1. Publication Nº	2. Version	3. Date	5. Distribution
INPE-3200-PRE/562		Julho, 1984	☐ Internal ☒ External ☐ Restricted

4. Origin	Program
DCA/DEA	SUBORD/SDA

6. Key words - selected by the author(s)

ON BOARD SUPERVISION - SPACE DATA SYSTEMS - ON BOARD COMPUTER
ON BOARD DATA HANDLING - ON BOARD DATA ACQUISITION AND CONTROL

7. U.D.C.: *629.785:528.711.7(81)*

8. Title *INPE-3200-PRE/562*

BRESEX ON BOARD SUPERVISION: BASIC ARCHITECTURE AND PRELIMINARY ASPECTS FOR PAYLOAD AND SPACE SHUTTLE INTERFACE

10. Nº of pages: 22

11. Last page: 20

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14. Abstract/Notes

This report presents the material relative to the On Board Supervision Subsystem which was presented and considered in the joint conference between INPE and NASA personnel, held in march 12, 13 and 14 14 of 1984, in São José dos Campos, with the purpose of initiating a joint work which will lead to the implementation of the "Brazilian Remote Sensing Experiment - BRESEX. The BRESEX should consist, basically, of a Multispectral Camera for earth observation, to be tested in a future flight of the "Space Shuttle", according to a program to be executed by NASA in collaboration with INPE.

15. Remarks *Trabalho apresentado ao pessoal do INPE e da NASA nos dias 12, 13 e 14 de março de 1984, em São José dos Campos, com o propósito de iniciar entendimentos conjuntos que deverão levar à implementação do "Brazilian Remote Sensing Experiment - BRESEX".*

RESUMO

ESTE RELATÓRIO DOCUMENTA A PARTE DA MATÉRIA RELATIVA AO SUBSISTEMA DE SUPERVISÃO DE BORDO QUE FOI APRESENTADA E CONSIDERADA NAS CONVERSAÇÕES LEVADAS A EFEITO ENTRE O PESSOAL DO INPE E DA NASA, NOS DIAS 12,13 E 14 DE MARÇO DE 1984, EM SÃO JOSÉ DOS CAMPOS, COM O PROPÓSITO DE INICIAR ENTENDIMENTOS CONJUNTOS QUE DEVERÃO LEVAR À IMPLEMENTAÇÃO DO "BRAZILIAN REMOTE SENSING EXPERIMENT - BRESEX". O EXPERIMENTO BRESEX DEVE CONSTAR, BASICAMENTE, DE UMA CÂMARA MULTIESPECTRAL DE OBSERVAÇÃO DA TERRA, A SER TESTADA EM UM DOS FUTUROS VÔOS DO "SPACE SHUTTLE", DE ACORDO COM PROGRAMA A SER EXECUTADO PELA NASA EM COLABORAÇÃO COM O INPE.

ACKNOWLEDGEMENTS

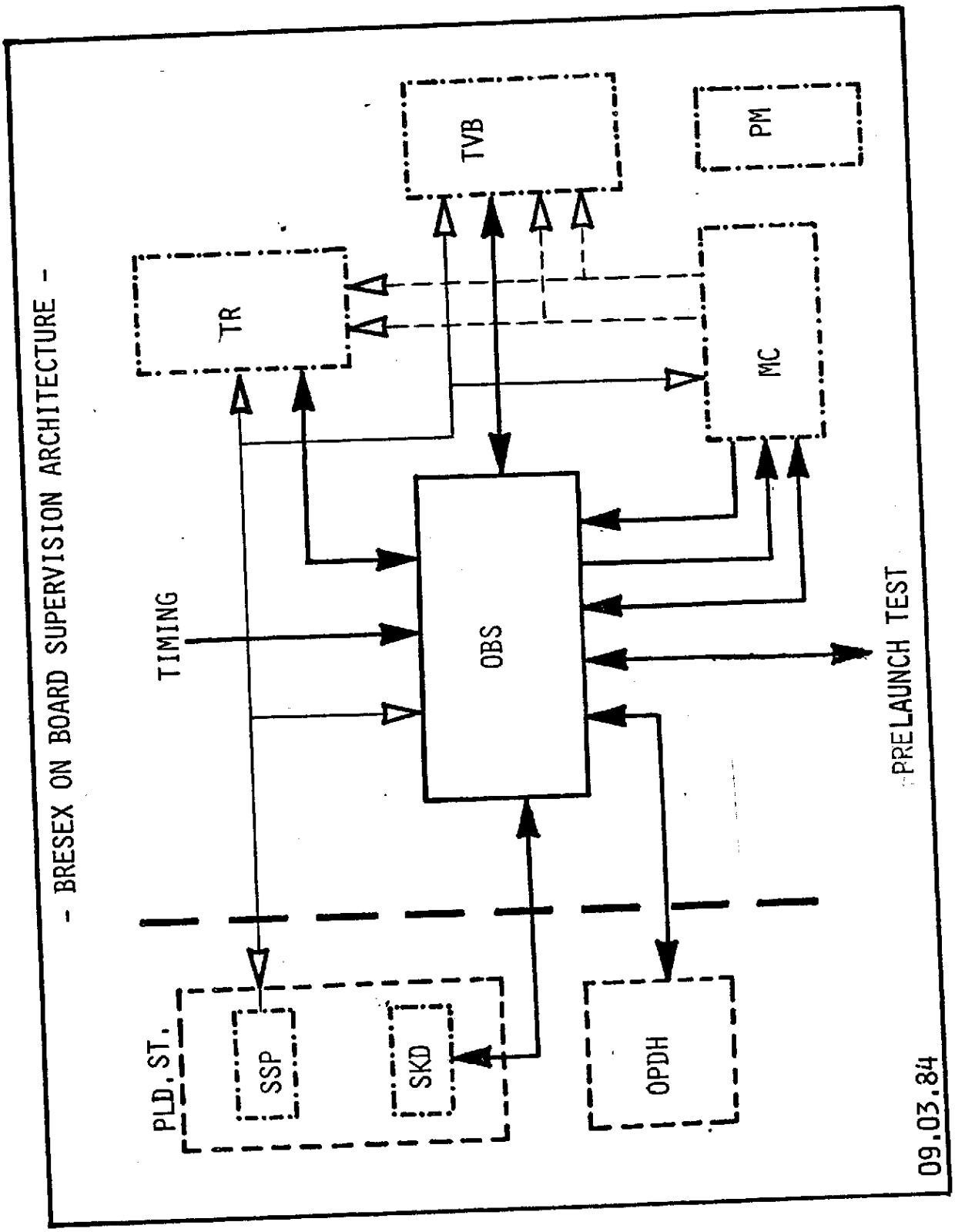
THE AUTHORS ARE INDEBTED TO ENGINEERS MARCUS ANTONIUS A. SIQUEIRA AND PAULO CAMILLI FOR THE DATA FURNISHED IN RELATION TO THE OTHER BRESEX SUBSYSTEMS AND THE SPACE SHUTTLE AVIONICS, RESPECTIVELY.

CONTENTS

	Page
BRESEX ON BOARD SUPERVISION GLOSSARY	1
BRESEX ON BOARD SUPERVISION ARCHITECTURE	2
BASIC FUNCTIONS OF THE OBS-MC BUSES	3
BRESEX ON BOARD SUPERVISION ARCHITECTURE	4
BASIC FUNCTIONS OF THE OBS-TR BUS	5
BRESEX ON BOARD SUPERVISION ARCHITECTURE	6
BASIC FUNCTIONS OF THE OBS-TVB BUS	7
BRESEX ON BOARD SUPERVISION ARCHITECTURE	8
BASIC FUNCTIONS OF THE TC/TM BUS	9
BRESEX ON BOARD SUPERVISION ARCHITECTURE	10
SPACE SHUTTLE STANDARD SWITCH PANEL	11
SPACE SHUTTLE AFT FLIGHT DECK PAYLOAD AVIONICS	12
BASIC FUNCTION OF THE DATA HANDLING BUS	14
BRESEX ON BOARD SUPERVISION ARCHITECTURE	15
BASIC FUNCTIONS OF THE STANDARD COMMAND BUS	16
BRESEX ON BOARD SUPERVISION ARCHITECTURE	17
SOME VERY BASIC QUESTIONS TO BE TREATED	18

- BRESEX ON BOARD SUPERVISION GLOSSARY -

- OBS: ON BOARD SUPERVISION
- MC: MULTISPECTRAL CAMERA
- TR: TAPE RECORDER
- SKD: SUPERVISION KEYBOARD AND DISPLAY
- TVB: TV BUFFER
- PM: POWER MODULE
- PLD.ST.: PAYLOAD STATION
- SSP: STANDARD SWITCH PANEL
- OPDH: ORBITER PAYLOAD DATA HANDLING
- GPC: GENERAL PURPOSE COMPUTER
- MDM: MULTIPLEXER DEMULTIPLEXER
- PSP: PAYLOAD SIGNAL PROCESSOR
- MTU: MASTER TIMING UNIT
- CCTV SYSTEM: CLOSED CIRCUIT TV SYSTEM
- TC/TM: TELECOMMAND/TELEMETRY
- C/DSN: CONSOLIDATED DEEP SPACE NETWORK


- BRESEX ON BOARD SUPERVISION ARCHITECTURE -
TVB
PM
TR
MC
TIMING
OBS
PRELAUNCH TEST
PLD, ST.
SSP
SKD
OPDH
09.03.84

- BASIC FUNCTIONS OF THE OBS-MC BUSES -

. DATA ACQUISITION BUS:

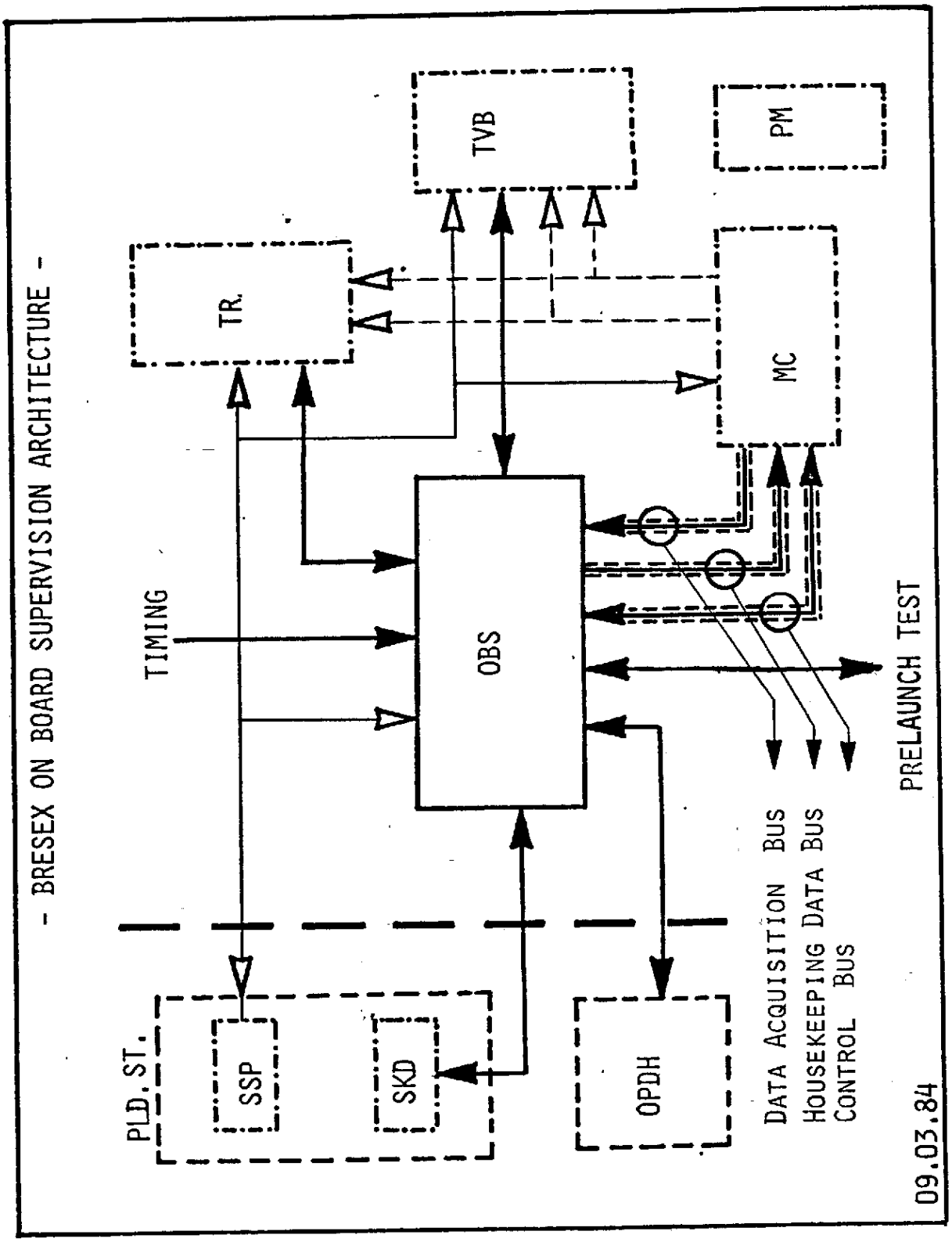
SENSORS RELATED DATA (CALIBRATION, TEMPERATURE, VIDEO SIGNAL, ETC.)

. HOUSEKEEPING DATA BUS:

MESSAGE CONTAINING ACQUISITION, CONTROL, TESTING, ANCILLARY, TIMING, SYNCHRONIZATION, TESTING, KEYBOARD AND OTHER POSSIBLE SUPERVISING DATA, FOR RECORDING, UNDER MC FRAME FORMATTING.

. CONTROL BUS:

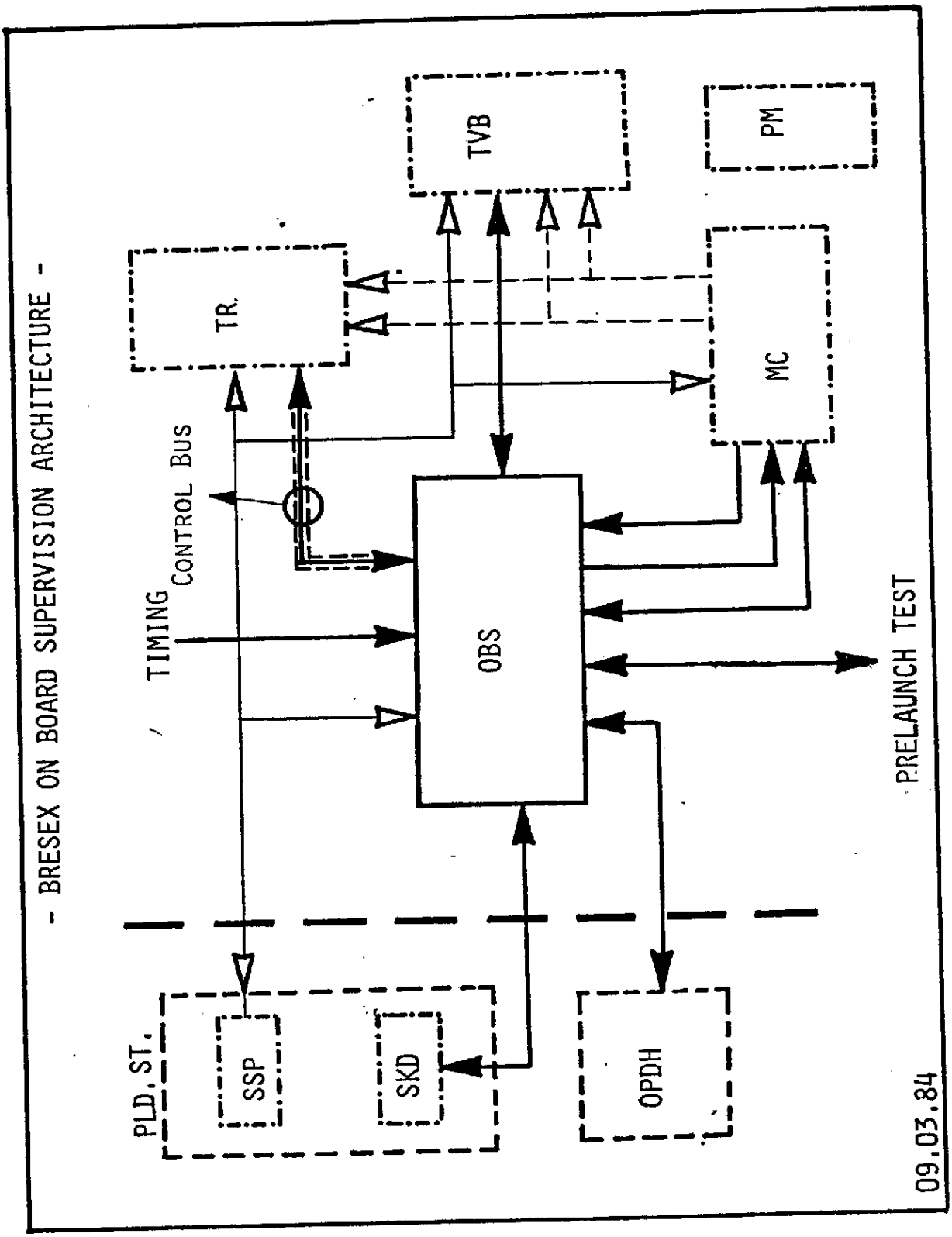
COMMANDS AND ACQUISITION RELATED TO:
CAMERA READINESS; MIRROR POSITION NG;
CALIBRATION AND AMPLIFICATION STATUS;
SHUTTER ACTUATION;
CAMERA POWER SUPPLY, ETC.


- BRESEX ON BOARD SUPERVISION ARCHITECTURE -
TVB
PM
TR
MC
TIMING
OBS
PRELAUNCH TEST
PLD.ST.
SSP
SKD
OPDH
DATA ACQUISITION BUS
HOUSEKEEPING DATA BUS
CONTROL BUS
09.03.84

- BASIC FUNCTIONS OF THE OBS-TR BUS -

. CONTROL BUS:

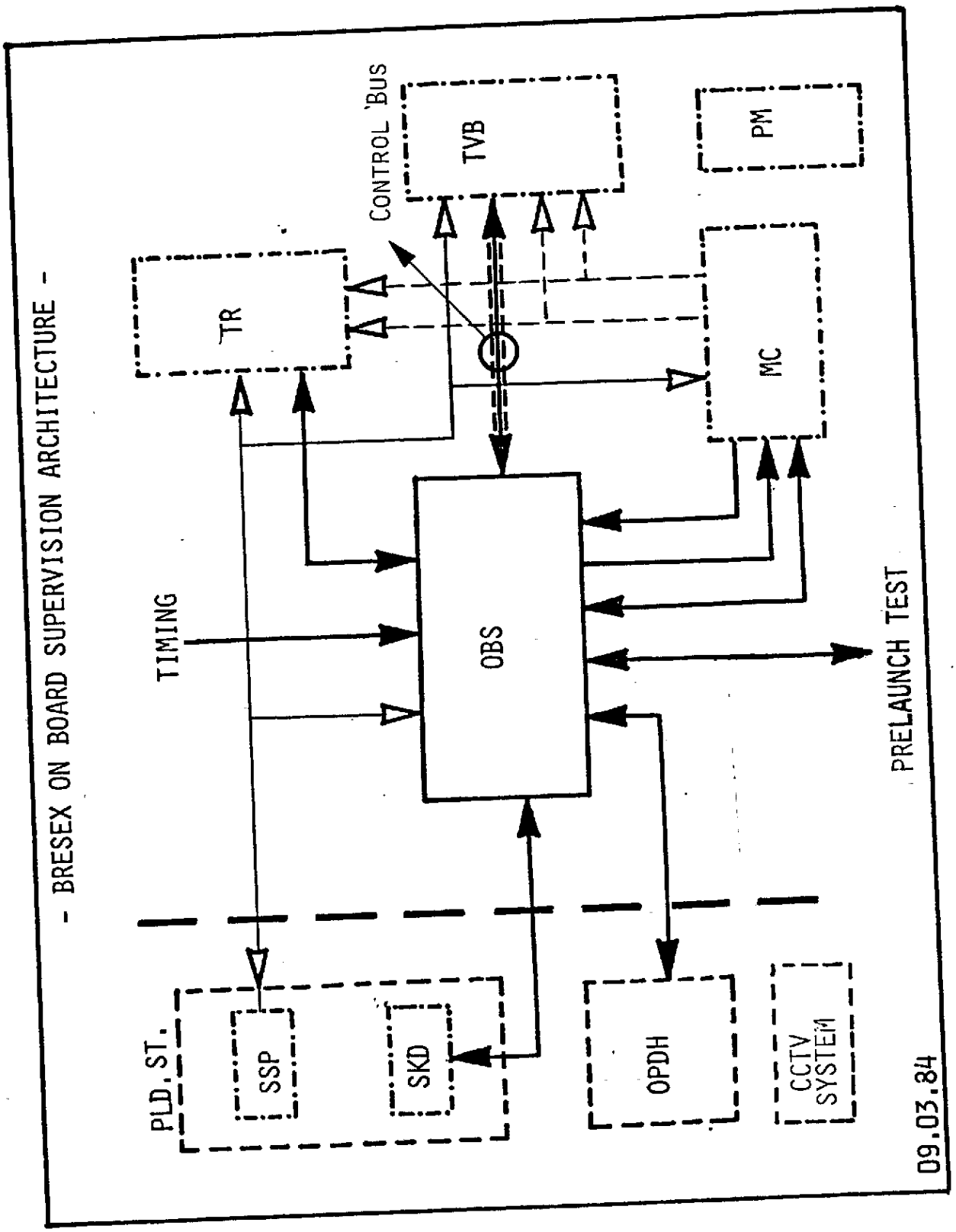
TAPE RECORDER COMMAND AND ACQUISITION:
POWER SUPPLY, STATUS, ACTIVATION, RUN,ETC.


- BRESEX ON BOARD SUPERVISION ARCHITECTURE -
TVB
PM
TR.
MC
CONTROL BUS
TIMING
OBS
PRELAUNCH TEST
PLD.ST.
SSP
SKD
OPDH
09.03.84

- BASIC FUNCTIONS OF THE OBS-TVB BUS -

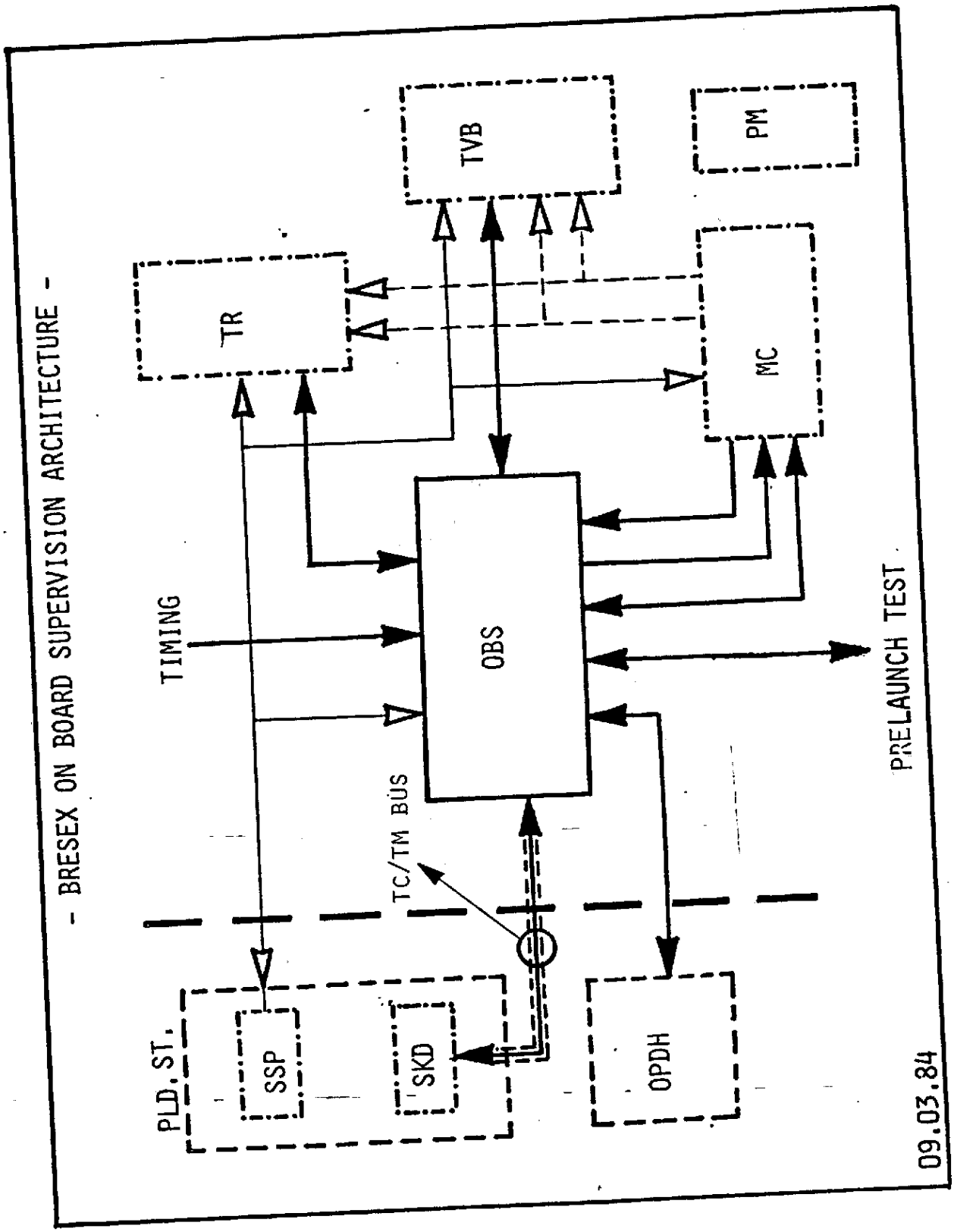
. CONTROL BUS:

TV BUFFER COMMAND AND ACQUISITION:
POWER SUPPLY, STATUS, ACTIVATION, ETC.

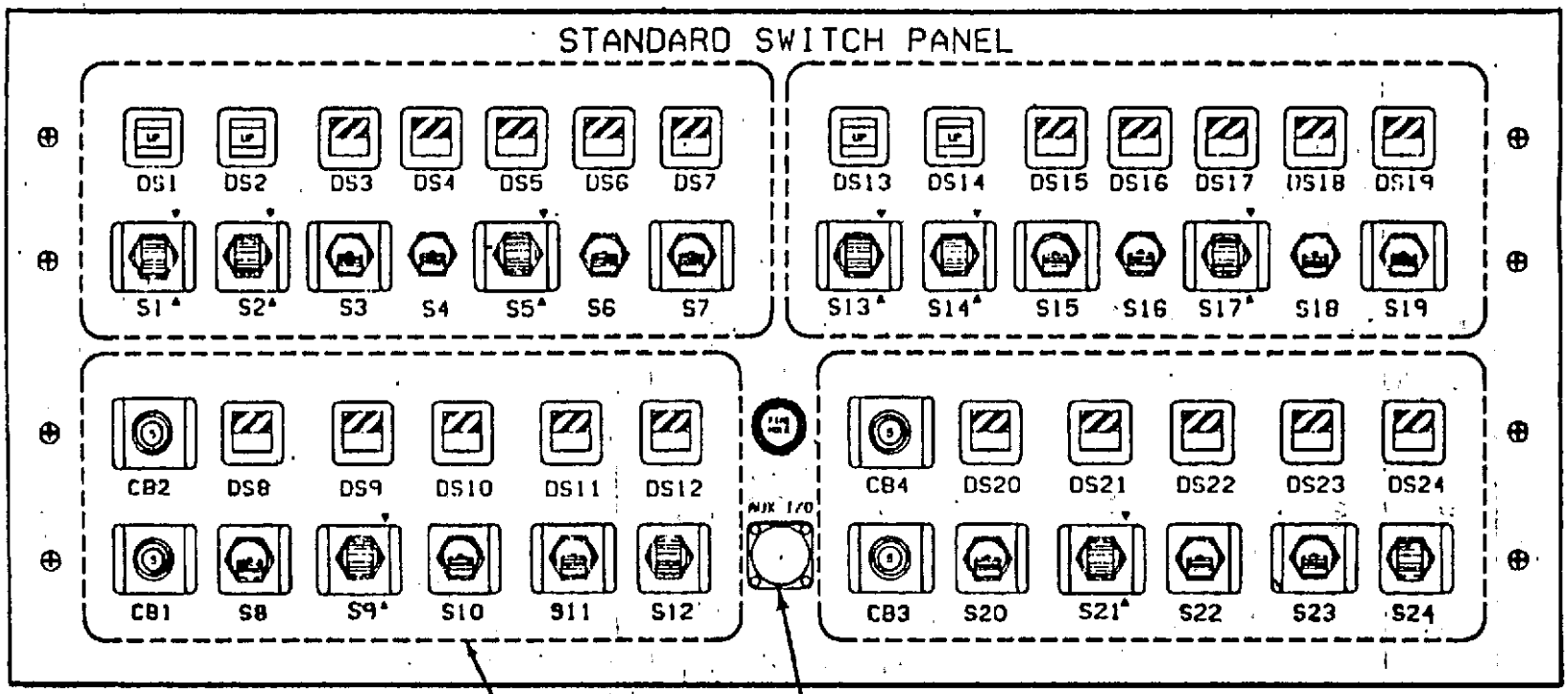

- BRESEX ON BOARD SUPERVISION ARCHITECTURE -
TR
CONTROL BUS
TVB
PM
MC
TIMING
OBS
PRELAUNCH TEST
PLD.ST.
SSP
SKD
OPDH
CCTV SYSTEM
09.03.84

- BASIC FUNCTIONS OF THE TC/TM BUS -

THE TC/TM BUS IS CONSIDERED TO IMPLEMENT A DIRECT CONNECTION BETWEEN THE SUPERVISOR KEYBOARD AND DISPLAY (SKD) AND THE ON BOARD SUPERVISOR (OBS) ITSELF. THE EXCHANGE OF APPROPRIATE COMMAND AND TELEMETRY MESSAGES THROUGH THE TC/TM BUS WOULD ENABLE THE PAYLOAD SPECIALIST TO MONITOR THE OPERATION OF THE EXPERIMENT. THE SKD COULD BE IMPLEMENTED USING SOME SPECIAL INPUT/OUTPUT ELECTRONICS OR, IN A PRIMITIVE FASHION, USING THE STANDARD SWITCH PANEL (SSP) IN ITS UNIQUE VERSION, WITHOUT FURTHER SOPHISTICATION.


- BRESEX ON BOARD SUPERVISION ARCHITECTURE -
TVB
PM
TR
MC
TIMING
OBS
PRELAUNCH TEST
TC/TM BUS
PLD.ST.
SSP
SKD
OPDH
09.03.84

- SPACE SHUTTLE STANDARD SWITCH PANEL -

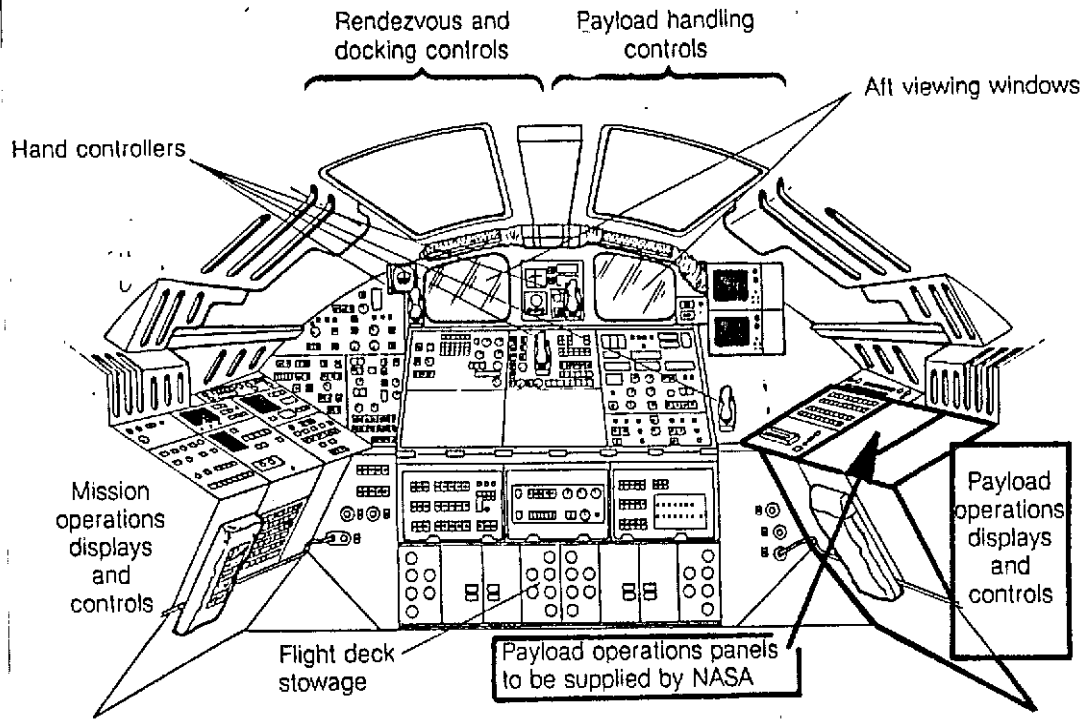


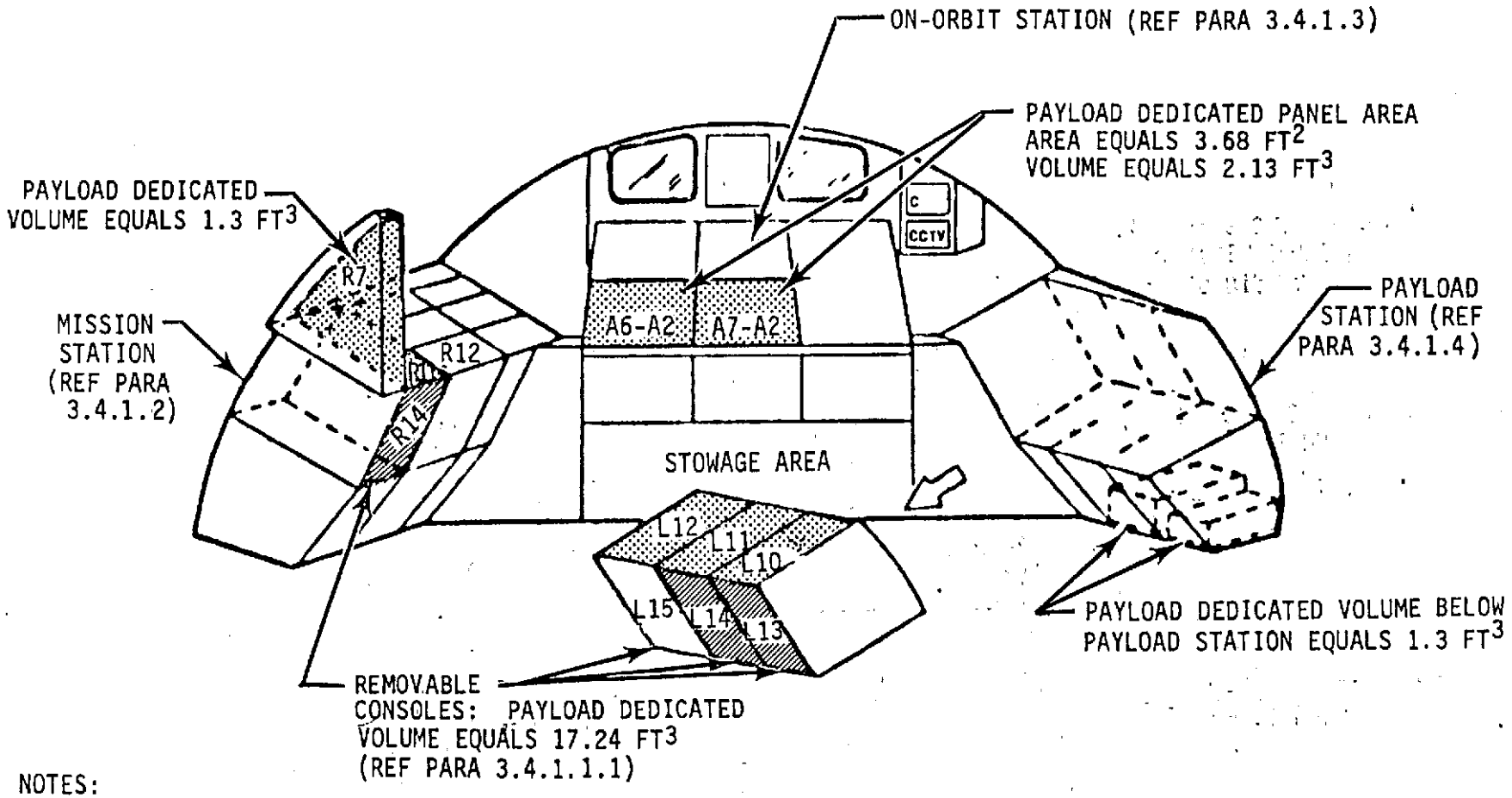
NOTES:

(1) CONFORMS TO NASA SPECIFICATION 40M39569

2. PANEL IS PANEL SIZE E AS DEFINED IN PARAGRAPH 3.4.1.1.1

- SPACE SHUTTLE AFT FLIGHT DECK PAYLOAD AVIONICS -





VIEW LOOKING AFT

NOTES:

1. LEGEND

PAYLOAD DEDICATED PANEL AREA EQUALS 16.85 FT^2. PANELS ARE DEFINED IN FIGURE 3.4.1.1.1-1.

ADDITIONAL PAYLOAD DEDICATED D&C PANELS ON INBOARD SURFACES OF THREE EQUIPMENT CONSOLES REQUIRE ALLOWANCE OF SIX (6) INCHES DEPTH OF NORMAL PANEL AREA. ALL COMPONENTS ON THESE SURFACES MUST BE FULLY RECESSED. ADDITIONAL PANEL SURFACE AREA IS 5.5 FT^2

2. TOTAL PAYLOAD DEDICATED VOLUME IS 21.64 FT^3

Figure 3.2.1.1(A) Shuttle Orbiter Payload Physical Interface Locations - Aft Flight Deck General Arrangement

- BASIC FUNCTION OF THE DATA HANDLING BUS -

FOUR POSSIBLE CONNECTIONS BETWEEN OPDH AND OBS:

1. GPC - OBS:

   - SPECIAL INTERFACE IS NEEDED;
   - RELATIVELY HIGH (1 MBITS/SEC) DATA RATE;
   - ANCILLARY, TIME, COMMAND AND TELEMETRY DATA CAN BE EXCHANGED, ALTHOUGH THROUGH A POLLED LINE.

2. MDM - OBS:

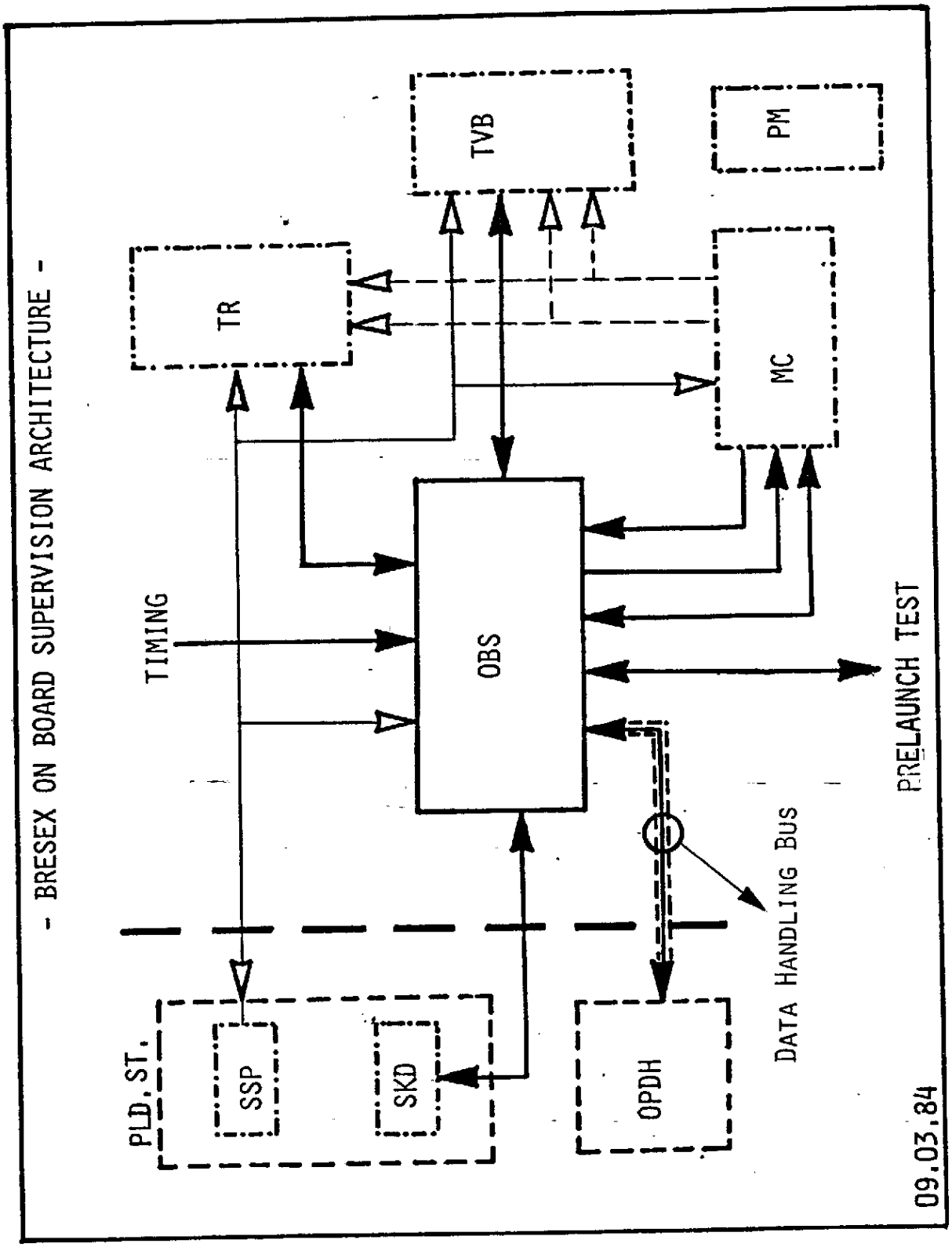
   - POINT-TO-POINT SERIAL COMMUNICATION;
   - APPARENTLY NO SPECIAL INTERFACING ELECTRONICS IS NEEDED;
   - COMMAND DATA;
   - RELATIVELY HIGH DATA RATE (1 MBITS/SEC).

3. PSP - OBS:

   - LOW SPEED DATA RATE;
   - PARALLEL LINES;
   - COMMANDS ONLY

4. MTU - OBS:

   - MASTER TIMING.


- BRESEX ON BOARD SUPERVISION ARCHITECTURE -
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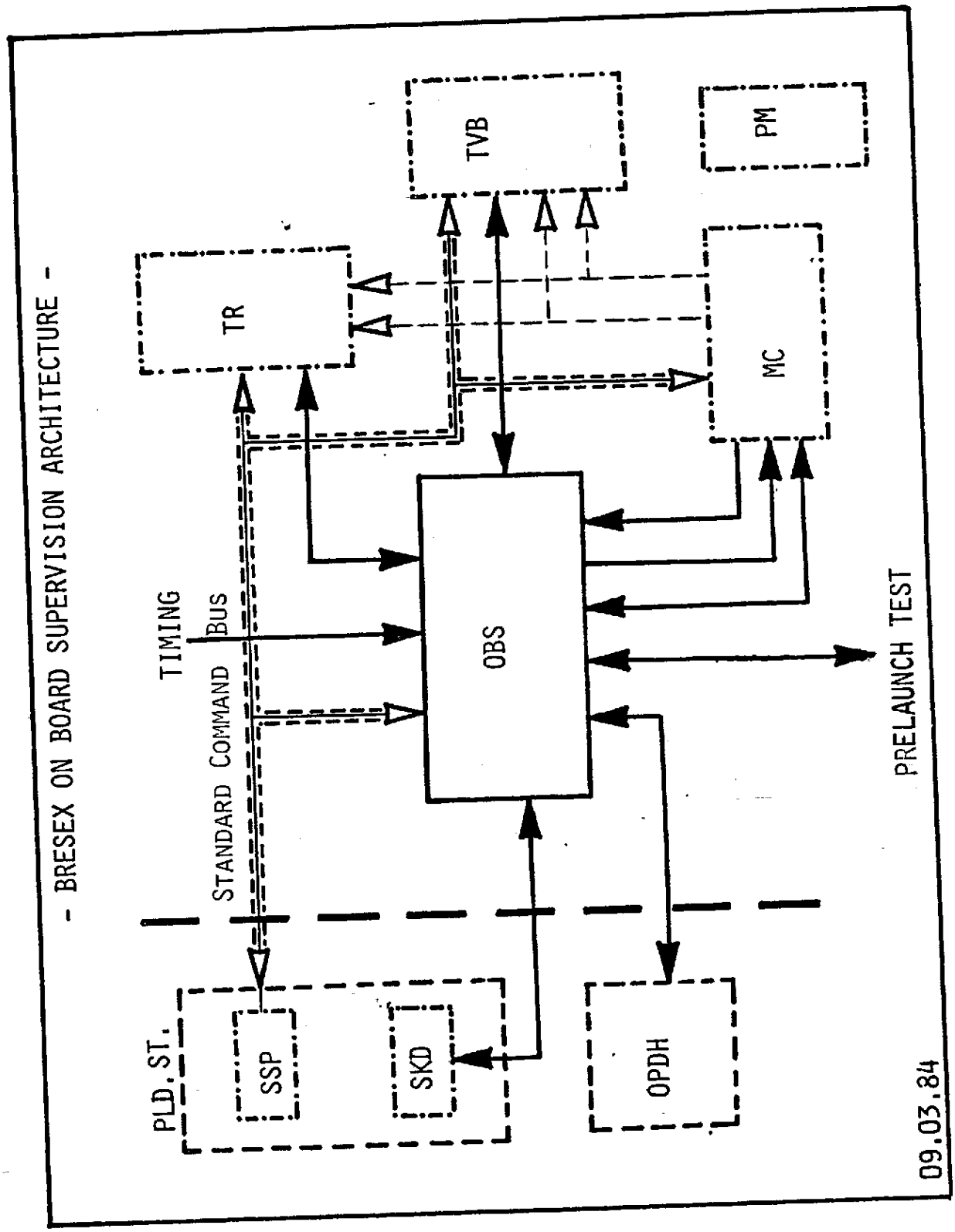
OBS
PRELAUNCH TEST
DATA HANDLING BUS
PLD,ST.
SSP
SKD
OPDH
09,03,84

- BASIC FUNCTIONS OF THE STANDARD COMMAND BUS -

THE STANDARD COMMAND BUS IS INTENDED FOR MANUAL USE, NOT ONLY FOR SOME RENDUNDANT FUNCTIONS, NORMALLY EXECUTED BY THE ON BOARD SUPERVISION SUBSYSTEMS, BUT FOR SUBSTITUTING IT, IN CASE OF FAILURE, WHILE PRESENVING THE ESSENTIAL OPERATION OF THE OTHER SUBSYSTEMS OF THE EXPERIMENT.


- BRESEX ON BOARD SUPERVISION ARCHITECTURE -
TVB
PM
TR
MC
OBS
TIMING BUS
STANDARD COMMAND
PRELAUNCH TEST
PLD.ST.
SSP
SKD
OPDH
09.03.84

- SOME VERY BASIC QUESTIONS TO BE TREATED -

1. DETAILED DOCUMENTATION (HARDWARE AND SOFTWARE) ON THE FOUR OPDH - OBS POSSIBLE CONNECTIONS FOR BETTER UNDERSTANDING OF THE ALTERNATIVES FOR INTERFACING THROUGH THESE BUSES;

2. DETAILED DOCUMENTATION ON THE SSP AND PAYLOAD STATION ELECTRONIC HARDWARE;

3. NASA EVALUATION AND COUNSELING ON THE ALTERNATIVES FOR INTERFACING THE ON BOARD SUPERVISOR WITH THE SPACE SHUTTLE AVIONICS;

4. NEED TO GET KNOWLEDGE ON QUALIFICATION CONSTRAINTS OF THE PAYLOAD FOR MISSION APPROVAL.

5. POSSIBLE MEANS OF ON BOARD AND GROUND MESSAGE EXCHANGE IN VIEW OF THE DESIRED FUTURE CONNECTION BETWEEN INPE SPACE DATA NETWORK AND THE C/DSN FOR CROSS-SUPPORTED SPACE MISSIONS.