

LM NAVIGATION SIMULATORS

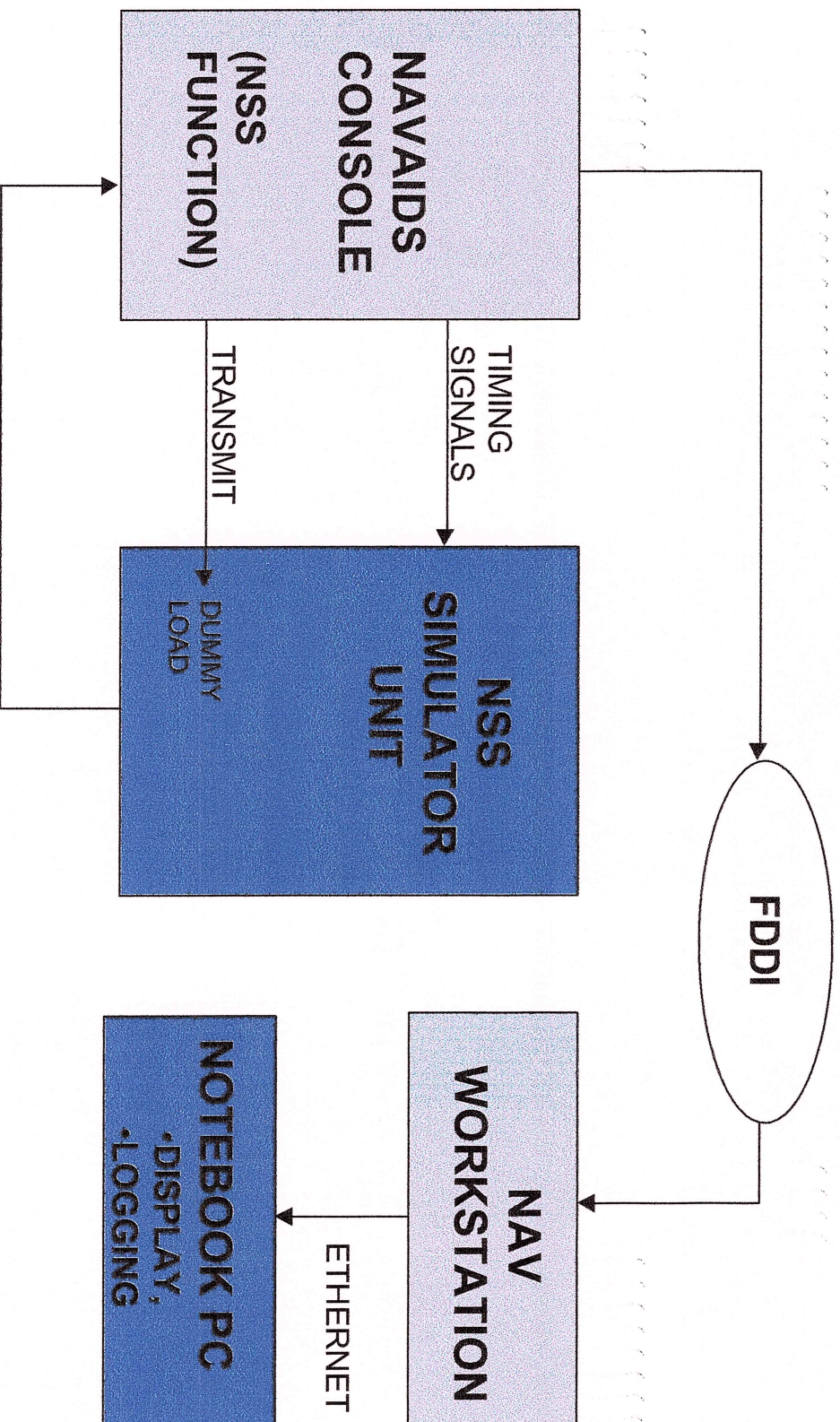
SIMULATOR	FUNCTION	PERFORMANCE MONITORING
NSS	ALL NSS MODES (VELOCITY, DEPTH AND READY)	ACCURACY AND PARAMETERS
BATHYMETRIC & ESGN	BATHYMETRIC FIX OVER SIMULATED P- POINT, ESGN DATA STREAMS	ACCURACY AND PARAMETERS
GPS	UP TO 12 SATELLITES, TIME & SHIP'S MOTIONS	ACCURACY AND RECEIVER TRACKING PARAMETERS
FC/ CCS	FIRE CONTROL AND COMMAND & CONTROL SYSTEM	OUTPUTS TO FC; INPUTS FROM CCS

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NSS SIMULATOR

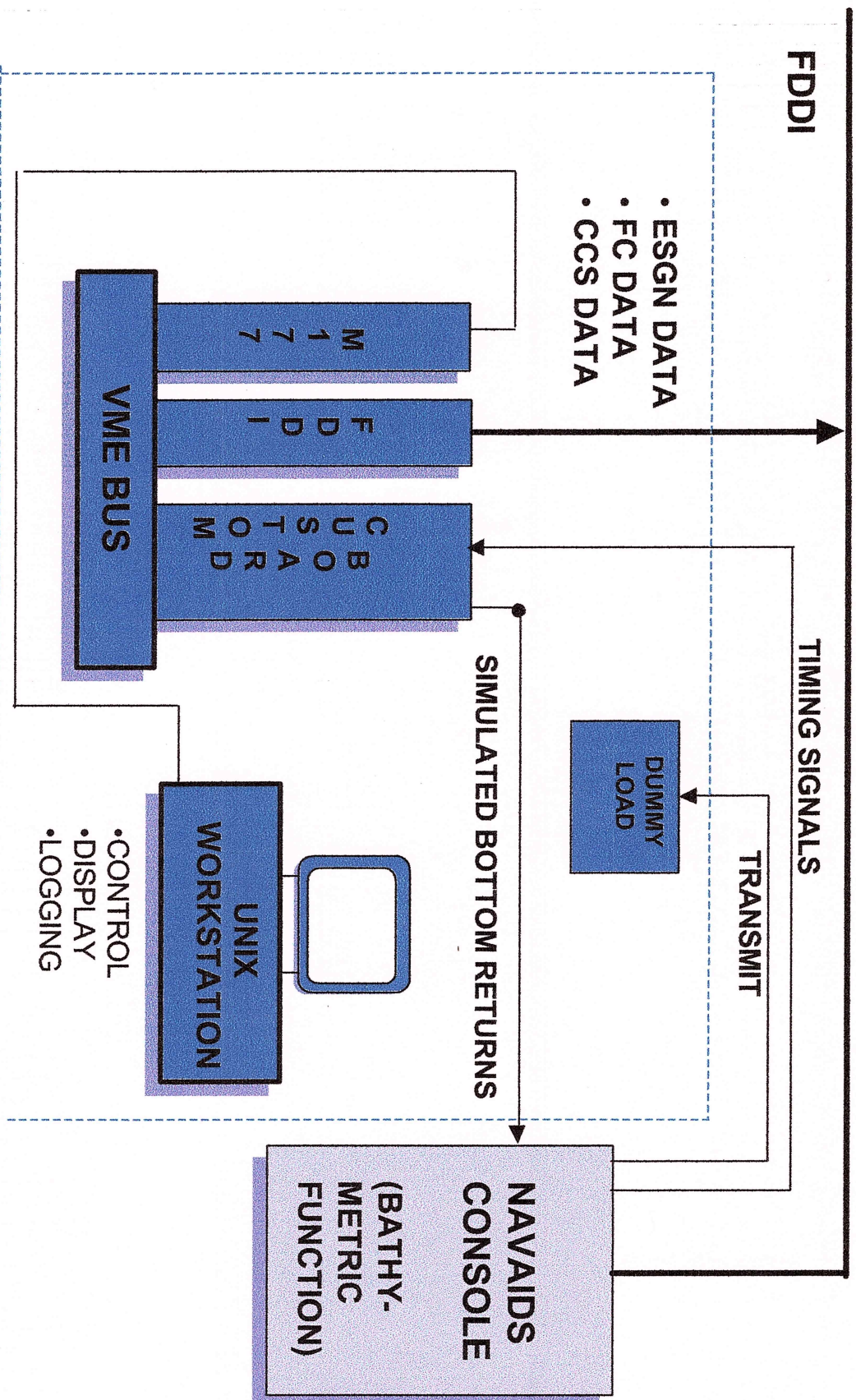


SIMULATED BOTTOM RETURNS

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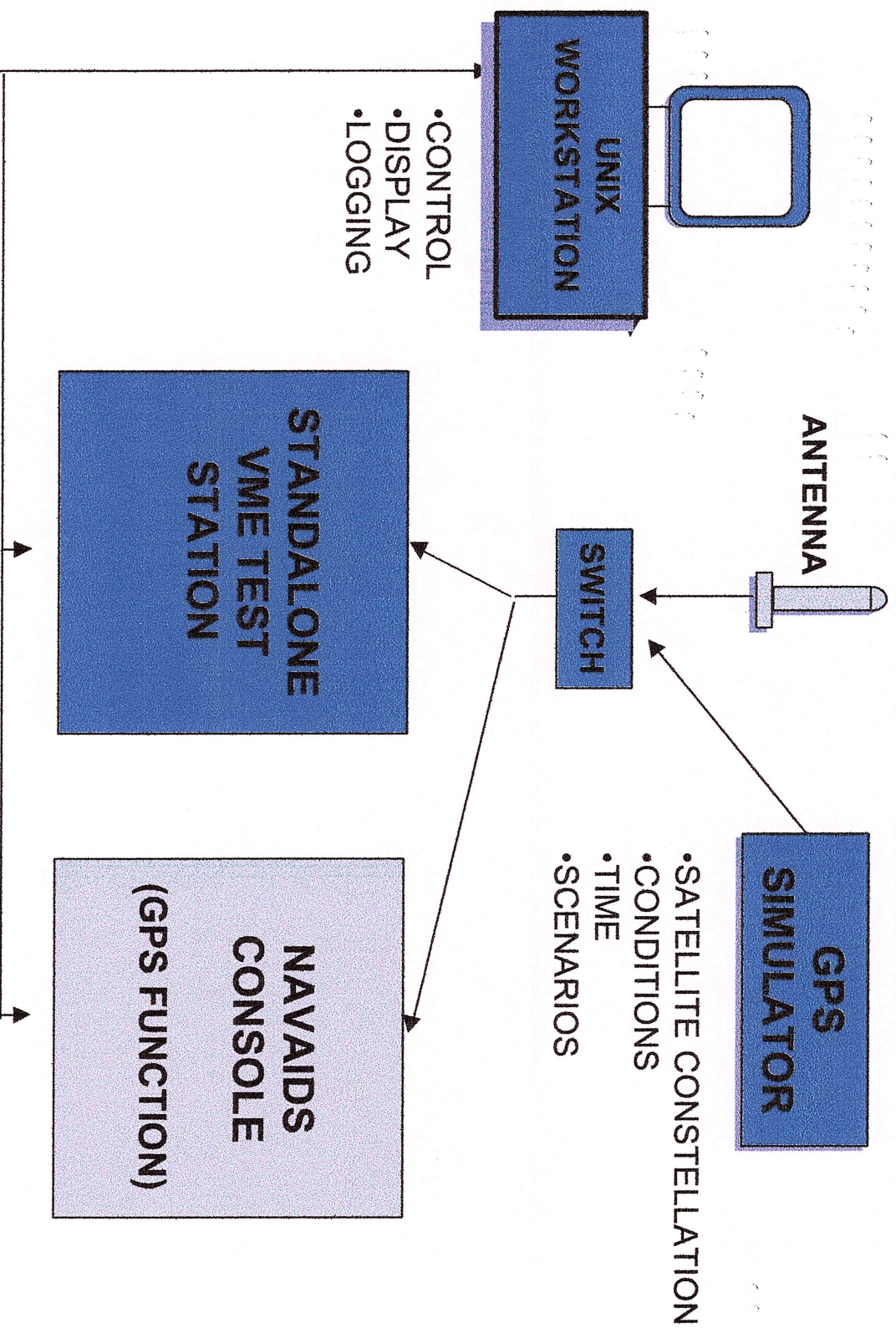
BATHYMETRIC & ESGN SIMULATORS



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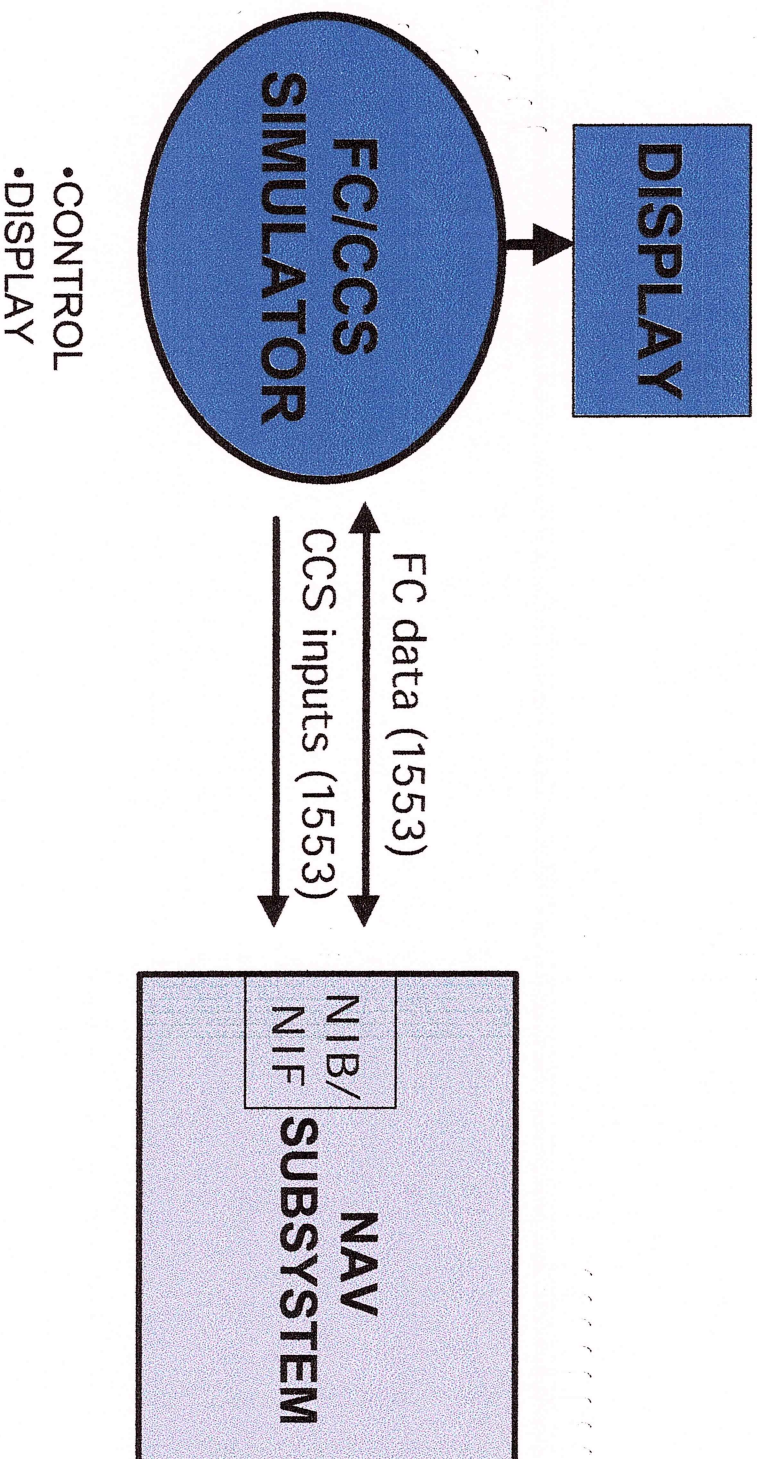
GPS SIMULATION



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FC/CCS SIMULATOR



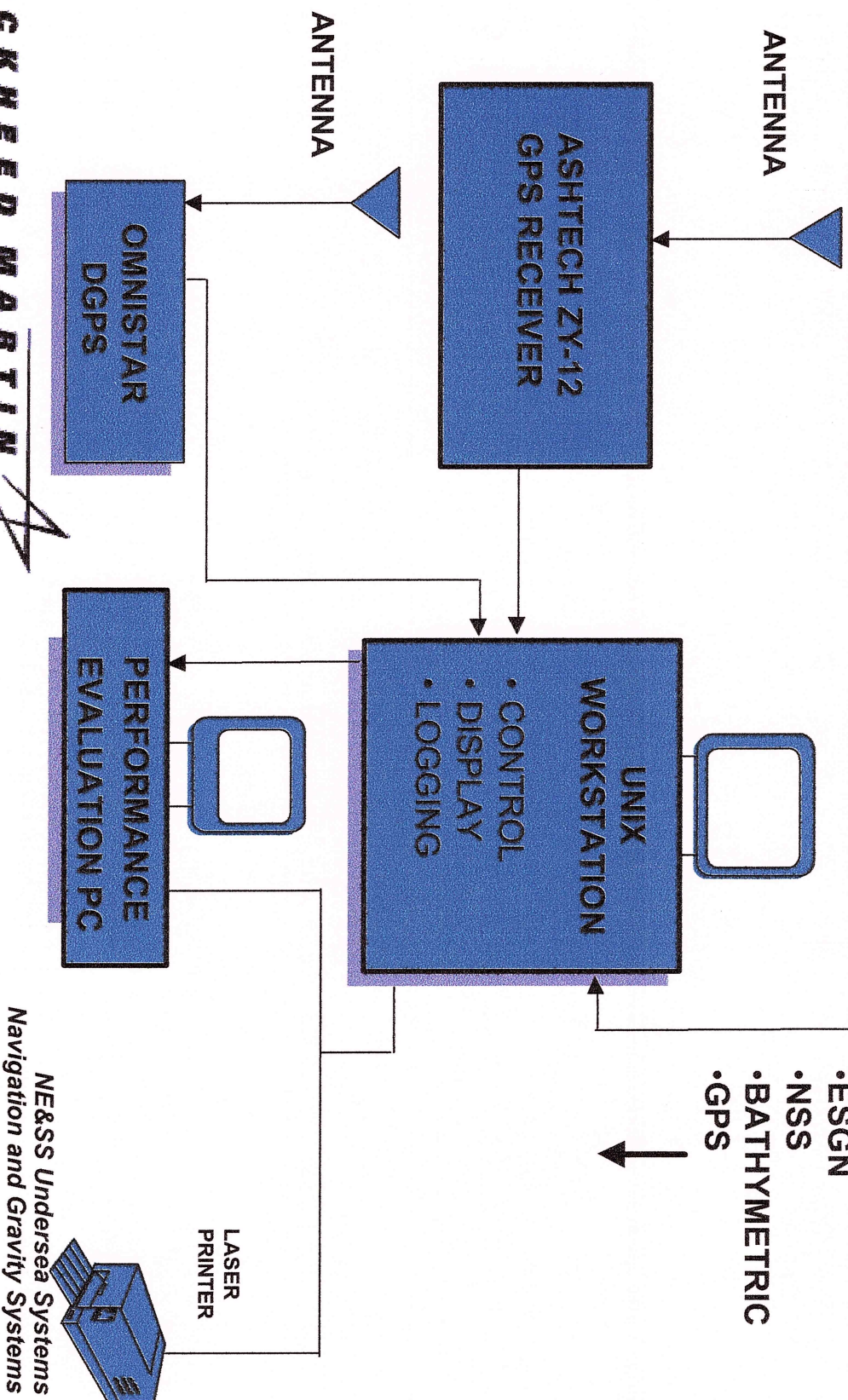
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PERFORMANCE MONITORING SYSTEM

TRIDENT NAV ETHERNET NETWORK

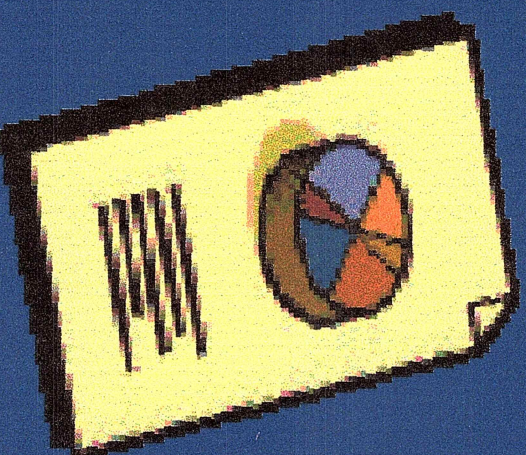
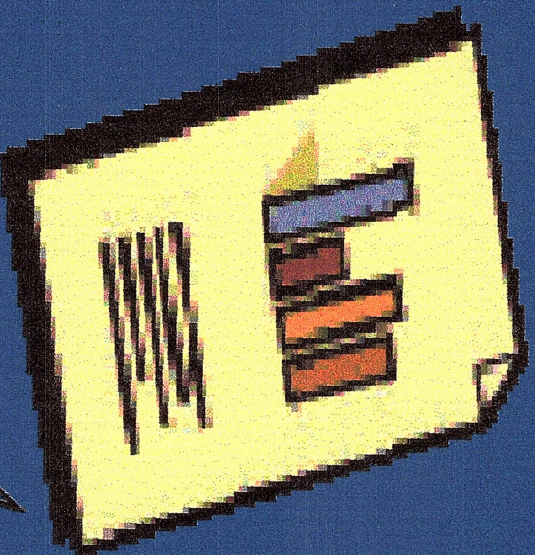


LESSONS LEARNED

- ① EFFECTIVE SIMULATIONS PAY OFF QUICKLY !
- ② REAL TIME PERFORMANCE MONITORING (PM) PAYS OFF AS WELL !
- ③ SYSTEM DESIGNED FOR USE OF SIMULATORS
- ④ FULL RANGE OF OPERATIONAL CONDITIONS AND SCENARIOS SHOULD BE SIMULATED
- ⑤ LOGGING OF ADDITIONAL "RAW" DATA FOR ENHANCED REAL TIME PM AND FLEET PROBLEM SOLVING SHOULD BE PURSUED

PERFORMANCE MONITORING EXAMPLE

- D5 BACKFIT NAVIGATION PERFORMANCE MONITORING ON CONSOLIDATED SUPPORT SHIP (CSS)- USNS WATERS
- FIELD ENGINEERS COMPILE PM SYSTEM OUTPUTS DAILY, E-MAIL RESULTS TO LM MITCHEL FIELD PERMIT IMMEDIATE ANALYSIS



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VISION FOR THE FUTURE

1 IMPLEMENT "LESSONS LEARNED" WITH EMPHASIS ON:

- SIMULATING FULL RANGE OF OPERATIONAL CONDITIONS AND SCENARIOS
- REAL TIME PERFORMANCE MONITORING
- ENHANCED DATA LOGGING TO ENABLE PLAYBACK

2 SIMULATE NEW SYSTEM FUNCTIONS

3 DEVELOP "SWITCH" FOR SIMULATION/ PATROL DATA PLAYBACK

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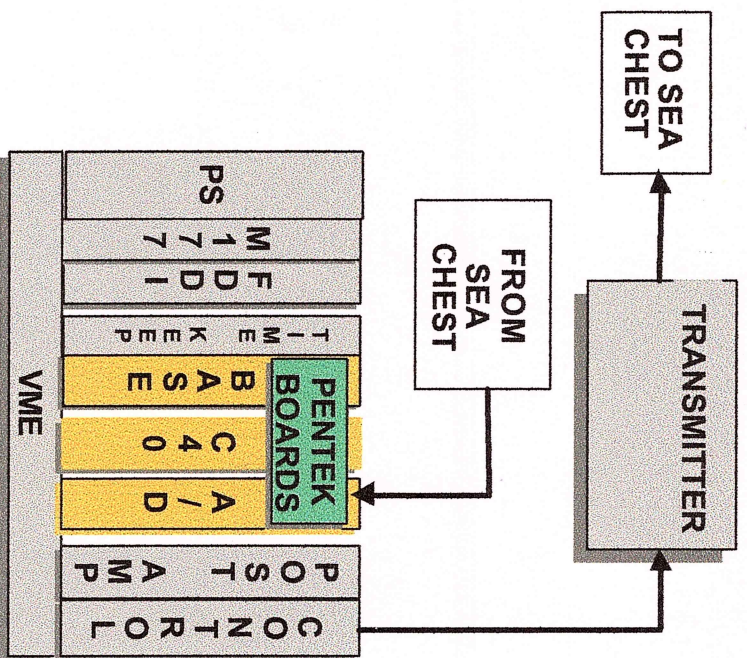
IMPLEMENTING THE VISION (RECENT ACTIVITY)

- SONAR: DEVELOPED APPROACH TO PROVIDE FULL RANGE OF OPERATIONAL CONDITIONS AND SCENARIOS FOR ALL CURRENT AND KNOWN FUTURE SONAR FUNCTIONS (FIGURE NEXT PAGE)
- GPS: UPDATED GPS SIMULATOR TO SUPPORT FUTURE GPS ENHANCEMENTS (SAASM AND M-CODE)

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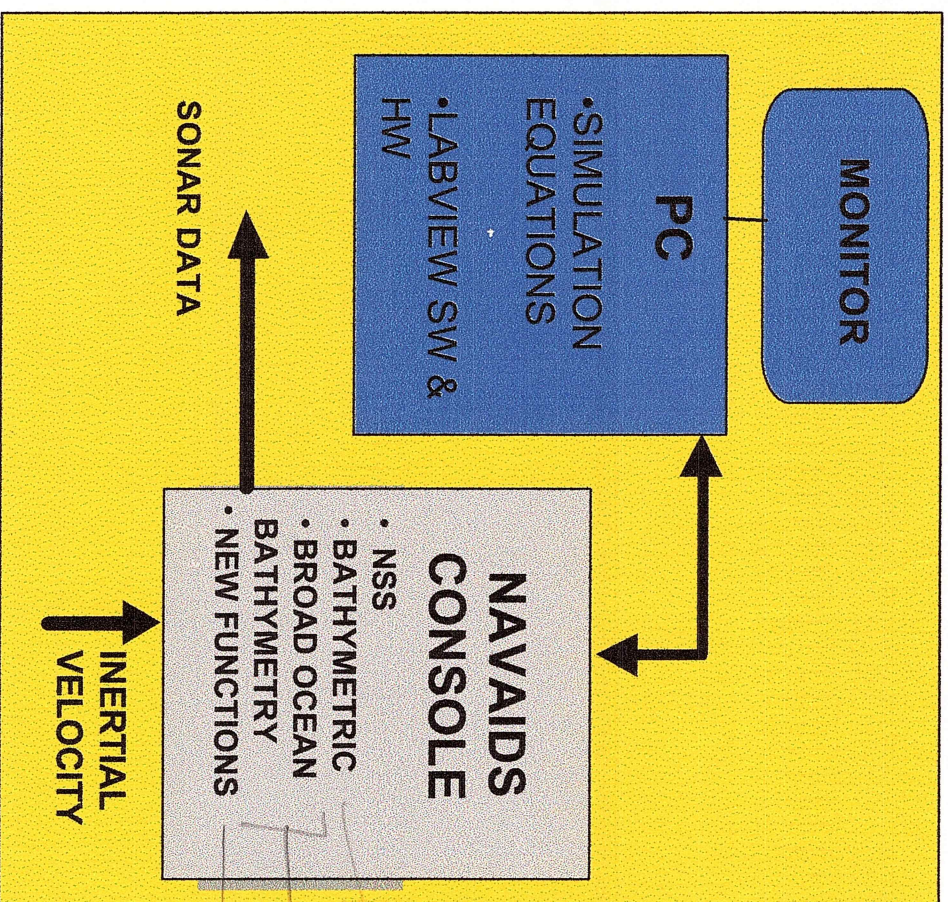
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FULL OPERATIONAL CONDITIONS & SCENARIOS: A PRELIMINARY APPROACH



**NAVAIDS
CONSOLE**

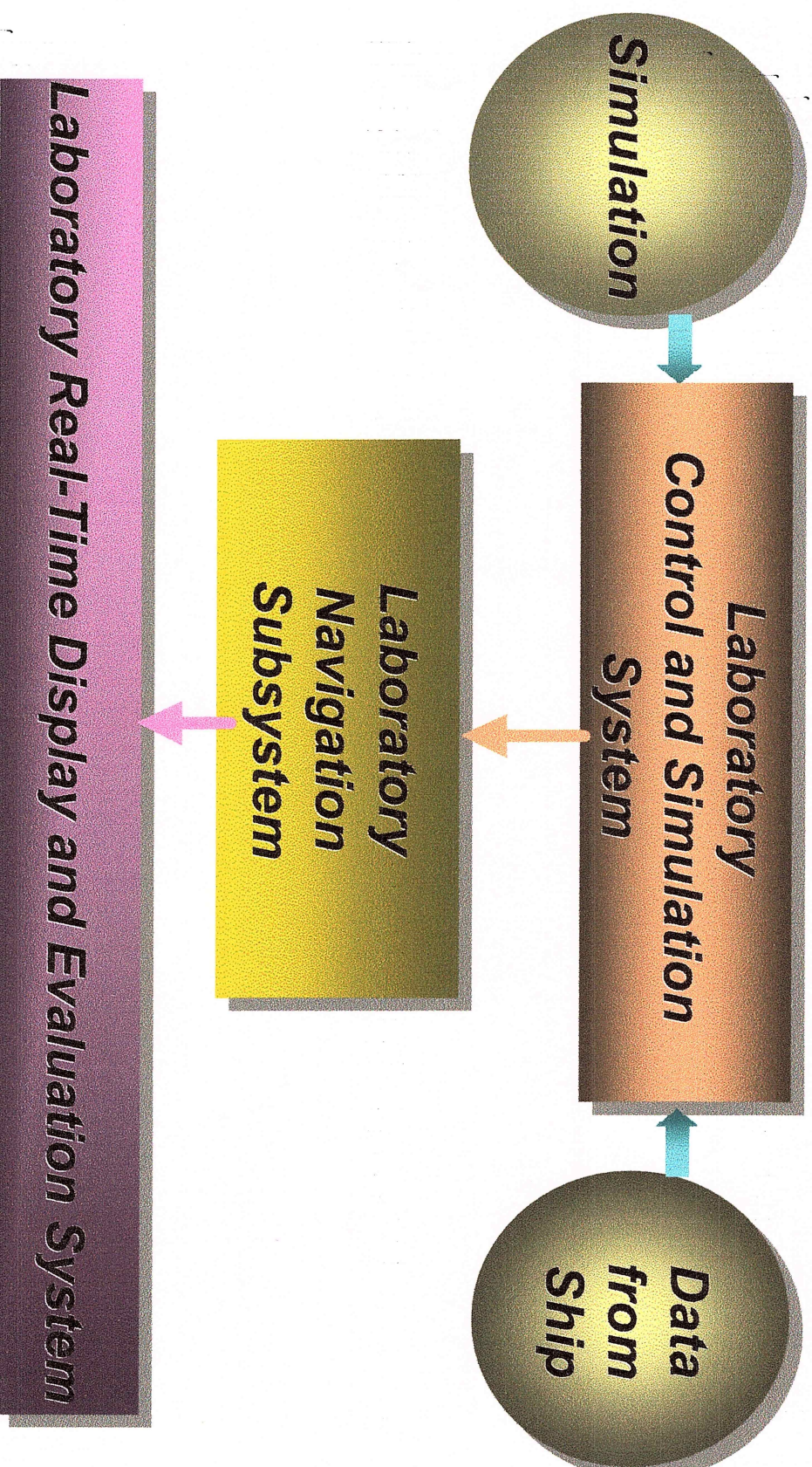
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*Velocity & Depth
BOB*

2010 VISION -- CONCEPTUAL DIAGRAM

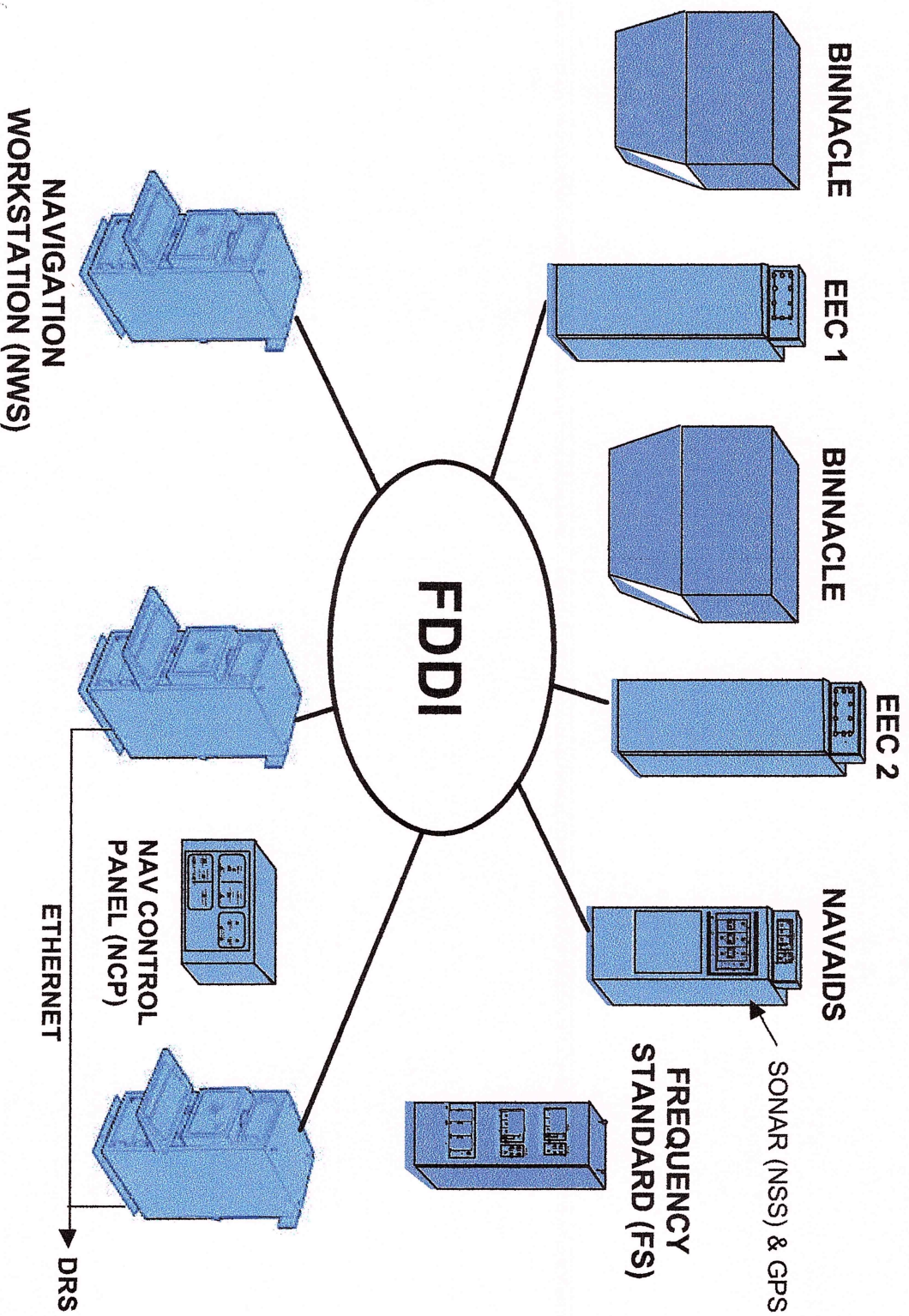


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D5 BACKFIT NAVIGATION SUBSYSTEM



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