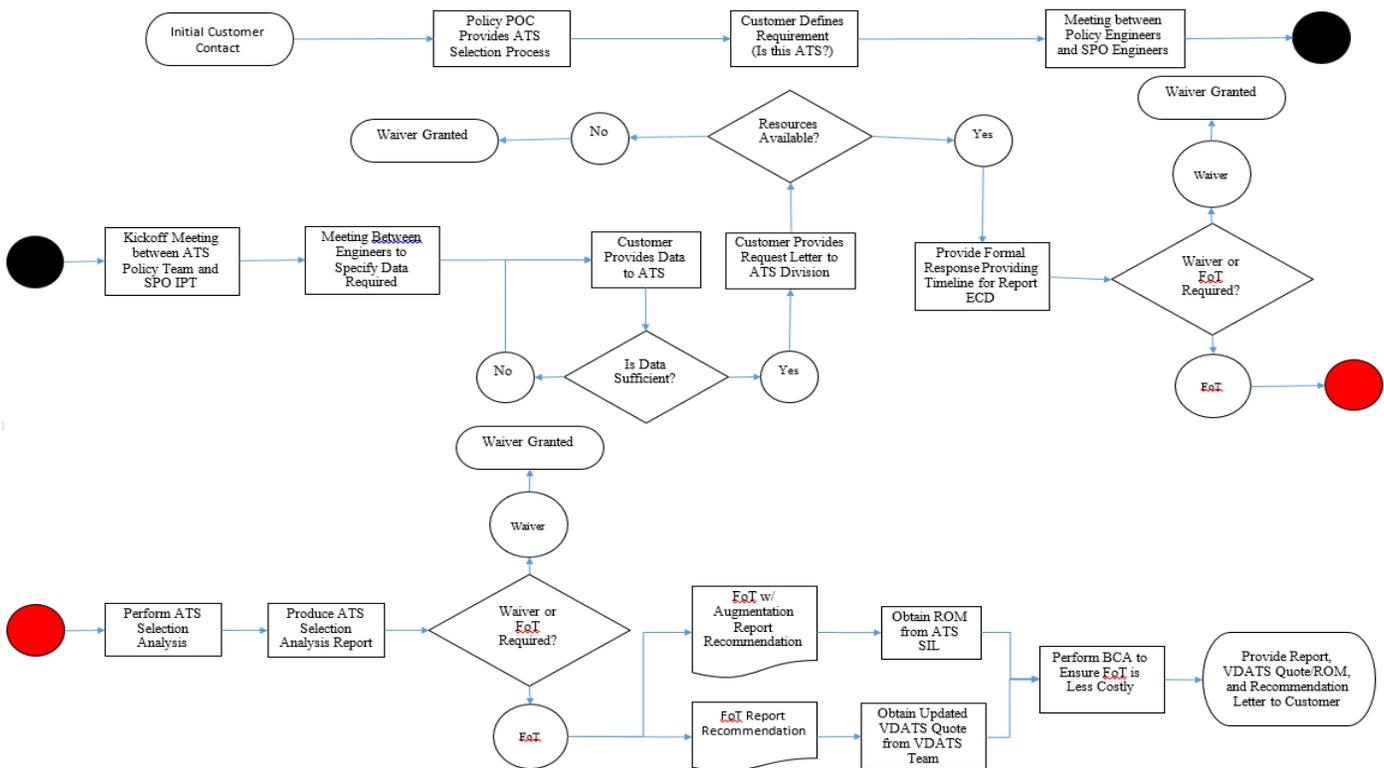
Figure 1: Selection Analysis Process

3.0. Initial Contact. The RO, a program manager for example, contacts the ATS Program Operations Office.

3.1. Upon initial contact, the ATS Policy POC provides this guide to the customer to review for the eventual first meeting between the RO and the ATS Policy Team.

3.2. At the first meeting, the steps in this guide will be reviewed and expectations between the teams will be established.

3.3. After the teams have met, each team's respective engineers will meet to establish the UUT data requirements.

4.0. Gather UUT Testing Requirements Data. UUT testing requirements data should be provided to the ATS Standardization IPT as soon as possible. The data is reviewed to determine if it's sufficient for ATS selection analysis. Once the data is deemed sufficient for analysis, the ATS Standardization IPT provides a schedule for completion of the ATS Selection Analysis Report to the RO.

4.1. The ATS Selection Process requires two types of data: ATS capability data and UUT test requirements data. The ATS Program Operations Office has the necessary ATS capability data for the comparison. The customer is responsible for providing the UUT test requirements data. The ATS Program Operations Office will compare the UUT data to the ATS capability data for DoD standard testers, including VDATS.

4.2. Basic Requirements. UUT testing requirements (UTRs) shall include all of the inputs and outputs of the UUT in both quantity and quality. The documentation should contain all high-level and low-level technical requirement parameters for testing UUTs. More importantly, the documentation should include what is needed to test and validate UUTs. The data that is provided in the UTR should be a roadmap for the testing effort. Any environmental conditions requirements necessary to adequately describe UUT's testing requirements shall be included. Additionally, the mission/purpose of the tester shall be defined, i.e. back shop electronics tester, flight line tester, fuel wetted tester, etc.

4.3. System Synthesis Model (SSM+) Tool. SSM+ is the primary tool used to compare the UUT's requirements versus the tester capability. Since SSM+ is no longer on line, the comparisons are done manually. The organization requiring the tester solution shall complete an SSM+ data spreadsheet (Appendix A) with their UUT requirements. Once the SSM+ data spreadsheet is completed, it should contain all of the UUT requirements. If any of the UUT requirements in the spreadsheet do not apply to the UUT, they should be filled in as N/A.

4.4. UUT Test Requirements Document (TRD). The UUT testing requirements data is needed as part of the basic information to support TPS development. Ideally, this is included as part of a properly prepared TRD. The scope of a TRD includes performance test design and diagnostic test design. Test design information, although useful, is not required for a minimal ATS selection analysis. A properly prepared TRD shall contain all of the basic UUT test requirements data that is needed for ATS selection.

4.5. Alternate Method for UUT Data (no TRD). If a properly prepared TRD is not available for the UUT, the next best source of information is the UUT documentation required to support TRD development. The data that is needed is the UUT parametric information with tolerances, accuracies, and required quantities of concurrent signals.

The UUT information may include:

- UUT environmental support requirements, such as cooling, facility characteristics, Electromagnetic Interference (EMI), humidity, vibration, etc.
- UUT mechanical, hydraulic, and pneumatic interface requirements. Drawings are very useful to support this information.
- UUT electrical interface requirements. Typically this takes the form of an Interface Control Document (ICD) and includes voltages, frequencies, currents, etc. needed to power up and operate the UUT.
- UUT acceptance test requirements and/or factory test requirements, if available. Sometimes this information is included in an Acceptance Test

Procedure (ATP), but it should not be confused with an ATP. Automated ATPs may only contain the minimal information needed for the operation of the testing equipment.

- Source listings for any automated acceptance or factory test programs, if available
- UUT theory of operation, if available
- UUT schematics, if available
- Unique parts data, if needed to understand the UUT testing requirements. This includes information such as Read Only Memory (ROM) data, data needed to program logic devices such as Complex Programmable Logic Devices (CPLDs) and Field Programmable Gate Arrays (FPGAs), and program source listings for any UUT built-in-programming. This information is needed in addition to UUT schematics to fully understand UUT operation and testing. UUTs can contain microprocessors. UUT program listings are needed to understand the basic operation of the microprocessor-controlled parts of the system such as built-in-test (BIT) capabilities.

4.6. **Alternative if Complete UUT Data is Not Available.** If the appropriate UUT test requirements data is not available, the next best choice is to compare the UUT's legacy tester including the respective test program set (TPS) interface test adapter (ITA) capabilities to the DoD standard tester capability. The analysis report will include any augmentation required for the standard tester to host the legacy TPSs. A legacy tester with a large number of TPSs generally has capabilities that are similar to data extracted from UUT test requirements that have tester and ITA capabilities combined. Since ITAs provide hardware capability beyond the legacy tester hardware and software capabilities, it is usually not sufficient to analyze just the legacy test programs for test capability. Unless the ITA is simple, with only wiring and passive components, the associated legacy test programs do not document all of the UUT test requirements.

4.7. **Example LRU.** For example, a simple line replaceable unit (LRU) that monitors the engine speed and power lever angle (PLA) and communicates via 1553 and Ethernet.

The documentation would include the aircraft TO section that describes the functional characteristics, the Test Requirement Document, as well as the following fields (Table 1) populated in the SSM+ Data UUT fields spreadsheet (Appendix B):

Power	28 VDC +/- 5	20 +/- 1 VAC400 +/- 5 Hz
Engine Speed	Pulse generator 0-1Khz	NA
PLA	Synchro Simulator	NA
Communication Buses	Ethernet	Mil-STD-1553

Table 1: LRU Sample Data

4.8. **Non-UUT Test Requirements.** List any non-standard test system requirements/certifications that have to be met. For example nuclear certification, flight line mobility requirement, explosive hazardous environment, classified testing, etc.

5.0. **Formal ATS Selection Analysis Request.** Once the data is verified as sufficient, the RO will draft a formal request for analysis (Appendix D) from the ATS Program Office. This formal request should be signed by 0-6/GS-15/NH-04 level personnel and submitted to AFLCMC/WN-ATS Workflow for processing. A review by the Standardization IPT is recommended prior to forwarding submission to AFLCMC/WN-ATS Workflow.

6.0. **ATS Standardization IPT.** The ATS Standardization IPT processes the request and provides a formal response to the RO.

6.1. **Formal ATS Response to RO Request (Appendix E).** The ATS Program Office will provide a response to the formal request within 5 business days that will provide additional instructions, to include request for UUT requirements data and the time required to gauge the requirements data's sufficiency.

7.0. **Analyze Data.** The ATS Standardization IPT will review the provided data for sufficiency and provide a schedule once the data has been deemed sufficient for analysis.

8.0. **Consider Alternatives.** Testing requirements data is compared to a series of hierarchical-based alternatives in order to determine the best solution for the testing requirement. The alternatives and the order they are considered are as follows:

8.1. **Service's Designated ATS Family.** There are multiple Air Force designated families of testers (FoTs). AFI 63-101/20-101 specifically identifies tester families as taking precedence over all other considerations. A waiver is granted in the event that a tester family is not adequate.

8.1.1. **Versatile Diagnostic Automatic Test Station (VDATS).** The Air Force designated DoD FoT.

8.1.2. **The Joint Service Electronic Combat Systems Tester (JSECST).** Designated as DoD FoT.

8.1.3. **Advanced Radar/Electronic Warfare Test Station (ARTS)**

8.1.4. **Bomber Armament Tester (BAT)**

8.1.5. **Common Aircraft Portable Reprogramming Equipment (CAPRE)**

8.1.6. **Common Munitions Bit/Reprogramming Equipment (CMBRE)**

8.2.   DoD Designated ATS Family. In accordance with the 2017 DoD ATS Master Plan, in the event that the Service's Designated ATS FoTs are not a viable solution, the other DoD families will be considered as potential solutions for the requirement.

   8.2.1. VDATS. The Air Force designated ATS FoT.

   8.2.2. Consolidated Automated Support System (CASS). The Navy designated ATS FoT.

   8.2.3. Integrated Family of Test Equipment (IFTE). The Army designated ATS FoT.

   8.2.4. Marine Corps Automatic Test Equipment System (MCATES). The Marine Corps designated ATS FoT.

   8.2.5. The Joint Service Electronic Combat Systems Tester (JSECST). JSECST is a DoD-wide FoT.

8.3.   Current Supportable Service ATS. There are multiple commercial testers utilized across multiple services and airframes. These are considered once all families have been exhausted as candidates.

8.4.   Other DoD Inventory Supportable ATS. Once Service ATS have been considered and exhausted as potential candidates, the ATS Standardization IPT will review current AF inventory for stock-listed testers currently capable of accommodating the test requirement.

8.5.   Commercial Tester ATS. Once the families, service ATS, and existing AF ATS have been considered, the ATS Standardization IPT will review established commercial testers as candidates for the testing requirement. These testers, once fielded, will be given a stock number and assigned management.

8.6.   New Development ATS. In the rare instance that no existing capability exists for a testing requirement, ATS Policy recommendation will be to allow the design of an entirely new system capable of satisfying the workload in question.

9.0.   Selection. The selection process can result in multiple candidates. While JSECST, VDATS or other FoTs may be able to accommodate a particular requirement, they may not be cost-effective. While a tester's core configurations and existing augmentations may not be enough to satisfy the testing requirement, the capability gap may be filled with development of a new augmentation. The selection process will address concerns like these to determine the best solution for the Air Force.

10.0. Document Recommendation in the ATS Selection Analysis Report. Utilizing the UUT requirements data, the ATS Selection Analysis Report is completed with a solution recommendation, provided to the RO for review, and staffed through the ATS Program Office for final processing.

11.0. ATS Selection Analysis Recommendation Memorandum. The ATS Selection Analysis Recommendation Memorandum provides the ATS Program Office solution recommendation. Potential recommendations are defined as follows:

11.1. Family of Tester (FoT) Recommendation. This memorandum identifies an AF FoT or another DoD designated FoT as the appropriate solution for the ATS requirement. In the event that the recommendation and the core configuration of tester are not adequate, a Rough Order of Magnitude for the necessary augmentation will be provided to the RO.

11.2. ATS Program Office Waiver. An ATS Selection Waiver (Appendix F) is granted in the event that a FoT is not an adequate solution for the test requirement due to prohibitive costs, technical constraints, or in rare cases, scheduling constraints. The ATS Program Office waiver may, however, recommend a tester in the DoD inventory as a solution. A unique solution is only recommended in the event that no other test solutions are available in DoD inventory.

11.3. The ATS Program Office only makes an ATS "Policy" determination. It does not provide local purchase authority for the tester(s) in question. This authority must come from the OSS&E authority for the equipment being procured.

Appendix A: Blank SSM+ Data Sheet

NON-UUT (FACILITY) REQUIREMENTS	
CONDUCTED EMISSION	
CONDUCTED SUSCEPTIBILITY	
RADIATED EMISSION	
RADIATED SUSCEPTIBILITY	
VIBRATION	
TEMPERATURE	
ALTITUDE/PRESSURE	
SHOCK	
HUMIDITY	
MOBILITY	
NUCLEAR CERTIFICATION	
EXPLOSIVE HAZARDOUS ENVIRONMENT	

Appendix B: SSM+ Data Example Spreadsheet

UUT NON-STANDARD TESTS		
Test Category	temp	temp
Parameter Name	Temp1	Temp2
Units	C	C
Value	0 - 810	0 - 810

Appendix C: ATS Selection Analysis Memo Template

DEPARTMENT OF THE AIR FORCE
Your Letterhead Here

MEMORANDUM FOR AFLCMC/WNA

FROM: (Program Office Symbol)
          Address Line 1
          Address Line 2

SUBJECT: Request for ATS Selection Analysis Assistance on (Program Name)

1. The (Your Program Office) requests assistance from the Automatic Test Systems (ATS) Program Office with determining the best solution for the (program name) system maintenance testing requirements.

2. With this request, the (Your Program Office) agrees to provide the ATS Capabilities and Integration Office the data and documentation necessary to assist in determining the best long-term ATS solution for the AF, per the guidance in AFI 63-101/20-101, *Integrated Life Cycle Management*, 7 Mar 13.

3. Our requested effort completion date is _____. We understand that meeting this date is dependent on the availability of resources and the accuracy and availability of system data provided.

4. My POC for any questions or concerns is (Name, DSN, Office Symbol).

                                        (Division-level Signature)

Appendix D: Sample ATS Selection Analysis Request Memo

DEPARTMENT OF THE AIR FORCE
AIR FORCE LIFE CYCLE MANAGEMENT CENTER (AFLCMC)
CRYPTOLOGIC AND CYBER SYSTEMS DIVISION
JOINT BASE SAN ANTONIO-LACKLAND, TEXAS 78243-7081

MEMORANDUM FOR AFLCMC/WNA

FROM: AFLCMC/HNCSA
130 Norton St.
Lackland AFB, TX 78226

SUBJECT: Request for Automatic Test System (ATS) Selection Analysis Assistance on the Space Modular Common Cryptography (SMCC) Program

1. The AFLCMC/HNCS requests assistance from the ATS Capabilities and Integrations Office (AFLCMC/WNABB) with determining the best solution for the SMCC Program maintenance testing requirements.

2. With this request, the SMCC program agrees to provide the ATS Capabilities and Integration Office the data and documentation necessary to assist in determining the best long-term ATS solution for the AF, per the guidance in AFI 63-101/20-101, *Integrated Life Cycle Management*, 07 Mar 2013.

3. The requested effort completion date is estimated to be no later than FY18 Q3. We understand that meeting this date is dependent on the availability of resources and the accuracy and availability of system data provided.

4. For questions or comments, our point of contact is our Lead Logistician, Shannon Tunstall (DSN-945-6657, AFLCMC/HNCSA).

MELIDA O. MONCUS, GG-15, DAF
Chief, Space COMSEC Branch
Cryptologic and Cyber Systems Division

Appendix E: Sample Formal ATS Response to RO Request

DEPARTMENT OF THE AIR FORCE
AIR FORCE LIFE CYCLE MANAGEMENT CENTER
ROBINS AIR FORCE BASE GEORGIA

MEMORANDUM FOR 402 EMXG/CC

FROM: AFLCMC/WNA

SUBJECT: Status Update to ATS Policy Selection Analysis Request for the APN-169
            Rehost to VDATS

REFERENCE: 402 EMXG/CC Memo, dated 16 May 16, Request for ATS Selection
            Analysis Assistance on the APN-169 Rehost to VDATS (L8TE57)

1. The Automatic Test Systems (ATS) Program Office, AFLCMC/WNA, is working to ensure your request for ATS assistance and analysis for the APN-169 Rehost is completed in a timely manner.

2. Customer-requested completion date for the completed report is 2 Sep 16.

3. The ATS Program Operations Office requires parametric test requirements data in order to complete the ATS selection analysis report and provide schedule for completion of the report. The data should include specific testing criteria for the items under test. The ATS Program Office will provide a schedule for report completion 21 business days after receipt of sufficient test requirements data.

4. Because of the wide variance in amount/type of data available, number of units under test involved, and complexity of tester and test program set, the ATS Program Office must determine the schedule for ATS selection analysis report completion on a case-by-case basis. Future requests will be evaluated based on this criteria and an estimated schedule based on the unique factors involved.

5. My POCs are Lt Col William Bradley, Portfolio Analysis & Business Integration Chief, and Sheryl Davis, Program Operations Chief. They can be reached at DSN 472-2138 or DSN 472-0260, respectively.

X
_____
JIMMY C. BAILEY, NH-04, DAF
Chief, Automatic Test Systems Program Office

Appendix F: Sample ATS Selection Waiver

DEPARTMENT OF THE AIR FORCE
AIR FORCE LIFE CYCLE MANAGEMENT CENTER
ROBINS AIR FORCE BASE GEORGIA

MEMORANDUM FOR AFNWC/ XXXXXX

FROM: AFLCMC/WNA

SUBJECT: ATS Selection Waiver to Satisfy the XXXXXXXXXXXXXXXXXX Requirement

1. AFNWC/XXXXX is granted an automatic test systems (ATS) policy waiver to utilize means other than the DoD families of testers to satisfy the XXXXXXXXX requirement at XXXXXXXXX. *This is an ATS policy waiver only (per AFI 63-101/20-101, para 6.17) and is not an approval to procure.*

2. After thorough examination by the ATS Program Operations Office, existing Families of Tester (FoT) do not provide the necessary capabilities to satisfy this requirement. In order to meet the XXXXX requirements, the proposed solution would require XXXXX. The Versatile Diagnostic Automatic Test System (VDATS) core does not have XXXX capability.

3. This ATS policy waiver is for this effort only. This waiver is being granted with the stipulation that any future potential requirements come through the ATS Program Operations Office for evaluation of the DoD Standard Family of Testers capability.

4. Product Support Elements must be addressed in the procurement of the hardware and software, including cyber security and program protection plan requirements. An authority-to-operate for the ATS must be secured prior to operation of the tester.

5. Operational Safety, Suitability & Effectiveness (OSS&E) responsibility for the test program sets (TPSs) run across the tester resides with the unit under test (UUT) owner, and any changes to the ATS that affect the TPS must be coordinated with the UUT owner.

6. This waiver letter does not make or change any program management assignments. While the ATS Program Office is providing the ATS standardization policy waiver letter for this item, the ATS Program Office will not accept OSS&E responsibility for XXXX test set, and AFNWC/XXXX will retain product support responsibility.

7. This ATS policy waiver does not negate current regulatory requirements for compliance with Competition in Contracting Act public laws and mandates, nor does it exempt AFNWC/XXX from following the local purchase process.

8. My POCs are Lt Col William S. Bradley, Portfolio Analysis Business Integration Chief, DSN 472-2138, and Sheryl Davis, Program Operations Chief, DSN 472-0260.

X Jimmy C. Bailey
_____
JIMMY C. BAILEY, NH-4, DAF
Chief, Automatic Test Systems Program Office
Signed by: BAILEY.JIMMY.C.1065997548

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Appendix G: Frequently Asked Questions

Is the ATS Policy Process necessary in the event that the RO already plans to use VDATS?

It is highly recommended that the ATS Selection Analysis Process be utilized for all efforts in order to ensure that VDATS is indeed the most cost-effective solution for the Air Force, and to ensure VDATS can meet your needs.

How early should I get the ATS Program Operations Office involved?

The ATS Program Operations Office can be involved as soon as possible to provide oversight during the early stages of the contract to include providing contract language to ensure that the test requirement is vetted through the ATS Program Operations Office for selection.

What is the lead time for the ATS Selection Analysis Process?

The ATS Selection Analysis Process is a highly complex process involving multiple schedule considerations. The process is event-driven, and scheduling information will be provided as the UUT testing requirements are analyzed by the ATS Standardization IPT and the scope of the analysis is established.

How do I obtain local purchase authority for a solution recommendation?

The RO will need to contact the configuration owner of the test system in order to obtain a local purchase waiver.

Is it possible for a contractor to perform the analysis?

Yes. However, the contract should stipulate that the ATS Program Operations Office is the approving authority for any selection analysis reports and any conclusion made therein.

Is there a sample analysis available for review?

Yes. We have a notional report developed by our engineers that may be provided upon request.