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June 24, 1996

WALTER C. MARSH
MANAGER OF NUCLEAR REGULATORY AFFAIRS

TELEPHONE
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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Gentlemen:

Subject: **Docket Nos. 50-361 and 50-362**
10 CFR 50.59 Safety Evaluation
Toxic Gas Isolation System Analog to Digital Upgrade
San Onofre Nuclear Generating Station
Units 2 and 3

The purpose of this letter is to provide for your information the 10 CFR 50.59 Safety Evaluation for the San Onofre Toxic Gas Isolation System instrumentation replacement. Submittal of this Safety Evaluation was discussed with the NRC during a meeting in the NRC offices in Rockville, Maryland, on April 24, 1996.

If you have any questions regarding this information, please contact me.

Sincerely,

Walter C. Marsh

Enclosure

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IE47 1/1

270043

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CDM Files
NLFS Files
Compliance Files

NRC CORRESPONDENCE			
REVIEW REQ.	ORGANIZATION	APPROVALS	DATE
✓	Mgr. - Nuc. Reg. Affairs		
✓	Mgr. - Plant Licensing		
	Mgr. - Nuclear Fuel		
✓	Mgr. - Nuc. Eng. Design	*	6/17/96
	Mgr. - Station Technical		
	Mgr. - Operations		
	Project Mgr./Eng.		
	Plant Engineering		
	Nuclear/Mechanical		
✓	Electrical/Controls	*	5/31/96
	Nuc. Safety Anal.		
	Nuc. Fuel Eng./Anal.		
	Compliance		
✓	Supervisor Licensing	TDM	6/21/96
✓	Author	JPL	6/20/96
✓	RCTS Completed	JPL	6/20/96
✓	Verified RCTS	EPR	6/20/96
	OTHER APPROVALS		
✓	N. PILLUTLA	*	5/21/96
Affected RCTS:			

* CONCURRENCE RECEIVED ON SEPARATE DOCUMENT.

K. JOHNSON NEDO
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N. PILLUTLA NEDO

ENCLOSURE

Design Change Package (DCP) 2/3-6933.00SJ Revision 0
Affected Section Change No. 2
Toxic Gas Isolation System Instrument Replacement

DCP 2/3-6933.00SJ REV. 0 SH. 1 of 68
Affected Section Change No 2

CONCEPTUAL ENGINEERING PACKAGE (CEP)/DESIGN CHANGE PACKAGE (DCP) COVER SHEET

1. *CEP/DCP No./Rev.*: 2/3-6933.00SJ / 0 ☒ Affected Section Change; ASC No. 2 ☐ Whole Document Revision

Title: TOXIC GAS ISOLATION SYSTEM INSTRUMENT REPLACEMENT

Originator: S NEEPER Originating Org.: CONTROLS/NEDO Unit: 2&3 System: SAA Quality Class: II Seismic Category: I

2. *CEP Approvals* (Sign/Date, As Applicable):

SDE	/	Health Physics	/
Originator	/	Security	/
Group Supervisor	/	Chemistry	/
Disc. Manager	/	Maintenance	/
Civil/Plant Design	/	Operations	/
Electrical/Controls	/	Nuclear Const.	/
Nuclear/Mechanical	/	EP	/
IPRE	/	Environmental	/
POG	/	Other	/
STEC Manager	/	Other	/

3. *DCP Approvals* (Sign/Date, As Applicable):

SDE	N. P. Hunter / 12/22/95	Nuclear/Mechanical	N/A /
Originator	[illegible] / 12/22/95	IPRE	[illegible] / 12/22/95
Group Supervisor	[illegible] / 12/22/95	Licensing	N/A /
Disc. Manager	[illegible] / 12/22/95	POG	[illegible] / 12/22/95
Civil/Plant Design	[illegible] / 12/22/95	Other	/
Electrical/Controls	[illegible] / 12/22/95	Other	/

Restrictions/Mode Restraints: None

4. *DCP Effective Date*: _____ *Nuclear Safety Group Approval* (Sign/Date): _____ /

5. *DCP Closure*: (signed by initiating organization, i.e., NES&L or Station)

A. Installation and required testing are complete with the following exceptions: _____

RECEIVED CDM
DEC 22 1995
SITE FILE COPY

RECEIVED CDM
DEC 22 1995
SITE FILE COPY

TEST OPERATIONS SUPERVISOR / or STATION COGNIZANT ENGINEER

DATE

B. Required testing is complete and additional engineering changes generated against this package during implementation and testing are listed on Form 26-503.

(NES&L) SDE / or (NGS) COGNIZANT ENGINEER

DATE

6. *Final Review/Acceptance*: Work completion and test results have been reviewed and are accepted for operation and maintenance.

COGNIZANT STATION ENGINEER / DATE / SUPERVISING ENGINEER

DATE

7. *Configuration Review*: (Signed/Dated by the Supervisor of Configuration Control)
Affected design document and procedures reflect this modification. _____ /

DCP 2/3-6933.00SJ REV. 0 SH. 2
Affected Section Change No 2

CONCEPTUAL ENGINEERING PACKAGE (CEP)/DESIGN CHANGE PACKAGE (DCP) COVER SHEET

8. *Package Contents*

			Included in Package (Y/N)		Page No.
A. Form 26-178-1,		CEP/DCP Cover Sheet	A	Y	1
B. Form 26-503,		Design Change Continuation Sheet	B	N	
C. Section	1	Description of Change	1	Y	3
	1A	Reason for the Change	1A	Y	4
	1B	Functional Objective of the Change	1B	Y	8
	1C	Impact of Change on Site Programs	1C	Y	10
	1D	Design Criteria Discussion	1D	Y	11
	1E	License Document Change Summary	1E	N	
	1F	Assumptions/Design Alternatives Consideration	1F	N	
D. Section	2	10CFR50.59 Safety Evaluation	2	Y	17
E. Section	3	Licensing and Design Document Impact/Design Criteria	3	Y	65
	3A	Operating License or License Amendments	3A	N	
	3B	Y UFSAR N UFHA N S P N EP SAR-23-417	3B	Y	66
	3C	Design Criteria, Form 26-182	3C	N	
	3D	System Descriptions Changes	3D	N	
	3E	Licensee Controlled Specifications Changes	3E	N	
	3F	General Design Criteria Changes	3F	N	
F. Section	4	Drawing Changes	4	N	
G. Section	5	Site Computer Software Change Requests	5	N	
H. Section	6	Calculations	6	N	
I. Section	7	Test Objectives/Acceptance Criteria	7	N	
J. Section	8	Materials	8	N	
K. Section	9	Construction Safety Assessment/Special Construction Requirements	9	N	
L. Section	10	Site Programs Impact Assessment, Form 26-404	10	N	
M. Section	11	Vendor Documents/Technical Manual References	11	N	
N. Section	12	Cost Estimates	12	N	
O. Section	13	Schedules	13	N	

9. Reference/Remarks (For Information Only)

Sinc

DCP 2/3-6933.00SJ REV. 0 SH. 3
Affected Section Change No 2

SECTION 1

DESCRIPTION OF CHANGE

SECTION 1 - DESCRIPTION OF CHANGE

1.A REASON FOR CHANGE

All construction activities on modification of TGIS Train A were placed on "Hold" by ASC #1 to ensure the Engineering and Safety Evaluation for the replacement of the obsolete analog analyzers with the microprocessor based digital analyzers was in line with the requirements of the NRC Generic letter # 95-02 dated April 26, 1995. ASC #2 is being issued to remove the "Hold" and implement the modifications on TGIS Train A, and provide the engineering and safety evaluation for the acceptability of replacement digital analyzers.

ASC #1 was issued to add interposing relays in the TGIS panel to enable proper interface with output contacts of the new Ammonia and Butane analyzers installed in this DCP. In the proposed design of the DCP, the new Siemens Butane and Ammonia analyzers high concentration and the channel failure contacts were used in circuits which operate 120 VAC relays. A subsequent review of the Siemens vendor manuals for the Butane and Ammonia analyzer indicated that the output contacts are only rated for 24 VAC or VDC. In ASC #1, 24 VAC interposing relays were installed to ensure that the analyzer contacts are operated within the vendors rated voltage. A 120/24 VAC transformer is used to operate 24 VAC relays. Output contacts from the 24 VAC relays operate existing 120 VAC time delay relays. In addition, fuses are installed to provide adequate protection for the transformer and relays.

ASC #1 also modified the operation of the output contacts of the Butane analyzer. This DCP specified Siemens Ammonia and Butane analyzers with output contacts that open on a high gas concentration to initiate TGIS. During the inspection and testing of the analyzers it was determined that the Ammonia analyzer contact closed on high gas concentration. SCE requested the vendor to modify the Ammonia analyzer contact operation but the vendor declined to do so. When spare Butane and Ammonia analyzers were ordered, Siemens notified SCE that current design Butane analyzer contacts operate in the same manner as the Ammonia analyzer (closed on high gas concentration). Siemens stated that the Ammonia and Butane analyzers contact operation was their standard design and requests to modify the relay operation were declined. It was decided to utilize the vendor's standard design. Therefore a revised EPROM (Erasable Programmable Read Only Memory) furnished by the vendor will be installed to make the Butane analyzer

contacts close on high gas concentration thereby conform to the vendors standard design. This change also makes the Butane and Ammonia analyzer output contacts identical in operation. Appropriate modifications will be made in the control circuit to accommodate the change. The high concentration output contact of the Butane analyzer will energize a 24 VAC relay, the contact from this relay will de-energize the existing TDD relay. The Ammonia analyzer high concentration output contact will also energize a 24 VAC relay and a contact from this relay will also de-energize the existing TDD relay.

Minor editorial changes to design documents have also been implemented in ASC #1.

This Design Change Package addresses the replacement of obsolete analyzers in the Toxic Gas Isolation System (TGIS)for the reasons discussed as follows:

Toxic chemical release is an accident condition for which the Non-NSSS Engineered Safety Features Actuation System (ESFAS) provides protective action through TGIS. TGIS contains safety-related instrumentation and controls that automatically terminate the supply of outside air to the main control room in the event of a toxic gas release at the SONGS site or on Interstate 5 or adjacent rail line. TGIS isolates the ventilation to the control room and initiates operation of the emergency HVAC system in the control room to minimize operator exposure if a toxic hazard is detected. TGIS also activates an alarm in the control room to alert operations personnel. Normal ventilation can only be restored manually by the control room operator after TGIS has been reset.

The TGIS gas analyzers are mounted in panel 2/3L378 located at the 9 ft. level of the Control Building. Two independent, redundant sets of sensors are provided to detect the presence of toxic gases for the system to perform the required isolation function. The redundant sensors provide two independent and redundant trains of TGIS. The toxic gases monitored are Butane/Propane (hydrocarbons), Ammonia, and Chlorine.

The TGIS panel was designed and fabricated with instruments purchased in the early 80's. Over the years, progress has been made in the field of analytical instrumentation, making this older generation of instruments obsolete. The original vendor of the Ammonia and Butane analyzers, Beckman Instruments, sold their analyzer division to Rosemount Analytical Inc. Rosemount discontinued the Model 400 Hydrocarbon Analyzer and 865 Infrared Ammonia Analyzer and spare parts for these analyzers are no longer available.

The Chlorine analyzers, made by Wallace & Tiernan, are still in production and spare parts are available. The maintenance records for these analyzers indicate

that replacement at this time is not necessary.

The existing Ammonia analyzers have experienced problems in drifting low (less than zero parts per million (ppm)), which gives an unacceptable indeterminate indication. Although calibration has usually shown the drift to be less than the 5% drift accounted for in the TGIS setpoint calculation, the maintenance costs associated with frequently restoring the above zero indication are significant. Additionally, the analyzer drift has been deteriorating and has exceeded 5% several times in the last 24 months. The increased drift is a function of component aging, and is expected to get worse as the analyzers get older.

These Ammonia analyzers have had a poor maintenance record and have been the cause of several spurious TGIS trips. Parts are becoming more difficult to obtain and, in some cases, are only available as substitutes requiring system modification. The two installed analyzers have different termination arrangements and are not interchangeable without design changes. This requires additional maintenance effort to keep two rebuilt analyzers available for replacement, which will ultimately result in reduced reliability.

Although the Hydrocarbon analyzers are not experiencing a significant amount of maintenance problems, compatible spare parts are no longer available.

The TGIS analyzers are presently furnished with 120 Vac power from common MCC's BQ and BS. Due to the addition of an air combustor in the original design, the voltage drops experienced by the analyzers could approach the analyzer voltage specifications under worst case conditions of maximum load. It is preferable to furnish instrumentation from a regulated and conditioned power source.

The TGIS panel is located outside of the 9' elevation elevator in the Control Building which is open to considerable traffic and noise. All of the existing analyzers are potentially sensitive to temperature and electronic noise which affects their reliability. The panel is currently lined with lead blanketing and the front panel doors are lined with a Faraday shield for RFI protection. In addition, the area is posted with "No Radio Use" signs. The current level of protection will be maintained.

Local annunciation is provided at the TGIS panel 2/3L378. "TGIS Actuation" and "TGIS Trouble" alarms are annunciated on 2/3UA0060B and 2/3UA0060T in the main control room, and "TGIS Manual Actuation" and "TGIS In Reset/Bypass" indications are available through the Plant Monitoring System (PMS). There are no recorders provided in the present design of the system, thus it is difficult to determine after a TGIS actuation whether or not the actuation was caused by a

voltage spike or by a true gas release. Following a TGIS actuation, a plant equipment operator is sent to the TGIS panel to determine the cause for actuation.

The TGIS panel is inherently congested, making access for routine maintenance and surveillance testing within the cabinet extremely difficult.

The Reset/Bypass switch (2/3HS-9784B1, B2) is a momentary contact push-button switch currently located on the front of the panel. The bypass function is obtained during calibration checks by jumpering the Reset/Bypass contacts, otherwise the technician has to maintain the switch in a depressed position during testing. Installation of the jumpers is time consuming due to the location of the terminal strip in the congested TGIS panel. In addition, the use of jumpers is discouraged for safety concerns; if the jumper is not removed it leaves TGIS inoperable.

The compressed gas bottles that support the TGIS system are mounted in the Control Building 9 ft. level passageway, making it difficult to bring in new bottles.

The following guidance was used in performing the safety analysis of the digital upgrade portion of this change:

1. NRC Generic Letter 95-02: Use of NUMARC/EPRI Report TR-102348, "Guideline on licensing digital upgrades in determining the acceptability of performing analog to digital replacements under 10 CFR 50.59"

2. EPRI Report TR-102348, "Guideline on Licensing Digital Upgrades"

Utilizing the above guidance documents Generic Letter 95-02 concerns were addressed as follows:

1. The use of common software in redundant channels.
   Addressed in 10 CFR 50.59.

2. Increased sensitivity to the effects of electromagnetic interference(EMI).
   Addressed in 10 CFR 50.59.

3. Improper use and control of equipment used to control and modify software and hardware configurations.
   Addressed in 10 CFR 50.59.

4. The effect that some digital designs have on diverse trip functions.
   Not applicable to this change.

5. Improper system integration.
Not applicable to this change.

6. Inappropriate commercial dedication of digital electronics.
Full commercial dedication performed.

1.B FUNCTIONAL OBJECTIVE FOR CHANGE

Functional objective of ASC #1 was to provide proper operating voltage for the new Butane and Ammonia analyzer output contacts and also make the Butane analyzer design consistent with the manufacturer's standard. Four additional class 1E interposing relays, one 120/24 VAC transformer and two fuses will be installed for each train of TGIS. The relays, fuses and the transformer will be installed on a plate mounted in the TGIS panel. Installation of these devices requires the relocation of the Reset/Bypass switch mounting plate installed by the DCP. The Reset/Bypass switch will be mounted on the same mounting plate used for the interposing relays, fuses and the 120/24 VAC transformer. An analysis to verify that the changes did not affect the seismic qualification of the panel has been performed. Electrical loading calculations have been revised. The additional relays will not affect the functional operability of the TGIS.

Installation of the vendor's standard Erasable Programmable Read Only Memory (EPROM) on the Butane analyzer will make its output contact operation identical to the Ammonia analyzer.

The functional objective of this design change is to provide replacement analyzers for obsolete equipment in the TGIS system. An additional objective is to reduce spurious trips experienced by this system and provide a means of operator evaluation of a TGIS actuation. This design change will reduce costs associated with reporting of spurious actuations, as well as the cost of maintenance and operator actions. Benefits will also be achieved by means of confirmation of an actual toxic hazard.

This design will implement the following changes:

1. Change the power supply for the Ammonia, Butane and Chlorine Analyzers from MCC's BQ for Train A, and BS for Train B, to the 120 VAC Vital buses Y01 and Y02 respectively. The TGIS sample pump and combustor will remain powered by the MCCs BQ and BS. The system will no longer actuate on power transfer from Unit 2 to Unit 3 since these analyzers are powered by the vital busses, which are uninterruptable power sources. A "Loss of Sample" and "TGIS Trouble" alarms will be not be initiated as long as the power transfer from Unit 2 to Unit 3 or vice versa, is accomplished within 5 seconds.

2. Replace the existing Beckman Model 865 Non-Dispersive Infrared (NDIR) Ammonia Analyzers (1 per train) with Siemens Industrial Automation Inc. ULTRAMAT 5E NDIR Ammonia Analyzer. These analyzers are commercial grade instruments that have been qualified as Quality Class II by means of commercial dedication. The analyzers were tested to provide seismic qualification. The specifications for these analyzers satisfy or exceed all requirements of the existing analyzers for response time, stability, accuracy and repeatability. The new analyzer vendor, Siemens, is an ISO 9001 certified company. ISO 9001 is the most comprehensive of the ISO 9000 International Standards for Quality Assurance and covers all aspects of product or service design and development, manufacturing, installation and customer service. Modify panel cutouts and instrument supports due to variations in the size of the analyzers. Determinate wires and disconnect the tubing connections on the existing analyzers and reterminate wires and reconnect tubing on the new analyzers .

3. Replace the existing Beckman Model 400 Hydrocarbon (Butane) analyzers (1 per train) with Siemens FIDAMAT 5E Flame Ionization Detector (FID) Hydrocarbon Analyzers. These analyzers are commercial grade instruments that have been qualified as Quality Class II by means of commercial dedication. The analyzers were tested to provide seismic qualification. The specifications for these analyzers satisfy or exceed all requirements of the existing analyzers for response time, stability, accuracy and repeatability. The new analyzer vendor, Siemens, is an ISO 9001 certified company. ISO 9001 is the most comprehensive of the ISO 9000 International Standards for Quality Assurance and covers all aspects of product or service design and development, manufacturing, installation and customer service. Modify panel cutouts and instrument supports due to variations in the size of the analyzers. Determinate wires and disconnect the tubing connections on the existing analyzers and reterminate the wires and reconnect tubing on the new analyzers.

4. Install (2) 1E, 2-pen, strip chart recorders (one per train) on the TGIS Panel. Analog outputs from each analyzer will provide concentration levels of the Ammonia and Butane gases on the recorders.

5. Rearrange TGIS panel instrumentation to accommodate the new analyzers, including indicating lights, regulating valves, pressure indicators and flow indicators.

6. Add a Test/Bypass keylock maintained selector switch (2/3HS-9784D1, D2) on the inside of panel 2/3L378 (one per train), for maintenance activities. The existing Reset/Bypass pushbutton switch (2/3HS-9784B1, B2) that is located on the front of the panel will be changed to a Reset switch and remain on the front of the panel. The bypass function was obtained during calibration checks by jumpering the

Reset/Bypass contacts. The Reset switch remains on the panel front for operations activities. TGIS is in bypass condition when light 2/3ZL9784B1 (B2) is extinguished.

7. Remove the grating directly outside the double doors (AC101) leading to the 7 ft. Turbine Building to provide a more direct access to the compressed gas bottles for TGIS maintenance. The grating is not a security barrier or otherwise credited in the security plan and is not reflected in any plant drawings. To minimize spurious TGIS actuations caused by unrestricted personnel traffic in the area, provide a key lock, controlled by the shift supervisor's office, on the AC101 doors. Opening of these doors for other than normal ingress and egress must be performed in accordance with the barrier control program.

1.C SITE PROGRAMS

1. Operations Impact

Replacement of the Ammonia and Butane analyzers will not modify plant system functions or design basis. The design changes will improve operator performance by providing pertinent information in the event of a TGIS actuation through the strip chart recorders.

Affected procedures include, but may not be limited to:

SO23-II-8.22, TGIS Time Response Test and Channel Functional
SO23-II-1.15, TGIS Train A Channel Functional and Calibration
SO23-II-1.15.1, TGIS Train B Channel Functional and Calibration
SO23-15-60.B, Alarm Response

Note: Applicable procedures must be revised prior to implementation to be used for post construction testing.

The Alarm Response Procedures, Operating Instructions and Operation Procedures need to be revised to update the modifications made. The LCO will be affected due to the 7 day action statement when only one channel of TGIS is operable. If both trains are out of service, a one hour action statement is in effect to place the control room in the isolation mode of operation.

Procedures governing key control will need to be updated for the key lock added to door AC101.

2. Maintenance Impact

Addition of a 120/24 VAC transformer and 24 VAC relays impacts the maintenance procedures.

The design changes impact maintenance procedures for the replacement analyzers, bypass switches and recorders. Since the new analyzers and recorders are powered from the vital bus, the procedures need to be modified for removing these instruments from service. Maintenance procedures must insure that the TGIS bypass condition is removed after any maintenance or testing activities. This will include key removal and verification that light 2/3ZL9784B1 (2/3ZL9784B2 for Train B) is lit.

Surveillance test procedures will need to be revised to reflect the new analyzers, the new recorders, and the transfer of power to the Vital Bus.

3. Site Fire Protection Group Impact

The Technical Specification Surveillance Procedures will need to be updated to identify the added lock on fire door AC101.

1.D DESIGN CRITERIA DISCUSSION

1. Codes and Standards

The design of the proposed modifications will be in accordance with the approved codes and standards listed in SONGS 2 & 3 UFSAR Section 7.3 for the NSSS and Non-NSSS ESFAS Protective Systems. The principle requirements are addressed by the following:

IEEE 279-1971, Criteria for Protection Systems for Nuclear Power Generating Stations.

IEEE 323-1974, Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations,

IEEE 338-1971, Trial-Use Criteria for the Periodic Testing of Protection Systems for Nuclear Power Generating Stations.

IEEE 344-1975, Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations.

IEEE 384-1984, Standard Criteria for Independence of Class 1E Equipment and Circuits.

Other Standards:

ISO 9000-3:1991 (E)- Quality management and quality assurance standards - Part 3: Guidelines for the application of ISO 9001 to the development supply and maintenance of software.

2. Regulatory Requirements

These design changes shall comply with the regulatory requirements stated in UFSAR Section 7.3 for the ESFAS. The principle requirements are as follows:

10 CFR 50, Appendix A,

RG 1.22, Periodic Testing of Protection System Actuator Functions,

RG 1.75, Physical Independence of Electrical Systems,

RG 1.78, Assumptions for Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release,

RG 1.95, Protection of Nuclear Power Plant Control Room Operators Against an Accidental Chlorine Release.

NRC Guidance:

EPRI TR-102348, "Guideline on Licensing Digital Upgrades"

NRC Generic Letter 95-02 dated April 26, 1995. Use of EPRI Report TR-102348 in determining the acceptability of performing analog to digital replacements under 10CFR50.59.

3. Input Parameter Requirements

Addition of 1 transformer and 4 relays for each train of TGIS impacts the electrical loading of the 120 volt vital buses, 2Y01 and 2Y02 and 3Y01 and 3Y02. The net increase due to this additional load is 35 VA on each bus. Electrical calculation No E4C-017 Rev 13 have been revised by ICCNs C-41 for Unit 2 and C-42 for Unit 3 to reflect this change. The seismic qualification of the TGIS panel, 2/3L378, will

not be affected by the addition of a mounting plate and relays. ICCN No F-662 to civil engineering discipline calculation No C-258-7.39. documents the evaluation of the seismic integrity of the TGIS panel.

Two safety-related continuous strip chart recorders 2/3AR-9782-1 (Train A) and 2/3AR-9782-2 (Train B) for recording of Ammonia and Butane concentrations will be installed on panel 2/3L378. Two keylocked Test Bypass switches 2/3HS-9784D1 (Train A) and 2/3HS-9784D2 (Train B) will be installed inside panel 2/3L378 for maintenance activities.

New Ammonia and Butane analyzers, strip chart recorders and existing Chlorine analyzers will be powered from Vital bus breakers 2Y01-25 or 3Y01-25 (Train A) and 2Y02-21 or 3Y02-21 (Train B). The existing feeders Q033-18 (Train A) and Q035-18 (Train B) will continue to power the catalytic combustors.

The transfer of analyzer power supplies will increase the power loading to the Vital busses 2Y01, 2Y02, 3Y01 and 3Y02 a total of 290 VA each during normal operation and a total of 490 VA each during the start-up period. The net total loading at Q033-18 and Q035-18 will decrease to 600W.

No other input parameters are affected.

4. Interface Requirements

The changes described in this package are common to both Units 2 and 3. The modifications will be made one train at a time and may be independent of a plant outage.

The bulk of the work will be in the TGIS panel 2/3L378. Door AC101 modifications and replacement of a nameplate on the local annunciator are made in the vicinity of the TGIS panel.

5. Material Requirements

Qualified class 1E transformers, fuses and fuse holders will be obtained from stock. New qualified class 1E Agastat relays have been procured.

The replacement Butane and Ammonia analyzers are commercial grade, seismically qualified instruments. The handswitches and recorders are safety related, seismically qualified. The paint materials are to match the existing paint on the TGIS panel. There are no additional special material requirements for this change.

6. Plant Layout and Arrangement Requirements

No General Arrangement Drawings are affected by this DCP. (The grating outside of door AC101 is not shown on any plant drawings). Any changes to the TGIS panel will be made with consideration given to accessibility, operation, maintenance and testing.

7. Environmental Conditions

No unique environmental conditions are created by this design change. The design is in accordance with the normal and post accident environmental conditions identified in SONGS 2 & 3 UFSAR Table 3.11-1. All changes in this package are confined to the Control Building which is a non harsh environment.

8. Safety Requirements

The work in this package will be implemented in accordance with established and approved SCE Construction Management Policies and Procedures. A Construction Safety Assessment (CSA) has been prepared and is included in Section 9 to ensure personnel safety and to prevent damage to adjacent plant components.

9. Quality Class and Seismic Category

The highest Quality Class and Seismic Category of work associated with this proposed change is QC II, SC I as referenced in the SONGS 2 & 3 Q-List (90034, This change is designed in accordance with the quality classification of major plant structures, components and systems listed in Units 2/3 FSAR Table 2.3-1.

10. Other Related Criteria

No security systems or equipment will be added, deleted or revised as a result of this change.

The TGIS Panel is not located in a harsh zone per DBD SO23-TR-EQ, thus environmental qualification requirements are not applicable.

This modification includes the removal of grating outside of AC-101, adds a lockset to AC-101 and adds safety related recorders and handswitches to a safe shutdown system, however presents no adverse impact to the Fire Protection or Appendix R criteria. A Fire Protection Checklist is included in the DCP for this modification.

11. Environmental Regulatory Impact

The changes proposed by this change will not impact the environmental regulatory requirements because the areas involved are confined to areas already disturbed during site preparation and plant construction.

12. Radwaste Treatment Systems Impact

There are no changes to radwaste treatment systems subject to semi-annual reporting per Technical Specifications.

13. Electrical System Loading Impacts

The additional transformer and interposing relays increase the load in each vital bus 2&3 Y01 and 2&3 Y02 by about 325 VA which is considered insignificant. ICCN No C-41 and C-42 to electrical calculation E4C-017 Rev 13 have determined that the increase in load to the vital busses and the Class 1E 125 VDC Batteries is within the margins provided in the Battery Loading. Consequently, the battery loading profile and the loading on the emergency diesel generators are not affected.

DESCRIPTION OF CHANGE	POWER SOURCE	KW CHANGES	COMMENTS
1. ADD NEW ANALYZERS AND RECORDERS	TRAIN A 2Y01-25, 3Y01-25 TRAIN B 2Y02-21, 3Y02-21	+0.325 KVA +0.325 KVA	SAFETY-RELATED LOADS ADDED TO 2(3)Y01 AND 2(3)Y02. LOADS ADDITION IS ANALYZED IN CALC. E4C-017, ICCN's # C-28 and C-41 (UNIT 2) AND ICCN's # C-29 and C-42(UNIT 3)
2. REMOVE OLD ANALYZERS. ONLY THE CATALYTIC COMBUSTOR SA1510ME658A IS NOW POWERED FROM Q033-18 AND SA1510ME658B POWERED FROM Q035-18	TRAIN A Q033-18 TRAIN B Q035-18	-0.900 KW -0.900 KW	SAFETY-RELATED LOADS ARE NOT ADDED. THE REDUCTION HAS BEEN DOCUMENTED IN CALC. E4C-086, ICCN# C9

The Butane, Ammonia and Chlorine analyzers are presently powered from distribution panels Q033 (Train A) and Q035 (Train B). This DCP provides vital

bus power to these analyzers. However, the catalytic combustors, which provide hydrocarbon free air to the Butane analyzers for zero point calibration will continue to receive power from the distribution panels Q033 and Q035. Therefore, there will be a net decrease of power supplied by each of these panels of 900 watts (from 1500 watts to 600 watts). An ICCN to Calculation E4C-086 has been generated to document this load reduction. Since this is a load reduction, the Diesel Generator loading as defined in Calc. E4C-088, Emergency Diesel Generator Loading, is still bounding and does not require a change to the calculation. In addition, the Voltage Regulation Calc., the System Dynamic Voltages during DBA Calc. and the Short Circuit Studies Calc. have been evaluated and are not impacted.

This DCP adds recorders and replaces the Butane and Ammonia analyzers with newer models which require less power. The power to these instruments will be supplied by the vital busses 2Y01 or 3Y01 (Train A) and 2Y02 or 3Y02 (Train B). There will be an increase in loads to these busses and consequently to the A and B train DC systems.

The total load of these instruments is 490 VA which includes 200 VA to the internal heater of the Butane analyzers. This heater is used only when the Butane analyzer is initially started and automatically shuts off after the analyzer is ready. Since this load exists for a very short period of time during instrument start up, it is not considered to be a continuous load and is not required to be included in Calculation E4C-017. The net increase in load on Train A and B vital busses is 325 VA. There is a corresponding increase of 3.45 Amps to both Train A and B battery loads. The load profile computed in E4C-017 Rev 13 includes a 10 Amp margin for contingencies. The additional load imposed on the batteries by this DCP will reduce the contingency margin available to 6.55 Amps. The battery load profile will not be affected.

An Engineering evaluation has determined that the voltage drops and fuse sizes of 2(3)Y01-25 and 2(3)Y02-21 are adequate.

14. Main Control Room Operating Area

This modification is designed in conformance with the Control Room Design Standard for Human Factors (JS-123-101 Rev. 1). The design changes are confined to the area surrounding the TGIS Panel.

15. Regulatory Guide 1.97 Criteria

This modification does not affect the Reg. Guide 1.97 criteria.

DCP 2/3-6933.00SJ REV. 0 SH. 17
Affected Section Change No 2

SECTION 2

10CFR50.59 SAFETY EVALUATION

SECTION 2 - 10CFR50.59 SAFETY EVALUATION

A. BASIS FOR SAFETY EVALUATION

This safety evaluation covers all changes made by DCP 2/3-6933.00SJ including ASC #1 and ASC #2. Additionally this safety evaluation will address NRC Generic Letter 95-02 for analog to digital replacements.

Attachment 1 to this Safety Evaluation contains submittals from the vendor pertaining to the ULTRAMAT 5 and FIDAMAT 5 analyzers, including certifications, basic block diagrams and supporting data.

The following is a summary of modifications:

Original DCP:

1. Replace obsolete Ammonia and Butane Analyzers for TGIS.
2. Add safety related recorders to the TGIS panel 2/3L378.
3. Change power supply from the 1E Heater Bus MCC's to the 120 VAC Vital Bus, for the Ammonia, Butane and Chlorine Analyzers. Power the new recorders from the 120 VAC Vital Bus.
4. Remove the Bypass function from the existing Reset/Bypass switch and add a keylocked maintained selector switch on the inside of the TGIS panel (one per train) to provide the bypass function.
5. Remove the grating between 9 ft. Aux Bldg. and 7 ft. Turbine building outside barrier door AC101 and install a lock on that door.

ASC #1

1. Place a "HOLD" on all Train A construction activities of the original DCP and this ASC.
2. Install four (4) 24 VAC interposing relays (2 each for Ammonia and Butane analyzers) to ensure that analyzer output contacts are operated within the rated voltage of the contacts. Install 120/24 VAC transformer to furnish power to interposing relays. Install fuses to provide protection for the

interposing relays and transformer. Modify existing mounting plate for Reset/Bypass switch to accommodate new components.

3. Replace Butane analyzer EPROM to make Ammonia and Butane analyzer output contacts consistent in operation.

ASC #2

1. Remove "HOLD" on Train A construction activities added in ASC #1.

2. Evaluate Ammonia and Butane analyzer analog to digital upgrades.

3. Update UFSAR Table 7.3-24 to correct channel failure effect on system.

B. SAFETY EVALUATION

1. **May the proposed activity increase the probability of occurrence of an accident evaluated previously in the safety analysis report?**

Response: No.

The proposed modification involves physical replacement of existing Ammonia and Butane analyzers, which are analog instruments, with microprocessor based digital analyzers. The new analyzers do not require operator or maintenance support beyond that required for the existing analog units. A failure in the output of these analyzers will not result in an increase in the probability of any system malfunction resulting in an accident.

This change requires modification to the TGIS panel to install new analyzers and components. Civil calculations have determined that Seismic Category I requirements for the TGIS panel and its installed components will continue to be met. The electrical loading calculations have determined that the additional load of the 120/24 VAC transformer and relays remains within the allowable loadings of the class 1E 120 VAC bus and the 125 VDC battery system. Since the modification will not affect the existing train separation and redundancy, no failures to other systems are possible.

The probability of occurrence of a toxic gas release as discussed in Section 6.4 of the UFSAR, will not be affected by the proposed modifications made in this DCP and ASCs since this system does not have an interface with toxic gas hazard sources.

The Toxic Gas Isolation System is not a precursor to any accident previously evaluated in chapters 3, 6 or 15 of the UFSAR, therefore, the proposed modifications do not involve equipment that would adversely impact any other accident scenarios previously evaluated.

2. **May the proposed activity increase the consequences of an accident evaluated previously in the safety analysis report?**

Response: No.

The Toxic Gas Isolation System is credited with isolating the Control Room to prevent a toxic gas release from exposing the operators to unacceptable concentrations of specific toxic gases. The TGIS system is not credited in any other UFSAR accidents previously evaluated (Control Room Habitability Systems UFSAR Section 6.4).

The consequences of a postulated toxic gas release will not be increased since there is no change to the functional design of the system. This change provides more accurate Ammonia and Butane analyzers, and additional trend information at the recorders. Instrument response time and Technical Specification setpoints are not altered by this change. The increased accuracy of the Ammonia analyzer provides additional allowable value margin based on the analyzer specifications as documented in ICCN C-2 to Controls Setpoint Calc. J-SAA-001 Rev 1.

Therefore, the proposed upgrade of Ammonia and Butane analyzers will not increase the consequences of an accident evaluated previously in the safety analysis report.

3. **May the proposed activity increase the probability of occurrence of a malfunction of equipment important to safety evaluated previously in the safety analysis report?**

Response: No.

The proposed equipment modifications are made within the TGIS panel with the exception of the lock on door AC101. Installation of these analyzers will not impact environmental parameters of any safety related equipment or require increased cabinet cooling or increase the burden on HVAC equipment based on vendor analyzer specifications. The new installation will maintain the existing Regulatory Guide 1.75 separation between the safety related and non-safety related systems. This equipment will not reduce the redundancy of the system

and no protection features will be modified. The specifications for the new analyzers increase the accuracy and reliability of the system thus effectively decreasing the possibility of a malfunction. The addition of the recorders provides for trending data only and will not affect the function of the TGIS system since the recorders are 1E qualified, Seismic Category I instruments which is consistent with the remainder of the system. The additional loads on the vital buses have been satisfactorily analyzed. Likewise, the modifications of the reset and bypass switches, which will be administratively controlled, do not affect the functional design of the system. The bypasses are consistent with the requirements for Non-NSSS ESFAS equipment per UFSAR Sections 7.3.1.2.K-M. The function of the barrier doors will not be changed by this modification.

The addition of interposing relays is to provide proper operating voltage for the vendor furnished analyzer contacts. Fuses are provided for the protection of the added relays and transformer. The modified mounting plate and the added transformer and relays will not affect the function of the TGIS since all added components are qualified, Seismic Category I which is consistent with the remainder of the system. Calculations have determined that the load increases to the 120 VAC vital busses and 125 VDC safety related batteries due to all the proposed modifications are insignificant and fall within the margins provided and no changes to the battery loading profile and the emergency diesel generator loading profile are warranted.

The new microprocessor based analyzers will be installed in the same TGIS panel as the existing analog analyzers and meet the seismic and environmental qualifications of the existing analyzers. The existing train separation, redundancy and independence will be maintained. EMI/RFI interference protection for the FIDAMAT 5 Butane analyzer is based on vendor certification (see Attachment 1). EMI/RFI interference protection for the ULTRAMAT 5 Ammonia analyzer is based on an engineering review of current vendor test data. Existing administrative controls prohibit the use of portable radios in the vicinity. Faraday shields and lead lining are provided in the TGIS panels to reduce the chances of EMI/RFI affecting the operation of these analyzers.

Each analyzer microprocessor is a self contained unit and therefore a random software failure in one analyzer will not be propagated to any other analyzer. Additionally, each train is powered from a separate vital bus and any power transient or spike in one train will not affect the operation of the analyzers in the opposite train.

Common mode/cause software failures are considered unlikely based on the relatively simple design, certified software change control and commercial

operating experience of these analyzers. The following is summary of the commercial operating experience as provided by the vendor:

The vendor reports that approximately 10,000 ULTRAMAT 5 analyzers (Ammonia Analyzer) have been sold with a corresponding operating time of approximately 25,000 unit years. While all these analyzers do not have the same software version as the ones to be installed at SONGS an engineering review of the software changes to date has been performed and changes were not required to correct potential common failure modes or silent failure modes. The vendor states that 2 failures were reported, approximately 4 years ago, that had an undefined failure status (silent failure). 2 failures out of 10,000 units is an insignificant failure rate. Currently there are approximately 800 ULTRAMAT units in commercial operation with the same software as installed in the analyzers to be installed by this change. The current software version has not experienced any "silent failures" or failures that could potentially become common mode failures.

The vendor reports that approximately 600 FIDAMAT 5 analyzers (Butane analyzer) have been sold with a corresponding operating time of approximately 1,000 unit years. While all these analyzers do not have the same software version as the ones to be installed at SONGS an engineering review of the software changes to date has been performed and changes were not required to correct potential common failure modes or silent failure modes. The vendor states that there have been no failures reported that had an undefined failure status (silent failure). Currently there are approximately 100 FIDAMAT units in commercial operation with the same software as the analyzers to be installed by this change. This analyzer also has a "watchdog" timer feature that will alert operators, by a channel failure alarm, of processor malfunctions. The current software version has not experienced any "silent failures" or failures that could potentially become common mode failures. Additionally, current revisions of the software are maintained in accordance with ISO 9001 standards, and the vendor is ISO 9001 certified. Based on simplicity of design, industry experience and certified software change control, it is considered unlikely that an unalarmed "silent failure" or a common mode failure will result from the installation of these analyzers. Therefore, common mode software failure is not a significant failure mode for the replacement analyzers. (See Attachment 1)

Therefore the proposed digital upgrade will not increase the probability of occurrence of a malfunction of equipment important to safety previously evaluated in the safety analysis report.

4. **May the proposed activity increase the consequence of a malfunction of equipment important to safety evaluated previously in the safety analysis report?**

Response: No.

The replacement analyzers will provide more accurate and reliable toxic gas measurements, as determined by vendor specifications and acceptance testing, and the installation is consistent with the Seismic Category I and 1E Electrical Separation requirements.

The installation of the interposing relay and 120/24VAC transformer is consistent with the Seismic Category I and 1E Electrical Separation requirements.

No new failure modes are created by the proposed modification as determined by a review of UFSAR Table 7.3-24. This table is being corrected by this change to show the effect on the system when the sensor fails low. A low sensor output of the Ammonia or Butane channels results in a loss of redundancy instead of system isolation. This is the channel failure configuration of the existing analog analyzers and is unchanged by this DCP. This condition will result in a channel failure annunciation that allows for immediate detection and therefore does not result in a potentially undetected pre-existing failure. Therefore the proposed modifications will not impact any other safety systems or accident mitigating systems and there will be no increase in radiological consequences due to a malfunction of any equipment important to safety.

The failure modes of the new microprocessor based analyzers are the same as the existing analog analyzers. Postulated hardware or software failure in the Ammonia or Butane analyzer of one train will only affect that train and is no different than the failure of an existing analyzer in any one train. These analyzers are based on individual microprocessors and simplistic design of system architecture. A common mode software failure is not a significant failure mode for the replacement analyzers. (see response to question 3 and Attachment 1). Upon loss of power the the Ammonia and Butane analyzers will actuate similar to the existing analyzers. Upon restoration of power, the analyzers restart themselves, default to the last operating parameters at the time of loss of power. The analyzers update with the previous operating data parameters as soon as the system is ready (warmup and initialization time) to analyze the sample flow. Therefore the loss of power will not adversely affect

the operation of these analyzers and will not adversely affect the control room HVAC system.

The basic operating instructions for all analyzer processors are permanently etched in their respective EPROMs to avoid changes and/or deletion as a result of operator error. Adequate safeguards (three levels of password protection) are provided against inadvertent deletion of field set system specific parameters and calibration and adjustment functions.

Therefore, the consequences of a malfunction of equipment important to safety are not increased by the proposed modification.

5. **May the proposed activity create the possibility of an accident of a different type than any evaluated previously in the safety analysis report?**

Response: No.

Installation of these analyzers will not impact environmental parameters of any safety related equipment or require increased cabinet cooling or increase the burden on HVAC equipment based on vendor analyzer specifications.

The new TGIS Train power supply from the vital busses is more reliable due to battery backup and provides regulated and conditioned power to the analyzers and recorders. The Vital Bus breakers are dedicated to each TGIS Train and include protective fuses. The combined load added to the vital bus due to the additional relay and transformer will will remain within the allowable loads on the vital AC or DC battery systems. The TGIS panel is physically separated into two trains by a seismically qualified steel barrier which provides the required Reg. Guide 1.75 separation for the redundant trains. All affected components located within the TGIS panel are 1E and seismically qualified for use in a safety related system. Electrical loading calculations for normal and emergency power supplies have been reviewed and updated as required, to verify that design limits will not be exceeded.

Since the system architecture, operation and function of the toxic gas isolation system are not changed, and based on the response to questions 1 and 3 of this safety evaluation, the Toxic Gas Isolation System cannot create any new accidents and the modification of this change will not create any new failure modes that would result in accidents of different type.

6. **May the proposed activity create the possibility of a malfunction of equipment important to safety of a different type than any evaluated previously in the safety analysis report?**

Response: No.

There are no plant functions or design bases changed as a result of the proposed modification to TGIS. No new failure modes are created by the proposed modification as determined by a review of UFSAR Table 7.3-24. This table is being updated (corrected) by this change to show the effect on the system when the sensor fails low. A low sensor output of the Ammonia or Butane channels results in a loss of redundancy instead of system isolation. This is the current channel failure configuration and is unchanged by this DCP. This condition will result in a channel failure annunciation that allows for immediate detection and therefore not result in a silent failure that could lead to a pre-existing failure.

The modification of the time delay relays does not affect the fail safe condition of the final TGIS output relay. The signal processing and indication are digital, however it does not present any new single failure modes. The QCII, Seismic I classifications of the proposed modifications to TGIS are consistent with the current TGIS System.

The addition of the 24 volt interposing relays does not affect the fail safe condition of the final TGIS output relay. The QCII, Seismic I classifications of the proposed modifications are consistent with the current TGIS System.

The new analyzers meet the seismic, and environmental qualifications at the same level as the existing analyzers. The new analyzers have adequate protection to EMI/RFI interference and the modifications will not adversely impact or reduce the protection level available. Additional protection is provided by maintaining the existing administrative controls on the usage of portable radios in the general area. The environmental parameters in the area, such as temperature and humidity, will not be impacted by this change. Therefore there will be no adverse effect on the operation of any equipment important to safety located in the vicinity. No increased maintenance or operator intervention will be required for the new analyzers.

Based on the response to question 3 of this safety evaluation, the probability of a common mode or common cause failure remains sufficiently low such that it can continue to be excluded as a credible failure mode.

Therefore, the modification will not create the possibility of a malfunction of equipment important to safety of a different type than any evaluated previously in the safety analysis report.

7. **Does the proposed activity reduce the margin of safety as defined in the basis for any technical specification?**

Response: No.

The proposed modifications will not reduce the margin of safety as defined in Tech Spec Sections 3/4.3 and B3/4.3. Table 3.3-3 which defines operable channel requirement is unaffected by the proposed modifications. Table 3.3-4, ESFAS Instrument Trip Values, Functional Unit 10, defines the Setpoints and Allowable Values for TGIS. No Tech Spec setpoints are changed as a result of the proposed modifications. The current Allowable Value for TGIS on high Ammonia is < 100 PPM per Tech Spec Table 3.3-4, Functional Unit 10. The calculated value for implementing the Tech Spec Allowable Value for the new Ammonia analyzer is < 88 PPM. This value is more conservative than the existing Tech Spec, and it may be implemented without reducing the margin of safety for Toxic Gas Isolation. The analyzer response time specifications and test data show that the new analyzers are equal to or better than the present instrumentation. Therefore the response times defined in Table 3.3-5, including instrumentation, logic and isolation damper closure times, are not affected by the proposed modifications. Response Time testing will be performed prior to the DCP closure.

Bases 3/4.8.1, 3/4.8.2 and 3/4.8.3, A.C. Sources, D.C. Sources and Onsite Power Distribution Systems, have been reviewed and based on the analysis performed, the defined margin of safety will not be reduced by the proposed modifications.

In addition, the proposed modifications do not affect the testing methodology or other bases as defined in Tech Spec Section B3/4.3.

Therefore the proposed modifications to TGIS will not reduce the margin of safety as defined in Tech Spec Sections 3/4.3.

DCP 2/3-6933.00SJ REV. 0 SH. 27
Affected Section Change No 2

ATTACHMENT 1

The following pages provide vendor submittals pertaining to the ULTRAMAT 5 and FIDAMAT 5 analyzers, including certifications, basic block diagrams and supporting data.

ATTACHMENT 1

SIEMENS Automation

Fax-Mitteilung an Fax-Message to	
Firma Company	Southern Cal. Edison Co.
Abteilung Department	
Name Name	Sandy Neeper/Steve Hetrick
Ort Location	San Clemente
Telefon Telephone	
Telefax Fax	001-714-368-~~8271~~ 7477
Seitenzahl Number of Pages	31 inkl. dieser Seite incl. this Page

VON Sender	Siemens AG
Abteilung Department	AUT 35 V2
Name Name	Jürgen Schönewerk
Straße Street	Siemensallee 84
Ort Location	76187 Karlsruhe
Telefon Telephone	+49 49 / 0721 / 595-2741
Telefax Fax	+49 49 / 0721 / 595-6602
Datum Date	12.12.95

FIDAMAT 5 / ULTRAMAT 5

Dear Sandy,
dear Steve,

You gave us a hard time because most of our internal documentation is in German. Enclosed is what we managed to compile in English.

Concering EMI / RFI, I have enclosed the original EC Certificate of Conformity for the FIDAMAT (in German only). (As you know, CE is a must for deliveries in 1996.)

The ULTRAMAT 5 has not been certified yet, but I have enclosed all available test information to date, which is valid for your unit.
The tests were made in our test center in Karlsruhe. We sincerely hope that we don't need to translate all of this.

With best regards,

Jürgen Elsenwerk

DCP 2/3-6933.00SJ REV. 0 SH. 2B
Affected Section Change No 2

Encl.

ATTACHMENT 1

SIEMENS

Automation

Fax-Mitteilung an Fax-Message to			
Firma Company	Southern Cal. Edison Co.		
Abteilung Department	Controls Engineering		
Name Name	Jim Redmon		
Ort Location	San Clemente		
Telefon Telephone			
Telefax Fax			
Seitenzahl Number of Pages	2	Inkl. dieser Seite Incl. this Page	

VON Sender	Siemens AG
Abteilung Department	AUT 35 V2
Name Name	Jürgen Schönewerk
Straße Street	Siemensallee 84
Ort Location	76187 Karlsruhe
Telefon Telephone	+49 49 / 0721 / 595-2741
Telefax Fax	+49 49 / 0721 / 595-6602 ✓
Datum Date	24.11.95

Siemens ULTRAMAT and FIDAMAT
Your fax to Glenn Schuelke dt. 17 Nov. 95

Dear Jim,

I'm happy to answer all your questions positively, as follows:

ref. 1. Of course we are certified to the ISO 9000 system, specifically to ISO 9001 (design, development, production, installation, and servicing). A copy of the certificate is attached.
You can imagine that a large company such as Siemens has quality standards and procedures for everything, which adds up to tons of paper!

ref. 2. For example, the FIDAMAT has an integral "watch dog" function:
error 1 indicates "processor-slave defective"
error 3 indicates "heating off", e.g. due to overheating and shut-off
error 9 indicates E-PROM check faulty (check sum check)

Additionally, there is a continuous parameter plausibility check:
error 8 with various sub-No's indicate which parameter
See also the manuals for further reference.

ref. 3. At start-up check sum is checked. Replacement of E-PROMs with same software version must have the same check sum. Updated software will result in a new check sum.

ref. 4. We have more than 600 FIDAMAT and several thousand ULTRAMAT in the field. Malfunctions of sub-components are really rare, if so, an alarm was always set off. Up to now we have not experienced any "hidden fault".

ATTACHMENT 1

ISO 9001 CERTIFICATION FOR SIEMENS AG

C E R T I F I C A T E

DQS Deutsche Gesellschaft zur Zertifizierung
von Qualitätssicherungssystemen mbH
(German Association for the Certification of Quality Systems)

hereby certifies, that the company

SIEMENS AG
AUTOMATION GROUP (AUT)
Test and Measurement Systems,
Process Automation (AUT 3)
R&D, Production, Sales and Service
Karlsruhe, Berlin, Hagenau, Munich

has implemented and now maintains a

quality system.

A quality audit performed by DQS has verified that
this quality system fulfils the requirements of the following standard:

DIN ISO 9001

Quality systems
Model for quality assurance in design/development, production,
installation and servicing;
(identical with ISO 9001 : 1987, EN 29 001 : 1987, BS 5750 Part 1 : 1987)

This certificate is valid until	May 05, 1996
Certificate Registration No.:	19 656 - 01
Frankfurt am Main,	May 06, 1993

This certificate is based on a quality audit in cooperation
with the VDE Prüf- und Zertifizierungsinstitut - VDE Prüfstelle
- Verband Deutscher Elektrotechniker (VDE) e.V.

PRÄSIDENT GESCHÄFTSFÜHRUNG VDE - PZI

Offices: D-6000 Frankfurt 50, August-Schanz-Straße 21   D-1000 Berlin 30, Burggrafenstraße 6

DCP 2/3-6933.00SJ REV. 0 SH. 30
Affected Section Change No 2

ATTACHMENT 1

GESAMT SEITEN 02

AN: 00 1 14 568 1799

Southern Cal. Edison
Sandy Nuper
Steve Hetrick

VON: Siemens AG AUT35V2

Name: Jürgen Schümmer
FAX: 00 49 721 595 6602

Datum: 14/12/95

total 2 pages

ULTRAMAT 5 / F-DAMPERS

Enclosed certificate as requested

Best Regards

Jürgen

P.S unfortunately I'm not in the office this afternoon. Please send a fax if required

DCP 2/3-6933.00SJ REV. 0 SH. 3/
Affected Section Change No 2

ATTACHMENT 1

SIEMENS

Qualitätsprüf-Zertifikat nach
Quality Inspection Certificate to
Certificat d'Inspection de qualité conformément à
DIN 55 350-18-4.2.1

Bezeichnung der Lieferung/Leistung/Menge Description of the supplies/services/quantity Désignation des fournitures/services/quantités	2x off FIDAMAT 5E-I 7MB1420-0BA12-1AB0 Fab.-Nr. : FD-251, FD-252 2x off ULTRAMAT 5E 7MB1120-1PE04-0BB1 Fab.-Nr. : FN-287, FN-288
Kunde Customer Client	Southern California Edison
Kundenauftragsnummer Customer order No. No de commande client	430003-Q-R351-616015
Auftragskennzeichen des Herstellers Manufacturer's order reference Référence de commande constructeur	50901254
Bemerkungen Remarks Remarques	

DCP 2/3-6933.00SJ REV. 0 SH. 32
Affected Section Change No 2

Die bezeichnete Lieferung/Leistung wurde entsprechend den Vorgaben geprüft und für einwandfrei befunden.
The supplies/services described were inspected in accordance with the specifications and were declared satisfactory.
Les fournitures/services ci-dessus ont été, après vérification de conformité, déclarés de qualité irréprochable.

Siemens AG

Bereich Automatisierungstechnik Automation Group Division Automatisation	AUT 3		
Abteilung/Dienststelle Department/Unit Département/Service	SPA QM		
Name Name Nom	Camboni	Unterschrift Signature Signature	Camboni
Ort Location Lieu de délivrance	Haguenau	Datum Date Date	14.12.1995

ATTACHMENT 1

SIEMENS

General Information ULTRAMAT 5 and FIDAMAT 5

ULTRAMAT 5:	units sold	approx. 10,000
	operating years	approx. 25,000

software errors without error message:

2 cases ~ 4 years ago.

FIDAMAT 5:	units sold	approx. 600
	operating years	approx. 1,000

software errors without error message:

unknown

Note: In case of timer fault there will be no error message, but the unit will go into a defined status:

- the analog output signal will go to either -1 mA or + 21 mA
- serial interface of the unit (as slave) will not answer to the master

DCP 2/3-6933.00SJ REV. 0 SH. 33
Affected Section Change No 2

ATTACHMENT 1

SIEMENS

CPU Hardware

FIDAMAT 5:	CPU:	INTEL / SIEMENS 80C32
	Watchdog:	MAXIM MAX 692 CWE
ULTRAMAT 5:	CPU:	SIEMENS 8032

Industrial Experience Data:

With latest software version delivered

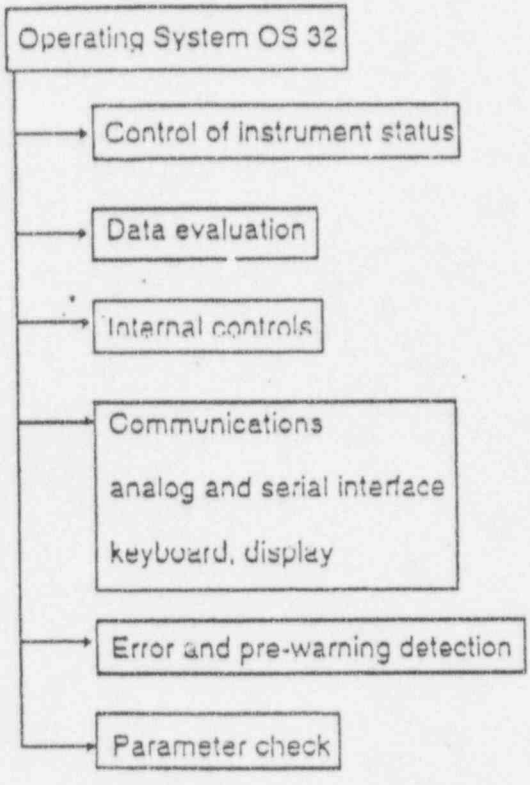
FIDAMAT 5:	approx. 100 units
ULTRAMAT 5:	approx. 600 units

DCP 2/3-6933.00SJ REV. 0 SH. 34
Affected Section Change No 2

ATTACHMENT 1

SIEMENS

Software Structure FIDAMAT 5



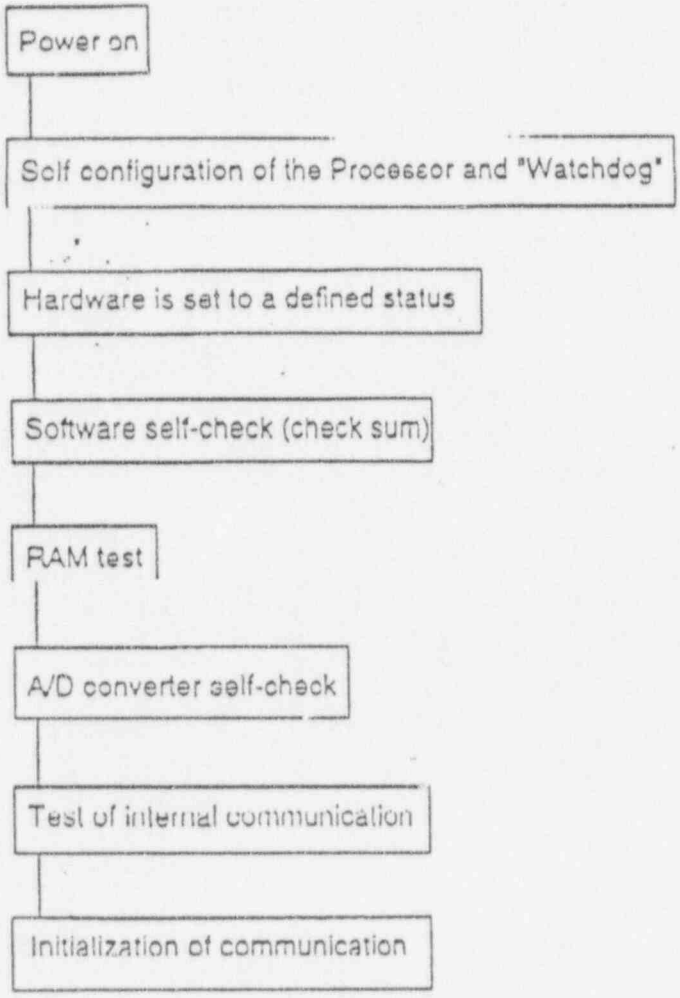
DCP 2/3-6933.00SJ REV. 0 SH. 35
Affected Section Change No 2

ATTACHMENT 1

SIEMENS

Start / Restart FIDAMAT 5

Power interruption of < 20 ms has no influence, >> 20 ms will cause restart as follows.



DCP 2/3-6933.00SJ REV. 0 SH. 36
Affected Section Change No 2

ATTACHMENT 1

SIEMENS

FIDAMAT 5 I Software changes

Pre-version / lab: V62 I, dated June 30, 1994

Version V1 I, dated August 8, 1994

Values for temperature compensation (Fc.. 71 and 73) are stored write-protected into the EEPROM

Version V2 I, dated October 25, 1994

Other serial interface standards implemented. Instead of AK (for automotive industry) now V24/TTY (standard for ULTRAMAT 5). Limit contacts (at X1 plug) now according to ULTRAMAT 5.

Version V3 I, dated November 29, 1994

Function of LED's for "Not Ready", "Meas." and "Cal." and relay contacts for "Ready", "Meas." now according to ULTRAMAT 5.

Version V4 I, dated January 18, 1995

The set value for burner air pressure is now factory adjusted to 550 mbar (previously 500 mbar).
The measuring value will be compensated to burner air pressure.

DCP 2/3-6933.00SJ REV. 0 SH. 37
Affected Section Change No 2

ATTACHMENT 1

SIEMENS

Watchdog Function (FIDAMAT 5)

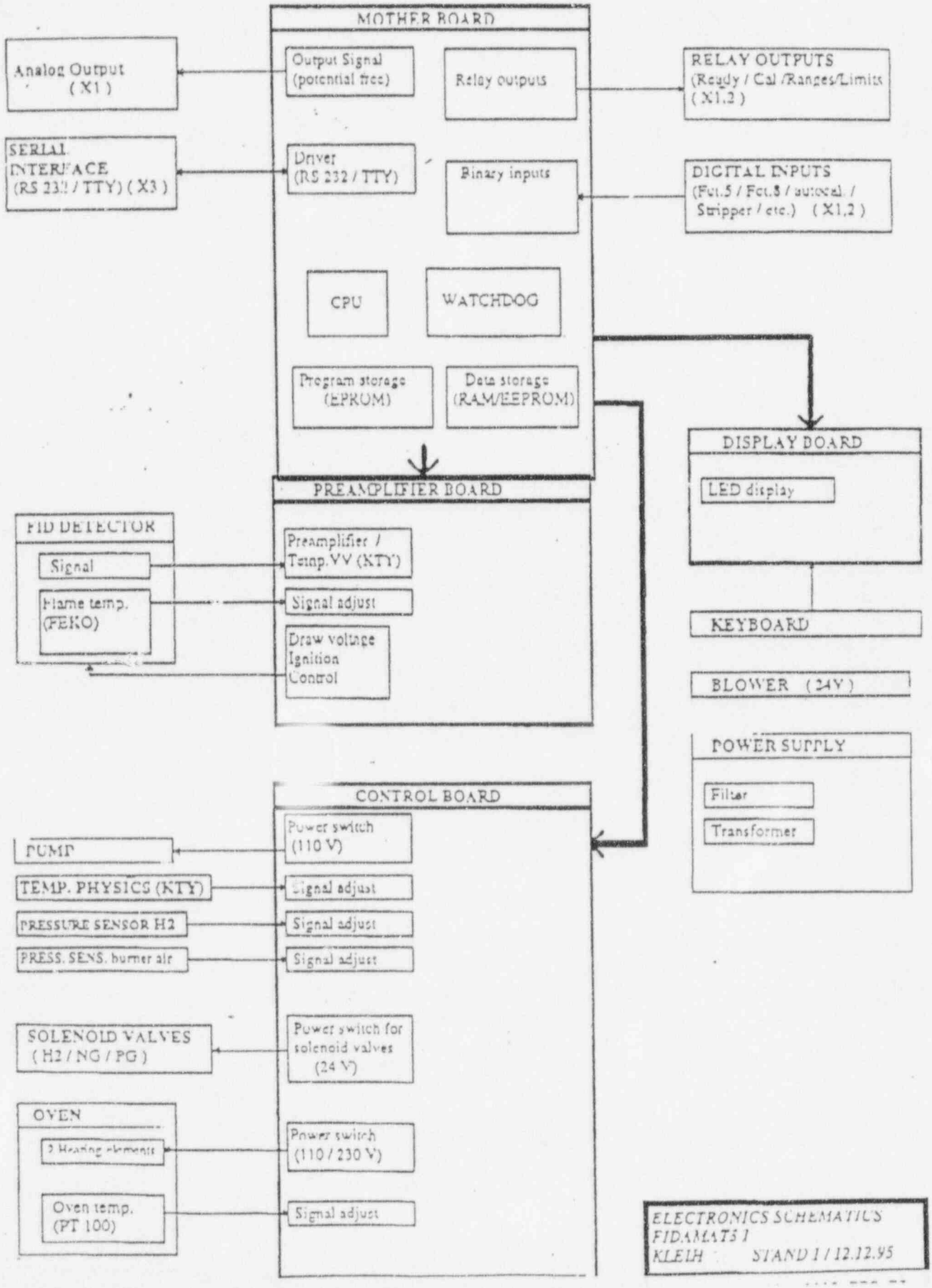
The watchdog module (MAXIM, MAX 691 CWE) is independant of the processor. The processor resets the watchdog timer every 100 msec. If the processor is caught in a loop the watchdog initiates a restart of the instrument.

DCP 2/3-6933.00SJ REV. 0 SH. 38
Affected Section Change No 2

ATTACHMENT 1

DCP 2/3-6933.00SJ REV. 0 SH. 39
Affected Section Change No 2

SIEMENS



ELECTRONICS SCHEMATICS
FIDAMAT 3 I
KLEIH STAND 1 / 12.12.95

ATTACHMENT 1
FIDAMAT 5E RFI CERTIFICATION

SIEMENS

DCP 2/3-6933.00SJ REV. 0 SH. 40
Affected Section Change No 2

EG-Konformitätserklärung

Nr. 3405 / 11.95

Hersteller:	*Siemens AG* *Bereich Automatisierungstechnik* *Meß- und Prüftechnik, Prozeßautomatisierung*
Anschrift:	*Siemensallee 84* *76181 Karlsruhe* *Bundesrepublik Deutschland*
Produktbezeichnung:	*Fidamat 5E* *7MR1420-XXXXX-XXX0*

Die bezeichneten Produkte stimmen mit den Vorschriften folgender Europäischer Richtlinien überein:

89/336/EWG Richtlinie des Rates zur Rechtsangleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit
geändert durch RL 91/263/EWG, 92/31/EWG und 93/68/EWG des Rates

73/23/EWG Richtlinie des Rates zur Rechtsangleichung der Rechtsvorschriften der Mitgliedstaaten betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen
geändert durch RL 93/68/EWG des Rates

Nachfolgende harmonisierte Normen werden angewendet:

EN 50081-1
EN 50082-2
EN 61010

Anbringung der CE-Kennzeichnung: 95

Siemens Aktiengesellschaft

Karlsruhe, den 29.11.95

Dr. Wendt, Abteilungsleiter

Gitter, Betriebsleitung

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Zusicherung von Eigenschaften im Sinne des Produkthaftungsgesetzes.
Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.

ATTACHMENT 1

9.2 Warnings and Error Messages

9.2.1 Warnings

The symbol  precedes each warning.

The LED "warning" flashes on the control panel. The cause of the warning can be scanned using "ENTER". Further measurements are possible in this state. The analyzer may fail if the cause of the warning is not eliminated.

Number in display	Cause of warning	Causes, notes
71	Pt100 temperature of physical section faulty or outside the limits	
72	The 2nd Pt100 temperature of the pump (check measurement) is faulty or outside the limits	
73	Temperature of electronics section outside the limits (0 to 60 °C) or sensor faulty	
74	Fan faulty	
75	Temperature deviation in pump comparison (2nd Pt100)	
76	The flow of control air is too high	Filter increasingly contaminated, pump diaphram leaks, line increasingly blocked
77	The flow of control air is too low	The outlet restrictor of the gas outlet is blocked
78	Temperature of physical section outside the limits (0 to 80 °C)	
79	Hydrogen pressure outside the limits	The limits defined in function 37 have been violated. Hydrogen input pressure is too high or too low; this warning may also be produced if the limits are too close and there are extreme variations in atmospheric pressure.

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Affected Section Change No 2

ATTACHMENT 1

Number in display	Cause of warning	Causes, notes
80	Sample gas pressure outside the limits	The limits defined in function 38 have been violated. Combustion air pressure (control air) is too high or too low; sample gas inlet faulty (pump, filter, lines); this warning may also be produced if the limits are too close and there are extreme variations in atmospheric pressure
81	Flame out	
82	Difference between last and current zero calibrations > 5 %	The exact value for new/old can be scanned using function 96
83	Output current 1 used for internal value	See function 62
84	Measured value exceeds full-scale value of largest measuring range	Redefine full-scale value (function 12)
85	Stripper (option) faulty	Inform service
86	Incorrect device configuration (only in "autocal" mode)	Upon changeover from total to single calibration only the measuring ranges with set values will be calibrated
87	Less than four setpoints have been entered (only in "autocal" mode)	Recalibrate device using function(s) 5 and/or 8
88	Incorrect measured value	

ATTACHMENT 1

9.2.2 Faults

The symbol  precedes each fault.

The LED "not ready" flashes on the control panel. One of the following error messages appears when you press "ENTER".

Number in display	Error message	Comment
1	Slave faulty	Pull mains plug immediately, inform service
2	Hardware fault	Inform service
3	Heating has switched off	RESET
4	EEPROM jumper must be set	Inform service
8	Parameter storage test not carried out	See 8, next page but one
9	EPROM faulty	Order replacement from manufacturer
19	Sensitivity too low	Incorrect calibration gas, incorrect measuring range, see functions 2 and 6
40	Oven temperature outside limits or Pt100 faulty	Check contacts
41	Pump temperature outside limits or Pt100 faulty	Check contacts
42	Sample gas probe temperature outside limits or Pt100 faulty	Check contacts
43	Sample gas line temperature outside limits or Pt100 faulty	Check contacts
44	Flame monitor faulty	Check contacts
45	Flow sensor temperature outside limits or Pt100 faulty	Check contacts
46	Flow outside limits or sensor faulty	Check contacts
47	Sample gas pressure too high or too low or pressure sensor faulty	Check cylinder pressure, readjust, check pressure sensor

ATTACHMENT 1

Number in display	Error message	Comment
48	Hydrogen pressure too high or too low or pressure sensor faulty	Check cylinder pressure, readjust, check pressure sensor
49	High-voltage outside limits	Check whether high-voltage line is connected
50	Operating voltages outside setpoints	Check power supply and connections on transformer
51	Flow too high	Check outlet restrictor, examine for leaks
52	Flow too low	Filter contaminated, pump faulty, line blocked
53	Oven temperature setpoint exceeded or fallen below	
54	Pump temperature setpoint exceeded or fallen below	
55	Heated line temperature setpoint exceeded or fallen below	
56	Sample gas probe temperature setpoint exceeded or fallen below	
57	Combustion air/sample gas pressure too low	Combustion air line interrupted
60	Flame does not ignite (30 min)	Check gas flows
61	Pump does not start	Check sample gas pressure (380 to 290 mbar without pump)

ATTACHMENT 1

Number in display	Cause of error	Comment
8	Parameter storage test not carried out	
	A: Analyzer does not react to ENTER	Press dot key for 30 sec until function 50 appears in the small display; recode the analyzer. Then reload basic data into RAM using function 53 or 55.
	B: One of the following error numbers is displayed when you press ENTER. A further number may be displayed when the error has been eliminated.	Correct the value in the corresponding function using the following table.

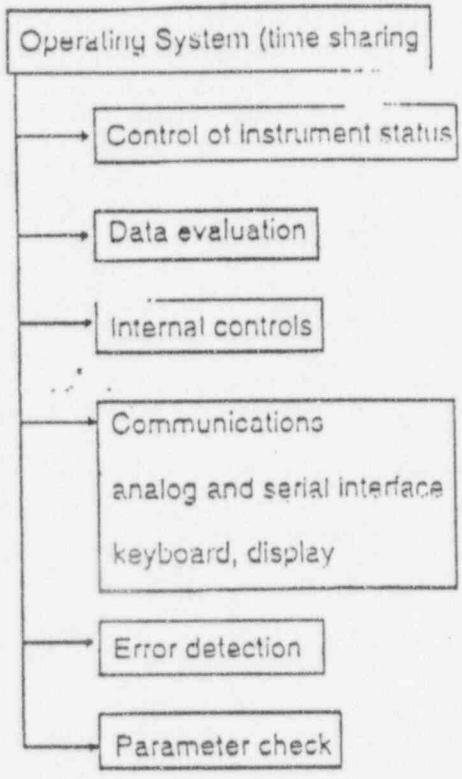
	Cause	Check/ input using function No.
2 3 4	Code 1 Code 2 Code 3	50 50 50
5	Assignment of current output 1	52, identifier 0
11	Number of measuring ranges	51
12	Measuring range	1
15 16	Sensitivity adjustment Sensitivity setpoint	17 7
17 18	Start-of-scale value Full-scale value	11 12
20	Limits	18 / 19
21	Zero	5
22	Sensitivity	17 / 7 / 8
37	Limits of time constant T_{90}	13
38	Dynamic noise rejection	14
200	Baud rate	80
201	Transmission procedure	81
202	Start, end, don't care characters	82
203	Calibration of analog current	Contact service
204	Adjustment of preamplifier	Contact service

DCP 2/3-6933.00SJ REV. 0 SH. 45
Affected Section Change No 2

ATTACHMENT 1

SIEMENS

Software Structure ULTRAMAT 5



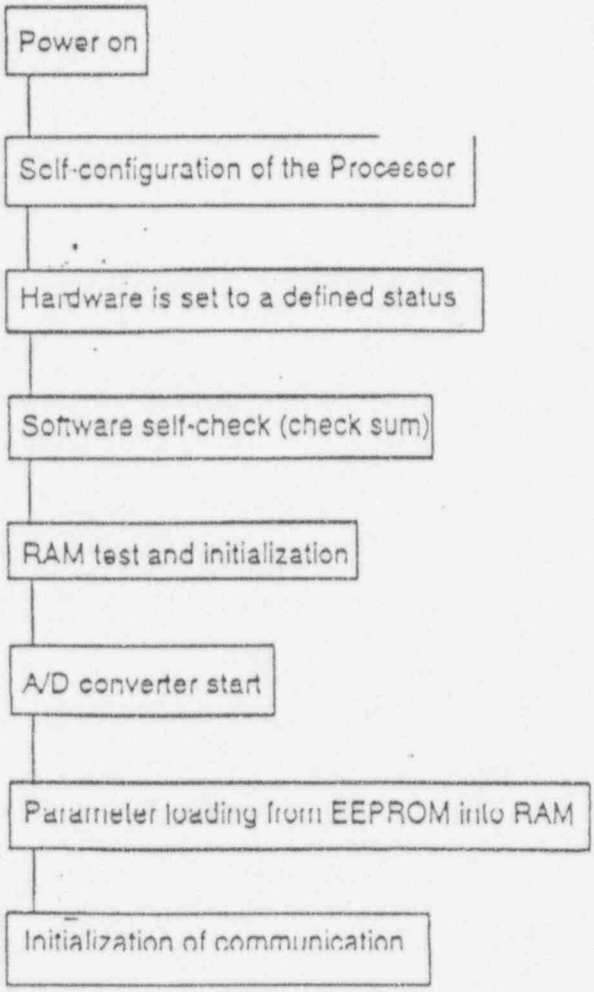
DCP 2/3-6933.00SJ REV. 0 SH. 46
Affected Section Change No 2

ATTACHMENT 1

SIEMENS

Start / Restart ULTRAMAT 5

Power interruption of < 20 ms has no influence, >> 20 ms will cause restart as follows:



DCP 2/3-6933.00SJ REV. 0 SH. 47
Affected Section Change No 2

ATTACHMENT 1

Display	Fault messages	Note
48	(3) If you press ENTER, the fault number is displayed (see the following). After correction, further fault is displayed if necessary etc.	Check the function under the fault number and enter the correct value according to test protocol and flow chart

Fault No.	Cause	Input/Control of operating functions
1	Number of measuring elements	51
2 3 4	Code 1 Code 2 Code 3	50 (or. ".") 50 (or. ".") 50 (or. ".")
5	Assigned to output current "I_1"	62 Enter identifier 0
6	Assigned to output current "I_2"	63 Enter identifier 0
7	Chopper frequency	28 / 27 Phase
11	Number of measuring ranges	51
12	Measuring ranges	1
13	Phase	37
14	Zero setpoint value	4 / 5
15	Span calibration	17 / 7 / 8
16	Sensitivity setpoint	7 / 8
17	Lower range value	11
18	Upper range value of MR	12
19	Relation URV 1 <..2 <..3 <..4 not respected	11 / 12
20	Limit values	19 / 18
21	Zero	4 / 5
22	Sensitivity (span)	17 / 7 / 8
23 24 25 26	Compensation of temperature Zero	5 (Zero setting) 71 identifier 1 71 identifier 2 71 identifier 3
27 28 29 30	Compensation of pressure Zero	5 (Zero setting) 72 identifier 1 72 identifier 2 72 identifier 3
31 32 33	Compensation of temperature Sensitivity	73 identifier 1 72 identifier 2 73 identifier 3
34 35 36	Compensation of pressure Sensitivity	74 identifier 1 74 identifier 2 74 identifier 3
37	Time constant T_{90}	13
38	Dynamic noise suppression	14
39	Linearization	31
40	Fullscale of phase	30
41	Zero	4 / 5
Serial interface		
200	Flow rate in baud	80
201	Transfer procedure	81
202	Symbols: Start-, End-, Don't Care	82

Table 9.2 List of faults

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Affected Section Change No 2

ATTACHMENT 1

List of fault messages

Display	Fault message	Note
V1	Chopper motor faulty	Select function 60, identifier 1: - Steady display: lamp defective (fig. 6.4) - Unsteady display: $\Delta f > 1$ %
V3 V4	Measure Flow gas rate too low Adjustment	Pull off the pushbutton if the gas flow rate is lower than < 0,5 l/min. The fault message is then cancelled.
V8	Parameter memory test faulty	See V8 below
V9	Eprom defective	Request a new one at the manufactory and replace. Analog output: 0/2/4 mA
V14 V15 V16	Measuring bridge, Channel 1: Diagonal DC voltage Measuring bridge, Channel 2: at grid > 78 mV Measuring bridge, Channel 3: (Setpoint < 10 mV)	Grid connection: Check resistors and joints Analog output: 0/2/4 mA
V18 V19 V20	Channel 1 Channel 2 Zero bias used up Channel 3	See section 10.3.2
V21 V22 V23	Channel 1 Channel 2 Signal voltage during sensitivity Channel 3 adjustment too low	Wrong calibrating gas? Wrong MR?
V24	Temperature sensor faulty (See detector)	Short circuit? phase failure?
V25	Barometric signal transmitter > 10 V or < 0 V	
V26	IR source current out of tolerance	IR source faulty? ($R_{IR} \approx 35\ \Omega$)
V27	Disturbance during phase adjustment (signal voltage at AD converter too low for automatic calibration)	
V28	Output current I_{A1} utilized for internal physical values	See function 62
V29	Output current I_{A2} utilized for internal physical values	See function 62

V8	Parameter memory test faulty: (A) The device does not respond to ENTER	1) Press [.] for 30 s until function 50 appears on the small display. Function 50 enables a new coding of the unit (see function 50): Load RAM with function 53 and reenter manual data according to the setting list on the unit.
—		(See the following)

ATTACHMENT 1

DCP 2/3-6933.00SJ REV. 0 SH. 50
Affected Section Change No 2

SIEMENS

ULTRAMAT 5 / OXYMAT 5

What's new with software version 11 (DATED 7-4-1988)

Function	Description
14	dynamic noise suppression: bug cleared: uncertain random behaviour for instruments where only one measuring range is programmed
19	limit value setting: with "0" individual ranges can be excluded
25	pressure sensor ranges: "0" for -50 ... + 50 mbar "1" for -200 ... + 200 mbar
32	cross interference correction: "1" - constant factor "2" - variable input (external)
38	automatic phase adjustment: can be interrupted with "clear"
48	status contact: at beginning or end of cablibration procedure
55 + 57	EE-Prom: calling and filing user-data
60/5	display of internal physical values: shows "--" on display, if no pressure sensor installed
61/8	display of measuring variables: display of actual amplification factor
78	amplification factor (0 - 12): unchanged during calibration "0" - off "1" - on
92	storing first fault: first fault is displayed until cleared
-	blinking lim.-LED on lim.-alarm
-	blinking store-LED during sample hold
-	blinking autocal LED during autocal procedure display slows measuring value
-	limit alarms not active during autocal procedure
-	for suppressed ranges full linearization curve from zero to end-value has to be entered
u30	fault status signal for heating

ATTACHMENT 1

DCP 2/3-6933.00SJ REV. 0 SH. 51
Affected Section Change No 2

SIEMENS
ULTRAMAT 5 / OXYMAT 5

What's new with software version 12 (MAY 1989)

Function	Description
17	total/single range calibration: only for dual channel anlyzers: autocal possible with only one cal.gas mixture; no single range calibration only total range calibration allowed.
24	setting current output: "2" - added 2 ... 20 mA
27	output signal: "1" - output signal of measuring value during fault conditions, e.g., warm-up time "0" - output signal 0/2/4 mA during fault conditions
u11 u12	fault displays deleted, therefore instead blinking display when overranged (> 21 mA)
-	- blinking "not ready" LED during fault conditions. Display of n...faults by pressing "Enter"; with "clear" back to measuring display

ATTACHMENT 1

DCP 2/3-6933.00SJ REV. 0 SH. 52
Affected Section Change No 2

SIEMENS

ULTRAMAT 5 / OXYMAT 5

What's new with software version 13 (DATED 01-08-1990)

Function	Description
22/2	remote initiation of zero and span calibration: in this case only the cal. functions 5 and 8 are initiated; span calibration is only possible with total range calibration (17/0); optional PC Board "autocal-board" is required; autocal with solenoid valve switching is not possible. terminal contacts: see manual
25/2	pressure sensor range: added: 1.000 mbar +/- 400 mbar 1.000 mbar = 0 on display

ATTACHMENT 1

DCP 2/3-6933.00SJ REV. 0 SH. 53
Affected Section Change No 2

SIEMENS

ULTRAMAT 5 / OXYMAT 5

What's new with software version 14 (DATED JUNE 1991)

Function	Description
44/3	autocal with absorber operation after normal zero and span calibration fct 44/3 allows setting the purge time for sample gas through sample call and flowing reference call bypassing the absorber for new zero setting/calibration. (see manual fig. 9 1 c and 9 3 a/b)
25/3	pressure sensor range: +/- 400 mbar will be displayed in absolute readings 600..-..1400 mbar under fct 60/5; also valid for fct 72 and 74 (pressure compensation)
27/1	analog output during fault conditions: limit values are also active
61/9	gain factore display this factor allows better fault or trend analysis (e.g. leaking detector) by comparison with documented factors (factory) $\text{Factor} = \frac{\text{value Fct 61/2}}{\text{value Fct 61/3}}$
93	calibration of pressure sensor: adjusting of max. +/- 20 mbar; don't forget to enter a value under fct 93 (or "0" if no other value is available)

ATTACHMENT 1

DCP 2/3-6933.00SJ REV. 0 SH. 54
Affected Section Change No 2

Function	Description
93 (CONT'D)	Increased display resolution: valid for measuring values and set values for zero and span; due to the 4 1/2 digits the following principal displays are possible: 0 000 19.999 20.00 ... 199.99 200.0 ... 1999.9 2000 ... 19999

measuring range < smaller than	resolution
1.5	0.001
3.5	0.002
7.5	0.005
15	0.01
35	0.02
75	0.05
150	0.1
350	0.2
750	0.5
1500	1
3500	2
7500	5
15000	10
20000	20

ATTACHMENT 1

DCP 2/3-6933.00SJ REV. 0 SH. 55
Affected Section Change No 2

SIEMENS

ULTRAMAT 5 / OXYMAT 5

What's new with software version 15 (DATED 3-11-1992)

Function	Description
16	range LED; bug cleared: range LED did not correlate to actual range during autocalibration
74	compensation of pressure influence: bug cleared: input of data influenced occassionally also fct 72
-	• autoranging (only OXYMAT 5): autoranging possible even when reference gas concentration is outside measuring range; e.g. ranges 0 - 10 % / 0 - 25 % with reference gas air (21 % O_2)
-	• display of overranged signals, but blinking

ATTACHMENT 1

DCP 2/3-6933.00SJ REV. 0 SH. 56
Affected Section Change No 2

SIEMENS
ULTRAMAT 5 / OXYMAT 5

What's new with software version 16 (DATED 10-19-1992)

Function	Description
11	Specifying start of scale value (only ULTRAMAT 5 - 2 R): the start of scale value can be changed separately for the second channel
-	- autocal with single range calibration: bug cleared: range LED's and reading was not always correctly indicated during cal gas purge times; the span calibration for single range calibration starts now with range 1 then 2, 3, 4 (previous sw-versions started with highest range to lowest).
-	- autocal - cal deviation (required by German TUV): With autocal the zero and span values are compared with previous values and a specified maximum deviation (limit), e.g. with TÜV-instruments this limit is set to 6 % deviation. This limit can be entered with fct 79. The value is a percentage value of the actual measuring range. On the ULTRAMAT 5 - 2 R each channel could have a different limit. If the cal deviation is larger than the specified limit the following alarms show up: zero cal, channel 1 u31 zero cal, channel 2 u32 span cal, channel 1 u33 span cal, channel 2 u34 with this also the "not ready" status appears. It can be cleared by a new calibration within the limits or by entering new values with fct 79. Wen entering "0" on fct 79 this cal deviation function is deactivated.
-	- second E-PROM required: due to program extentions a second E-PROM is required: S79610-G4-A902 for ULTRAMAT 5 S79610-G11-A902 for OXYMAT 5 The E-PROM for the serial interface S79610-G36-A901 is then no longer required, this code is now integrated (but hardware for the serial interface is still required, as option).

ATTACHMENT 1

DCP 2/3-6933.00SJ REV. 0 SH. 57
Affected Section Change No 2

SIEMENS
ULTRAMAT 5 / OXYMAT 5

What's new with software version 17

Function	Description
28	cal-deviation: "0" no cal deviation check "1" cal deviation to the previous calibration on autocal. input of limit in % of measuring range with fct 79; "2" checking each calibration (zero and span) against "factory-calibration", values stored with fct 57; limits: - zero deviation > 150 % of the smallest measuring range, - >/< +/- 30 % span deviation; the related alarms (status signals u31 ... u34 are not integrated into the "not ready" status; due to the lower priority only the limit alarm contact 4 is used, for alarming cal deviation conditions. If fct 28/1 or /2 is initiated the fourth limit setting on fct 19 is not active.
20/1	autoranging with OXYMAT 5 with 100 % O_2 reference gas: autoranging possible with ranges e.g. 98 ... 100 %, 95 ... 100 %, 90 ... 100 %
-	- analog output 4 - 20 mA: signal display is restricted to 3,6 ... 21 mA, below/above is fault condition, (NAMUR-requirement)
-	- new display board: C79451-A3210-A502 C79451-A3210-A503 with new software driver which automatically detects with start up which board is installed.
u30	- heating alarm with heated instruments is only active after reaching once the set temperature value.

SIEMENS

ATTACHMENT 1

Karlsruhe, den 20.07.94
Redaktion: AUT V35 M11
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Tel. 0721-595 6223
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Karlsruhe
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Prozeßanalytik

Service-Mitteilung

GA-SM 02.94

Gasanalyse/Flüssigkeitsanalyse

ULTRAMAT 5 / OXYMAT 5, Softwarestand 18
ULTRAMAT 5 / OXYMAT 5, software version 18

Folgende Änderungen wurden mit dem Softwarestand 18 eingeführt:

1. Signalbereich Analogsignal
Mit der Funktion 24, Kennziffer 3, kann der Unterlauf des Signalbereichs (4 bis 20 mA) von bisher 3,6 mA auf etwa minus 1 mA eingestellt werden.

2. Fehlermeldung "u1" Choppermotor
Die Fehlermeldung "u1" wird wie bisher bei einer Sollwertabweichung der Drehzahl von > ± 1% gesetzt; die Störmeldung "Not Ready" aber erst, wenn der Fehler länger als 2 Sekunden ansteht.

The following changes are implemented in software version 18:

1. Analogue signal
Function 24/0 equals 4 to 20 mA.
Function 24/1 equals 4 to 20 mA. To monitor negative zero drift the lowest analogue signal is 3.6 mA.
Function 24/3 equals 4 to 20 mA. To monitor negative zero drift the lowest analogue signal is -1 mA.

2. Fault message "u1" choppermotor
The fault message "u1" appears if the deviation of the chopperfrequency from the set value is > ± 1%. In addition the status "Not Ready" is activated if the deviation continues for more than 2 sec.

gez. R. Hauck

DCP 2/3-6933.00SJ REV. 0 SH. 58
Affected Section Change No 2

ATTACHMENT 1

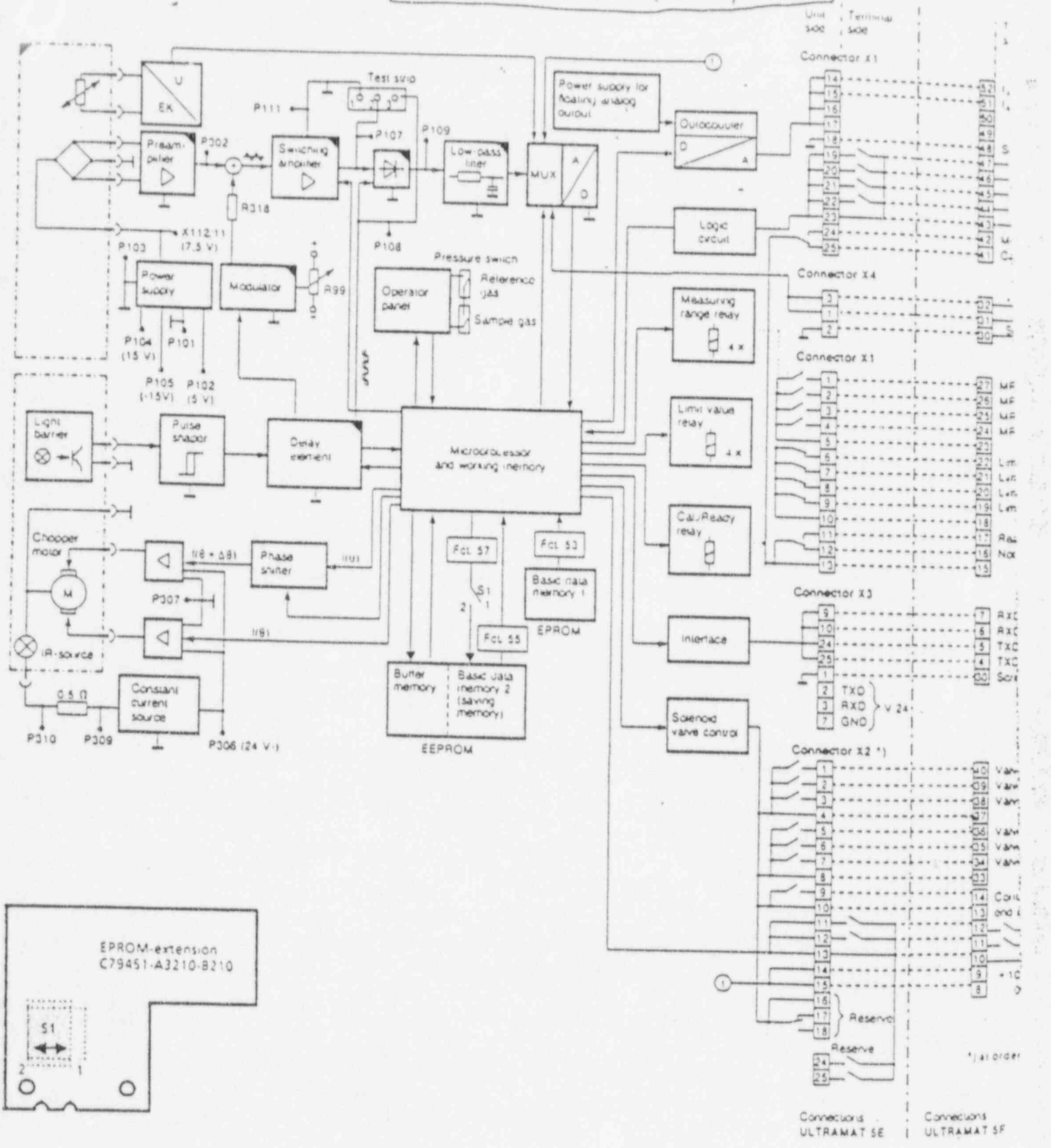


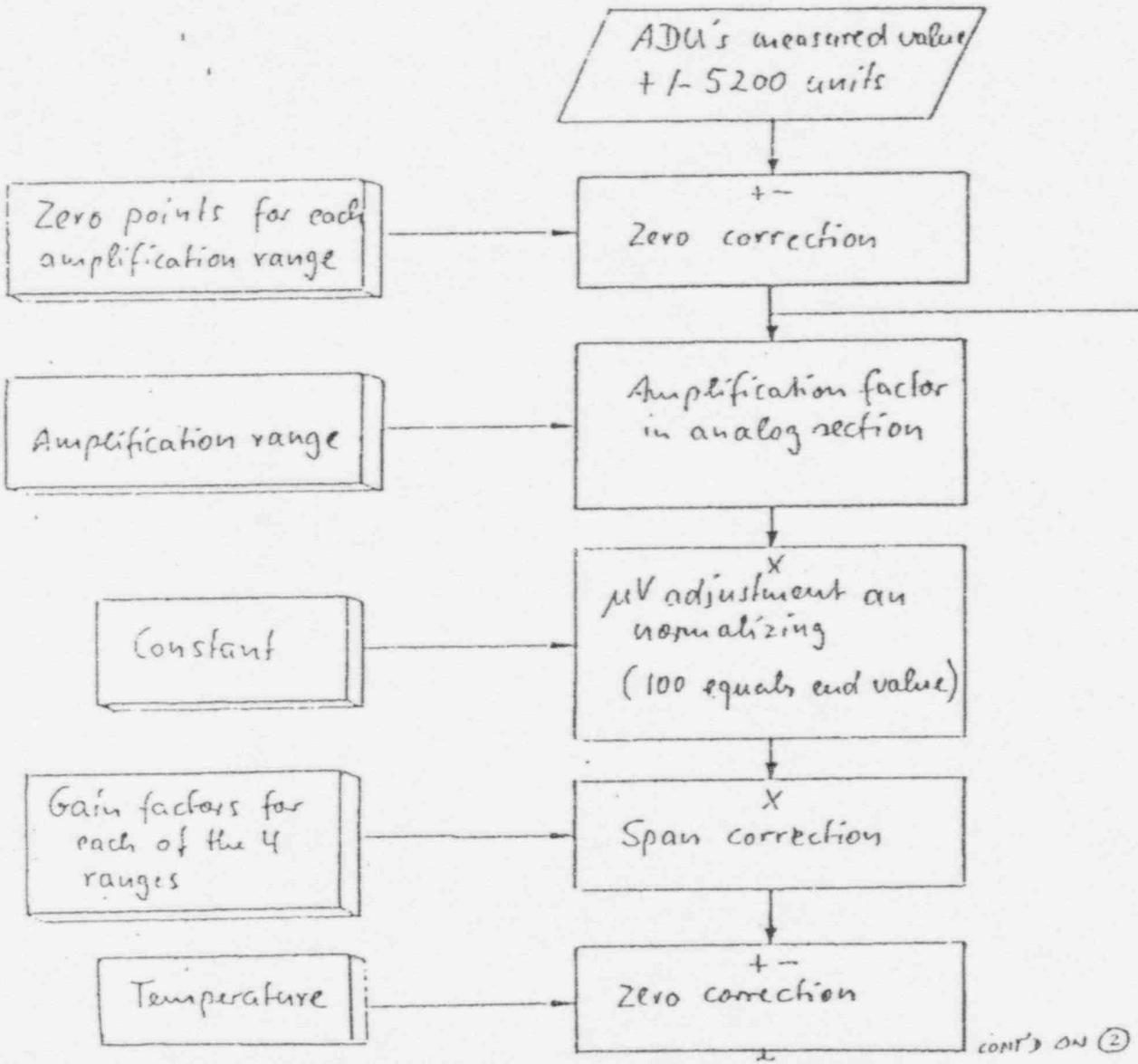
Figure 13.1 Block diagram with test points

DCP 2/3-6933.00SJ REV. 0 SH. 59
Affected Section Change No 2

ATTACHMENT 1

DCP 2/3-6933.00SJ REV. 0 SH. 60
Affected Section Change No 2

ULTRAMAT 5 Data Handling



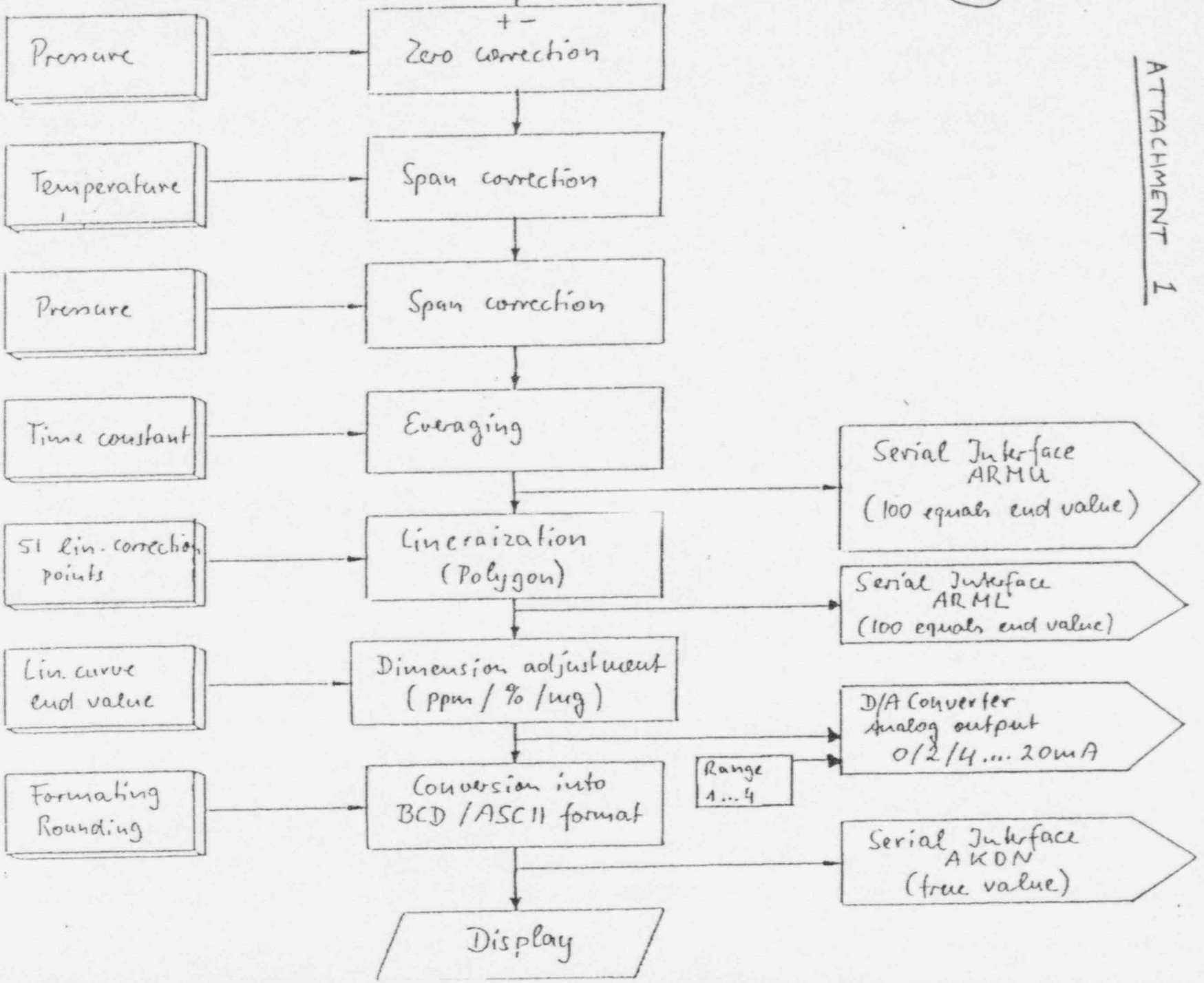
ULTRAMAT 5 DATA HANDLING

CONT'D FROM (1)

(2)

(2)

ATTACHMENT 1



DCP 2/3-6933.0USJ REV. 0 SH. 61
Affected Section Change No 2

ATTACHMENT 1

Examples ①.

RFI Tests at Test Center for Type Approvals ULTRAMAT 5

Prüfungen im Typprüfzentrum

HF-Bestromung High Frequency Test	U5 E	U5 F	U5 F beheizt	05 E	05 F	05 F beheizt	
HF-Bestromung: Netzzuleitung to power supply cable	●	●	●	●	●	●	1
HF-Bestromung: Signalleitung to signal cable	●	●	●	●	●	●	2
SURGE: Netzzuleitung to power supply cable	●	●	●	●		●	3
SURGE: Signalleitung to signal cable		●					4
BURST: Netzzuleitung to power supply cable			●			●	5
Kapazitive Einkopplung auf Signalleitungen capacity charge to signal cable			●			●	6
Elektrostat. Entladung electrostatic discharge		●	●	●		●	7
Netzunterbrechung power supply interruption			●			●	8
Netzabsenkung mains variation			●			●	9
Funkstörspannung RFI	●				●		10/11

● - TEST PERFORMED

DCP 2/3-6933.00SJ REV. 0 SH. 62
Affected Section Change No 2

SIEMENS

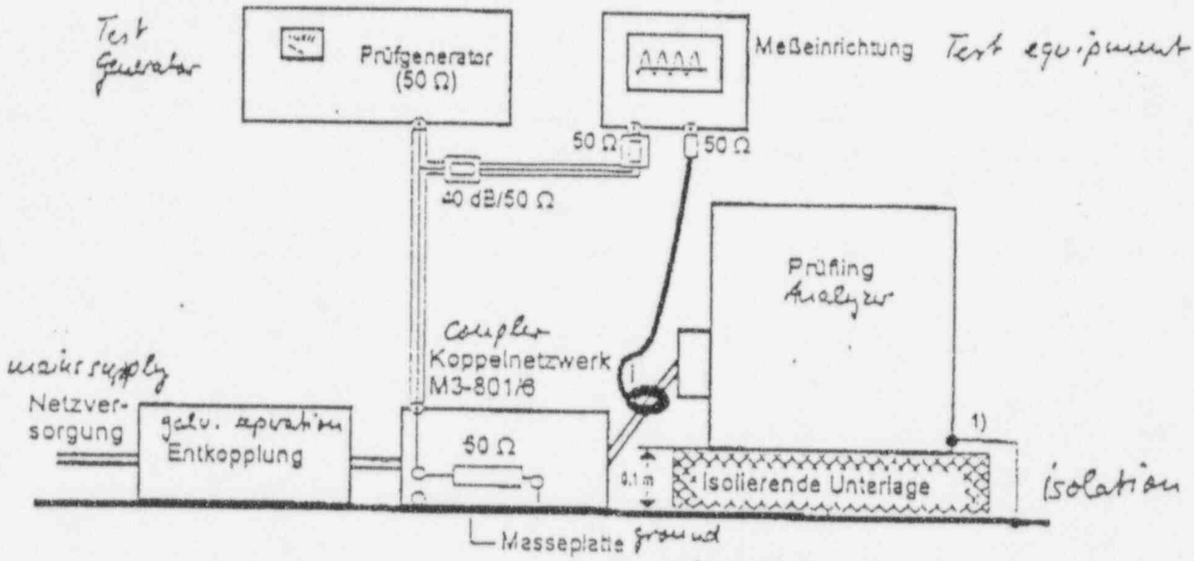
ATTACHMENT 1 (2)

Automatisierungstechnik
Typprüfzentrum - AUT1 EWK TQ 31
D - 76181 Karlsruhe

AUTOMATION Group
Test Center for type approvals

ULTRAMAT 5 RFI TEST DATA

High frequency test to power supply cables acc. to IEC .../EN.../DIN/VDE...
HF-Bestromung auf Stromversorgungsleitungen
nach IEC 801-6/19.. EN61000-4-6 DIN/VDE 0843 T.6.



1) Erdung des Prüflings abhängig von der Geräte-Aufbauvorschrift

Frequenz [MHz]	Störpegel I [A]	Störpegel U [V]	Störpegel I_{eff} [A]	U_{eff} [V]	Anforderung Lastenheft	Bemerkungen Comments
10 kHz				10 V	10 V	—
↓				↓	↓	
80 MHz				10 V	10 V	—

DCP 2/3-6933.00SJ REV. 0 SH. 63
Affected Section Change No 2

Test site Messort: KL. HF-Kabine, G. 1, Bau 2122

Prüfprogramm, Betriebsbedingungen: Test Program, Operating conditions

Inspector Prüfer: Wetzel

Tester Beteiligte: Hr. Pfirrmann

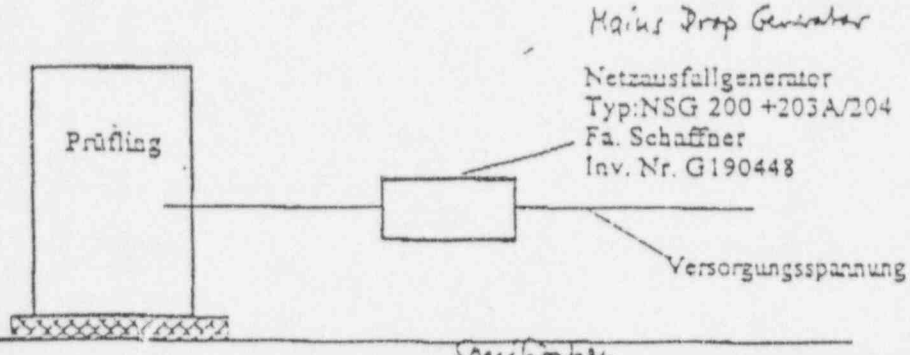
SIEMENS

ATTACHMENT 1

Automatisierungstechnik
Typprüfzentrum - AUT1 EWK TQ 31
D - 76181 Karlsruhe

(3)

ULTRAMAT 5 RFI TEST DATA



Spezifikation

Betriebsparameter operating Parameter	Anforderung Lastenheft	erreichter Wert	Ausfallkriterium failure criteria
1. Versorgungsspannung ☒ Wechselspannung .. 230 ... V (220 V) ○ Gleichspannung V			
2. Statische Grenzen -..... % = ... V +..... % = ... V			
3. Dynamische Grenzen Dynamic Limits - Netzabsenkung Ausgangsspannung Absenkung Dauer Wiederholdauer Anzahl d. Beanspruchungen	.....V .....V .....ms .....ms		failure criteria C: instrument does automatic restart
- Netzunterbrechuung (-100%) Mains interruption Ausgangsspannung Dauer duration Wiederholdauer repeating Anzahl d. Beanspruchungen repeated interruptions	230 V 50 ms einzel ms 10	V 50ms	C: Gerät läuft selbst- tätig wieder an
4. Frequenzänderung min. Frequenz max. Frequenz	.....Hz .....Hz		
5. Maximaler Einschaltstrom	.....A		Inenn mit Heizung ≈ 1,6 A Ieinschalt: max 24 A

Messort:.....

Prüfprogramm, Betriebsbedingungen:.....

.....

Prüfer:.....

Beteiligte:

DCP 2/3-6933.00SJ REV. 0 SH. 6/1
Affected Section Change No 2

DCP 2/3-6933.00SJ REV. 0 SH. 65
Affected Section Change No 2

SECTION 3B

UFSAR CHANGES

DCP 2/3-6933.00SJ REV. 0 SH. 66
Affected Section Change No 2

SECTION 3B - UFSAR CHANGES

Changes are required to UFSAR Chapter 7, Table 7.3-24 to indicate the correct failure mode for sensor lo failure for the Ammonia and Butane analyzers.

UFSAR/UFHA Change Request No. SAR-23-417 is attached.

UFSAR/UFHA CHANGE REQUEST

A. IDENTIFICATION

Unit 2/3

Change Request No.: SAR-23-417
(provided by Nuclear Licensing)

Title: TOXIC GAS ISOLATION SYSTEM

Date Prepared: 12-21-1995

Document Affected: UFSAR , Chapter 7

Section: Sect 7.3

Orig. Organization: NEDO / CONTROLS

Originator: SANDY NEEPER

Originating Design Document(s) or Other: DCP 2/3 - 6933.00SJ Rev.0, ASC #2

Operating License/TS affected? ☒ No ☐ Yes Section

B. DESCRIPTION

Summary of Change (Attach additional pages as required): Revise the failure mode on low sensor failure for Ammonia and Butane Analyzers

Describe Why Change is Necessary (Attach additional pages as required): The change is required to reflect the existing failure mode.

C. EVALUATION

50.59 Evaluation

☒ Covered by DCP/FCN
☐ Attached
☐ Reference
☐ N/A - No impact on Nuclear Safety
(see Attachment 5 guidelines)

D. APPROVALS (Optional for DCP)

Prepared by:

Sandra Neeper — Signature/PAX — 12-21-95 Date

Approved by:

J R Robinson — Signature/PAX — 12/22/95 Date

E. FORWARD TO MANAGER, UNIT 1 AND GENERIC LICENSING, IOC ANNEX

F. APPROVED FOR INCORPORATION

Effectivity Date _____

Nuclear Licensing — Date

SCE 26-449 REV. 1 3/94 [REFERENCE: S0123-XXX-5.2]

DCP 2/3-6933.00SJ REV. 0 SH. 67
Affected Section Change No 2

Table 7.3-24
TOXIC GAS ISOLATION SYSTEM FAILURE MODE AND EFFECTS ANALYSIS (Sheet 1)

Failure Mode	Effect on System	Detection	Remarks
Loss of one ac load group	System isolates	Immediate annunciator on loss of bus	Redundant air conditioning and isolation system actuates.
Loss of one dc load group	System isolates	Immediate annunciation on loss of bus	Redundant air conditioning and isolation system actuates.
Loss of instrument air	No effect on system	Immediate annunciator on loss of plant instrument air	Instrument air not used by this system.
Loss of burner fuel pressure	No effect on system	Immediate annunciation when cylinder pressure is less than 200 lb/in.^{2}g	Operator shifts cylinder manually to eliminate eventual burner flame-out.
Analog sensor fails:			
HI (FOR CHLORINE, BUTANE & AMMONIA ANALYZERS)	System isolates	Immediate annunciator and periodic testing	Trip-isolates.
LO (FOR CHLORINE DETECTOR)	System isolates	Immediate annunciator and periodic testing	Trip-isolates due to channel failure detectors.
LO (FOR AMMONIA & BUTANE ANALYZERS	LOSS OF REDUNDANCY	IMMEDIATE ANNUNCIATION AND PERIODIC TESTING	REDUNDANT TRAIN AVAILABLE FOR SYSTEM ISOLATION.
Analog sensor wiring:			
Open	Not applicable		No analog wiring
Short	Not applicable		No analog wiring.