JSC-14577

PRELIMINARY DESIGN SPECIFICATION

FOR THE

LANDSAT IMAGERY VERIFICATION & EXTRACTION SYSTEM (LIVES)

Prepared By:

Lockheed Electronics Company, Inc.

Systems and Services Division

Houston, Texas

Contract NAS 9-15200

For

EARTH OBSERVATIONS DIVISION

National Aeronautics and Space Administration

LYNDON B. JOHNSON SPACE CENTER

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ACRONYMS

LIVES	- LANDSAT IMAGERY VERIFICATION & EXTRACTION SYSTEM
LEC	- Lockheed Electronics Company
HDTRS	- High Density Tape Reformatting System
NASA/JSC	- National Aeronautics and Space Administration/Johnson Space Center
CCT	- Computer Compatible Tape
GHIT	- Goddard High Density Tape Inventory Tape
PC&S	- Process Control and Status
PDP	- A line of computers build by Digital Equipment Corporation
I-100	- A color graphic terminal attached to the Image Processor
RIMS	- Regional Information Management System
MSS	- Multispectral Scanner System
LACIE	- Large Area Crop Inventory Experiment
AI	- Area of Interest
WRS	- World Reference System
TBD	- To be determined
QIO	- An RSX operating system routine
DMS	- Data Management System

1. INTRODUCTION

1.1 PURPOSE AND SCOPE

This document presents a functional design for the Landsat Imagery Verification and Extraction System (LIVES) to be delivered in April 1978. This document is based upon currently defined functional requirements.

This document defines the current software design concept for LIVES. Included is a definition of the major modules of the system and a description of how they are to be accomplished. Section 4 discusses system operation.

1.2 SYSTEM OVERVIEW

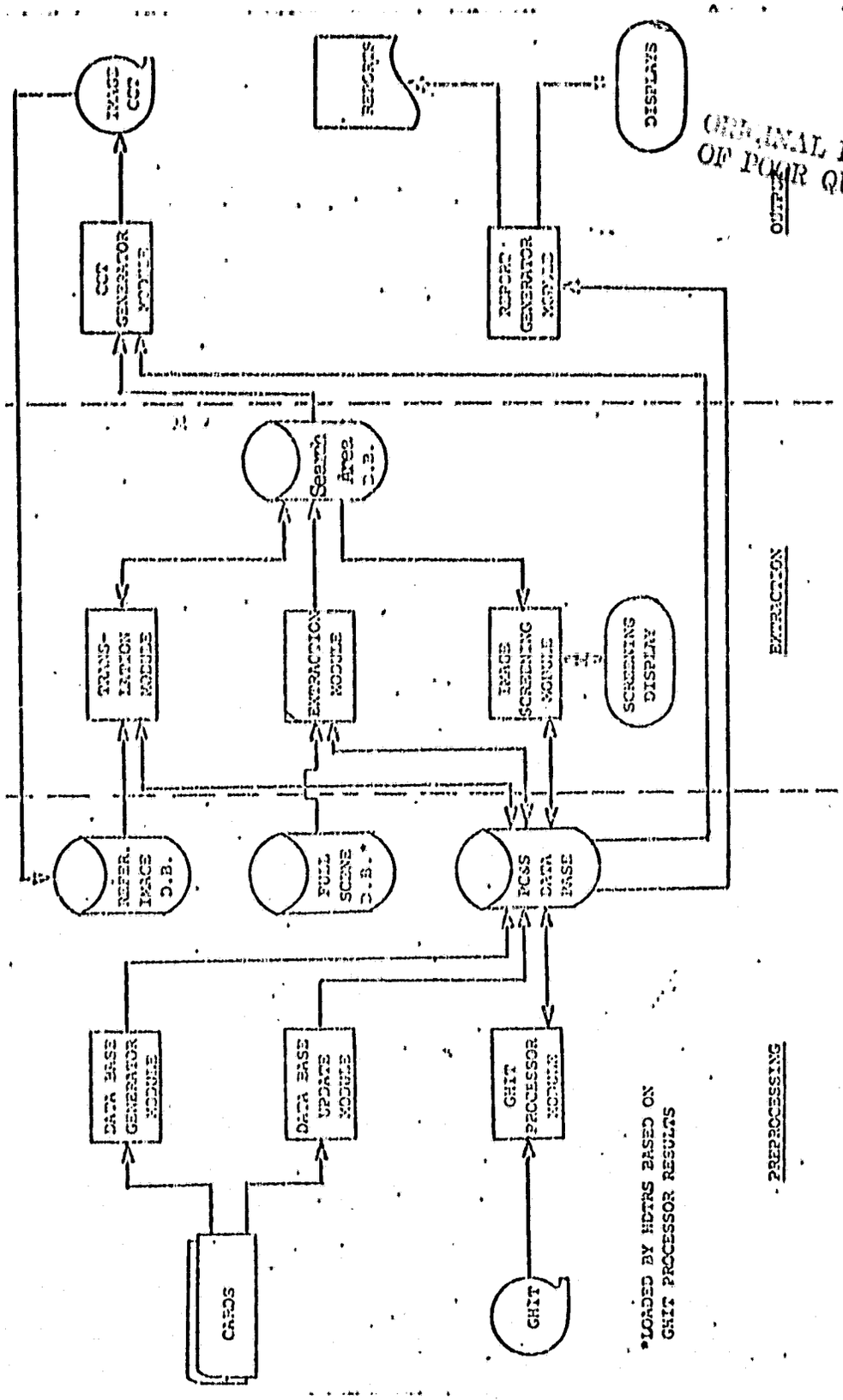
LIVES and the HDT Reformatting System (HDTRS) comprise the HDT processing system to be implemented into the DTL in building 17, NASA/JSC. This system reads high density Landsat tapes and produces computer compatible tapes (CCT's).

Figure 1-1 illustrates the LIVES software organization.

Input to LIVES is image data which has been placed on disk by the HDTRS. Other inputs include area of interest descriptions and the Goddard HDT Inventory Tape (GHIT) which defines what information is on a set of HDT tapes.

The principal output is computer compatible tapes (CCT's) which contain imagery for areas of interest. Other outputs include operations and management reports concerning system utilization and processing.

Figure 1-1. LIVES Software Organization



LIVES processing and status reporting is accomplished utilizing data from the Process Control and Status Data Base (PC&S). This data base defines the various areas of interest for which Landsat data is needed by the users. It also contains information required for computations in the various system processes, other control information, and status information.

The principal files of the LIVES system are:

- Full Scene data base produced by the HDTRS.
- Search Area data base, which contains image data needed to process data for each area of interest.
- Translation Control Image data base, which contains reference images to support the translation function.
- Area of Interest data base.

Area of interest descriptions must be defined and constructed before an area of interest can be extracted. A generalized data management system, RIMS, will be used for generating and updating area of interest descriptions in the PC&S data base.

Daily processing is initiated by executing the GHIT processor which compares the GHIT tape and data order information to determine which HDT(s) require processing. The GHIT processor also updates the PC&S data base using information from the GHIT. This updated information is used in other system processes.

After the GHIT processor establishes which HDT's must be processed, the HDTRS is executed and performs its primary task of reading Full Scene data from the HDT's to disk. Concurrently, with the execution of this program on the PDP 11/20, the Extraction Processor is executed on the PDP 11/45. By extracting pertinent data from the full scenes the Extraction Processor builds the Search Area data base which includes all data for

areas of interest. A search area includes all data within the area of interest plus additional data to allow for translation. It then moves this search area to another disk thereby freeing the full scene disk so that the reformatting system may continue to read additional full scene HDT data.

After extraction has been accomplished, the screening and translation function may optionally be performed on the Image Processor utilizing the I-100 terminal. Screening is requried for images based on a user supplied registration threshold quality code. Screening options include the ability to (1) reject the data from further processing; (2) accept the data for CCT as is, and (3) perform X-Y translation. Translation is accomplished by screening both the image and a control image. Points which corresponds on each image are identified by positioning the I-100 terminal cursor. The current image is then translated to the control image based on the difference in the marked positions of both images.

The CCT Write Processor provides the capability to write area of interest data to tape or disk. The program provides the capability to produce CCT's by user I.D. This processor performs computations for translation and certain other computations which are ultimately provided as parts of the image header information.

All reports in the system are accomplished using RIMS. The RIMS generalized report generation capability provides for rapid response in meeting new or changing report requirements.

1.3 DEFINITIONS

The MSS image data represents a rectangular array which is 3548 pixels by 2983 scan lines.

Common conventions in this document:

Scene - a delineated, terrestrial site; normally 185 km (crosstrack) by 170 km (in-track); a scene's radiation is spectrally separated into one, four or five bands depending on Landsat configuration at the time of data acquisition.

Search Area - a portion of a scene which contains an area of interest plus a border large enough to assure the capability to search for and find the area of interest when registration confidence is low.

Area of Interest (AI) - a portion of a scene which has been specified by the data user. The area of interest size is a variable input by the user. In LACIE this was called a sample segment and the size was restricted to 196 pixels by 117 lines.

2. APPLICABLE DOCUMENTS

The following documents have been considered and used in formulating the functional design of the LIVES system.

Reference 1 - IPF-ICD-003 - Interface Control Document between the Imagery Processing Facility and EDC Digital Image Processing System for Landsat Fully Processed Multispectral Scanner High Density Tape, GSFC, February 25, 1977.

Reference 2 - IPF-ICD-207 - Interface Control Document Between the Image Processing Facility and EDC Digital Image Processing System for Landsat Fully Processed Return Beam Vidicon High Density Tape.

Reference 3 - Landsat HDT Reformatting System Interface Control Document, EOD/JSC prepared by Ford Aerospace, August 1, 1978.

Reference 4 - Functional Requirements Document for the Landsat Imagery Verification and Extraction System, EOD/JSC prepared by LEC, August 1978.

Reference 5 - Goddard HDT Inventory Tape (GHIT) Interface Control Document, GSFC, February 28, 1978.

Reference 6 - LACIE-C00701 "Rev. A"/JSC 11670 - GSFC/JSC Interface Control Document for the LACIE, January 1977.

3. FUNCTIONAL DESCRIPTIONS

3.1 HARDWARE DESCRIPTION

Figure 3-1 dipicts the HDT system hardware. It is composed of three general purpose computers, (1) PDP 11/20, (2) Support Processor (PDP 11/45), and (3) Image Processor (PDP 11/45). The HDT Reformatting System operates principally in the PDP 11/20 using the Serial Computer Interface (SCI) to control the reading of the HDT. It places HDT data on disk accessable to the Support Processor.

LIVES will reside on the Support Processor and the Image Processor. The extract function will be on the Support Processor in order to access HDT data placed on disk by the Reformatting System. The display and translation functions will be on the Image Processor because they both use the Image-100 terminal. The data management and tape write functions are scheduled to be performed on the Support Processor but could be performed on the Image Processor.

3.2 SOFTWARE DESCRIPTION

The following paragraphs describe functionally the specific software components of the LIVES capability and provides a basic understanding of the manner in which the components operate.

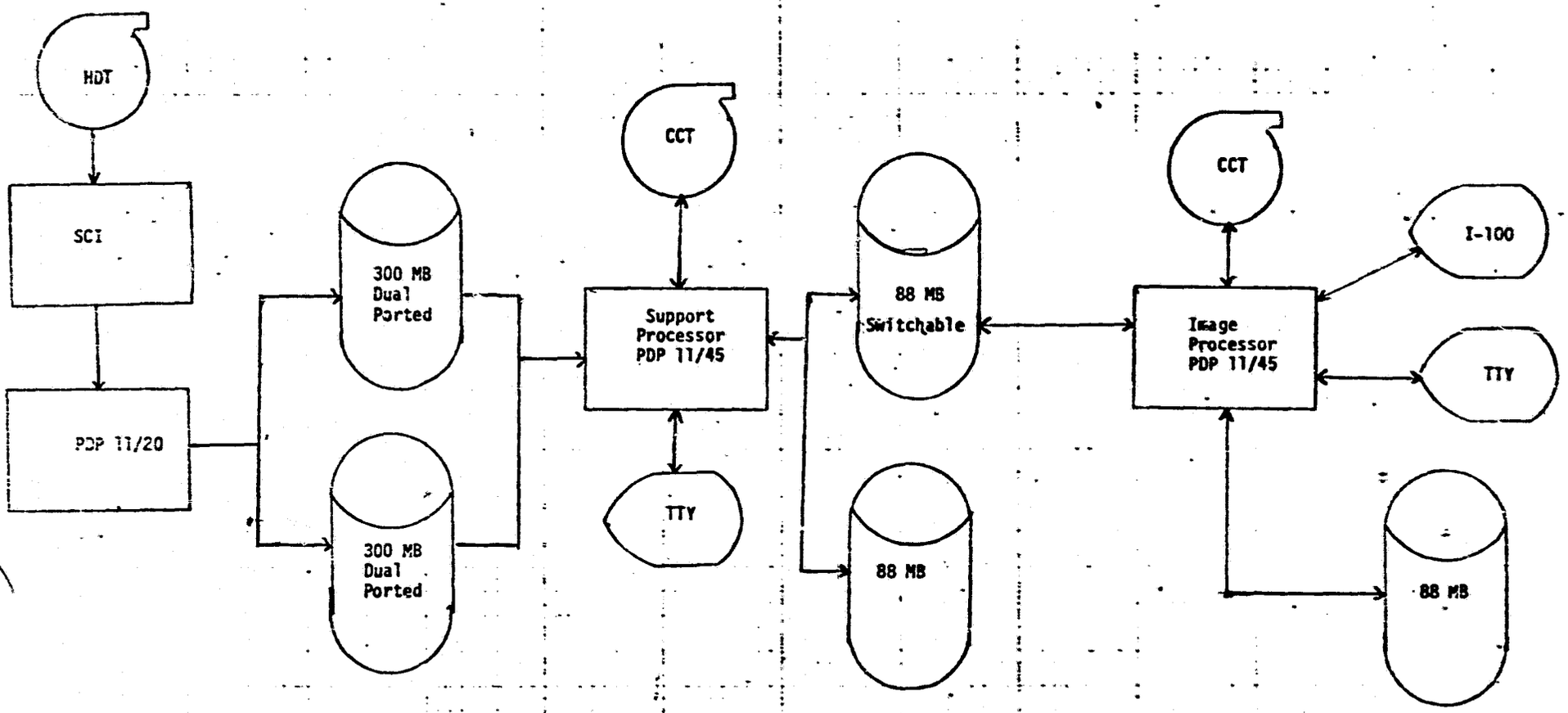


Figure 3-1 HDT Processing System Hardware

3.2.1 GHIT PROCESSOR

This processor identifies the data to be processed from a set of HDT tapes based on information contained on the GHIT tape and in the PC&S data base. The GHIT tape identifies the data scenes on the HDT tapes and the PC&S data base describes the areas of interest required by the user.

3.2.1.1 Inputs

- o GHIT tape
- o PC&S data base

3.2.1.2 Outputs

- o PC&S data base
  - --scene description
  - --acquisition descriptions
- o PDP 11/20 operator commands

3.2.1.3 Description

The program reads records from the GHIT tape describing scenes (GHIT tape header, HDT directory, HDT header, HDT annotation, and HDT trailer records). A description of each scene is added to the PC&S data base. The scenes World Reference System (WRS) coordinates, row and path, are compared with those of the primary and secondary scenes of all areas of interest in the PC&S data base. Those matching area of interest which need an aquisition are updated to reflect that they are on the HDT. Areas of interest which need acquisitions are those whose date of acquisition falls within the acquisition start and stop dates. Upon completion of processing of all scenes on the GHIT, a report is produced which identifies the HDT's to be processed and the sequence in which they are to be processed.

3.2.1.4 Flow Charts

- o See Figure 3-2.

GHIT PROCESSOR FLOW

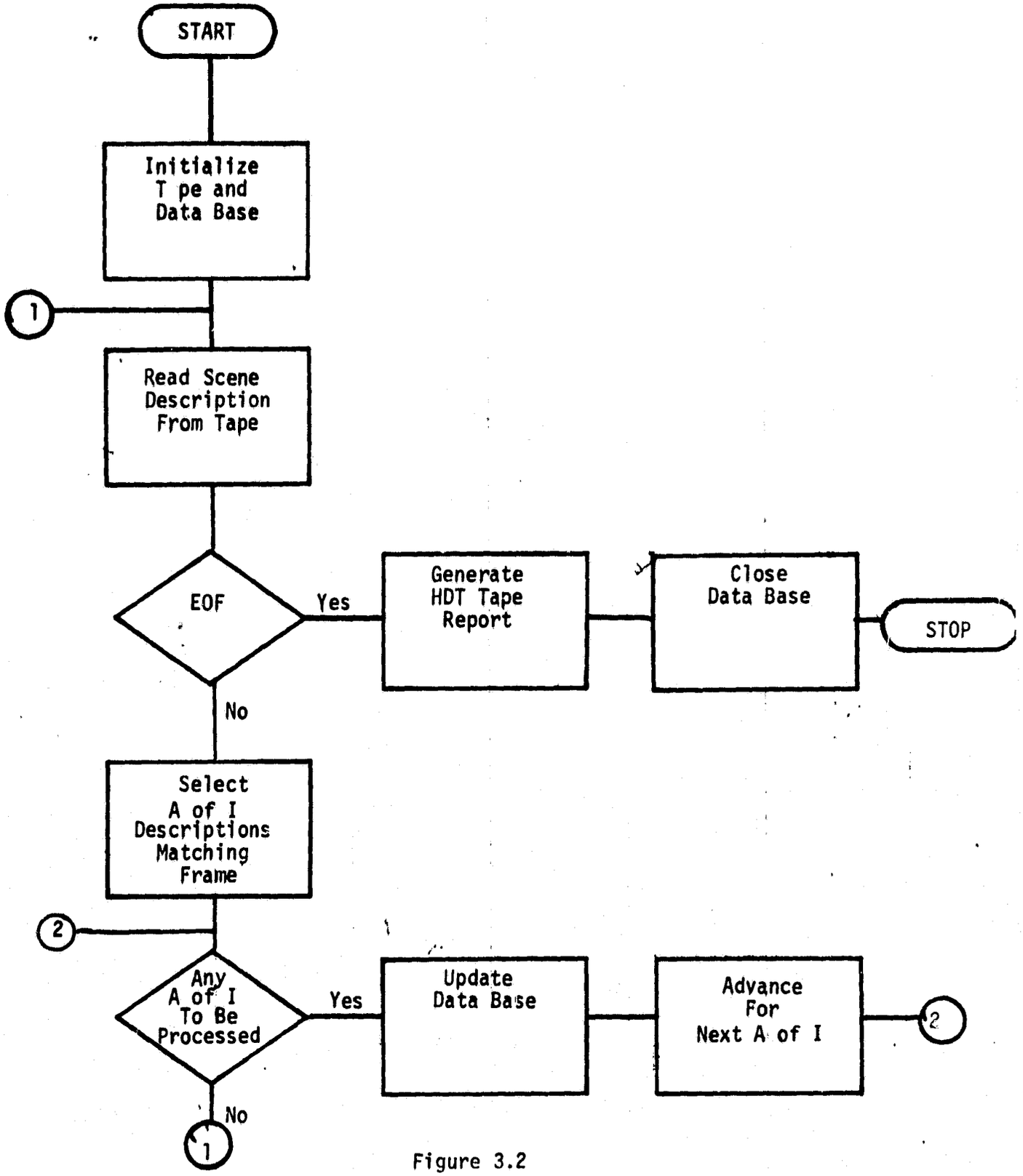


Figure 3.2

3.2.2 EXTRACTION PROCESSOR

The extraction processor retrieves search areas from the full scene data base and places them on the search area data base. Automatic cloud detection and bias and gain computations are performed during this process. The extraction is controlled by the area of interest coordinate and the scene quality codes. For registration quality codes above the user supplied threshold, the area of interest itself is extracted. The area of interest plus a border of additional data is extracted for quality code equal to or below user supplied threshold to allow for translation.

3.2.2.1 Inputs

- o System Parameter File
  - Full Frame Size
  - Default for Area of Interest size
  - Cloud Detection Threshold value
  - Percent value for excessive cloud cover
  - Number of pixel(s) to add for search area
  - Number of line(s) to add for search area
- o Full scene data base
- o PC&S data base
- o Disk Status Flag

3.2.3.2 Outputs

- o Search area data base (see paragraph 3.2.10)
- o PC&S data base
- o Disk Status Flag

3.2.2.3 Description

System parameters such as full frame size, default value for areas of interest, threshold value for cloud detection, and percent value exceeding threshold value required for rejecting

areas of interest are input from a disk file. Search areas to be processed are selected from the PC&S data base. They are ordered for processing using the same criteria which HDT tapes are ordered for processing.

Parametric data is read from the PC&S data base for each area of interest. The search area coordinates and size are computed based on the area of interest and quality code.

Particular scenes on the full frame data base and area of interest on the search area data base are on seperate files. File names are generated as a function of scene I.D. and Area of Interest I.D. and assigned. If a file cannot be assigned for the full frame data base, it is assumed to be on the next disk. The disk status flag on the current disk is set to the PDP 11/45 processing complete status. The status flag on the other disk is then checked until the PDP 11/20 has set it to indicate the disk is ready for the PDP 11/45 to use.

Pixel data for individual lines from each band of the search area are retrieved from the full frame data base then stored in the search area data base. A count of pixels exceeding the cloud detection values is maintained. A histogram of the count of each of the possible radiance values is maintained for computing bias and gains.

At completion of the transfer of a search area to the search area data base, bias and gains are computed from TBD equations.

The PC&S data base is then updated to reflect the search area that has been generated for the area of interest.

RIMS will be used to select areas of interest for processing, retrieving data, and updating the PC&S data base. QIO will be

used to retrieve data from the full frame data base and the currently existing fast video package will be used to store data in the search area data base.

3.2.2.4 Flow Charts

o See Figure 3-3.

EXTRACT/SELECT PROCESSOR FLOW

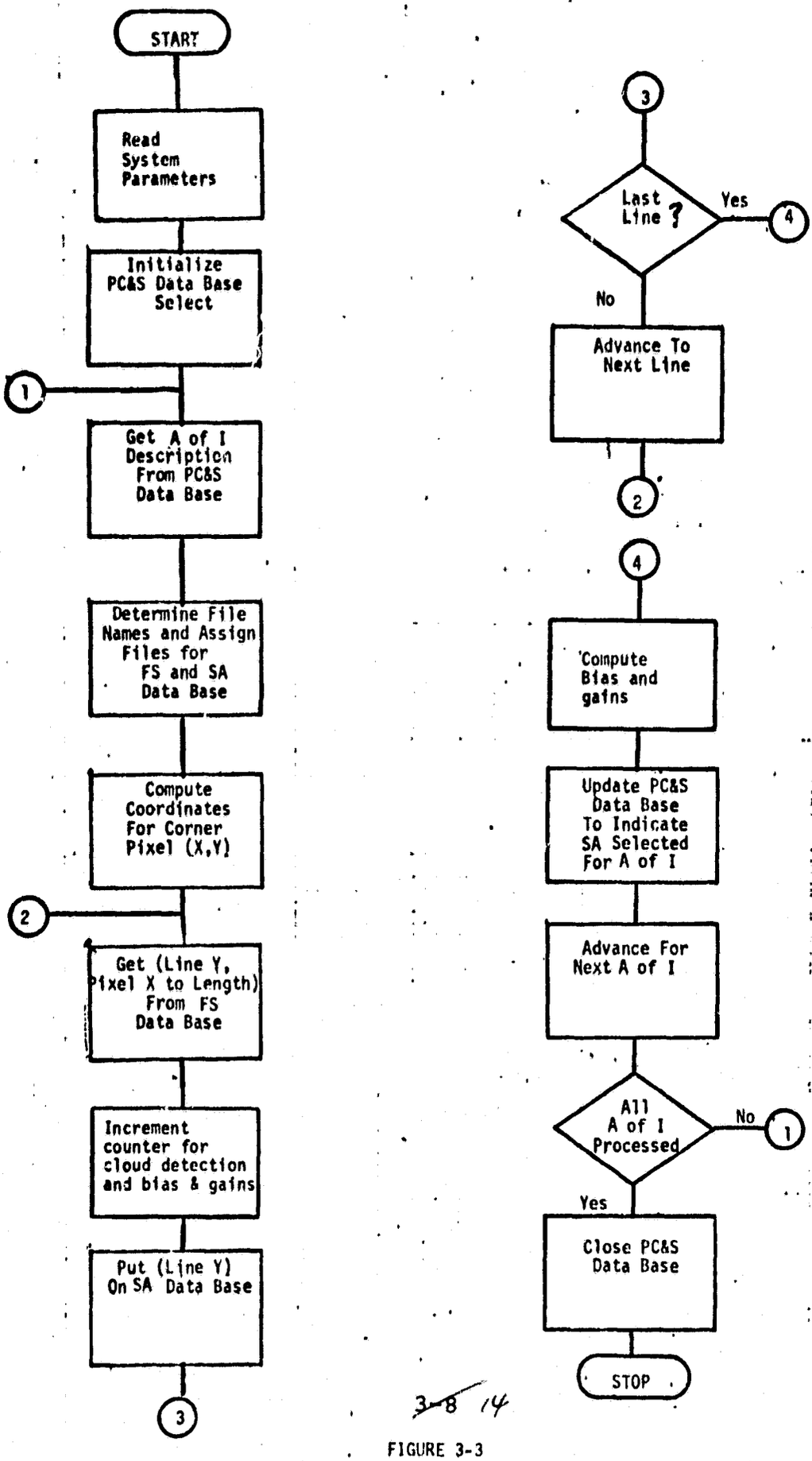


FIGURE 3-3

3.2.3 Screening/Translation Processor

The screening/translation processor provides the capability to manually view an area of interest and allows the analyst to (1) reject the image, (2) accept the image as is, or (3) specify a manually controlled coordinate translation. When in the translation mode a reference image will be displayed on the I-100 CRT on one channel. The area of interest will be displayed on another channel in the same scale. By use of the I-100 channel-select capability, an analyst can then specify the coordinate translation. The translation is based on positioning the cursor to a point on the reference image and the corresponding point on the area of interest image for two separate points.

3.2.3.1 Inputs

- o Reference image data base
- o Search area data base
- o PC&S data base
- o Cursor position of reference point on reference image
- o Cursor position to which translation is to occur
- o Analyst Input

3.2.3.2 Outputs

- o Image to screen
- o PC&S data base
  - --Image accept/reject flag
  - --Translation values (X,Y)

3.2.3.3 Description

Default values for screening are retrieved from the data base. Search area control information for all areas of interest with quality codes between user supplied thresholds are selected from the PC&S data base, then each search area is processed separately as follows:

The area of interest ID and associated default parameters are read from the data base. The search areas file name is determined; then the analyst is prompted for any screening controls. Screening controls include:

- o capability to display header data
- o capability to display annotation data
- o capability to display trailer data
- o capability to enter specifications of starting pixel coordinates to be displayed in upper left corner of screen
- o capability to display only the pixels from every "Nth" row and column

- o capability to specify the band to be displayed
- o capability to specify gain and bias for band to be displayed.

After the image is displayed, the user is prompted to (1) reject image, (2) accept image, or (3) initiate translation.

In translation mode a control image and an area of interest image must be displayed superimposed on each other. The user is allowed to zoom both images by up to four times around a selected feature. The user then may specify a common point in both images from which an X and Y will be calculated. This process will be repeated and the ΔX's and ΔY's compared. If the computed values are less than or equal to 1 pixel, the translation will be considered acceptable. If not, the user will be allowed to repeat the translation attempt for a total of 3 times. If translation is still unacceptable, the area of interest will be rejected and an indicator given to the user. For a successful translation, the PC&S is updated to reflect the translated image.

The PC&S data base is then updated to reflect the action of the analyst.

RIMS will be used to select areas of interest which require screening, reading data from the PC&S data base, and updating the PC&S data base.

Search areas will be read using currently available fast video subroutines.

Displays will be output using currently available video display routines (IWV). Cursor positions will be read using currently available subroutines.

3.2.3.4 Flow Chart

- o See Figure 3-4.

SCREENING AND TRANSLATION PROCESSOR

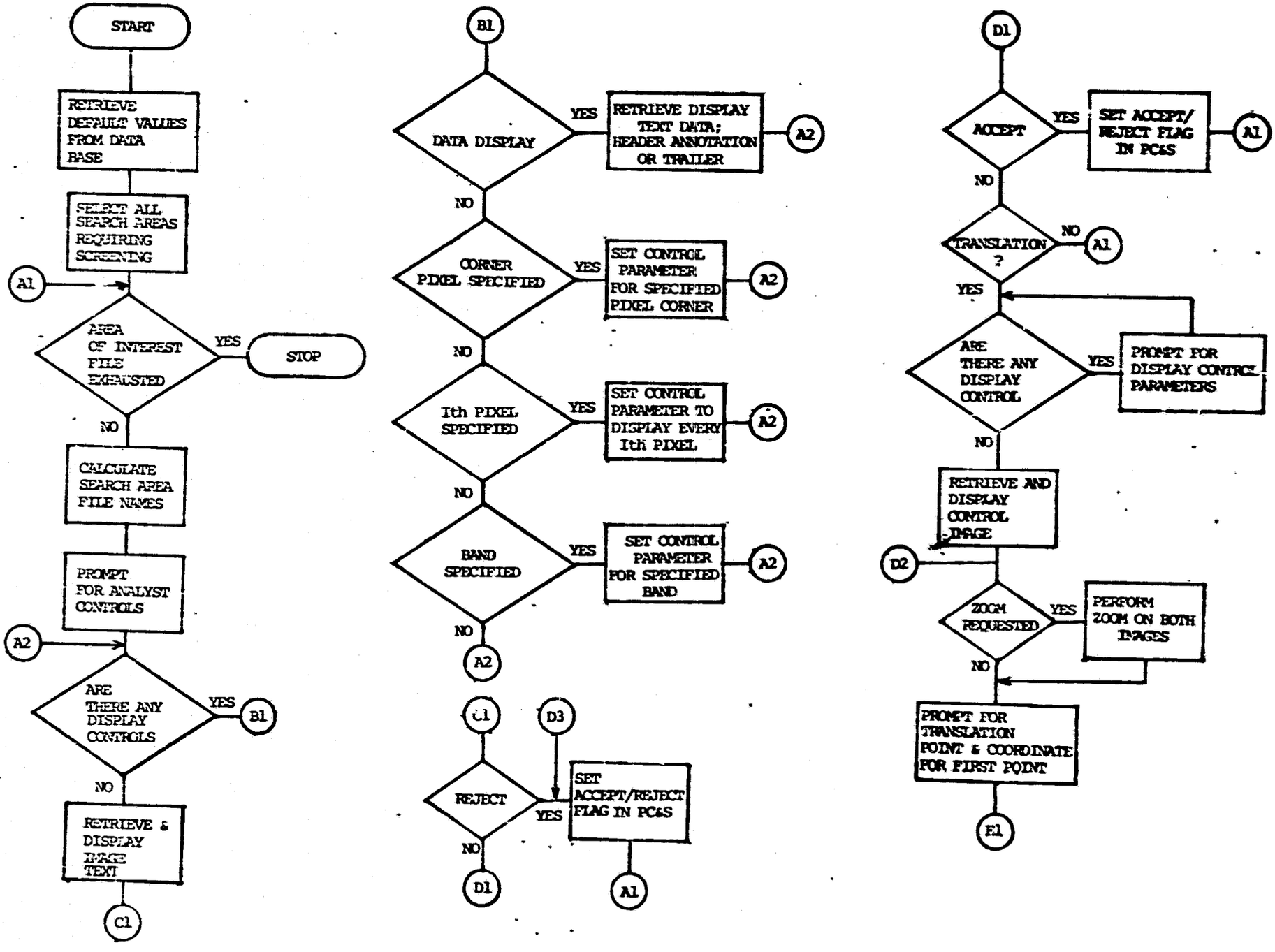


Figure 3-4

3-17

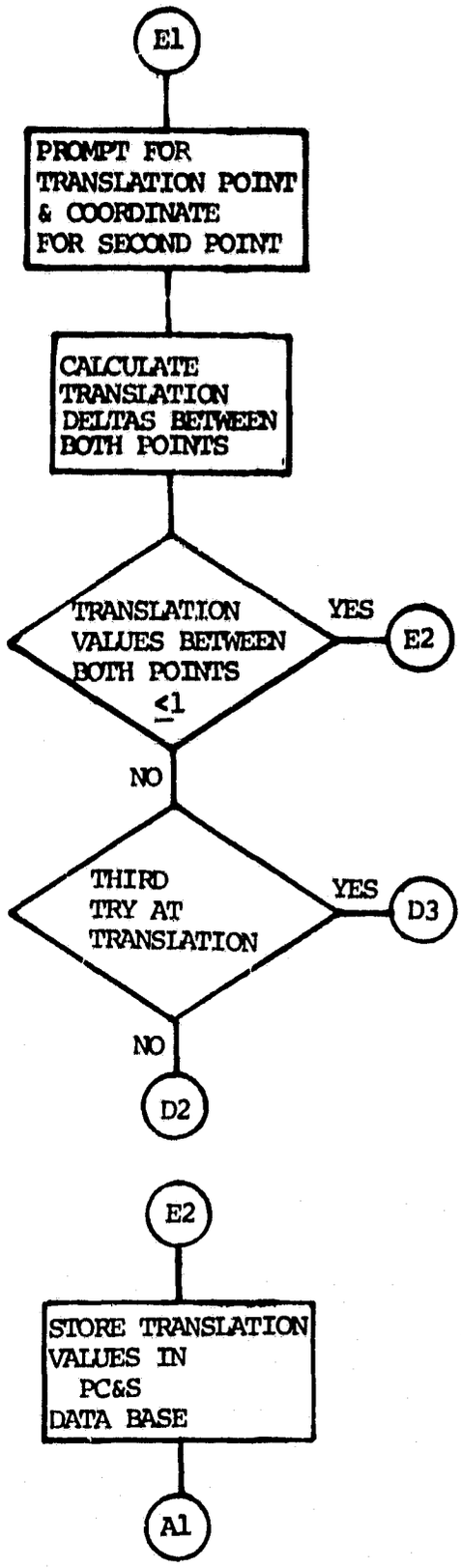


Figure 3-4 Continued.

3.2.4 CCT WRITE PROCESSOR

This processor transfers areas of interest from disk to CCT in universal imagery format.

3.2.4.1 Inputs

- o Search Area File
  - Image data
  - Header data
  - Annotation data
  - Trailer data
- o Process control and status data base
  - Area of interest location data
  - Area of interest size
  - Search area size
  - Translation data
  - Cloud cover data
  - Active band data
- o System Parameter File - system defaults

3.2.4.2 Outputs

- o CCT
- o Process control and status data base - status information.

3.2.4.3 Description

Areas of interest to be written to tape are selected and sorted according to user ID (so that areas of interest for a user group

may be written to the same tape). The area of interest description for a search area is read from the PC&S data base. Scene header, annotation, ancillary, and trailer data is read from the search area data base. File header data is constructed from header data, annotation data, PC&S data, and calculated data (see reference 6) and then output to tape. The appropriate image data is then read from the search area data base. Those pixels in the area of interest are written to tape (the search area may be larger than the area of interest).

If the search area is not equal to the area of interest bias and gains computations must be recalculated prior to writing the area of interest to tape. Bias and gains are calculated by retrieving the search area records and building a histogram of radiance values for pixels in the area of interest. When the histogram has been constructed, the bias and gains will be computed using TBD equations. These results will be used in the file header instead of those in the PC&S data base.

Area of interest description records will be selected from the PC&S data base, sorted and read using RIMS. Header data will be moved to the output buffer using tables which define the differences in format of the HDT and CCT for header data. Image data from the search area file will be retrieved using an existing fast video package.

3.2.4.4 Flow chart

o See Figure 3-5.

CCT TAPE WRITE FLOW

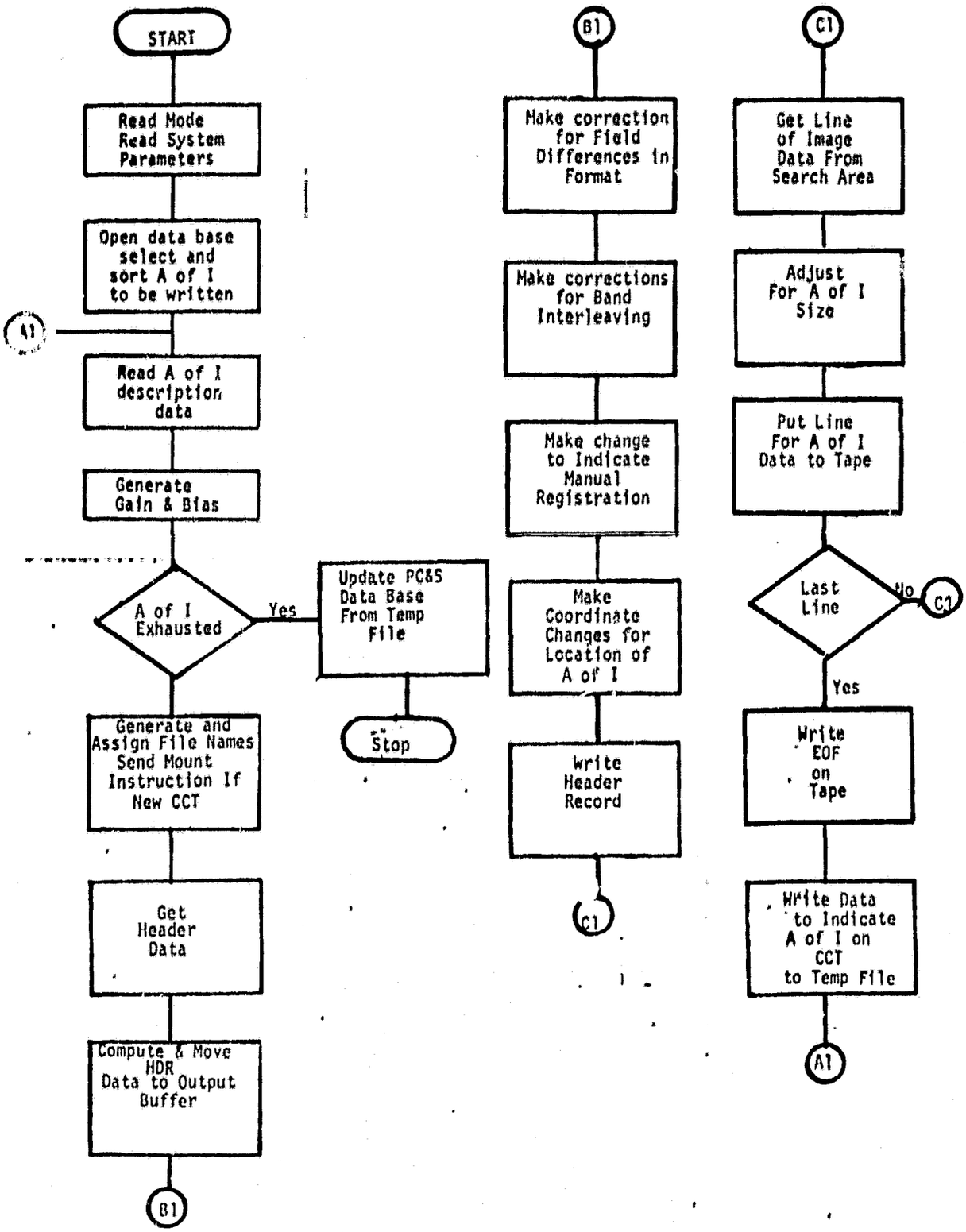


Figure 3.5

3.2.5 DATA MANAGEMENT FUNCTION

The RIMS data management system will be used to create, update, and report from the PC&S data base. RIMS has a self-contained language which will support (1) data base creation, (2) data base updates, (3) data base querying, and (4) generation of data base reports in a batch or interactive environment. Currently, RIMS does not have a FORTRAN interface or a data base lock feature needed to support concurrent data base updates from different programs. The data base lock feature will be available from the terminal by a ":L" being appended to the data base name in the BEGIN command. Also, because of the different initial device assignments needed, there will be two versions of RIMS available; one for FORTRAN users and one for terminal users. The difference between these two data managers will be the modification of one RIMS subroutine to assign a device description file.

3.2.5.1 Inputs

BEXXXX:L where BE is the command mnemonic, XXXX is the data base name, and ":L" is the lock designator.

3.2.5.2 Outputs

A message if the data base is already locked.

3.2.5.3 Description

When the ":L" is appended to the BEGIN command, the RIMS program will attempt to assign a specific file. If the file cannot be assigned, then the message "DATA BASE LOCKED" will be sent to the message file and the program will exit. If the file can be assigned, then the program will continue, giving the user update capability. The END command will be modified then to free the file. If the ":L" does not appear appended to BEGIN command, the program will continue but allow only read access to the data base.

3.2.6 DMS HOST LANGUAGE INTERFACE

An interface between RIMS and the other processors in the system is needed to allow the processors to communicate with the data base. The processors will build RIMS command and data files, read RIMS report and message files, and initiate RIMS processing via an interface routine.

3.2.6.1 Inputs

- o Command file name
- o Report file name
- o Data file name
- o Message file name
- o Command file
- o Data file

3.2.6.2 Outputs

- o Report file
- o Message file

3.2.6.3 Description

The routine will wait until it can assign a specific file to ensure exclusive use of the data base in the update mode. Then it will store the given file names on a standard file where RIMS looks for unit/device assignment information. RIMS is then started, with the calling program being rolled out until RIMS is finished. Then the lock-indicator file is freed and processing returns to the main program.

3.2.7 PROCESS CONTROL AND STATUS DATA BASE GENERATION

This program provides the area of interest definitions for the LIVES system.

3.2.7.1 Inputs

- o Cards describing the areas of interest; format TBD.
- o Command file for updates using RIMS.

3.2.7.2 Outputs

- o Area of interest description records created in PC&S data base.
- o Listing of all area of interest descriptions.

3.2.7.3 Description

The data base records and listing of these records will be accomplished using the RIMS self contained language.

3.2.8 PROCESS CONTROL AND STATUS DATA BASE UPDATE PROGRAM

This program provides for updating existing area of interest definitions in the PC&S data base.

3.2.8.1 Inputs

- o Card images describing areas of interest to be modified; format is the same as for generation.
- o Command file for updates using RIMS.

3.2.8.2 Outputs

- o Field changes for updates are made for specified areas of interest.
- o Listings of areas of interest which were changed.
- o Listing of areas of interest which did not exist in data base.

3.2.8.3 Description

Update card images are read and a new file containing each area of interest ID is generated. This file is then used to select the associated (before modification) area of interest description which are written to an output file. The data base updates are made using the original update card images.

Both the before and after modification image files are read and both images are printed. Next, the before modification image file and the original update card image file are compared. Then, any area of interest segment ID in the update card image not in the before modification list is printed.

RIMS will be used for selecting records, making updates, and printing before and after images. A FORTRAN program will generate the area of interest ID file. All other functions will be performed by another FORTRAN program.

3.2.9 PROCESS CONTROL AND STATUS DATA BASE

The PC&S data base is used to (1) define areas of interest, (2) support system computations, (3) support system control, and (4) provide system statusing information. The contents of the PC&S data base is derived from area of interest definition, GHIT tape, and the processing functions.

There are three types of records in the PC&S data base:

- Area of Interest Description - Defines those items of an area of interest common to all image acquisitions
- Scene Descriptions - Describes scenes from the HDT
- Acquisition Descriptions - Contains data describing an area of interest acquisition and the processing of this acquisition

There will exist at least three versions of the PC&S data base. They are:

- Daily PC&S data base - This data base contains only those Area of Interest description and Scene Descriptions from a given day. It is used to control any status report on a given day's activity. The use of a small data base for daily processing minimizes the system overhead for data management activities.
- Archive PC&S data base - This data base contains Acquisition Descriptions and scene descriptions from all days of HDT processing. This data base is used for weekly, monthly, and other periodic and aperiodic reporting.
- Basic Definition PC&S data base - This data base is used for maintaining area of interest description. It is copied daily to initialize a new Daily PC&S data base. AI updates are also copied from this data base to the Archive PC&S data base.

3.2.9.1 Area of Interest Description Record

The following fields comprise an area of Interest Description record:

User ID

AI - Number of Lines

AI - Number Pixels

Registration Quality Threshold - Screen

Registration Quality Threshold - Reject

Cloud Percent Threshold

Area of Interest Number

Country

Region

Zone

Strata

Priority

Area of Interest Type

Crop Code

Latitude/Direction

Longitude/Direction

Acquisition Start Date

Acquisition Stop Date

Primary WRS (Row, path)

Secondary WRS (Row, path)

Film Flag

Band Numbers required for extraction

3.2.9.2 Scene Description Record

The following Fields comprise a scene Description record:

HDT Tape ID

Image ID

Number of Bands on Tape

Acquisition Date

Scene Cloud Assessment

Regenerated Product Flag

WRS Designator

WRS Offset

Mission Number

Resampling Type

Quality Assessment of Geographical Model

Format Center Lat/Dir

Format Center Lon/Dir

Playback/Direct Flag

Ascending/Descending Flag

Sun Elevation Angle

Sun Azimuth Angle

Date GHIT Run

HDT Processed Date

3.2.9.3 Acquisition Description Record

The following fields are included in an acquisition description record:

HDT Number

Area of Interest ID

Image ID

Number of Bands on Tape

Acquisition Date

Date GHIT Run

Preprocessing Reject Reason

Screening & Registration Flag

Search Area Cloud Assessment

Extraction Reject Reason Code

Screen & Register Date

Screen Reject Code

CCT Date

CCT Number

Bias and Gain Factors

3.2.10 LIVES FILES

The Full Frame data base is generated by the HDTRS. It is the original source for all image data input to LIVES. Particular Full Frame data base file names are a function of the scene ID. The convention used is described in reference 3.

The Search Area data base contains image data for all segments. All functions manipulating image data use the Search Area data base; its exact format is TBD. The Search Area data base is composed of individual files for each search area. The file names are a function of the area of interest ID. The exact file naming convention to be used will be defined in the detail design document.

The GHIT Tape files describe the contents of a set of HDT's. The format for the GHIT Tape is described in reference 5.

The System Parameter file provides a method of modifying system parameters used by the various processors without recompiling and task building the processors. Each processor will initiate its processing by reading the parameters it uses from this file. The contents of this file include:

- Full Frame size
- Default for area of interest size
- Cloud Detection Threshold value
- Percent value for excessive cloud cover
- Default number of pixels to add for search area
- Default number of lines to add for search area

The Computer Compatible Tapes, CCT's, contain image data and are the principal output of the LIVES. The format for CCT's is contained in reference 6.

3.2.11 System Reports

Currently five HDT data processing reports have been identified as required output from the system report generation function. These reports are:

1. Preprocessing Activity Summary - A report output to each user containing the results from the preprocessing function wherein the GHIT is compared to user supplied input to determine data available for processing.

2. Daily Expected AI Summary - A report sorted by user I.D. containing specific information about AI's which appear on the GHIT and match the user requested AI.

3. Extraction Processing Summary - A report sorted by user I.D. containing specific information about AI's extracted for output to CCT and/or available for screening and possible output depending on successful translation.

4. Screening and Registration Summary - A report sorted by user I.D. containing items which define the AI's screened and registered and the results of these processes.

5. Tape Order Processing Summary - A report provided to operations personnel, particularly the system operator, containing the results of the data identification function, within system preprocessing, describing those AIs which are to be processed, their HDT tape number and the sequence in which they are to be loaded by the HDTRS onto the full scene disc.

Table 3-6, Report Elements versus System Report Title graphically presents the currently defined system reports and their individual contents.

Additional Ad hoc reports will be needed. The provided DMS and data base organization will allow for Ad hoc reports and easy generation of new periodic reports.

REPORT TITLE	PC&S DATA SOURCE																			
		AI DESCRIPTION													SCENE DESCRIPTION					
	USER ID	AREA OF INTEREST SIZE	REGISTRATION THRESHOLDS	CLOUD THRESHOLD	AI NUMBER	COUNTRY	REGION	ZONE	STRATA	PRIORITY	AI TYPE	CROP TYPE	LATITUDE/DESCRIPTION	LONGITUDE/DIRECTION	HDT TAPE ID	SCENE ID	NO. OF BANDS	ACQUISITION DATE	SCENE CLOUD ASSESSMENT	WRS DESIGNATOR
PREPROCESSING ACTIVITY SUMMARY	X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DAILY EXPECTED AI SUMMARY	X	X	X	X	X	X	X	X	X						X	X		X		X
EXTRACTION PROCESSING SUMMARY	X	X	X	X	X	X	X	X	X						X	X		X		X
SCREENING & REGISTRATION SUMMARY	X	X	X	X	X	X	X	X	X							X		X		X
TAPE ORDER PROCESSING SUMMARY	X														X					

REPORT TITLE	PC&S DATA SOURCE																			
	SCENE DESCRIPTION									ACQUISITION DESCRIPTION										
	WRS OFFSET	MISSION	SENSOR	QUALITY ASSESSMENT	LATITUDE/DIRECTION	LONGITUDE/DIRECTION	SUN ELEVATION	SUN AZIMUTH	DATE GHIT RUN	PREPROCESSING REJECT FLAG	SCREENING/REGISTER FLAG	HDT PROCESS DATE	SEARCH AREA CLOUD ASSESS	EXTRACT REJECT CODE	SCREEN REGISTER CODE	SCREEN REJECT CODE	CCT DATE	CCT NUMBER	GAIN FACTOR	BIAS FACTOR
PREPROCESSING ACTIVITY SUMMARY	X	X	X	X	X	X	X	X	X	X										
DAILY EXPECTED AI SUMMARY		X	X	X						X	X									
EXTRACTION PROCESSING SUMMARY		X	X									X	X	X			X	X	X	X
SCREENING & REGISTRATION SUMMARY		X	X										X		X	X	X	X	X	X
TAPE ORDER PROCESSING SUMMARY																				

Table 3.6 Report Elements VS System Report Title

3.2.12 WRS ROW PATH GENERATOR

This program generates a primary and secondary WRS row and path for a latitude and longitude. This program may be used to generate manual input to the data base or used in conjunction with RIMS for automatic data base updates.

3.2.12.1 Inputs

- o **Disk file containing:**
  - **AI ID**
  - **Latitude**
  - **Longitude**
  - **AI size**
- o **Table describing path of spacecraft: scene center Lat/Long vs row/path**

3.2.12.2 Outputs

- o **Disk File containing:**
  - **AI ID**
  - **WRS primary row**
  - **WRS primary path**

3.2.12.3 Description

The latitude and longitude of the corners of each input area of interest will be evaluated against the WRS table. If the area of interest is contained fully within a WRS scene, the WRS row/path numbers will be stored in the PC&S for that AI. In the case where the AI lies completely within two overlapping (side by side) scenes, the Eastern most will be stored as primary WRS and the Western most as secondary. In all cases, the Northern most on any path will be selected.

3.2.13 REFERENCE DATA BASE LOAD PROGRAM

This program provides for loading the reference image data base from CCT's in Universal Format.

3.2.13.1 Inputs

- o CCT
- o Identification of band for reference image
- o Identification of image to be loaded

3.2.13.2 Outputs

- o Reference Image Files

3.2.13.3 Description

A reference image is read from the input file. The CCT is read forward till the corresponding image is found. The image header data is read. Scene header, annotation, ancillary, and trailer record data is reformatted and stored (note only that data used by the Screening and Translation Processor needs to be saved). The image data from the selected band is then moved from tape to the reference image file. The reference image data base is formatted identical to the Search Area data base.

4. OPERATION

4.1 OPERATORS GUIDE

The instructions and procedures necessary for operators to perform the various required functions will be provided prior to system delivery. Since the April LIVES delivery will contain only a portion of the complete High Density tape processing requirement only those instructions & procedures necessary for that delivery will be addressed. It is envisioned that as changes are implemented all corresponding operator, user and maintenance documentation will be updated.

4.2 USERS GUIDE

A users guide will be prepared and delivered prior to acceptance testing.

4.3 MAINTENANCE DOCUMENTATION

4.3.1 Hardware

N/A

4.3.2 Software

Program maintenance documentation will consist of the "As-Built" Design Specification and program listings for all modules/programs developed. These documents will be delivered to the DTL library within 60 days after acceptance testing.

4.4 CONCEPT OF OPERATION FOR APRIL 1978 DELIVERY

In the first delivery of LIVES each processor will be run in sequence. In addition, the extract process will be run in

parallel with HDTRS. The sequence and mode of operation proposed is as follows:

Processor	Mode of Operation
o AI Generation	Batch
o AI update	Batch
o GHIT Processor	Batch
o Extract Processor	Operator started
o Screening & Translation	Analyst start with Interaction
o CCT Write	Operator started (with interaction for tape mounting)
o Reports (Daily)	Batch
o Reports (Other)	Batch

Ad hoc data base queries may be made at any time. The system may be run without the GHIT processor by updating the PC&S data base from cards using RIMS to reflect existence of scenes on HDT's.

The need for concurrent execution of different processors will depend on the total work load of the Support and Image Processors. As experience is gained and the total work load environment is known the operation of the system can be changed. For example, a processor could be made country oriented or WRS path oriented. One processor could be working on a country or path while another processor is working on a different country or path.