Ministry of Defence

JSP 886
DEFENCE LOGISTICS SUPPORT CHAIN MANUAL

VOLUME 7
SUPPORTABILITY ENGINEERING

PART 8.06
TEST EQUIPMENT

VERSION RECORD		
Version Number	**Version Date**	**Version Description**
1.3	25/01/10	Changes to Ownership and Points of Contact
1.4	22/09/11	Move from Volume 5 to Volume 7
2.0	31/05/12	Major revision
2.1	04/07/12	Addition of Chapter 2: User Access Devices
2.2	22/11/12	Formatting update. Content unchanged.
2.3	25/02/13	Chapter 3: Management Maturity Levels added.

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CHAPTER 1: TEST EQUIPMENT

CONTEXT

1. This part of JSP 886 Volume 7 provides key points of policy and guidance, in respect of Test Equipment (TE) required for the effective Through Life Support (TLS) of equipment, in accordance with MOD Integrated Logistic Support (ILS) policy.

2. Within JSP 886 Volume 7 the policy requirements for Support and Test Equipment (S&TE) are covered in two parts, this part which relates to TE including Automatic Test Systems (ATS), and Part 8.07 which relates to Support Equipment (SE).

3. Support and Test Equipment (S&TE), as defined in DEFSTAN 00-600, is all equipment (mobile or fixed), required to support the operation and maintenance of a product. TE is part of the ILS element of S&TE and can be classed as:

   a. **General Purpose Test and Measurement Equipment (GPTME).** Those items that are common to more than one product, platform or system, and is further defined within JSP 509: The Management of Test Equipment.

   b. **Special Purpose Test and Measurement Equipment (SPTME).** Those items which are designed, developed, produced and used solely for one product, platform or system.

4. Test Equipment can be further defined as:

   a. Test Equipment (TE) within the MOD is defined as those items which are used to provide an indication of system, equipment or component serviceability, and / or evaluate the ability of the system or equipment to meet precisely defined performance or measurement standards; this is further defined within JSP 509. It also includes simulators, where they are used to provide a standard against which performance or measurements are evaluated.

   b. Automatic Test System (ATS) is defined as a system which includes Automatic Test Equipment (ATE) and all associated items (eg test fixtures, test software etc), required to test a Unit Under Test (UUT). ATE is usually a computer-driven approach to testing in which the computer is used to control, via test software or firmware, complex test instruments to provide stimuli to, and measure, the response from a UUT.

POLICY

5. It is MOD Policy that for Test Equipment (TE), a centralised procurement and re-provisioning strategy will be adopted to enable maximum use and interoperability of TE within the MOD, thus providing the most cost effective and efficient solution to meet Platform, Project or Equipment requirements. This is managed by the Deployable Infrastructure Project Team (DIPT).

   a. Project Teams (PTs) are to engage with the GPTME gatekeeper[1] before commencing the selection, procurement or modification of TE within the MOD.

[1] JSP 886 Volume 7 Part 8.15 refers

b. Before commencement of all TE selection or procurement, existing MOD test solutions and TE shall be considered as part of the Supportability Analysis process.

c. If existing solutions from the MOD inventory are not viable, procurement of COTS TE shall be considered initially. SPTME shall only be procured after proving that this is the most cost effective solution.

d. To assist in driving an Open System Architecture philosophy, before commencement of ATS selection or procurement, existing MOD ATS test solutions shall be considered and if found unsuitable, then DEFSTAN 66-31 Part 8 shall be invoked.

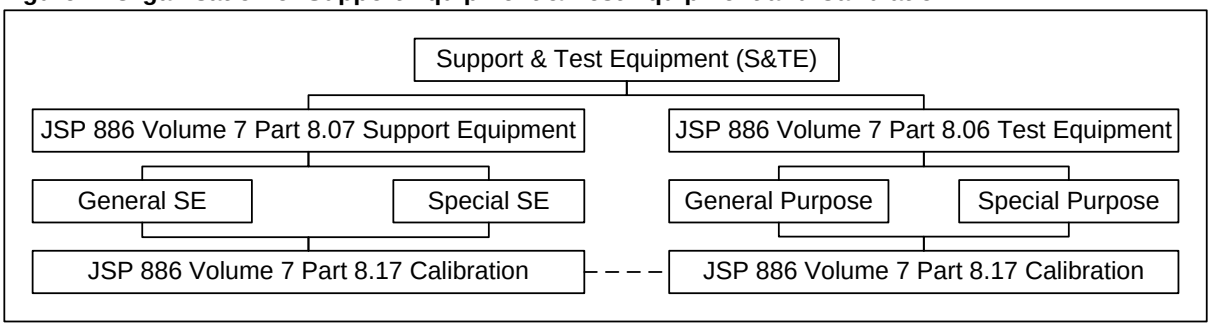
e. Calibration of TE must comply with MOD Calibration policy outlined in JSP 886 Volume 7 Part 8.17: Calibration.

f. It is MoD Policy to reduce the proliferation of User Access Devises (UAD's) therefore for all TE or SE incorporating a UAD, chapter 2 must be considered.

6. PTs will provide a Support & Test Equipment (S&TE) Plan to the GPTME Gatekeeper, as an ILS element, which will include details of the selection and in-service support requirements of the TE.

7. To reduce proliferation of non standard TE, which is expensive to support or calibrate, MOD units are not permitted to procure TE using local purchase budgets, unless in exceptional circumstances (refer to JSP 509).

Figure 1: Organisation of Support Equipment & Test Equipment and Calibration



PRECEDENCE AND AUTHORITY

8. The authority to carry out Test and Measurement is promulgated from Defence Equipment and Support- DE&S Corporate Governance Portal – Support Solutions Envelope.

MANDATED REQUIREMENTS

9. MOD TE is supplied to ensure that the material state of those equipments being tested can be verified. In order to meet the MOD's legal duty of care obligations, it is a requirement that all MOD TE must comply with all statutory European and UK Health and Safety legislation for the environment in which they are to be used or operated. This is substantiated within the Secretary of State's Policy Statement contained in JSP 815: Defence Environment and Safety Management, Annex A.

10. It is the responsibility of the PT to compile and maintain a Safety Case and Hazard Log through all stages of the life cycle of equipments and systems. The Safety case for

Test Equipment must demonstrate that the safety risk from the TE is ALARP (As Low As Reasonably Practicable). This assessment is to consider the actual TE, its impact on the item being tested, and the wider environmental area

11. All equipment purchased within the UK shall be CE marked in accordance with the European Directive. Any equipment purchased outside the UK should be CE marked by the importer of the equipment. This does not necessarily mean the physical attachment of the mark, but rather that there is a suitable and sufficient technical construction pack supporting the equipment. It should also be noted that the creation of a system from multiple pieces of test equipment will require the system to be self certified by the PT, which should take the form of a technical construction pack.

12. All Electronic and Electrical TE procured by the MOD must adhere to the requirements of DEFSTAN 66-31.

13. To reduce Whole Life Costs and Intellectual Property Right (IPR) issues, test software signal requirements shall be defined using IEEE 1641 Signal Test Definition (STD).

PROCESS

14. To ensure compliance to DEFSTAN 00-600, at the commencement of all procurements, PTs are required to produce an S&TE Plan detailing all TE technical and calibration requirements. Information on the TE procurement process, technical, and mandatory requirements are detailed in DEFSTAN 66-31 and JSP 509.

KEY PRINCIPLES

15. The GPTME gatekeeper will advise on the availability of equipment or instrumentation. This will ensure maximum interoperability and commonality whilst maintaining economy of scale. Where it can be demonstrated that this is not feasible, PTs are not to refer to specific equipment models; they are to use generic terminology which refers to the measurement requirement.

16. In the event that SPTME is essential, it is to be procured and supported by the PT. The PT must ensure that the S&TE Plan reflects the reasoning for SPTME.

17. In order that the MOD is not constrained by Intellectual Property Right (IPR) issues and therefore dependant on proprietary solutions, existing MOD ATS test solutions shall be considered in the first instance, and if found unsuitable, an Open System Architecture approach (DEFSTAN 66-31 Part 8 refers) must be utilized with all Test Program Set source documentation for hardware and software, along with user rights (IPR) being owned by the MOD. This will have the benefit of reducing whole life costs.

18. To ensure value for money, a cost based analysis shall be carried out on a case by case basis when determining if a Test Program Set (TPS) shall be migrated or rewritten. If found feasible, the migration[2] of existing in-service TPSs in their original format or the migration onto an existing in-service ATS will not contravene this policy.

19. Evidence of compliance to the relevant European Directives, UK Legislation and Regulations, shall be provided. This is particularly pertinent to complex weapon testing

[2] Migration – the transfer of the test program from one ATE to another.

and safety under test, as it will assist in the assurance that the weapon is in a known safe state, fit for purpose and that the TE will not hazard the weapon or vice versa.

20. Calibration of TE is to conform to MOD policy (JSP 886 Volume 7 Part 8.17) to provide MOD customers and TE users with confidence in the quality of calibration provided, thus ensuring that all TE is capable of fulfilling its intended role, taking into account product safety and fitness for purpose. This is achieved by calibrating TE at prescribed time intervals, to a specified requirement, against Measurement Standards which have accuracy traceable to the UK National Measurement Standards, or similar National Measurement Standards held by countries which are signatories of the same Mutual Recognition Arrangement as the UK.

ASSOCIATED STANDARDS AND GUIDANCE

21. Guidance:

a. DES JSC SCM-EngTLS-TM will provide advice and guidance on the requirements for ATS, Safety Under Test requirements for complex weapon testing and suitable Safety Cases for ATS.

b. DI PT will provide advice and guidance on TE requirements for GPTME and SPTME.

c. DES JSC SCM-EngTLS-TM will provide advice on all calibration requirements.

d. Support Solutions Envelope (SSE) - Key Support Area (KSA) 2 – Supportability Engineering.

22. Associated Standards:

a. JSP 430: MOD Ship Safety Management.

b. JSP 440: Defence Manual of Security.

c. JSP 454: Land Systems Safety and Environmental Protection.

d. JSP 482: MOD Explosive Regulations. Chapter 8.

e. JSP 509: The Management of Test Equipment.

f. JSP 553: Military Airworthiness Regulations.

g. JSP 815: Defence Environment and Safety Management.

h. JSP 886: Defence Logistic Support Chain Manual:

(1) Volume 3 Part 2: Contractor Logistic Support (CLS). Chapter 2: GPTME[3].

(2) Volume 7 Part 15: Gatekeeper.

(3) Volume 7 Part 17: Calibration.

i. DEFSTAN 00-56: Safety Management Requirements for Defence Systems.

[3] Policy refers only to repairable GPTME

j. DEFSTAN 00-600: Integrated Logistic Support. Requirements for MOD Projects.

k. DEFSTAN 02-43: Ancillary Support Equipment. Test Equipment and Tools (Cat2).

l. DEFSTAN 05-57: Configuration Management of Defence Materiel.

m. DEFSTAN 66-31: Basic Requirements & Tests for Electronic & Electrical Test & Measurement Equipment.

n. BS EN ISO / IEC 9001:2008: Quality Management Systems – Requirements.

o. IEEE 1641: IEEE Standard for Signal and Test Definition.

p. IEEE 488: IEEE Standard for Digital Interface for Programmable Instrumentation.

OWNERSHIP AND POINT OF CONTACT

23. The policy for Test Equipment is sponsored by DES JSC SCM-EngTLS-PEng.

a. Contact Details

DES JSC SCM EngTLS-TM
Tel: Mil: 9679 82690, Civ: 030679 82690

b. Document Editor

DES JSC SCM-SCPol-Editorial Team
Tel: Mil 9679 80953, Civ: 030679 80953

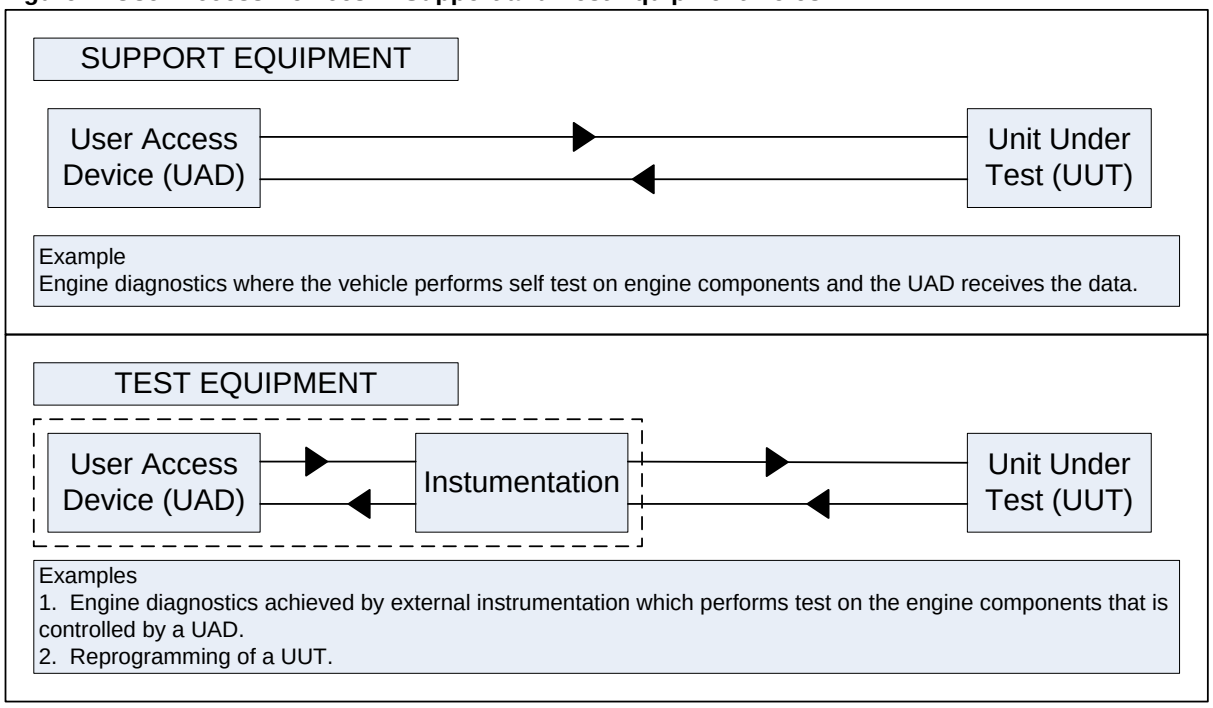
CHAPTER 2: USER ACCESS DEVICE (UAD)

BACKGROUND

1. User Access Device (UAD) in this document is a programmable computer designed to interface with other systems, accept data, execute a programmed list of actions and is able to display the results of these operations. The device is multifunctional / portable taking a number of forms including laptops, handhelds and tablets.

2. UADs can be utilised as Support Equipment (SE) or Test Equipment (TE) or both.

Figure 2: User Access Devices in Support and Test Equipment Roles



REQUIREMENTS

3. The drive within Defence is for the rationalisation of the MOD's information infrastructure. This involves the consolidation of information infrastructure, networked and non-networked, across Defence. Accordingly, DII is the infrastructure of choice for core information services supporting the MOD's operation as an organisation.

4. Due to the increased technological advances in UADs with multifunctional capabilities that can be utilised over a wide range of applications, this provides an opportunity for rationalisation and consolidation across a number of capability domains. Thereby PTs can benefit from the economies of scale, in terms of procurement and through life costs, which the MOD can bring to bear. When procuring a UAD as part of their SE or ATS solution PTs should:

a. In the first instance, seek a DII provided solution.

b. If a DII solution is not available or appropriate PTs should apply for DII exemption in accordance with the DII Exemption Policy (DIN 2011DIN05-028).

c. PTs with a valid DII exemption certificate should engage with Log NEC, the support UAD Gatekeeper, for the provision of a generic support UAD solution which meets both their needs and the MOD's drive towards a centralised procurement system for provisioning and through life support.

5. As part of the Supportability Analysis process an existing MOD, DII provided, UAD solution shall be considered. If a DII solution is not available the analysis process will be managed by LogNEC who will act as the Gatekeeper within the requirements of JSP886 Volume 7 Part 8.15: Gatekeeper Role in Utilisation of Common Defence Materiel.

6. Cognisance should also be taken of the information provided in JSP509 as detailed in Chapter 1.

UAD PROCUREMENT POINT OF CONTACT

7. The respective points of contacts for UAD procurement in priority order are:

a. DII POC: Local ISS representative.

b. Log NEC POC: DES Log NEC Front Door.

CHAPTER 3: TEST EQUIPMENT MANAGEMENT MATURITY LEVELS

1. The maturity of the support and test equipment management can be assessed during the life cycle of a project using the 9 Support Maturity Levels (SML) which are defined, along with suggested milestones, in Volume 7 Part 2 Chapter 2.

ULTIMATE SUCCESS CRITERIA

2. Ultimate Success Criteria

   a. All support equipment required to achieve the maintenance tasks in the Maintenance Plan are identified and clearly linked to the task requirements (this includes maintenance tooling, test equipment, calibration and/or diagnostic aids etc).

   b. For each type of support equipment the appropriate test methodology is identified or defined including approaches and tools, test equipment, handling equipment and diagnostic aids.

   c. Where appropriate, the standard or existing range of support and test equipment, (S&TE) has been optimised as part of the solution.

   d. The S&TE has been optimised for the contracted support environment and assumptions *(hard to prove….)*

   e. Support resources required to achieve the maintenance of all support equipment, rigs, training devices etc are identified and presented as part of the Maintenance Plan and datasets

   f. All special to type equipment has been designed and made or bought.

   g. The contribution the S&TE makes in the context of the overall capability is understood

   h. The cost of providing the S&TE is understood and actions has been taken to minimise it

   i. The S&TE technical data pack is up to date and an integral part of the capability

   j. There is a clear and agreed plan for the implementation, certification and integration of the S&TE as an element of the support capability.

   k. The required Technical Information for the use, calibration, maintenance, storage of S&TE etc is included as part of the Technical Documentation suite.

3. To enable the project to assess maturity against the success criteria, the measure of effectiveness for each SML detailed in Table 1 is to be agreed with the Contractor and included in the development or support contract.

Table 1: Assessment of Project Maturity

Support Maturity Level	Measure Of Effectiveness	Risk if not in place
1	Review of the URD and Use Study to identify TE related requirements and constraints.	TE will not be identified or developed. Failure to address testability during product design. Failure to implement policy.
2	Where requested by Customer, a draft Support Equipment Plan (SEP) may be produced at this stage. Otherwise, TE activities will be briefly described in the draft ISP. TE requirements should have been provided to Suppliers as part of the URD.	TE will not be identified as part of supportability analysis. Support solution is incomplete.
3	Depending on the nature of the programme, either a dedicated SEP may be produced or TE activities may be fully described in ISP. In-Service (existing) TE information should have been passed by MOD to Contractor. Initial TE data may be collected from Suppliers. Any special to type TE requirements, design concept and risks (likely impact on Training Solution, Maintenance Planning, Support Solution) should be jointly agreed at PDR.	Design will not be influenced to minimise special to type TE. TE not developed or identified. WLC will increase due to proliferation of Special To Type TE.
4	Depending on the nature of the programme, updated SEP or S&TE section in ISP to reflect any changes in the ILS programme or the overall programme. The SEP (or TE section in ISP) is in a mature state for the D&M phase and only minor amendments are expected. TE data from Suppliers and that from the initial Supportability Analysis may be available. Any special to type TE designed for the programme should have been incorporated into PDR.	Design not influenced to minimise special to type TE. Unable to support or test the product. WLC will increase.

Support Maturity Level	Measure Of Effectiveness	Risk if not in place
5	Depending on the nature of the programme, updated SEP or S&TE section in ISP should reflect any changes in the ILS programme or the overall programme. The SEP (or S&TE section in ISP) is in a mature state for the D&M phase and only minor amendments are expected. All TE should have been identified. Provisioning data on TE should have been collected. Rationale for use of special to type TE should have been agreed with Customer. A scaled TE Recommended List should be available from/to Customer. A Demo (feasibility study/trial procedure) may have occurred to validate the TE Recommended List. Any special to type TE designed for the programme should have reached CDR and a representative prototype should be available for validation.	Unable to support or test the product. TE not available for diagnostics or repairs. Support solution not complete.
6	Sufficient range & scale of TE should be available to the Customer for equipment support.	Unable to repair or carry out diagnostics on the product. Proliferation of bespoke TE. Increased WLC.
7	Depending on the nature of the programme, an updated SEP or S&TE section in ISP reflects the Support Solution. The SE will be maintained in line with the Support Solution.	The product will not be supportable or maintainable. Proliferation of bespoke TE. Increased WLC.
8	The SEP (or S&TE section in ISP) has been updated to reflect the reviewed Support Solution. The TE will be maintained in line with the reviewed Support Solution	TE may need to be replaced or modified to continue supporting the product. TE may become obsolescent.
9	Establishing which TE should be disposed of as detailed in Disposal Plan (managed by the ISP) and which SE should be retained in-service.	The TE will not be disposed of in a cost effective manner. Late recognition of hazardous items increases unplanned expenditure during disposal.