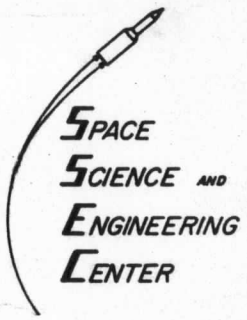
VAS SYSTEM DESIGN REVIEW

A REPORT

from the space science and engineering center
the university of wisconsin-madison
madison, wisconsin

VAS SYSTEM DESIGN REVIEW



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

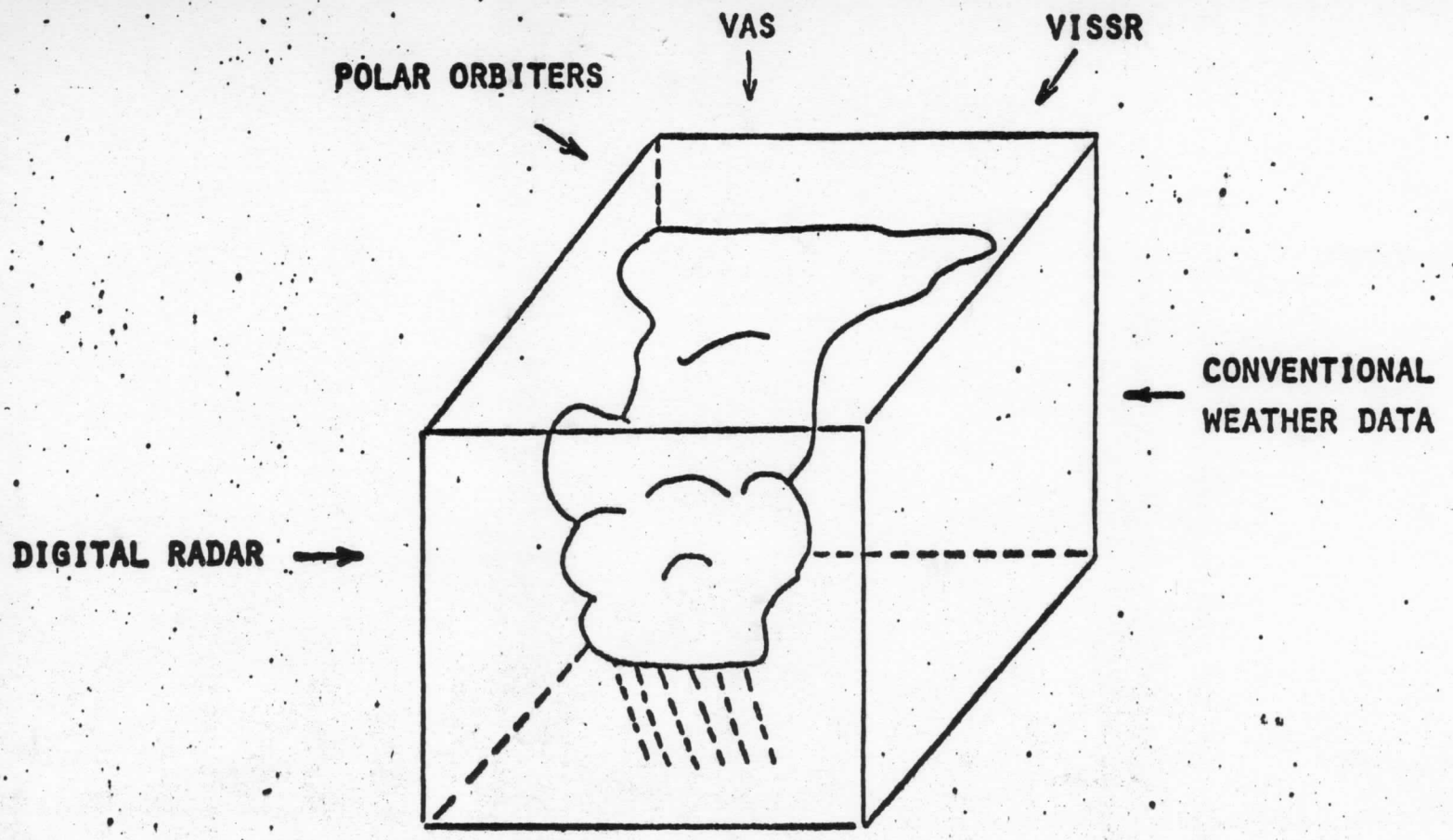
VAS SYSTEM DEFINITION

PURPOSE OF VAS SOUNDING RESEARCH

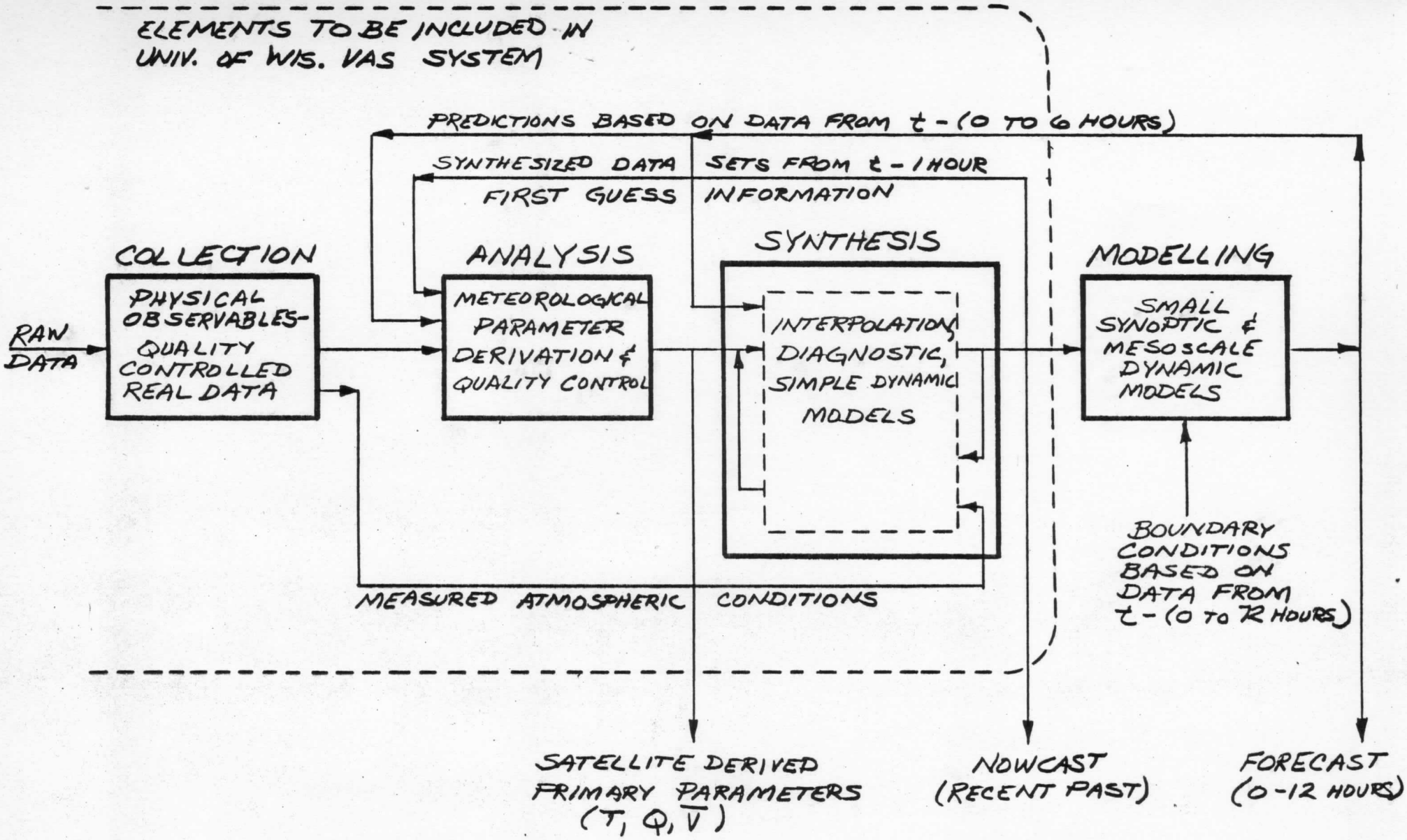
1. TO INCREASE OUR UNDERSTANDING OF SHORT-LIVED WEATHER PHENOMENA

2. TO INCREASE THE ABILITY TO PREDICT THE BEHAVIOR OF SHORT-LIVED WEATHER PHENOMENA

THE PRIMARY NEED



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 DATE 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

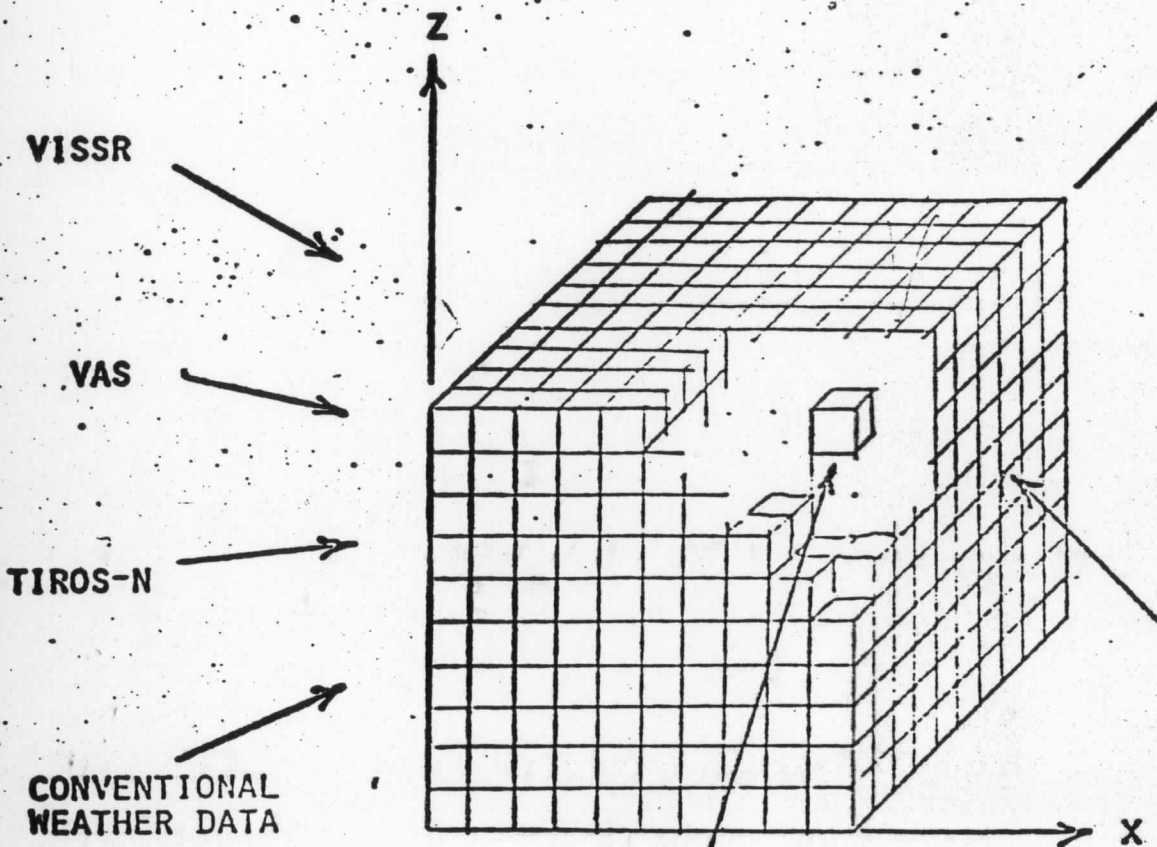
DERIVED OUTPUTS - CLEAR AREAS

- 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

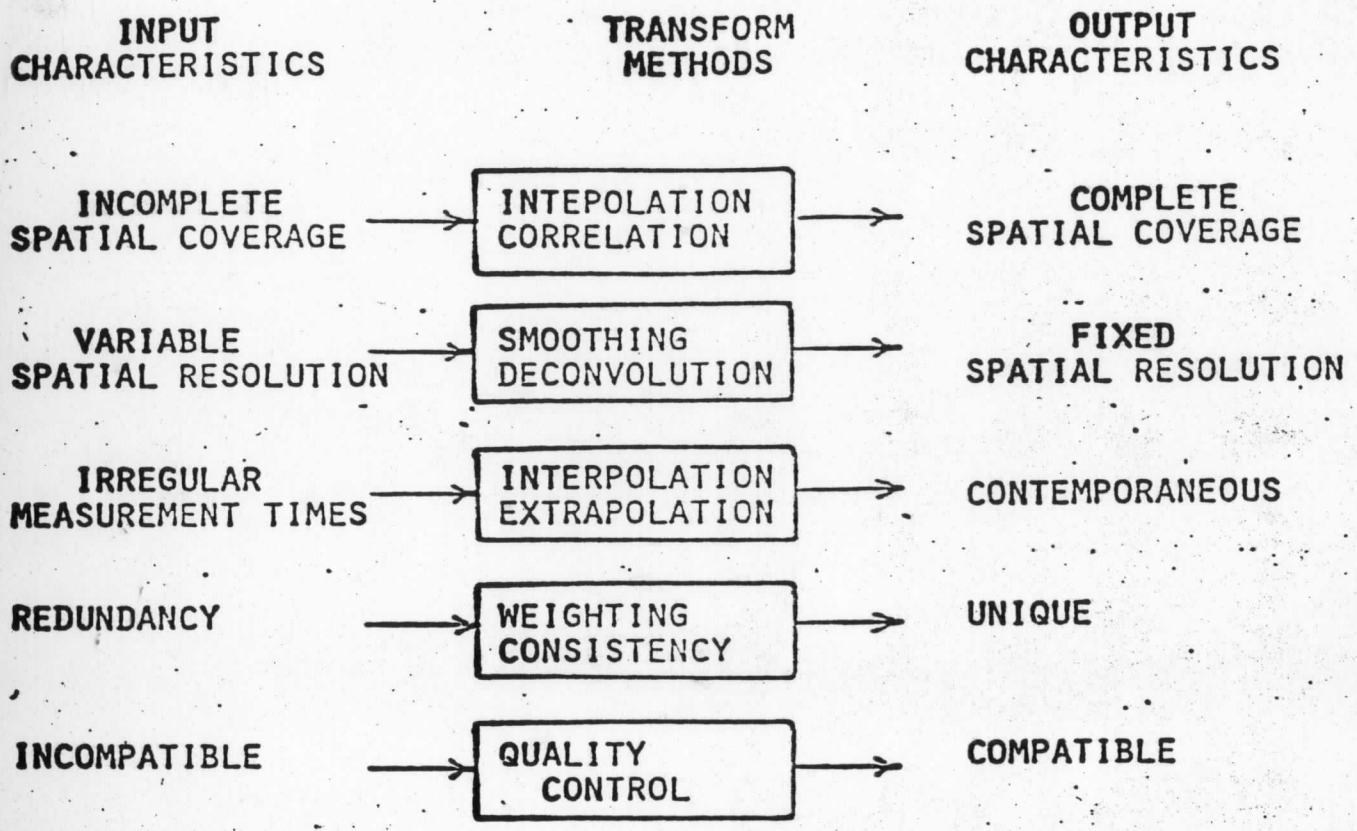
BASIC OBJECT OF SYNTHESIS



EVERY BOX IN THE MESOSCALE VOLUME IS FULL OF NUMBERS:

$(T, P, Q, \vec{V}, \text{liq. } H_2O, \ldots)$

DATA SET SYNTHESIS FUNCTIONS



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

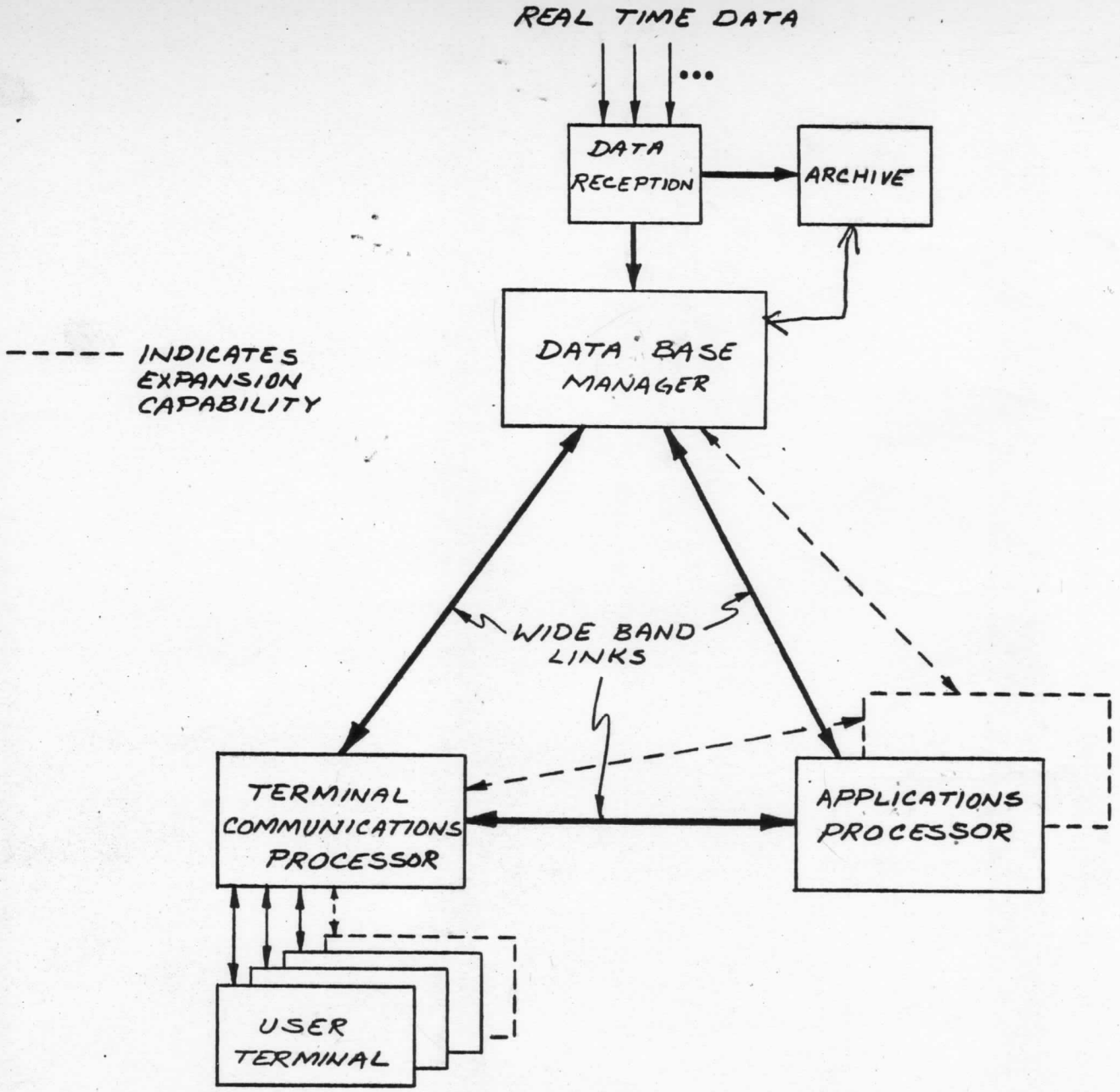
(2) MEET PROCESSING REQUIREMENTS

(3) PROVIDE FOR LINEAR EXPANSION TO MEET FUTURE REQUIREMENTS (MODULARITY)

(4) DISTRIBUTE WORK LOAD

(5) MINIMIZE INTER PROCESSOR COMMUNICATIONS

(6) PROVIDE FAILSOFT MECHANISMS



VAS PROCESSING SYSTEM ARCHITECTURE

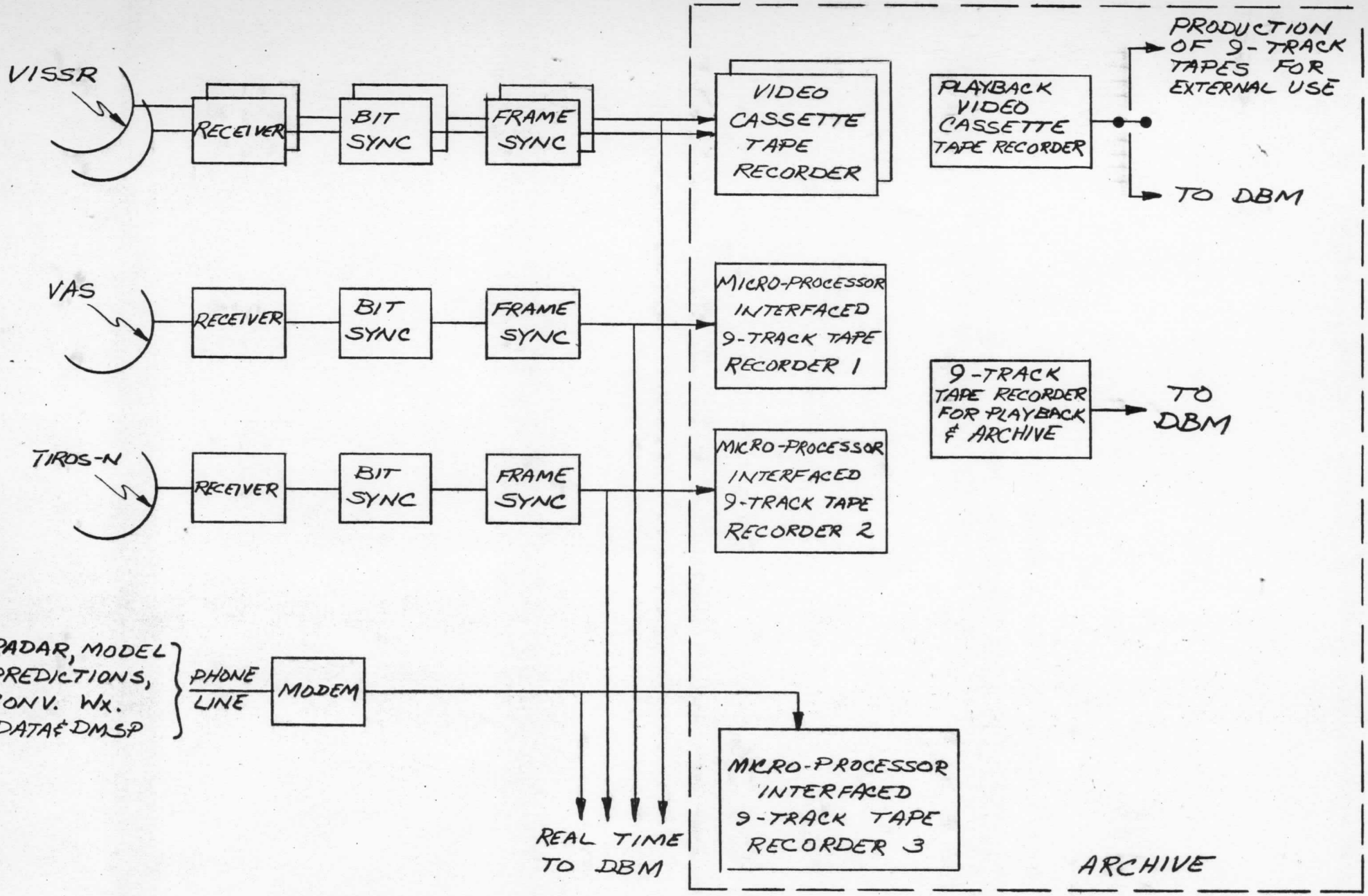
THE MAJOR FUNCTIONS OF THE ARCHIVE SYSTEM ARE TO

(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.



DATA RECEPTION AND ARCHIVE SUBSYSTEMS

THE MAJOR FUNCTIONS THE DATA BASE MANAGER WILL PERFORM ARE TO

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

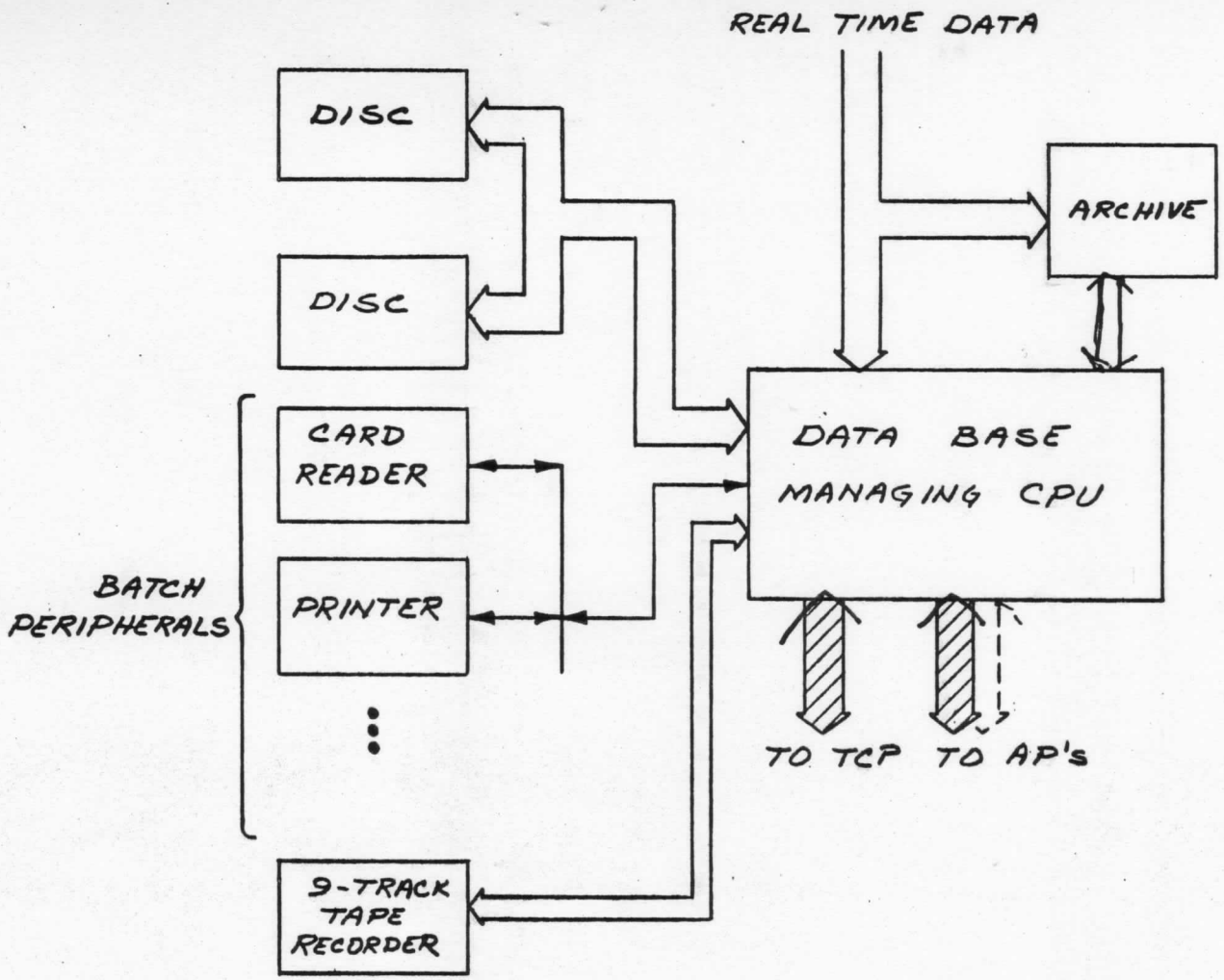
(2) ORGANIZE ALL RAW DATA INPUTS TO THE SYSTEM AND STORE ON-LINE;

(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; AND

(6) RECORD NON-SATELLITE RAW DATA FOR ARCHIVE.



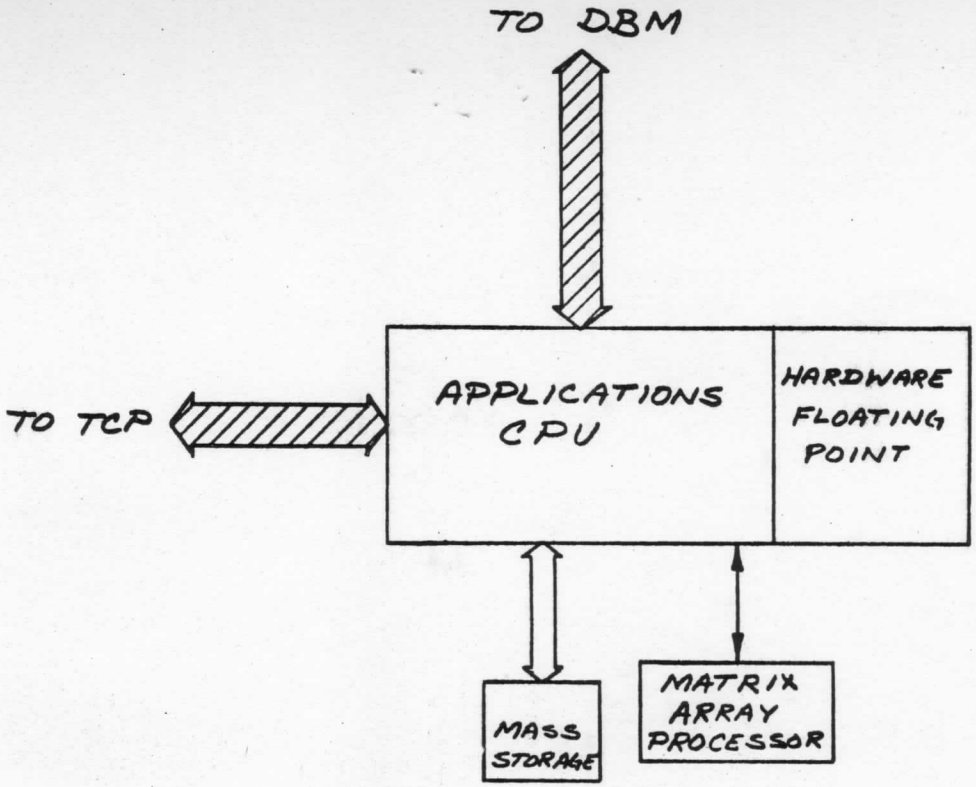
DATA BASE MANAGER

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.



APPLICATIONS PROCESSOR

TCP MAJOR FUNCTIONS

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

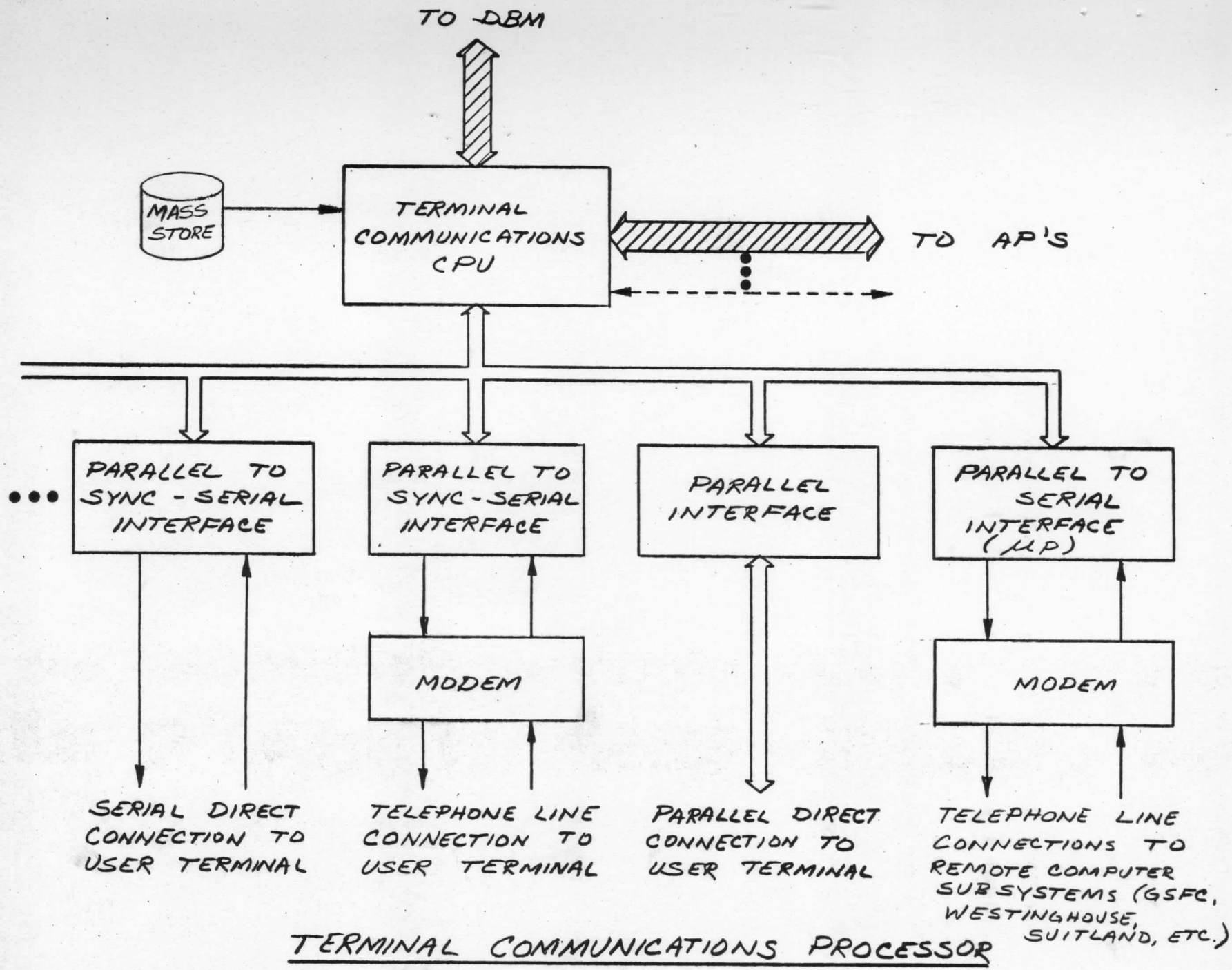
2) Route commands and data requests to and from other computer systems (GSFC, Westinghouse, Suitland)

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.

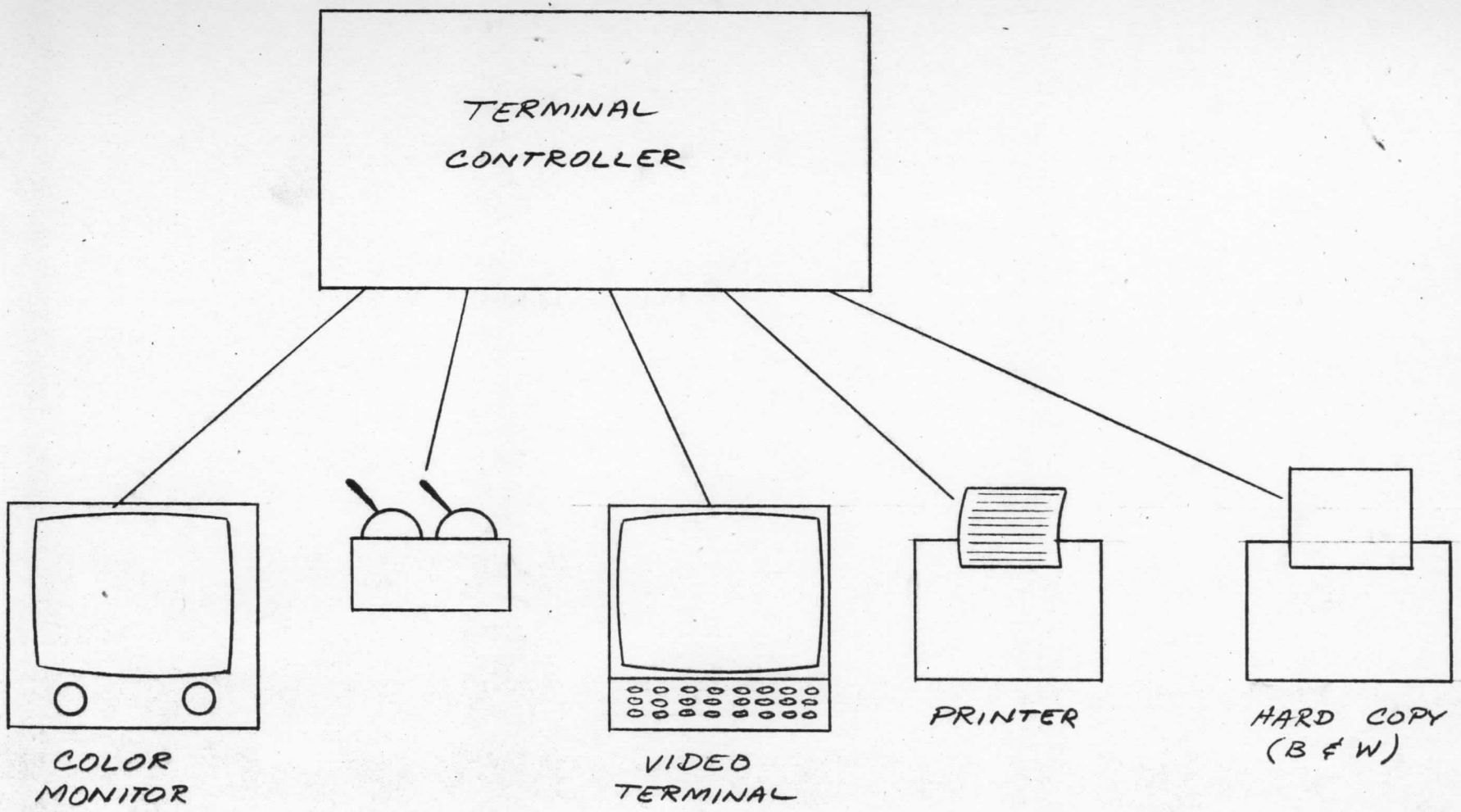


TERMINAL COMMUNICATIONS PROCESSOR

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.

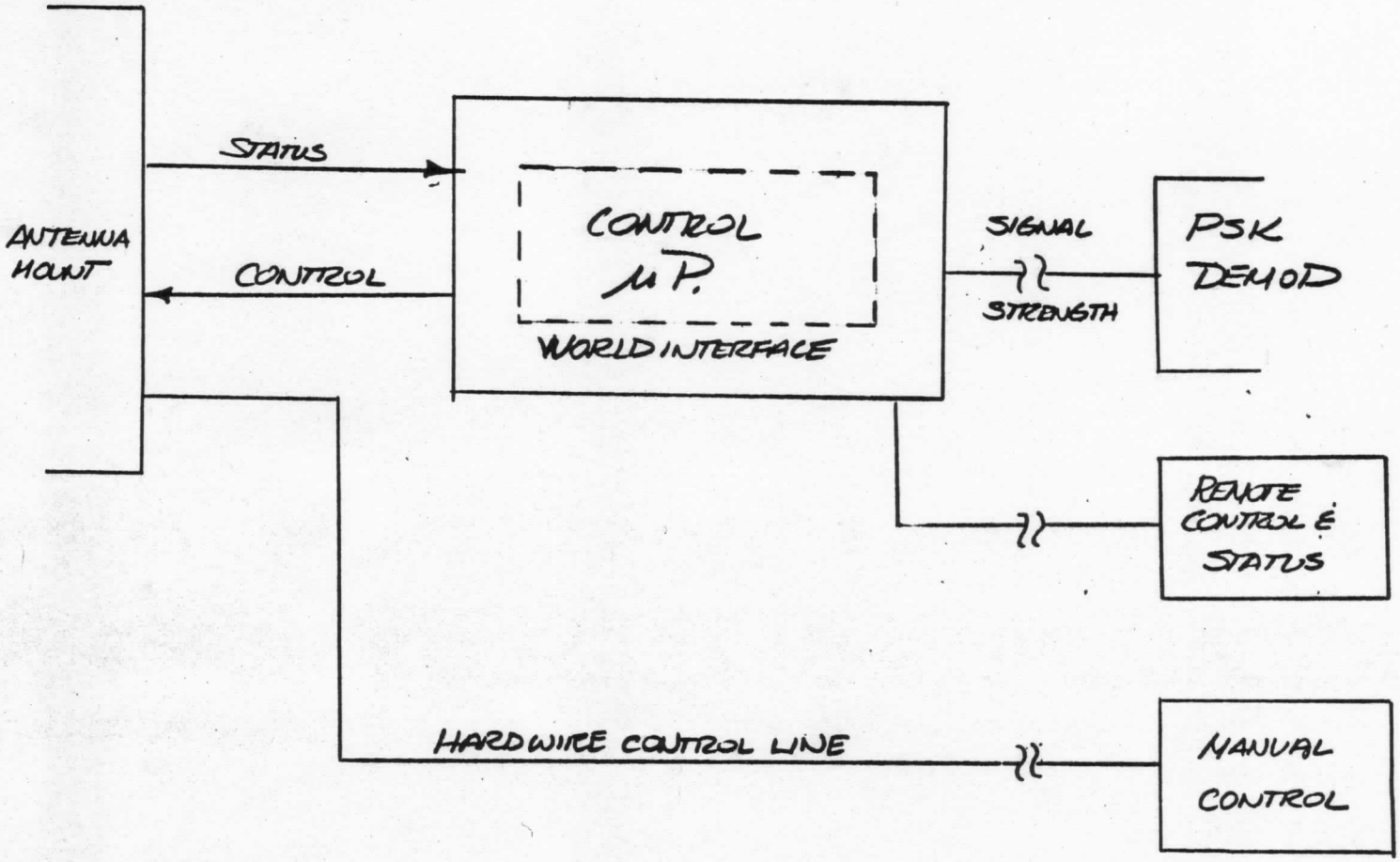


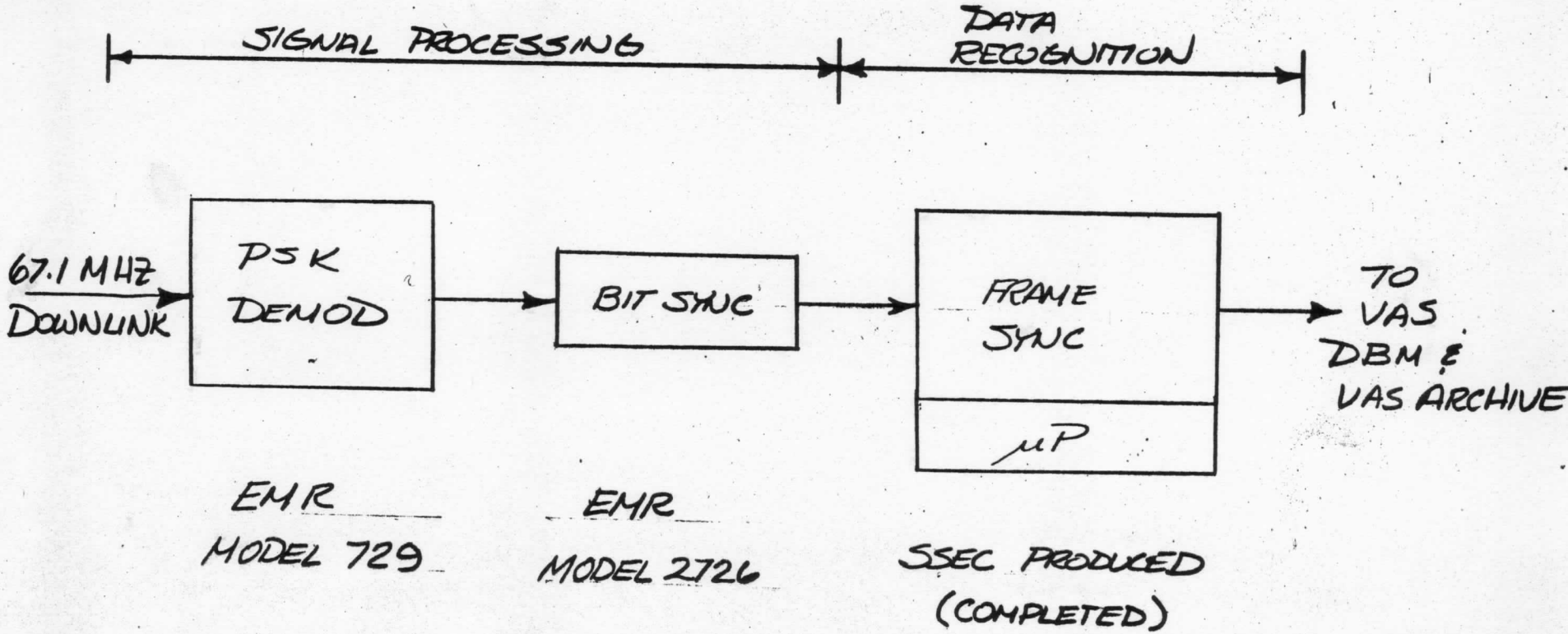
USER TERMINAL

III. DESIGN SUBSYSTEMS

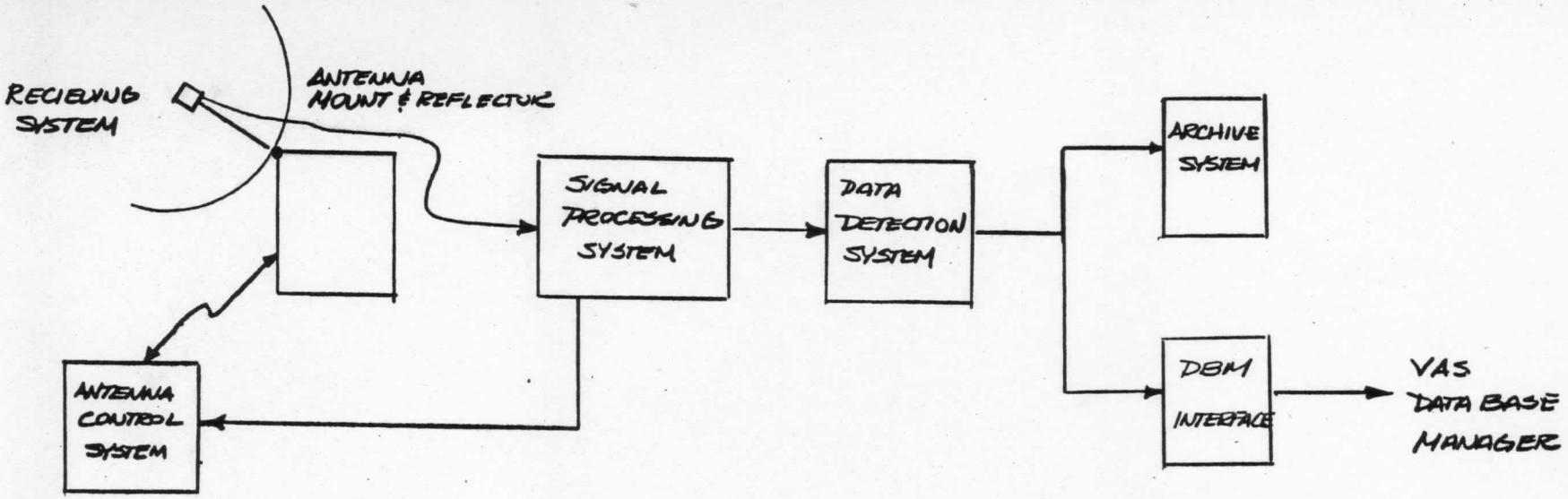
III.A. VAS ANTENNA

ANTENNA CONTROL SYSTEM




SIGNAL PROCESSING
DATA RECOGNITION
67.1 MHz DOWNLINK
PSK DEMOD
BIT SYNC
FRAME SYNC
μP
TO VAS DBM & VAS ARCHIVE
EMR MODEL 729
EMR MODEL 2726
SSEC PRODUCED (COMPLETED)

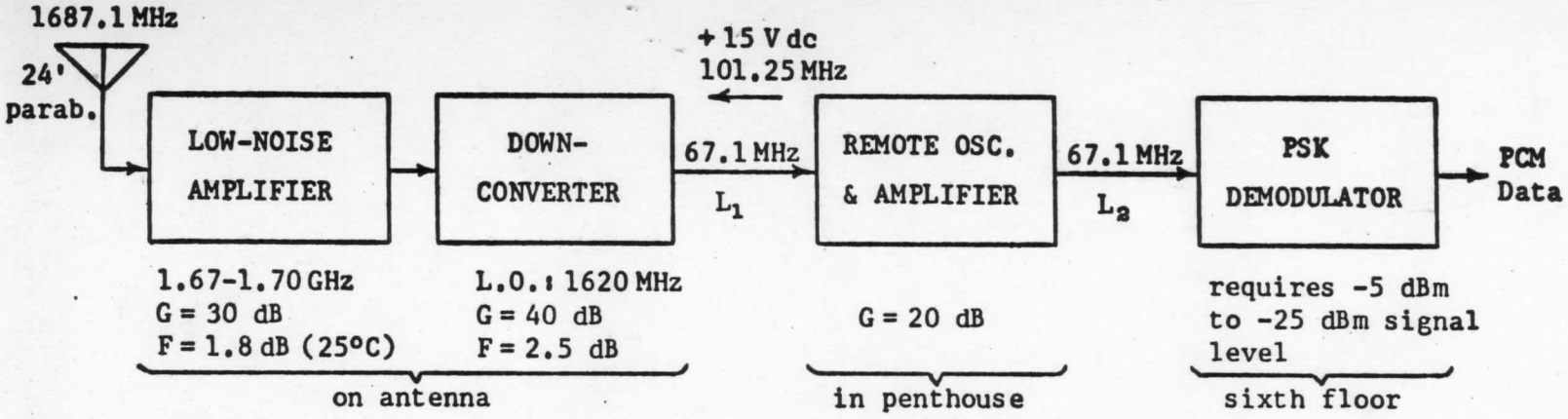
VAS ANTENNA SYSTEM



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



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)

L_1 (100' @ 67.1 MHz): 1.8 dB

L_2 (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

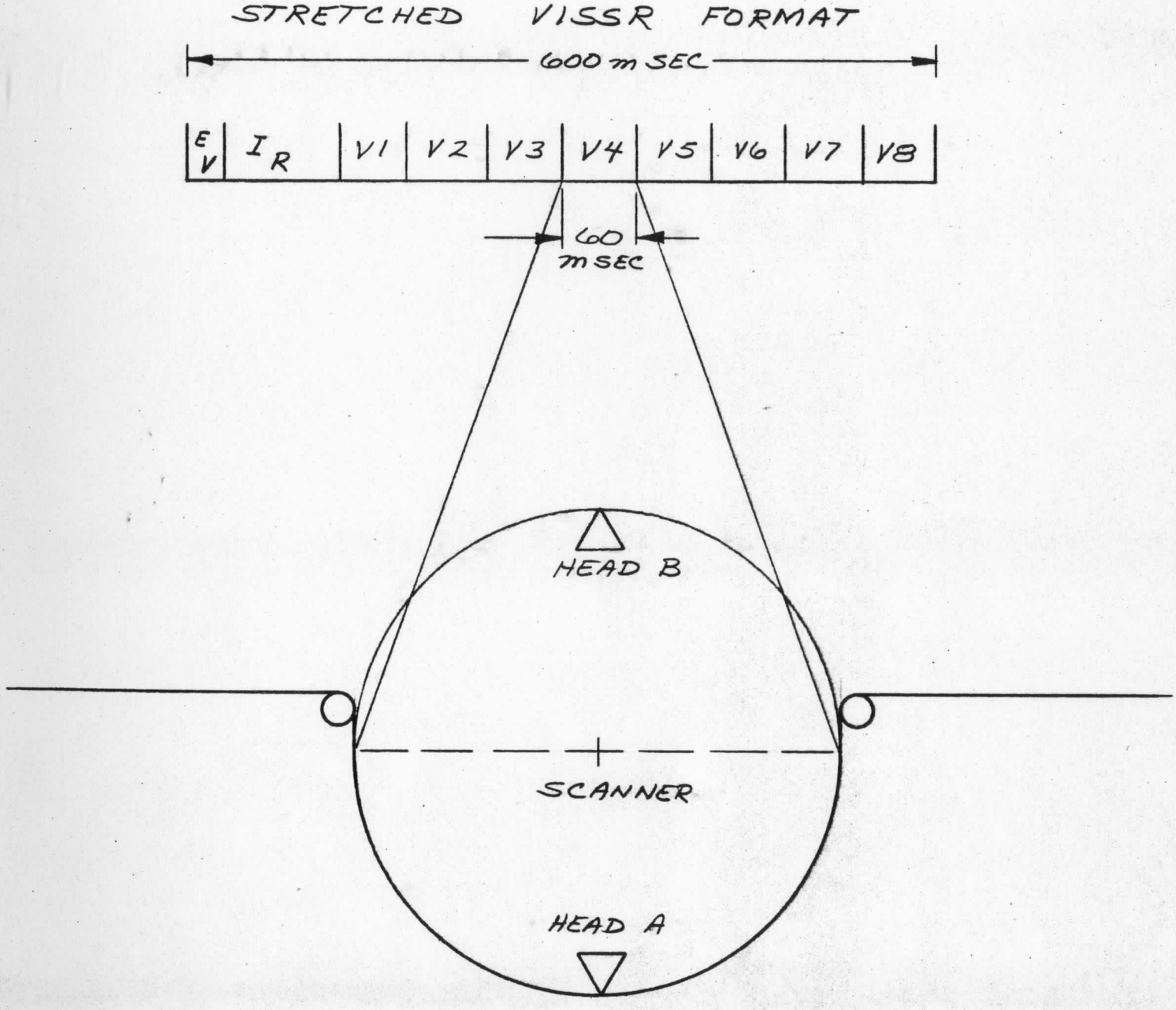
THE REQUIREMENTS OF THE VISSR ARCHIVE

(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.

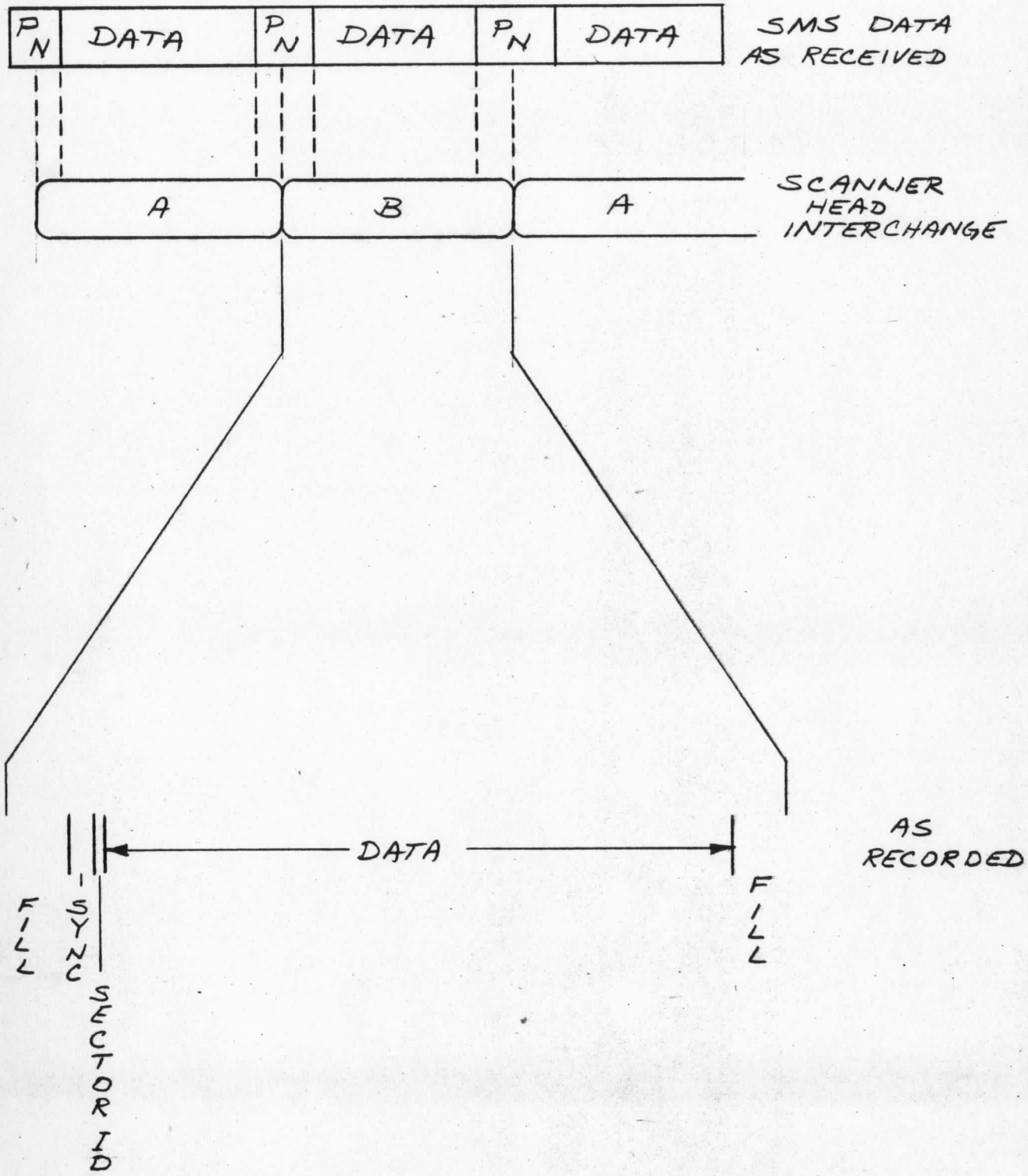
(2) IT MUST MAXIMIZE THE PACKING DENSITY TO MINIMIZE TAPE OPERATIONAL COSTS. THEREFORE THE CASSETTE IS RUN SYNCHRONOUSLY WITH THE SATELLITE.

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

BASIS FOR SYNCHRONISM



DATA FORMAT


P N
DATA
P N
DATA
P N
DATA
SMS DATA AS RECEIVED
A
B
A
SCANNER HEAD INTERCHANGE
DATA
AS RECORDED
FILL
SYNC
SECTOR ID
FILL

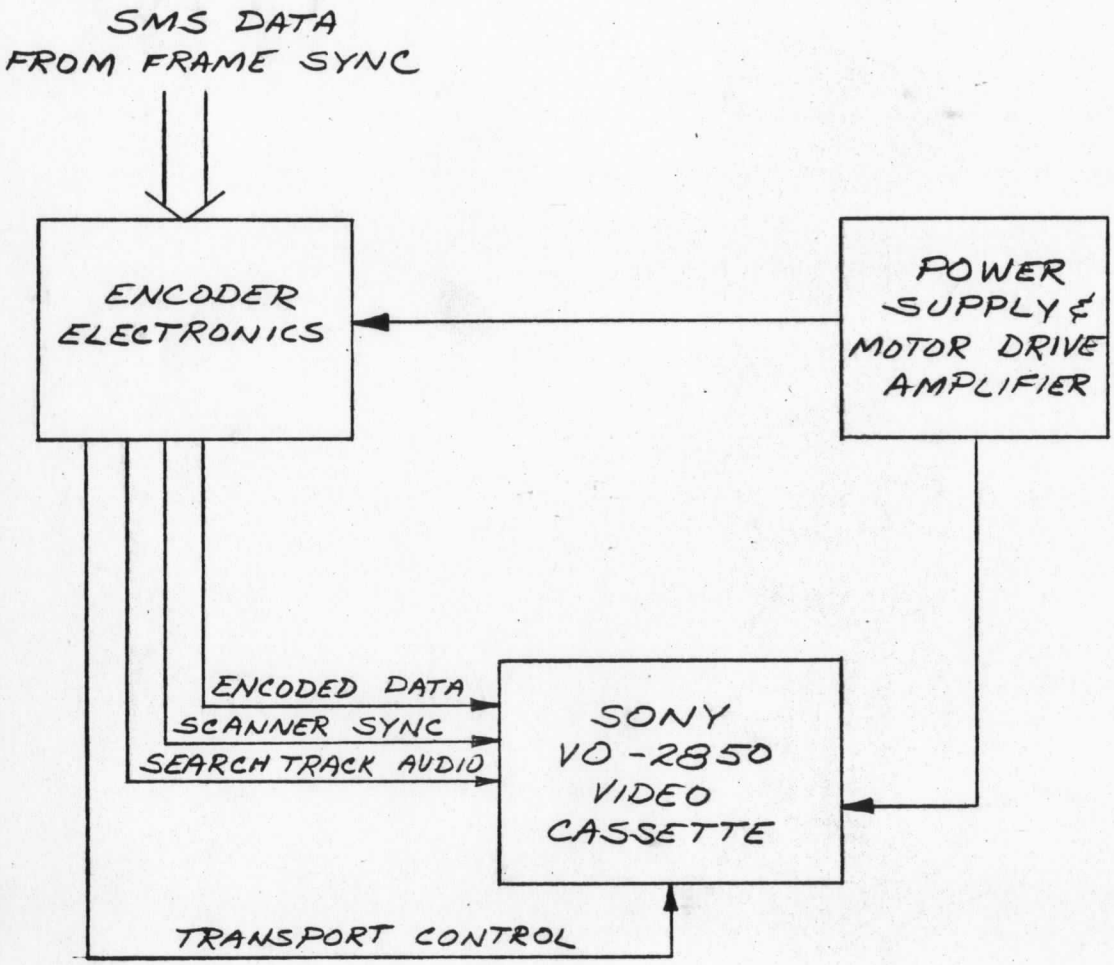
SEARCH TRACK

ACCESS PARAMETERS

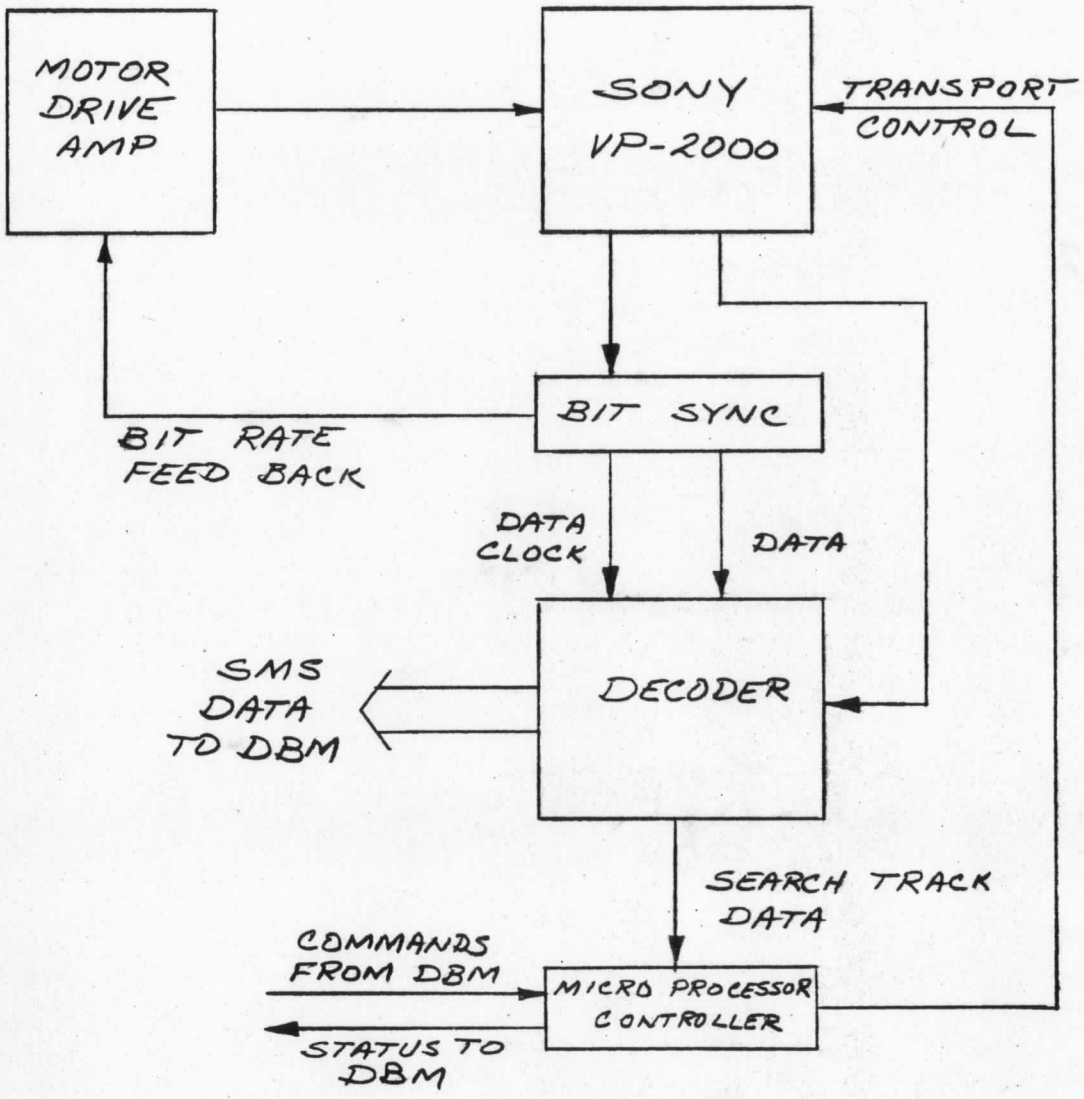
- SATELLITE IDENTIFIER
- SCAN COUNT
- YEAR
- SOLAR DAY
- HOUR
- MINUTES

RECORDED FORMAT

* DIGITAL ASYNCHRONOUS FORMAT
* AMPLITUDE MODULATED AUDIO TONE
* TONE IS A MULTIPLE OF THE DIGITAL DATA CLOCK TO ALLOW VARIABLE SPEED PLAYBACK

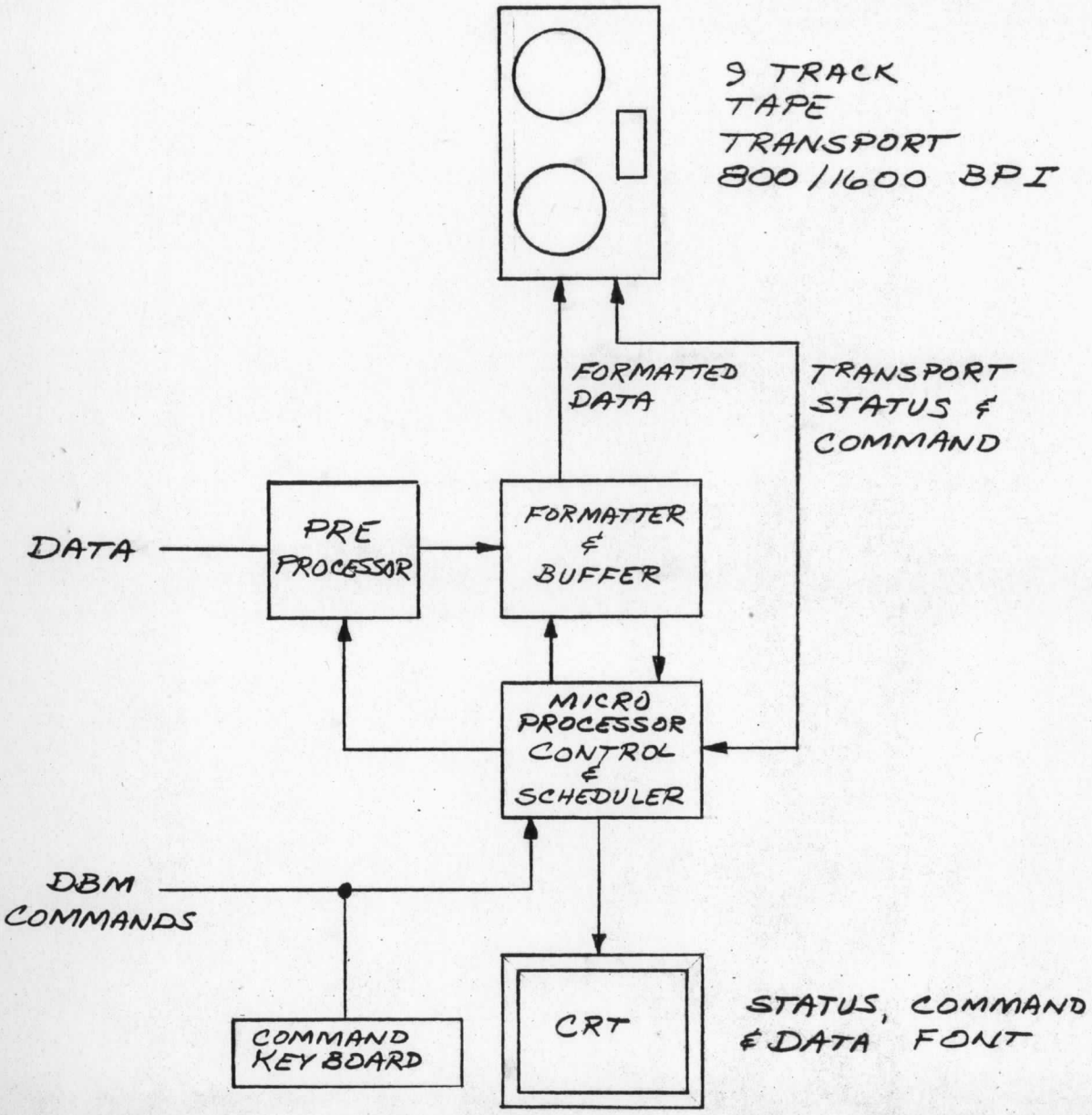


ARCHIVE RECORDER
HARDWARE CONFIGURATION



ARCHIVE PLAYER
HARDWARE CONFIGURATION

OFF LINE DATA INGEST SYSTEM
(VAS ARCHIVE)



III.C. VAS SYSTEM INTERFACES

VAS SYSTEM INTERFACES TO EXTERNAL DATA SOURCES

SOURCE	RECEIVER	STATUS
VAS	24 FT. DISH	NEAR COMPLETION
VISSR	24 FT. DISH	OPERATIONAL
VISSR	---	STILL IN PLANNING STAGES
TIROS-N	DUAL YAGI	PROTOTYPE BEING TESTED
DMSP	?	?
DIGITAL RADAR	TELEPHONE LINE VIA MODEM	STILL IN PLANNING STAGES
SURFACE DATA	WB604 LINE	OPERATIONAL
MODEL OUTPUTS	TELEPHONE LINE VIA MODEL (SUITLAND, NCAR)	STILL IN PLANNING STAGES

III.D. TIROS-N RECEIVING UNIT

FUNCTIONAL DESCRIPTION OF TIROS-N REAL-TIME DATA

	HIRS-2	MSU	APT
DATA VOL. (BYTES/SEC.)	360	40	4000
NUMBER OF CHANNELS	20	4	2
SPATIAL RESOLUTION	24 KM.	100 KM.	4 KM.
256-SEC SCAN PATTERN	40 LINES	10 LINES	4 FRAMES *
APPLICATION	T, W, CI	T	T_S, CI

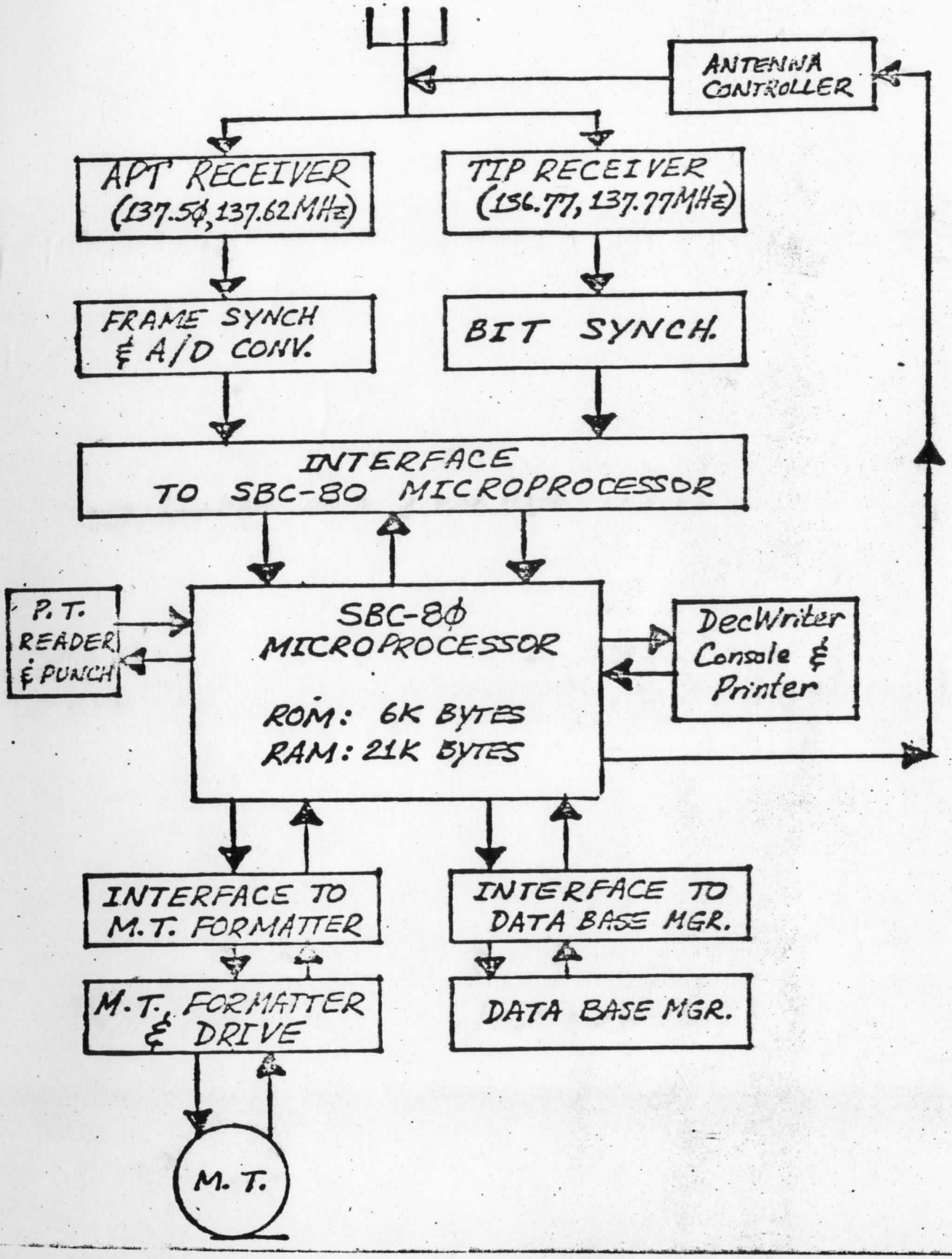
(HIRS-2 & MSU COME FROM TIP @ 1040 BYTES/SEC)

* APT FRAME = 128 LINES

TIROS-N REAL-TIME DATA PROCESSING TASKS AND CPU DUTY CYCLE

HIRS-2 & MSU	DUTY CYCE (%)
INPUT UNDER µP CONTROL	12
UNPACK, Q.C., CONVERT INTEGERS	24
(SUB TOTAL	36)
APT	
INPUT VIA DMA	1
(INPUT UNDER µP CONTROL)	(48)
OTHER TASKS	
ANTENNA CONTROL	8
SOFTWARE CLOCK	8
RAM REFRESH	6
OUTPUT VIA DMA	1
(SUB TOTAL	23)
TOTAL DUTY CYCLE	**60 %**

TIROS-N
Real-Time Data
Acquisition & Preprocessing System



III.E. VAS DATA BASE MANAGER

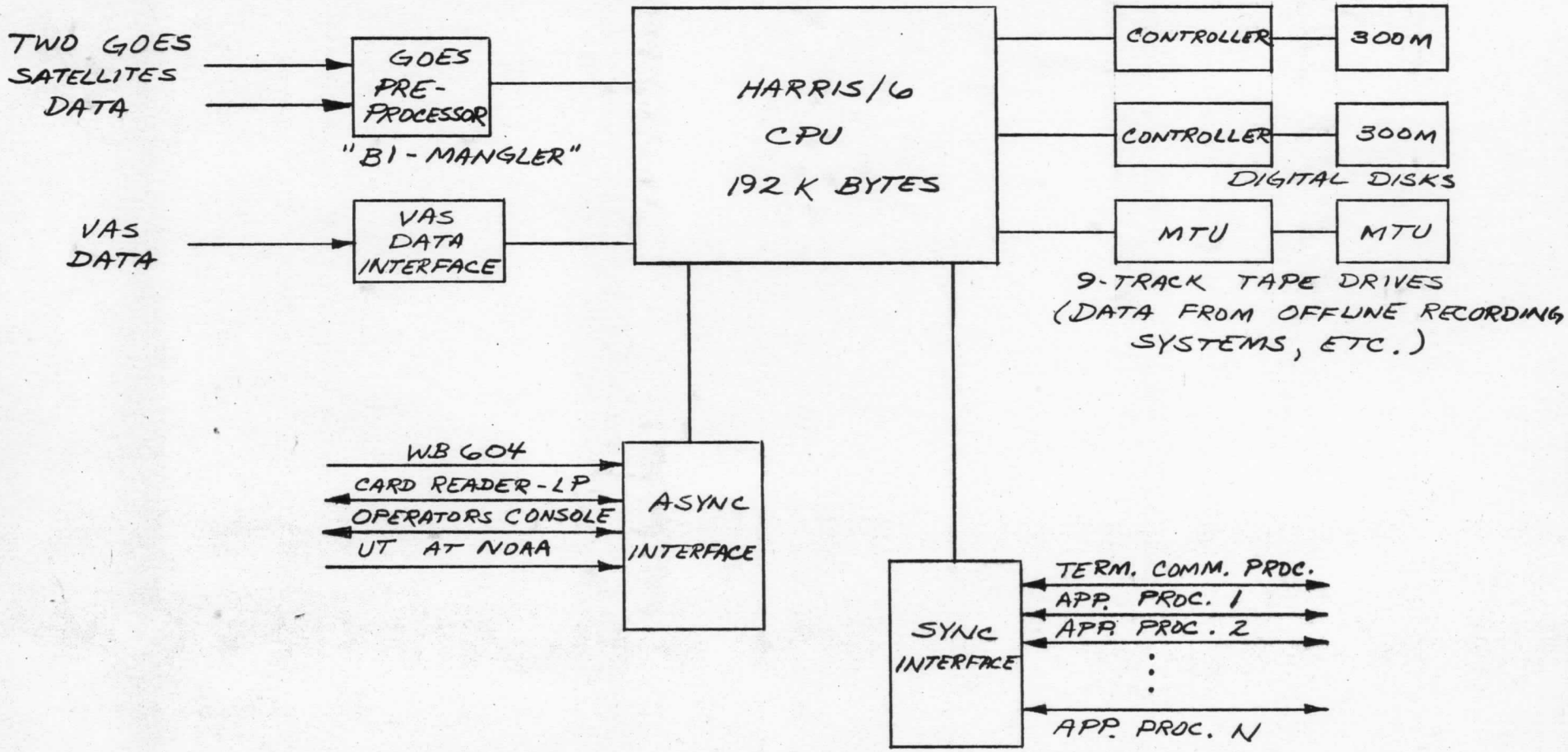
THE PERFORMANCE REQUIREMENTS OF THE VAS DATA BASE MANAGER (DBM)

(1) IT MUST BE ABLE TO INGEST DATA FROM TWO VISSRS 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.

DATA BASE MANAGER



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 SOUNDING DATA -

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

scan program/ resolution / Operation	Excluding VAS 4μ Channels 50 km	Excluding VAS 4μ Channels 100 km	Using All VAS Channels 50 km	Using All VAS Channels 100 km
Eigenvector** (1.3 sec/ Clear Column (100 FOV Radiance (pairs with Retrieval (12 bands)	28.7 min.	34.4 min.	18.0 min.	21.2 min.
Minimum* Information (.6 sec/ Inversion (12 band retrieval)	7.4 min.	1.8 min.	2.8 min.	.7 min.
Total	36 min.	36 min.	21 min.	22 min.

* 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.

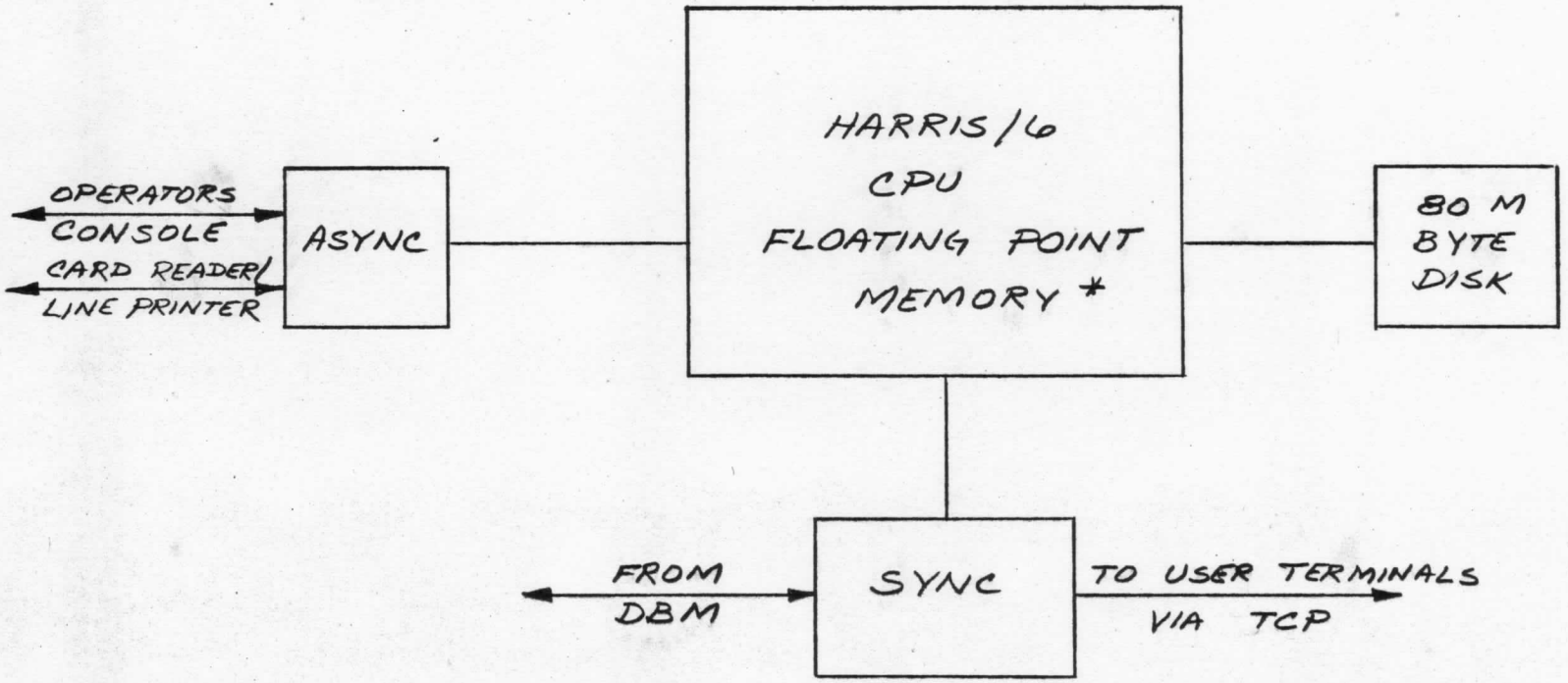
SUMMARY OF CPU REQUIREMENTS FOR

12 HOUR PERIOD

● DATA SOURCE	CPU TIME
VAS (29 MINUTES/HOUR ASSUMING 50 OR 100 KM SPATIAL RESOLUTION WITH 4μ CHANNELS USED HALF OF THE TIME)	348 MIN.
POLAR ORBITERS (4 OVERPASSES, 2 TIROS AND 2 DMSP, AT 10 MIN/OVERPASS)	40 MIN.
VISSR (WINDS)	SMALL
TOTAL	388 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



* 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 syncronous

      iii) serial asyncronous

      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

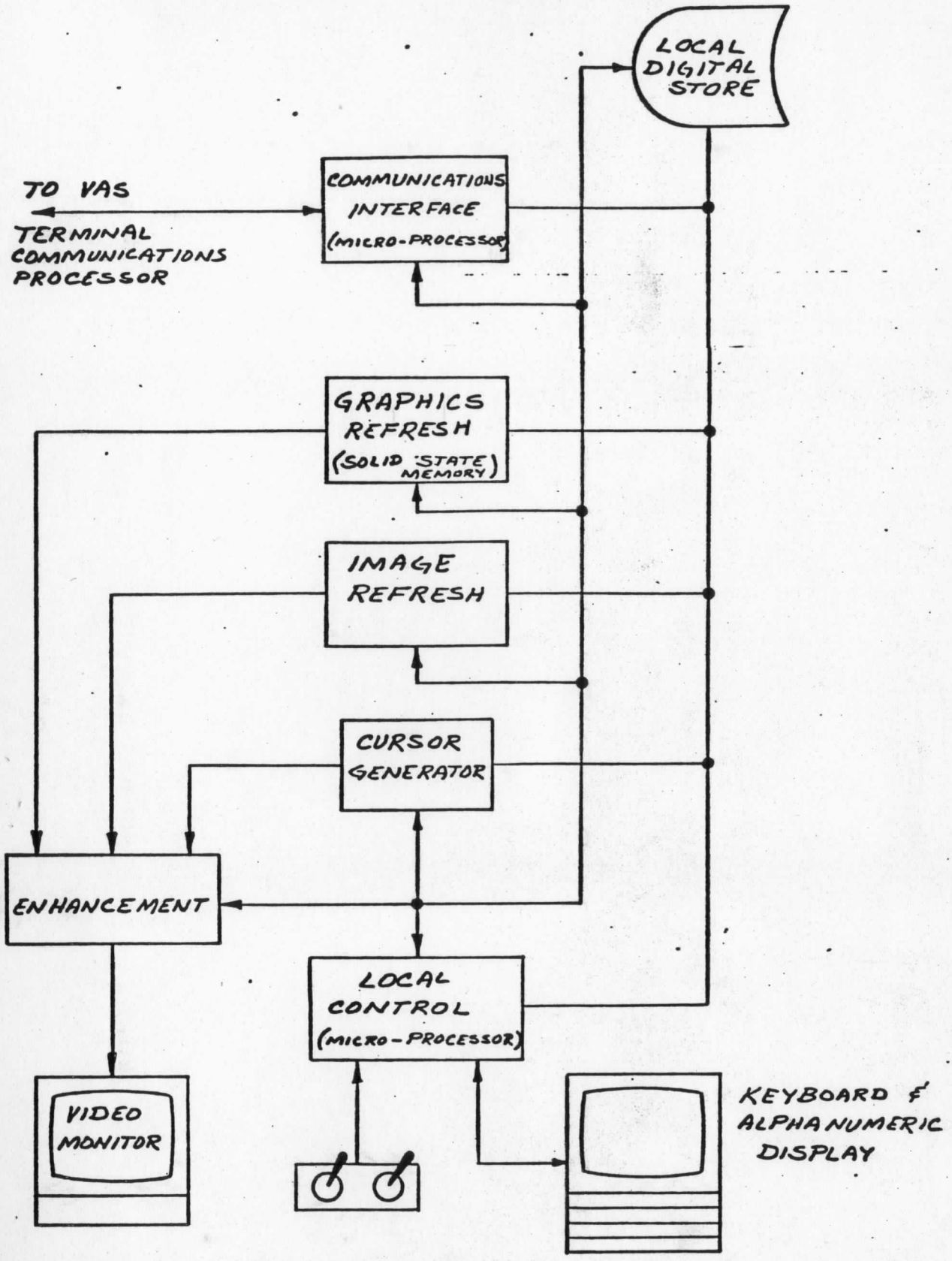
VAS USER TERMINAL

FEATURES

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

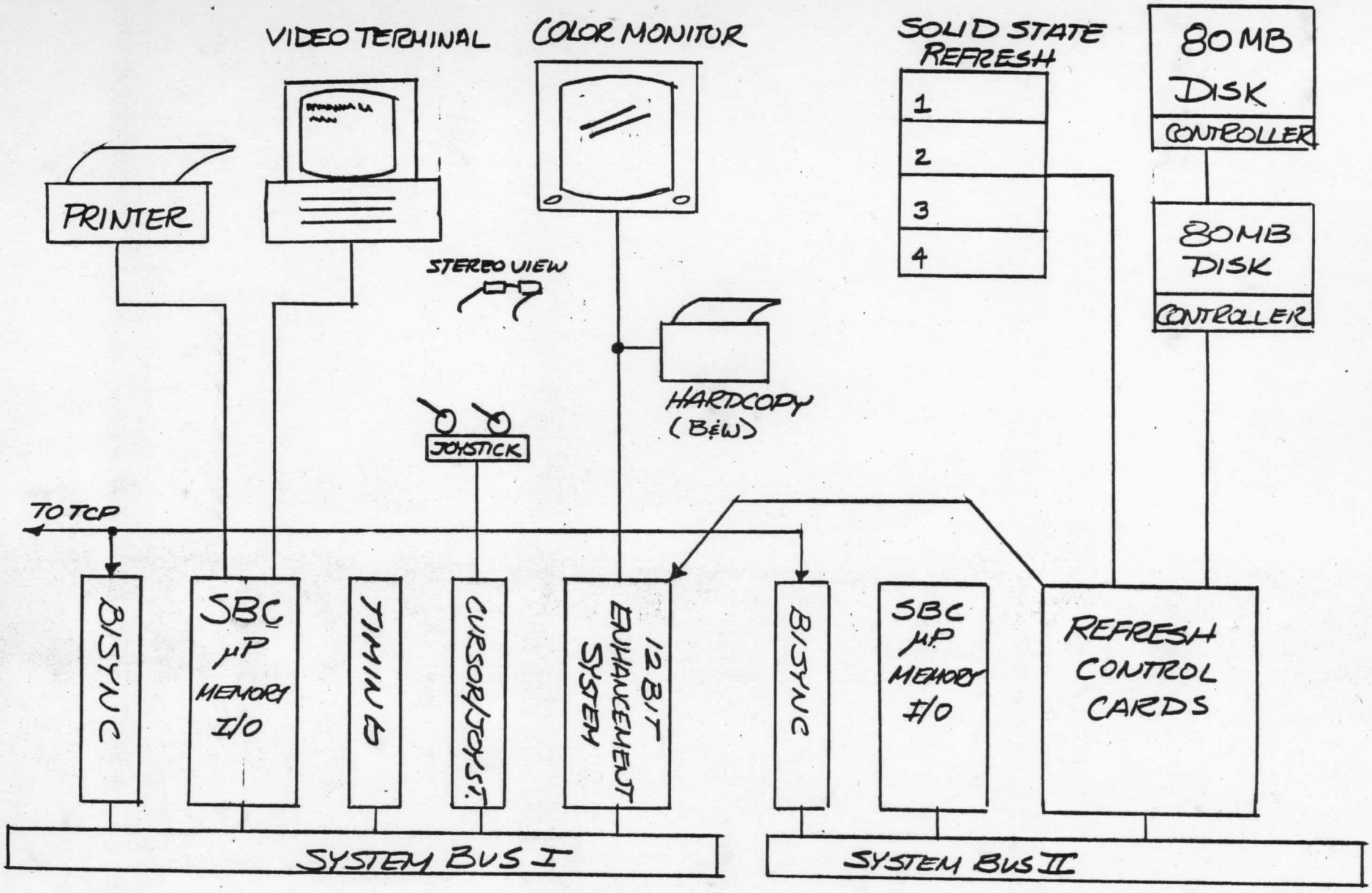
   SINGLE CHANNEL AT 10 FRAMES/SEC

   TWO CHANNEL (STEREO) AT 5 FRAMES/SEC
6. INCLUDES ALL MCIDAS TERMINAL CAPABILITIES



USER TERMINAL

VAS USER TERMINAL



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