A REPORT
from the space science and engineering center
the university of wisconsin-madison
madison, wisconsin
VAS SYSTEM DESIGN REVIEW

SPACE
SCIENCE AND
ENGINEERING
CENTER

THE UNIVERSITY OF WISCONSIN
AGENDA FOR:

THE DESIGN REVIEW OF SSEC'S PROPOSED VAS GROUND DATA PROCESSING SYSTEM

10 January 1978
University of Wisconsin
Madison, Wisconsin
Space Science and Engineering Center - Room 823

9:00 a.m. - Noon

I. Introduction - P. Menzel

II. System Overview - R. Dedecker

III. Design Subsystems:
   VAS Antenna - G. Banta
   Archive - E. Suomi
   Interfaces - E. Suomi
   TIROS-N Recieving Unit - B. Howell
   Data Base Manager - J. Benson
   Applications Processor - H. Revercomb/J. Benson
   Terminal Communications Processor - R. Dedecker
   User Terminal - G. Banta

IV. Summary - P. Menzel

V. Possible Impact on Eventual NOAA System - D. Small
I. INTRODUCTION
VAS DATA PROCESSING SYSTEM MUST

1. PROVIDE A TEST FACILITY FOR EVALUATION OF IN ORBIT VAS PERFORMANCE

2. SERVE AS A RESEARCH FACILITY FOR THE DEVELOPMENT OF TECHNIQUES FOR MESOSCALE ANALYSIS, SYNTHESIS AND PREDICTION

3. PROVIDE AN ARCHIVE OF ALL DATA DURING THE DEMONSTRATION PERIOD

4. SERVE AS AN OPERATIONAL PROTOTYPE WHICH CAN BE ADAPTED BY NOAA TO PROVIDE OPERATIONAL SUPPORT
VAS DATA PROCESSING SYSTEM MILESTONES

SYSTEM DEFINITION REVIEW (NOV 9, 1976)

SYSTEM DESIGN REVIEW (JAN 10, 1978)

FINAL REPORT (APR 1979)
SUMMARY OF UW/SSEC

VAS SYSTEM DEFINITION
PURPOSE OF VAS SOUNDING RESEARCH

1. **To increase our understanding of short-lived weather phenomena**

2. **To increase the ability to predict the behavior of short-lived weather phenomena**
A COMPLETE AND CONSISTENT FOUR DIMENSIONAL (COORDINATED HORIZONTAL, VERTICAL, AND TEMPORAL) DESCRIPTION OF THE ATMOSPHERIC STATE DURING MESOSCALE PHENOMENA
THE VAS SYSTEM FUNCTIONAL ELEMENTS
COLLECTION OF METEOROLOGICAL OBSERVABLES FROM MANY SOURCES IS PLANNED

- VAS
- VISSR
- POLAR ORBITING SATELLITES
- CONVENTIONAL WEATHER DATA
- DIGITAL RADAR

ANCILLARY DATA
A DESCRIPTION OF MESOSCALE PHENOMENA REQUIRES SPATIAL RESOLUTIONS OF 20-50 KM AND TEMPORAL RESOLUTIONS OF 5-15 MIN DURING SEVERE ATMOSPHERIC CONDITIONS.

ONLY WITH COORDINATION OF VAS AND ANCILLARY DATA WILL THIS BE POSSIBLE.
ANCILLARY DATA WILL

- PROVIDE OBSERVATIONS OF THE SYNOPTIC SCALE PHENOMENA
- PROVIDE DESCRIPTION OF THE BOUNDARY LAYER
- PROVIDE GROUND TRUTH INFORMATION
- PROVIDE SOUNDINGS WHERE THERE ARE CLOUDS
VAS WILL FILL

OBSERVATION TIME AND SPACE

GAPS
ANALYSIS

OBSERVATION INPUTS - SOUNDING

IMAGING

DERIVED OUTPUTS - CLEAR AREAS

- WATER VAPOR FIELDS
- WINDS FROM WATER VAPOR TRACKING
- TEMPERATURE FIELDS
- SURFACE TEMPERATURES

CLOUDY AREAS

- WINDS FROM CLOUD TRACKING
- CLOUD HEIGHTS
- LIQUID WATER CONTENT
- CLOUD TYPES
BASIC OBJECT OF SYNTHESIS

EVERY BOX IN THE MESOSCALE VOLUME IS FULL OF NUMBERS:

\[ T, P, Q, \vec{V}, \text{liq. } H_2O, \ldots \]
DATA SET SYNTHESIS FUNCTIONS

**INPUT CHARACTERISTICS**

- INCOMPLETE SPATIAL COVERAGE $\rightarrow$ INTERPOLATION CORRELATION
- VARIABLE SPATIAL RESOLUTION $\rightarrow$ SMOOTHING DECONVOLUTION
- IRREGULAR MEASUREMENT TIMES $\rightarrow$ INTERPOLATION EXTRAPOLATION
- REDUNDANCY $\rightarrow$ WEIGHTING CONSISTENCY
- INCOMPATIBLE $\rightarrow$ QUALITY CONTROL

**OUTPUT CHARACTERISTICS**

- COMPLETE SPATIAL COVERAGE
- FIXED SPATIAL RESOLUTION
- CONTEMPORANEOUS
- UNIQUE
- COMPATIBLE
II. VAS SYSTEM OVERVIEW
VAS SYSTEM GENERAL PROCESSING REQUIREMENTS

(1) DATA BASE ACQUISITION AND DATA HANDLING
(2) APPLICATIONS PROCESSING
(3) USER COMMUNICATIONS
CRITERIA FOR THE SYSTEM DESIGN

(1) USE MCIDAS EXPERIENCE
(2) MEET PROCESSING REQUIREMENTS
(3) PROVIDE FOR LINEAR EXPANSION TO MEET FUTURE REQUIREMENTS (MODULARITY)
(4) DISTRIBUTE WORK LOAD
(5) MINIMIZE INTER PROCESSOR COMMUNICATIONS
(6) PROVIDE FAILSOFT MECHANISMS
THE MAJOR FUNCTIONS OF THE ARCHIVE SYSTEM ARE TO

(1) PROVIDE AN OFF LINE LIBRARY OF ALL RAW DATA SETS;
(2) PROVIDE A BACKUP FOR COLLECTION OF VOLATILE DATA
     IN THE EVENT OF DBM FAILURE;
(3) PROVIDE A MECHANISM FOR RETRIEVING AND INPUTING
     HISTORICAL DATA INTO THE VAS PROCESSING SYSTEM;
(4) PROVIDE AN OFF LINE LIBRARY OF VAS PROCESSING SYSTEM
     OUTPUTS.
THE MAJOR FUNCTIONS THE DATA BASE MANAGER WILL PERFORM ARE TO

(1) PREPROCESS VAS, VISSR, AND TIROS-N DATA;

(2) ORGANIZE ALL RAW DATA INPUTS TO THE SYSTEM AND STORE ON-LINE;

(3) SATISFY REQUESTS FOR DATA FROM THE REST OF THE SYSTEM;

(4) PERFORM ON-LINE STORAGE AS REQUESTED BY THE REST OF THE SYSTEM;

(5) RECORD PRODUCTS GENERATED BY THE SYSTEM FOR ARCHIVE;

(6) RECORD NON-SATELLITE RAW DATA FOR ARCHIVE.
DATA BASE MANAGER
THE MAJOR FUNCTIONS THE APPLICATIONS PROCESSOR(S) WILL PERFORM ARE

(1) DATA SET ANALYSIS;
(2) DATA SET SYNTHESIS;
(3) DATA SET QUALITY CONTROL VIA MAN INTERACTION.
TCP MAJOR FUNCTIONS

1) Route requests from user terminal to AP, DBM, or other terminals, and return central system output to user terminals.

2) Route commands and data requests to and from other computer systems (GSFC, Westinghouse, Suitland)

3) Compensate for differences between various user terminals not removed by the terminal microprocessors.

4) Program and control user priorities.

5) Translate user commands.

6) Assign individual tasks to the most appropriate AP on the basis of machine load and capability.
Terminal Communications Processor

MASS STORE

TERMINAL
COMMUNICATIONS
CPU

TO DBM

TO AP's

... PARALLEL TO
SYNC-SERIAL
INTERFACE...

PARALLEL TO
SYNC-SERIAL
INTERFACE

MODEM

SERIAL DIRECT
CONNECTION TO
USER TERMINAL

TELEPHONE LINE
CONNECTION TO
USER TERMINAL

PARALLEL DIRECT
CONNECTION TO
USER TERMINAL

PARALLEL TO
SERIAL
INTERFACE (MP)

MODEM

TELEPHONE LINE
CONNECTIONS TO
REMOTE COMPUTER
SUBSYSTEMS (GSFC,
WESTINGHOUSE,
SUITLAND, ETC.)
THE MAJOR FUNCTIONS OF THE USER TERMINAL ARE TO

(1) PROVIDE A MECHANISM FOR VIEWING DATA SETS;

(2) PROVIDE A MECHANISM FOR SELECTIVE PROCESSING AND EDITING OF DATA SETS.
III. DESIGN SUBSYSTEMS
III.A. VAS ANTENNA
ANTENNA CONTROL SYSTEM

PSK DECODER

SIGNAL STRENGTH

REMOTE CONTROL & STATUS

MANUAL CONTROL

HARDWARE CONTROL LINE

CONTROL M.P.

WORLD INTERFACE

ANTENNA MOUNT

ANTENNA MOUNT

STATUS CONTROL

STATUS
VAS ANTENNA SYSTEM ELEMENTS

1. MOUNT AND REFLECTOR
2. ANTENNA CONTROL
3. RECEIVING SYSTEM
4. SIGNAL PROCESSING SYSTEM
5. DATA DETECTION SYSTEM
6. VAS ARCHIVE SYSTEM
7. DBM INTERFACE
SSEC WEST ANTENNA RECEIVING SYSTEM

1687.1 MHz

24" parab.

- LOW-NOISE AMPLIFIER
  - 1.67-1.70 GHz
  - G = 30 dB
  - F = 1.8 dB (25°C)

- DOWN-CONVERTER
  - L.O.: 1620 MHz
  - G = 40 dB
  - F = 2.5 dB

- REMOTE OSC. & AMPLIFIER
  - G = 20 dB

- PSK DEMODULATOR
  - 67.1 MHz

PCM Data

+ 15 V dc
101.25 MHz

67.1 MHz

L₁

67.1 MHz

L₂

requires -5 dBm to -25 dBm signal level

in penthouse

sixth floor

Low-Noise Amplifier
Scientific Comm., Inc.
Model SCF-169-30 (GaAs FET)

Downconverter/Remote Osc. & Amplifier
F G Engineering
Model ADO-1691 (AM)

PSK Demodulator
EMR
Model 729

Cable Losses (for RG 214/U)

L₁ (100' @ 67.1 MHz): 1.8 dB
L₂ (200' @ 67.1 MHz): 3.6 dB

Expected Received Signal Levels

At input of the LNA: -95 dBm
At input of PSK Demod.: -10 dBm

FGS
1/3/78
III.B. VAS SYSTEM ARCHIVE
THE REQUIREMENTS OF THE VISSR ARCHIVE

(1) IT MUST RECORD A HIGH DATA VOLUME AS WELL AS A HIGH DATA RATE, 1.7472 MBS FOR 18 MIN. TWO VISIBLE PICTURES USE UP AN ENTIRE 40 MB DISK DRIVE STORAGE CAPACITY. THEREFORE A VIDEO SLANT TRACK IS USED.

(2) IT MUST MAXIMIZE THE PACKING DENSITY TO MINIMIZE TAPE OPERATIONAL COSTS. THEREFORE THE CASSETTE IS RUN SYNCHRONOUSLY WITH THE SATELLITE.

(3) IT MUST PROVIDE EASY ACCESS TO A DATA SET, THEREFORE IT WILL HAVE A SEARCH CAPABILITY.
BASIS FOR SYNCHRONISM

STRETCHED V1SSR FORMAT

600 m SEC

E I V1 V2 V3 V4 V5 V6 V7 V8

600 m SEC

HEAD B

SCANNER

HEAD A
DATA FORMAT

SMS DATA AS RECEIVED

SCANNER HEAD INTERCHANGE

AS RECORDED
SEARCH TRACK
ACCESS PARAMETERS

- SATELLITE IDENTIFIER
- SCAN COUNT
- YEAR
- SOLAR DAY
- HOUR
- MINUTES

RECORDED FORMAT

* DIGITAL ASYNCHRONOUS FORMAT
* AMPLITUDE MODULATED AUDIO TONE
* TONE IS A MULTIPLE OF THE DIGITAL DATA CLOCK TO ALLOW VARIABLE SPEED PLAYBACK
ARCHIVE RECORDER HARDWARE CONFIGURATION
ARCHIVE PLAYER HARDWARE CONFIGURATION
OFF LINE DATA INGEST SYSTEM
(VAS ARCHIVE)

9 TRACK TAPE TRANSport 800/1600 BPI

DATA → PRE PROCESSOR → FORMATTER & BUFFER

DBM COMMANDS

COMMAND KEYBOARD

CRT

FORMATTED DATA → TRANSPORT STATUS & COMMAND

MICRO PROCESSOR CONTROL & SCHEDULER
III.c. VAS SYSTEM INTERFACES
<table>
<thead>
<tr>
<th>SOURCE</th>
<th>RECEIVER</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAS</td>
<td>24 FT. DISH</td>
<td>NEAR COMPLETION</td>
</tr>
<tr>
<td>VISSR</td>
<td>24 FT. DISH</td>
<td>OPERATIONAL</td>
</tr>
<tr>
<td>VISSR</td>
<td>---</td>
<td>STILL IN PLANNING STAGES</td>
</tr>
<tr>
<td>TIROS-N</td>
<td>DUAL YAGI</td>
<td>prototype being tested</td>
</tr>
<tr>
<td>DMSP</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>DIGITAL RADAR</td>
<td>TELEPHONE LINE VIA MODEM</td>
<td>STILL IN PLANNING STAGES</td>
</tr>
<tr>
<td>SURFACE DATA</td>
<td>WB604 LINE</td>
<td>operational</td>
</tr>
<tr>
<td>MODEL OUTPUTS</td>
<td>TELEPHONE LINE VIA MODEL</td>
<td>still in planning stages</td>
</tr>
<tr>
<td></td>
<td>(SUITLAND, NCAR)</td>
<td></td>
</tr>
</tbody>
</table>
III.D. TIROS-N RECEIVING UNIT
**FUNCTIONAL DESCRIPTION OF TIROS-N REAL-TIME DATA**

<table>
<thead>
<tr>
<th></th>
<th>HIRS-2</th>
<th>MSU</th>
<th>APT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Vol. (bytes/sec)</td>
<td>360</td>
<td>40</td>
<td>4000</td>
</tr>
<tr>
<td>Number of Channels</td>
<td>20</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Spatial Resolution</td>
<td>24 km.</td>
<td>100 km</td>
<td>4 km.</td>
</tr>
<tr>
<td>256-sec Scan Pattern</td>
<td>40 lines</td>
<td>10 lines</td>
<td>4 frames*</td>
</tr>
<tr>
<td>Application</td>
<td>t, w, c1</td>
<td>t</td>
<td>t5, c1</td>
</tr>
</tbody>
</table>

*(HIRS-2 & MSU come from TIP @ 1040 bytes/sec)*

*Apt frame = 128 lines*
TIROS-N REAL-TIME DATA PROCESSING TASKS
AND CPU DUTY CYCLE

<table>
<thead>
<tr>
<th>HIRS-2 &amp; MSU</th>
<th>Duty Cycle (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>INPUT UNDER (\mu)P CONTROL</td>
<td>12</td>
</tr>
<tr>
<td>UNPACK, Q.C., CONVERT INTEGERS</td>
<td>24</td>
</tr>
<tr>
<td>(SUB TOTAL)</td>
<td>36</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>APT</th>
</tr>
</thead>
<tbody>
<tr>
<td>INPUT VIA DMA</td>
</tr>
<tr>
<td>(INPUT UNDER (\mu)P CONTROL)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OTHER TASKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTENNA CONTROL</td>
</tr>
<tr>
<td>SOFTWARE CLOCK</td>
</tr>
<tr>
<td>RAM REFRESH</td>
</tr>
<tr>
<td>OUTPUT VIA DMA</td>
</tr>
<tr>
<td>(SUB TOTAL)</td>
</tr>
</tbody>
</table>

TOTAL DUTY CYCLE | 60%
III.E. VAS DATA BASE MANAGER
THE PERFORMANCE REQUIREMENTS OF THE VAS DATA BASE MANAGER (DBM)

(1) IT MUST BE ABLE TO INGEST DATA FROM TWO VISSPS AND ONE VAS SIMULTANEOUSLY (THROUGHPUT GREATER THAN 5.25 MBITS/SEC) IN ADDITION TO OTHER ANCILLARY DATA.

(2) IT MUST BE ABLE TO MANAGE A LARGE DATA BASE.

(3) IT MUST BE ABLE TO QUICKLY SATISFY USER AND APPLICATIONS PROCESSOR DATA REQUESTS.
VAS DATA BASE MANAGER FEATURES

(1) LARGE THROUGHPUT. GEOSTATIONARY INPUT CONSUMES LESS THAN 15% OF THROUGHPUT.

(2) LARGE DATA BASE. 600 MBYTES IS DIVIDED AMONG TWO DISKS AND LOSS OF A SINGLE DISK CAUSES ONLY A SOFT FAILURE.

(3) EASY INTERFACES. ALL BUT THE VAS DATA INTERFACE IS WELL DEFINED AT THIS TIME.
III.F. VAS APPLICATIONS PROCESSOR
PERFORMANCE REQUIREMENTS

FOR THE

APPLICATIONS PROCESSOR (AP)
SUMMARY OF THE MAJOR TASKS
OF THE APPLICATIONS PROCESSOR

• ANALYSIS OF COMPLETE SOUNDING DATA FROM VAS OR POLAR SATELLITES (YIELDING T & Q FIELDS AND CLOUD HEIGHTS)

• ANALYSIS OF FAST TIME SEQUENCE DATA FROM VAS OR VISSR (YIELDING CLOUD OR WATER VAPOR WINDS, CLOUD HEIGHT GROWTH RATE, T AND Q FIELDS AS A FUNCTION OF TIME)

• 4-D DATA ASSIMILATION
BASIC REQUIREMENT

SPEED SUFFICIENT FOR REAL TIME CONTINUOUS OPERATION.

PRACTICAL REQUIREMENT

CAPABILITY OF THE AP SHOULD BE EXPANSIBLE TO ALLOW FOR THE UNKNOWN.
SPEED ESTIMATION TECHNIQUES

- Speeds for various tasks were estimated either from actual timing tests on MCIDAS or scaled from actual timing tests using the number of arithmetic operations involved.

- CPU time estimates given are times required for processing on a machine 10 times faster than MCIDAS (since this speed improvement should be roughly characteristic of the AP chosen, these time estimates can be interpreted as performance estimates).
## CPU REQUIREMENTS FOR PROCESSING VAS DATA

### COMPLETE SOUNING DATA -

CPU Time to process 1 hour of VAS data on machine 10x faster than McIDAS Harris/5.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Excluding VAS Channels</th>
<th>Using All VAS Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>scan program/ resolution</td>
<td><strong>(1.3 sec/ Clear Column (100 FOV Radiance (pairs with Retrieval (12 bands)</strong></td>
<td><strong>(1.3 sec/ Clear Column (100 FOV Radiance (pairs with Retrieval (12 bands)</strong></td>
</tr>
<tr>
<td><strong>Eigenvector</strong>(1.3 sec/ Clear Column (100 FOV Radiance (pairs with Retrieval (12 bands)**</td>
<td>28.7 min.</td>
<td>34.4 min.</td>
</tr>
<tr>
<td><strong>Minimum</strong> Information (.6 sec/ Inversion (12 band retrieval)**</td>
<td>7.4 min.</td>
<td>1.8 min.</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>36 min.</td>
<td>36 min.</td>
</tr>
</tbody>
</table>

* Assuming retrievals performed at 50% of potential locations

** Assuming all available FOV used

### FAST TIME SEQUENCE DATA

- WINDS REQUIRE MINIMAL CPU TIME.

- CPU REQUIREMENTS FOR LESS THAN COMPLETE CHANNEL SOUNDING ARE ASSUMED TO BE NO MORE SEVERE THAN COMPLETE CHANNEL SOUNDING.
SUMMARY OF CPU REQUIREMENTS FOR

12 HOUR PERIOD

- DATA SOURCE

  VAS (29 MINUTES/HOUR ASSUMING 50 OR 100 KM ...... 348 MIN.
  SPATIAL RESOLUTION WITH 4µ CHANNELS
  USED HALF OF THE TIME)

  POLAR ORBITERS (4 OVERPASSES, 2 TIROS AND ...... 40 MIN.
  2 DMSP, AT 10 MIN/OVERPASS)

  VISSR (WINDS) ........................................ SMALL

  TOTAL .................................................. 389 MIN.
  OR
  54% DUTY CYCLE FOR SATELLITE
  DATA ANALYSIS WITH AP 10x
  FASTER THAN MCIDAS.

- LEAVES 46% OF CAPABILITY FOR DATA ASSIMILATION AND SIMPLE
  EXTRAPOLATION MODELLING (TIME ESTIMATE FOR ONE SIMPLE INTERPOLATION
  SCHEME YIELDED 20 MIN. CPU TIME/2 HOURS DATA OR 17% DUTY CYCLE).
APPLICATIONS PROCESSOR

HARRIS/10
CPU
FLOATING POINT
MEMORY *

ASYNC

80 M
BYTE
DISK

FROM
DBM

TO USER TERMINALS
VIA TCP

* MEMORY 96 KB TO 768 KB DEPENDING ON APPLICATIONS REQ.
VAS APPLICATIONS PROCESSOR FEATURES

(1) SIMPLE, ONLY THREE INTERFACES ARE NEEDED AND ALL ARE ALREADY DESIGNED.

(2) POWERFUL, ABOUT TEN TIMES THE FLOATING POINT THROUGHPUT OF MCIDAS IS POSSIBLE.

(3) EXPANDABLE, SINCE THE TASKS ARE SEPARABLE, ANOTHER IDENTICAL APPLICATIONS PROCESSOR EXPANDS THE SYSTEM CAPABILITY.

(4) REDUNDANCY, SINCE THE AP AND THE DBM ARE THE SAME COMPUTER THE AP CAN SERVE AS THE DBM IN CASE OF DBM FAILURE.
III.G. VAS TERMINAL COMMUNICATIONS PROCESSOR
TCP FUNCTION EXPLANATIONS

1) Route requests from user terminal to AP or DBM and return central system output to user terminals.

A) Determine type of data requested and route request to appropriate processor.

EXAMPLES
 i) simple data catalog (Route to DBM)
 ii) clear column radiance retrieval (route to AP)
 iii) terminal to terminal message (route to appropriate terminal)

B) Provide the necessary buffering for appropriate data transfer rates to various peripherals: i.e.
 i) central system processors
 ii) serial synchronous
 iii) serial asynchronous
 iv) parallel
2) Route commands and data requests to and from other computer systems (GSFC, Westinghouse, Suitland, etc.)

A) Determine type of command or data requested and route to appropriate processor: Examples
   i) Request from GSFC center for a processed data set (Route to DBM).
   ii) Acquire orbit and attitude parameters for Westinghouse system S/DB program (Route to appropriate AP).

B) Interpret and format user data requests and commands to or from remote computer systems.

C) Error check data requests or commands to or from remote computer systems.

D) Check for legality of Westinghouse system commands during various real time domains.
3) Compensate for differences between various user terminals not removed by the terminal microprocessors:

A. Allows terminals with different capabilities

Examples:

i) Is image data for solid state memory or video disk (fast store)?

ii) Limit number of images addressed. (Each terminal may have a different number of images).

iii) Provide necessary data format for terminal peripherals.
4) Program and control user priorities.

A) Some users may require long term higher priority over other users.

B) A particular user may require short time higher priority (EX: severe storm situation).
5) Translate user commands.

A) Preliminary error checking.

B) Menu system.
   i) easily learned
   ii) for user familiar with system language, this is more time consuming to use

C) Command parameter sequence.
   (currently used on McIDAS)
   i) for familiar user, this is faster
   ii) easier to implement a MACRO structure

D) A new language system utilizing the best features of Menu and Command parameter languages.

E) Provide a dictionary of language terms.
6) Assign individual tasks to the most appropriate AP on the basis of machine load and capability.

A) Route commands and (or) requests needing specific hardware (software) capabilities to the AP with these capabilities: EX.
   i) matrix arithmetic

B) Given equal AP abilities, route commands and (or) requests to AP with most facilities currently idle (memory, IO, and CPU cycles).
III.H. VAS USER TERMINAL
VAS USER TERMINAL

FEATURES

1. 12 BIT ENHANCEMENT TABLE
2. STEREO IMAGING
3. 800 FRAMES OF DIGITAL IMAGES
4. HARD COPY
5. LONG LOOPS

SINGLE CHANNEL AT 10 FRAMES/SEC
TWO CHANNEL (STEREO) AT 5 FRAMES/SEC

6. INCLUDES ALL MCIDAS TERMINAL CAPABILITIES
IV. SUMMARY OF IMPENDING ACTIVITIES
VAS SYSTEM HARDWARE AND SOFTWARE DESIGNS ARE

- MODULAR
- FOUNDED IN SSEC MCIDAS EXPERIENCE

SYSTEM IMPLEMENTATION WILL BE

- MODULAR
- USING MCIDAS AS DEVELOPMENT TEST BED
FIRST STAGE OF IMPLEMENTATION (NOW)

- **SECURE VAS ANTENNA**
  
  **(DONE)**

- **DESIGN AND IMPLEMENT TIROS-N RECEIVING STATION**
  
  **(ONGOING)**

- **ESTABLISH DATA LINKS TO VAS DATA BASE MANAGER (DBM)**
  
  **(ON ORDER)**

- **TEST DATA INGEST SOFTWARE PACKAGES**
  
  **(AWAITING DBM)**

- **ACQUIRE DATA SETS FOR TECHNIQUE DEVELOPMENT**
  
  **(ONGOING)**
SECOND STAGE (REMAINDER OF FY 78)

- ADD ON VAS APPLICATION PROCESSOR (AP) WITH FLOATING POINT HARDWARE

- PROCEED WITH UT DEVELOPMENT

- FREE MCIDAS FROM VAS SOFTWARE DEVELOPMENT
THIRD STAGE (FY 79)

- IMPLEMENT VAS TERMINAL COMMUNICATION PROCESSOR (TCP)

- ESTABLISH OPERATING KERNEL VAS PROCESSING SYSTEM

- ESTABLISH COMPUTER TO COMPUTER INTERFACE WITH GSFC
FINAL STAGE (EARLY FY 80)

- COMPLETE VAS SYSTEM WITH ADDITION OF MEMORY AND STORAGE CAPABILITIES

- DELIVER REMOTE TERMINAL TO NOAA

- INCORPORATE ALTERATIONS TO THE SYSTEM INDICATED BY ACTUAL OPERATION WITH VAS DATA
THE VAS PROCESSING SYSTEM WILL

- RECEIVE MESOSCALE DATA REAL TIME
- ARCHIVE ALL DATA
- ANALYZE AND SYNTHESIZE THE MESOSCALE REAL DATA AND PREDICTIVE MODEL OUTPUTS
- OUTPUT MESOSCALE MODEL COMPATIBLE DATA SETS FOR REAL TIME APPLICATION
- DISPLAY ACTUAL AND PREDICTED MESOSCALE WEATHER
- SUPPORT TERMINALS AT NOAA AND GSFC
- HAVE SUFFICIENT GENERALITY TO SERVE AS A PROTOTYPE ON WHICH A FUTURE NOAA VAS MESOSCALE SYSTEM CAN BE BASED