

ORDER

6/9/95

1100.157A

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

NATIONAL SYSTEMS ENGINEERING DIVISIONS MAINTENANCE

SUBJ: PROGRAM PROCEDURES, OPERATIONAL SUPPORT (AOS)

1. PURPOSE. This order prescribes operating procedures for the National Systems Engineering Divisions within Operational Support (AOS) in the implementation of the maintenance engineering support for the National Airspace System (NAS). In this document, these divisions are referred to collectively as the National Systems Engineering Divisions (NSED). This order also defines the delegated signature authority for NAS systems modification and maintenance documentation. These operating procedures for the NSED's are augmented by other directives.

2. DISTRIBUTION. This order is distributed to the division level within Airway Facilities, Air Traffic, Office of System Architecture and Program Evaluation, and the Office of Communications, Navigation, and Surveillance Systems in Washington; to division level at the FAA Logistics Center and the Airway Facilities Division at the FAA Academy; to the branch level in the Engineering, Research, and Development Service, Resource Management Service, and Engineering, Test, and Evaluation Service at the FAA Technical Center; to the branch level in the regional Airway Facilities divisions; and to all Airway Facilities field offices with a standard distribution.

3. CANCELLATION. Order 1100.157, National Engineering Field Support Division Maintenance Program Procedures, dated March 17, 1992, is canceled.

4. EXPLANATION OF CHANGES. This revision reflects the changes required by the establishment of AOS which combined the three field support divisions, ASM-400, ASM-600, and ATR-400 (National Automation Engineering Field Support Division, National Engineering Field Support Division, and National Automation Field Support Division, respectively).

5. DELEGATION OF AUTHORITY.

a. The authority to sign the following documents for the director is delegated to the NSED managers. This authority may be redelegated only to whomever is appointed in an acting capacity.

(1) Electronic equipment modifications (EEM).

(2) Plant equipment modifications (PEM).

(3) New modification handbooks.

(4) Minor revisions, changes, and corrections to maintenance technical handbooks.

(5) Site technical bulletins (STB).

(6) Site program bulletins (SPB).

(7) Notices effecting modifications and maintenance documentation.

(8) Table of contents for 6000 series modification directives.

b. The authority to sign new or major revisions to maintenance technical handbooks remains with the Director, AOS-1. A major revision is defined as a substantial change in the total concept of a handbook.

c. The authority to select the specific NSED responsible for field support of existing and new NAS systems, equipment, and software deployed into the FAA operational inventory shall remain with the Director, AOS-1. Program managers for new NAS systems, equipment, and software to be deployed shall get the identity of the NSED designated for their system(s) from AOS-1.

6. REPORTS. The NSED shall provide the following to AOS-1:

a. Project Status Report(s) (hardware, software, and documentation).

b. Contract Status Update Report.

c. Priority List Update Report.

7. RESPONSIBILITIES.

a. Operational Support is the office of primary responsibility (OPR) for the series of modification (EEM/PEM) handbooks, National Airspace System Configuration Management Documents (NAS MD), and the series of maintenance technical handbooks that contain maintenance standards, schedules, and procedures. The NSED's shall update, issue, and serve as the OPR for these NAS MD documents. All material for these documents is issued by the authority of AOS-1. AOS provides the authorizations for the development and deployment of engineering changes to the configuration management baseline throughout the life of fielded equipment, systems, or software in the NAS. The actual implementation of engineering changes into the field operation is in consonance with the latest version of Orders 6032.1, Modification to Ground Facilities, Systems, and Equipment in the National Airspace System, and 1100.134, Maintenance of National Airspace System Automation.

b. The Air Traffic Configuration Control Board (ATCCB) shall retain configuration control decision (CCD) control over operational Air Traffic Control (ATC) software systems. That is, CCD's required to change the NAS MD's for the ATC HOST Computer System, Automated Radar Terminal System (ARTS), and the Flight Service Automated System (FSAS) shall be signed by the ATCCB. The cognizant Air Traffic OPR's (ATM/ATP/ATR/ATZ) shall verify operational functionality of all functional changes to the operational software systems and ensure that all Air Traffic operational, training, and procedural requirements will be accomplished. The cognizant NSED's shall be a MUST evaluator of all such case files before approval by the ATCCB in accordance with the latest edition of Order 1800.8, National Airspace System Configuration Management.

c. The program managers/directors in the program offices for Communications, Navigation, and Surveillance Systems, Air Traffic Systems Development, and NAS Transition and Implementation Service are responsible for:

(1) Acquiring camera ready copies of instruction manuals, component or assembly level data, software source code and documentation, maintenance support equipment (i.e., installation and delivery of a copy of the fielded system(s) for second-level support and configuration management to the appropriate [NSED](#), compilers, automatic test equipment (ATE), test program sets (TPS), and special programmable read-only memory (PROM) and electrically erasable programmable read-only memory (EEPROM), and programming equipment for all deployed equipment, systems, and software procured by program offices.

(2) Performing coordination and technical consultation with the cognizant NSED during the acquisition process prior to field delivery of new systems, equipment, or software.

(3) Assuring that accurate and complete baseline documentation is delivered to the NSED for each system or equipment prior to system shakedown testing (SST). Then from that juncture, all subsequent modifications required to satisfy contractual or operational commitments shall be funded by the responsible program office but approved for deployment by the cognizant NSED. From this point on in the life cycle of the system, equipment, or software, no modifications shall be delivered to the field or implemented unless approved by the cognizant NSED. Contractor developed modifications shall be reviewed and approved by the NSED. The release of these modifications shall be via an [EEM, PEM, STB, or SPB](#) issued by the cognizant NSED.

(4) Coordinating with the cognizant NSED on the development, acceptance, and implementation of enhancements or improvements to operational systems, equipment, or software.

(5) Providing funds for software and equipment modifications in support of program modifications which occur while equipment is still being fielded and for test equipment required to perform shakedown testing. This includes funding for the retrofit of systems already fielded and funding to support key-site activity for new software releases, major program technical report (PTR) fixes, or installation of national local patches.

(6) Promoting the timely development of technical knowledge and proficiency in NSED personnel on new systems, software, and equipment being installed in the NAS. This shall be facilitated by NSED's formal participation in at least the following phases of the facilities and equipment (F&E) program:

(a) Specification, system, software, and equipment design reviews.

(b) Acceptance testing, including all phases throughout operational test and evaluation (OT&E).

(c) Instruction book reviews, in-process and final.

(d) Technical training sessions, normal and NSED specified, provided by the program office and/or the contractor(s).

(7) Establishing the product baseline for those systems under their purview in cooperation with the NSED. Refer to Order 1800.8.

(8) Placing baseline documents into the National Airspace System Master Configuration Index, NAS-MD-001.

(9) Transferring the baseline management to the Maintenance Engineering Configuration Control Board ([MECCB](#)) or the [ATCCB](#) as appropriate after establishment of the product baseline:

(10) Providing funding and contractor personnel for software, hardware, and/or firmware engineering support services through the [NSED](#) for a minimum of 2 years. This support is to begin at the time of commissioning the first operational facility.

(11) Providing contract vehicle(s) to extend engineering support services for at least an additional 3 years beyond the initial 2 years. The contractor extension(s) shall be funded by AOS.

d. The NSED's are responsible for:

(1) Providing engineering support for deployment readiness review on new systems by directing the development and accomplishment of shakedown testing for assigned equipment, software, and systems. See the latest version of Order 1810.4, FAA NAS Test and Evaluation Policy.

(2) Providing modification engineering, software maintenance, and documentation for the NAS. Except for field-employed emergency modifications, NSED's are the **ONLY** organizations through which modifications to commissioned NAS systems, software, and equipment shall be authorized or implemented. These divisions maintain the baseline configuration for all commissioned NAS systems, equipment, and software. This responsibility begins when the first contract item is operational in the NAS. The NSED's shall ensure that all logistics support requirements are addressed in modification planning.

(a) The modification engineering functions include the design, development, testing, and acquisition associated with hardware and software modifications to commissioned NAS facilities and systems.

(b) The software maintenance function includes the maintenance of the baseline software, design, development, testing, and delivery of computer program improvements and corrections in support of operational, functional, diagnostic, and various support programs. The term software as used in this order encompasses firmware. Attributes of firmware which are not covered in software maintenance are addressed in the modification engineering function.

(c) The documentation function includes preparation, editing, proofreading, printing, and distribution of all documentation generated by the NSED's in their hardware and software maintenance engineering functions. Also included are the generation of new maintenance technical and modification handbooks, updating of maintenance technical handbooks, issuing changes to modification handbooks and associated technical instruction books and software manuals, maintaining directives case files, and maintaining a complete file of handbooks and instruction books reflecting the current level of agency-approved equipment modifications and maintenance guidance, standards, and tolerances. The [NSED](#) software engineering maintenance responsibilities include, but are not limited to, Computer Program Functional Specifications (CPFS), User's Manuals, Operator's Manuals, and all appropriate DOD-STD-2167A compliant documentation. The NSED's also provide for reprinting and subsequent restocking services for all documentation generated by them.

(d) The NSED's provide engineering technical support to regional field offices. The NSED's are the **ONLY** organizations authorized to provide second-level engineering/technical support for commissioned NAS facilities, systems, subsystems, equipment, and software.

(e) The NSED's provide the authorizations for development and deployment of all modifications for systems, software, and equipment assigned to them. Refer to [Appendix 1](#), NSED Facility Assignments.

(f) Participating in national airspace integrated logistics support management teams (NAILSMT) to ensure that hardware and software support issues, including identification of maintenance and training support requirements are addressed in a timely manner.

e. Regional AF divisions assure that known or perceived equipment or system problems and deficiencies are

corrected and/or reported to the appropriate NSED. The regional AF personnel are responsible for maintenance and repair of their systems. The site AF staff, in cooperation with the sector and regional office support functions, is the first-level support organization. AOS serves as the agency's second-level support organization for the NAS.

8. AUTHORIZATIONS AND APPROVALS. An authorizing organization is the office providing permission or sanction to proceed with a given task or project. Once a task or project is authorized, an approving organization approves the project expenditures, technical solutions, documentation, implementing directives, and sanctions installation and/or operational use of final product(s) at NAS field facilities.

- a. The NSED's have full authorization to carry out responsibilities delegated by the AOS-1.
- b. Figure 1 identifies the authorizing and approving offices for the activities indicated.
- c. The terms modification and change apply equally to hardware, software, or documentation. These different areas of effort are all treated the same as far as reporting problems and requesting changes are concerned. This philosophy applies throughout this order.
- d. The managers of the NSED's shall approve the expenditure of funds on authorized projects. They are authorized to adjust NSED project expenditures, as appropriate, so long as the total program funds assigned are not exceeded. Any adjustments made shall be reported in quarterly status reports to AOS-1.
- e. The NSED managers shall also approve the expenditure of assigned reserve funds or other project surpluses for important, unfunded projects undertaken during the program year. These projects will be identified, along with estimated cost, in the regular status reports (see [paragraph 6](#)). The total program funds assigned shall not be exceeded.
- f. Time-critical changes to computer software programs or facilities, systems, subsystems, and equipment under the purview of the [NSED's](#) may be made by general notice (GENOT), notice, or other interim documentation by the approving NSED. An urgent NAS change proposal (NCP), if required to reflect such changes, shall be submitted as soon as feasible. Permanent documentation reflecting these changes shall be assigned a high priority for accomplishment.

FIGURE 1. AUTHORIZING AND APPROVING OFFICES FOR NSED ACTIVITIES

Note: AOS-1 is the director of AOS, NSED is the manager of the NSED, RO is the regional AF/AT division manager, and SM is the sector manager.

<u>Activity</u>	<u>Authorizing Office</u>	<u>Approving Office</u>
1. NAS change proposal (NCP) waiver approval	Varies	Varies, see Order 1800.8

2. New maintenance technical handbooks and major revisions of handbooks	AOS-1	AOS-1
3. All national standard handbook changes and minor revisions; new modification handbooks; technical issuance changes; EEM/PEM's; SPB's; STB's	NSED (See Par. 5a)	NSED (See Par. 5a)
4. NSED field test	In accordance with the latest version of Orders 6032.1 and 1100.134	NSED
5. Emergency modification		
a. Non-software	RO or SM according to region's policy	RO or SM according to region's policy
b. software	In accordance with the latest version of Orders 6032.1 and 1100.134	NSED
6. Notices effecting implementation of a modification issued by the NSED	NSED	NSED
7. Notices effecting application of maintenance technical	NSED	NSED

9. PROBLEM IDENTIFICATION.

- a. Discrepancies software, hardware, or documentation in systems for which the [NSED's](#) have been assigned field support responsibilities (see [Appendix 1](#), NSED Facility Assignments) will be referred directly to the appropriate NSED from all organizational levels. Information copies of the reports on these discrepancies should be forwarded to the cognizant regional office. The referral methods can be by whatever means deemed appropriate; i.e., letters, telephone contacts, etc. Problems considered not eligible for national implementation will be returned to the submitting organization without further review.
- b. The NSED's will also identify and resolve problems encountered in the course of their daily activities.
- c. Problems identified in systems, subsystems, facilities, and equipment, which fall within the criteria established in Order 1800.8, will be screened and processed in accordance with the procedure outlined in that order.
- d. Any improvement recommended for national consideration shall be evaluated by each organizational level to which it is submitted to be sure that only the most significant requests are forwarded to the next higher level. To do this, a standard set of screening criteria is established and all requests will be screened through supervisory and management channels, beginning at the originating office, using these criteria. The basis of the criteria is user service and reflects safety, reliability, and cost/savings, in that order. Refer to [paragraph 10](#) for a full explanation of the screening criteria.
- e. Employee suggestions impacting configuration-managed items covered by Order 1800.8 are required by the latest version of Order 3450.7, Incentive Awards Program, to be evaluated and processed according to all provisions of Order 1800.8. The cognizant NSED shall prescreen suggestion casefiles, using the [paragraph 10](#) for criteria, develop, and implement any resulting [CCD](#) pertaining to the suggestion.
- f. NCP case files submitted by the field shall be prescreened by the cognizant NSED. Applying the criteria outlined in [paragraph 10](#), the NSED's shall:

(1) Determine the case file category and needed level of processing for:

- (a) Regional-level impact issues.
- (b) NSED documentation and supply support impact issues.
- (c) National impact issues requiring broad review.

NOTE: Regional and documentation/supply support-level case files shall be processed wholly within the NSED. Case files on issues having national impact and requiring broad review shall be forwarded for processing.

(2) After determining the impact level of a proposed change, the NSED shall take the appropriate action as follows:

- (a) Recommend approval and forward national impact case files to the [Engineering Specialties Branch, ASD-140, for NCP](#) processing.
- (b) Disapprove the case file stating the reason(s) and returning it to the originating region.
- (c) Return the case file to the originating office for additional information.

10. SCREENING CRITERIA. The following criteria shall be applied during case file evaluations to determine whether

the proposed change can be approved. Generally, the equipment/facility type to which a proposed modification applies shall not be undergoing replacement or scheduled for replacement in the FAA inventory within 2 years from the date screening criteria are being applied. Exceptions to this are proposed changes of an emergency or urgent nature that are considered critical to the NAS which shall all be forwarded. Upon satisfying these initial review criteria, one or more of the following must also be satisfied for a proposal to qualify for further consideration.

- a. Modifications to improve reliability/availability which show identifiable increases or are supported by sufficient outage/failure data to show operational impact. The criticality of the facility to the NAS, useability, internal redundancy, and overlapping coverage or alternate facilities must be considered. This criteria does not sanction convenience modifications or any changes that degrade system reliability/availability. Any review level may reject a proposed change if its merits are not sufficiently demonstrated.
- b. Occupational safety modifications that identify a specific agency or the Occupational Safety and Health Act standard(s) being violated unless a cursory examination reveals an obvious hazard.
- c. Potential cost savings exceed the estimated costs of evaluation, development, implementation, and materials.
- d. Time-savings or convenience modifications producing tangible employee-hour savings by facility type that can be reflected in staffing standards.
- e. Energy-saving modifications, the cost of which amortize within a 15-year period.
- f. Documentation improvements about clarification or correction of instructions contained in the NAS maintenance handbooks or manufacturers technical instruction books; i.e. provided the life expectancy criterion specified in [paragraph 10](#) are met.

11. PROJECT ASSIGNMENTS.

- a. Project assignments to the [NSED](#) are normally made using FAA Form 1800-49, HAS Configuration Control Decision. However, projects may become assignments to the NSED's through other less formal processes. These include hardware discrepancy reports (HDR), program technical reports (PTR), letters, telecons, program directives, etc. Other projects may be undertaken at the discretion of the NSED manager.
- b. A numbering system shall be established by each [NSED](#) for the purpose of project identification. The NSED shall maintain a complete listing of projects assigned and develop a priority for accomplishment.
- c. The regional AF divisions may volunteer to accomplish projects normally undertaken by the NSED. They may wish to establish technical assistance teams for problem analysis. These teams should be defined in advance of development of needs. Volunteer assistance will not be permitted in project approval, printing, contract awarding, management, and release of modification kits, parts, or equipment for field organizations. All of these excepted tasks shall be accomplished only by the NSED. Volunteer organizations shall consult with the NSED on any projects so that all plans for implementation, including documents for procurement and implementing directives, will be completely developed to conform with national standards. Final approval of all documents, prototypes, directives, and project reports shall be made by the appropriate NSED. Any projects undertaken shall be completed in their entirety to national standards. The national standards include, but are not limited to, the latest versions of:

(1) Order 1320.58, Equipment and Facility Directives modification and Maintenance Technical Handbook.

(2) Order 1320.1, FAA Directives System.

(3) Order 6032.1, Modifications to Ground Facilities, Systems, and Equipment in the National

Airspace System.

(4) FAA-D-2494/b, Technical Instruction Book Manuscript: Electronic, Electrical, and Mechanical Equipment, Requirements for Preparation of Manuscript and Production of Books.

(5) DOD-STD-2167A, Defense System Software Development.

(6) Current internally imposed standards each NSED uses to assure quality products are delivered for field use.

12. PROGRAM FUNDING AND DEVELOPMENT. Funding to support the modification program activities of the NSED shall be budgeted by the NSED and submitted as part of their yearly operations funds estimates for inclusion in each year's AOS budget. Some projects may require and receive funding through a program office or other source from F&E appropriations.

13. TECHNICAL SUPPORT. The NSED's shall provide technical support to all commissioned systems, subsystems, facilities, and equipment in the FAA inventory. Refer to [appendix 1](#) for the specific systems assigned to each NSED. The NSED's shall also provide support to F&E projects. The F&E support for a new or proposed NAS system begins when an NSED is selected by AOS-1 and resources are identified. The F&E support shall extend through commissioning of the final system. The NSED shall maintain a standard configuration (baseline) throughout the life of the equipment or system. Changes to the baseline shall be coordinated for information only with the appropriate program office(s).

14. FIELD SUPPORT. Engineering support to the field is provided by the NSED's. New systems added to the FAA inventory will immediately be provided field support by the cognizant NSED unless specific arrangements are made to provide NSED-managed contractor second-level field support. This service may be provided by telephone and, where necessary, onsite assistance shall be provided. The service is available on a 24-hour basis. Direct communications with the cognizant [NSED](#) is strongly encouraged. Onsite support activity, travel, and expenses for NSED personnel are funded by the NSED.

15. PREPARATION AND APPROVAL OF DIRECTIVES.

a. Directives Management. Directives management representatives are designated within the NSED's to provide for the necessary directives activities. The Planning and Policy Division, AFZ-600, is responsible for the overall AOS directives management function and provides guidance and oversight of all directives within the purview of AOS.

b. Preparation of Documents. Documentation in support of maintenance technical handbooks and modification handbooks (EEM/PEM) shall be prepared in accordance with Order 1320.58.

c. Routing Approval Packages.

(1) All modification directives and maintenance technical handbooks and changes approved by the NSED's for the AOS-1 are printed and distributed in accordance with the established distribution procedures for the particular system, software, or equipment. These directives include, but are not limited to, [EEM's](#), [PEM's](#), [SPB's](#), and [STB's](#).

(2) All new maintenance technical handbooks and complete major revisions to maintenance technical handbooks shall be approved and signed by AOS-1. Editorial, coordination, and publishing responsibilities remain with the NSED's who prepared the documents.

d. Release of Modification Directives. Modification directives shall not be released to the field prior to release of

any associated modification kits, tapes, disks, or other supporting material. No modification or modification directive shall be released by any organization other than the NSED's for any HAS system or facility.

16. CONFIGURATION MANAGEMENT. The configuration of all facilities, systems, subsystems, equipment, and software under HAS configuration management control, as listed in NAS-MD-001, shall be managed in accordance with the latest versions of Orders 1800.8, 1100.134, and 1100. 145.

a. The operational baseline configuration of all new systems, facilities, subsystems, equipment, or software added to the FAA inventory shall be maintained by the designated NSED. This includes product baseline configuration and users documentation and data. The product baseline is established by the FAA upon completion of the functional and physical configuration audits (FCA, PCA) and following first article acceptance. (For further information, refer to Order 1800.8.)

b. The appropriate NSED will provide control of a baseline configuration on any designated facility. Except under emergency conditions, as indicated in [figure 1](#), no change(s) shall be performed on a system unless approved by the cognizant NSED.

c. The designated NSED will assist the responsible program office in getting all delivered systems, subsystems, equipment, and software with configurations below the defined baseline upgraded to the baseline configuration. Attaining the baseline configuration for all down-level facilities is the responsibility of the cognizant program office. The implementation of [CCD](#) authorized changes from the defined baseline configuration are the responsibility of the cognizant NSED.

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APPENDIX 1. NSED FACILITY ASSIGNMENTS

NOTE: For descriptions of facility contractions, see the latest version of Order 1375.4, Standard Data Elements and Codes - Facility identification and Supplemental Standards.

NATIONAL AIRWAY SYSTEMS ENGINEERING DIVISION, AOS-200

ACD DMER

ACEPS DSRCE LLWAS PRM

AID DTE MALS RRH

ALS DVR MALSR RRWDS

ALSF EDPS MAPPER RTR

ALTE ELD MAREQ RSS

ANICS ETVS MCEPS RVR

ARBCN FAATSAT MCR SALS

ARCRB FAC MCT SAN

ARMS FIFO MDS SB

ARSR FLD MHFR SCAT-1

ARTCC FM MIM SCC

ASDE FMA MLS SDM

ASI FOTS MM SSALR

ASOS FPS MTDS SSALS

ASR* FSS NARACS SSO

ATBM GATR NDB SSRBD

ATCBI GDL NEXRAD STATMUX

ATCT GFR OAW STVS

ATIS GPS ODALS SX

ATRAM GS OFFRD TACAN

AWANS H OLD TACR

AWIS HCVR OM TCD

AWOS HEAT PAPI TCSS

BDIS HH PATWAS TDWR

BRITE HIWAS PAR TELEX

BUEC IATSC PCS TML

CCMS ICSS PRM TR

CCTV IFSS PX TRACO

CERAP IM RAPCO TRACAB

CHI IMSLA RATCF TROPO

CKT IMLSE RBC TWEB

CMLT ITWS RBDE UB

COMCO LCOTE RCAG UPS

CTRB LDA RCF VAS

CST LDIN RCIU VASI

DASI LDRCL RCL VEHS

DF LINCS RCO VFSS

DME LIVQ RDVS VMS

DASI LMM REIL VOR

DGPS LOC RML VOT

DMN LOM RMS WAAS

RMVC WSM

WSP

*Except ASR-9

NATIONAL ENROUTE SYSTEMS ENGINEERING DIVISIONS, AOS-300

CCCH DCC MDARC PDC

CDC DARC MSP SMMC

CTS FDIO NOSS TMS

CUE FSP NRC WFMU

CPF GENASYS ODAPS

CPH ISSS OFDPS

CPN MAPS PAMRI

NATIONAL TERMINAL SYSTEMS ENGINEERING DIVISION, AOS-400

ARTS EARTS TAMPA UMBRELLA TCCC

DBRITE SRAP TAAS TCDD

NATIONAL DATA COMMUNICATION SYSTEMS ENGINEERING DIVISION, AOS-500

ADAS CWP MCC RBDPE

AFSS DLP MCS RIT

AMCC FDEP MDT RWP

ASR-9 FSAS MPS VSCS

AWP FSDPS MWP WMSCW

CD GMCC NADIN

CNS GWDS RASS