DOE/NASA CONTRACTOR REPORT

DOE/NASA CR-150590

DESIGN REVIEW PACKAGE FOR THE ON-SITE MONITOR FOR SOLAR HEATING AND COOLING SYSTEMS

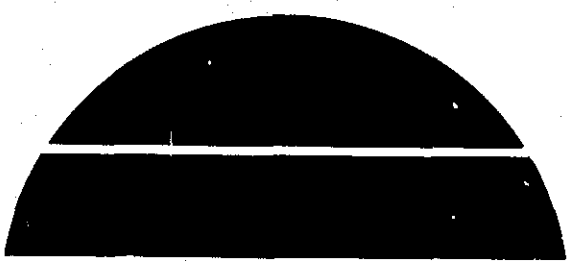
Prepared by

IBM Federal Systems Division
150 Sparkman Drive
Huntsville, Alabama 35805

Under Contract NAS8-32036 with

National Aeronautics and Space Administration
George C. Marshall Space Flight Center, Alabama 35812

For the U. S. Department of Energy



U.S. Department of Energy

Solar Energy

TECHNICAL REPORT STANDARD TITLE PAGE

1. REPORT NO.	2. GOVERNMENT ACCESSION NO.	3. RECIPIENT'S CATALOG NO.
DOE/NASA CR-150590		

4. TITLE AND SUBTITLE	5. REPORT DATE
Design Review Package for the On-Site Monitor for Solar Heating and Cooling Systems	January 1977
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT #
9. PERFORMING ORGANIZATION NAME AND ADDRESS IBM Federal Systems Division 150 Sparkman Drive Huntsville, Alabama 35805	10. WORK UNIT NO.
	11. CONTRACT OR GRANT NO. NAS8-32036
12. SPONSORING AGENCY NAME AND ADDRESS National Aeronautics and Space Administration Washington, D. C. 20546	13. TYPE OF REPORT & PERIOD COVERED Contractor Report
	14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

This work was done under the technical management of Mr. Cecil W. Messer, George C. Marshall Space Flight Center, Alabama.

16. ABSTRACT

This design review package consists of the Performance Specification and Verification Matrix for the On-Site Monitor (OSM). The OSM is a portable device which, when connected to the Site Data Acquisition subsystem, allows readout of data on solar heating and cooling operational test sites.

The design review was held in January 1977. The MSFC review and critique of these documents are not included in this package.

17. KEY WORDS	18. DISTRIBUTION STATEMENT
	Unclassified-Unlimited William A. Brooksbank WILLIAM A. BROOKSBANK, JR. Mgr, Solar Heating and Cooling Project Office

19. SECURITY CLASSIF. (of this report)	20. SECURITY CLASSIF. (of this page)	21. NO. OF PAGES	22. PRICE
Unclassified	Unclassified	10	NTIS

MSFC - Form 3292 (May 1969)

INTRODUCTION

This package reflects the design review material submitted by IBM on their effort to develop, design and build On-Site Monitors under NASA/MSFC Contract NAS8-32036.

The On-Site Monitor is a portable device which can be easily connected to a Site Data Acquisition Subsystem to allow readouts of clock and sensor data in voltage or engineering units at instrumented solar heating and cooling sites.

REVISIONS					
CHK	ENGRG NOTICE	LTR	DESCRIPTION	DATE	APPROVED
			ORIGINAL	1/18/77	

DWG NO.

CONTR NO.	INTERNATIONAL BUSINESS MACHINES CORP. FEDERAL SYSTEMS DIVISION HUNTSVILLE, ALA. 35807
PREPARATION	
DSGN CHK	TITLE: ON-SITE MONITOR DESIGN AND PERFORMANCE SPECIFICATION
DWG CHK	
DSGN APPROVAL	SIZE: A | CODE IDENT NO. | DWG NO.: 7934047
	SCALE | WT | SHEET: 1 of 7

1. INTRODUCTION

1.1 This specification establishes the design and performance requirements for the On-Site Monitor (OSM). The OSM shall be designed to interface with the Site Data Acquisition Subsystem (SDAS) to allow local readout of sensor data in engineering units stored in the SDAS at instrumented solar heating and cooling sites.

2. APPLICABLE DOCUMENTS

2.1 The following document forms a part of this specification to the extent specified herein. In case of conflict between this document and this specification, this specification shall govern.

SPECIFICATIONS

International Business Machines Corporation

7932905	Site Data Acquisition Subsystem Performance Specification

3. REQUIREMENTS

3.1 General. - The OSM shall be designed to allow manual selection and display of up to three simultaneous SDAS sensor outputs. Operation of the SDAS shall be in accordance with IBM Document 7932905.

3.1.1 OSM/SDAS Isolation. - The OSM shall be designed such that an OSM failure shall not degrade the operation of an OSM as defined in IBM Document 7932905.

3.1.2 Operation. - The OSM shall be designed such that the OSM operator may select the parameter to be displayed from a predefined, site-personalized table which defines the SDAS channel, type of measurement, and range (scale factor) in engineering units. Upon manual selection of these parameters, the OSM shall obtain raw sensor data in digital format from the SDAS and perform the required calculations to display this data digitally in engineering units.

IBM02

3.2 Data Scan. - The OSM shall present an interrupt to the SDAS as a request for data. The software in the SDAS is structured such that this request for a special OSM data scan may not be honored when the SDAS is in its normal data scan mode or is in the communications mode with the Central Data Processing System (CDPS). Therefore, operator requests for the OSM to display data may be delayed until the SDAS software accepts the OSM interrupt request during the OSM operating modes described in paragraph 3.3.

3.3 OSM Modes and Scan Switch. - The OSM shall have two operating modes that are manually selectable by a scan select switch on the OSM display panel. These modes are Manual and Auto. Operation of the scan switch shall be as follows:

Auto Mode. - When the OSM scan switch is placed in the stationary auto position, the OSM shall present the request for data interrupt to the SDAS approximately every two seconds to obtain a complete data set and update the selected data displays at that rate.

Off/Manual. - The OSM scan switch shall also have stationary off/momentary-on positions. When the scan switch is momentarily placed in the manual position, the OSM shall present a request for data interrupt once each time this switch is depressed. A complete SDAS sensor data scan shall be requested and retained by the OSM memory for continuous display of the selected parameters. Upon release, the scan switch shall return to the off position and the displayed parameters shall reflect the data obtained at the time of momentary closure. New parameters for display shall be selectable from the data set obtained by this action without re-selecting the manual mode.

3.4 Displays. - The OSM display panel shall have three 3-1/2 digit Light Emitting Diode displays for presentation of SDAS sensor outputs. Associated with each display shall be four ten-position lever wheel switches. Two of the switches shall be used to select the channel to be displayed. One switch shall select the measurement type and one shall select the measurement range (scale factor).

If a channel is selected which is designated a spare at a particular site, the displayed value shall be the value of the corresponding channel digital data words that are stored in the SDAS, normally zero. If the channel selected exceeds the number of installed channels in the SDAS or if there is no combination of the measurement

IBM02

type and scale factor stored in the OSM memory, the selected display shall present -1.999.

3.5 Power Switch. - The OSM shall have a two-position on/off power switch.

3.6 Memory. - The OSM shall contain the 2K byte of Programmable Read Only Memory (PROM) minimum and 1K byte minimum of Random Access Memory (RAM) to perform the functions defined in this specification. The PROM shall be contained in a pluggable subassembly to facilitate bench replacement of the stored measurement and scale factor table and the operational program.

3.7 Microprocessor. - The OSM shall be controlled by a microprocessor similar to that provided in the SDAS.

3.8 Interfaces. -

3.8.1 Power. - Power to the OSM shall be standard 110-125 V, 60 Hertz, 1 Phase, 2.0 amp service. A standard 3-wire power cord (safety ground, power, and return) shall be required. The power cable shall be capable of being stored in the OSM case.

The OSM shall contain a primary power supply with outputs of +5 Vdc and ±12 Vdc.

3.8.2 OSM/SDAS Interface Cable. - The OSM/SDAS interface shall be via 10-ft. maximum cable terminating in a 37-pin pluggable connector. The OSM/SDAS connector shall be designed to interface with the J106 connector on the SDAS. Pin functions shall be as defined in Table 3-1. The OSM/SDAS interface cable shall be capable of being stored in the OSM case.

3.9 Packaging. -

3.9.1 Design Environment. - The OSM shall be designed to operate in an indoor environment suitable for operation by electronic tradesmen.

Table 3-1. OSM/SDAS Pin Functions

PIN NO.	SIGNAL NAME	COMMENT
1	OSM TO SDAS DBI BIT 0	Currently not used
2	1	
3	2	
4	3	
5	4	
6	5	
7	6	
8	7	
9	-CARD SELECT 2	
10	-INTERRUPT POLL	
11	-OSM INTERRUPT REQUEST	
12	-OSM SELECT ACK.	
13	-AI STROBE	
14	FUNCTION BIT 0	
15	1	
16	2	Currently not used
17	3	
18	SUBADDRESS BIT 0	
19	1	
20	2	
21	3	
22	SDAS TO OSM DBO BIT 0	
23	1	
24	2	
25	3	
26	4	
27	5	
28	6	
29	7	

Table 3-1. OSM/SDAS Pin Functions (Continued)

PIN NO.	SIGNAL NAME	COMMENT
30	-SYSTEM RESET	Currently not used
31	-CLOCK	Currently not used
32	-OSM CONNECTED	
33	UNUSED	
34	UNUSED	
35	UNUSED	
36	UNUSED	
37	UNUSED	

3.9.2 Case. - The OSM shall be contained in a portable case whose dimensions shall be approximately 17" x 17" x 7". The case shall have a carrying handle and a tilt stand.

3.9.3 Weight. - The weight of the OSM, including cables, shall not exceed 40 pounds.

4. DESIGN AND CONSTRUCTION

4.1 Workmanship. - Workmanship in fabrication and assembly of the OSM shall be consistent with good commercial practices.

4.2 Materials and Components. - The OSM shall use commercial grade components.

4.3 Certification. - The OSM shall be UL-certified.

IBM SPECIFICATION 7934047-OSM VERIFICATION CROSS MATRIX

VERIFICATION METHOD

S = SIMILARITY I = INSPECTION
A = ANALYSIS T = TEST

PERFORMANCE REQUIREMENT		VERIFICATION PHASE: DEVELOPMENT TEST	TEST	ACCEPTANCE TEST
3.0	REQUIREMENTS	T		
3.1	GENERAL	A		
3.1.1	OSM/SDAS ISOLATION	A		
3.1.2	OPERATION	T		T
3.2	DATA SCAN	T		T
3.3	OSM MODES AND SCAN SWITCH			T
3.4	DISPLAYS	T		T
3.5	POWER SWITCH	T		
3.6	MEMORY	A		
3.7	MICROPROCESSOR	I		
3.8	INTERFACES	T		
3.8.1	POWER	T		T
3.8.2	OSM/SDAS INTERFACE CABLE	T		T
3.9	PACKAGING	T		
3.9.1	DESIGN ENVIRONMENT	T		
3.9.2	CASE	A,I		
3.9.3	WEIGHT	T		
4.0	DESIGN AND CONSTRUCTION	A		
4.1	WORKMANSHIP			I
4.2	MATERIALS AND COMPONENTS	A		
4.3	UL CERTIFICATION	A,I,T		

IBM