No. 19253

UNITED STATES OF AMERICA
and
FEDERAL REPUBLIC OF GERMANY

Memorandum of Understanding concerning development of national air traffic control systems (with annex). Signed at Washington on 8 August 1979 and at Bonn on 20 August 1979

Authentic texts of the Memorandum of Understanding: English and German.

Authentic text of the annex: English.

Registered by the United States of America on 7 November 1980.

ÉTATS-UNIS D'AMÉRIQUE
et
RÉPUBLIQUE FÉDÉRALE D'ALLEMAGNE

Mémorandum d'accord relatif au développement de systèmes nationaux de contrôle du trafic aérien (avec annexe). Signé à Washington le 8 août 1979 et à Bonn le 20 août 1979

Textes authentiques du Mémorandum d'accord : anglais et allemand.

Texte authentique de l'annexe : anglais.

Enregistré par les États-Unis d'Amérique le 7 novembre 1980.

MEMORANDUM OF UNDERSTANDING[1] BETWEEN UNITED STATES OF AMERICA, DEPARTMENT OF TRANSPORTATION, FEDERAL AVIATION ADMINISTRATION, AND THE FEDERAL REPUBLIC OF GERMANY, FEDERAL MINISTER FOR RESEARCH AND TECHNOLOGY

Whereas, the United States of America, Federal Aviation Administration (hereinafter referred to as the FAA) and the Federal Minister for Research and Technology of the Federal Republic of Germany (hereinafter referred to as the BMFT) have a common interest in cooperating in the development of their national air traffic control systems; and

Whereas, Section 312 (*c*) of the U.S. FAA Act of 1958, as amended, directs the Administrator of the FAA to develop, modify, test, and evaluate systems, procedures, facilities and devices to meet the needs for safe and efficient air navigation and air traffic control; and

Whereas, Section 305 of the FAA Act of 1958, as amended, directs the Administrator of the FAA to encourage and foster the development of civil aeronautics and air commerce in the U.S. and abroad; and

Whereas, the FAA and BMFT have common objectives in their individual research and development programs, to improve air traffic control;

Now, therefore, FAA and the BMFT agree to undertake joint programs, in accordance with the following understanding and arrangements.

Article 1. PURPOSE OF AGREEMENT

The purpose of this agreement is to establish a program for cooperation in the development of air traffic control systems and to share information derived from these programs to effect improvements to the respective ATC systems in an efficient, cost-saving manner.

This purpose will be achieved by any of the following:

—The exchange of information regarding programs and projects, research results, publications.

—The execution of joint analyses.

—The coordination of programs and projects, and their execution based on shared effort.

—The exchange of scientific and technical staff.

—The exchange of specific equipment and systems, particularly for research activities and compatibility studies.

—The joint organization of symposia or conferences.

—Reciprocal consultations with the aim of establishing concerted action in appropriate international bodies.

Cooperation in the development and testing of the respective ATC systems will utilize the capability of the FAA and the EMFT in areas where both possess expertise.

Article 2. SCOPE

The scope of the effort under this agreement involves the development of advanced guidance and navigation systems for application to the air traffic control system. Special

[1] Came into force on 20 August 1979 by signature, in accordance with article 12.

effort will initially be devoted to the ICAO-selected Microwave Landing System. The scope comprises, but is not limited to the program tasks, schedules and plans as included in the technical annex to this Memorandum of Understanding.

Article 3. FUNDING

In order to carry out the provisions of this agreement, the FAA and the BMFT will each assume the cost of the work to be done by it, in accordance with specific tasks identified in the technical annex.

Each party will fund the costs of its respective activity under this Memorandum of Understanding. All program activities under this Memorandum of Understanding will be subject to the applicable laws and regulations of each country.

Article 4. IMPLEMENTATION

For the implementation of this Memorandum of Understanding, a joint FAA/BMFT committee shall be established on cooperation in this field. This committee will implement, coordinate, and review all aspects of this Memorandum of Understanding and, where necessary, make recommendations covering specific means by which this Memorandum of Understanding shall be implemented. The committee shall decide on changes and amendments of the technical annex.

The joint committee shall consist of six members, three of which shall be appointed by each of the parties to this Memorandum of Understanding. The American members shall be appointed by the Federal Aviation Administration. The German members shall be appointed by BMFT. Each party shall designate one principal member.

The joint committee will meet as agreed upon between the principal members of the committee, alternately in the United States of America and in the Federal Republic of Germany. The principal member of the committee for each country shall act as chairman of the joint committee whenever it meets in his country.

After mutual agreement, each party has the right to invite advisors as necessary.

At least once a year, the parties will provide the joint committee with a comprehensive review of the program status and plans which concern cooperation under this Memorandum of Understanding.

Article 5. EXCHANGE OF PERSONNEL

Under this agreement and as identified in the attachment, an exchange of technical personnel may be undertaken as required to pursue the work described in the technical annex. Such personnel will accomplish work associated with the programs of their organization and as mutually agreed. Such personnel may be from the Federal Aviation Administration or the Minister for Research and Technology or their contractors, or supporting Government agencies, as mutually agreed. Administrative support would be arranged by the FAA or BMFT or their contractors, or supporting Government agencies, as mutually agreed. Administrative support would be arranged by the FAA or BMFT as the host agency.

Article 6. EQUIPMENT AND LOAN ARRANGEMENTS

It is anticipated that equipment will be exchanged as a part of this agreement as the program proceeds. Such equipment will be identified in the appropriate technical annex. With respect to the exchange of equipment, the following provisions apply:

—FAA or the BMFT (or DFVLR on behalf of BMFT) as a lender will, at its own expense, transport any equipment to the borrower's designated location, identifying its value. The FAA or BMFT (or DFVLR on behalf of BMFT) as a borrower will assume custody

and possession of said equipment upon its delivery to the designated receiving point. Upon completion of use or expiration or termination of the agreement, the borrower will return the equipment to the lender.

—The borrower will be totally responsible for installation. The lender will assist in securing export licenses and other documents with respect to the equipment. The lender will assist the borrower in locating sources of supplies for common items and parts peculiar which are not readily available to the borrower.

—The borrower will place and install equipment in accordance with the agreed program plan, as shown in the technical annex.

—The borrower will operate and maintain equipment in proper condition during the period of the loan, and will insure operability of the equipment and will permit inspection by the lenders at any reasonable time.

—In the event loss or damage of any equipment exchanged under this agreement and as described in the technical annex occurs, the borrower agrees to compensate the lender for value of items lost or damaged.

Article 7. RIGHTS

Except as required by applicable law, neither the BMFT nor the FAA will present any information or material pertinent to the tasks, or related to the agreed program to third parties outside of contractors and subcontractors engaged in this cooperation, to any public forum or print and distribute same without the consent of the other party.

FAA will not release information under the U.S. Freedom of Information Act transmitted by BMFT or its contractor which has been marked proprietary and which comes under exemption No. 4 of the Freedom of Information Act for proprietary information.

FAA shall notify BMFT of any request under the Freedom of Information Act, and the two parties shall jointly discuss the proprietary nature of this information.

Article 8. LIAISON

Program liaison will be accomplished through the designated liaison point of contact. Additionally, technical program management contacts will be established as indicated in the technical annex for the specific activity. Program liaison points of contact are:

U.S./FAA
Office of Systems Engineering Management
International Staff, AEM-6

BMFT
Aeronautical Research Section

Article 9. COORDINATION WITH OTHER NATIONAL AUTHORITIES

The Federal Aviation Administration will coordinate with the National Aeronautics and Space Administration on tasks and their participation in specific areas will be determined and agreed upon.

Additional coordination with other national authorities supporting Government programs will occur, and their participation in specific efforts will be determined and agreed upon.

Article 10. BERLIN CLAUSE

This Memorandum of Understanding shall also apply to Land Berlin, provided that the Government of the Federal Republic of Germany has not made a contrary declaration to the Government of the United States of America within three months from the date of entry into force of this Memorandum of Understanding.

Article 11. TERMINATION AND DURATION

This Memorandum of Understanding shall be valid for five years from the date of entry into force. It may be extended by the written agreement of the parties. Either party may terminate the present agreement on twelve (12) months' written notice to the other party.

Article 12. EFFECTIVE DATE

This Memorandum of Understanding shall enter into force on the date of last signature.

DONE at Bonn and Washington, in duplicate in the English and German languages, each text being equally authentic.

Federal Minister for Research and Technology,

Federal Republic of Germany:

By: [*Signed — Signé*][1]
Title: Ministerialdirektor[3]

Date: 20.08.1979

United States of America
Department of Transportation
Federal Aviation Administration:

By: [*Signed — Signé*][2]
Title: Director of International Aviation Affairs (Acting)
Date: August 8, 1979

WORK PLAN AND PROGRAM SCHEDULE—
TECHNICAL ANNEX I

Program Task No. 1

Assessment of the operational requirements for and benefits of 360-degree navigational guidance in the TMA and as an integral element of the Time Reference Scanning Beam Microwave Landing System (TRSB/MLS).

1.1.	Both parties will propose locations of typical sites for analysis. Listing will include airports where 360-degree coverage would appear to provide improved operations.	FAA + BMFT	
	Action Items		*End of Action Item: Month/Year*
1.1.1.	Classification of TMAs (traffic, types of aircraft, site, etc.)		6.79
1.1.2.	Nomination of typical TMAs in USA, Europe and 3rd world		6.79
1.2.	Analysis, assessment, and identification of the operational requirement and benefits of 360-degree coverage. This assessment will be without reference to the use of any particular candidate aid.	BMFT	
	Action Items		
1.2.1.	Collection and investigation of existing information about 360° coverage		9.79

[1] Signed by Wolfgang Finke —Signé par Wolfgang Finke.
[2] Signed by Norman H. Plummer —Signé par Norman H. Plummer.
[3] Ministry Director —Directeur au Ministère.

1.2.2.	Criteria for a qualitative and quantitative assessment of the benefits of navigation systems for TMA and Landing		9.79
1.2.3.	Application of these criteria to TMAs (see 1.1.2)		12.79
1.2.4.	Comparison of TMAs equipped with TRSB + VOR/NDB or TRSB + 360°		3.80
1.2.5.	Information of FAA about the results of these studies		3.80
1.3.	Proceeding from item 1.2, a functional requirements statement will be developed.	BMFT + FAA	
	Action Items		
1.3.1.	Formulation of operational requirements by FAA and BMFT		6.80
1.3.2.	Development of a common operational requirements statement (final report)		6.80

Program Task No. 2

Assessment, evaluation and test of the technical capability of the TRSB and DAS 360-degree alternatives including cost, implementability, accuracy and performance.

2.1.	Provision of results to FAA and advisement of state of on-going program, as well as plans for future work related to DAS. Development of the DAS design for the 360-degree capability for use in the TMA and as an integral element of the MLS.	BMFT	
	Action Items		
2.1.1.	Provision of results and advisement of state of on-going program DAS		6.79
2.1.2.	Definition of DAS ground and on-board hardware (report)		3.80
2.2.	Commenting on data provided on DAS system design, performance data, and implementation capabilities.	FAA	
	Action Items		
2.2.1.	Comments on DAS results by FAA		6.80
2.3.	Provision of results of similar studies and advisement of state of on-going programs and plans for future work related to TRSB. Development of the TRSB 360-degree functional element design for use in the TMA and for landing operations.	FAA	
	Action Items		
2.3.1.	Provision of results and advisement of state of on-going program TRSB-360°		6.79
2.3.2.	Definition of TRSB-360° ground and on-board hardware (report)		3.80
2.4.	Commenting on data provided for the TRSB 360-degree function, performance data, and implementation capabilities.	BMFT	

	Action Items		
2.4.1.	Comments on TRSB-360-degree results by BMFT		6.80
2.5.	Development of principles for comparative assessment of the DAS and TRSB 360-degree alternatives and the related comparative assessment of other means for providing the 360-degree service for use in the TMA and that associated with the TRSB landing function. This effort includes consideration of VOR/DME, Loran-C, and the Global Positioning System (GPS) as alternative candidates.	FAA + BMFT	
	Action Items		
2.5.1.	Definition of criteria and procedures for a comparative assessment of the potential of technical alternatives for 360° for TMA and landing		9.80
2.5.2.	Provision by FAA of technical information about Loran-C and GPS as alternative candidates for 360°		9.80
2.5.3.	Consideration of VOR/DME, Loran-C and GPS as technical alternatives for 360-degree navigational guidance in the TMA and as an integral element of TRSB		12.80
2.6.	Perform comparative assessment of all alternatives.	BMFT + FAA	
	Action Items		
2.6.1.	Studies by FAA and BMFT to compare potential of all alternatives (reports)		12.81
2.6.2.	Agreement upon the most promising candidates for 360°. Decision on ground and flight tests. Selection of test candidates. Definition and agreement on ground and flight test procedures		6.82
2.6.3.	Execution of ground and flight tests for the evaluation of hardware configurations for 360-degree navigational guidance in the TMA and as an integral element of TRSB		6.83
2.6.4.	Discussion of results of studies and flight tests and conclusion about future work		12.83
2.7.	Study of the requirements for a simulation model or modification to existing simulations that could be used to systematically evaluate various candidate navigation systems.	BMFT + FAA	
	Action Items		
2.7.1.	Examination of the necessity of simulations to complete studies and field tests		6.82
2.7.2.	If required, definition of a simulation concept		12.82
2.7.3.	Simulation of candidate configurations for 360° in the TMA and for landing		12.83

Program Task No. 3

Evaluation of signal processing techniques for navigation applications utilizing data processing as a means of improving system accuracy as a trade-off for antenna characteristics.

3.1.	Discussion and provision of results of signal processing studies and tests.	BMFT + FAA	
	Action Items		
3.1.1.	Reports on the experiences and results of FAA and BMFT of signal processing studies and test		6.80
3.1.2.	Exchange of reports and discussion. Definition of research programs for application of signal processing techniques to MLS and other navigation systems.		12.80
3.2.	Consideration of how this technique may be applied to MLS and other navigation systems.	FAA + BMFT	
	Action Items		
3.2.1.	Research programs of FAA and BMFT on signal processing techniques		12.83

Program Task No. 4

An assessment of the DAS system for use as a short-distance navigational aid, in comparison with other candidate systems.

4.1.	Provision of results of DAS with emphasis on short-distance navigation.	BMFT	
	Action Items		
4.1.1.	Conventional and future operational requirements for short-distance navigation		6.80
4.1.2.	Potential of DAS for these operational requirements (report).		6.81
4.2.	Consideration of further work and program details.	BMFT + FAA	
	Action Items		
4.2.1.	Formulation of program for operational evaluation of DAS as short distance navigational aid.		6.82
4.3.	Assessment of DAS-results in comparison with other candidate systems such as VOR/DME, Loran-C, and GPS.	FAA + BMFT	
	Action Items		
4.3.1.	Definition of criteria and procedures for a comparative assessment of the potential of technical alternatives for short-distance navigational aids.		9.82
4.3.2.	Provision by FAA of technical information about Loran-C and GPS as alternative candidates for short-distance navigation.		9.82
4.3.3.	Consideration of VOR/DME, Loran-C and GPS as technical alternatives for short-distance navigation (report).		6.83

Program Task No. 5

Coordination of development programs for ground and airborne DME for MLS/DAS applications, including SARPs development.

5.1.	Development of DME system performance requirements for use with TRSB, including channel plan and technical aspects of SARPs.	FAA + BMFT	
	Action Items		
5.1.1.	Development of DME system performance requirements for use with TRSB.		12.79
5.2.	Development of DAS system performance requirements, including channel plan and technical aspects of SARPs.	BMFT	
	Action Items		
5.2.1.	Development of system performance requirements for DAS as TMA and short-distance navigational aid.		12.79
5.2.2.	Formulation of SARPs for DME and DAS (report).		12.79

Program Task No. 6

Cooperation and information exchange on the status of flight and ground calibration and flight inspection requirements for MLS.

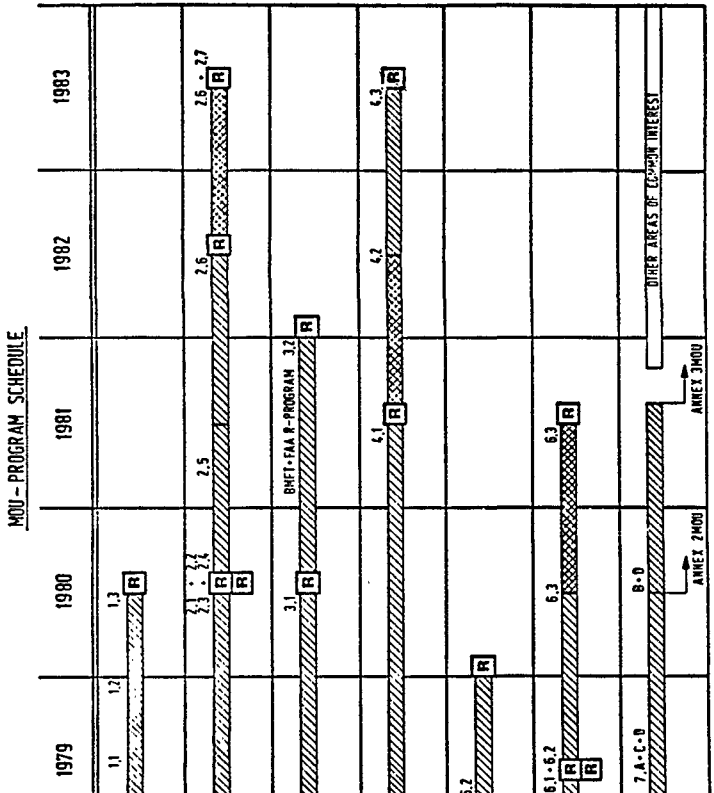
6.1.	Provision of details of flight calibration techniques and of flight inspection procedures envisaged for TRSB.	FAA	
	Action Items		
6.1.1.	Report on flight calibration techniques and flight inspection procedures envisaged for TRSB by FAA.		6.79
6.2.	Provision of details of techniques used for advanced flight calibration and testing used with the DAS evaluation program.	BMFT	
	Action Items		
6.2.1.	Report on techniques envisaged for flight calibration and testing of DAS		6.79
6.3.	Development of improved real-time flight calibration and data reduction capability for MLS applications.	FAA + BMFT	
	Action Items		
6.3.1.	Definition of the operational and technical requirements for the flight calibration of MLS		9.79
6.3.2.	Development of the operational part of the flight calibration system		12.79
6.3.3.	Definition of the hardware and software of the flight calibration system		6.80
6.3.4.	Build-up and testing of the flight calibration system for MLS application (report)		6.81

Program Task No. 7

Develop a program for information exchange on the status of individual development programs in other areas, including:

A. Certification and failure protection of active controls and digital fly-by-wire systems.

B.	Development of special aircraft instrumentation and procedures.	
C.	Cockpit integration for cockpit displays.	
D.	Ground-based collision avoidance systems, including DABS and DABS data link, and	
E.	Real-time flight data acquisition and processing for flight calibration, including approach and terminal area guidance.	
7.1.	Joint presentation and discussion on status of FAA and BMFT program will be provided for following exchange of information and cooperation on specific aspects as agreed upon in the joint committee.	FAA + BMFT
	Action Items	
7.1.1.	Presentation of activities and results on the above mentioned areas A, B, C, D and E (report)	6.79
7.1.2.	Selection of common area of interest and proposal for a Technical annex II to the MOU	12.79
7.1.3.	Work plan and Program Schedule for the annex II	6.80
7.1.4.	Identification of other areas of common interest for further cooperation	6.80


MOU - PROGRAM SCHEDULE
PROGRAM TASK NO
1979
1980
1981
1982
1983
① OR FOR 360°
② TRSB AND DAS 360°
③ SIGNAL PROCESSING TECHNIQUES
④ DAS FOR SHORT - DISTANCE NAVIGATION
⑤ SARPS FOR DME
⑥ FLIGHT CALIBRATION OF MLS
⑦ OTHER AREAS FOR COOPERATION
1.1
1.2
1.3
2.1 • 2.2
2.3 • 2.4
2.5
2.6
2.6 • 2.7
3.1
BNFT-FAA R-PROGRAM 3.2
4.1
4.2
4.3
5.1 • 5.2
6.1 • 6.2
6.3
7.A • C • B
8 • D
ANNEX 2MOU
ANNEX 3MOU
OTHER AREAS OF COMMON INTEREST
R — REPORT
STUDY
FLIGHT TEST