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VISSR DATA PROCESSING PLAN FOR SYNCHRONOUS METEOROLOGICAL AND GEOSTATIONARY OPERATIONAL ENVIRONMENTAL SATELLITES (SMS/GOES)

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GSFC

GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND

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VISSR DATA PROCESSING PLAN

FOR

SMS/GOES SATELLITES

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Information Processing Division

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VISSR DATA PROCESSING PLAN

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ABSTRACT

This document describes the procedures used by the Information Processing Division (IPD) to process VISSR data received from the synchronous orbiting SMS/GOES spacecraft. The IPD receives analog and digital tapes containing spacecraft, experiment, and video data from the supporting ground stations. The IPD is then responsible for evaluation and quality checking the tapes, maintaining accounting records, editing and decommutating the data and shipping the results to various organizations. Included in this document are descriptions of computer programs used to process the SMS/GOES telemetry data.

Information pertinent to PCM telemetry data processed within the IPD is described in the PCM Data Processing Plan for SMS/GOES Satellites.

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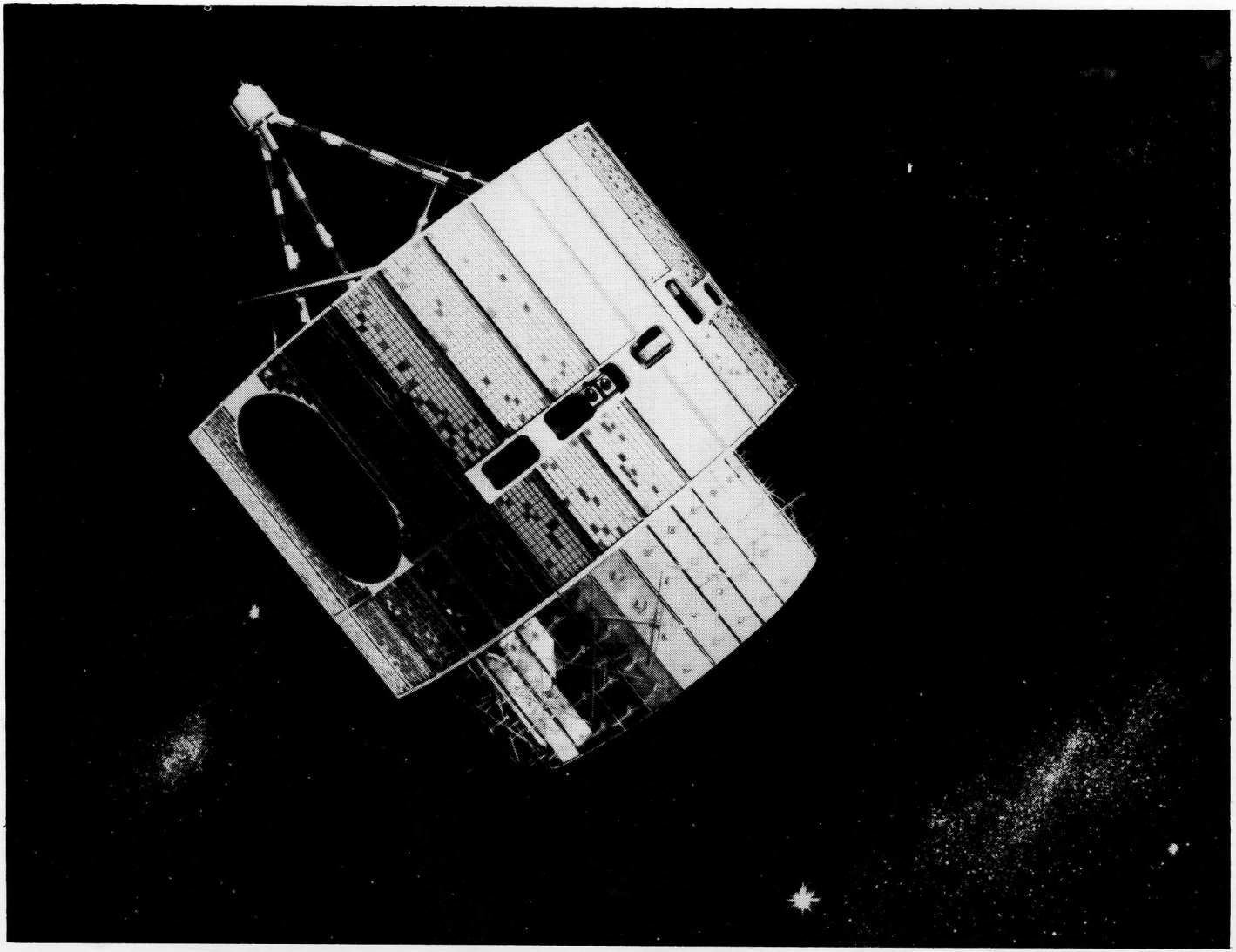


Frontispiece. SMS Spacecraft

VISSR DATA PROCESSING PLAN FOR SYNCHRONOUS METEOROLOGICAL AND GEOSTATIONARY OPERATIONAL ENVIRONMENTAL SATELLITES

1.0 INTRODUCTION

The National Aeronautics and Space Administration (NASA) and the Department of Commerce (DOC) are involved in a joint effort which will culminate in an operational geostationary satellite system. NASA's Goddard Space Flight Center (GSFC) is responsible for spacecraft and ground system design and development, the launch vehicle, the launch operation, initial satellite checkout, and spacecraft evaluation. The DOC National Oceanic and Atmospheric Administration (NOAA) is responsible for the operational phase of the satellite, including determining the need for replacement; for operation of the ground system; and for the acquisition, handling and processing of satellite data.

The SMS System is a logical development from existing space accomplishments and activities. The Applications Technology Satellites (ATS), Synchronous Communications (SYNCOM) Satellites, Television Infrared Observation Satellite (TIROS), TIROS Operational System (TOS), Nimbus Satellites, and Delta Programs have developed and demonstrated compatible and transferrable technological assets to the SMS Program. Throughout this document the satellites may be referred to as SMS, GOES, or SMS/GOES. The three names are used interchangeably.

1.1 MISSION OBJECTIVES

The primary objectives of the SMS/GOES are as follows:

- To extend knowledge and understanding of the atmosphere and its processes by viewing the evolution and motion of storms and other atmospheric phenomena
- To aid in the development of a domestic and international environmental network that can receive, process, and distribute routine observations and early warnings in real time
- To improve NOAA's ability to forecast and warn of solar disturbances in real time
- To increase the kind, quantity, and quality of environmental-parameter measurements.

The mission objectives will be achieved by the SMS/GOES System which includes the spacecraft, the ground stations, and remote data collection platforms (DCPs). The spacecraft has an Earth imaging instrument which forms images of the Earth's surface and cloudcover for transmission to regional data-user stations for use in weather prediction. Also included in the system is the capability of retransmitting to several small data-user stations the earth imagery transmitted by the spacecraft to the master command and data acquisition (CDA) station at Wallops Island. The SMS/GOES System includes provision for a transponder subsystem to collect environmental data from remotely located Earth-based, small, self-contained, DCP sensors. These sensors may be located on ocean buoys, on river and stream gauges, on merchant vessels, and at real-time weather stations. The system also includes the provision for transmitting narrowband weather maps, satellite pictures, and other data (weather facsimile) from the Wallops Island CDA Station to the existing 500 small automatic picture transmission (APT) stations. The mission objectives will be met by providing a space environmental monitoring system on-board the spacecraft to make continuous data measurements of protons, electrons, magnetic fields, and solar X-ray flux within the vicinity of the spacecraft (these data will be used to forecast and warn of solar disturbances in real time). The SMS/GOES System concept, after the spacecraft 30-to-60 day checkout period, is illustrated in Figure 1-1.

1.2 VISIBLE AND INFRARED SPIN-SCAN RADIOMETER SYSTEM (VISSR)

The Visible Infrared Spin-Scan Radiometer will be capable of mapping the Earth and clouds from a synchronous spin-stabilized geostationary satellite. The instrument will provide both a day and night mapping capability with a satellite subpoint resolution of 0.9 km in daylight and approximately 8 km at nighttime. In addition, cloud altitude will be determined by infrared radiometric measurement of cloud top temperature.

The radiometer, which contains eight visible channels operating in the 0.55- to 0.70-micron band, will provide albedo measurements between 0.5 and 100 percent. The radiometer also contains a single IR (thermal) channel operating in an optical bandpass of 10.5 to 12.6 microns which will be capable of providing radiance temperature measurements between 180 and 315 K and will have a noise equivalent temperature difference sensitivity of no greater than 30 K at a scene temperature of 200 K.

A secondary objective of the design is to include capability for future growth with temperature profile measurements as the primary consideration. Such measurements would involve additional infrared channels having different spectral and field-of-view (FOV) considerations.

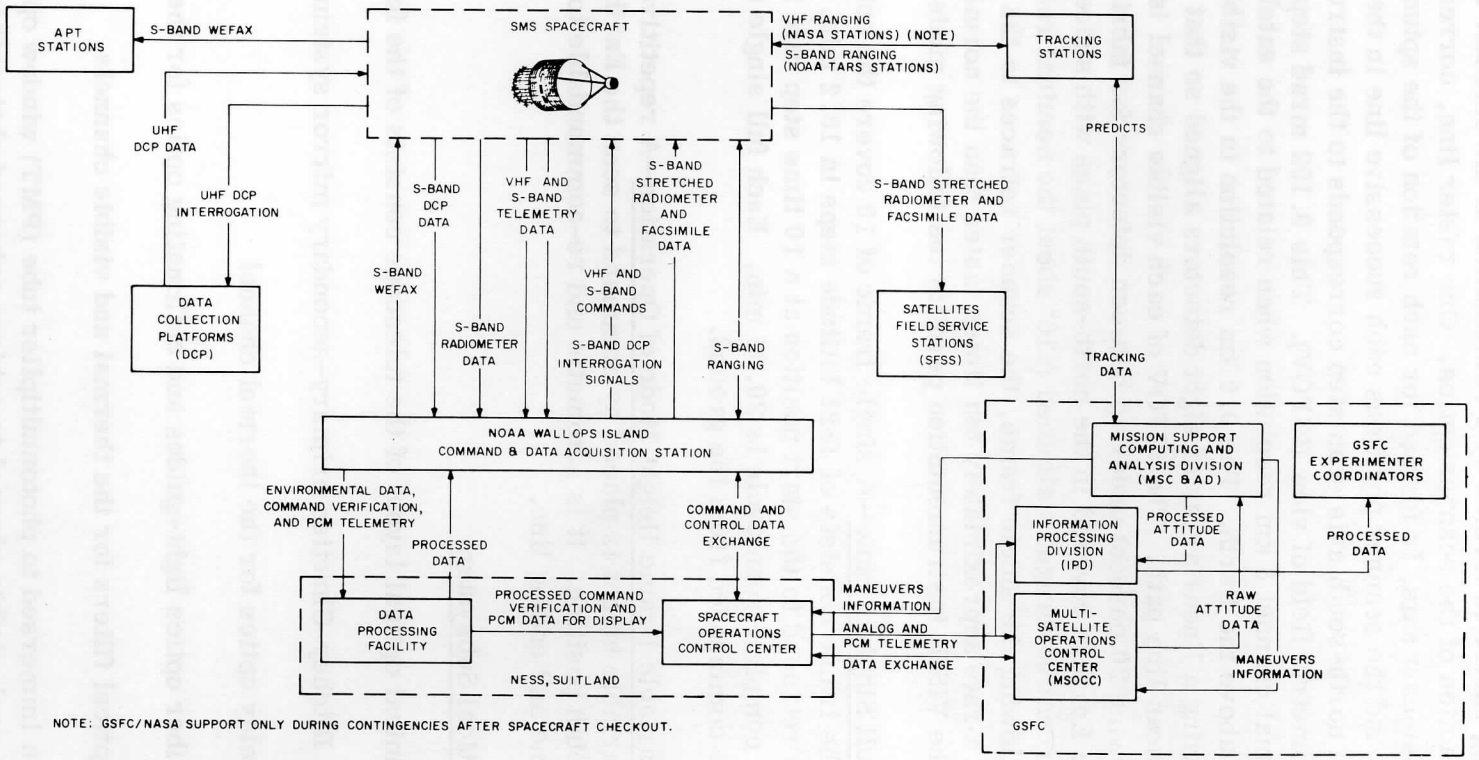


Figure 1-1. SMS/GOES System Concept (Post Checkout Period)

The mapping raster is formed by a combination of the satellite spin motion and a step action of the scanner optics. One raster line, corresponding to the Earth's west-east axis, is formed for each rotation of the spinning satellite (100 r/m), and the scanner positions each successive line in the north-south axis. Each north-south axis scan step corresponds to the instrument's instantaneous geometric field of view (IGFOV). This 0.192 mrad step corresponds to the thermal channel 8 km resolution when related to the satellite's position 31,000 km above the Earth. The 0.9 km resolution in the visible region is obtained by using a linear array of eight detectors aligned so that they sweep out the same scan line path. The IGFOV of each visible channel is 0.25 x 0.021 mrad, allowing 20 percent underlap between detectors for fabrication considerations. The Earth is covered in the north-south plane with successive latitude steps until 20 percent coverage is attained (±10° about the nominal radiometer optical axis). Following the single frame, the scanner retraces to the original start position at a rate approximately ten times faster than the normal step scan period. The VISSR instrumentation permits the following modes of scanning:

- Full Single Frame—A single frame of 10 covers the entire Earth. The frame consists of 1821 latitude steps in 18.2 min. The frame is retraced to the start position at a 10 time step rate in 1.82 min. A complete scan cycle is 20.02 min. Each full single frame has to be commanded from the ground.

- Variable Frame Height Mode of Operation—A repetitive frame of variable height is placed by command to scan the Earth at any north-south position. It is automatic and re-commandable to any beginning line and ending line.

1.2.1 Optical Subsystem

The mechanical optical layout of the telescope consists of the following:

- A Ritchey-Chretien primary-secondary mirror system

- Relay optics for the thermal channel

- Fiber optics light-guides and collimating optics for the visible channels

- Optical filters for the thermal and visible channels

- An immersed to photomultiplier tube (PMT) window optical prism in each visible channel to achieve enhanced photocathode effective quantum efficiency.

Radiation is received by the primary optics via the 45° object-space scan mirror. It is an elliptically shaped plane mirror which is tilted about its minor axis to obtain the north-south scan steps. The mirror is servo-positioned using a torque motor drive together with a digital encoder for completing the servo loop. A redundant assembly is on the opposite side of the mirror. The servo electronics include the logic necessary to step position the mirror at .096 mrad steps (0.192 mrad optical IGFOV) in the required sequence to make the selected scan mode.

Energy from the scan mirror is collected by a Ritchey-Chretien optical system. The 40.64 cm diameter optics has a 291.3 cm focal length. The system includes a baffle that extends from the primary mirror center section to minimize the effects of scattered radiation. Energy in the visible region is detected at the prime focus using eight fiber optics arranged at the focal plane to form the defining 0.2 by 0.025 mrad (field stop) linear array (each fiber is 0.025 by 0.021 mrad). The other ends of the individual fibers are optically integrated with the eight photomultiplier tubes having the desired 0.54- to 0.70-micron response. In addition, the prime focal plane is relayed to the radiation cooler cold plate using two germanium relay lenses. The relay configuration also is used to increase the overall optical speed of f/1.28 relative to the thermal detectors. The 0.25 by 0.25 mrad intrinsic long-wavelength HgCd/Te detector is mounted on the radiation cooler cold plate together with the redundant detector. An optical filter between the final relay lens and the detectors restricts the energy to the 10.5- to 12.6-micron wavelength bandpass.

1.3 SPACE ENVIRONMENT MONITORING SYSTEM (SEM)

Space for selected space environment monitoring sensors is available on the SMS spacecraft. The flight of all sensors, unless mandatory for spacecraft basic system performance, is contingent upon their availability for the launch schedule.

NOAA has long been involved in describing the relationships between solar disturbances and effects on the Earth's near-space environment. These relationships were originally recognized in the field of ionospheric radio communication. Now it is realized that large disturbances can pose significant radiation hazards for men in space. This may also constrain the flight of supersonic aircraft operating at the fringe of the Earth's atmosphere.

The space environment monitoring sensors are designed to provide direct measurement of important effects of solar activity in such a manner that data will be available continuously in real time for use in generation of advisory or warning messages. The data will also be available for other uses, such as forecasting and operational research.

1.3.1 Solar Energetic Particles Subsystem

Solar particle radiation constitutes the major radiation hazard to manned spaceflight activities. It also presents an operational problem to supersonic flights at high altitudes and is responsible for major high altitude communication blackouts.

The operational need exists for providing a warning of the onset of an event and sufficient quantitative description of the flux to enable the actual radiation hazards and communication effects to be calculated. The second need cannot be met by ground based measurements except in a limited fashion, and then assumptions must be made about the spectrum. The SMS has great advantages for operational monitoring because of the continuous real-time transmission of data. The data required for radiation hazard calculations in the Manned Space Flight Program have been defined as at least 4 points in the spectrum between 15 and 100 Mev for protons and for alpha particles in the range 60-400 Mev. High altitude aircraft flights demand a knowledge of higher energies than 100 Mev because of the shielding effects of the atmosphere. The requirements for prediction of communication effects are primarily for information on proton fluxes below 50 Mev where the high latitude fluxes and ionospheric effects are large.

The following specification is therefore based upon the foregoing considerations and the practical limitation set on the one hand at low energies by the validity of measurements in geostationary orbit and at the other by the difficulties of providing energy resolution at proton energies above 500 Mev.

The solar energetic particle monitor shall monitor protons in 7 ranges between 1 Mev and 500 Mev. It shall monitor alpha particles in 6 ranges between 4 Mev and 400 Mev, and there will also be one channel for the measurement of electrons in the range 500 kev.

1.3.2 Solar X-Ray Sensor Subsystem

The X-ray emission is the direct cause of the immediate ionospheric effects associated with solar flares (i.e., height of reflective changes and changes in absorption of VLF, LF and HF radio paths). These effects can be calculated from quantitative X-ray measurements and used as an operational input to the control of radio communication systems.

Many scientific experiments in both satellite and ground-based units are specifically designed to investigate flare-induced effects. NOAA provides real-time warnings of flare commencements to experimenters on request and

these can greatly improve the productivity of such experiments. Studies have shown that direct satellite measurements of solar X-ray events can be perhaps an order of magnitude more sensitive for the detection of onset and confirmation of small events than is possible using ground-based measurements. Satellite-based measurements should not suffer from the problem of false alarms.

There is a continuous monitoring need for this data. The background level of X-ray radiation from the quiet Sun is an excellent general indicator of solar activity. There is also a good deal of evidence to suggest that most flares are preceded by a gradual buildup in background level over the preceding 10-30 min. known as a precursor. A great deal of operational value is lost if the data are not available in essentially real time.

Again, some tradeoff in the sensor design is required in order to achieve the discussed needs and to avoid the unacceptable interference to the X-ray measurements by the energetic electron environment in geostationary orbit. For this reason the X-ray monitor for the initial SMS should be a simple type employing ion chamber or Geiger-Muller detectors. The ranges and minimum useful threshold sensitivity shall be 0.5 - 3A, 10^{-6} ergs cm^{-2} sec^{-1} and 108 A, 10^{-4} ergs cm^{-2} sec^{-1} with a dynamic range of at least 10^3.

1.3.3 Magnetometer Subsystem

The magnetosphere is a dynamic region whose magnetic field variations define, in many ways, the motions of the plasma of charged particles contained within its boundaries or guided to the Earth's surface. These are the particles responsible for auroral radiowave absorption, polar communications blackouts, radiation hazards for space flight, etc.

These fields have been studied by ground observatories. However, the surface field is a complex mixture of the solid Earth sources, magnetospheric perturbations, ionospheric currents, induced surface effects and miscellaneous other contributions which are not easily measured. Satellite field determination allows the separation of the space from the surface and ionospheric effects.

The geostationary satellite has an especially important monitoring value because continuous measurements can be made in conjunction with the charged particle sensing at a fixed spatial position. The significant question is not only to determine the quantity of energetic charged particles which have arrived within our Earth's magnetosphere but what will be their route to the Earth.

The magnetometer will be used to measure the field direction and magnitudes in the range of 10 to 500 gamma. This can be used immediately to warn of magnetospheric boundary compressions past the satellite position. The data will also be used to assist in predicting trajectories of the observed energetic particles and developing techniques for projecting Earth observatory data into the space environment. In addition, the data will allow investigation of the currents within the magnetosphere and the magnetic field micropulsations in the region of the spacecraft.

In order to achieve these objectives the magnetometer will have a range of 400 gamma (without saturation) and a resolution of 0.1 gamma over a range of 50 gamma.

SECTION 2

IPD DATA PROCESSING SUPPORT FUNCTIONS

2.0 IPD DATA PROCESSING SUPPORT FUNCTIONS

2.1 TAPE STAGING AND STORAGE (TS&S)

TS&S is responsible for handling VISSR analog tapes for the SMS/GOES satellite. TS&S receives the analog tapes directly as they are picked up from NOAA/NESS World Weather Building. TS&S then marks and files the tapes in sequence, and sends a list of tapes received to the Accounting Office. As tapes are requested for processing, TS&S delivers them to the proper processing line. After the analog tapes are processed, TS&S receives and files the analog tapes. After a specified period of time, TS&S will send the analog tapes to the Washington National Records Center for a minimum of five years.

TS&S is also responsible for the storage and shipping of all digital tapes. This involves supplying the computers with blank digital tapes and then the collection of digital tapes containing telemetry data. All experimenter tapes are shipped to the experimenters by this group. The mailing list for the experimenters is given in Appendix F. When the users have completed all processing required on these experimenter tapes they should return those tapes to TS&S (see address in Figure 2-1) to be erased, cleaned, and reissued for use on other projects.

TS&S, in addition to shipping the experimenter data tapes, is responsible for maintaining an inventory of all tapes shipped. To maintain an accurate inventory, TS&S includes a Tape Receipt Form (Figure 2-1) with each shipment. Upon receipt of a shipment, the experimenter should validate the tape receipt, retain his copy, and return the form to GSFC.

2.2 TELEMETRY DATA ACCOUNTING OFFICE (TDAO)

TDAO is responsible for keeping transaction records on all analog and digital tapes used for SMS and GOES. TDAO receives teletype reports for each analog tape from the tracking stations. From these reports, TDAO has 02 cards punched which contain the basic information for each file of the telemetry data processed by IPD. As the telemetry data are further processed, the code 02 card is repunched by the computer programs with additional information. After a file of telemetry data is completely processed, it will have several different accounting cards with different code numbers. These accounting cards are stored in the Telemetry Data Accounting System (TDAS) implemented on the IBM 7010 computer. This system is used to provide reports concerning SMS tapes to the Production Control Center (PCC), the Data Processing Engineer, and the Data Processing Specialists. Descriptions of the accounting cards used by the TDAS are given in Appendix A. Two examples of reports generated by TDAO are shown in Figures 2-2 and 2-3. Report number 70 is a listing of

TAPE STAGING & STORAGE FACILITY
INFORMATION PROCESSING DIVISION
NASA, GODDARD SPACE FLIGHT CENTER
GREENBELT ROAD
GREENBELT, MARYLAND 20771

MEO1 APT REGALAB

MS. ELIZABETH REGALA
CODE 931
BLDG 16A RM 66
GSFC

TOTAL TAPES IN THIS SHIPMENT _____		DATE SHIPPED _____	
TAPE INVENTORY CONTROL NUMBER	DECOM RUN NUMBER/ SCENE IDENTIFICATION	TAPE INVENTORY CONTROL NUMBER	DECOM RUN NUMBER/ SCENE IDENTIFICATION

Please verify that the tape(s) described above have been received, then sign and date copy number 3 and return it in the accompanying pre-addressed penalty envelope. Copy number 2 may be retained for your records. A complete explanation of any shipping problems should accompany copy number 3 when returned.

DATE RECEIVED	SIGNATURE
BOX NUMBER	COPY 1 STAYBACK

GSFC 22-58(9/76)

Figure 2-1. Tape Receipt Form

KP70 SMS/GOES DATA TAPES AVAILABLE TO USERS PAGE 0033

(SORT IS CHRONOLOGICAL)

DATE FEBRUARY 08,1977 (SMS-2)

RECORD STATION	SOURCE TAPE NUMBER	PIC NO.	SEC NO.	START IMAGE LINE	STOP IMAGE LINE	DATE OF DATA	DATA COVERAGE START	DATA COVERAGE STOP	REQUEST NUMBER	EXPERIMENTER TAPES (VALUES EQUAL TAPES OUTPUT) ADIPS EXH	ADIPS IR	ADIPS VIS	CELCO IR	CELCO VIS	IDAMS IR	IDAMS VIS	PDF B=IR C=VIS
DRG	00470	3	1	1475	1599	750427	1530	1531	077								C
DRG	00470	4	1	0180	0440	750427	1547	1550	077	0	1	1	0	0	0	0	C
DRG	00470A	4	1	0439	0699	750427	1550	1551	077	0	1	1	0	0	0	0	C
							1551	1552	077	0	1	1	0	0	0	0	C
DRG	00470	4	1	0698	0958	750427	1552	1554	077								C
							1554	1555	077								C
DRG	00470	4	1	0957	1217	750427	1555	1557	077								C
DRG	00470	4	1	1216	1476	750427	1557	1558	077								C
							1558	1600	077								C
DRG	00470	4	1	1475	1505	750427	1600	1600	077								C
DRG	00470	5	1	0180	0440	750427	1617	1619	077	0	1	1	0	0	0	0	C
DRG	00470	5	1	0439	0699	750427	1620	1621	077	0	1	1	0	0	0	0	C
							1621	1622	077	0	1	1	0	0	0	0	C
DRG	00470	5	1	0698	0958	750427	1622	1624	077								C
							1624	1625	077								C
DRG	00470	5	1	0957	1217	750427	1625	1627	077								C
DRG	00470	5	1	1216	1473	750427	1627	1628	077								C
							1528	1630	077								C
DRG	00471	1	1	0180	0440	750427	1647	1649	077	0	1	1	0	0	0	0	C
DRG	00471	1	1	0439	0699	750427	1649	1650	077	0	1	1	0	0	0	0	C
							1651	1652	077	0	1	1	0	0	0	0	C
DRG	00471	1	1	0698	0958	750427	1652	1654	077								C
							1654	1655	077								C
DRG	00471	1	1	0957	1217	750427	1655	1657	077								C
DRG	00471	1	1	1216	1476	750427	1657	1658	077								C
							1658	1700	077								C
DRG	00471	1	1	1475	1520	750427	1700	1700	077								C
DRG	00471	2	1	0180	0440	750427	1718	1720	077	0	1	1	0	0	0	0	C
DRG	00471	2	1	0439	0699	750427	1720	1721	077	0	1	1	0	0	0	0	C
							1721	1723	077	0	1	1	0	0	0	0	C
DRG	00471	2	1	0698	0958	750427	1723	1725	077								C
							1725	1725	077								C
DRG	00471	2	1	0957	1217	750427	1725	1728	077								C
DRG	00471	2	1	1216	1468	750427	1728	1729	077								C
							1729	1731	077								C

NO DATA SIGNIFIES
MASTER DATA TAPE BEING PROCESSED

Figure 2-2. Report 70 - Available Master Data Tapes

RP71 STATUS OF SMS VISSR DATA USER REQUESTS

DATE FEBRUARY 08,1977 ME02 (SMS-2)

Y = YES N = NO I = IR ONLY
U = UNPRO V = VIS

LOC.	REQ NO.	RECORD STATION	ANALOG TAPE NUMBER	SUBSEQUENT REQUESTS	PICT.	DATE OF DATA	TIME COVERAGE START	TIME COVERAGE STOP	PRIORITY 9 = COMPLETE	PED TAPE AVAILABLE	MDT TAPE AVAILABLE	VISSR TYPE	COMMENTS
	044	DRG	00561	C	5	750507	0000	0014	9	Y	Y	I	
	015	DRG	00562		1	750507	0015	0029	9	Y	Y	V	LS,1,2,3
	031	DRG	00562	A	1	750507	0015	0029	9	Y	Y	V	LS,1,2,3
	044	DRG	00562	B	1	750507	0015	0029	9	Y	Y	I	
	015	DRG	00562		2	750507	0030	0044	9	Y	Y	V	LS,1,2,3
	031	DRG	00562	A	2	750507	0030	0044	9	Y	Y	V	LS,1,2,3
	044	DRG	00562	B	2	750507	0030	0044	9	Y	Y	I	
	015	DRG	00562		3	750507	0045	0059	9	Y	Y	V	LS,1,2,3
	031	DRG	00562	A	3	750507	0045	0059	9	Y	Y	V	LS,1,2,3
	044	DRG	00562	B	3	750507	0045	0059	9	Y	Y	I	
	015	DRG	00562		4	750507	0100	0114	9	Y	Y	V	LS,1,2,3
	031	DRG	00562	A	4	750507	0100	0114	9	Y	Y	V	LS,1,2,3
	044	DRG	00562	B	4	750507	0100	0114	9	Y	Y	I	
	015	DRG	00562		5	750507	0115	0129	9	Y	Y	V	LS,1,2,3
	031	DRG	00562	A	5	750507	0115	0129	9	Y	Y	V	LS,1,2,3
	044	DRG	00562	B	5	750507	0115	0129	9	Y	Y	I	
	015	DRG	00563		1	750507	0130	0144	9	Y	Y	V	LS,1,2,3
	031	DRG	00563	A	1	750507	0130	0144	9	Y	Y	V	LS,1,2,3
	044	DRG	00563	B	1	750507	0130	0144	9	Y	Y	I	
	015	DRG	00563		2	750507	0145	0159	9	Y	Y	V	LS,1,2,3
	031	DRG	00563	A	2	750507	0145	0159	9	Y	Y	V	LS,1,2,3
	044	DRG	00563	B	2	750507	0145	0159	9	Y	Y	I	
		DRG	00563		3	750507	0216	0231					
		DRG	00563		4	750507	0245	0301					
		DRG	00563		5	750507	0316	0331					
STO		DRG	00564		1	750507	0346	0401					
STO		DRG	00564		2	750507	0416	0431					
STO		DRG	00564		3	750507	0446	0501					
STO		DRG	00564		4	750507	0516	0531					
STO		DRG	00564		5	750507	0546	0601					

LOCATION OF ANALOG TAPE
BLANK = AT TS&SF
STO = AT FEDERAL RECORDS
TSF = RETURNED TO TS&SF

THE REQUEST NUMBER APPEARS ON EACH LIST OF TAPES AUTHORIZED FOR PROCESSING BY CODE 911

BLANKS IN THESE COLUMNS INDICATE TAPES NOT REQUESTED FOR PROCESSING

PRIORITY ASSIGNMENTS ARE FROM A-Z WITH "A" BEING THE HIGHEST PRIORITY

Figure 2-3. Report 71 - Status of VISSR Data User Request

available Master Data Tapes and Report number 71 shows the status of VISSR data user requests. These reports aid the analyst in determining the status and disposition of tapes processed.

The following are procedures for numbering and labeling of SMS VISSR Buffer and Pre-edit data tapes. An example of the Picture Numbering System is shown in Figure 2-4.

- Starting from the left position the first four digits contain the analog tape number (units, tens, hundreds, and thousands). The high order position of the analog tape number is not included. Any leading zeros are included.

- The fourth position is the picture number on that analog tape that was processed. Normally there can be up to five pictures on an analog tape.

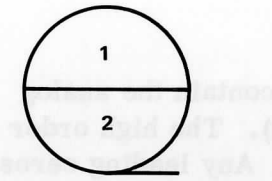
- The fifth position is the picture reel number. This is a sequential number starting with '1' and increased each time a new output reel is started (per picture). The amount of data on an output reel is limited to 260 scan lines per tape. If more than 260 scan lines are to be processed in a given section, the analyst must schedule the appropriate number of output reels.

- The sixth position is the section number of that picture. If the entire picture (all 12-18 minutes) is to be processed, the section number is to be '1'. If only pieces of the picture are to be processed, each piece is assigned a different section number starting with '1'. Subsequent pieces of sections are to be given the next unused section number. Redo's of previous sections are to be given the same section number as the origianl.

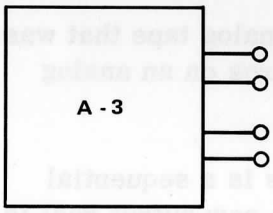
- When IR data are processed, the section number is zero ('0') for both complete picture and partial sections. If a partial section is redone for the scan lines, the section number is zero. If subsequent sections are requested after one section has been processed, the entire IR picture must be processed with a section number of '0'. Occasionally, the number of sections processed for a given picture will exceed nine. When this occurs the analyst should contact the Data Accounting Office for further instructions.

- The seventh position is the section file number. This number is a sequential file number indicating the number of reels output for each section.

PICTURE NUMBERING SYSTEM EXAMPLE



ANALOG TAPE #0003 PICTURE 2 PROCESS FROM SCAN LINE 0000 - 0450 AND 700 - 1100.



SCAN		BUFFER#				
START	STOP	ANALOG TAPE #	PICTURE #	PICTURE REEL #	SECTION #	SECTION FILE
0000	0260	003	2	1	1	1
0250	0450	003	2	2	1	2
0700	0960	003	2	3	2	1
0950	1100	003	2	4	2	2

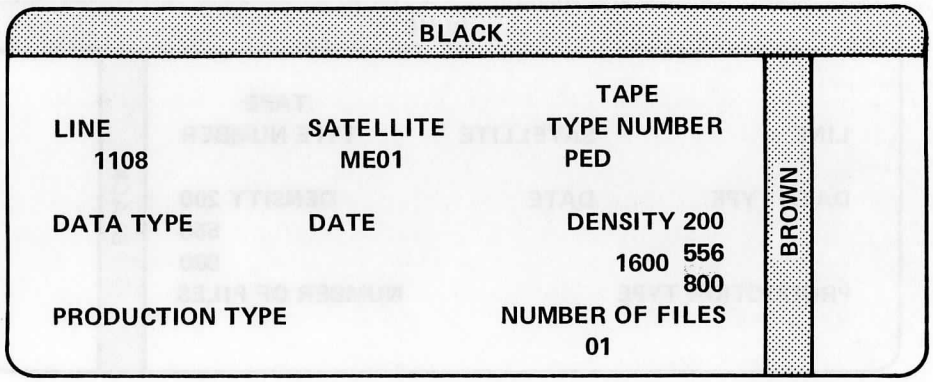
If at a later date, a redo is done for scan lines 0250 - 0450, the buffer # is 003 2 2 1 2.

Figure 2-4. Picture Numbering System

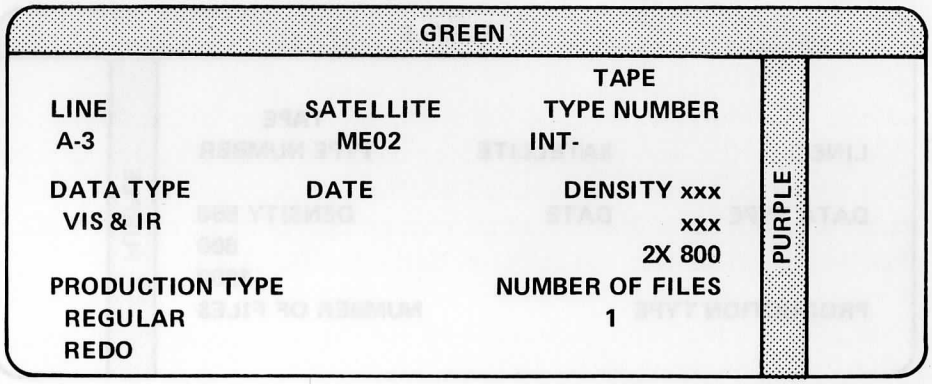
If a redo of non-IR data is requested for a section file covering approximately the same scan line area, the original buffer number is re-assigned. If any other redo is requested, the next unused section number should be used. If data are requested during a limited scan recording, both IR and Visible data must be digitized even though the request calls for IR data only.

The following labels have been generated by the Data Processing Branch for use in processing VISSR data.

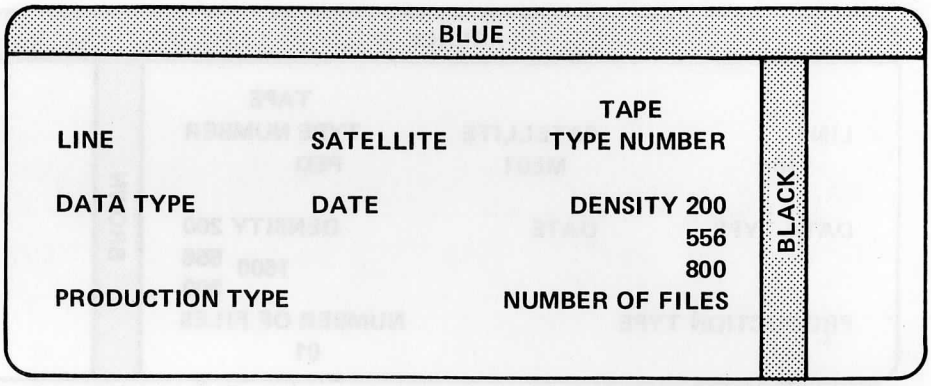
Intermediate Labels (SMS-1)



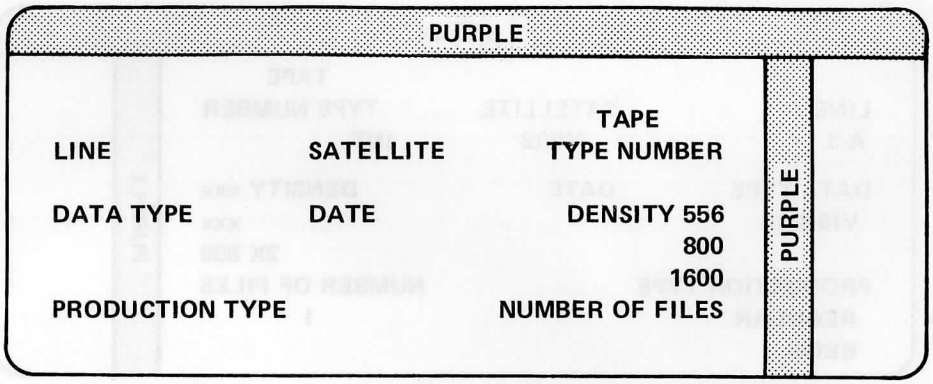
Intermediate Label (SMS-2)



Intermediate Label (GOES-1)



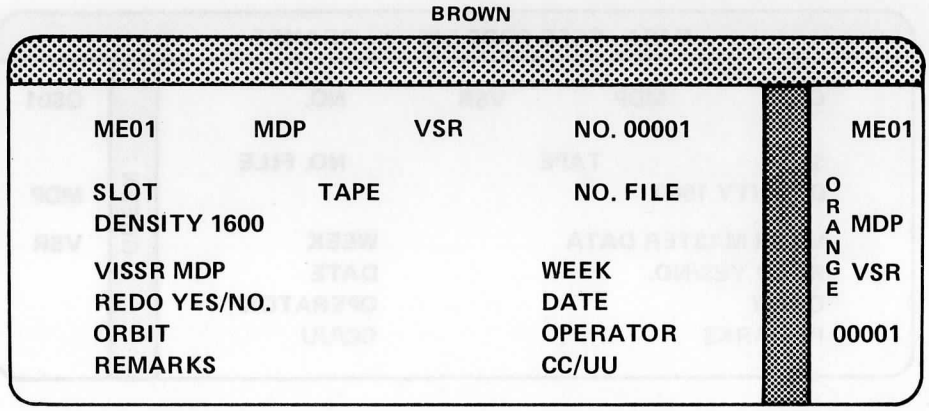
Intermediate Label (GOES-B)



The following tape labels have been generated by the Telemetry Computation Branch for use in processing VISSR data:

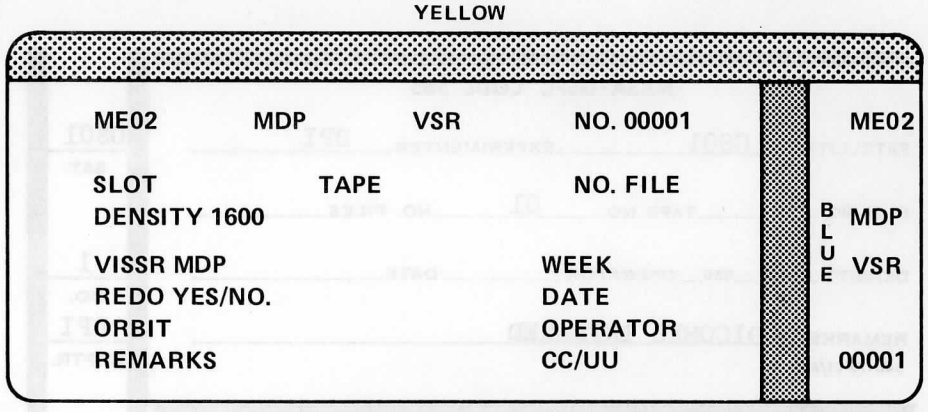
Intermediate Labels (SMS-1)

MDP (Master Data Tape for the VISSR) Example



Intermediate Labels (SMS-2)

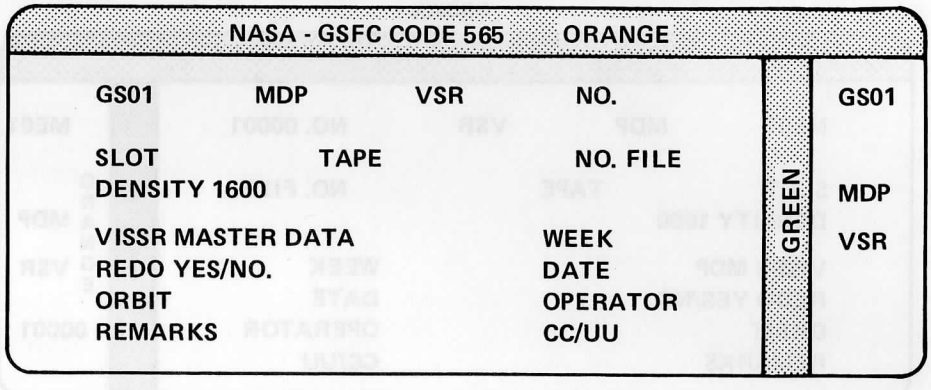
MDP (Master Data Tape for the VISSR) Example



Intermediate Labels (GOES-1)

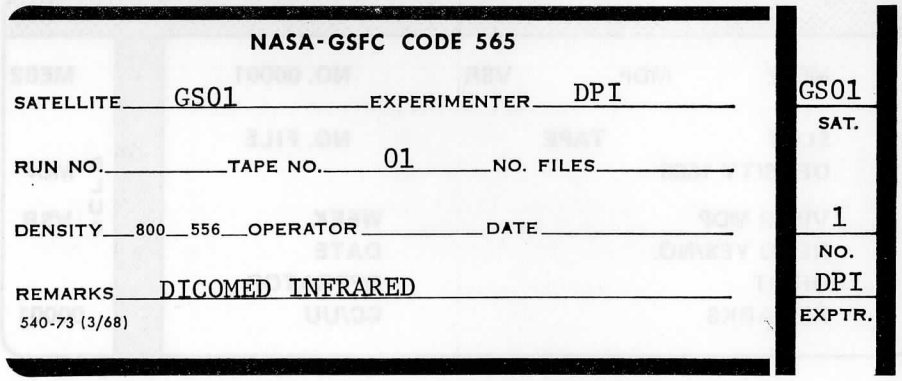
MDP (Master Data Tape for VISSR)

vertical = GP 264-G
horizontal = GP 204-Y
example



TYPE 2 Decom (VISSR Data)

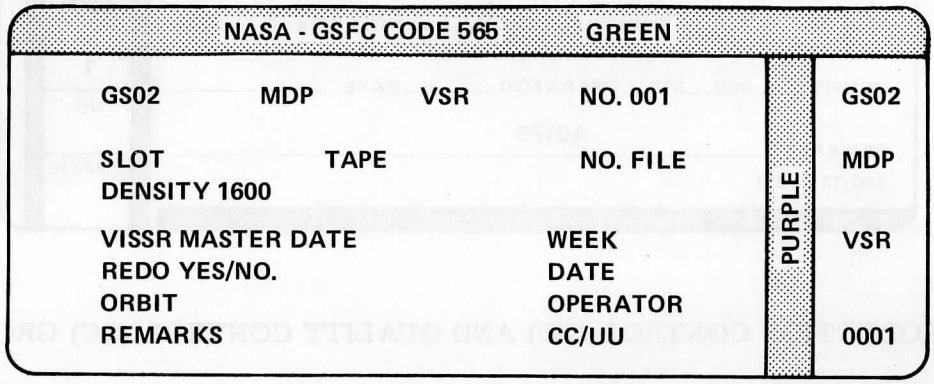
vertical = black
horizontal = black
example



Intermediate Labels (GOES-B)

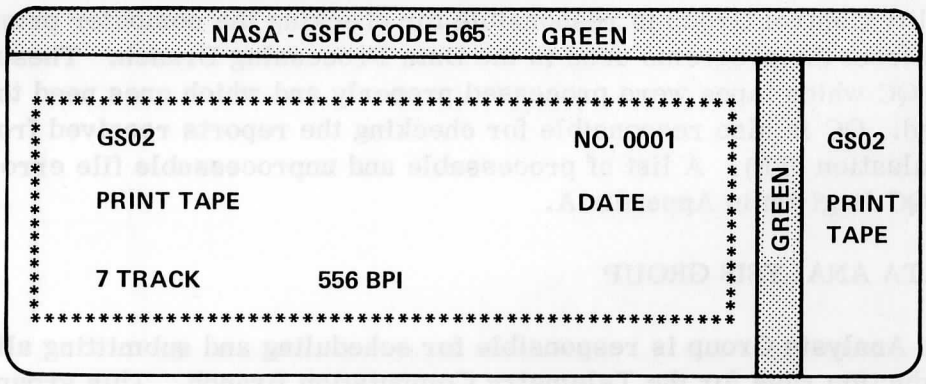
MDP (Master Data Tape for VISSR)

vertical = GP 231-P
horizontal = GP 264-G
example



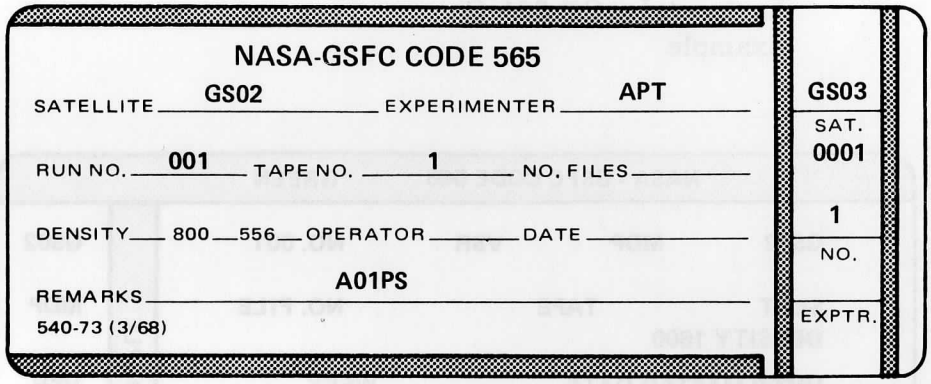
PRT (Print Tape)

vertical = GP 264-G
horizontal = GP 264-G
example



EXP (Experimenter Tape)

vertical = GP 267-G
horizontal = GP 267-G



2.3 PRODUCTION CONTROL (PC) AND QUALITY CONTROL (QC) GROUP

The Production Control Group is responsible for scheduling and submitting analog tapes to the processing lines for digitization. PC receives a list of the analog tapes along with a copy of their post pass summary. With this information, PC is able to prepare a digitization schedule with the analog tapes grouped together. The PC then prepares an "Analog Tape Request" which is used to request analog tapes to be brought to the processing line for digitization. PC also prepares code 02R cards for computer input and receives code 05D cards from the computer. All tapes processed incorrectly or with errors are scheduled for redigitization.

The Quality Control Group is responsible for checking the computer printouts received from the programs used in the Data Processing Branch. These printouts tell QC which tapes were processed properly and which ones need to be processed. QC is also responsible for checking the reports received from Tape Evaluation (TE). A list of processable and unprocessable file error codes used by QC is given in Appendix A.

2.4 DATA ANALYSIS GROUP

The Data Analysis Group is responsible for scheduling and submitting all of the SMS production runs for the Telemetry Computation Branch. This group also validates the output and distributes it as required. The Data Analysis Group maintains a VISSR status report shown in Figure 2-5. This report is generated

CODE 565 SMS/GOES PROCESSING SUMMARY
STATUS DATE: 770203

HEADING LEGEND

RQNM	REQUEST NUMBER	ITSAVA	ITEMS AVAILABLE FOR PROCESSING
P	REQUEST PRIORITY	ITSSHP	ITEMS SHIPPED
SATELL	SATELLITE NAME	ITSRSH	ITEMS RESHIPPED BY CODE 565
SUBDAT	REQUEST SUBMISSION DATE	A%P	% AVAILABLE OF PROCESSABLE ITEMS
OUTTYP	REQUESTED OUTPUT TYPE	S%P	% SHIPPED OF PROCESSABLE ITEMS
ITSREQ	ITEMS REQUESTED	S%A	% SHIPPED OF ITEMS AVAILABLE
ITSUNP	ITEMS UNPROCESSABLE	REM-HR	ESTIMATED REMAINING 1108 PROCESSING HOURS
ITS564	ITEMS SUBMITTED TO CODE 564 FOR REDO		

RQNM	P	SATELL	SUBDAT	OUTTYP	ITSREQ	ITSUNP	ITS564	ITSAVA	ITSSHP	ITSRSH	A%P	S%P	S%A	REM_HR	REMARKS
R 01		SMS-1	750227	IDAMS	18	0	0	18	18	0	100	100	100	.0	50217
R 01		SMS-1	750227	CELCO	24	0	0	24	24	0	100	100	100	.0	
R 01		SMS-1	750530	EXHIST	2	0	0	20	20	0	100	100	100	.0	9 TRACK, 800 BPI TAPES FOR T. HAIG
R 01		SMS-2	750227	IDAMS	18	0	0	18	18	0	100	100	100	.0	
R 01		SMS-2	750227	CELCO	24	0	0	24	24	0	100	100	100	.0	
R 01		SMS-2	750530	EXHIST	24	0	0	24	24	0	100	100	100	.0	9 TRACK, 800 BPI TAPES FOR T. HAIG
R 01		REQ. TOTALS			128	0	0	128	128	0	100	100	100	.0	
R 02		SMS-1	750530	IDAMS	2	0	0	2	2	0	100	100	100	.0	50506
R 02		SMS-1	750530	CELCO	2	0	0	2	2	0	100	100	100	.0	
R 02		SMS-1	750530	EXHIST	2	0	0	2	2	0	100	100	100	.0	7 TRACK,556 OR 800 BPI TAPES FOR B.ISLEY
R 02		REQ. TOTALS			6	0	0	6	6	0	100	100	100	.0	
R 03		SMS-2	750729	EXHIST	2	0	0	2	2	0	100	100	100	.0	9 TRACK, 1600 BPI TAPES FOR D. HELFER
R 03		SMS-2	750729	CELCO	1	0	0	1	1	0	100	100	100	.0	50506
R 03		REQ. TOTALS			3	0	0	3	3	0	100	100	100	.0	
R 04		SMS-1	750729	CELCO	3	0	0	3	3	0	100	100	100	.0	50217
R 04		REQ. TOTALS			3	0	0	3	3	0	100	100	100	.0	
R 05		SMS-1	750301	IDAMS	38	20	0	18	18	0	100	100	100	.0	40912
R 05		SMS-1	750301	CELCO	38	20	0	18	18	0	100	100	100	.0	
R 05		REQ. TOTALS			76	40	0	36	36	0	100	100	100	.0	
R 5R		SMS-1	750326	IDAMS	8	0	0	8	8	0	100	100	100	.0	40912
R 5R		SMS-1	750326	CELCO	8	0	0	8	8	0	100	100	100	.0	
R 5R		REQ. TOTALS			16	0	0	16	16	0	100	100	100	.0	
R 06		SMS-1	750622	IDAMS	23	1	0	22	22	0	100	100	100	.0	41112-13
R 06		SMS-1	750622	CELCO	23	1	0	22	22	0	100	100	100	.0	
R 06		REQ. TOTALS			46	2	0	44	44	0	100	100	100	.0	
R 07		SMS-1	750630	IDAMS	30	2	0	28	28	0	100	100	100	.0	41118-19
R 07		SMS-1	750630	CELCO	30	2	0	28	28	0	100	100	100	.0	
R 07		REQ. TOTALS			60	4	0	56	56	0	100	100	100	.0	
R 08		SMS-1	750630	IDAMS	403	6	0	397	397	0	100	100	100	.0	40831-0901, 37 IDAMS DELETED BY CODE 900
R 08		SMS-1	750630	CELCO	438	6	0	432	432	0	100	100	100	.0	
R 08		REQ. TOTALS			841	12	0	829	829	0	100	100	100	.0	

Figure 2-5. VISSR Status Report

CODE 565 SMS/GOES PROCESSING SUMMARY
STATUS DATE: 770203

RQNM	P	SATELL	SUBDAT	OUTTYP	ITSREQ	ITSUNP	ITS564	ITSAVA	ITSSHP	ITSRSH	A%P	S%P	S%A	REM-HR	REMARKS
R104	A	SMS-1	77?201	AOIPS	2	0	0	2	0	0	100	0	0	.3	51217, REF:REQ 01
R104	A	SMS-2	77?201	AOIPS	2	0	0	2	0	0	100	0	0	.3	
R104		REQ.	TOTALS		4	0	0	4	0	0	100	0	0	.6	
R997		ATS-6	751201	XHIST	10	0	0	10	10	0	100	100	100	.0	
R997		REQ.	TOTALS		10	0	0	10	10	0	100	100	100	.0	
R998		ATS-6	75 918	DICOM	32	0	0	32	32	0	100	100	100	.0	
R998		REQ.	TOTALS		32	0	0	32	32	0	100	100	100	.0	
R999		SMS-2	760608	CELCO	15	0	2	15	13	0	100	87	87	.3	SPECIAL SCALING PICTURES FOR CODE 900
R999		REQ.	TOTALS		15	0	0	15	13	0	100	87	87	.3	
R100		ATS-6	76?218	IDAMS1	0	0	0	0	0	0	0	0	0	.0	1245 IDAMS DELETED BY CODE 900
R101		ATS-6	76?218	DICOM	3446	0	0	3446	3109	114	100	90	90	33.7	
R200		ATS-6	76?218	XHIST	750	0	0	750	619	14	100	83	83	13.1	
R000		REQ.	TOTALS		4196	0	0	4196	3728	128	100	89	89	46.8	
		IDAMS	TOTALS		2416	134	0	2282	2282	43	100	100	100	.0	
		CELCO	TOTALS		6570	290	19	5902	5818	82	94	93	99	69.3	
		EXHIST	TOTALS		403	25	0	378	373	0	100	99	99	.8	
		AOIPS	TOTALS		2309	80	13	1871	1819	57	84	82	97	61.5	
		XHIST	TOTALS		760	0	0	760	629	14	100	83	83	13.1	
		IDAMS1	TOTALS		0	0	0	0	0	0	0	0	0	.0	
		DICOM	TOTALS		3478	0	0	3478	3141	114	100	90	90	33.7	
		SMS-1	TOTALS		4478	211	6	3605	3585	4	84	83	98	108.3	
		SMS-2	TOTALS		5602	282	26	5248	5209	166	99	98	99	16.6	
		GOES-1	TOTALS		1618	36	0	1580	1538	12	100	97	97	6.6	
		ATS-6	TOTALS		4238	0	0	4238	3770	128	100	89	89	46.8	
		GRAND	TOTALS		15936	529	32	14671	14062	310	95	91	96	178.3	

Figure 2-5. VISSR Status Report (Continued)

by the analyst to maintain a continuous status of each data type from all requests made by the users. All problems should be stated in the comments field. The "Edit Release Form" (Figure 2-6) is used to release data files to code 565. The original copy is kept by the data analyst, the first copy is given to the Data Processing Specialist, the second copy goes to QC, and the third copy goes to the Production Specialist.

EDIT RELEASE FORM

Project SMS/GOES VISSR Group/Orbit Number 2657.6 Record Dates 2/11/77 To / /

No. Tapes Scheduled 1 No. Files Processed 2 Date Processed 3/15/77

No. Files Tape Evaluated ____ No. Files Deleted ____ No. Files Unpro ____

No. Files Reprocessed ____ No. Code / / / / / / / / / / /

No. Files Improved ____ No. Files / / / / / / / / / / /

No. of Files Received 2 No. Files Released 2 Date Released 3/21/77

No. of Files Released Below Criteria ____ Date Released from PEAS 3/22/77

Date Released from Code 564 3/22/77

Tape Number	Inv. Number	#FL/DL	Type	Tape Number	Inv. Number	#FL/DL	Type
2657.611	N09457H						
2657.612	PJ036F						

560-267 (10/75)

Figure 2-6. Edit Release Form

SECTION 3

VISSR DATA PROCESSING SYSTEM

3.0 VISSR DATA PROCESSING SYSTEM

The Data Processing System for processing Visible Infrared Spin-Scan Radiometer (VISSR) video data telemetered by the SMS/GOES satellites consists of an Analog-to-Digital (A/D) Conversion System along with several computer programs. The A/D Conversion System is used to convert raw telemetry data to digitized form, which is followed by more processing on a UNIVAC 1108 or CDC 3200 computer. The digitized data is then processed by a UNIVAC 1108 computer before being sent to the Atmospheric and Oceanographic Information Processing Facility.

NOTE: The current version of the UNIVAC 1108 pre-edit tape data processing program processes visible mode A and IR data. GMT time is not processed.

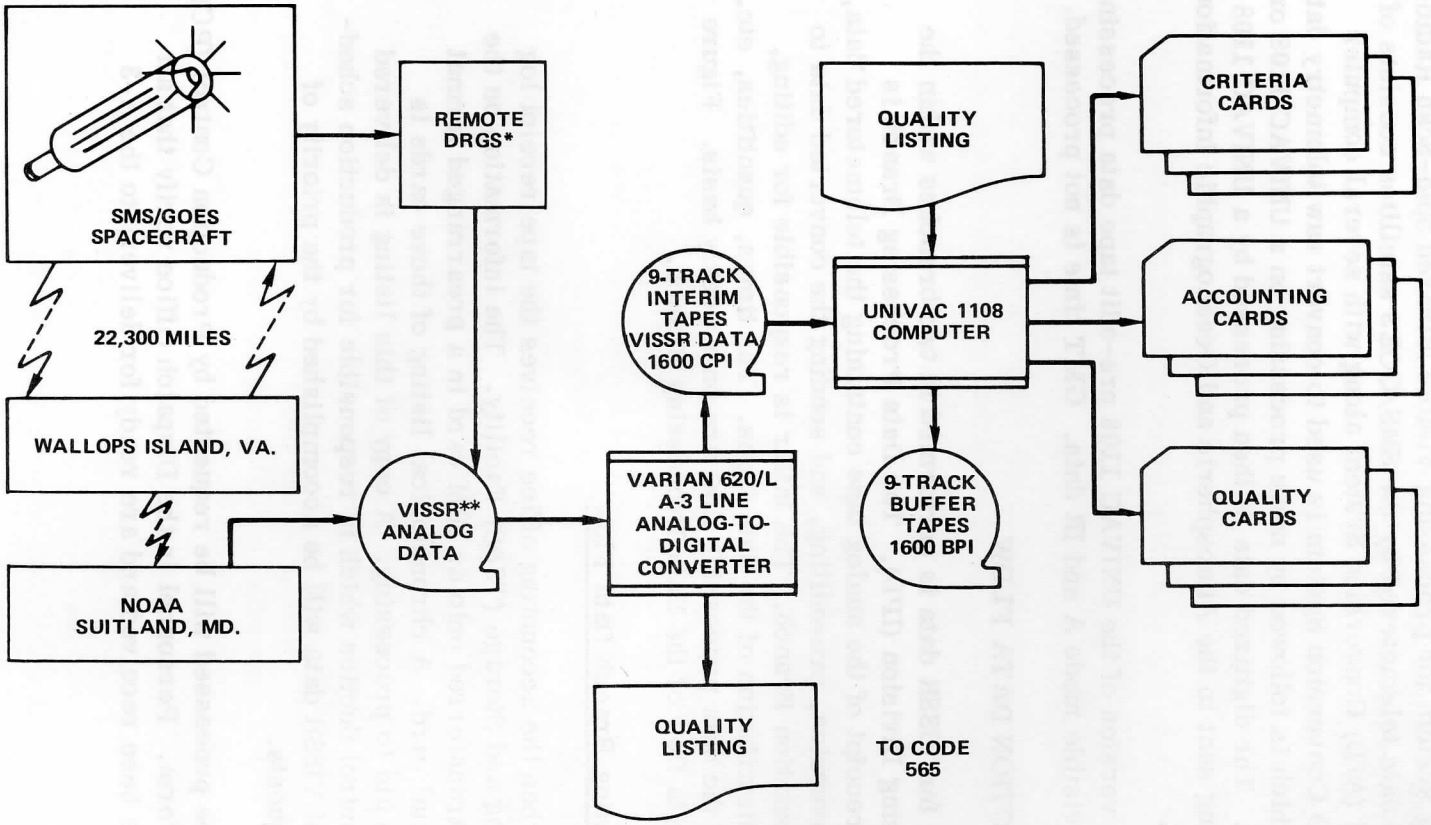
3.1 VISSR PRODUCTION DATA FLOW

The data processing for VISSR data is performed in two branches within the Information Processing Division (IPD). The Data Processing Branch is responsible for the receipt of the analog tape containing the telemetered data, accounting, A/D conversion, pre-editing, and sending the converted data to the Telemetry Computation Branch. The latter is responsible for editing, quality control and distribution of the data tapes. The times, quantities, etc., in the description of the data processing flow are on a weekly basis. Figure 3-1 illustrates the data flow of the Data Processing Branch.

3.1.1 Data Processing Branch Data Flow

Processing begins when the accounting office receives the tape receipt log from the Tape Staging and Storage (TS&S) Facility. The information on the tape receipt logs is transferred onto an IBM card in a prearranged format to form an O2R special card. A chronological listing of these cards is produced daily as an aid to processing. A copy of this listing is delivered to the Production Control Section which is responsible for production scheduling. Processing of VISSR data will be accomplished by the priority of outstanding user requests.

All analog tapes to be processed will be requested by Production Control (PC) on a Tape Request Form. Personnel in the Dispatch Office verify that all tapes requested have been received and are ready for delivery to the A-3 processing line.



*NOAA- NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION
WSP- WHITE SANDS
DRG- WESTINGHOUSE ELECTRIC CORPORATION
**GOES-B- ANALOG TAPES FROM NOAA ONLY

Figure 3-1. VISSR Data Processing Branch Data Flow

3.1.1.1 Pass I—Pass I of the Video Data Processing System will utilize the A-3 processing system to digitize the video analog data tapes. The A-3 processing system has a front-end that will be used as a high-speed A/D processor under control of a Varian 620/L computer. The A-3 front-end is composed of modular subsystems as shown in Figure 3-2 and the configuration of the Varian 620/L computer is shown in Figure 3-3. This system will also check hardware data status bits. The digitized data, and hardware status bits are buffered into the Varian 620/L computer and subsequently written on a 9-track digital tape at 1600 b/in.

The inputs of Pass I are analog data tapes and operator keyins from an ASR-35 teletype terminal. The analog data tapes may contain any one of four possible data modes (see Figure 3-4). These four data modes are defined as modes A, B, C, and D. All modes follow the same general format. The modes are distinguished by the picture data resolution, the bits per sample, and the number of allocated words per scan line. These distinguishing features are outlined in Tables 3-1 and 3-2.

The first portion of the data format, the pre-infrared, lasts for approximately 45 ms and consists of no data transmission. Both the 67.1-MHz carrier and the carrier modulation are eliminated during this period, and the system input is noise only.

Following the pre-infrared period and ending at the 120-ms point is the infrared (IR) portion of the format. This portion is transmitted at 524.16 kb/s (at 100 r/m) for all modes. The IR portion can be divided into three segments which are the PN sequence, Documentation (DOC) and Video data.

The PN sequence lasts 3762 bit times, and consists of a 15-bit pseudorandom noise (PN) sequence which ends with 15 ones followed by a zero. The PN sequence data is input into the frame synchronizer and is utilized only for frame synchronication. Following the PN sequence are 128 9-bit documentation words. The frame synchronizer and the simulator are concerned with only three of the IR documentation words. These are word 4 (frame code), word 6 (step code), and word 7 (data relay). All of the IR documentation words are described in Tables B-2 through B-3 of Appendix B. Following the documentation sequence are 3822 9-bit video data words. These words define the IR video for one complete line of picture data.

Beginning immediately after the IR data at the 120-ms point is the visible data. One of the four visible formats may be selected by the operator for simulation. (The pre-IR and IR portions of all four formats are identical.)

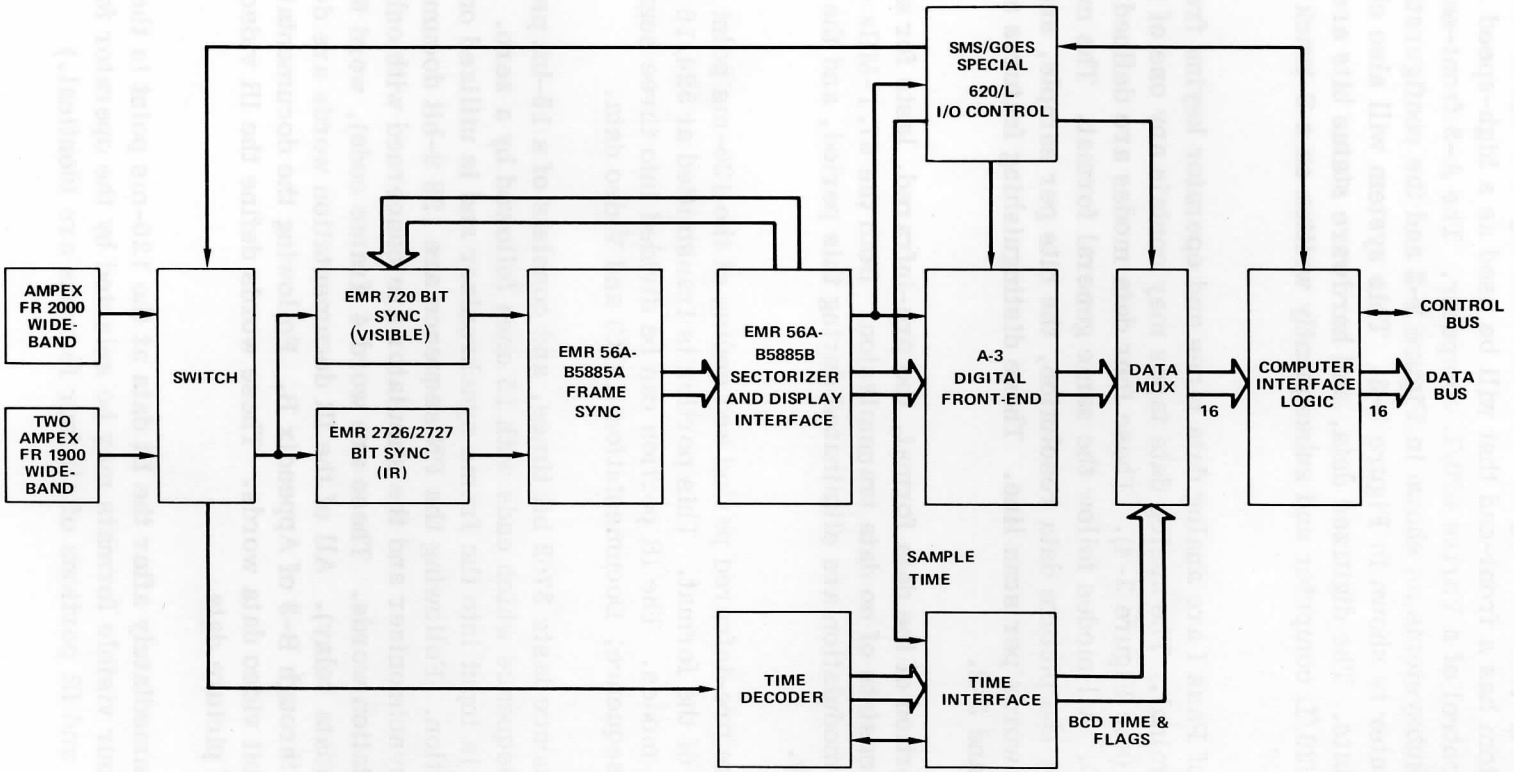


Figure 3-2. A-3 Processing System Front-End

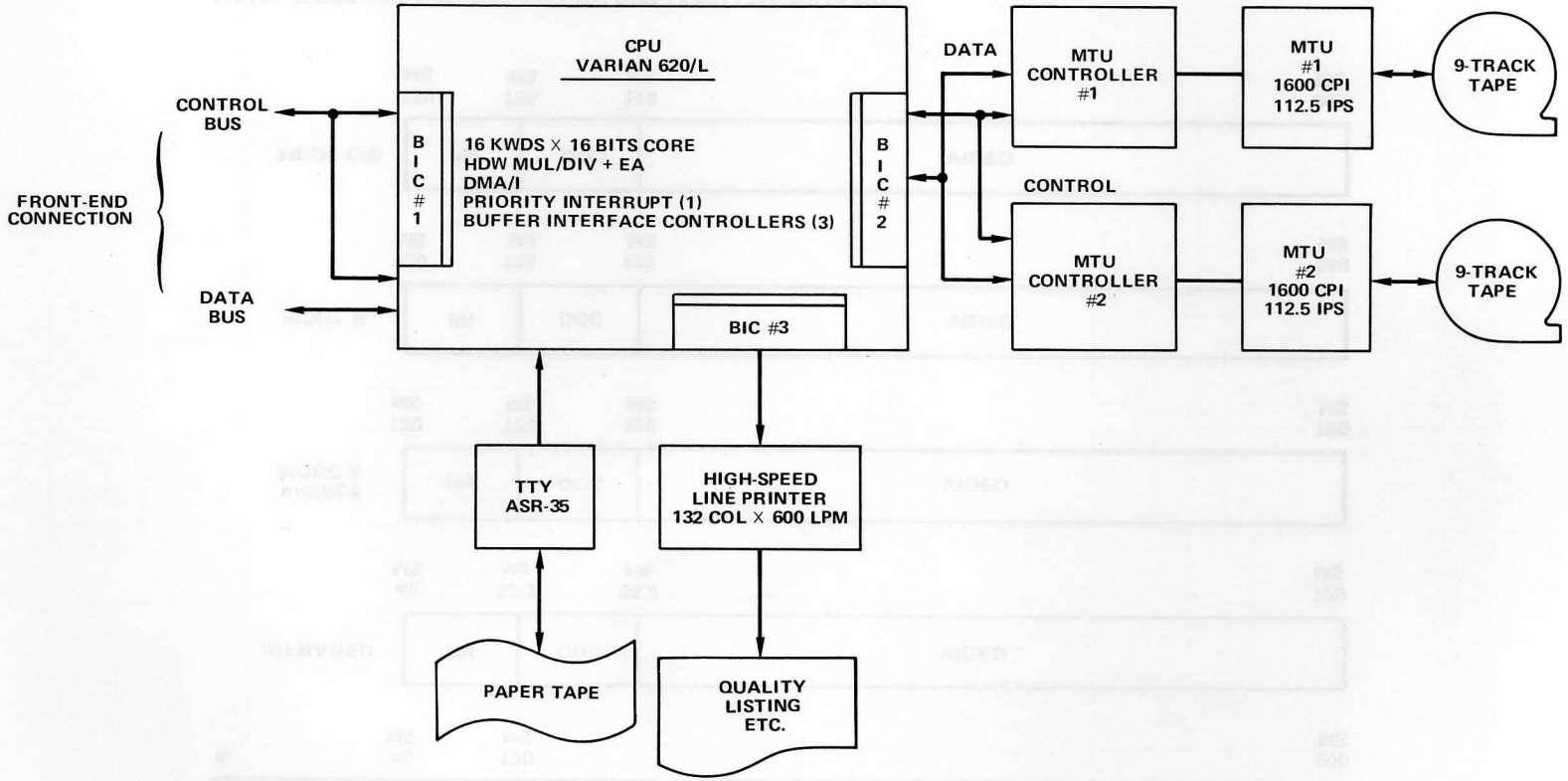


Figure 3-3. A-3 Processing System Computer Configuration

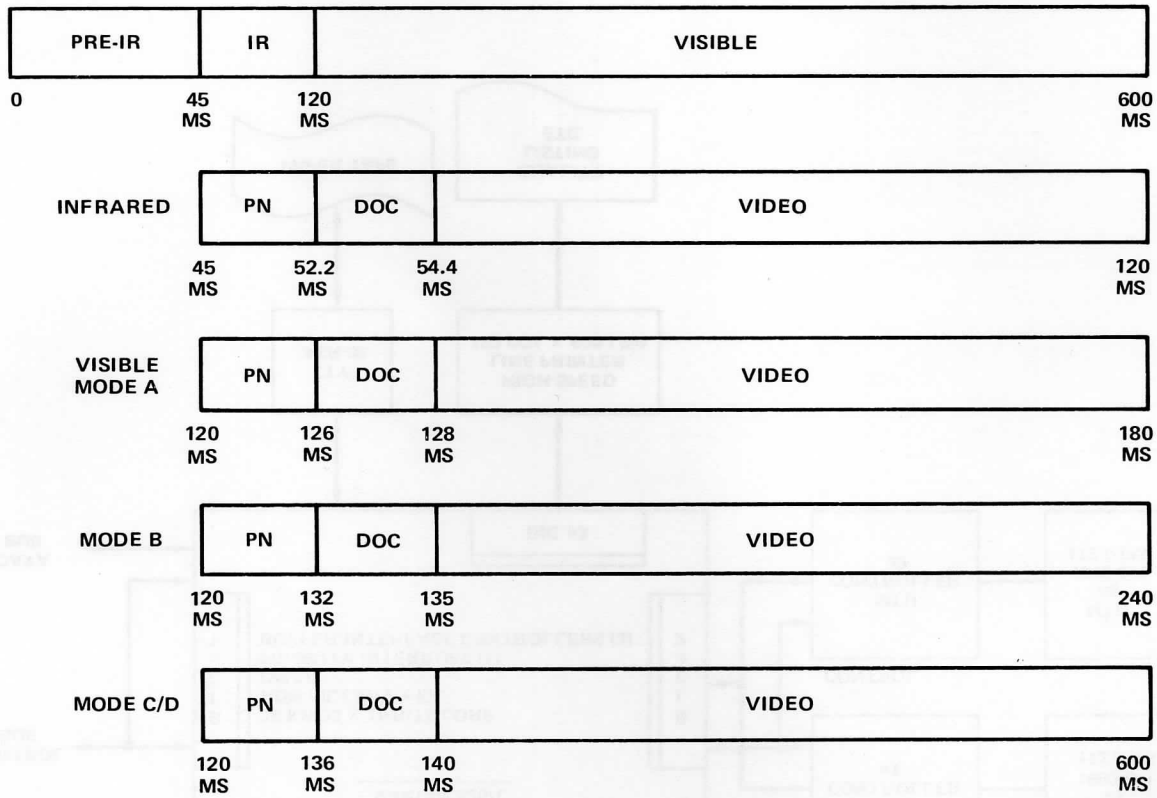


Figure 3-4. VISSR Data Modes

Table 3-1
VISSR Word Allocation

All Modes	Mode			
	IR	A	B	C/D
Initial Sync	418	1,672	836	69
Documentation	128	512	256	16
Video	3,822	15,288	7,644	1,911
Total	4,368	17,472	8,736	1,996

Table 3-2
VISSR Picture Data Retransmission Modes

Mode	Sensor	Resolution (miles)	Bits/Sample
A	Vis	1/2 × 1/2	6
B	Vis	1 × 1	6
C	Vis	4 × 4	8
D	Vis	4 × 4	8

The data contained in each segment for each mode are given in Table 3-3. In mode A, the video sequence is repeated for a total of eight times (lines) per 600-ms satellite rotation. In mode B, it is repeated four times per rotation. There is only one line per satellite rotation for modes C or D. At 100 r/m satellite rotation, the visible bit rate will be 1.7472 Mb/s for mode A, 436.8 kb/s for mode B, and 33.28 kb/s for mode C/D.

Table 3-3
VISSR Data per Mode

Mode	A	B	C/D
Pn Sequence	10032 bits	5016 bits	552 bits
Documentation	512 6-bit words	256 6-bit words	16 8-bit words
Video	15288 6-bit words	7644 6-bit words	1911 8-bit words

The output of PASS I will consist of 9-track multi-file digital tapes (Digital Buffer tape). Each data file will contain a tape file label, data records and a single end-of-file mark. Double end-of-file marks will be used to indicate the end of a buffer data tape. The data files on this tape may be a combination of the various data modes, however, the modes will not be mixed within a single file.

The first record of each buffer tape file will be a file label record containing 3957 16-bit computer words. The information in the tape file label records will be entered into the system through the ASR-35 teletype terminal. The label record will be followed by a varying number of data records. The record length of all intermediate output data records will be 7914 8-bit characters. The format for the tape file label and a complete data format summary for all the various data modes and data segments are shown in Tables B-6 through B-8 and Figure B-1 of Appendix B.

A brief data quality summary will be produced by PASS I at the end of each processed data file. The PASS I Quality Control (QC) Summary Report is shown in Figure 3-5.

Operating procedures for PASS I processing are started by mounting a reel of analog data on one of the two FR1900 analog tape drives or the FR2000 tape drive and setting the tape drive speed to 60 in./s. The A-3 line operator then loads into the Varian 620/L Computer the PASS I portion of the VISSR data processing

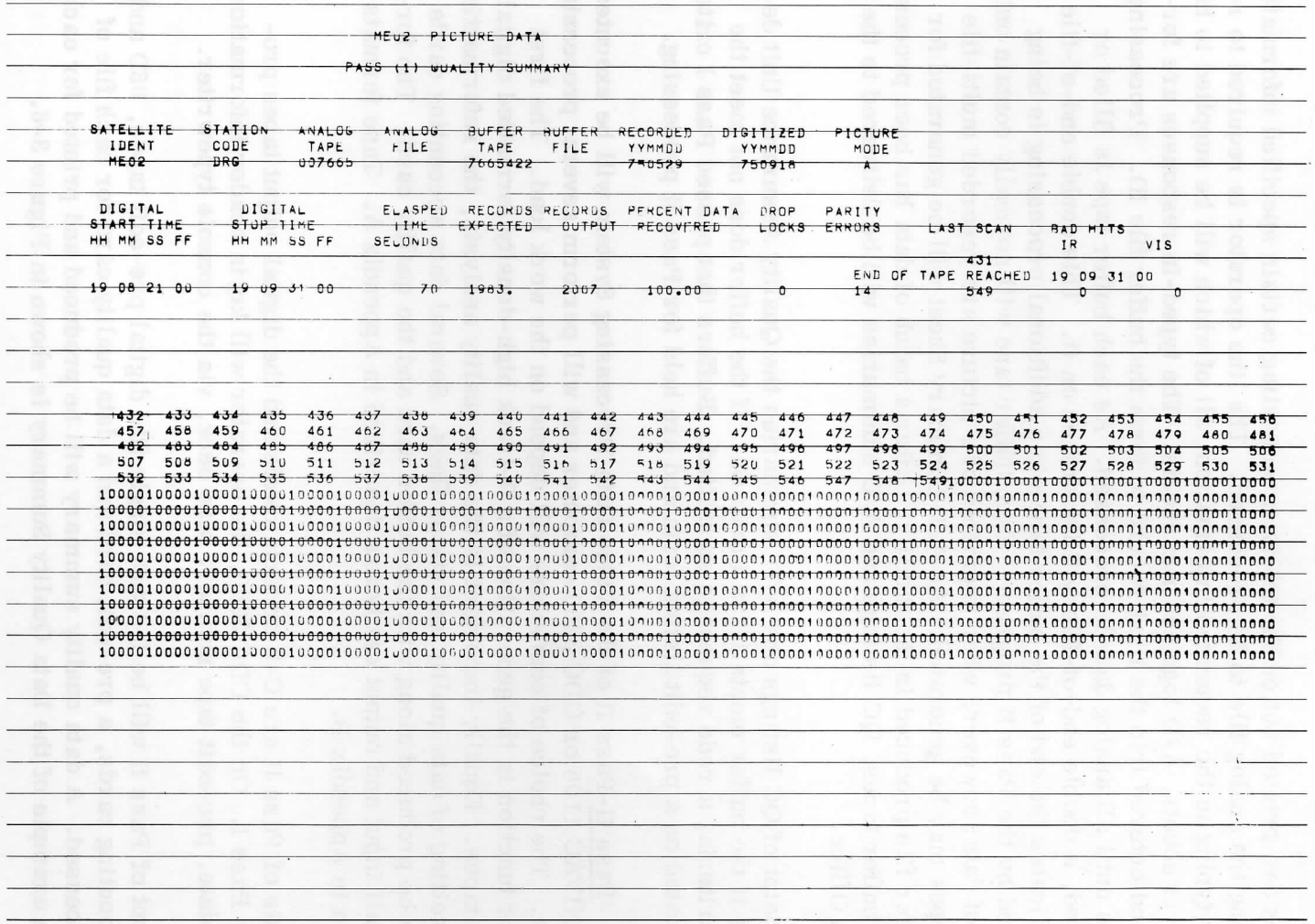


Figure 3-5. VISSR Pass I Program Data Quality Summary Sample Printout

program which controls the interface and other electronics incorporated into the processing line.

Messages are printed out on the teletype requesting certain specified information concerning the analog file to be processed. The line operator is required to respond by typing in the requested information, all of which will be supplied to him via request sheets, A/D logs and run sheets. The typed-in responses are formatted and entered into the first record to form the buffer file ID. Processing continues until all analog data is processed. As each buffer tape is filled or terminated, a double end-of-file will be written on it. This double end-of-file mark indicates the end of the buffer tape when additional processing is being performed by the Pass II program. Each buffer tape will normally contain only one file of data; however, when segments of a picture are recorded multi-file buffer tapes may be generated. An A/D Summary Sheet will be generated for each buffer file produced in the facility. After a batch of data has been processed, all buffer tapes, QC listings and A/D summaries will be delivered to the Dispatch Office.

Upon receipt of QC listings and A/D summaries the Quality Assurance Unit determines if the buffer meets PASS I criteria. If the buffer does not meet the quality criteria, a redo request is submitted. Buffers that passed Pass I criteria are indicated on a pre-edit listing form and are held for Pass II processing.

3.1.1.2 Pass II-Pass II of the Video Data Processing System will be executed on the UNIVAC 1108 or CDC 3200 computer and will perform several processing functions. The choice of computers will depend on the work load. The first important function is the generation of a 9-track high-density formatted digital pre-edit tapes. Equally important is the data quality analysis, the reformatting and the setting of data quality and status flags. Several data accounting cards will also be produced along with the buffer card and the quality card. The formats of all input and output cards are described in Appendix A. Tape formats are given in Appendix B.

The inputs of Pass II are C-2 criteria cards and the digital output tapes produced by Pass I. On the CDC 3200, the operator will keyin header information such as date, pre-edit tape number, tape deck, via the console typewriter.

The output of Pass II will be 9-track single file digital pre-edit tapes, 05D and 07B accounting cards, a pre-edit card and a data quality card for each file of data processed. A data quality summary will be produced and printed for each file. An example of the Data Quality Summary is shown in Figure 3-6.

SMS-B PICTURE DATA

PASS (2) QUALITY SUMMARY

DATE OF RUN 10/07/75

SATELLITE IDENT	STATION CODE	ANALOG TAPE	ANALOG FILE	RECORDED YY DDD	START SCAN LINE	STOP SCAN LINE	DIGITIZED YY DDD	ANALOG DECK	BUFFER TAPE	BUFFER FILE	PICTURE MODE
ME02	DRG	00770	2	75 149	0421	0549	75 267	A	7702111	1	A

I = INFRARED
A = MODE (A)
B = MODE (B)
C = MODE (C)

DIG BUFFER START TIME	DIG BUFFER STOP TIME	ELASPED TIME	PREDIT FILE START TIME	PREDIT FILE STOP TIME	ELASPED TIME	PREDIT TAPE	PREDIT FILE	LINE ID	OPER ID	DIGITAL SHIFT DECK	DIGITAL SHIFT NUM	BUFFER PARITY ERRORS
23 17 49	23 19 06	00 01 17	23 17 49	23 19 06	00 01 17	7702111	1	U1	N/A	1	3	0000

RECORDS INPUT	RECORDS OUTPUT	PERCENT DATA RECOVERED	PARTIAL RECORDS	FILL RECORDS	INCORRECT SCAN LINES	MISSING SCAN LINES	PERCENT PICT PROCESSED	TIME BIAS GMT VS DOC.	PREDIT PARITY ERRORS
02193	01161	100.00	N/A	N/A	0000	0000	7.08	N/A	0000

IR ERROR BITS PN SEQUENCE	TOTAL IR BITS PN SEQUENCE	PERCENTAGE OF IR ERROR BITS	VIS ERROR BITS PN SEQUENCE	TOTAL VIS BITS PN SEQUENCE	PERCENTAGE OF VIS ERROR BITS	DOC. TIME DISCONTINUE	GMT TIME DISCONTINUE
0000002	0489809	.00	0000099	10262679	.00	0000	N/A

---- COMPUTED ONLY FOR IR DATA ----

TIME DECODER FLAGS GOOD FLGS	BAD FLGS	PCENT BAD	WRONG LEN RECORDS	EST. PE FROM PN SEQUENCE	EST. S/N RATIO DB	FILE QUALITY INDEX	IR ERROR RECORDS	VISIBLE RECORDS	IR DATA RECORDS	DROP LOCKS
			0000				0000	1032	0129	0000
1 1161	00000	.00								
2 1161	00000	.00								
3 1161	00000	.00								
4 1161	00000	.00								
5 1161	00000	.00								
6 1161	00000	.00								

IR START TIME DDD HH MM SS	IR STOP TIME DDD HH MM SS	IR DEEP SPACE ERRORS WHOLE LINE	LEFT SIDE	RIGHT SIDE	VIS DEEP SPACE ERRORS WHOLE LINE	LEFT SIDE	RIGHT SIDE
149 23 17 49	149 23 19 06	0040	0040	0079	0000	0000	0000

CR2 CARD -- ME02A0529500002002020202050005002050005000500050005009000 74217C2

02R CARD -- ME02DRG0770 21C02R77021 5052923172319177021 1 0421 0549 XXXXXX 3050924

05D CARD -- ME02DRG0770 21C05D770211 300001 051007

07B CARD -- ME02DRG0770 21C07B770211 0

PRE CARD -- ME02 750529 DRG 007702 750924 1 1 1 1 1 1 1 149 231749 231906 A N 0421 0549 D VR

Q/H CARD -- ME02DRG007702C75149770211 0 8386983946116110000007080000000000000075267U1AQ

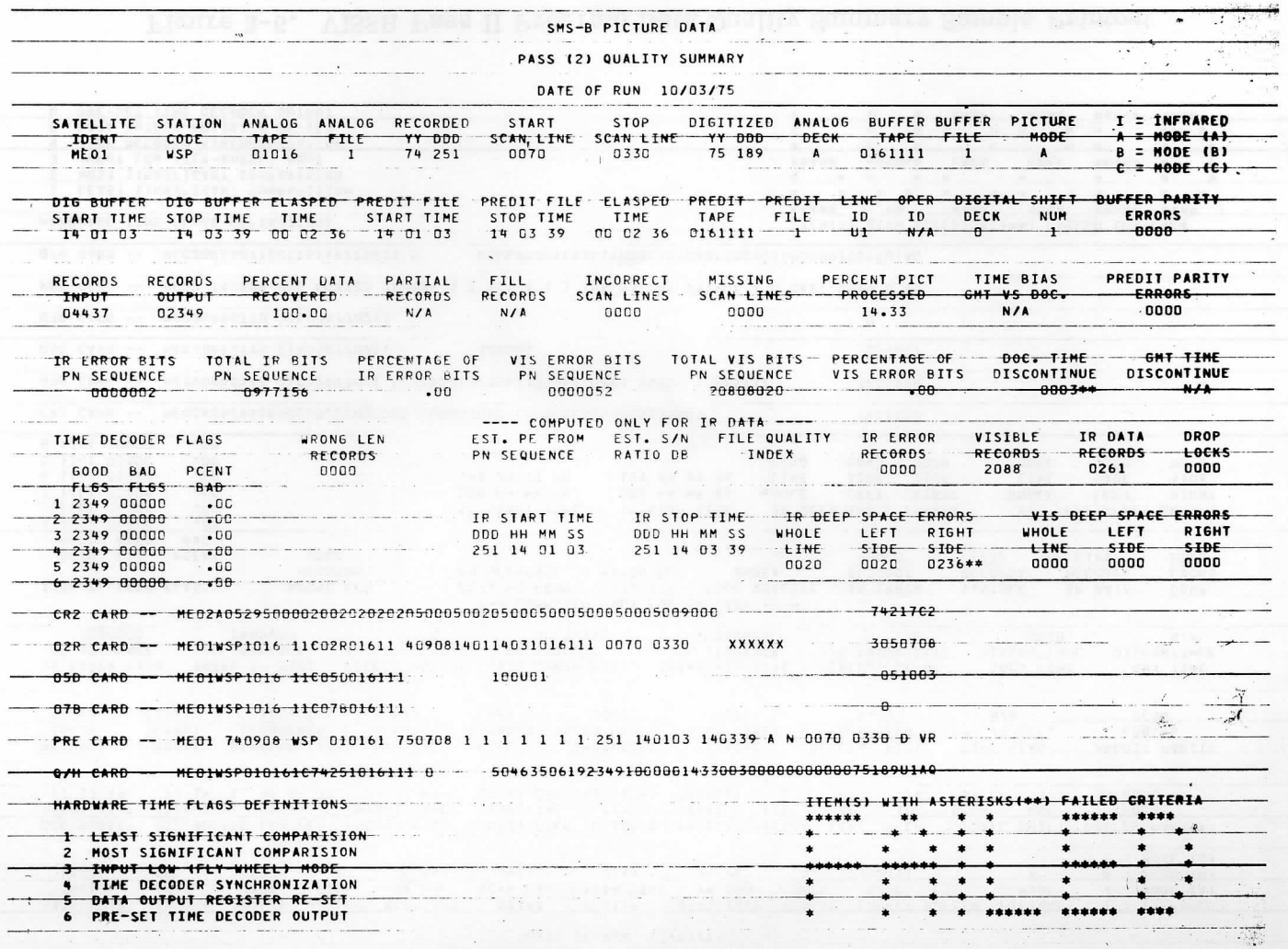
HARDWARE TIME FLAGS DEFINITIONS

1 LEAST SIGNIFICANT COMPARISION
2 MOST SIGNIFICANT COMPARISION
3 INPUT LOW (FLY-WHEEL) MODE
4 TIME DECODER SYNCHRONIZATION
5 DATA OUTPUT REGISTER RE-SET
6 PRE-SET TIME DECODER OUTPUT

ITEM(S) WITH ASTERISKS(**) FAILED CRITERIA

*****	**	****	****	*****	****					
*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*
*****	******	****	****	*****	*					
*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*
*	*	*	****	****	*****	****				

Figure 3-6. VISSR Pass II Program Data Quality Summary Sample Printout



SMS-B PICTURE DATA

PASS (2) QUALITY SUMMARY

DATE OF RUN 10/03/75

SATELLITE IDENT	STATION CODE	ANALOG TAPE	ANALOG FILE	RECORDED YY DDD	START SCAN LINE	STOP SCAN LINE	DIGITIZED YY DDD	ANALOG DECK	BUFFER TAPE	BUFFER FILE	PICTURE MODE
ME01	WSP	01016	1	74 251	0070	0330	75 189	A	0161111	1	A

I = INFRARED
A = MODE (A)
B = MODE (B)
C = MODE (C)

DIG BUFFER START TIME	DIG BUFFER STOP TIME	ELASPED TIME	PREDIT FILE START TIME	PREDIT FILE STOP TIME	ELASPED TIME	PREDIT TAPE	PREDIT FILE	LINE ID	OPER ID	DIGITAL DECK	SHIFT NUM	BUFFER PARITY ERRORS
14 01 03	14 03 39	00 02 36	14 01 03	14 03 39	00 02 36	0161111	1	U1	N/A	0	1	0000

RECORDS INPUT	RECORDS OUTPUT	PERCENT DATA RECOVERED	PARTIAL RECORDS	FILL RECORDS	INCORRECT SCAN LINES	MISSING SCAN LINES	PERCENT PICT PROCESSED	TIME BIAS GMT VS DOC.	PREDIT PARITY ERRORS
04437	02349	100.00	N/A	N/A	0000	0000	14.33	N/A	0000

IR ERROR BITS PN SEQUENCE	TOTAL IR BITS PN SEQUENCE	PERCENTAGE OF IR ERROR BITS	VIS ERROR BITS PN SEQUENCE	TOTAL VIS BITS PN SEQUENCE	PERCENTAGE OF VIS ERROR BITS	DOC. TIME DISCONTINUE	GMT TIME DISCONTINUE
0000002	0977156	.00	0000052	20808020	.00	0003**	N/A

---- COMPUTED ONLY FOR IR DATA ----

TIME DECODER FLAGS GOOD FLGS	BAD FLGS	PCENT BAD	WRONG LEN RECORDS	EST. PE FROM PN SEQUENCE	EST. S/N RATIO DB	FILE QUALITY INDEX	IR ERROR RECORDS	VISIBLE RECORDS	IR DATA RECORDS	DROP LOCKS
			0000				0000	2088	0261	0000
1 2349	00000	.00								
2 2349	00000	.00								
3 2349	00000	.00								
4 2349	00000	.00								
5 2349	00000	.00								
6 2349	00000	.00								

IR START TIME DDD HH MM SS	IR STOP TIME DDD HH MM SS	IR DEEP SPACE ERRORS WHOLE LINE	LEFT SIDE	RIGHT SIDE	VIS DEEP SPACE ERRORS WHOLE LINE	LEFT SIDE	RIGHT SIDE
251 14 01 03	251 14 03 39	0020	0020	0236**	0000	0000	0000

CR2 CARD -- ME02A0529500002002020202050005002050005000500050005009000 74217C2

02R CARD -- ME01WSP1016 11C02R01611 4090814011403101611 1 0070 0330 XXXXXX 3050708

05D CARD -- ME01WSP1016 11C05D016111 100001 051003

07B CARD -- ME01WSP1016 11C07B016111 0

PRE CARD -- ME01 740908 WSP 010161 750708 1 1 1 1 1 1 1 1 251 140103 140339 A N 0070 0330 D VR

Q/H CARD -- ME01WSP010161C74251016111 0 -- 5046350619234910000014330030000000000075189U1A0

HARDWARE TIME FLAGS DEFINITIONS

1 LEAST SIGNIFICANT COMPARISION
2 MOST SIGNIFICANT COMPARISION
3 INPUT LOW (FLY WHEEL) MODE
4 TIME DECODER SYNCHRONIZATION
5 DATA OUTPUT REGISTER RE-SET
6 PRE-SET TIME DECODER OUTPUT

ITEM(S) WITH ASTERISKS(**) FAILED CRITERIA

******		**		*	*		******	****		
*		*	*	*	*		*		*	*
*		*		*	*		*		*	*
******		******		*	*		******		*	*
*		*		*	*		*		*	*
*		*		*	*		*		*	*
*		*		*	*	******	******	****		

Figure 3-6. VISSR Pass II Program Data Quality Summary Sample Printout (continued)

The VISSR pre-edit tapes will have one file written in binary with odd parity. These pre-edit tapes will be 9-track tapes written at 1600 b/in. Each file will have a pre-edit file label, varying numbers of telemetry data records and an end-of-file indicator.

The first record of each digital pre-edit file will be a file label written in EBCDIC code. This label record will contain 22 36-bit (UNIVAC 1108) words. Following the label record there will be a number of data records. Each data record will contain 2638 36-bit computer words. A record size of 2638 words will allow the use of a common record length for all modes (A, B, C, or D) of data.

The composition of a scan line of picture data is dependent upon the data mode. This is true for all of the visible portions of the scan line. The first output record for each scan line will be the IR data record. This IR record is common to all data modes. The number of visible data records following the IR record is a function of the particular mode of data being processed. In mode A, there will be eight visible data records per scan line. In mode B, there will be four visible data records, and in modes C/D there will be only one visible data record per scan line.

A complete picture will consist of 1821 scan lines or frames of data. However, in most cases a portion of the picture will be processed rather than the entire 1821 scan lines. Therefore, the number of data records in a file will depend on the percentage of the picture being processed.

Some of the primary processing requirements of the SMS VISSR Pass II program are as follows:

- Each output record should be identified with a frame scan line counter, Doc. time, and the necessary data flags. The GMT time requirement has been dropped.

- A scan line of mode A data should be formatted into nine records.

- A complete scan line of mode B data should be formatted into five records.

- A complete scan line of mode C/D data should be formatted into two records.

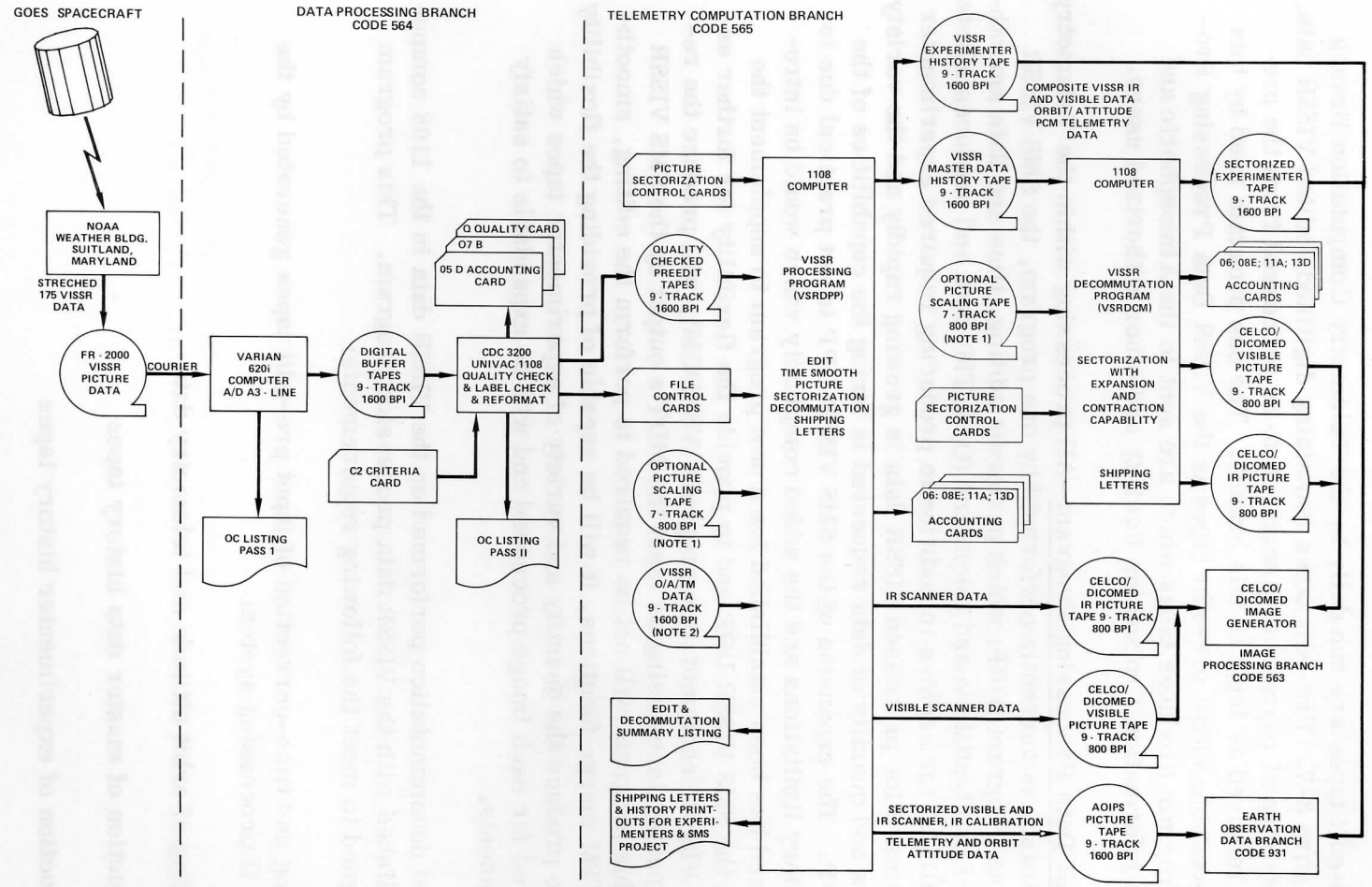
- Count partial lines processed.

- Count bit errors in PN sequence.
- Compute percent of picture processed.
- Flag incorrect scan line counters.
- Flag data dropouts.
- Flag partial frames.

Operating Procedures for Pass II processing begin with the loading of the SMS/GOES data processing program into the UNIVAC 1108 or CDC 3200, (Figure 3-7) and the mounting of buffer tapes and output tapes on the assigned tape drives. For each buffer tape that is processed a pre-edit tape is generated on a one to one ratio. The digital output tape is now labeled with the same color combination labels as those that identify the buffer tape. This output is now called a pre-edit tape and the pre-edit number is the same as the buffer tape number. Additional outputs from Pass II processing are QC listings and punched cards. The buffer and pre-edit tapes are transferred to the Tape Staging and Storage Facility area and stored until additional processing is scheduled. The buffer tapes are to be retained for a period of 30 days. After this 30 day period they will be degaussed and returned for reuse. The QC listings and cards are given to the Quality Assurance Unit along with a copy of the processing line log. The log indicates any line action taken during production of a pre-edit tape and it lists the inventory number of the pre-edit tape. When the pre-edit tapes pass all QC criteria, the punched cards are interpreted and listed. Following this a QC release form is completed and with the 07B, special purpose cards, and card listings are passed on to the PEAS Section.

The PEAS Section inspects the cards and listings forwarded to them from the quality assurance group and if everything is normal, they in turn transmit it to the data processing specialist in the Processing Operations Section.

Upon receiving the cards and listings from PEAS, the data processing specialist examines all the information released to him, to verify that all data requested for processing was processed. Output cards are forwarded to the Accounting Office, for use in the updating of chronological listings. A copy of the release form, the special purpose cards listing, and the special (VR) cards are then released to the designated data processing specialist in Code 565. The pre-edit data tapes are released to Code 565 for additional processing.



NOTE 1: THE SMS/GOES VISSR SYSTEM NORMALLY READS PICTURE SCALING TABLES FROM A PREVIOUSLY CATALOGED DRUM FILE. IF A SCALING TABLES TAPE IS INPUT, THE SYSTEM WILL REPLACE THE TABLES IN THE DRUM FILE WITH THOSE IN THE TAPE AND USE THE NEW TABLES FOR CURRENT AND FUTURE PROCESSING.

NOTE 2: PULSE CODE MODULATION (PCM) TELEMETRY DATA HAS BEEN ADDED AND ORBIT/ ATTITUDE (O/A) DATA WILL BE ADDED TO THE STREAM OF IMAGE DATA GENERATED BY THE SMS/GOES SPACECRAFT SO THAT VISSR O/A/TM DATA TAPES WILL NO LONGER BE REQUIRED IN THE FUTURE AS INPUT TO THE VSRDPP.

Figure 3-7. SMS/GOES VISSR Data Flow

3.1.2 Telemetry Computation Branch Data Flow

The VISSR pre-edit tapes are run daily by the Telemetry Computation Branch as shown in Figure 3-7. Pre-edit tapes containing digitized, edited VISSR data, and a File Control card representing each file to be processed from the pre-edit tapes are received as input to this branch. The one program used by this branch for processing VISSR pre-edit tapes is the VISSR Data Processing Program. This program produces tapes which are sent to the Atmospheric and Oceanographic Information Processing Facility and other authorized users.

3.1.2.1 VISSR Data Processing Program—All processing within the Telemetry Computation Branch is currently performed by one program, the SMS VISSR Data Processing Program (DPP) which performs editing, time and data smoothing, merging of orbit/attitude and telemetry (O/A/TM) data and produces Master Data Tapes (MDT's) for archive in addition to producing required experimenter tapes. The demand for processed VISSR data is growing rapidly and the variety of tape formats and quantity of data requested is taxing the capabilities of the SMS VISSR DPP. The expansion of the SMS VISSR DPP is not practical due to computer memory limitations and the added complexity which would be introduced. The need has been established for a new program to supplement the capabilities of the SMS VISSR DPP and to provide the flexibility for further expansion. The VISSR decommutation program (VSRDCM), will produce the required experimenter tapes using as input the MDT's output by the SMS VISSR DPP. Since this program will not be required to perform the editing, smoothing, and O/A/TM merge functions, it will be capable of providing the flexibility and capacity to produce the quantity and variety of experimenter tapes which may be required for each image processed and will be expandable to satisfy future requirements.

The editing and decommutation performed on the VISSR data in the 1108 computer is accomplished with the VISSR data processing program. This program has been designed to meet the following requirements:

- Editing and time-correction of input pre-edit tapes generated by the Pass II processing system
- Merging of orbit attitude and telemetry data
- Production of master data history tapes
- Production of experimenter history tapes
- Production of visible and infrared picture tapes for picture generation on Dicomed or CELCO machines

- Production of visible and infrared picture tapes suitable for input to the Image Display and Manipulation System (IDAMS)

- Production of picture tapes containing visible and IR data for input to AOIPS

- Generation of shipping letters for each output tape

- Maintenance of the master data history tape data base

These requirements are met by the SMS VISSR DPP which accepts either VISSR pre-edit or previously produced master data tapes as input; performs the required editing, smoothing, and merging of O/A data; and generates the requested output tapes. All processing is done on a picture-section basis. A picture section is a series of contiguous scan lines, each of which is defined during the digitization process (Pass I). A picture may be completely digitized into one section or may be divided into one or more sections. Each section may be divided into more than one file over more than one tape. The division of each section into files is arbitrary and is due to the fact that a new file is started whenever a new output tape reel is started in Pass I.

Table 3-4 shows the approximate system resource requirements per week. Pictures will be produced at the rate of about one per day. The number of VISSR pre-edit tapes generated will depend on the number of pictures produced and the percentage of each picture processed. A complete picture will require about seven pre-edit tapes.

The SMS VISSR DPP executes on a UNIVAC 1108 computer under the EXEC 8 Operating System, and it uses 40K of main memory. It requires a card reader, a line printer, a card punch, 2,500,000 words of drum storage and a maximum of seven 9-track tape drives and three 7-track tape drives.

3.1.2.2 Program Description—The SMS VISSR DPP consists of nine functional modules. Figure 3-8 shows the functional interrelationship of these modules. Brief descriptions of each module follow.

The main control module controls the sequencing of operations through the modules shown in Figure 3-8. It handles initialization, segment loading, error handling, and cleanup.

The control card sort module is responsible for reading and verifying all control cards. The sorted cards are printed and placed on drum storage where they may be accessed by the other modules as required. Each input tape file

Table 3-4
VISSR Data Processing Program Resources

ITEM	QTY/WEEK	SOURCE	FUNCTION	DISPOSITION
INPUT TAPES				
VISSR Pre-edit	50	Code 564 Pass II	Picture Input Data	Temporary Storage
Master Data	As required	VISSR-DPS DECOM	Data Base Update	Permanent Storage
VISSR O/A	1	SMS/GOES Ground Data Processing System	Orbit/Attitude and Telemetry Input	Temporary Storage
Picture Scaling Tape	As required	Code 900	Image Contrast Enhancement	Active File
OUTPUT TAPES				
Master Data	50	DECOM Module	Permanent History	Permanent Storage
Experimenter History	As required	DECOM Module	Experimenter Data	Experimenter
IDAMS Visible Picture Tape	25	Picture Generation Module	Picture Data	Experimenter
IDAMS IR Picture Tape	25	Picture Generation Module	Picture Data	Experimenter
DICOMED Visible Picture Tape	25	Picture Generation Module	Picture Data	Image Processing Facility
DICOMED IR Picture Tape	25	Picture Generation Module	Picture Data	Image Processing Facility
AOIPS Picture Tapes	25	Picture Generation Module	Picture Data	Experimenter
INPUT CARDS				
Pre-edit Control	50	Code 564 Pass II	Input Data Definition	
Processing Parameters	1	Production Control	Program Control	
Picture Sectorization Control	25	Production Control	Output Data Definition	
Output Tape I.D.	As required	Production Control	Provide Output Tape Numbers	
OUTPUT CARDS				
08E—Accounting Cards	75	Statistics and Reporting Module	Data Accounting	Telemetry Data Accounting System
11A—Accounting Cards	75	Statistics and Reporting Module	Data Accounting	Telemetry Data Accounting System
13D—Accounting Cards	75	Statistics and Reporting Module	Data Accounting	Telemetry Data Accounting System
06—Accounting Cards	50	Statistics and Reporting Module	Data Accounting (563)	Telemetry Data Accounting System
Special 11A—Accounting Cards	50	Statistics and Reporting Module	Data Accounting (563)	Telemetry Data Accounting System

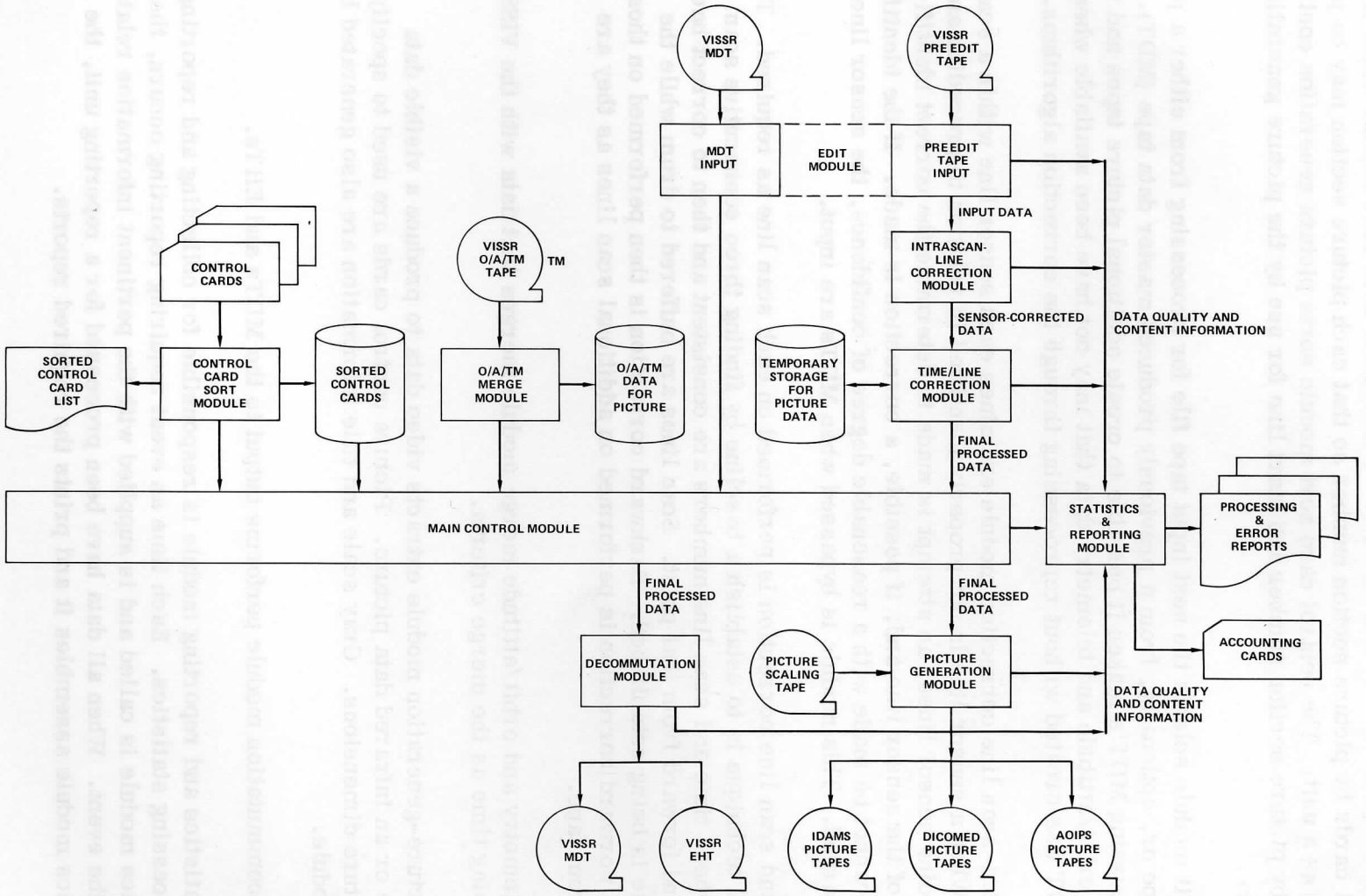


Figure 3-8. SMS VISSR Data Processing System Module Organization and Relationship

has a corresponding edit control card. The control card sort module sorts the control cards by picture section number so that each picture section may be processed as a unit. The control card sort module sorts picture generation control cards by picture section number and start line for use by the picture generation module.

The edit module selects the next input tape file for processing from either a pre-edit tape or, optionally, from a previously produced master data tape (MDT). Reprocessing MDT's makes it possible to create additional picture tapes and to merge orbit/attitude and telemetry data that may not have been available when the MDT was created without reprocessing through the correction algorithms.

The intra-scan line correction module examines each sensor line within a scan line. When a sensor line is not properly identified in relation to preceding and succeeding sensor lines, an attempt is made to determine the correct identification of the sensor line and, if possible, a correction is made. If the identification cannot be made with a reasonable degree of confidence, the sensor line is discarded. This module is bypassed when MDTs are input.

Time and scan line correction is performed on each scan line as required. The general technique is to establish a baseline by finding three consecutive scan lines whose time and scan line numbers are consistent and then to correct backward and forward from that point. Scan lines are buffered to drum while the baseline is being established. Backward correction is then performed on those lines. Forward correction is performed on additional scan lines as they are read from tape.

The telemetry and orbit/attitude merge module merges that data with the VISSR data using time as the merge criteria.

The picture-generation module extracts video data to produce a visible data picture or an infrared data picture. Picture control cards are used to specify the picture dimensions. Gray scale and title information are also generated by this module.

The decommutation module performs output to the MDTs and EHTs.

The statistics and reporting module is responsible for collecting and reporting all processing statistics. Each time an event requiring reporting occurs, the statistics module is called and is supplied with the pertinent information relating to the event. When all data have been processed for a reporting unit, the statistics module assembles it and prints the required reports.

3.1.2.3 VISSR Data Description—VISSR picture data is made up of two components: infrared and visible. The infrared component is of fixed resolution with a complete picture of the Earth being made up of 1821 horizontal lines with 3822 points per line. This corresponds to a resolution of 4 miles by 2 miles. The resolution of the visible picture component is varible in three steps. In the highest resolution mode (mode A), there are 14,568 horizontal lines made up of 15,288 data points each. This corresponds to a resolution of about 1/2 mile by 1/2 mile. The next highest resolution mode (mode B) has a resolution which is one-half of the mode A resolution. The third mode (mode C/D) has a resolution equal to that of the infrared component in the north-south direction and one-half the resolution of the infrared component in the west-east direction.

Both infrared and visible picture data are generated concurrently by the spacecraft. The ground station assembles the data into horizontal scan lines and merges a scan line of infrared data with 8, 4 or 1 lines of visible data for modes A, B, and C/D, respectively. The terminology applicable to VISSR data is as follows:

Term	Definition
Sensor	One horizontal line produced by the output from one sensor, visible or infrared, for one spacecraft rotation. A complete infrared picture consists of 1821 sensor lines, a mode A-visible picture has 14,568 sensor lines and mode B has 7284 sensor lines.
Picture Element (pixel)	One sample on a sensor line. An infrared sensor line has 3822 nine-bit elements. A mode A-visible sensor line has 15,288 six-bit elements and a mode B sensor line has 7644 six-bit elements.
Scan line	The total picture output produced by one spacecraft rotation. A scan line will consist of one infrared and eight visible sensor lines for mode A. For mode B, a scan line consists of one infrared and four visible sensor lines. A complete picture consists of 1821 scan lines regardless of the mode.
Image Line Number	The number associated with each scan line which indicates the approximate location of that scan line relative to the North pole of the Earth. The location of the Earth relative to the first scan.

Term	Definition
	line will vary depending on the latitude and attitude of the spacecraft when the picture is generated. The image line number provides a consistent relationship between a scan line and any Earth latitude. For scan line numbers 1 through 3, the image line number always equals the scan line number. The image line number will remain at three while the scan line number increases until the scan line is 37 scan lines above the North pole at which time the image line number will again increment, starting at 4. Once the image line number starts incrementing past, it will continue to increment by 1 for each scan line until the end of the picture. The first scan line containing any part of the Earth (i.e., the North pole) should occur approximately at image line number 40.
Equatorial Scan Count (ESC)	The equatorial scan count relates the scan line number to the image line number for all line numbers greater than 3. The equation defining this relationship is: Scan Line Number = Image Line Number + Equatorial Scan Count - 840; (for Image Line Number >3).

The eight visible sensor lines produced for each scan line of mode A cover the same area as the one infrared sensor line but with 8 times the resolution. The mode A-visible sensor lines are names V_5, V_6, V_7, V_8, V_1, V_2, V_3, and V_4 and occur in that order from North to South. In mode B, the sensors are combined and named V_{5-6}, V_{7-8}, V_{1-2}, and V_{3-4}. Figures 3-9 and 3-10 show how the infrared and visible data form a picture for modes A and B, respectively.

3.1.2.4 Data Processing Requirements—For purposes of data reduction, a full Earth image comprises six full segments of digital data (260 scan lines per segment) digitized from the analog to computer-compatible magnetic tape. These six segments can be processed from either one full frame picture, or one segment can be secured from each of six separate full frame pictures. If the user desires a full frame of IR data only, this will be considered the equivalent of one segment of combined IR and visible data. The Earth image sectorization and segmentation is illustrated in Figure 3-11.

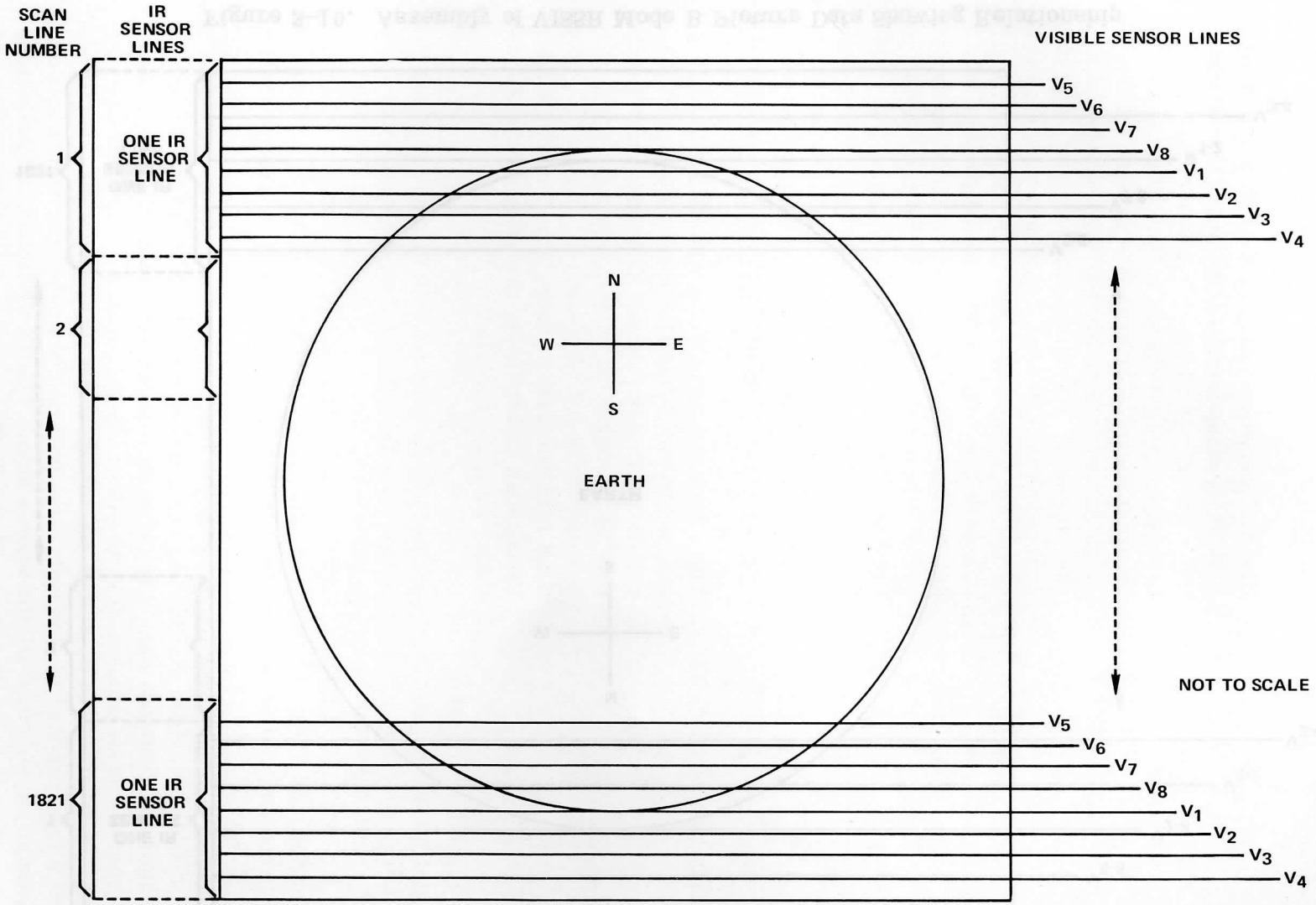


Figure 3-9. Assembly of VISSR Mode A Picture Data Showing Relationship Between Infrared and Visible Sensor Lines

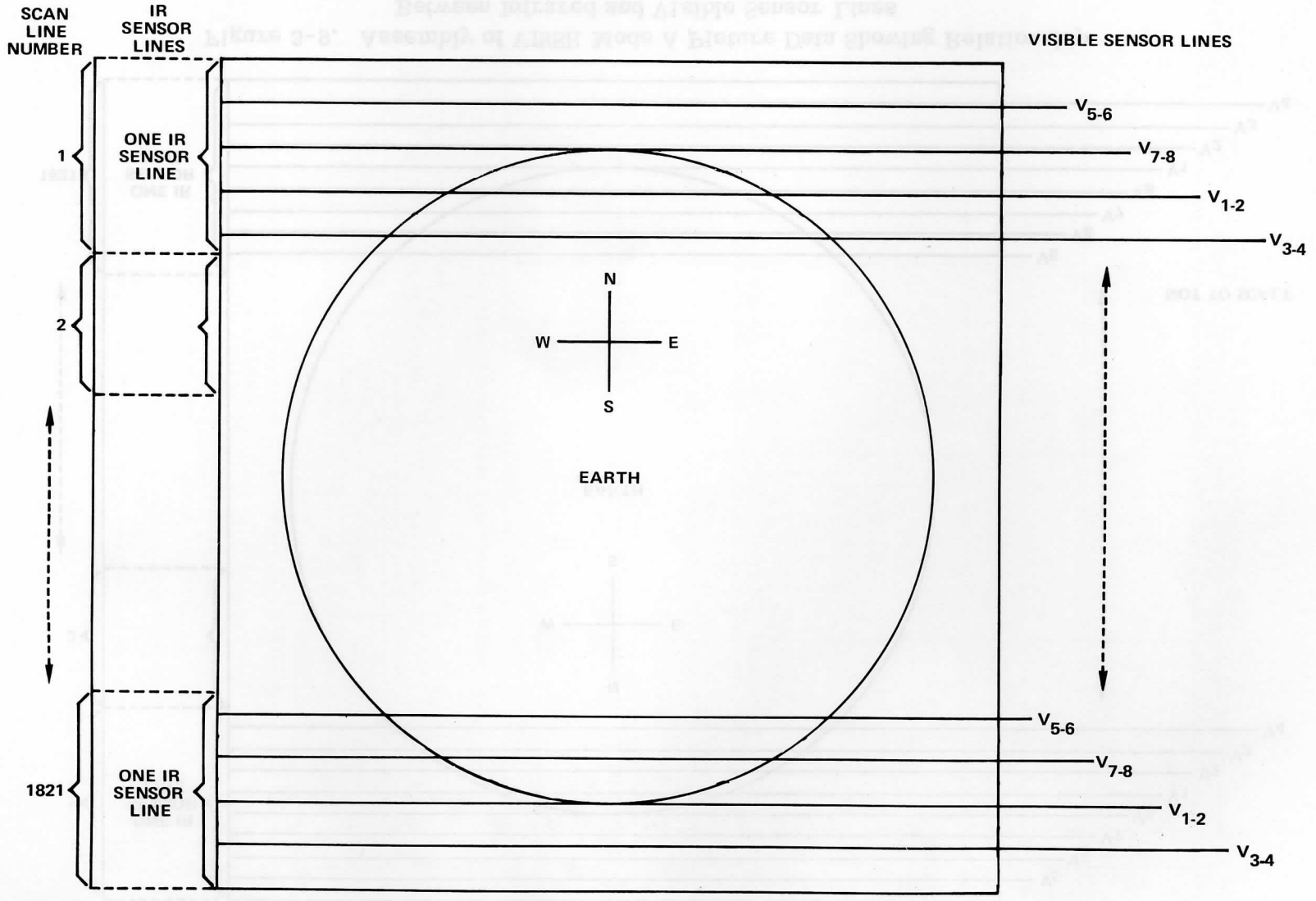
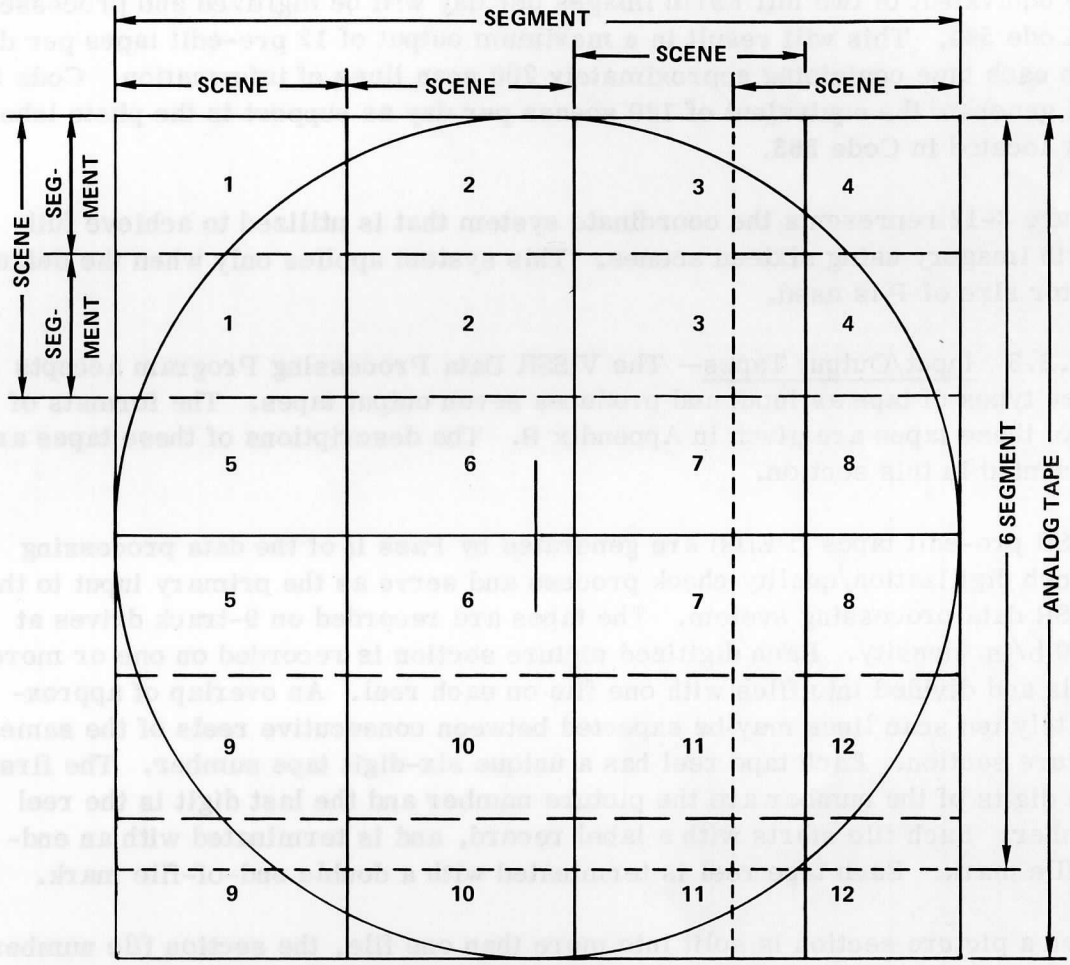


Figure 3-10. Assembly of VISSR Mode B Picture Data Showing Relationship Between Infrared and Visible Sensor Lines



EARTH IMAGE SECTORIZED = 12 SCENES

ITEM	DIGITAL* TAPES	SCAN LINES	PIX/LINE
SEGMENT	1	260	3822
SCENE**	2	520	976

ITEM	SEGMENT	SCENES	SCAN LINES
FULL*** PICTURE	7	16	1821
EARTH IMAGE	6	12	1560
ANALOG TAPE 9200 FT	6	12	1400

*9 TRACK 1600 BPI

**SCENE = CELCO IMAGE OF STANDARD SECTOR SIZE P (SEE TABLE 2-6) PLUS 20 SCAN LINES OF OVERLAP.

***A FULL PICTURE INCLUDES LINES CORRESPONDING TO EMPTY SPACE ON THE TOP AND BOTTOM OF THE EARTH IMAGE WHICH ARE NOT SHOWN IN THE FIGURE.

Figure 3-11. Earth Image Sectorization and Segmentation

The equivalent of two full Earth images per day will be digitized and processed by Code 564. This will result in a maximum output of 12 pre-edit tapes per day, with each tape containing approximately 260 scan lines of information. Code 565 will generate the equivalent of 120 scenes per day as support to the photo laboratory located in Code 563.

Figure 3-12 represents the coordinate system that is utilized to achieve full Earth imagery using sixteen scenes. This system applies only when the default sector size of P is used.

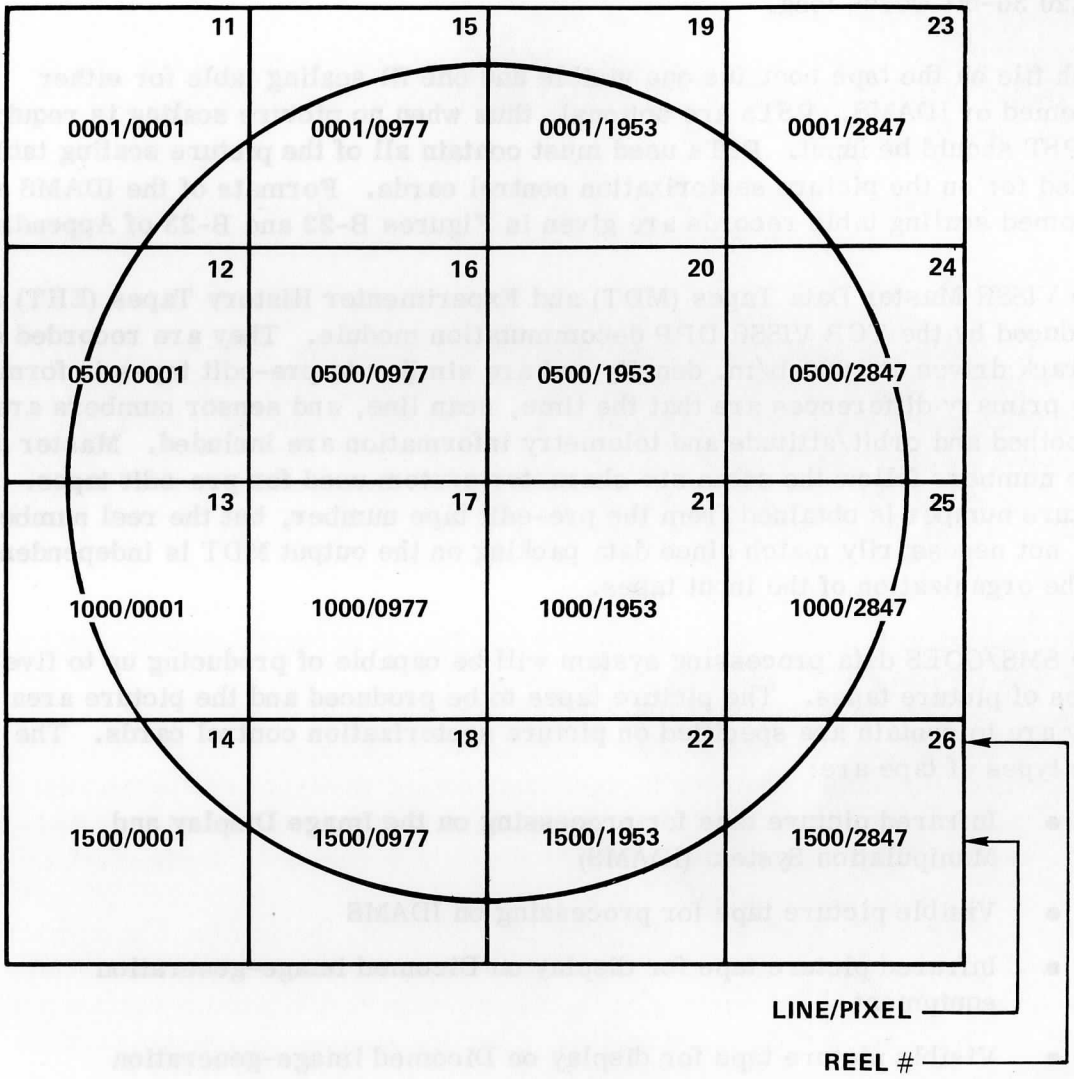
3.1.2.5 Input/Output Tapes— The VISSR Data Processing Program accepts three types of tape as input and produces seven output tapes. The formats of all of these tapes are given in Appendix B. The descriptions of these tapes are presented in this section.

VISSR pre-edit tapes (PEDs) are generated by Pass II of the data processing branch digitization/quality check process and serve as the primary input to the VISSR data processing system. The tapes are recorded on 9-track drives at 1600 b/in. density. Each digitized picture section is recorded on one or more reels and divided into files with one file on each reel. An overlap of approximately ten scan lines may be expected between consecutive reels of the same picture section. Each tape reel has a unique six-digit tape number. The first five digits of the number are the picture number and the last digit is the reel number. Each file starts with a label record, and is terminated with an end-of-file mark. Each tape reel is terminated with a double end-of-file mark.

When a picture section is split into more than one file, the section file number field in the label record is used to indicate the relationship of the files. The section file number is the number of the file relative to the picture section and should be 1 for the first file in a section, 2 for the second, and so on. When the file label is processed, this field is examined to determine if the file is a continuation of the previous file or if it is the beginning of a new picture section.

The length of each file will be variable depending on the percentage of the picture processed. Each file will contain only one mode of data and will always have complete scan lines. Padding records are not inserted where scan lines are incomplete.

The VISSR O/A tape is produced by the Decommutation Program of the PCM telemetry ground data processing system. The tapes are recorded on 9-track drives at 1600-b/in. density. Each file has a 132-character EBCDIC label field. The tapes have multiple, variable-length files and each file is terminated by a single end-of-file mark. The last file on each tape is terminated by a double end-of-file mark.



Note:

1. The two-digit number (11) indicates the reel number
2. The eight-digit number with the slash (0001/0001) indicates the line/pixel coordinates of the upper left corner of each sector.

Figure 3-12. Coordinates of Image Sectorization

Picture scaling tapes (PSTs) are provided by the GSFC experimenter (Code 900) and are used to enhance the images on both the IR and visible picture tapes for IDAMS and for Dicomed. The tapes are recorded on 7-track drives at 800 b/in.

density. The number of files on each tape is variable with each file containing a maximum of two data records without a file label record. Each data record is 220 36-bit words long.

Each file on the tape contains one visible and one IR scaling table for either Dicomed or IDAMS. PSTs are optional, thus when no picture scaling is required, no PST should be input. PSTs used must contain all of the picture scaling tables called for on the picture sectorization control cards. Formats of the IDAMS and Dicomed scaling table records are given in Figures B-22 and B-23 of Appendix B.

The VISSR Master Data Tapes (MDT) and Experimenter History Tapes (EHT) are produced by the TCB VISSR DPP decommutation module. They are recorded on 9-track drives at 1600-b/in. density and are similar to pre-edit tapes in format. The primary differences are that the time, scan line, and sensor numbers are smoothed and orbit/attitude and telemetry information are included. Master data tape numbers follow the same six-character system used for pre-edit tapes. The picture number is obtained from the pre-edit tape number, but the reel numbers will not necessarily match since data packing on the output MDT is independent of the organization of the input tapes.

The SMS/GOES data processing system will be capable of producing up to five types of picture tapes. The picture tapes to be produced and the picture area they are to contain are specified on picture sectorization control cards. The five types of tape are:

- Infrared picture tape for processing on the Image Display and Manipulation System (IDAMS)
- Visible picture tape for processing on IDAMS
- Infrared picture tape for display on Dicomed image-generation equipment
- Visible picture tape for display on Dicomed image-generation equipment
- Picture tapes containing visible, IR image, IR grid and calibration data. Each is a separate file for input to the Atmospheric and Oceanographic Image Processing Facility.

Each tape will contain only one picture. When more than one tape is produced, each picture will cover the same Earth area. That is, each picture will have the same number of scan lines, and the starting and ending elements on each line will be chosen according to the resolution of the picture type (infrared or visible) and data mode (A or B) so that the western and eastern boundaries of each picture are the same. Because the visible data for both modes A and B have higher resolution than the IR data, not as many IR picture points are required to produce a picture that covers the same area as a visible picture. However, because each IR picture element covers a geographic area which is twice

as wide as it is high and the display equipment displays each picture element as a square, each IR pixel must be repeated to achieve a normal one-to-one aspect ratio. On the Dicomed tapes, the IR data will be expanded to fill the entire 4096-by-4096 display by repeating each picture element and picture line the required number of times. This will permit a standard equipment setup on the Dicomed regardless of the picture type or size. On IDAMS IR picture tapes, only the lines will be repeated to achieve the correct aspect ratio. Lines will never be repeated on AOIPS tapes.

If only IR picture tapes are produced, they may cover a larger geographic area than if they are generated in conjunction with visible picture tapes. In fact, all the IR data may be placed on one picture tape to produce a full-Earth image. When an IR picture tape is produced in conjunction with a visible picture tape, only 500 scan lines will be present. When IR pictures alone are produced, they must be in sizes of exactly 500, 1000, or 2000 scan lines. For the 2000-scan line size, the last 179 lines will contain background fill and Gray scale only, because a complete picture consists of only 1821 scan lines.

The picture element values transferred to the IDAMS and Dicomed picture tapes will be scaled using input scaling tables. The elements for each type of picture tape are scaled independently using four different tables. Ordinarily, the scaling tables will be supplied on an input tape. A default scaling table may also be specified which does not require an input tape. The default scaling for IR pixels will be to drop the least significant bits to convert the element sizes from nine bits to six bits for IDAMS and eight bits for the Dicomed. For visible picture elements, the default will be no change for IDAMS and for the Dicomed tapes two low-order zero bits will be appended to take advantage of the full dynamic range of the Dicomed equipment.

The maximum picture size to be produced on any output tape by the VISSR DPP is 4095 lines by 4096 elements. This is determined by the maximum size picture that can be generated on the Dicomed equipment. The Dicomed can actually handle 4096 lines; however, the first line will contain IPD tape identification information rather than picture data. Each picture will contain a 33-level Gray scale on the right boundary and a title on the top boundary. The Gray scale area will require 192 elements and the title will require 95 lines. Therefore, the effective maximum picture size will be 4000 lines by 3904 elements. Figure 3-13 shows a sample layout for a picture. Table 3-5 shows the format and contents of the title information with sample information.

IDAMS picture tapes will be recorded on 7-track drives at 800 b/in. The first record is a special label required by IDAMS and the second record on the tape contains a special IPD label. The next two records contain orbit/attitude and PCM telemetry data blocks.

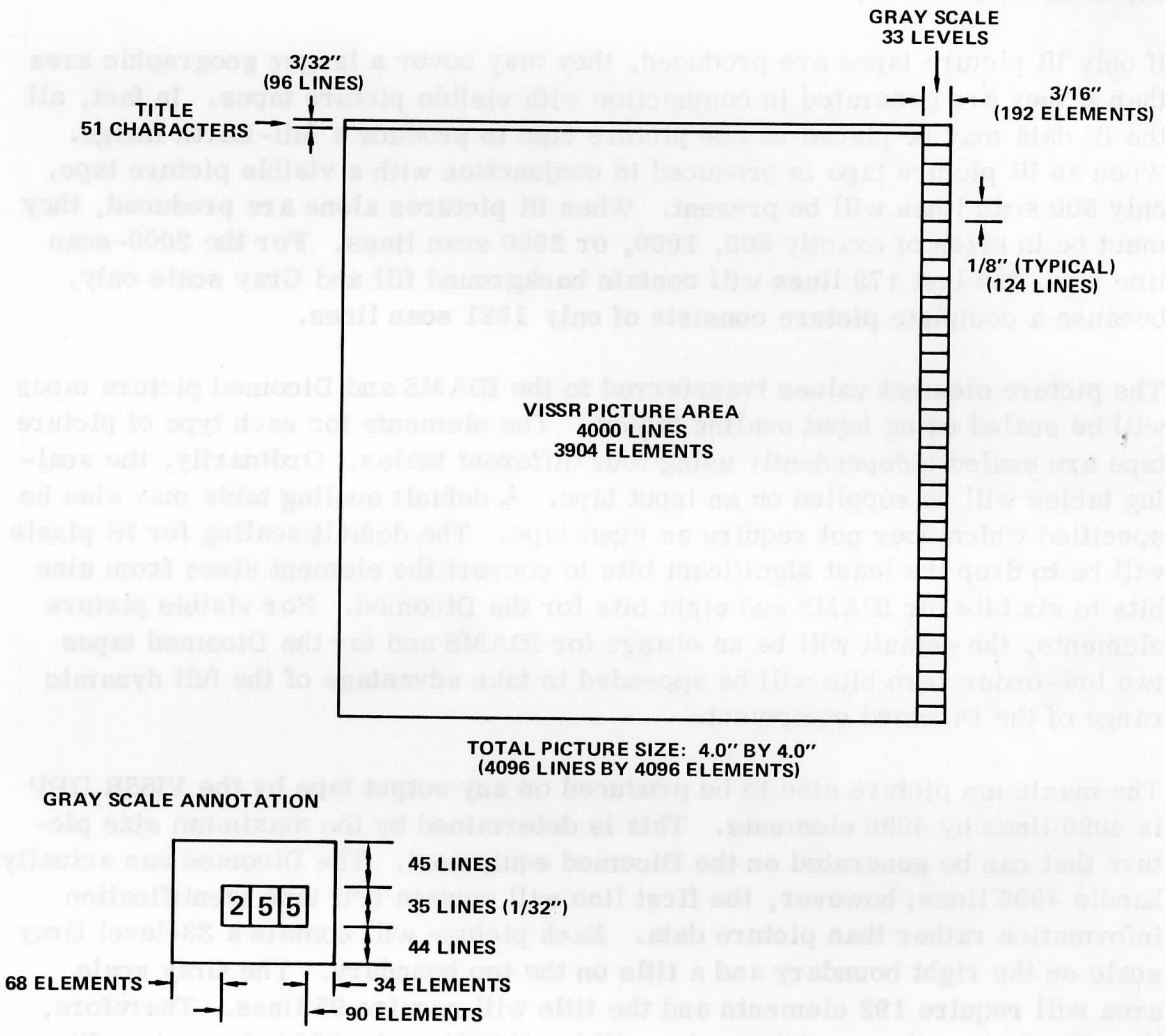


Figure 3-13. VISSR Dicomed Picture Format

Table 3-5

VISSR Picture Title Information

Column	Description	Example
1-4	Satellite Identification	ME01
5	Blank	
6-14	Picture Number, Reel Number	001532.02
15	Blank	
16-18	Picture Type (IR, VA = Mode A VIS; VB = Mode B VIS) Followed By Picture Section Number	VA1
19	Blank	
20-32	Coordinate numbers of the top left pixel relative to the IR sensor (line/pixel)	T/L: 1000/1900
33	Blank	
34-40	Date	30SEP74
41	Blank	
42-46	Start time of sectorized image to nearest minute (HHMMZ)	1805Z
47	Blank	
48-50	Pixel scaling table identification	805
51	Blank	
52	Sector Size Code (ref. Table 2-6)	P

Note: When displayed across the picture, the examples shown would appear as follows:

ME01 001532.02 VA1 T/L:1000/1900 30SEP74 1805Z 805 P

The IPD label and telemetry records will appear as lines on the picture produced and should be ignored. The first actual picture lines follow and contain the title information. The flag, scan line, and GMT fields for these records will be zero.

The rest of the tape will contain a maximum of 4000 records. Each record represents one line of picture. The tape is terminated by a double end-of-file. The data flags, scan line numbers, and GMT have the same format and meaning as for the MDTs.

Each record--other than the IDAMS label on the IDAMS picture tape--contains a sequential binary line count in the first 24 bits. The IPD label and the telemetry records must contain this number because IDAMS equipment treats them as picture lines. The O/A/TM data on each IDAMS picture tape are the same two blocks that appear in the MDT file containing the first scan line of the picture section. The telemetry data block is in the same format as it appears on the O/A/TM tape. The orbit/attitude data are reformatted and placed in the IDAMS label record.

The tapes produced for Dicomed image generation will be recorded on 9-track drives at 800 b/in. Each tape will contain one file to produce one image. Each file will have 4096 records. The tape will be terminated by a double end-of-file mark. The first record of the fill will be an IPD label record. When the image is produced, the label record will appear as the first line and should be disregarded.

The actual picture line records have a length of 4122 8-bit tape characters. A total of 4096 picture elements, including Gray scale information, are in each record and each record produces one line of the picture. The data flags, scan line numbers, and time are defined the same as for an MDT. The picture information in the 95 records immediately following the label contains the title area. The flags, scan line number, and time fields for the title records contain zeros. Figure 3-14 shows a VISSR image production form used to transmit tapes and pertinent information to the Image Processing Facility of IPS.

3.1.2.6 AOIPS and Sectorized Experimenter Tape Format—The following discussion describes both the AOIPS tape, produced by the SMS/GOES VISSR DPP, and the planned Sectorized Experimenter tape to be produced by the VSRDCM program which is in the process of being implemented. Current plans are to make the formats for these two tapes compatible. The primary difference is that AOIPS tapes will only be produced in standard sector sizes: P, S, and U (see Table 3-6). AOIPS tapes have the following physical characteristics.

DATE SUBMITTED CODE 900 11/ 1/ 75

SMS

VISSR PROCESSING FORM

DATE RECEIVED CODE 564 11/ 2/ 75

DIGITIZATION CODE 564								SECTORIZATION CODE 565						
DATE RECORDED	ANALOG TAPE NUMBER	IMAGE FILE NUMBER	START TIME HR MN	INITIAL IMAGE COUNT	STOP TIME HR MN	FINAL IMAGE COUNT	FULL IR ONLY	INITIAL IMAGE COUNT	FINAL IMAGE COUNT	START IR ELEMENT	DICOMED/CELCO		AOIPS/IDAMS	
											IR PICTURE	VISIBLE PICTURE	IR TAPE	VISIBLE TAPE
10 JAN 75	209	2	1331	240	1343	490		240	490	950	√	√	√	√
	210	1	1401		1413									
	210	2	1431		1443									
	211	1	1501		1513									
	211	2	1531		1543									
	212	1	1601		1613									
	212	2	1631		1643									
	213	1	1701		1713									

COMMENTS - SPACE TO BE USED BY CODE 900 FOR SPECIAL PRODUCTS EX, EXTRA DICOMED OR CELCO NEGATIVE 7 TRACK 800 BPI EXPERIMENTER TAPES, ETC

REQUESTS FOR LIMITED SCAN DATA MUST BE IDENTIFIED AND LOGGED ON A SEPARATE FORM

Figure 3-14. VISSR Image Production Form

- Tape type/density: 9-track/1600 b/in.
- Number of files: Variable: 1 to 4
- File label record: Two label records per file. First label is AOIPS label, (512 8-bit bytes). IPD label follows the AOIPS label and has the same length as a data record.
- Data Records: Length varies but is constant for any file. Length indicated in AOIPS label (minimum: 1244 8-bit bytes, maximum: 4172 bytes).

The IR data are separated into two components and placed into two different files. The eight low-order bits of each input IR pixel contain the actual IR image and are placed in the IR image data file. The high-order bit of each IR pixel contains a grid overlay and is placed in the IR grid data file.

Tapes may contain fewer than 4 files depending on the availability of calibration data and whether or not visible and/or IR data are requested.

An IR grid data file will always be present with an IR image data file. When both visible and IR data are present on one tape, then both the visible and the IR data will correspond to the same geographic area as specified by the sectorization parameters used to generate the tape.

Appendix B (Table B-10) shows the format of the AOIPS label record. The AOIPS label contains information which identifies the image and the physical characteristics of the file and the data records as well as up to two blocks of orbit and attitude information, when available. Also shown in Table B-11 are the possible contents of the IR and visible data files for each possible sector size in terms of AOIPS label parameters. The sector sizes are defined so as to be compatible with other sectorized VISSR image data tape formats and to enable visible, IR and calibration data files to fit on one AOIPS tape reel. The VISSR DPP will only produce tapes in the standard sector sizes indicated in Table B-11 of Appendix B. The VSRDCM program will be capable of producing tapes for any of the sector sizes shown. The number of records of image data is a maximum value. The actual number of records will be less if all of the requested data is not available. The calibration data file is formatted the same as an IR image data file for sector size U; however, there are a maximum of 3 image data records in the calibration file.

The IPD label contains only EBCDIC data. The first 149 characters are formatted as shown in Table B-9 of Appendix B. The remainder of the IPD label record is filled with blanks.

The image data records in the visible and IR image data files may be preceded by up to eight records of telemetry data. The actual number of telemetry data records is indicated by the "top edge fill" field, word 36, of the AOIPS label record. This telemetry data, and the orbit/attitude data in the AOIPS label, will only be present when it is supplied by the SMS PCM Telemetry Ground Data Processing System and merged with VISSR data by the SMS VISSR DPP. When O/A/TM data is merged into the IR documentation at the ground station, that information will only be available from the IR documentation in each image data record.

Each sixty-four frame telemetry block is divided into four sixteen-frame blocks. This is done to reduce the maximum size of each telemetry record so that the telemetry records will not be longer than any possible image data record.

Each image data record contains all of the pixel values for one image line. The number of pixels in each image data record will vary depending on the sector size and data type. The image data in each record is followed by 270 bytes containing IR documentation, time, and flags. Two additional bytes are appended for certain record sizes to make the total record length an even multiple of 32 bits. The IR documentation will not always be available for the visible data records. The presence of valid IR documentation is indicated in the first byte of the IR documentation area. The image data are always packed one pixel per byte starting in the first byte of each record. Visible pixels which contain six bits of significant data are expanded to eight bits by appending two low-order zero bits. The IR image data is obtained from the eight low-order bits of each IR pixel. The IR grid data is obtained by taking the high-order bit from each IR pixel and appending seven low-order zero bits.

3.1.2.7 Sectorization, Sector Sizes, and Resolution—Sectorization is the process of selecting a specific range of image lines, and pixels within each image line, for output to picture tapes. A complete visible image may contain up to 14,544 lines of image data with each line containing 15,288 pixels. This amount of data is too great for most image processing systems to handle. Furthermore, much of the data is not useful since it contains space, or the edge of the Earth which are too distorted to analyze. Sectorization consists of extracting a part of the complete image, a sector, which is small enough to be handled easily and which contains only the portion of the image which is of interest to a particular experimenter.

The size of a sector is specified in terms of the number of input image lines and pixels required to provide the data for the sector. The SMS VISSR DPP allows one sector size for each mode of visible data and allows three sector

sizes for IR data. The size of the visible sectors is limited to provide a maximum of 4000 output lines with 3904 pixels per line. This limitation is due to the maximum image size that the Dicomed can handle and is also imposed on the AOIPS and IDAMS output for consistency. The SMS VISSR DPP is also limited in that it can only output visible data at full resolution (i.e., one output pixel per input pixel). It is frequently desirable, however, to display more or less geographic area on each visible image than would fit within the 4000 line by 3904 pixel format at full resolution. The only way more geographic area can be output is by increasing the size of the output format or by reducing the amount of data necessary to represent a geographic area by reducing the resolution of the data. The VSRDCM program will provide both of these capabilities. For output tapes whose format allows more than 3904 pixels per line, such as the Sectorized Experimenter tape, sector sizes will be available to provide more visible data at full resolution. The capability will also be provided to enable visible data representing a large geographic area to be compressed to the extent necessary to fit within any particular tape format. Compression will be performed by sampling every nth pixel from every nth line. When n equals 4 for mode A data, the 14544 (1818 × 8) input sensor lines which may contain useable image data are reduced to 3636 lines on output, and the 15,288 pixels from each input line are reduced to 3822 pixels on output, thereby enabling a full visible image to be represented in a format processable on current equipment.

It is also desirable to provide the capability to "blow-up" visible images. This does not increase the resolution of the data; however, when photographic images are produced small details become more apparent, which effectively increases the resolution of the photograph. This capability is primarily applicable to tapes which will be used to produce photographic images, i.e., Dicomed tapes, since interactive image processors normally have this capability built in. However, since the image area included on a tape for an interactive processor would be less for increased resolution images this feature will permit a smaller image area to be placed on each tape, thereby reducing processing time and storage requirements when only a small part of the image is to be analyzed. This capability will be implemented in the VSRDCM program for Dicomed tapes by repeating each input pixel n times to create an output line and then recording each output line n times on the output tape. This capability currently exists in the SMS VISSR DPP only for IR data with the possible values of 2 and 4 for n.

Table 3-6 shows the sector sizes which will be available in the VSRDCM program. Although values are shown for IDAMS it is unlikely that IDAMS will be in operation when the VSRDCM program is implemented in which case the IDAMS tapes will not be produced. The sector sizes are defined in terms of scan lines and IR pixels. For IR data the number of unique image lines and pixels recorded on the output tape will be the same as the number of scan lines and IR pixels speci-

fied for the sector size. The visible information for a sector is defined to be the visible data which corresponds to the IR data for the sector size. In mode A there are 8 visible lines corresponding to each IR line and 4 pixels corresponding to each IR pixel. The output data resolution factors indicate the amount by which the input data for the sector must be expanded, or compressed, to satisfy the output tape format requirements. A resolution factor of one indicates no expansion or compression. A resolution factor greater than one indicates the number of times each input line or pixel will be present on the output tape. A fractional resolution factor indicates the ratio of output lines and pixels to input lines and pixels.

Each sectorization request will specify an image line number for the first scan line for the sector, the leftmost IR pixel number, and a request code letter corresponding to the desired sector size as shown in Table 3-6. For visible data the sector will start at the first visible line of the specified start image line and the visible pixel corresponding to the specified IR pixel number.

3.1.2.8 Output Reports—To maintain adequate quality control, a series of printed reports will be produced for each file processed. The reports will provide both summary and detailed error and processing information. All necessary information will be accumulated by the statistics and reporting module. Table 3-7 provides a brief description of each report. Detailed descriptions of each report are provided below.

The Parameter Card List (Figure 3-15) contains the values of the parameters specified on the run parameter cards. Run parameters are listed along with their values and an indication as to whether the value is a default generated by the system or an input value. If a value is input which is identical to the standard default value, it is identified as a default value.

The Control Card Summary Report lists all information supplied on the processing control cards and lists the sorted edit, picture, and decommutation control cards. When processing parameters are not input and a default applies, the default value is listed also. If any input card errors are detected, the value or card in error is flagged and the run will terminate after the entire summary has been printed.

The Pre-edit File Processing Report (Figure 3-16) will contain detailed information about each pre-edit tape input file. The first item in the report will be

Table 3-6

Sector Size Summary

SECTOR SIZE			OUTPUT DATA RESOLUTION FACTOR[1]					
			Sectorized Exp. Tape (AOIPS)[5]		DICOMED		IDAMS	
SCAN LINES	IR PIXELS	REQUEST CODE	IR	VISIBLE	IR	VISIBLE	IR	VISIBLE
125	244	G	N/A	N/A	N/A	4	N/A	N/A
	488	L	1	1	8	2	1	1
	976	M	1	1	4	1	1	1
250	1952	N	1	1	2	1/2	1	1/2
	3822	O	1	1/2	1	1/4	1	1/4
	976	P[2]	1	1	4	1	1	1
500	1952	Q	1	1	2	1/2	1	1/2
	3822	R	1	1/2	1	1/4	1	1/4
	1952	S[3]	1	1/2	2	1/2	1	1/2
1000	3822	T	1	1/4	1	1/4	1	1/4
1818	3822	U[4]	1	1/4	1	1/4	1	1/4

[1]Visible resolution factors shown are for Mode A. The resolution factors for Mode B visible data are twice those shown.

[2]Standard Sector size—IR and Mode A visible.

[3]Standard Sector size—IR and Mode B visible.

[4]Standard Sector size—IR only.

[5]AOIPS tapes are only available in standard sector sizes.

Table 3-7

VISSR Report Summary

REPORT TITLE	DESCRIPTION	TIME PRODUCED
Parameter Card List	List of parameters and parameter values specified on run parameter cards.	Beginning of run
Control Card Summary	Listing of all run parameters and control cards sorted by picture number	Beginning of run
Pre-edit File Processing Report	Input PET file label and detailed list of input error conditions and correction problems causing loss of data or re-establishment of base reference line	Each entry is produced at time of occurrence
Pre-edit File Summary Report	Summary of file content and quality before and after the data was corrected. Summary of statistics for corrections performed.	After completion of processing for each input file
Master Data Tape File Summary Report	Description of the content and quality of each output MDT file.	Produced after the Picture Generation Report
Master Data Tape File Summary List	List of all MDT output files produced for an entire picture.	Produced at the completion of processing for the run following the Master Data Tape File Summary Report
Sensor Line Correction Report	Detailed list of visible sensors whose sensor identification was changed by the intrascan line correction module	After Pre-edit File Summary Report only if required
Time And Line Correction Report	Detailed list of scan lines whose time or line number was changed by the time/line correction module	After Pre-edit File Summary Report only if required
Between Scan Line Analysis Report	Detailed list of interscan-line time discontinuities in which the time change is not proportional to the line change	After Pre-edit File Summary Report only if required
Picture Generation Report	Summary of the content and quality of the data used to create the set of picture tapes requested on one picture sectorization control card	When PETs are input, after the last Between Scan Line Analysis Report; when MDTs are input, after the last Master Data Tape Input Report

Table 3-7

VISSR Report Summary (continued)

REPORT TITLE	DESCRIPTION	TIME PRODUCED
IDAMS Picture Tape Shipping Letter	File label and summary of tape content including O/A/PCM data content	After last detailed report for PET file required to produce the tape
DICOMED Picture Tape Shipping Letter	File label and summary of tape content	After IDAMS picture tape shipping letter
AOIPS Picture Tape Shipping Letter	File labels and summary of AOIPS tape contents	After Dicomed shipping letters
Experimenter History Tape Shipping Letter	List of all file labels and summary of content for each EHT reel	After last detailed report or picture tape shipping letter for last file
Master Data Tape Input Report	Detailed information concerning processing for each MDT input file	Produced for each MDT input file only when MDTs are input
Master Data Tape File Input Summary Report	Detailed tape error listing, file labels, and summary of data content and quality for each MDT file input	Replaces all pre-edit file summary and detailed reports for MDT input
Accounting Card List	List of all accounting cards produced during the run, sorted by type	End of run
Picture Scaling Tables Listing	Listing of all non-default picture scaling tables, gray level values and corresponding gray level annotation which are available for use by the run. Tables are printed one to a page with an appropriate heading identifying each table's content	Scaling tables are printed only when requested via run parameter card PRTSCL

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TAPE SELECTION PARAMETERS

EXPERIMENTER HISTORY TAPE OUTPUT SELECTION	EHTOUT = NO		INPUT VALUE
MASTER DATA TAPE INPUT SELECTION	MDTIN = YES		INPUT VALUE
MASTER DATA TAPE OUTPUT SELECTION	MDTOUT = NO		INPUT VALUE
ORBIT / ATTITUDE / TELEMETRY INPUT SELECTION	OATMIN = NO		INPUT VALUE
SCALING TABLE TAPE INPUT SELECTION	SCLTAP = YES		INPUT VALUE

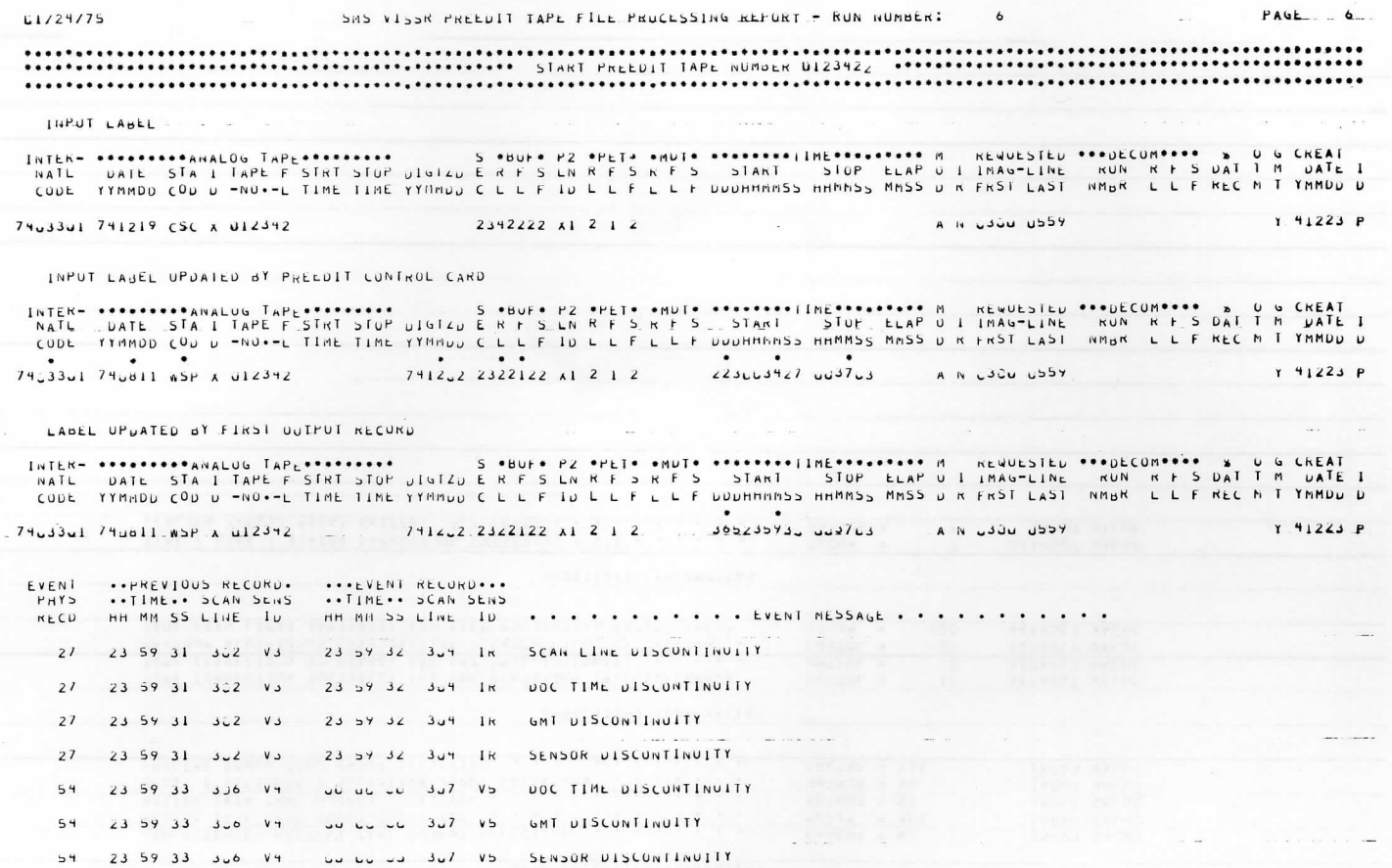
PROCESSING TOLERANCES

TIME CORRECTION TOLERANCE FOR DOCUMENTATION (MILLISECONDS)	DOCTOL =	10	DEFAULT VALUE
TIME CORRECTION TOLERANCE FOR GMT (MILLISECONDS)	GMTTOL =	5	DEFAULT VALUE
MAXIMUM ACCEPTABLE LINE OVERLAP BETWEEN FILES OF SECTION .	LOVTOL =	20	DEFAULT VALUE
TIME BIAS LIMIT (GMT-DOC) FOR FILE PROCESSING REPORT ENTRY	TBLIM =	500	DEFAULT VALUE

PROCESSING PARAMETERS

TIME / LINE / SENSOR CORRECTION SWITCH: 0 = OFF	TLCON =	1	DEFAULT VALUE
SCALING TABLES PRINT SWITCH: 1 = PRINT	PRTSCL =	1	INPUT VALUE

Figure 3-15. VISSR Input Parameter Card List



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START PREEDIT TAPE NUMBER 012342

INPUT LABEL

INTER-NAL CODE	DATE YYMMDD	STA COD	I D	TAPE -NO-	F -L	STRT TIME	STOP TIME	DIGIZD YYMMDD	S E C	*BUF* P2 R L	F L	S ID	*PET* R L	F L	S F	*MDT* R L	F L	S F	TIME START DDDHHMMSS	TIME STOP HHMMSS	ELAP MMSS	M D R	I FRST	REQUESTED IMAG-LINE LAST	RUN NMBR	R L	F L	S F	DAT REC	T M	CREAT DATE YYMMDD	I D
7403301	741219	CSC	X	012342					2	3	4	2	2	2	2							A	N	0300	0559						Y	41223	P

INPUT LABEL UPDATED BY PREEDIT CONTROL CARD

INTER-NAL CODE	DATE YYMMDD	STA COD	I D	TAPE -NO-	F -L	STRT TIME	STOP TIME	DIGIZD YYMMDD	S E C	*BUF* P2 R L	F L	S ID	*PET* R L	F L	S F	*MDT* R L	F L	S F	TIME START DDDHHMMSS	TIME STOP HHMMSS	ELAP MMSS	M D R	I FRST	REQUESTED IMAG-LINE LAST	RUN NMBR	R L	F L	S F	DAT REC	T M	CREAT DATE YYMMDD	I D
7403301	740811	WSP	X	012342				741202	2	3	2	2	2	2	2				223003427	0037 03		A	N	0300	0559						Y	41223	P

LABEL UPDATED BY FIRST OUTPUT RECORD

INTER-NAL CODE	DATE YYMMDD	STA COD	I D	TAPE -NO-	F -L	STRT TIME	STOP TIME	DIGIZD YYMMDD	S E C	*BUF* P2 R L	F L	S ID	*PET* R L	F L	S F	*MDT* R L	F L	S F	TIME START DDDHHMMSS	TIME STOP HHMMSS	ELAP MMSS	M D R	I FRST	REQUESTED IMAG-LINE LAST	RUN NMBR	R L	F L	S F	DAT REC	T M	CREAT DATE YYMMDD	I D
7403301	740811	WSP	X	012342				741202	2	3	2	2	2	2	2				365235934	0037 03		A	N	0300	0559						Y	41223	P

EVENT PHYS RECD	PREVIOUS RECORD TIME HH	MM	SS	SCAN LINE	SENS ID	EVENT RECORD TIME HH	MM	SS	SCAN LINE	SENS ID	EVENT MESSAGE
27	23	59	31	302	V3	23	59	32	304	IR	SCAN LINE DISCONTINUITY
27	23	59	31	302	V3	23	59	32	304	IR	DOC TIME DISCONTINUITY
27	23	59	31	302	V3	23	59	32	304	IR	GMT DISCONTINUITY
27	23	59	31	302	V3	23	59	32	304	IR	SENSOR DISCONTINUITY
54	23	59	33	306	V4	00	00	00	307	V5	DOC TIME DISCONTINUITY
54	23	59	33	306	V4	00	00	00	307	V5	GMT DISCONTINUITY
54	23	59	33	306	V4	00	00	00	307	V5	SENSOR DISCONTINUITY

Figure 3-16. VISSR Pre-edit File Processing Report (1 of 2)

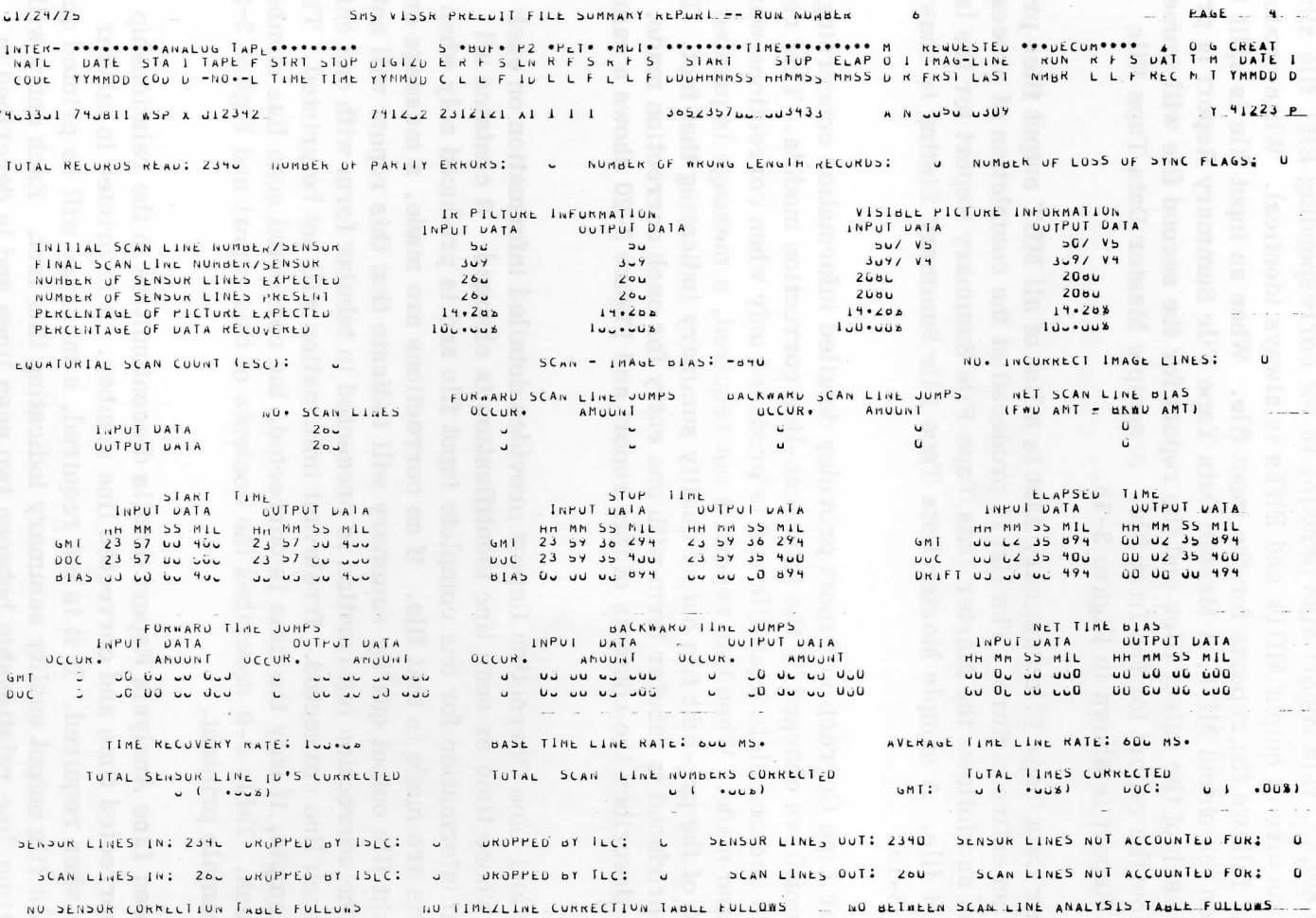
EVENT REC'D	••PREVIOUS RECORD• ••TIME•• HH MM SS	SCAN LINE	SENS ID	•••EVENT RECORD••• ••TIME•• HH MM SS	SCAN LINE	SENS ID	• • • • • • • • • • • EVENT MESSAGE • • • • • • • • • • •
62	00 00 00	307	V4	23 59 34	306	IR	DOC TIME DISCONTINUITY
78	23 59 35	309	V2	23 59 35	307	V4	GMT DISCONTINUITY
78	23 59 35	309	V2	23 59 35	307	V4	SENSOR DISCONTINUITY
108	23 59 37	313	V5	23 59 37	313	V8	SENSOR DISCONTINUITY
109	23 59 37	313	V8	23 59 37	313	V7	SENSOR DISCONTINUITY
113	23 59 37	313	V4	23 59 38	444	IR	SCAN LINE DISCONTINUITY
124	23 59 38	444	V4	23 59 39	315	IR	SCAN LINE DISCONTINUITY
160	23 59 40	318	V4	23 59 42	320	IR	LOSS OF SYNC
160	23 59 40	318	V4	23 59 42	320	IR	SCAN LINE DISCONTINUITY
160	23 59 40	318	V4	23 59 42	320	IR	DOC TIME DISCONTINUITY
160	23 59 40	318	V4	23 59 42	320	IR	GMT DISCONTINUITY
				00 00 02	354		SCAN LINE DELETED. CONTAINED 1 IR AND 8 VISIBLE SENSORS
				00 00 03	355		SCAN LINE DELETED. CONTAINED 1 IR AND 8 VISIBLE SENSORS
				00 00 03	356		SCAN LINE DELETED. CONTAINED 1 IR AND 8 VISIBLE SENSORS
				00 00 04	357		SCAN LINE DELETED. CONTAINED 1 IR AND 8 VISIBLE SENSORS
				00 00 04	358		SCAN LINE DELETED. CONTAINED 1 IR AND 8 VISIBLE SENSORS
				00 00 05	359		SCAN LINE DELETED. CONTAINED 1 IR AND 8 VISIBLE SENSORS
				00 00 06	360		SCAN LINE DELETED. CONTAINED 1 IR AND 8 VISIBLE SENSORS
				00 00 06	361		SCAN LINE DELETED. CONTAINED 1 IR AND 8 VISIBLE SENSORS
				00 00 07	362		SCAN LINE DELETED. CONTAINED 1 IR AND 8 VISIBLE SENSORS
				00 00 07	363		SCAN LINE DELETED. CONTAINED 1 IR AND 8 VISIBLE SENSORS
				00 00 08	364		SCAN LINE DELETED. CONTAINED 1 IR AND 8 VISIBLE SENSORS
				00 00 09	365		SCAN LINE DELETED. CONTAINED 1 IR AND 8 VISIBLE SENSORS
				00 00 09	366		SCAN LINE DELETED. CONTAINED 1 IR AND 8 VISIBLE SENSORS
				00 00 10	367		SCAN LINE DELETED. CONTAINED 1 IR AND 8 VISIBLE SENSORS

Figure 3-16. VISSR Pre-edit File Processing Report (2 of 2)

the actual file label. Each entry in the report will describe a different condition. The conditions to be reported are

- Tape parity errors
- Wrong-length records
- Records deleted by the intrascan line correction module
- Scan lines deleted by the time/line correction module
- Records containing loss of sync flag
- Sensor discontinuities
- GMT discontinuities
- Documentation time discontinuities
- Scan line discontinuities
- Loss of tape position
- Unexpected I/O status code
- Non-integral word count
- Excessive time bias (GMT - documentation)
- Bad image line number
- End of file

The Pre-edit Tape File Summary Report is produced at the completion of processing for each PET file. It immediately follows the Pre-edit File Processing Report and contains a summary of the file content and quality before and after the data were corrected as well as summary statistics for the corrections performed. This report is produced whether the file was processed successfully or not. If processing for the file did not complete normally, the report will reflect the processing status at the time processing was terminated. Figure 3-17 shows a sample Pre-edit File Summary Report.



01/29/75 SMS VISSR PREEDIT FILE SUMMARY REPORT -- RUN NUMBER 6 PAGE 4

INTER- ••••••••ANALOG TAPE•••••••• S •BUF• P2 •PET• •MDI• ••••••••TIME••••••••• M REQUESTED •••DECOM•••• A O G CREAT
NATL DATE STA I TAPE F STRT STOP DIGIZD E R F S LN R F S R F S START STOP ELAP O I IMAG-LINE RUN R F S DAT T M DATE I
CODE YYMMDD CDD D -NO.-L TIME TIME YYMMDD C L L F ID L L F L L F DDDHHMMSS HHMMSS MMSS D R FRST LAST NMBR L L F REC M T YMMDD D

7463351 740811 WSP A 012342 741252 2312121 X1 1 1 1 3652357DD 003933 A N 3050 0309 Y 41223 P

TOTAL RECORDS READ: 2340 NUMBER OF PARITY ERRORS: 0 NUMBER OF WRONG LENGTH RECORDS: 0 NUMBER OF LOSS OF SYNC FLAGS: 0

	IR PICTURE INFORMATION INPUT DATA	IR PICTURE INFORMATION OUTPUT DATA	VISIBLE PICTURE INFORMATION INPUT DATA	VISIBLE PICTURE INFORMATION OUTPUT DATA
INITIAL SCAN LINE NUMBER/SENSOR	50	50	507 V5	507 V5
FINAL SCAN LINE NUMBER/SENSOR	309	309	3097 V4	3097 V4
NUMBER OF SENSOR LINES EXPECTED	260	260	2080	2080
NUMBER OF SENSOR LINES PRESENT	260	260	2080	2080
PERCENTAGE OF PICTURE EXPECTED	14.28%	14.28%	14.28%	14.28%
PERCENTAGE OF DATA RECOVERED	100.00%	100.00%	100.00%	100.00%

EQUATORIAL SCAN COUNT (ESC): 0 SCAN - IMAGE BIAS: -840 NO. INCORRECT IMAGE LINES: 0

	NO. SCAN LINES	FORWARD SCAN LINE JUMPS OCCUR.	FORWARD SCAN LINE JUMPS AMOUNT	BACKWARD SCAN LINE JUMPS OCCUR.	BACKWARD SCAN LINE JUMPS AMOUNT	NET SCAN LINE BIAS (FWD AMT - BKWD AMT)
INPUT DATA	260	0	0	0	0	0
OUTPUT DATA	260	0	0	0	0	0

	START TIME INPUT DATA HH MM SS MIL	START TIME OUTPUT DATA HH MM SS MIL	STOP TIME INPUT DATA HH MM SS MIL	STOP TIME OUTPUT DATA HH MM SS MIL	ELAPSED TIME INPUT DATA HH MM SS MIL	ELAPSED TIME OUTPUT DATA HH MM SS MIL
GMT	23 57 00 400	23 57 00 400	23 59 36 294	23 59 36 294	00 02 35 894	00 02 35 900
DOC	23 57 00 000	23 57 00 000	23 59 35 900	23 59 35 900	00 02 35 900	00 02 35 900
BIAS	00 00 00 400	00 00 00 400	00 00 00 894	00 00 00 894	DRIFT 00 00 00 494	00 00 00 494

	FORWARD TIME JUMPS INPUT DATA OCCUR.	FORWARD TIME JUMPS INPUT DATA AMOUNT	FORWARD TIME JUMPS OUTPUT DATA OCCUR.	FORWARD TIME JUMPS OUTPUT DATA AMOUNT	BACKWARD TIME JUMPS INPUT DATA OCCUR.	BACKWARD TIME JUMPS INPUT DATA AMOUNT	BACKWARD TIME JUMPS OUTPUT DATA OCCUR.	BACKWARD TIME JUMPS OUTPUT DATA AMOUNT	NET TIME BIAS INPUT DATA HH MM SS MIL	NET TIME BIAS OUTPUT DATA HH MM SS MIL
GMT	0	00 00 00 000	0	00 00 00 000	0	00 00 00 000	0	00 00 00 000	00 00 00 000	00 00 00 000
DOC	0	00 00 00 000	0	00 00 00 000	0	00 00 00 000	0	00 00 00 000	00 00 00 000	00 00 00 000

TIME RECOVERY RATE: 100.00 BASE TIME LINE RATE: 600 MS. AVERAGE TIME LINE RATE: 600 MS.

TOTAL SENSOR LINE ID'S CORRECTED 0 (.00%) TOTAL SCAN LINE NUMBERS CORRECTED 0 (.00%) TOTAL TIMES CORRECTED GMT: 0 (.00%) DOC: 0 (.00%)

SENSOR LINES IN: 2340 DROPPED BY ISLC: 0 DROPPED BY TLC: 0 SENSOR LINES OUT: 2340 SENSOR LINES NOT ACCOUNTED FOR: 0

SCAN LINES IN: 260 DROPPED BY ISLC: 0 DROPPED BY TLC: 0 SCAN LINES OUT: 260 SCAN LINES NOT ACCOUNTED FOR: 0

NO SENSOR CORRECTION TABLE FOLLOWS NO TIME/LINE CORRECTION TABLE FOLLOWS NO BETWEEN SCAN LINE ANALYSIS TABLE FOLLOWS

Figure 3-17. VISSR Pre-edit File Quality Summary Report

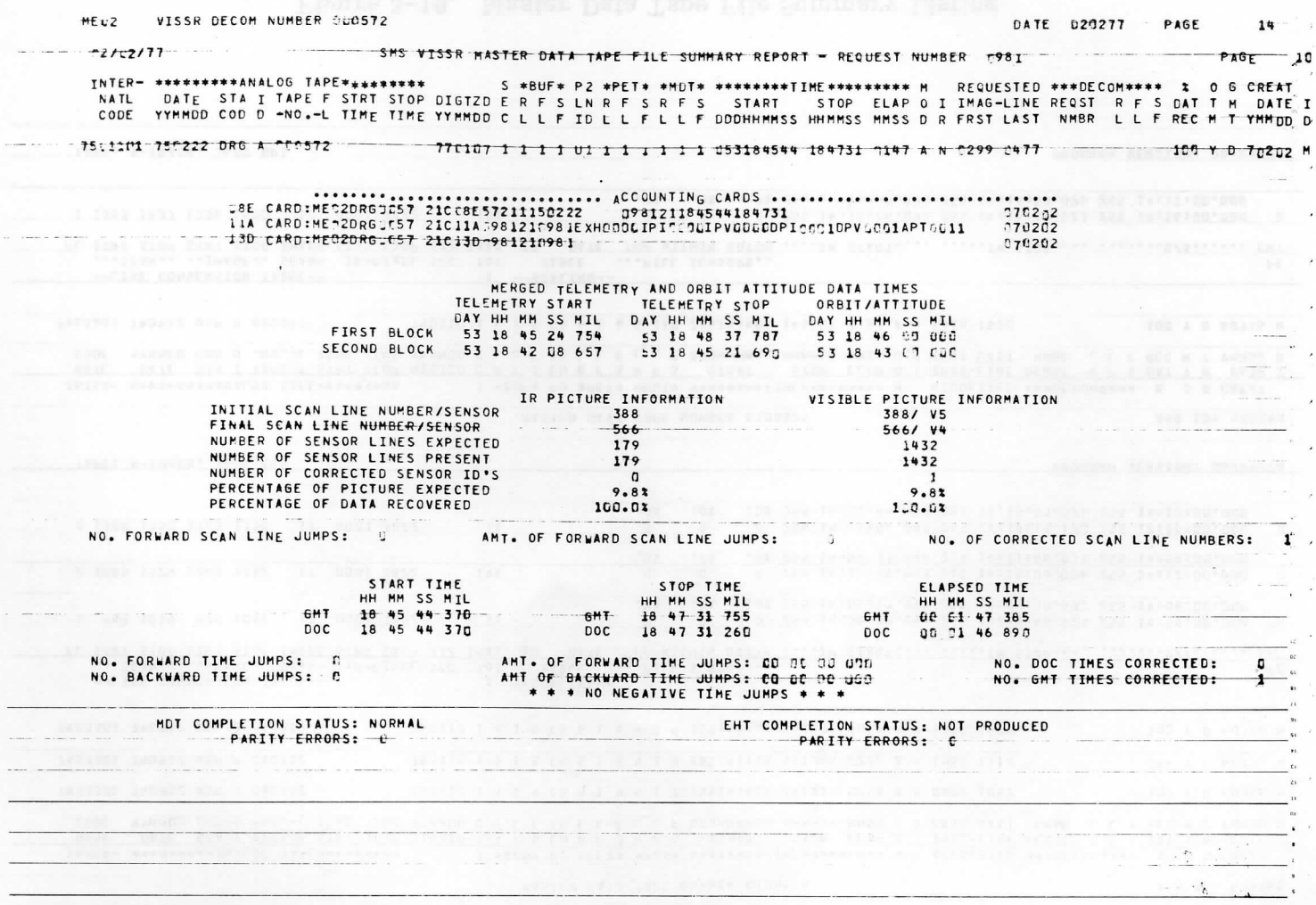
The Master Data Tape File Summary Report describes the content and quality of each output MDT file. It is only produced when MDTs are output. When EHTs are output, this report also pertains to the corresponding EHT file since the file structure of output MDTs and EHTs is always identical. When produced, this report follows the reports for the input file. When an input file is split into two files on the output MDT, a Master Data Tape File Summary Report is produced for each of the output files and the report for the second file will immediately follow the report for the first file. A sample Master Data Tape File Summary Report is shown in Figure 3-18.

The Master Data Tape File Summary List is a list of all MDT output files produced for an entire picture. The list is produced at the completion of processing for the run and follows the Master Data Tape File Summary Report for the last output MDT file. A sample Master Data Tape File Summary Listing is shown in Figure 3-19.

The Sensor Line Correction Report provides detailed information concerning sensor identifiers changed by the intrascan-line correction module. This report pertains to one complete input file and is produced only when corrections were required and made. When this report is not required, a message is printed at the bottom of the pre-edit file output quality summary indicating that fact. This report is produced in tabular form with one entry for each correction made. Table 3-8 describes the contents of this report and Figure 3-20 shows a sample printout.

The Time and Line Correction Report provides detailed information on each scan line whose time or scan line identification is changed. It contains all correction information for one complete input file and is produced only when corrections are made in that file. If no corrections are made, a message on the pre-edit file output quality summary will indicate that this report will not follow. The correction information is presented in tabular form with one entry for each scan line corrected. Irrelevant information will not be printed. That is, for example, if only the time is corrected, the corrected scan line number will be blank. Table 3-9 describes the contents of this report and Figure 3-21 shows a sample printout.

The Between Line Analysis Report details discontinuities in the relationship between corrected time and corrected line number. It is printed in tabular form only when required. If it is not required, a message will be printed on the pre-edit file output quality summary indicating this fact. Each entry will show the time/line relationship between two scan lines and is described in Table 3-10.



```
MEG2    VISSR DECOM NUMBER 000572                                   DATE  020277    PAGE      14

-2/02/77                    SMS VISSR MASTER DATA TAPE FILE SUMMARY REPORT - REQUEST NUMBER 0981                    PAGE      10

INTER- *********ANALOG TAPE********        S *BUF* P2 *PET* *MDT* ********TIME********* M    REQUESTED ***DECOM****  %  O G CREAT
 NATL   DATE  STA I TAPE F STRT STOP DIGTZD E R F S LN R F S R F S   START    STOP   ELAP O I IMAG-LINE REQST  R F S DAT T M  DATE I
 CODE  YYMMDD COD D -NO.-L TIME TIME YYMMDD C L L F ID L L F L L F DDDHHMMSS HHMMSS MMSS D R FRST LAST  NMBR  L L F REC M T YMMDD D

75111M1 750222 DRG A 000572          77C107 1 1 1 1 01 1 1 1 1 1 1 053184544 184731 0147 A N 0299 0477          100 Y 0 702 02 M

                                    ACCOUNTING CARDS
08E CARD:ME02DRG0057 21C08E57211150222    0981211845441847 31                    070202
11A CARD:ME02DRG0057 21C11A0981210981EXH0000IPIC00IPVG000DPIC001DPV0001APT0011   070202
13D CARD:ME02DRG0057 21C13D0981210981                                            070202

                          MERGED TELEMETRY AND ORBIT ATTITUDE DATA TIMES
                        TELEMETRY START     TELEMETRY STOP      ORBIT/ATTITUDE
                        DAY HH MM SS MIL   DAY HH MM SS MIL   DAY HH MM SS MIL
          FIRST BLOCK   53 18 45 24 754    53 18 48 37 787    53 18 46 00 000
          SECOND BLOCK  53 18 42 08 657    53 18 45 21 690    53 18 43 00 000

                                  IR PICTURE INFORMATION      VISIBLE PICTURE INFORMATION
INITIAL SCAN LINE NUMBER/SENSOR                388                    388/ V5
FINAL SCAN LINE NUMBER/SENSOR                  566                    566/ V4
NUMBER OF SENSOR LINES EXPECTED                179                     1432
NUMBER OF SENSOR LINES PRESENT                 179                     1432
NUMBER OF CORRECTED SENSOR ID'S                  0                        1
PERCENTAGE OF PICTURE EXPECTED                9.8%                     9.8%
PERCENTAGE OF DATA RECOVERED                100.0%                   100.0%

NO. FORWARD SCAN LINE JUMPS:  0        AMT. OF FORWARD SCAN LINE JUMPS:  0        NO. OF CORRECTED SCAN LINE NUMBERS:  1

                    START TIME              STOP TIME               ELAPSED TIME
                    HH MM SS MIL            HH MM SS MIL            HH MM SS MIL
          GMT       18 45 44 370      GMT   18 47 31 755      GMT   00 01 46 890
          DOC       18 45 44 370      DOC   18 47 31 260      DOC   00 01 46 890

NO. FORWARD TIME JUMPS:  0          AMT. OF FORWARD TIME JUMPS: 00 00 00 000          NO. DOC TIMES CORRECTED:  0
NO. BACKWARD TIME JUMPS:  0         AMT OF BACKWARD TIME JUMPS: 00 00 00 000          NO. GMT TIMES CORRECTED:  1
                                    * * * NO NEGATIVE TIME JUMPS * * *

MDT COMPLETION STATUS: NORMAL                    EHT COMPLETION STATUS: NOT PRODUCED
        PARITY ERRORS:  0                                PARITY ERRORS:  0
```

Figure 3-18. Master Data Tape File Summary Report

07/16/76 MASTER DATA TAPE FILE SUMMARY LISTING FOR PICTURE NO 010852, RUN NUMBER: 1 PAGE 43

MASTER DATA TAPE NUMBER 0108524 ASG ID: 47946S

INTER- NATL CODE	DATE YYMMDD	STA COD	I D	TAPE -NO.	F -L	STRT TIME	STOP TIME	DIGTZD YYMMDD	S *BUF* E C	R L	F L	S F	LN ID	R L	F L	S F	*PET* R L	F L	S F	*MDT* R L	F L	S F	START DDDHHMMSS	STOP HHMMSS	ELAP MMSS	O D	I R	IMAG FRST	-LINE LAST	REQST NMBR	R L	F L	S F	DAT REC	T M	DATE YMMDD	I D
7403301	740912	WSP	B	010852				750110	1	4	1	4	C5	4	1	4	4	1	7	255	141022	141118	0056	A	N	0802	1062					100	Y	D	60716	M
7403301	740912	WSP	B	010852				750110	1	5	1	5	C5	5	1	5	4	2	8	255	141118	141348	0230	A	N	1052	1312					099	Y	D	60716	M
7403301	740912	WSP	B	010852				750110	1	6	1	6	C5	6	1	6	4	3	9	255	141348	141401	0014	A	N	1310	1520					100	Y	D	60716	M

FL	--LINE CONVERSION TABLE-- ...SCAN.. STRT	STOP	..IMAGE.. STRT	STOP	SCAN-IMAGE	IR-PIXEL STRT	STOP	SEC SIZ	% TOT IMAG	--SCALING-- TABLE ID	DATE	...FILL SENSORS.. TOP	WITHIN	BOTTM	....TM START....	.....TM STOP....	........O/A.....	PE CNT
1	987	1079	970	1062	17	0001	3822		5%			0	0	0	255 14:08:33.896	255 14:11:46.929	255 14:09:00.000	0
												.0%	.0%	.0%	255 14:05:17.799	255 14:08:30.832	255 14:06:00.000	
2	1080	1329	1063	1312	17	0001	3822		14%			0	0	0	255 14:11:49.993	255 14:15:03.026	255 14:12:00.000	0
												.0%	.0%	.0%	255 14:08:33.896	255 14:11:46.929	255 14:09:00.000	
3	1330	1352	1313	1335	17	0001	3822		1%			0	0	0	255 14:15:06.090	255 14:18:19.123	255 14:16:00.000	0
												.0%	.0%	.0%	255 14:11:49.993	255 14:15:03.026	255 14:12:00.000	

TAPE: 9-TRACK, 1600 BPI PROGRAM VERSION: 08/24/76

MASTER DATA TAPE NUMBER 0108525 ASG ID: 47956S

INTER- NATL CODE	DATE YYMMDD	STA COD	I D	TAPE -NO.	F -L	STRT TIME	STOP TIME	DIGTZD YYMMDD	S *BUF* E C	R L	F L	S F	LN ID	R L	F L	S F	*PET* R L	F L	S F	*MDT* R L	F L	S F	START DDDHHMMSS	STOP HHMMSS	ELAP MMSS	O D	I R	IMAG FRST	-LINE LAST	REQST NMBR	R L	F L	S F	DAT REC	T M	DATE YMMDD	I D
7403301	740912	WSP	B	010852				750110	1	6	1	6	C5	6	1	6	5	110		255	141402	141552	0151	A	N	1310	1520					100	Y	D	60716	M

FL	--LINE CONVERSION TABLE-- ...SCAN.. STRT	STOP	..IMAGE.. STRT	STOP	SCAN-IMAGE	IR-PIXEL STRT	STOP	SEC SIZ	% TOT IMAG	--SCALING-- TABLE ID	DATE	...FILL SENSORS.. TOP	WITHIN	BOTTM	....TM START....	.....TM STOP....	........O/A.....	PE CNT
1	1353	1537	1336	1520	17	0001	3822		10%			0	0	0	255 14:15:06.090	255 14:18:19.123	255 14:16:00.000	0
												.0%	.0%	.0%	255 14:11:49.993	255 14:15:03.026	255 14:12:00.000	

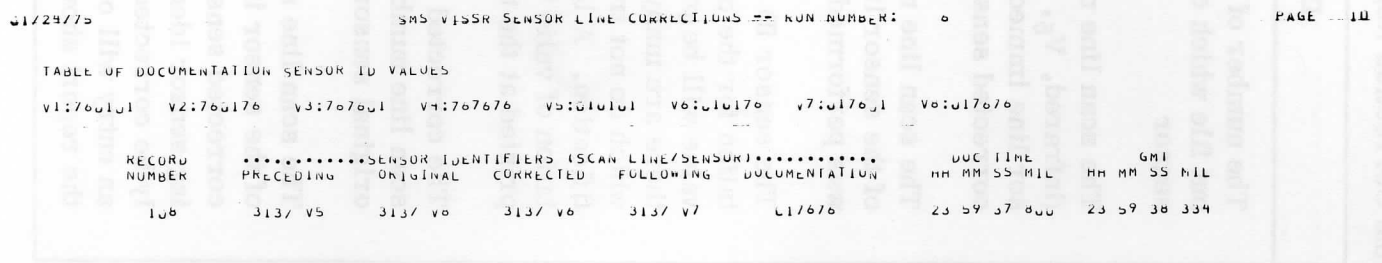
TAPE: 9-TRACK, 1600 BPI PROGRAM VERSION: 08/24/76

Figure 3-19. Master Data Tape File Summary Listing

Table 3-8

VISSR Sensor Line Correction Report

Data	Description
Physical record number	The number of the record within the input file which contains the corrected sensor
Preceding sensor ID (scan line/type)	The scan line number and sensor type (infrared, V_5, V_6, . . . , V_4) of the sensor line immediately preceding the corrected sensor
Original sensor ID (scan line/type)	The scan line number and sensor type of the sensor line before correction was performed
Documentation sensor ID	The sensor ID specified in the documentation for the corrected sensor. This value will be printed in octal because there are many possible bit patterns which do not translate to a sensor identification. A legend showing the translation of valid bit patterns will also be printed at the top of the report
Corrected sensor ID (scan line/type)	The corrected sensor identification. The scan line number is the same as the original sensor ID
Following sensor ID (scan line/type)	The scan line number and sensor type of the sensor immediately following the corrected sensor. Note that this following sensor identification may subsequently be corrected also, but if this occurs, an entry will occur on the next line of the report showing that correction



```
01/29/75                    SMS VISSR SENSOR LINE CORRECTIONS -- RUN NUMBER:    6                    PAGE   10

TABLE OF DOCUMENTATION SENSOR ID VALUES

V1:760101   V2:760176   V3:767601   V4:767676   V5:761101   V6:761176   V7:761201   V8:761676

        RECORD      ..........SENSOR IDENTIFIERS (SCAN LINE/SENSOR).........      DOC TIME        GMT
        NUMBER      PRECEDING    ORIGINAL   CORRECTED   FOLLOWING   DOCUMENTATION   HH MM SS MIL   HH MM SS MIL

           108      313/ V5      313/ V6     313/ V6     313/ V7        61767b       23 59 37 800   23 59 38 334
```

Figure 3-20. VISSR Sensor Line Correction Report

Table 3-9

VISSR Time and Line Correction Report

Data	Description
Baseline number	The line number of the base reference line on which the correction is based. This field will always be present
Uncorrected line number	The original scan line number of the corrected line. This value is always printed
Corrected line number	The corrected scan line number as set by the time and line correction module. If the line was not corrected, this entry is blank
Line difference	The difference between the original and the corrected line number. If no line correction was made, this item is blank
Base time	The time associated with the base reference line. This field will always be printed
Uncorrected time	The original time for the corrected line. This value is always printed
Corrected time	The corrected time as determined by the time and line correction module. This field will be blank if the time was not corrected
Time difference	The difference in time between the corrected time and the uncorrected time. This field is blank if no time correction was made
Loss of sync	This field will be either Blank or 'No', and indicates whether or not there was a loss of sync in the first record of the scan line

01/29/75 SMS VISSR TIME/LINE CORRECTION TABLE - RUN NUMBER 6 PAGE 12

LOSS OF SYNC	BASE LINE NO.	UNCR LINE NO.	CORR LINE NO.	LINE DIFF	DOC BASE TIME HHMMSS MIL	UNCORRECTED DOC TIME HHMMSS MIL	CORRECTED DOC TIME HHMMSS MIL	DOC TIME DIFF HHMMSS MIL	GMT BASE TIME HHMMSS MIL	UNCORRECTED GMT TIME HHMMSS MIL	CORRECTED GMT TIME HHMMSS MIL	GMT TIME DIFF HHMMSS MIL
	301	310			235936 000	235936 000			235931 000	235936 714	235936 789	000000 075
	301	310			235936 000	235936 000			235931 000	235936 774	235936 849	000000 075
	301	310			235936 000	235936 000			235931 000	235936 834	235936 909	000000 075
	301	310			235936 000	235936 000			235931 000	235936 894	235936 969	000000 075
	301	311			235936 000	235936 000			235931 000	235937 000	235937 074	000000 074
	301	311			235936 000	235936 000			235931 000	235937 074	235937 149	000000 075
	301	311			235936 000	235936 000			235931 000	235937 134	235937 209	000000 075
	301	311			235936 000	235936 000			235931 000	235937 194	235937 269	000000 075
	301	311			235936 000	235936 000			235931 000	235937 254	235937 329	000000 075
	301	311			235936 000	235936 000			235931 000	235937 314	235937 389	000000 075
	301	311			235936 000	235936 000			235931 000	235937 374	235937 449	000000 075
	301	311			235936 000	235936 000			235931 000	235937 434	235937 509	000000 075
	301	311			235936 000	235936 000			235931 000	235937 494	235937 569	000000 075
	316	444	314	130	235937 000	235938 400			235940 000	235938 800		
	316	350			235937 000	000000 000	000000 000	371657 727	235940 000	000000 400	000000 400	371657 727
	316	350			235937 000	000000 000	000000 000	371657 727	235940 000	000000 474	000000 475	371657 726
	316	350			235937 000	000000 000	000000 000	371657 727	235940 000	000000 534	000000 535	371657 726
	316	350			235937 000	000000 000	000000 000	371657 727	235940 000	000000 594	000000 595	371657 726
	316	350			235937 000	000000 000	000000 000	371657 727	235940 000	000000 654	000000 655	371657 726
	316	350			235937 000	000000 000	000000 000	371657 727	235940 000	000000 714	000000 715	371657 726
	316	350			235937 000	000000 000	000000 000	371657 727	235940 000	000000 774	000000 775	371657 726
	316	350			235937 000	000000 000	000000 000	371657 727	235940 000	000000 834	000000 835	371657 726
	316	350			235937 000	000000 000	000000 000	371657 727	235940 000	000000 894	000000 895	371657 726

Figure 3-21. VISSR Time and Line Correction Report

Table 3-10

VISSR Between Line Analysis Report

Data	Description
Scan line number A	The scan line number of the first line of the pair
Scan line number B	The scan line number of the second line of the pair
Line difference	Computer as scan line number B minus scan line number A
Time A	The time associated with the first line of the pair
Time B	The time associated with the second line of the pair
Time difference	Computed as time B minus time A
Time difference/line difference	Computed as indicated. This value will always be outside the range of 594 to 606 milliseconds per scan line, which is the criteria for making an entry in this report
Loss of sync	This field will contain either Yes or No, depending on whether or not the loss of sync flag is set in the second scan line (B) of the pair

The Picture Generation Report summarizes the content and quality of the data used to create the set of picture tapes requested on one picture sectorization control card. A sample Picture Generation Report is shown in Figure 3-22.

A one-page shipping letter (Figure 3-23) is printed for each output tape reel produced. Each shipping letter will provide all the information that appears in the tape labels, plus any information determined after the label was produced (such as final time and line number). The number of tape write errors will also be printed for each file. For IDAMS and AOIPS picture tapes, an O/A/PCM merge summary will also be provided.

When the primary system input is a master data tape, a Master Data Tape Input Report and a Master Data Tape File Input Summary Report will be produced for each input file. These reports replace all reports related to pre-edit tape processing (pre-edit reports plus sensor line correction, time and line correction, and between scan line analysis reports). The Master Data Tape Input Report (Figure 3-24) provides detailed information concerning each MDT input file processed. The report starts with a heading identifying the report and the Master Data Tape and file number to which it refers. The remainder of the report consists of diagnostic messages describing conditions which occur during the processing of the MDT file. The Master Data Tape File Input Summary Report (Figure 3-25) appears immediately after the Master Data Tape Input Report for the file after the end of the input file is encountered. It summarizes the content and quality of the input file and provides other related information.

The following quality summary information will also be printed. All these items have been defined previously and the definitions will not be repeated here.

- Total number of records read
- Number of read parity errors
- Number of wrong-length records
- Number of records with loss of sync
- Start time (infrared and visible)
- Stop time (infrared and visible)

11/15/78 SMS/GOES VISSR PICTURE GENERATION REPORT - REQUEST NUMBER: 1123 PAGE 27

INTER-	**********	ANALOG TAPE	**********				S	*BUF*	P2	*PET*	*MDT*	********	TIME	**********	M		REQUESTED	***DECOM****		%	O	G	CREAT	
NATL CODE	DATE YYMMDD	STA COD	I D	TAPE -NO.-	F	STRT TIME	STOP TIME	DIGTZD YYMMDD	E C	R L	F L	S F	LN ID	R L	F L	S F	R L	F L	S F	START DDDHHMMSS	STOP HHMMSS	ELAP MMSS	O D	I R	IMAG-LINE FRST	REQST LAST	NMBR	R L	F L	S F	DAT REC	T M	DATE YYMMDD	I D
7403301	740912	WSP	R	010852				750110	1	3	1	3	C6	3	1	3	3	1	5	255140722	141222	0500	A	N	0670	1169	1123		1		Y	D	61115	

START PIXEL: 0506

PICTURE SECTORIZATION CONTROL CARD

PIC NUMBER	S E C	START- IMAG LINE	START- PIXL	STOP IMAG LINE	S C	AOIPS I R	AOIPS V S	DICOMED- IR- RL	DICOMED- VIS. RL	IDAMS- IR- S	IDAMS- VIS. RL	IDAMS- DICOMED RL	SCALING TABLES- IDAMS- IR	IDAMS- VIS	ID
010852	1	0670	0500			Y	Y	Y	Y	Y	Y		005	501 302 083	PX

THE FOLLOWING TELEMETRY AND ORBIT/ATTITUDE DATA IS INCLUDED ON THE IDAMS AND AOIPS PICTURE TAPES

	TM START TIME DAY HH MM SS MIL	TM STOP TIME DAY HH MM SS MIL	O/A TIME DAY HH MM SS MIL
FIRST BLOCK	255 14 05 17 799	255 14 08 30 832	255 14 06 00 000
SECOND BLOCK	255 14 08 33 896	255 14 11 46 929	255 14 09 00 000

	INFRARED	VISIBLE
REQUESTED START (SCAN LINE / SENSOR).....	687	687/ V5
ACTUAL START (SCAN LINE / SENSOR).....	688	687/ V6
EXPECTED STOP (SCAN LINE / SENSOR).....	1186	1186/ V4
ACTUAL STOP (SCAN LINE / SENSOR).....	1186	1186/ V4
NUMBER OF SENSORS EXPECTED.....	500	4000
NUMBER OF SENSORS PRESENT.....	499	3987
FILL LINES PRECEEDING IMAGE.....	0(.0%)	0(.0%)
FILL LINES WITHIN IMAGE.....	0(.0%)	12(.3%)
FILL LINES FOLLOWING IMAGE.....	0(.0%)	0(.0%)
TOTAL NUMBER OF FILL LINES.....	0(.0%)	12(.3%)
NUMBER OF CORRECTED SENSOR ID'S.....	0(0.0%)	4(.1%)
NUMBER OF CORRECTED SCAN LINES.....	5(1.0%)	5(1.0%)
PERCENTAGE OF DATA RECOVERED.....	99.8%	99.7%
START TIME.....	14:07:22.920	14:07:22.320
STOP TIME.....	14:12:21.790	14:12:21.790
ELAPSED TIME.....	04:58.870	04:59.470

TAPE OR AOIPS FILE	PARITY ERRORS	TERMINATION STATUS
IDAMS IR	0	NORMAL
IDAMS VISIBLE	0	NORMAL
DICOMED IR	0	NORMAL
DICOMED VISIBLE	0	NORMAL
AOIPS VISIBLE	0	NORMAL
AOIPS IR IMAGE	0	NORMAL
AOIPS IR GRID	0	NORMAL
AOIPS CALIBRAION	0	NO DATA

Figure 3-22. Picture Generation Report

```
LINE
NUMBER
     1  11/12/76                              SMS/GOES VISSR SHIPPING LETTER - REQUEST NUMBER:  1123                              PAGE   31
     2
     3
     4                                                AOIPS PICTURE TAPE NUMBER 01085225                                      ASG ID: BLANK
     5
     6  INTER-  *********ANALOG TAPE********          S *BUF* P2 *PET* *MDT* ********TIME********* M   REQUESTED ***DECOM****   %  O G CREAT
     7   NATL    DATE  STA I TAPE F STRT STOP DIGTZD E R F S LN R F S R F S   START    STOP  ELAP O I IMAG-LINE REQST  R F S DAT T M  DATE I
     8   CODE    YYMMDD COD D -NO.-L TIME TIME YYMMDD C L L F ID L L F L L F DDDHHMMSS HHMMSS MMSS D R FRST LAST  NMBR  L L F REC M T YMMDD D
     9
    10  7403301 740912 WSP B 01085Z          750110 1 3 1 3 C6 3 1 3      255140722 141222 0500 A N 0670 1169  1123 25 1 1 099 Y D 61112 A
    11
    12  7403301 740912 WSP B 01085Z          750110 1 3 1 3 C6 3 1 3      255140723 141222 0459 I Y 0670 1169  1123 25 2 2 099 Y D 61112 A
    13
    14  7403301 740912 WSP B 01085Z          750110 1 3 1 3 C6 3 1 3      255140723 141222 0459 G Y 0670 1169  1123 25 3 3 099 N D 61112 A
    15
    16
    17     --LINE CONVERSION TABLE--              %  --SCALING--
    18     ...SCAN.. ..IMAGE.. SCAN-  IR-PIXEL SEC  TOT    TABLE    ...FILL SENSORS..                                                PE
    19  FL STRT STOP STRT STOP IMAGE STRT STOP SIZ IMAG  ID   DATE  TOP WITHIN BOTTM ....TM START.... .....TM STOP.... ........O/A...... CNT
    20
    21   1  687 1186  670 1169   17  0500 1475  P    7% 0001          0    12     0  255 14:05:17.799 255 14:08:30.832 255 14:06:00.000   0
    22                                                                .0%   .3%   .0% 255 14:08:33.896 255 14:11:46.929 255 14:09:00.000
    23
    24   2  688 1186  671 1169   17  0500 1475  P    7% 0001          0     0     0  255 14:05:17.799 255 14:08:30.832 255 14:06:00.000   0
    25                                                                .0%   .0%   .0% 255 14:08:33.896 255 14:11:46.929 255 14:09:00.000
    26
    27   3  688 1186  671 1169   17  0500 1475  P    7% 0000          0     0     0    0 00:00:00.000    0 00:00:00.000    0 00:00:00.000   0
    28                                                                .0%   .0%   .0%    0 00:00:00.000    0 00:00:30.000    0 00:00:00.000
    29
    30
    31  TAPE: 9-TRACK, 1600 BPI                                                                          PROGRAM VERSION: 11/11/76

    *** USER   WARNING    MESSAGE  833, CALLED BY SHPLTR ... FIRST DIGIT OF DECOM REEL NO. 25 DOES NOT MATCH PICTURE SECTION NO. 1.
```

Figure 3-23. VISSR Shipping Letter Report

```
01/31/77                    MASTER DATA TAPE INPUT REPORT - REQUEST NUMBER  1123                    PAGE    6

**********************************************************************************************************************
*****************************************  START INPUT MASTER DATA TAPE NO. 010852З, FILE 1 ***************************
**********************************************************************************************************ASG ID: 4793EC

INTER- **********ANALOG TAPE*********        S *BUF* P2 *PET* *MDT* ********TIME********* M   REQUESTED ***DECOM****  %  O G CREAT
 NATL   DATE  STA I TAPE F STRT STOP DIGTZD E R F S LN R F S R F S   START    STOP  ELAP O I IMAG-LINE REQST  R F S DAT T M  DATE I
 CODE   YYMMDD COD D -NO.-L TIME TIME YYMMDD C L L F ID L L F L L F DDDHHMMSS HHMMSS MMSS D R FRST LAST  NMBR  L L F REC M T YMMDD D

7403301 740912 WSP B 010852          750110 1 3 1 3 C6 3 1 3 3 1 5 255140643 140848      A N 0552 0812                Y D 60716 M

***  USER  INFORMATION MESSAGE  821, CALLED BY STAT22 ... END OF FILE ON INPUT MDT AT BLOCK     1877
```

Figure 3-24. Master Data Tape Input Report

```
01/31/77                    SMS VISSR MASTER DATA TAPE FILE INPUT SUMMARY REPORT - REQUEST NUMBER   1123                    PAGE    7

INTER- *********ANALOG TAPE*********        S *BUF* P-2 *PET* *MDT* ********TIME********* M   REQUESTED ***DECOM****  %  O G CREAT
 NATL   DATE  STA I TAPE F STRT STOP DIGTZD E R F S LN R F S R F S   START    STOP  ELAP O I IMAG-LINE REQST  R F S DAT T M  DATE I
 CODE  YYMMDD COD D -NO.-L TIME TIME YYMMDD C L L F ID L L F L L F DDDHHMMSS HHMMSS MMSS D R FRST LAST  NMBR  L L F REC M T YMMDD D

7403301 740912 WSP B 010852          750110 1 3 1 3 C6 3 1 3 3 1 5 255140643 140848      A N 0552 0812                 Y D 60716 M

RECORDS READ: 1876   PARITY ERRORS:   0   WRONG LENGTH RECORDS:   0  EQUATORIAL SCAN COUNT (ESC):  857   SCAN - IMAGE BIAS:  17

                    ..... ACCOUNTING CARDS .....
11A CARD:ME01WSP1085 23C11A1123231123EXH0000IPIC00IPV0000DPIC001DPV0000APT0000    070131
13D CARD:ME01WSP1085 23C13D1123231123                                             070131

                    TELEMETRY AND ORBIT/ATTITUDE DATA TIMES

                          TELEMETRY START     TELEMETRY STOP      ORBIT/ATTITUDE
                          DAY HHMMSS MIL      DAY HHMMSS MIL      DAY HHMMSS MIL
          FIRST  BLOCK: 255 140517 799    255 140830 832    255 140600 000
          SECOND BLOCK: 255 140833 896    255 141146 929    255 140900 000

                                IR PICTURE INFORMATION      VISIBLE PICTURE INFORMATION
INITIAL SCAN LINE NUMBER/SENSOR          621                      621/ V5
FINAL SCAN LINE NUMBER/SENSOR            829                      829/ V4
NUMBER OF SENSOR LINES EXPECTED          209                     1672
NUMBER OF SENSOR LINES PRESENT           209                     1667
NUMBER OF CORRECTED SENSOR ID'S            0                        2
PERCENTAGE OF PICTURE EXPECTED          11.5%                    11.5%
PERCENTAGE OF DATA RECOVERED           100.0%                    99.7%

NO. FORWARD SCAN LINE JUMPS:   0        AMT. OF FORWARD SCAN LINE JUMPS:   0        NO. OF CORRECTED SCAN LINE NUMBERS:   2

                START TIME                  STOP TIME                 ELAPSED TIME
                HH MM SS MIL                HH MM SS MIL              HH MM SS MIL
          GMT   14  6 42 710          GMT   14  8 48  35        GMT    0  2  5 325
          DOC   14  6 42 710          DOC   14  8 47 540        DOC    0  2  4 830

NO. FORWARD TIME JUMPS:   0          AMT. OF FORWARD TIME JUMPS:   0  0  0  0        NO. OF DOC. TIMES CORRECTED:   0
NO. BACKWARD TIME JUMPS:  0          AMT. OF BACKWARD TIME JUMPS:  0  0  0  0        NO. OF GMT. TIMES CORRECTED:   2
                                          *** NO NEGATIVE TIME JUMPS ***
```

Figure 3-25. SMS VISSR Master Data Tape File Input Summary Report

- Initial scan line number (infrared and visible)
- Final scan line number (infrared and visible)
- Number of sensor lines (infrared and visible)
- Percentage of data recovered (infrared and visible)
- o Percentage of picture (infrared and visible)
- Number of sensor IDs corrected (visible only)
- Number of scan line numbers corrected
- Number of times corrected

Additional reports produced by the VISSR Data Processing Program include an Accounting Card List shown in Figure 3-26, and a listing of all non-default Picture Scaling Tables available for use by the run shown in Figure 3-27.

3.1.2.9 Control Cards—Processing in the VISSR Data Processing Program (DPP) is controlled by Exec 8 control statements and data control cards. The EXEC 8 executive control cards provide information to the UNIVAC 1108 EXEC 8 Operating System which allows it to allocate the necessary resources for the run and to schedule and load the VISSR DPP program. The program control cards are read directly by the VISSR DPP and are used to control operation within the program. The required run deck will consist of the following cards or groups of cards in the order specified:

- @RUN card
- Program access control cards (@ASG, @COPY, @FREE)
- Tape assignment cards (@ASG)
- @XQT card
- Run parameter cards

```
11715776                    SMS VISSR ACCOUNTING CARD LIST - REQUEST NUMBER:  1123                    PAGE   37

                                                06  CARDS

0000000001111111111222222222233333333334444444444555555555566666666667777777778
1234567890123456789C123456789012345678901234567890123456789012345678901234567890

ME01WSP1085 02C06 1123C5409121525125I9014011614163O                              0
ME01WSP1085 02C06 1123C6409120499126I9114072314122 2                             0
ME01WSP1085 02C06 1123254091205001 5A9114072214122 2                             0

                                                08E CARDS

0000000001111111111222222222233333333334444444444555555555566666666667777777778
1234567890123456789C123456789012345678901234567890123456789012345678901234567890

ME01WSP1085 27B08E85270140912    1123211401151416 1                              061115
ME01WSP1085 23C08E85231340912    1123231406431408 48                             061115
ME01WSP1085 24C08E85241440912    1123231408481410 22                             061115
ME01WSP1085 24C08E85241440912    1123241410221411 18                             061115
ME01WSP1085 25C08E85251540912    1123241411181413 48                             061115

                                                11A CARDS

0000000001111111111222222222233333333334444444444555555555566666666667777777778
1234567890123456789C123456789012345678901234567890123456789012345678901234567890

ME01WSP1085 27B11A1123211123EXH0000IPI0001IPV0001DPI0001DPV0001APT0010          061115
ME01WSP1085 02C11A1123C5112300011821005915831401141700008 3uX005000101085 2.25 IR0
ME01WSP1085 23C11A1123231123EXH0000IPI0001IPV0001DPI0001DPV0001APT0011          061115
ME01WSP1085 24C11A1123231123EXH0000IPI0001IPV0001DPI0001DPV0001APT0011          061115
ME01WSP1085 24C11A1123241123EXH0000IPI0001IPV0001DPI0001DPV0001APT0011          061115
ME01WSP1085 02C11A1123C6112306700500067111691407141200009 9PX005050001085 2.26 IR1
ME01WSP1085 02C11A1123251123C6700500006701169140714120000 9PX5010500010852.25 VA1
ME01WSP1085 25C11A1123241123EXH0000IPI0001IPV0001DPI0001DPV0001APT0011          061115

                                                13D CARDS

0000000001111111111222222222233333333334444444444555555555566666666667777777778
1234567890123456789C123456789012345678901234567890123456789012345678901234567890

ME01WSP1085 27B13D1123211123                                                     061115
ME01WSP1085 23C13D1123231123                                                     061115
ME01WSP1085 24C13D1123231123                                                     061115
ME01WSP1085 24C13D1123241123                                                     061115
ME01WSP1085 25C13D1123241123                                                     061115
```

Figure 3-26. SMS VISSR Accounting Card List

01/31/77 SMS/GOES VISSR - DICOMED IR PICTURE SCALING TABLE - REQUEST NUMBER 1123 PAGE 5

TABLE NUMBER = 5 JULIAN DAY AND YEAR OF TABLE CREATION = 34/76

SCALING TABLE VALUES (OCTAL)

ELEM	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	070	070	070	070	070	070	070	070	070
30	070	070	070	070	070	070	070	070	070	070	070	070	070	070	070	070	070	070	070	110	110	110	110	110	110	110	110	110	110	110
60	110	130	130	130	130	130	130	130	130	130	130	130	130	150	150	150	150	150	150	150	150	150	150	150	170	170	170	170	170	170
90	170	170	170	170	170	170	170	210	210	210	210	210	210	210	210	210	210	210	230	230	230	230	230	230	230	230	230	230	230	230
120	230	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	270	270	270	270	270	270	270	270	270	270
150	270	270	270	270	270	270	270	270	270	270	270	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	120
180	120	120	120	120	120	120	120	120	120	220	220	220	220	220	220	220	220	220	220	000	000	000	000	000	000	000	000	000	000	334
210	334	334	334	334	334	334	334	334	334	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
240	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
270	000	000	000	000	000	000	000	070	070	070	070	070	070	070	070	070	070	070	070	070	070	070	070	070	070	070	070	070	070	070
300	070	070	070	070	070	110	110	110	110	110	110	110	110	110	110	110	110	130	130	130	130	130	130	130	130	130	130	130	130	150
330	150	150	150	150	150	150	150	150	150	150	150	170	170	170	170	170	170	170	170	170	170	170	210	210	210	210	210	210	210	210
360	210	210	210	210	210	230	230	230	230	230	230	230	230	230	230	230	230	250	250	250	250	250	250	250	250	250	250	250	250	250
390	250	250	250	250	250	250	250	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	310	310	310
420	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	120	120	120	120	120	120	120	120	120	220	220	220	220	220	220
450	220	220	220	220	220	000	000	000	000	000	000	000	000	000	000	334	334	334	334	334	334	334	334	334	334	000	000	000	000	000
480	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
510	000	000																												

GRAY LEVEL VALUES (OCTAL)

ELEM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	0000	0000	0070	0070	0110	0110	0130	0130	0150	0150	0170	0170	0210	0210	0230	0230	0250	0250	0270	0270	0310	0310	0120	0120
25	0220	0220	0000	0000	0334	0334	0000	0000	0000															

GRAY LEVEL ANNOTATION (FIELDATA)

ELEM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	330	325	320	313	306	303	300	297	294	291	288	285	282	279	276	273	270	265	260	255	250	245	240	235
25	230	225	220	215	210	205	200	195																

Figure 3-27. Picture Scaling Table

- Pre-edit, picture control, and output reel number cards
- @EOF card
- @FIN card

Three EXEC 8 control cards are required to access the program from the production program file and copy it to the temporary program file for execution. These cards should be punched exactly as follows:

```
@ASG,A  PRODUCTION*PROGRAM.
@COPY,A  PRODUCTION*PROGRAM.VSRDPS/GOES,TPF$.VSRDPS
@FREE  PRODUCTION*PROGRAM.
```

The tape assignment (@ASG) cards serve two purposes: supply input tape reel numbers and inform the executive of the physical tape unit requirements so that the units will be available when execution of the program begins. Up to ten tape assignments may be required depending on the requirements of the run.

Each assigned tape has a file name. The file names for the various tapes are shown in Table 3-11. Pre-edit tapes and master data tapes may not be processed together as input in the same run; therefore, only one should be assigned.

Reel numbers must be specified for MDT input and O/A input tapes. MDT input reels must be grouped by picture number, and the reels for each picture must be specified in order of increasing section number and increasing section file number within each section. A maximum of two O/A reel numbers may be specified and they must be in chronological order. Reel numbers for pre-edit tapes are obtained from pre-edit control cards and should not be specified on the assignment cards. All output tape numbers are determined by the picture number being processed. When more than one reel is required for the output data for one picture, the system will assign sequential reel numbers by default; however, special output tape reel numbers may be specified on the output reel number control cards discussed below.

The run parameter cards are one or more cards used to supply the processing program with information about the processing to be performed. The data are supplied in FORTRAN NAMELIST format and all parameters are optional except

Table 3-11

Tape File Names, Types, and Channels

TAPE	FUNCTION	FILE NAME	TYPE	LOG
VISSR Pre-edit (PET)	Input	PED	U9V	A
VISSR Master Data (MDT)	Input	MDPIN	U9V	A
VISSR Orbit/Attitude/Telemetry (O/A/TM)	Input	OATM	U9V	A
Picture Scaling Tables (PST) (see Note 1)	Input	PST	16	A
VISSR Master Data (MDT)	Output	MDP-W	U9V	D
VISSR Experimenter History (EHT)	Output	EHT-W	see Note 2	D
AOIPS Picture (APT)	Output	APT-W	U9V	B
Orbit Determination (ODT)	Output	ODT-W	U9V	B
Sectorized Experimenter (SET)	Output	SET-W	U9V	B
IDAMS Infrared Picture	Output	IPI-W	16	B
IDAMS Visible Picture	Output	IPV-W	16	B
Dicomed Infrared Picture	Output	DPI-W	U9H	C
Dicomed Visible Picture	Output	DPV-W	U9H	C

NOTES:

1. The PST tape will be dynamically assigned by the program whenever a SCLTAP parameter card specifying a scaling tables tape reel number is input to the run. The PST tape should never be assigned externally as is done for all other tapes.

2. EHTS may be recorded on either 7- or 9-track tape at various densities depending on the values coded in the options and type fields of the assignment card. For 9-track tapes, the options field should be "T" and the type field should be coded "U9V" for 1600-b/in., and "U9H" for 800-b/in. For 7-track, 800-b/in. tapes the option field should be "T" and the type field should be "16". 7-track, 556-b/in. tapes must be specially prepared by moving the physical end-of-tape reflective marker so that at least 40 feet of tape follow it. The options field should then be coded "TM" and the type field should be "16". Note, however, that whenever 9-track, 1600-b/in. MDTs are to be output in a run where EHTs are also to be produced, the EHTs must also be assigned as 9-track, 1600-b/in. or an error message will be printed and the run aborted.

the run number. When a parameter is not specified, a default applies. The NAMELIST identifier $PARAMS is used to identify the parameter cards. The last parameter specified, if any, should be followed by the sentinel $END.

Pre-edit, picture-generation control, and output reel number cards follow the parameter cards as required. These cards may be intermingled and in any order because they are sorted by the control card sort module. A card identifier in columns 79-80 is used to distinguish between card types. The following subsections describe the format and usage of each of these cards.

One pre-edit control card must be provided for each pre-edit file to be processed. These cards are normally produced at the same time the tapes are produced by pass two of the DPP digitization/quality check process. The information on each card is identical with the information in the PET file label record. The picture number (analog tape and file number), PET reel number, and PET reel file number are used to mount the correct tape and locate the proper file. The other items on the card are used to override the corresponding items in the file label.

The picture sectorization control cards, are used to specify which picture tapes are to be produced and the exact picture boundaries desired. The boundaries are specified by four fields: start image line, start IR element, stop image line, and sector size code. Only one set of boundaries must be specified regardless of which tapes are to be produced because all tapes must contain the same picture area. The start element is specified as the element number within the IR data. The start element for the visible data is computed to correspond to the left boundary of the IR start element because there is more than one visible element per IR element. Specific output tape reel numbers may also be specified on this card.

More than one picture sectorization control card may be input for each picture. However, when this is done, the start line numbers must be specified so that there is no overlap between pictures. When mode A visible pictures are being produced, each picture will require 500 scan lines of data. Therefore when more than one picture tape is to be produced for one mode A picture, the start line numbers from one card to the next must differ by at least 500.

When only IR picture tapes are to be produced, a full picture is possible because all the IR data will fit within the 4000-line-by-3904-element format at full resolution. If a larger area than the 500-line-by-976-element area normally produced along with a mode A visible picture is desired, a specific stop line (a multiple of 500 relative to the start line) should be specified.

The output tape reel number cards are used to specify specific reel numbers for output MDTs and EHTs. Ordinarily, output tape reel numbers are assigned sequentially, starting with one, for each output reel of a given picture. When data from the same picture is processed in two or more runs, output reel numbers will be duplicated after the first run. To prevent unwanted duplication, the output reel number cards should be used. The reel numbers specified do not have to be sequential but may not be duplicated. No more reel numbers need to be specified than will actually be used. However, if enough reel numbers are not specified, additional output reels will not be produced.

3.1.2.10 Image Location Procedure—The following computation must be made prior to filling out a Film Recorder Data Request for 2X or 4X blow-ups. This formula converts the start line and IR element requested for the blow-ups into a starting record and byte required as input by the Black and White Film Recorder (BWFR) also know as CELCO.

- TO CALCULATE THE START RECORD (LINE)

OL = start line of image on tape (requested)
XL = start line of the requested expanded image
R = starting record number (line)

$$R = 97+8(XL-OL)$$

- TO CALCULATE THE START BYTE (IR ELEMENT)

OP = start IR pixel of image on tape
XP = start IR pixel of the requested expanded image
P = starting byte (IR element)

$$P = 4(XP-OP)+1$$

The above holds for all visible and 500 scan line IR images ONLY.

If a 2000 scan line IR image is to be calculated, use the following:

START RECORD: $R = 97+2(XL-OL)$
START BYTE: $P = (XP-OP)+1$

3.1.2.11 ESC Versus Scan Count Error Procedure—In order to successfully process SMS/GOES imagery when the percentage of incorrect image lines exceed accepted criteria or the ESC versus scan line count are found to be inconsistent, the following procedures must be implemented.

- Using the pre-edit file processing reports, locate the initial scan line number and the scan image bias count.
- With these values, compute a new image start line for the picture sectorization control card according to the formula:

  (Initial scan line number) - (scan image bias) = corrected image start line

- Verify that the stop line image count exceeds the number of scan lines available as indicated by the Quality Control reports. If it does not, then modify the card value to accept the number of scan lines available for processing.
- With the MDT's available from the previous run, supply a new sectorization control card and rerun.

Before shipping any user tapes, including line tests; the image count must be checked for correctness. In all cases where an error occurs, the corrected image line count must be computed and used in the sectorization process to guarantee a successful data run.

3.2 UTILITY PROGRAMS

There are four utility programs associated with the VISSR DPS: SMSDMP, GRYDMP, SMSCHK, and SMSPRT. Program SMSDMP produces formatted dumps of VISSR PETs, MDTs, or EHTs. Program GRYDMP produces a formatted printout of the gray scale information recorded on DICOMED picture tapes. Program SMSCHK checks the quality of any output tape and produces shipping letters. Program SMSPRT produces formatted dumps of AOIPS and DICOMED tapes. These programs are described in the following subsections.

3.2.1 Program SMSDMP

SMSDMP produces formatted dumps of VISSR PETs, MDTs, or EHTs. A tape dump is useful in examining data irregularities and validating system output. SMSDMP provides the options of printing the complete contents of each record (full print), selected control information for each record (partial print), or only the file label record (label print). The portion of the file printed for the full and partial print modes is selectable by GMT, physical record number, or scan line number.

3.2.1.1 Input - The input to the SMSDMP Program consists of the tape to be dumped and a run deck which contains a parameter card indicating (1) the desired dump format and (2) the records to be dumped.

The following cards are comprised in the run deck:

```
@RUN        run-id, acct-id, project-id, run-time, pages
@ASG,A      PRODUCTION*PROGRAM.
@COPY,A     PRODUCTION*PROGRAM.SMSDMP/GOES, TPF$.SMSDMP
@FREE       PRODUCTION*PROGRAM.
@ASG,T      SMSEDT, U9V, NNNNNN
@XQT        .SMSDMP
...parameter card...
@FIN
```

The fields on the @RUN card (card 1) are defined as follows:

Field	Description
@RUN	Card identification as shown; must start in column 1, be followed by at least one blank, and may not contain any embedded blanks
run-id	Run identifier or programmer identification assigned to person who originates run
acct-id	Account identification; always IS040P
project-id	Project identification; 608A2I00703 for SMS-A runs, 608B2I00703 for SMS-B runs, or GS012I00701 for GOES-A runs
run-time	Estimated maximum run time in minutes; a minimum of 30 minutes per input PET or MDT is recommended
pages	Maximum number of printed pages; a minimum value of 70 for partial print mode and at least 500 for full print modes
cards	Maximum number of punched cards output; a minimum value of 100 is recommended

Card 5 assigns the tape to be dumped. The field nnnnnn must contain the tape number.

Card 7 is the parameter card which indicates the desired dump format and the records to be dumped. The parameter card is formatted as follows:

Column	Description
1-3	Tape file number to be dumped (right justified)
4-7	Start day of year (GMT)
8-17	Start time of day (GMT, HHMMSS)
18-22	Start image line number
23-27	Start physical record number
28-32	Number of records to dump
33-34	Type of dump = 01, partial print = 02, full print = 03, label print

Only one start point may be specified. The start point may be either a day and time (columns 4 through 17), start scan line (columns 18 through 22), or start physical record (columns 23 through 27). In the partial print mode, if the requested start time or line is not present on the input tape, the dump will start with the first record for which the parameter value exceeds the requested value. In the full print mode, the dump will start only if a record is found whose parameter value exactly matches the requested value; however, there is a ±200-millisecond tolerance allowed in matching the requested with an actual time.

3.2.1.2 Output - The only output produced by the SMSDMP Program is a listing showing the parameter values read from the parameter card, the file label, and the requested data records. A sample parameter card printout is shown in Figure 3-28. The file label record is always printed regardless of the type of dump requested. A sample label printout is shown in Figure 3-29.

A sample printout for the partial print mode is shown in Figure 3-30. The definition of each column is as follows:

Column	Content
1	Sensor identification
2	Physical record number
3	GMT day

*** PARAMETER CARD ***	
FILE NUMBER	1
DAY OF YEAR	0
START TIME	0
SCAN LINE	0
START RECORD	1
RECS TO DUMP	40
PRINT OPTION	1

PARTIAL=1
FULL=2
LABEL=3

Figure 3-28. Sample Parameter Card Printout for SMSDMP

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INTEN-		ANALOG TAPE							S	BUF	P2	PET	MDT	TIME		M			DECOM		S	O	G	CREAT	
NATL	DATE	STA	I	TAPE	F	STRT	STOP	DIGTZD	E	R F S	LN	R F S	R F S	START	STOP	ELAP	O	I	IMAG-LINE	RUN	R	F	S	DAT	T	M	DATE	I
CODE	YYMMDD	COD	D	-NO.-L		TIME	TIME	YYMMDD	C	L L F	ID	L L F	L L F	DDDHHMMSS	HHMMSS	MMSS	D	R	FRST LAST	NMBR	L	L	F	REC	M	T	YMMDD	D
7403301	740912	WSP	B	010851				750206	1	4 1 4	C6	4 1 4		255134455			A	N	0811 1071						Y		50207	P

Figure 3-29. Sample Label Printout for SMSDMP

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SENS	REC#	DAY	HHMMSSMIL	F1	F2	LINE F3	F4	IR DOCUMENTATION LINE	IMAG	ESC	M	YR	DAYHHMMSSMIL	BETA	SYNC	L/S	VIDEO DATA A	B	C	D	E	W	X	Y	Z
IR	1	255	134455583	0000	0000	811	0	833	811	862	A	74	255134455280	10981376	0000	NO	376	376	376	376	376	477	477	477	477
V5	2	255	134455656	0010	0000	811	0	833	811	862	A	74	255134455280	10981376	0000	NO	000	000	001	000	000	000	001	000	000
V6	3	255	134455716	0011	0000	811	0	833	811	862	A	74	255134455280	10981376	0000	NO	004	004	003	003	004	005	006	006	005
V7	4	255	134455776	0012	0000	811	0	833	811	862	A	74	255134455280	10981376	0000	NO	004	004	003	003	004	005	006	006	005
V8	5	255	134455836	0013	0000	811	0	833	811	862	A	74	255134455280	10981376	0000	NO	002	001	001	001	001	002	002	002	002
V1	6	255	134455896	0014	0000	811	0	833	811	862	A	74	255134455280	10981376	0000	NO	001	002	001	001	001	002	002	002	002
V2	7	255	134455956	0015	0000	811	0	833	811	862	A	74	255134455280	10981376	0000	NO	001	001	001	001	001	002	002	002	002
V3	8	255	134456016	0016	0000	811	0	833	811	862	A	74	255134455280	10981376	0000	NO	002	002	002	002	002	002	003	003	003
V4	9	255	134456076	0017	0000	811	0	833	811	862	A	74	255134455280	10981376	0000	NO	002	002	003	002	002	003	003	004	003
IR	10	255	134456183	0000	0000	812	0	834	812	862	A	74	255134455880	10981332	0000	NO	376	376	376	376	376	477	477	477	477
V5	11	255	134456256	0010	0000	812	0	834	812	862	A	74	255134455880	10981332	0000	NO	000	000	000	000	000	001	001	001	001
V6	12	255	134456316	0011	0000	812	0	834	812	862	A	74	255134455880	10981332	0000	NO	004	004	004	003	003	004	004	005	005
V7	13	255	134456376	0012	0000	812	0	834	812	862	A	74	255134455880	10981332	0000	NO	004	004	004	003	003	004	004	005	005
V8	14	255	134456436	0013	0000	812	0	834	812	862	A	74	255134455880	10981332	0000	NO	002	002	002	002	002	002	002	002	003
V1	15	255	134456496	0014	0000	812	0	834	812	862	A	74	255134455880	10981332	0000	NO	001	001	001	001	001	001	001	002	002
V2	16	255	134456556	0015	0000	812	0	834	812	862	A	74	255134455880	10981332	0000	NO	002	002	001	001	001	002	002	002	002
V3	17	255	134456616	0016	0000	812	0	834	812	862	A	74	255134455880	10981332	0000	NO	002	002	002	002	002	003	003	002	003
V4	18	255	134456676	0017	0000	812	0	834	812	862	A	74	255134455880	10981332	0000	NO	003	002	002	002	002	004	004	004	004
IR	19	255	134456783	0000	0000	813	0	835	813	862	A	74	255134456480	10981288	0000	NO	376	376	376	376	376	477	477	477	477
V5	20	255	134456856	0010	0000	813	0	835	813	862	A	74	255134456480	10981288	0000	NO	000	000	000	000	000	001	000	000	001
V6	21	255	134456916	0011	0000	813	0	835	813	862	A	74	255134456480	10981288	0000	NO	003	003	003	003	003	005	005	005	005
V7	22	255	134456976	0012	0000	813	0	835	813	862	A	74	255134456480	10981288	0000	NO	003	003	003	003	003	005	005	005	005
V8	23	255	134457036	0013	0000	813	0	835	813	862	A	74	255134456480	10981288	0000	NO	001	001	002	001	001	003	003	003	002
V1	24	255	134457097	0014	0000	813	0	835	813	862	A	74	255134456480	10981288	0000	NO	001	001	001	001	001	002	002	002	002
V2	25	255	134457156	0015	0000	813	0	835	813	862	A	74	255134456480	10981288	0000	NO	002	002	001	001	001	002	002	002	002
V3	26	255	134457217	0016	0000	813	0	835	813	862	A	74	255134456480	10981288	0000	NO	002	003	002	002	002	002	003	003	003
V4	27	255	134457277	0017	0000	813	0	835	813	862	A	74	255134456480	10981288	0000	NO	003	003	003	003	002	003	003	003	003
IR	28	255	134457383	0000	0000	814	0	836	814	862	A	74	255134457080	10981244	0000	NO	376	376	376	376	376	477	477	477	477
V5	29	255	134457457	0010	0000	814	0	836	814	862	A	74	255134457080	10981244	0000	NO	000	000	000	000	000	001	001	001	000
V6	30	255	134457517	0011	0000	814	0	836	814	862	A	74	255134457080	10981244	0000	NO	004	004	004	005	004	004	005	004	005
V7	31	255	134457577	0012	0000	814	0	836	814	862	A	74	255134457080	10981244	0000	NO	004	004	004	005	004	004	005	004	005
V8	32	255	134457637	0013	0000	814	0	836	814	862	A	74	255134457080	10981244	0000	NO	001	002	001	001	001	003	002	003	003
V1	33	255	134457697	0014	0000	814	0	836	814	862	A	74	255134457080	10981244	0000	NO	001	001	001	001	001	002	002	002	002
V2	34	255	134457757	0015	0000	814	0	836	814	862	A	74	255134457080	10981244	0000	NO	001	002	001	001	001	001	002	002	002
V3	35	255	134457817	0016	0000	814	0	836	814	862	A	74	255134457080	10981244	0000	NO	002	002	002	002	002	003	003	003	004
V4	36	255	134457877	0017	0000	814	0	836	814	862	A	74	255134457080	10981244	0000	NO	003	003	002	002	003	003	004	003	004
IR	37	255	134457983	0000	0000	815	0	837	815	862	A	74	255134457680	10981201	0000	NO	376	376	376	376	376	477	477	477	477
V5	38	255	134458057	0010	0000	815	0	837	815	862	A	74	255134457680	10981201	0000	NO	000	000	000	000	000	000	001	001	002
V6	39	255	134458117	0011	0000	815	0	837	815	862	A	74	255134457680	10981201	0000	NO	003	003	003	003	003	004	004	004	004
V7	40	255	134458177	0012	0000	815	0	837	815	862	A	74	255134457680	10981201	0000	NO	003	003	003	003	003	004	004	004	004

COLUMN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

Figure 3-30. Sample Partial Print Listing for SMSDMP

Column	Content
4	GMT time of day (hours, minutes, seconds, and milliseconds)
5	F1 data flags in octal
6	F2 data flags in octal
7	F3 data flag in decimal (uncorrected scan line number)
8	F4 data flag in decimal (corrected scan line number)
9	Scan line number from IR documentation
10	Image line number from IR documentation
11	Equatorial scan count from IR documentation
12	Visible data mode from IR documentation
13	Year of IR documentation time
14	Time of day from IR documentation (day, hours, minutes, seconds, and milliseconds)
15	Beta count from IR documentation
17	Sync bits from IR documentation word 37. Four least significant bits in binary
18-22	First five pixel values
23-26	Last four pixel values

The IR documentation information in columns 9 through 17 from the IR record is repeated for each of the visible records because this information is not contained in the visible records. If there is no IR record, columns 9 through 17 will be blank for the visible records.

A sample printout of an IR record in full print mode is shown in Figure 3-31. The same information provided for a partial print is printed at the beginning of each full print record. Then the documentation data from the record is printed in octal and broken out into 9-bit words. The video picture data are

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SENS	REC#	DAY	HHMMSSMIL	F1	F2	LINE F3	F4	LINE	IMAG	ESC	M	YR	DAYHHMMSSMIL	BETA	SYNC	L/S	A	B	C	D	E	W	X	Y	Z
IR	1	255	13445583	0000	0000	811	0	833	811	862	A	74	25513445	5280	10981376	0000	NO	376	376	376	376	376	477	477	477	477

WORD ••• OCTAL DUMP OF DOCUMENTATION SENSOR: IR •••

WORD																															
1	001	001	000	376	001	376	000	001	001	376	010	021	144	247	220	000	001	000	006	000	240	001	000	000	010	043	000	164	002	125
31	023	104	125	050	001	376	000	001	021	100	376	376	000	001	000	376	376	000	001	302	376	374	000	240	240	000	001	016	355	003
61	136	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
91	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
121	000	000	000	000	000	000	000	000																							

••• VIDEO DATA - SENSOR: IR SCAN LINE: 811 •••

ELEM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376
31	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376
61	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376
91	372	344	310	284	201	150	136	131	130	127	126	125	124	123	122	123	123	124	124	125	126	126	126	126	126	125	126	126	126	126
121	126	125	125	125	124	123	122	122	123	124	124	124	124	123	121	117	116	115	115	114	114	114	114	114	114	115	115	115	114	114
151	114	115	116	120	122	122	123	124	124	124	124	124	123	122	121	122	124	125	125	126	126	125	125	125	126	126	126	126	125	125
181	124	124	125	125	126	126	126	126	126	125	125	125	125	124	124	125	125	125	125	124	124	124	124	123	123	124	124	124	124	124
211	124	123	123	123	123	123	122	121	120	117	120	121	122	122	121	120	117	120	121	122	122	123	123	123	122	122	122	122	122	122
241	122	122	122	122	122	122	120	116	114	114	115	116	117	120	120	121	121	120	120	120	121	121	121	121	121	121	122	122	121	121
271	121	120	120	117	117	116	116	116	116	117	117	116	115	114	113	113	113	114	115	116	116	116	115	115	114	114	115	115	116	116
301	116	115	114	113	112	112	112	112	113	113	114	114	114	114	114	113	113	114	114	114	114	113	112	113	114	115	116	116	116	116
331	116	116	116	116	116	116	115	115	115	116	115	115	115	114	115	116	116	116	116	115	114	113	113	113	114	115	115	114	114	114
361	113	113	113	114	114	115	115	115	115	115	114	114	114	114	114	115	114	114	114	114	114	115	115	115	114	114	114	114	114	115
391	115	115	115	115	115	115	116	116	116	117	120	120	121	122	121	117	117	116	116	116	116	117	117	117	117	116	116	116	117	116
421	116	117	117	117	116	115	114	114	114	114	114	114	114	115	116	116	116	116	116	116	117	117	120	121	123	127	135	145	162	204
451	226	244	252	255	250	232	214	211	222	234	232	215	173	151	137	136	144	181	152	153	154	153	145	136	130	124	122	124	127	133
481	141	152	163	172	167	162	165	174	177	174	165	152	137	127	124	122	120	117	116	116	116	116	116	115	115	115	115	115	116	116
511	116	115	116	116	116	116	115	115	116	116	116	116	116	117	117	117	117	117	117	117	120	120	120	117	120	120	117	117	117	117
541	117	116	116	117	120	123	125	124	122	120	117	117	120	123	130	135	141	147	154	160	162	163	163	165	166	166	166	167	167	170
571	170	170	167	167	170	170	170	170	172	172	172	172	172	166	160	152	150	150	152	151	147	144	142	140	140	142	144	144	144	145
601	150	150	145	143	143	144	147	151	152	152	151	144	137	130	124	122	121	121	120	120	117	120	120	121	121	121	121	120	120	117
631	117	116	116	116	116	115	116	117	122	127	135	143	150	153	154	154	153	152	204	200	140	137	140	142	201	201	144	143	144	145
661	150	152	155	161	163	165	163	157	152	145	143	142	143	145	150	152	153	153	151	145	144	143	141	136	133	133	135	137	137	137
691	137	140	140	137	140	142	147	152	154	154	155	157	157	157	155	153	151	150	151	151	151	147	145	145	147	150	152	153	154	154
721	153	151	143	132	123	117	116	117	120	120	120	116	115	115	115	114	114	114	115	120	124	127	127	126	125	123	120	116	115	114
751	115	116	115	115	115	115	115	115	115	115	116	116	116	116	116	116	115	114	115	120	123	124	122	120	120	123	130	136	141	143
781	145	145	142	138	130	127	132	136	136	136	141	147	155	161	162	163	165	165	166	166	163	161	160	160	160	160	157	153	150	147
811	151	152	151	145	140	132	126	127	132	138	133	130	127	130	133	137	143	145	147	150	152	154	154	154	153	153	153	153	147	143
841	141	143	145	150	153	155	160	160	157	153	144	136	127	122	116	112	110	106	105	103	101	100	100	100	101	102	105	111	113	116
871	126	143	155	157	153	160	175	210	213	204	172	163	160	154	152	152	153	153	152	150	147	145	145	145	147	147	150	150	150	151
901	152	153	154	154	153	151	147	144	145	147	152	154	154	152	151	147	145	143	143	145	150	152	154	161	170	200	203	177	167	155
931	143	131	124	123	125	131	133	135	135	133	133	135	137	141	143	144	144	144	143	141	133	127	126	127	130	130	127	125	122	123
961	131	137	137	126	113	104	101	101	100	100	101	100	100	077	077	077	077	076	076	076	077	101	103	104	105	107	114	121	122	121
991	115	114	113	111	110	110	111	111	112	112	107	103	100	077	076	076	076	076	076	076	076	076	076	076	076	076	076	076	075	075
1021	075	075	075	075	074	075	075	076	077	100	102	105	115	125	132	132	130	130	131	135	141	141	141	142	147	158	165	204	217	227
1051	234	235	232	223	205	165	144	132	124	122	124	127	136	150	165	200	204	211	213	213	210	206	210	215	223	226	226	222	214	205
1081	200	170	161	153	145	140	130	122	117	117	117	116	112	107	104	105	104	102	100	100	100	100	077	077	077	077	076	076	076	076

Figure 3-31. Sample Full Print Listing for SMSDMP

printed in octal following the documentation with each 9-bit pixel printed separately. The video information is continued on additional pages which are not shown in Figure 3-31. A full print of a visible record is similar to that of an IR record, except that the documentation and video data are broken into 6-bit values rather than 9-bit values.

3.2.2 Program GRYDMP

Program GRYDMP (gray dump) produces a formatted printout of the gray scale information recorded on DICOMED picture tapes. This information is useful in validating that the tape was generated correctly and in isolating the cause of a poor-quality image to the data content of the tape or to the image generation equipment. It may also be used to validate the gray scale content when the gray scale is modified by scaling table values input from tape.

3.2.2.1 Input—The input to the GRYDMP Program consists of the DICOMED picture tape to be analyzed and control cards to initiate execution of the program. The following cards are comprised in the run deck:

```
@RUN        run-id, acct-id, project-id, 10, pages
@ASG, T     tapename, U9H, reel-id  . Assign Dicomed Tape
@COPY, A    PRODUCTION*PROGRAM.  GRYDMP/GOES, TPF$.
@HDG, N     X.M, 66, 0, 0  .  Suppress top and bottom page margins
@XQT        .GRYDMP/GOES
@FIN
```

The @RUN card (card 1) should be punched with the appropriate information in the run-id, acct-id, and project-id fields.

The pages field may be used to control the amount of printed output produced. A complete printout for all 4096 records requires about 80 pages. If a printout of only the top portion of the gray scale is desired, a smaller page limit may be used.

Card 2 assigns the DICOMED tape to be analyzed. The tapename field should be coded SMSVSR-DPI for DICOMED IR tapes and SMSVSR-DPV for DICOMED visible tapes. The tape number or slot number of the tape to be analyzed should be punched in the reel-id field.

The rest of the deck (cards 3 through 6) is always the same. Card 3 copies the program to a temporary file for execution. Card 4 causes the margins at the top and bottom of each printed page to be eliminated to improve the appearance of the output listing. Card 5 causes the program to be loaded into core storage and initiates execution, and Card 6 terminates the run deck.

3.2.2.2 Output—The output of the GRYDMP Program consists of a printer listing showing the tape label and sampled gray scale and image data for each record. The printout of the label appears first with a heading. Only the first 132 label characters are printed.

Figure 3-32 shows a sample page of the output produced by the GRYDMP Program. One line is printed for each record on the tape. The block number indicates the number of the record. The rest of the line contains 118 characters which represent the approximate values (6 high-order bits only) of every other pixel, sampled from the last 236 pixels of the record. Because there is a total of 4096 pixels per record, the first character printed represents the approximate value of pixel number 3861, the second is 3863, and so forth with the last being 4095. The first 22 characters are sampled from the image data and the last 96 characters are sampled from the gray scale data. Although each pixel contains up to eight bits of information, the character printed reflects only the content of the six most significant bits. Table 3-12 shows the range of pixel values represented by each printed character.

Note that this printout does not provide a precise indication of the data content of the tape. It is nonetheless useful in analyzing possible errors because most of the precision of the data (carried in the low-order bits) is lost in the photographic process. The only error condition that could not be detected is that in which pixels that are not sampled are the only ones in error; however, this condition is considered highly unlikely.

3.2.3 Program SMSCHK

Program SMSCHK checks the physical quality and data content of VISSR MDTs, EHTs, AOIPS and DICOMED picture tapes; produces a shipping letter for each reel processed; and punches 06 and special 11A cards for each DICOMED tape reel processed. This program may be used to verify the quality of a tape before shipment to an experimenter or to storage. It may also be used to reproduce lost shipping letters or accounting cards.

3.2.3.1 Input—The input to the SMSCHK Program consists of the tape(s) to be checked. There are no option cards; however, a run deck is required to initiate program execution. The following cards are comprised in the run deck:

```
@RUN        run-id, acct-id, project-id, time, 100
@COPY, A    PRODUCTION*PROGRAM, SMSCHK/GOES, TPF$.
@ASG, T     SMSVSR-xxx, type, reel1-id/reel2-id. . . /reeln-id
@XQT        TPF$, SMSCHK/GOES
@FIN
```

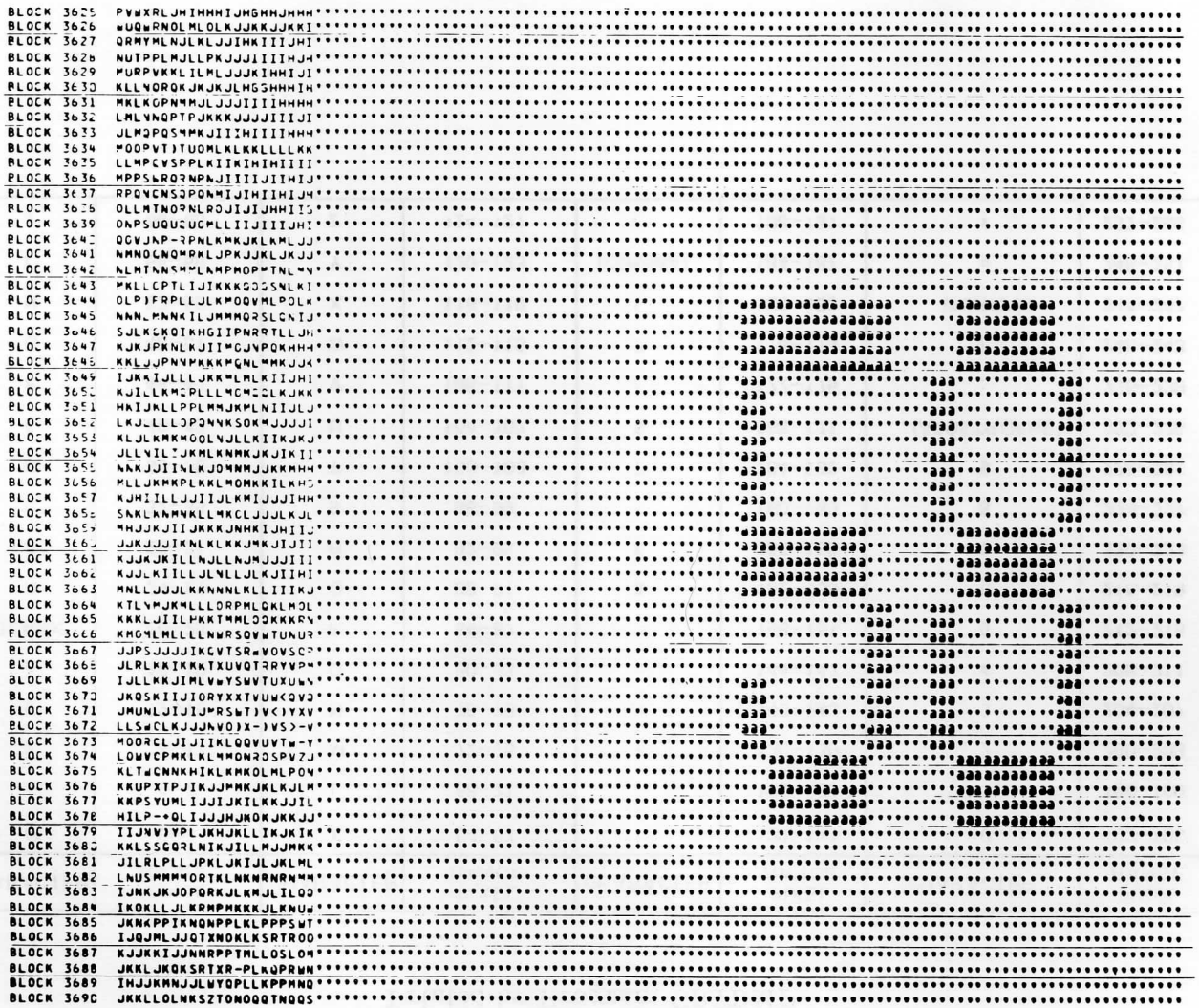

Figure 3-32. Sample Output for Program GRYDMP

Table 3-12. Range of Pixel Values for Each Character Printed by Program GRYDMP

CHARACTER	PIXEL RANGE	CHARACTER	PIXEL RANGE	CHARACTER	PIXEL RANGE	CHARACTER	PIXEL RANGE
@	0–3	K	64–67	)	128–131	0	192–195
[	4–7	L	68–71	–	132–135	1	196–199
]	8–11	M	72–75	+	136–139	2	200–203
#	12–15	N	76–79	<	140–143	3	204–207
Δ	16–19	O	80–83	=	144–147	4	208–211
BLANK	20–23	P	84–87	>	148–151	5	212–215
A	24–27	Q	88–91	&	152–155	6	216–219
B	28–31	R	92–95	$	156–159	7	220–223
C	32–35	S	96–99	*	160–163	8	224–227
D	36–39	T	100–103	(	164–167	9	228–231
E	40–43	U	104–107	%	168–171	(APOSTROPHE)	232–235
F	44–47	V	108–111	:	172–175	;	236–239
G	48–51	W	112–115	?	176–179	/	240–243
H	52–55	X	116–119	!	180–183	(PERIOD)	244–247
I	56–59	Y	120–123	(COMMA)	184–187	¤	248–251
J	60–63	Z	124–127	/	188–191	≠	252–255

The run-id, acct-id, and project-id fields on the @RUN card (card 1) should be coded in the normal manner. The time field should be coded to allow 10 minutes for each reel specified in the assignment card (card 3). The assignment card indicates the type of tape to be processed and the tape reel numbers. The characters xxx should be "MDP" to process a Master Data Tape, "EHT" to process an Experimenter History Tape, "APT" to process an AOIPS tape, "DPI" to process a DICOMED tape containing an IR image, or "DPV" to process a DICOMED tape containing a visible image. The type field of the assignment card should be coded as follows, depending on how the tapes were recorded:

- U9V for nine track, 1600 bpi
- U9H for nine track, 800 bpi
- 16 for seven track, 800 bpi

The tape numbers or slot numbers of the tapes to be processed should be coded in the reel1-id, . . . reeln-id field. Note that any number of reels may be processed; however, it is generally not practical to process more than about 10 reels per run.

3.2.3.2 Output—The SMSCHK Program prints the contents of each file label read, diagnostic messages when an error is encountered, and a shipping letter for each reel processed. For DICOMED tapes, 06 and special 11A cards are also punched and the card images are printed on the shipping letter. The diagnostic messages are self-explanatory. If excessive errors are encountered in any file, diagnostic output is turned off to prevent excessive printed output. The format of the shipping letters are shown in Figures 3-33 through 3-35.

3.2.4 Program SMSPRT

Program SMSPRT produces formatted dumps of AOIPS and DICOMED picture tapes. The SMSPRT Program prints file labels and data records in either a full or partial print mode. In full print mode, all of the meaningful information is printed for each data record. In the partial print mode, only selected control information is printed from each record.

3.2.4.1 Input—The input to SMSPRT consists of the tape to be printed, a run deck, and print control cards which specify the records to be printed and the desired print mode.

```
LINE
NUMBER
 1  11/12/76                          SMS/GOES VISSR SHIPPING LETTER - REQUEST NUMBER:  1123                          PAGE   31
 2
 3
 4                                                AOIPS PICTURE TAPE NUMBER 01085225                                AS6 ID: BLANK
 5
 6  INTER- *********ANALOG TAPE********          S *BUF* P2 *PET* *MDT* ********TIME********* M   REQUESTED ***DECOM****   %  O G CREAT
 7   NATL   DATE  STA I TAPE F STRT STOP DIGTZD E R F S LN R F S R F S   START    STOP  ELAP O I IMAG-LINE REQST  R F S DAT T M  DATE I
 8   CODE   YYMMDD COD D -NO.-L TIME TIME YYMMDD C L L F ID L L F L L F DDDHHMMSS HHMMSS MMSS D R FRST LAST  NMBR  L L F REC M T YMMDD D
 9
10  7403301 740912 WSP B 010852          750110 1 3 1 3 C6 3 1 3       255140722 141222 0500 A N 0670 1169  1123 25 1 1 099 Y D 61112 A
11
12  7403301 740912 WSP B 010852          750110 1 3 1 3 C6 3 1 3       255140723 141222 0459 I Y 0670 1169  1123 25 2 2 099 Y D 61112 A
13
14  7403301 740912 WSP B 010852          750110 1 3 1 3 C6 3 1 3       255140723 141222 0459 G Y 0670 1169  1123 25 3 3 099 N D 61112 A
15
16
17      --LINE CONVERSION TABLE--                 %  --SCALING--
18      ...SCAN.. ..IMAGE.. SCAN-  IR-PIXEL SEC  TOT    TABLE    ...FILL SENSORS..                                          PE
19  FL STRT STOP STRT STOP IMAGE STRT STOP SIZ IMAG  ID   DATE   TOP WITHIN BOTTM ....TM START.... .....TM STOP.... ........O/A...... CNT
20
21   1  687 1186  670 1169   17  0500 1475  P    7% 0000          0    12     0  255 14:05:17.799 255 14:08:30.832 255 14:06:00.000   0
22                                                              .0%  .3%   .0% 255 14:08:33.896 255 14:11:46.929 255 14:09:00.000
23
24   2  688 1186  671 1169   17  0500 1475  P    7% 0000          0     0     0  255 14:05:17.799 255 14:08:30.832 255 14:06:00.000   0
25                                                              .0%  .0%   .0% 255 14:08:33.896 255 14:11:46.929 255 14:09:00.000
26
27   3  688 1186  671 1169   17  0500 1475  P    7% 0000          0     0     0    0 00:00:00.000    0 00:00:00.000    0 00:00:00.000   0
28                                                              .0%  .0%   .0%    0 00:00:00.000    0 00:00:00.000    0 00:00:00.000
29
30
31  TAPE: 9-TRACK, 1600 BPI                                                                  PROGRAM VERSION: 11/11/76

*** USER   WARNING    MESSAGE  833, CALLED BY SHPLTR ... FIRST DIGIT OF DECOM REEL NO. 25 DOES NOT MATCH PICTURE SECTION NO. 1.
```

Figure 3-33. Sample AOIPS Tape Shipping Letter

```
11/12/76                        SMS/GOES VISSR SHIPPING LETTER - REQUEST NUMBER:  1123                    PAGE   29

                                DICOMED IR PICTURE TAPE NUMBER 01085225                                   ASG ID: BLANK

 INTER- *********ANALOG TAPE*********          S *BUF* P2 *PET* *MDT* ********TIME********* M   REQUESTED ***DECOM****  %  O G CREAT
  NATL   DATE  STA I TAPE F STRT STOP DIGTZD E R F S LN R F S R F S   START    STOP  ELAP O I IMAG-LINE REQST  R F S DAT T M  DATE I
  CODE  YYMMDD COD D -NO.-L TIME TIME YYMMDD C L L F ID L L F L L F DDDHHMMSS HHMMSS MMSS D R FRST LAST  NMBR  L L F REC M T YMMDD D

7403301 740912 WSP B 01 852          75 11  2 3 1 3 C6 3 1 3     255142722 141222 0500 A Y 0670 1169  1123 25 1 1 099 N D 61112 D

   --LINE CONVERSION TABLE--          %  --SCALING--
   ...SCAN.. ..IMAGE.. SCAN-  IR-PIXEL SEC  TOT    TABLE   ...FILL SENSORS..                                                    PE
FL STRT STOP STRT STOP IMAGE STRT STOP SIZ IMAG  ID   DATE  TOP WITHIN BOTTM ....TM START.... .....TM STOP.... .......O/A...... CNT

 1  688 1186  671 1169   17  05a7 1475  P    7%  7005 76 34    0     0     0   0 00:00:00.000   0 00:00:00.000   0 00:00:00.000   0
                                                              .0%   .0%   .0%  0 00:00:00.000   0 00:00:00.000   0 00:00:00.000

 TAPE: 9-TRACK,  800 BPI                                                                  PROGRAM VERSION: 11/11/76

***  USER   WARNING    MESSAGE  833, CALLED BY SHPLTR ... FIRST DIGIT OF DECOM REEL NO. 25 DOES NOT MATCH PICTURE SECTION NO. 1.

                                        D6 AND 11A ACCOUNTING CARDS

                    00000000011111111112222222222333333333344444444445555555555666666666677777777778
                    12345678912345678901234567890123456789012345678901234567890123456789012345678901234567890

                    MEDIWSP1785 D2C06 1123C54D912C499125I9114072314122 2
                    MEDIWSP1 85 D2C11A1123C51123 670056 067111691407141200099PX00505000010852.25 IR1
```

Figure 3-34. Sample DICOMED IR Picture Tape Shipping Letter

```
11/12/76                                     SMS/GOES VISSR SHIPPING LETTER - REQUEST NUMBER:  1123                                         PAGE   30

                                             DICOMED VISIBLE PICTURE TAPE NUMBER 01085225                                                 ASG ID: BLANK

INTER- *********ANALOG TAPE*********          S *BUF* P2 *PET* *MDT* ********TIME********* M    REQUESTED ***DECOM****  %  O G CREAT
 NATL   DATE  STA I TAPE F STRT STOP DIGTZD E R F S LN R F S R F S   START    STOP  ELAP O I IMAG-LINE REQST  R F S DAT T M  DATE I
 CODE  YYMMDD COD D -NO.-L TIME TIME YYMMDD C L L F ID L L F L L F DDDHHMMSS HHMMSS MMSS D R FRST LAST  NMBR  L L F REC M T YMMDD D

7403301 740912 WSP B 01852            750117 1 3 1 3 C6 3 1 3       255140722 141222 0500 A N 0670 1169  1123 25 1 1 099 N D 61112 D

 --LINE CONVERSION TABLE--          %  --SCALING--
  ...SCAN.. ..IMAGE.. SCAN-  IR-PIXEL SEC  TOT    TABLE    ...FILL SENSORS..                                                          PE
FL STRT STOP STRT STOP IMAGE STRT STOP SIZ IMAG  ID   DATE  TOP WITHIN BOTTM ....TM START.... .....TM STOP.... ........O/A...... CNT

 1  687 1186  671 1169   17  0500 1475  P    7% 0501 76 34    0     12     0    0 00:00:00.000  0 00:00:00.000  0 00:00:00.000   0
                                                            .0%    .3%   .0%    0 00:00:00.000  0 00:00:00.000  0 00:00:00.000

TAPE: 9-TRACK,  800 BPI                                                                                      PROGRAM VERSION: 11/11/76

*** USER  WARNING   MESSAGE  833, CALLED BY SHPLTR ... FIRST DIGIT OF DECOM REEL NO. 25 DOES NOT MATCH PICTURE SECTION NO. 1.

                                                    76 AND 11A ACCOUNTING CARDS

                                    000000000111111111122222222223333333333444444444455555555556666666666777777777778
                                    123456789012345678901234567890123456789012345678901234567890123456789012345678900

                                    MED1WSP1785 02006 11232540912050125A91140722141222                     0
                                    MED1WSP1785 02011A11232511230670050067011691407141200099PX5010500010852.25 VA1
```

Figure 3-35. Sample DICOMED Visible Picture Tape Shipping Letter

The following cards are comprised in the run deck:

```
@RUN          run-id, acct-id, project-id, 20, pages
@COPY, A      PRODUCTION*PROGRAM.SMSPRT/GOES, TPFS.
@ASG, T       SMSVSR-APT, U9V, reel-id
@XQT          TPF$.SMSPRT/GOES
                  Print Control Cards
@FIN
```

The run-id, acct-id, and project-id, fields of the @RUN card (card 1) should be coded as usual. The pages field should be set to a reasonable value depending on the amount of output or the maximum output desired. To print a complete file in partial print mode usually requires fewer than 100 pages. However, if many records are to be printed in full print mode, the value in the pages field should be chosen carefully because a large amount of output may be expected.

The tape number or slot number of the AOIPS tape to be printed should be coded in the reel-id field of the assignment card (card 3). The print control cards, which follow the @XQT card, indicate which records are to be printed and the type of printout, full or partial, desired. The print control card format is shown in Table 3-13. More than one print control card may be input to print data from different files and/or to print data in different print modes. When more than one print control card is input, the cards must be ordered by increasing file and by increasing start record parameter within each file.

The start record, specified in columns 3 through 7, may refer to a physical record number, a scan line number, or an image line number, depending on whether an "R", "S", or "I" is punched in column 9. The physical record number indicates the location of the record in the file and is usually the best way to specify a start record. The first nonlabel record is assigned physical record number 1. The AOIPS and IPD label records are considered collectively to be physical record number 0. The contents of the file label records are printed automatically whenever there is at least one print control card for the file. To print only the label records, a print control card should be input which specifies that one record is to be printed, starting at physical record number 0.

3.2.4.2 Output—The only output produced by the SMSPRT Program is a printer listing which shows the input print control cards, the contents of the file labels, and requested data records. The format of the full and partial print output is similar to that produced by the SMSDMP Program (Section 3.2.1).

Table 3-13. Print Control Card Format

COLUMN	DESCRIPTION
1	TAPE FILE NUMBER FROM WHICH DATA IS TO BE PRINTED
3–7	RECORD PARAMETER VALUE AT WHICH PRINT IS TO START. THIS VALUE IS INTERPRETED AS A PHYSICAL RECORD NUMBER, A SCAN LINE NUMBER, OR AN IMAGE LINE NUMBER, DEPENDING ON CHARACTER IN COLUMN 9
9	START RECORD PARAMETER TYPE WHICH SPECIFIES INTERPRETATION OF COLUMNS 3 THROUGH 7: =R, PHYSICAL RECORD NUMBER =S, SCAN LINE NUMBER =I, IMAGE LINE NUMBER
11–15	NUMBER OF PHYSICAL RECORDS TO BE PRINTED
17	TYPE OF PRINT =P, PARTIAL =F, FULL

SECTION 4

IMAGE PROCESSING

4.0 IMAGE PROCESSING

4.1 INTRODUCTION

The SMS/GOES image processing requirement is performed by the Image Processing Branch (Code 563) of IPD located in building 23 at Goddard. Image data can be processed on either of two systems in the Image Processing Facility (IPF). The primary system is the black and white film recorder (BWFR) and the secondary system is the color film recorder (CFR). Since the CFR is a secondary system it is further discussed in Appendix D.

The primary mission of the IPF, in support of SMS/GOES, is to provide a timely and responsive means for converting the satellite data to film imagery, reproducing the imagery, and maintaining the associated support functions, such as QA, scheduling, etc., to insure the optimum throughput for the operational system.

4.2 INPUT PRODUCTS TO THE IPF

Input products consist of SMS/GOES digital tapes, 9-track 800 b/in. structured in BWFR compatible format. Detailed descriptions of input tape formats are provided in Appendix B.

The tapes contain either visible or infrared data which is used to satisfy the requirements of both standing order and data request (special order) processing. The input tape data structure is created utilizing the following options:

- Contrast enhancement
- Image sectorization
- Full-earth or sector imagery (IR only)
- 1/4 size imagery (IR only)
- 1/16 size imagery (IR and VIS).

A broader range of sizes and format options is planned for the future.

Only tapes in the BWFR compatible format are accepted for IPF processing. Input of non-standard tapes or previously prepared photographic images for reproduction will not be accepted.

4.3 OUTPUT PRODUCTS OF THE IPF

The following products are available to fulfill standing order requirements:

- 70 mm, first generation, negative image film - designated 70 mm (-) 1
- 9.5 inch, second generation, positive image paper prints - designated 9.5 inch (+) 2.

Special order requirements (data request) are met by supplying any of the following products:

- 70 mm (-) 1
- 9.5 inch (+) 2
- 9.5 inch, second generation, positive image transparencies (positive appearing imagery on a clear acetate substrate) - designated 9.5 inch transparencies.

4.3.1 Output Product Format

The SMS/GOES image area consists of a data array comprised of 4096 bytes (pixels) and 4096 records (lines). The first 96 records of each image contain image annotation information. The last 192 bytes of each record contain gray-scale information. The satellite data appears in the remaining data fields (records 97 through 4096, and bytes 1 through 3904).

The image annotation contains information pertaining to image identification, location and time, data processing options utilized, and a calibration gray level (128). The gray scale is a 33 level scale indicating the gray level for a corresponding digital value. The values range from 0 to 63 for visible data (6 bit data), and from 0 to 255 for IR data (8 bit data).

The SMS/GOES data can be displayed at 1X, 2X, or 4X magnification. For 1X magnification, each byte, of 3904 contiguous bytes, and each record, of 4000 contiguous records is displayed one time as shown in Figure 4-1.

For 2X magnification, each byte, of 2048 contiguous bytes, and each record, of 2000 contiguous records, is displayed twice in order to fill the data field as shown in Figure 4-2. The 2X imagery has 1X annotation and all gray scale data is deleted.

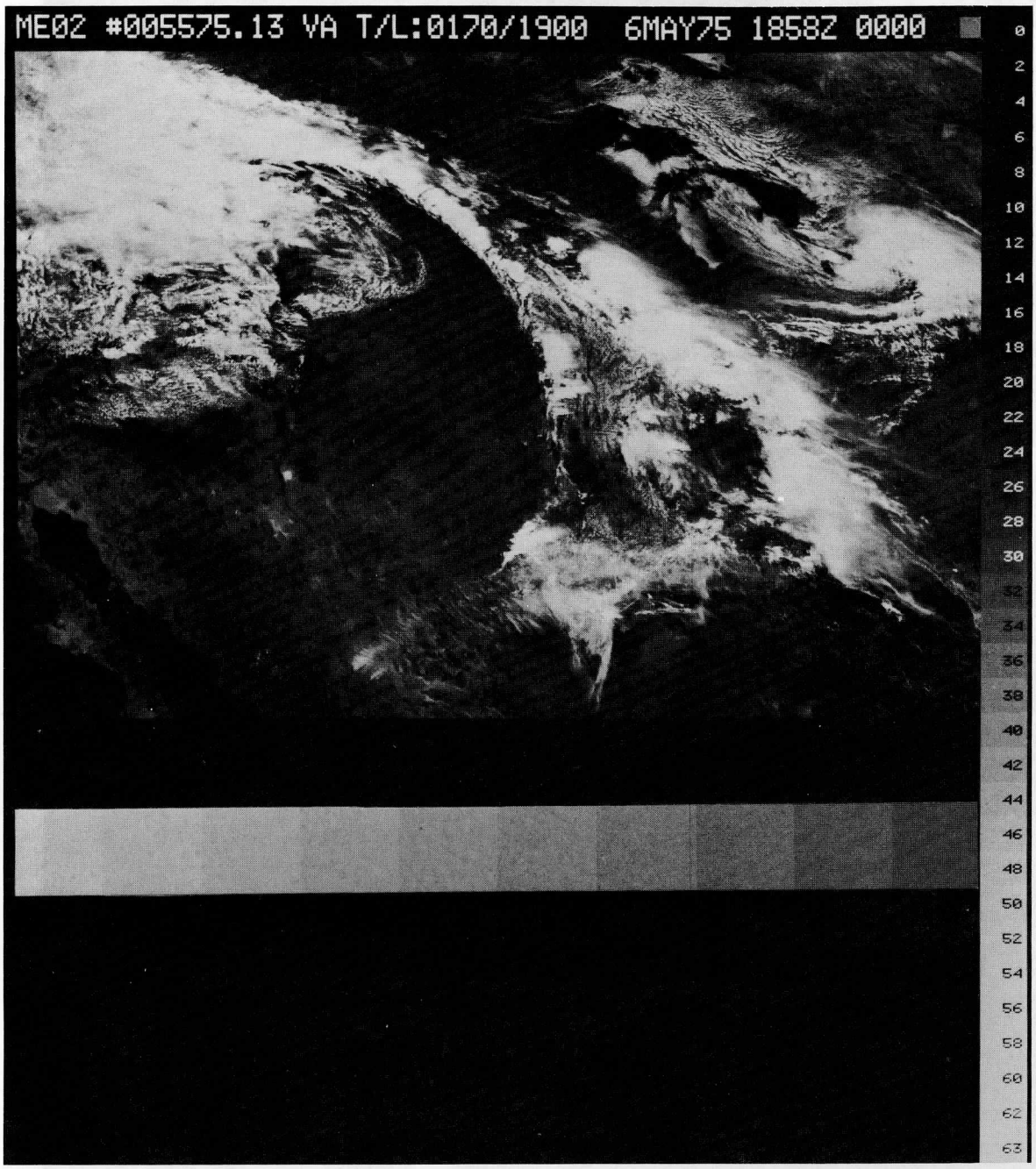

Figure 4-1. SMS-2 Image Produced by the BWFR (1X)

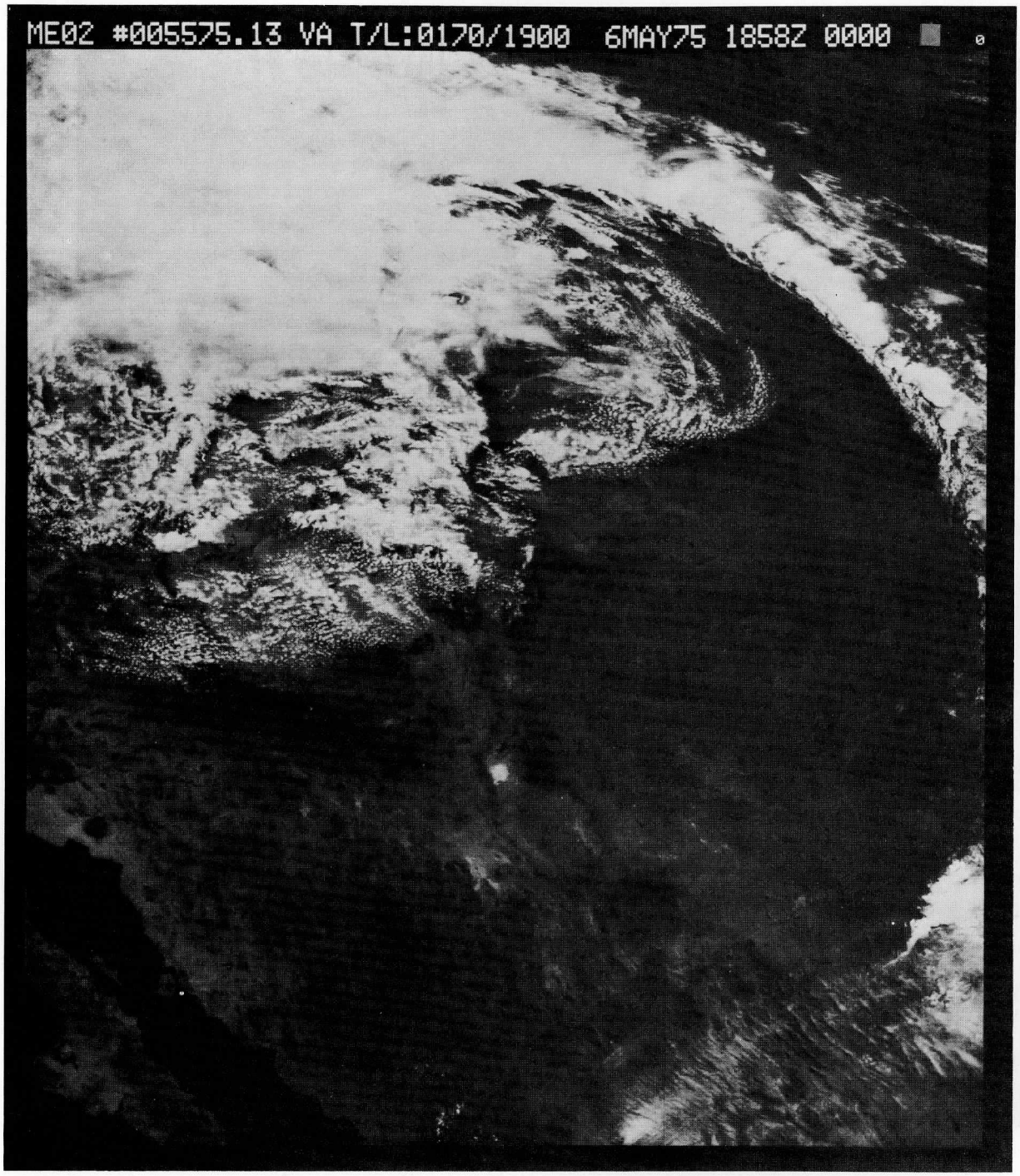

Figure 4-2. SMS-2 Image Produced by the BWFR (2X)

For 4X magnification, each byte, of 1024 contiguous bytes, and each record, of 1000 contiguous records, is displayed four times in order to fill the data field as shown in Figure 4-3.

The 4X imagery has 1X annotation and all gray scale data is deleted.

All data field information received a 14 percent aspect ratio correction factor (adjust of pixel and line spacing) to compensate for an inherent satellite data characteristic.

4.3.2. GOES-B IR Image

An example of the GOES-B IR Image is shown in Figure 4-4. Aspect ratio correction factors have been applied. This is the first photograph taken from GOES-B after synchronous orbit was achieved.

4.3.3 Output Product Restrictions

Output products for standing orders are limited to one 70 mm (-) 1 and two 9.5 inch (+) 2, in a 1X format, for each SMS/GOES tape submitted to the system.

Output products for data requests may be for any of the previously identified product types or formats, with a quantity not to exceed one 70 (-) 1 and a combined total of three prints or transparencies for each scene.

4.3.4 System Requirements

Initial IPF support efforts for standing order products provides a throughput capability of 240 tapes (scenes) per week for a total of 240 (-) 1 and 480 (+) 2 images. The throughput volumes for standing order products will double after March 1976, i.e. 480 tapes, 480 (-) 1 and 960 (+) 2 images. Each tape will be processed and the required imagery produced within 10 days of the receipt of the input tapes.

The combined total throughput volume for data requests in the 1X, 2X and 4X formats shall not exceed 10 percent of the standing order volume or 24 scenes per week. Each data request will be processed and the required imagery produced within 10 days of the receipt of the input tapes.

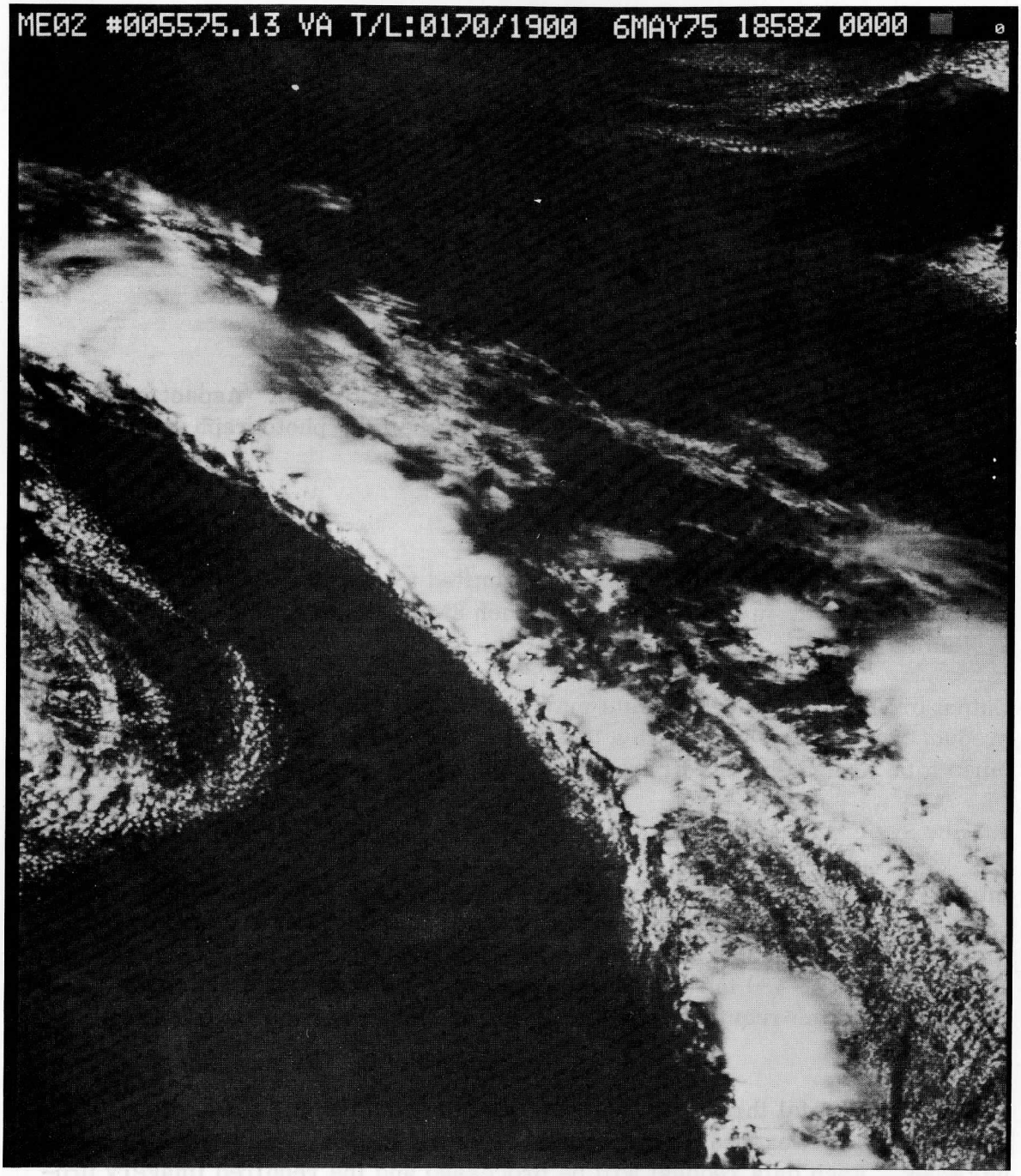

Figure 4-3. SMS-2 Image Produced by the BWFR (4X)

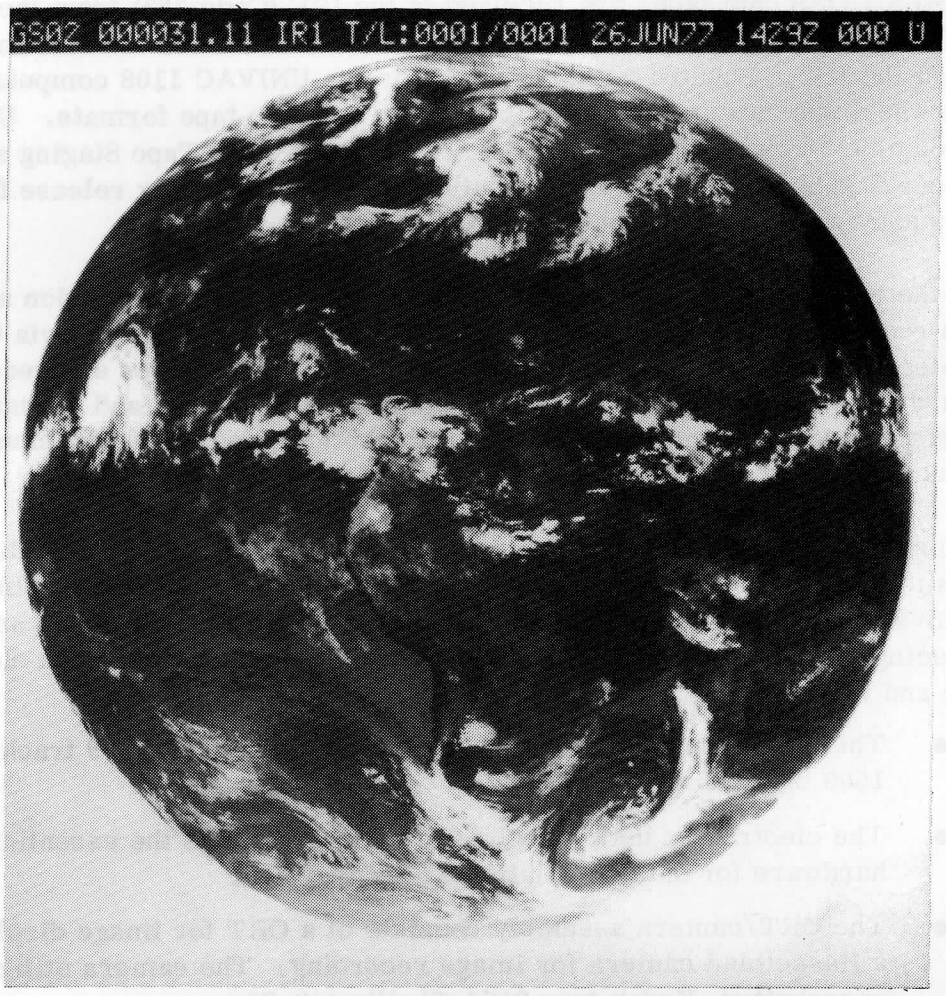

Figure 4-4. SMS-2 Image Produced by the BWFR (IX)

4.4 SYSTEMS OPERATIONS FLOW

4.4.1 Standing Orders

The SMS/GOES data tapes are received in the IPF (Code 563) from the Telemetry Computation Branch (Code 565). Figure 4-5 illustrates the functional data flow of the IPF. Located within Code 565 is the UNIVAC 1108 computer operations where the data is converted into IPF acceptable tape formats. Upon completion of 1108 processing, the tapes are transferred to Tape Staging and Storage (TS&S) located in Glendale building 3, and a shipping release form and accompanying shipping letter are sent to the IPF tape library.

It is the receipt of the form and letter which initiates IPF production activities. Upon receipt of this information, the tape library requests TS&S, via teletype, to release the specified tapes for processing. When the tapes are received in the library the required work order documentation is generated and the tapes are transferred to the Film Recorder (FR) Production Area for assignment to a production queue.

The primary SMS/GOES activity in the FR area is the conversion of digital tapes to 70 mm photographic images utilizing the Black and White Film Recorder (BWFR), also known as CELCO (see Appendix D). The BWFR is an image producing, film recording system comprised of two tape drives, an electronics logic and interface unit, and a CRT/camera assembly.

- The 2 tape drives are Texas Instrument Model 940-6, 9 track, 800-1600 b/in. units.
- The electronics unit, developed by ITE, contains the essential logic hardware for data translation and conversion.
- The CRT/camera assembly consists of a CRT for image display, and a Hasselblad camera for image recording. The camera utilizes 70 mm, sprocketted, Kodak type 2476 (Shellburst) film.

The BWFR system performance is monitored and maintained through a series of daily certification and weekly engineering tests.

A Daily Certification Test is run, processed, and assessed prior to the start of daily production activity. The certification establishes the correct exposure values, brightness and contrast, for the days production processing. It also verifies the accuracy of the aspect ratio correction.

A Weekly Engineering Test is generated at the first of each week to provide the data necessary for assessing the system MTF, geometric distortion, density uniformity, gray scale tonal values, and maximum and minimum density levels.

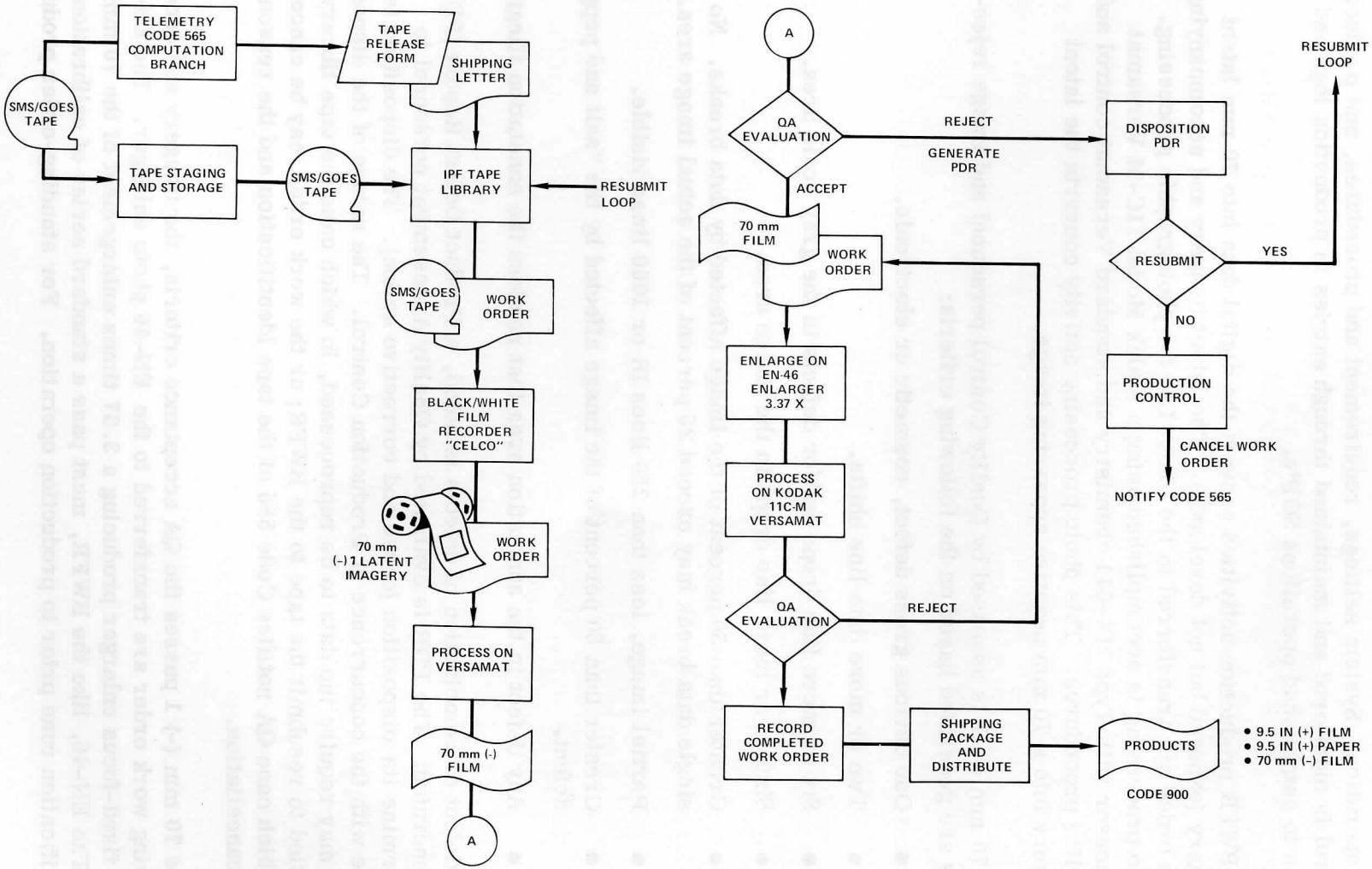

Figure 4-5. IPF Functional Data Flow

After receiving notification of certification, the system is prepared for production operation. System settings, requirement and procedures, and production control is monitored and maintained through entries in production logs and adherence to established operations SOP's.

The BWFR production activities convert the digital data into 70 mm latent imagery (exposed but not developed). The latent imagery and accompanying work order are transferred to the Photo Lab for photographic processing. Photo processing is accomplished using a Kodak Model 11C-M Versamat Processor with Type MX-641 chemistry and standard Versamat control and handling procedures. This photo processing activity converts the latent imagery into a 70 mm negative appearing image.

The 70 mm (-) 1 is assessed by Quality Control personnel and image rejections are generated based on the following criteria:

- One obvious gross defect, cosmetic or electronic.
- Two or more data line shifts.
- Six or more line drops and/or defects in the gray scale area.
- Sixteen or more line drops in the image area.
- Greater than 50 percent of the image affected by data breaks. No single data break may exceed 25 percent of the actual image area.
- Partial image, less than 250 lines IR or 1000 lines visible.
- Greater than 50 percent of the image affected by the "salt and pepper" defect.
- Any defect in the annotation area that renders the annotation illegible.

If a defect or combination of defects is noted, a Product Defect Report (PDR) is generated. The PDR is evaluated by Quality Assessment personnel to determine its disposition (cause and corrective action). The disposition is made with the concurrence of Production Control. The nature of the disposition may require the data to be reprocessed, in which case the tape library is notified to resubmit the tape to the BWFR; or the work order may be cancelled, in which case QA notifies Code 565 of the tape identification and the reason for the cancellation.

If the 70 mm (-) 1 passes the QA acceptance criteria, the imagery and accompanying work order are transferred to the EN-46 photo enlarger. The EN-46 is a fixed-focus enlarger producing a 3.37 times enlargement of the 70 mm (-) 1. The EN-46, like the BWFR, must pass a standard series of calibration and certification runs prior to production operation. For standing-order production

activity, two 9.5 inch second generation paper prints with positive appearing images (9.5 inch (+) 2) will be exposed for each 70 mm (-) 1 image.

The exposed prints are processed on the Versamat processor, assessed by Quality Control personnel, and rejected based on the following criteria:

- Density of constant density patch not within 0.75 ± 0.15
- One obvious defect (e.g. Newton rings)
- Eight or more dust or dirt spots greater than 1.0 mm in diameter in the image area.

If a defect or a combination of defects is detected, a PDR is generated. The PDR is evaluated by QA to determine the cause, and the 70 mm (-) 1 is resubmitted to the EN-46 for enlargement.

If the prints pass the QA inspection, the 70 mm (-) 1, two 9.5 inch (+) 2 prints, and accompanying work order are transferred to the IPF Shipping Area. Shipping packages and prepares the final products for distribution to Code 900. Shipping also notifies Production Control of the completion and closeout of the work order.

4.4.2 Data Requests

The flow and procedures for data requests are the same as those for standing order with the exception of the following items:

- Work Order Initiation - Special product requests are initiated when a data user completes a Data Request form (see Figure 4-6). This form provides information pertaining to satellite and tape identification, data starting points, and product requirement. The form is routed through the Code 565 SMS Data Processing Engineering Office to the Code 563 IPF tape library.
- Output Product Requirements - Data requests can be for any of the previously identified product types, formats, and quantities. For each product type the data starting points (starting byte and starting record) must be indicated.

REQUEST # _____

FOR CODE 563 USE ONLY
WORK ORDER NUMBER:
_____

FILM RECORDER
DATA REQUEST

REQUESTED BY _____ CODE _____ EXT. _____ DATE _____

SAT. I.D. _____ TYPE _____ TAPE # _____ INV. # _____

PRODUCTS REQUIRED

STARTING		NEGATIVE			9.5" PRINT			9.5" + TRANS		
IR ELEM (BYTE)	LINE (RECORD)	1:1	2:1	4:1	1:1	2:1	4:1	1:1	2:1	4:1

COMMENTS:

NOTE: NEGATIVE WILL BE DELIVERED TO REQUESTOR FOR EACH AREA REQUESTED.

Figure 4-6. Data Request Order Form

- Inspection Criteria - The inspection criteria for data request 70 mm (-) 1 and 9.5 inch (+) 2 products are the same as those for similar standing order products. For 9.5 inch transparencies the following rejection criteria applies:

  1. Density of constant density patch not within 1.19 ± 0.15.

  2. One obvious defect (e.g., Newton rings).

  3. Eight or more dust or dirt spots greater than 1.0 mm in diameter in the image area.

GLOSSARY

GLOSSARY

ABM	apogee boost motor
ACN	Ascension Island
A/D	analog to digital
AGC	automatic gain control
AOIPS	Atmospheric and Oceanographic Information Processing System
AGO	Santiago
APS	Auxiliary power system
APT	automatic picture transmission
ATS	Application Technology Satellite
ATSOCC	Applications Technology Satellite Operations Control Center
BCD	binary coded decimal
BDA	Bermuda
b/in.	bits per inch
b/s	bits per second
BUR	Johannesburg
BWFR	black and white film recorder
CDA	command and data acquisition
CDC	Control Data Corporation
CFR	color film recorder
cm	centimeter
CPU	central processing unit
CRO	Carnarvon
dc	direct current
DCP	data collection platform
DCPI	data collection platform interrogation
DCPR	data collection platform retransmission
DCS	data collection systems

DHE	data handling equipment
DOC	Department of Commerce
DPDT	double pole double throw
DPE	data processing engineer
DPP	Data Processing Plan; also Data Processing Program (VISSR)
DRGS	direct readout ground station
DRL	data reduction laboratory
DUS	data utilization station
EHT	Experimenter History Tape
EOF	end-of-file
ESC	equatorial scan count
ESRO	European Space Research Organization
FH	flying head
FM	frequency modulation
FOV	field-of-view
FR	field recorder
GHz	gigahertz
GMT	Greenwich Mean Time
GOES	Geostationary Operational Environmental Satellite
GSFC	Goddard Space Flight Center
HAW	Hawaii
HF	high frequency
IDAMS	Image Display and Manipulation System
IDIIOM	Information Displays Incorporated Input Output Machine
IGFOV	instantaneous geometric field-of-view
IPD	Information Processing Division
IPF	Image Processing Facility
IR	infrared
IRIG	inter-range instrumentation group

K	Kelvin
kb/s	kilobits per second
keV	kiloelectron volt
kg	kilogram
KHz	kilohertz
km	kilometer
LES	Lincoln Experimental Satellite
LF	low frequency
LPM	lines per minute
LSB	least significant bit
Mb/s	Mega bits per second
MDT	master data tape
MET	master edit tape
MeV	million electron volts
MHz	megahertz
MIL	Merritt Island
min	minute
mrad	milliradian
ms	milliseconds
MSC&AD	Mission Support Computing and Analysis Division
MSOCC	Multi-satellite Operations Control Center
MSB	most significant bit
mw	milliwatts
NASA	National Aeronautics and Space Administration
NESS	National Environmental Satellite Services
NOA	National Oceanic and Atmospheric
NOAA	National Oceanographic and Atmospheric Administration
NRZI	non-return to zero indicator
O/A	Orbit/Attitude
ORR	Orroral

PCC	production control center
PCM	pulse code modulation
PDR	Product Defect Report
pixel	picture element
PM	phase modulation
PMT	photomultiplier tube
PN	pseudo-random noise
PST	picture scaling table
QA	quality assurance
QC	quality control
QUI	Quito
RF	radio frequency
rms	root-mean-square
ROS	Rosman
r/m	revolutions per minute
R&RR	range and range rate
RTDU	real-time data unit
S/C	spacecraft
SCAMA	switching conference and monitoring arrangements
SCDT	serial coded decimal time
S/DB	synchronizer/data buffer
SEM	space environment monitoring
SET	Sectorized Experimenter
SFSS	Satellites Field Service Stations
SMS	Synchronous Meteorological Satellite
SOCC	satellite operations control center
SOP	standard operating procedures
STDN	Spaceflight Tracking & Data Network
SYNCOM	synchronous communications satellite
TAN	Tananarive

TARS	turn-around ranging station
TDAO	Telemetry Data Accounting Office
TDAS	Telemetry Data Accounting System
T&DS	Tracking & Data System Directorate
TE	tape evaluation
TELTRAN	telemetry translator
TIROS	Television Infrared Observation Satellite
TM	telemetry
TOS	TIROS Operational System
TS&S	tape staging & storage
UHF	ultrahigh frequency
ULA	Alaska
USSR	Union of Soviet Socialist Republics
VCO	velocity control unit
VLF	very low frequency
VHF	very high frequency
VISSR	visible and infrared spin scan radiometer
VSRDCM	VISSR Decommutation Program
WEFAX	weather facsimile

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APPENDIX A

CARD FORMATS

APPENDIX A
CARD FORMATS

Table A-1

Code 02R Analog Tape Received VISSR (GOES)

COLUMNS	DESCRIPTION
1 - 4	Satellite ID
5 - 7	Recording Station ID
8 - 11	Picture Tape Number
12	Subsequent User Request ID
13 - 14	Picture Number
15	Project Data Format (C)
16 - 18	Transaction Code 02R
19 - 22	Start Line of Data
23	Constant Zero
24	Unused
25 - 29	Date of Recording
30 - 33	Start Time
34 - 37	Stop Time
38	Constant '1'
39 - 57	Comments Field
58	Recorder (A or B)
59 - 61	Bit Error Rate IN (0 or X filled)
62 - 64	Bit Error Rate OUT (0 or X filled)
65 - 73	Blank
74	Constant '3'
75	First or High Order Digit of picture tape number
76 - 80	Process Date (YMMDD) (Date Tape was received at Goddard)

Note: This 02R Format is used for SMS/GOES VISSR data when recorded at National Oceanic and Atmospheric (NOA) at the World Weather Building, Marlow Heights, Maryland.

Table A-2

Code 04E to Account for Stop Line and Speed for Analog Tapes

(Recorded at NOA Only)

COLUMNS	DESCRIPTION
1 - 4	Satellite ID
5 - 7	Recording Station ID
8 - 11	Picture Tape Number
12	Subsequent User Request ID
13 - 14	Picture Number
15	Project Data Format (C)
16 - 17	Transaction Code 04E
19 - 22	Stop Line (Zero fill)
23 - 24	Speed (12=120, 03=30)
25 - 74	Blank
75	High Order Digit of Picture Tape
76 - 80	Date Picture Tape Received at Glendale (YMMDD)

Note: Stop Line is recorded from the Station Logs. If the stop line is blank on the logs then '0' fill.
If there is more than one entry for the stop line, then use the highest.
Refer to the 02R transaction for the Start time of the data.
There will be only two speeds used 030 and 120.

Table A-3

Code 06 CELCO Picture Tape Released to IPE
Code 563

COLUMNS	DESCRIPTION
1 - 4	Satellite ID
5 - 7	Reocrding Station ID
8 - 11	Picture Tape Number
12	Subsequent User Request ID
13 - 14	Picture Number
15	Project Data Format (C)
16 - 17	Transaction Code 06
18	Blank
19 - 21	Request Number
22	Pass Number
23	Section Number (for DPI, A=ϕ, B=1, etc.)
24	Picture Reel Number
25 - 29	Digital Date of Data (YMMDD)
30 - 33	Total Scan Lines
34	Constant 1
35 - 36	Section/Reel (Will be same as cols. 23 - 24 for DPV)
37	Type VISSR (Mode A or B = VIS., I=IR)
38	Constant 9
39	Actual Section Number
40 - 45	Digital Start Time (HHMMSS)
46 - 51	Digital Stop Time (HHMMSS)
52 - 74	Blank
75	High Order Digit of Picture Tape Number
76 - 80	Date Picture Tape Released (YMMDD)

Table A-4

Code 05D Digitization (Successful)

Column	Data
1-4	Satellite ID
5-7	Recording Station ID
8-11	Data Tape NBR (4 Low Order Digits)
12	Data Tape Duplication Letter
13-14	Data Tape File
15	Project Data Format (B, C, D, E)
16-17	Transaction Code "05"
18	"D"
19-24	Pre-edit Tape Number
25-33	Must be Blank
34	Shift (1, 2 or 3 only)
35-36	Operator
37-39	Line
40-70	Must be Blank
71-72	Reprocess
73-74	Must be Blank
75	Analog Tape High Order Digit (Blank = 0)
76-80	Date of Process (YMMDD)

Note: For IR, Video A, Video B, and Video C/D.

Table A-5

Code 05D Digitization (Unprocessable)

Column	Data
1-18	Same as Code 05D (Successful)
19-33	Must be Blank
34	Shift (1, 2 or 3 only)
35-36	Operator
37-39	Line
40-53	Must be Blank
54-55	Unprocessable Code
56-70	Must be Blank
71-72	Reprocess
73-74	Must be Blank
75	Analog Tape High Order Digit (Blank = 0)
76-80	Date of Process (YMMDD)

Note: For IR, Video A, Video 2, Video C/D

Table A-6

Code 07B Edit Tape Released

Column	Data
1-4	Satellite ID
5-7	Recording Station ID
8-11	Analog Tape Number
12	Analog Tape Duplication Letter
13-14	Analog Tape File
15	Project Data Format (B, C, D, E)
16-18	Transaction Code 07E
19-24	Pre-edit Tape Number (From 05D)
25-74	Blank
75	Analog Tape High Order Digit (BLK = 0)
76-80	Date of Process

Note: For IR, Video A, Video B, and Video C/D

Table A-7

(VISSR) 08E Accounting Card Format

Columns	Description
1-4	Satellite ID
5-7	Receiving Station ID
8-11	Analog Tape Number (Four Low-Order Digits)
12	Data Tape (Analog) Duplication Letter (Always Blank)
13	Analog Tape File Number
14	Buffer Tape Reel Number
15	Valid Type Recording (PDF) B for IR only C for Mode A D for Mode B
16-18	Transaction Code (Always 08E)
19-24	Reference Identifier Columns 19 and 20: Two Low-Order Digits of Analog Tape Number Column 21: Analog File Number Column 22: Preedit Tape Reel Number Column 23: Picture Section Number Column 24: Preedit Tape Section File Number
25-29	Start Date of Data (YMMDD)
30-31	Data Quality Code (Always Blank)
32-33	Format Code (Always Blank)
34-39	Item Identifier: Columns 34 through 36: Experimenter Request Number Column 37 Decom Pass Number Column 38: Analog File Number Column 39: MDT Reel Number
40-45	Start Time of Data (HHMMSS)
46-51	Stop Time of Data (HHMMSS)
52-70	Not used (Always Blank)
71-72	Reprocess (Always Blank)
73-74	Not used (Always Blank)
75	High-Order Digit of Analog Tape Number
76-80	Date of Process (YMMDD)

Table A-8

Code 11A VISSR Decom Accounting Card

Columns	Description
1-4	Satellite ID
5-7	Recording Station ID
8-11	Analog Tape Number (Four Low-Order Digits)
12	Data Tape (Analog) Duplication Letter (Always Blank)
13	Analog Tape File Number
14	Buffer Tape Reel Number
15	Valid Type Recording (PDF): B For IR Only C For Mode A B For Mode B
16-18	Transaction Code (Always 11A)
19-24	Reference Identifier: Columns 19 through 21: Experimenter Request Column 22: Decom Pass Number Columns 23: Picture Number (Analog File Number) Column 24: MDT Reel Number
25-28	Decom Run Number
29-31	Experimenter History Tape Identification (Always EXH)
32-35	Experimenter History Tape Count
36-38	IDAMS IR Picture Tape Identification (Always IPI)
39-42	IDAMS IR Picture Tape Count
43-45	IDAMS Visible Picture Tape Identification (Always IPV)
46-49	IDAMS Visible Picture Tape Count
50-52	Dicomed IR Picture Tape Identification (Always DPI)
53-56	Dicomed IR Picture Tape Count
57-59	Dicomed Visible Picture Tape Identification (Always DPV)
60-63	Dicomed Visible Picture Tape Count
64-66	AOIPS Picture Tape Identification (Always APT)
67-68	Count of AOIPS Tapes Receiving Calibration Data
69	Count of AOIPS Tapes Receiving IR Data
70	Count of AOIPS Tapes Receiving Visible Data
71-72	Reprocess (Not Used; Always Blank)
73-74	Not Used (Always Blank)
75	Analog Tape High-Order Digit
76-80	Date of Process (YMMDD)

Table A-9

VISSR Special 11A Accounting Card Format

Card Columns	Description
1-4	Satellite ID (e.g., ME01)
5-7	Recording Station ID
8-11	Analog Tape Number (Four Low-Order Digits)
12	Analog Tape Duplication Letter (Always Blank)
13-14	Analog Tape File Number
15	Project Data Format (Always C)
16-18	Transaction Code (Always 11A)
19-22	Decom Run Number Columns 19-21: Request Number Column 22: Decom Pass Number
23	First Digit of Decom Reel Number, Numeric for Visible Tapes Converted to Alphabetic Character (i.e., 0→A, 1→B, etc.) for IR Tapes
24	Second Digit of Decom Reel Number
25-28	Decom Run Number; Same Format as Columns 19 Through 22
29-32	Requested Start Image Line Number
33-36	Number of Image Lines Requested
37-40	Actual Start Image Line
41-44	Actual Stop Image Line
45-48	Actual Image Start Time (HHMM)
49-52	Actual Image Stop Time (HHMM)
53-55	Percent of Embedded Fill (i.e., Number of Black Fill Lines Between First and Last Valid Image Data Lines, Expressed as a Percentage of Total Number of Lines, Including Fill, Between First and Last Valid Image Data Lines)
56-58	Percentage of Data Recovered (i.e., Total Number of Lines, Including Fill, Between First and Last Valid Image Data Lines Expressed as a Percentage of Number of Lines Requested - Columns 33 Through 36)
59-60	Sector Size Code Followed by Character X
61-63	Scaling Table Number
64-67	Start IR Pixel
68-80	Picture Title Information: Columns 68-73: Analog Tape and File Number Column 74: Always Period (.) Columns 75-76: Decom Reel Number Column 77: Always Blank Columns 78-79: Data Type - IR, VA, or VB Column 80: Picture Section Number

Table A-10

Code 13D VISSR Accounting Card Format

Columns	Description
1-4	Satellite ID
5-7	Recording Station ID
8-11	Analog Tape Number (Four Low-Order Digits)
12	Data Tape (Analog) Duplication Letter (Always Blank)
13	Analog Tape File Number
14	Buffer Tape Reel Number
15	Valid Type Recording (PDF): B For IR Only C For Mode A B For Mode B
16-18	Transaction Code (Always 13D)
19-24	Reference Identifier: Columns 19 through 21: Request Number Column 22: Decom Pass Number Column 23: Analog File Number Column 24: MDT Reel Number
25-28	Decom Run Number
29-74	Not Used (Always Blank)
75	Analog Tape High-Order Digit
76-80	Date of Process (YMMDD)

Table A-11
Code 14U VISSR Accounting Card Format
(for Rejected Files Only)

Columns	Items
1-4	Satellite ID
5-7	Recording Station ID (Alpha)
8-11	Analog Tape Number (4 low-order digits)
12	Analog Tape Duplication Letter
13-14	Analog File Number
15	Project Data Format *
16-18	Transaction Code (constant)
19-22	Buffer Tape Number
23-24	Buffer File Number
25-34	(Must be blanks)
35-37	Last Processing Step Performed
38-56	(Must be blanks)
57-58	Delete Code (User must add this code)
59-74	(Must be blanks)
75	Analog Tape High-Order Digit
76-80	Date of Processing (YMMDD)

* For DPC and WAL Stations; Type = 'A'. For all other Stations; Type = 'F'.

Table A-12

Pass Two Quality Criteria Card Format (VISSR)

Card Columns	Contents
1-4	Satellite ID
5	Data Mode or Blank
6-7	Max. Time Difference (Buffer-Pre-edit)
8	Max. # Parity Errors
9-12	Min. Percent Data Recovery
13-15	Max. # Incorrect Scan Lines
16-18	Max. # Missing Scan Lines
19-20	Max. # Time Bias
21-22	Documentation Time Discontinuities
23-24	GMT Time Discontinuities
25-28	Max. Percent IR Bit Errors
29-32	Max. Percent VIS Bit Errors
33	Max. # Wrong Length Records
34-37	Max. % Time Decoder Flags F_1
38-41	Max. % Time Decoder Flags F_2
42-45	Max. % Time Decoder Flags F_3
46-49	Max. % Time Decoder Flags F_4
50-53	Max. % Time Decoder Flags F_5
54-57	Min. Percent Bad Deep Space Lines
58-73	Used For Software Data Flags When Needed
74-78	Date of Criteria
79-80	Card ID

Table A-13
VISSR Pass Two Quality Criteria Card Format

Columns	Contents
1- 4	Satellite ID
5	Data Mode
6- 7	Max. Time Bias between GMT and Documentation per 1821 Lines
8-12	Min. Output Frames
13-15	Min. Percent Frames Recovered
16-18	Min. Percent Picture Processed
19-20	Max. Number Partial Frames
21-22	Max. Time Difference between Intermediate and Buffer Time
23-25	Max. Number Time Biases for GMT and Documentation
26-28	Max. Bad Time Decoder Flags
29	Max. Wrong Length Records
30	Max. Tape Parity Errors
31-73	Not Used at this Time
74-78	Date of Criteria (YYDDD)
79-80	Card Identification Code (C2)

Card Columns 31-73 may be used at a later date if additional criteria is needed.

Table A-14
VISSR Data Buffer Card Format

Columns	Contents
1- 4	Satellite ID
6-11	Date of Recording (YYMMDD)
13-15	Station Code (Alpha)
17-22	Station Equipment Parameters
24-27	Analog Tape Number
29-30	Analog File Number
32-37	Date of Digitization (YYMMDD)
39-40	Line 1D, Deck Number
42-45	Intermediate Tape Number
47-48	Intermediate File Number
50-53	Buffer Tape Number
55-56	Buffer File Number
58-60	Start Day from Buffer Tape
62-67	Start Time (HHMMSS) from Buffer
69-71	Stop Day from Buffer Tape
73-78	Stop Time (HHMMSS) from Buffer
79	Debug Flag (Use *)
80	Card Identification Code

Note: All designated fields are required. All entries are left-justified in the designated fields with a blank space between each entry.

Table A-15
VISSR Data Quality Card Format

Columns	Contents
1-4	Satellite ID
5-7	Recording Station ID (Alpha)
8-12	Analog Tape Number
13	Analog File Number
14	Mode*
15-16	Year Recorded
17-19	Day Recorded (Julian)
20-25	Buffer Tape Number
26-27	Drop Locks
28-33	Blank
34-38	Buffer Start Time (Seconds)
39-43	Buffer Stop Time (Seconds)
44-47	Number of Records Recovered
48-52	Percent of Records Recovered
53-57	Percent of Picture Recovered
58-60	Documentation Time Discontinuities
61-63	Number of GMT Time Discontinuities
64-66	Number of Incorrect Scan Lines
67-71	Partial Lines (Frames) Processed
72-73	Year Digitized
74-76	Day Digitized (Julian)
77-78	A/D Processing Line
79	Analog Tape Deck
80	Card Identification Code

If the file of data is unprocessable the "H" Code will be inserted in card column 80 to indicate that file has been deleted. When this occurs, the quality card is re-designated as the unprocessable history card.

*Mode codes (see card column 14)

N— C = Mode A
D = Mode B
E = Mode C/D
F = Infrared

Note: All designated fields are required. The symbol (^) indicates an implied decimal point.

Table A-16
Video Data Buffer Card Format

Columns	Contents
1-4	Satellite ID
6-11	Date of Recording (YYMMDD)
13-15	Station Code (Alpha)
17-22	Station Equipment Parameters
24-27	Analog Tape Number
29-30	Analog File Number
32-37	Date of Digitization (YYMMDD)
39-40	Line ID, Deck Number
42-45	Intermediate Tape Number
47-48	Intermediate File Number
50-53	Buffer Tape Number
55-56	Buffer File Number
58-60	Start Day from Buffer Tape
62-67	Start Time (HHMMSS) from Buffer
69-71	Stop Day from Buffer Tape
73-78	Stop Time (HHMMSS) from Buffer
79	Debug Flag (Use *)
80	Card Identification Code

Note: All designated fields are required. All entries are left-justified in the designated fields with a blank space between each entry.

Table A-17
VISSR Pre-edit Control Card

Columns	Data
1-4	Satellite ID
6-11	Date of recording
13-15	Station code
17-22	Analog tape and file number (picture number)
24-29	Date of digitization (YYMMDD)
31	Picture section number
33	Buffer tape reel number
35	Buffer tape reel file number
37	Buffer tape section file number
39	Pre-edit tape reel number
41	Pre-edit tape reel file number
43	Pre-edit tape section file number
45-47	Start day of year
49-54	Start time (HHMMSS)
56-61	Stop time (HHMMSS)
63	Processing mode (A, B, or I)
65	IR data only (Y or N)
67-70	Initial image line number requested
72-75	Final image line number requested
77	GMT present D = Documentation Time
79-80	Card identification (VR)

Table A-18
Picture Sectorization Control Card Format

Column	Description
1-6	Picture number (analog tape and file number)
8	Picture section number
10-13	Start image line number (1-1820)
15-18	Start pixel number (1-2847, relative to IR data)
20-23	Stop image line number (optional, if blank, A default value based on the sector size code is used)
25	Sector size code (blank, P, S, or U must be blank if any visible output is requested. Default value is P for Mode A data and S for Mode B data.
27	AOIPS IR file request (Y or N; optional; default is Y)
29	AOIPS visible file request (Y or N; optional; default is Y)
31-32	AOIPS tape reel number (optional)
34	Dicomed IR tape request (Y or N; optional; default is Y)
36-37	Dicomed IR tape reel number (optional)
39	Dicomed visible tape request (Y or N; optional; default is Y)
41-42	Dicomed visible tape reel number
44	IDAMS IR tape request (Y or N; optional; default is Y)
46-47	IDAMS IR tape reel number (optional)
49	IDAMS visible tape request (Y or N; optional; default is Y)
51-52	IDAMS visible tape reel number (optional)
54-56	Dicomed IR scaling table number (optional)
58-60	Dicomed visible scaling table number (optional)
62-64	IDAMS IR scaling table number (optional)
66-68	IDAMS visible scaling table number (optional)
69-78	Blank
79-80	Card identification (PX)

Table A-19
VISSR Output Tape Reel Number Card

Columns	Data
1-6	Picture number
8	First reel number
9	Second reel number
10	Third reel number
11	Fourth reel number
12	Fifth reel number
13	Sixth reel number
14	Seventh reel number
15	Eighth reel number
16	Ninth reel number
18-19	Start sector file number, or Blank
79-80	Card identification MD (master data tape) EX (experimenter history tape)

APPENDIX B

VISSR TAPE FORMATS

APPENDIX B

VISSR TAPE FORMATS

Table B-1

VISSR Analog Data Track Assignments

Track	Record Amplifier	Signal	Signal Source
1	Direct	1.75-MHz VISSR data	Forward
2	Direct	1.75-MHz VISSR data	Reverse
3	Direct	1.75-MHz VISSR data	Forward
4	Direct	1.75-MHz VISSR data	Reverse
5	Direct	1.75-MHz VISSR data	Forward
6	Direct	1.75-MHz VISSR data	Reverse
7	Direct	1.75-MHz VISSR data	Forward

Table B-2
4 X 2 Mile IR Documentation (128 9-bit words)

Position	Word Contents
Word 1	Retrace (Note 1) One indicates scanner retrace.
Word 2	Spacecraft name
Word 3	Unused
Word 4	Frame Code (Note 1) One indicates picture transmission.
Word 5	Change Code (Note 1) One indicates first line of picture if frame code is one or last line plus one of picture if frame code is zero.
Word 6	Step Code (Note 1) One indicates normal line transmission; zero indicates that this line is not to be used to expose film and facsimile recorder line is not to be incremented (stepped).
Word 7	Line Delay This number (1-8) denotes the delay to be introduced by the user; expressed in bit in intervals.
Word 8	IR Selection MSB LSB 0000000001 IR1 0000000010 IR2 000000100 AVG
Word 9	Gray Scale Status (Note 1) One indicates gray scale information retransmission.
Word 10	Direct Transmission Mode (Note 1) One indicates 28 Mb/sec; zero indicates 14 Mb/sec

Note 1: Zero = 1_{16}
One = FE_{16}

Table B-2 (Continued)
4 X 2 Mile IR Documentation (128 9-bit words)

Position	Word Contents
	Image Line Number BDC value split into 2 characters/word
Word 11	2 most significant BCD characters
Word 12	2 least significant BCD characters
Word 13	Mode Code MSB A 001100100 B 001011001 C 010110010 D 010001111
	Beta Count MSB LSB
Word 14	0 8 MSB
Word 15	0 8 MSB
Word 16	0 8 LSB
Word 17	Grid/No Grid (Note 1) Zero indicates no grid information
	Sync Error MSB LSB
Word 18	0 8 MSB
Word 19	0 7 LSB 0
	Bit Error Count MSB LSB
Word 20	0 8 MSB
Word 21	0 5 LSB 000
Word 22	Setup Error (Note 1) One indicates setup error.
Word 23-24	Computer Error Messages MSB LSB 00000001 00000010 : : 10000000

Note 1: Zero = 1_{16}
One = FE_{16}

Table B-2 (Continued)

4 X 2 Mile IR Documentation (128 9-bit words)

Position	Word Contents
	Scan Count
Word 25	Two most significant BCD characters
Word 26	Two least significant BCD characters
	BCD Time
Word 27	Year - 2 MSD
Word 28	Year - 2 LSD
Word 29	Day of year - 2 MSD
Word 30	Day of year - 2 LSD
Word 31	Hour
Word 32	Minute
Word 33	Second
Word 34	Millisecond * 10
Word 35	Black Enable (Note 1) One indicates annotation transmission.
Word 36	Mode C-Calibrate One (Note 1) indicates that C-Cal is not used; otherwise: MSB V_1 00000001 V_2 00000010 V_3 00000100 V_4 00001000 V_5 00010000 V_6 00100000 V_7 01000000 V_8 10000000
Word 37	Bit/Frame Sync Lock MSB LSB 00000001X Bit Lock 00000010X Frame Lock 00000100X Bit Freq Lock } 1 loss, X = 1 for any of lock
Word 38	Limited Scan Mode Indicator (Note 1) One indicates limited scan mode.
Word 39	Sample Control Mode (LSB) IR - 2 PT IR - 1 PT IR - EMP

Note 1: Zero = 1_{16}

One = FE_{16}

Table B-2 (Continued)
4 X 2 Mile IR Documentation (128 9-bit words)

Position	Word Contents
Word 39 (Cont.)	Visible - 4 PT Visible - 2 PT Visible - 1 PT Visible - EMT
Word 40	Visible Channel Connection (LSB) V_1 V_2 V_3 V_4 V_5 V_6 V_7 V_8 Coding for each channel is as follows: 0 = normal 1 = patched input is used.
Word 41	Scan Direction (Note 1) One indicates normal North-South direction (may not be used).
Word 42	Bi-phase Modulator On/Off (Note 1) On indicates modulator is on.
Word 43	Unused
Word 44	PLL Error Light (Note 1) One indicates error condition.
Word 45	Test Data MSB LSB 000000000 Normal 000000001 Local 000000010 Remote 000000100 Comp Gen IR
Word 46	Data Randomization (Note 1) One indicates on
Word 47	Sun Pulse Select (Note 1) One indicates digital Zero indicates analog

Note 1: Zero = 1_{16}
One = FE_{16}

Table B-2 (Continued)
4 X 2 Mile IR Documentation (128 9-bit words)

Position	Word Contents
Word 48	Ness Mode Select MSB LSB 000000000 4 x 4 IR 000000001 Max SV 000000010 4 x 2 IR
Word 49	Limited Scan Command Encoder Enable One indicates on.
Word 50	Digital Sun Pulse 8 LSB's contain the digital sun pulse.
Word 51	Bit Error Light One indicates on
Word 52	Mean IR Difference
Word 53	RMS IR Difference
Words 54-55	Correction Table ID
Word 56	Left Horizon Point 8 MSB
Word 57	8 LSB
Word 58	Right Horizon Point 8 MSB
Word 59	8 LSB
Word 60	Equatorial Scan Count 8 MSB
Word 61	8 LSB

Table B-2 (Continued)
4 X 2 Mile IR Documentation (128 9-bit words)

Position	Word Contents
62-79	Unused
80	Telemetry Code Word MSB LSB 0 A B C D E F G H A and B - Unused; always zero C = D = 0 - Indicates frame sync in search; no valid telemetry present, three or more bad sync patterns since lock C = 0, D = 1 - Indicates frame sync in check1; one good sync since search or two bad syncs since lock C = 1, D = 0 - Indicates frame sync in check2; two good syncs since search or one bad sync since lock C = D = 1 - Indicates frame sync in lock; three or more good sync patterns found. EFG - 0-3 - Telemetry quarter-frame number 4 - First output without telemetry 5 - Second output without telemetry 6 - Third output without telemetry 7 - Fourth or greater output without telemetry H - Parity bit, exclusive or of B, D, and F
81-98	One quarter of a telemetry frame; 16 9-bit words packed into the 8 LSBs of each 9-bit IR documentation word
99	O/A block number (1-10)
	One quarter of an orbit/attitude data block; contents are as follows(Note 2):

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
100	00000001	00000010	00000011	00000100
101-104	O/A Word 2	O/A Word 8	O/A Word 14	β_ϕ
105-108	O/A Word 3	O/A Word 9	O/A Word 15	$\dot{\beta} * 2^{30}$
109-112	O/A Word 4	O/A Word 10	O/A Word 16	τ_ϕ (HHMMSS)
113-116	O/A Word 5	O/A Word 11	O/A Word 17	O/A Word 20
117-120	O/A Word 6	O/A Word 12	O/A Word 18	O/A Word 21
121-124	O/A Word 7	O/A Word 13	O/A Word 19	O/A Word 3
125-127	Unused			
128	Longitudinal parity check (ODD)			

Note 2: Regarding O/A data blocks, words 100 to 124:

a. If no O/A data is present, word 100 will be zeros.

b. Descriptions of each O/A word are contained in Table A-2.

c. $\beta_0, \dot{\beta}, \tau_\phi$ are the coefficients of the equation for beta count, words 14-16. The units of $\dot{\beta}$ are counts per 10 milliseconds, and the second bit of $\dot{\beta}$ is set to 1 to indicate a negative value.

Table B-3
Description of O/A Block Contained in IR Documentation

O/A Data Block Description Geocentric True of Data Inertial				Location in IR Documentation	
Block Word (32-bit)		Description	Units	Quarter Block Number	9-bit Documentation Words
	1	Block Number	(1-10) (4 LSBs) Binary Integer	N/A	99
	2	Date	($YYDDD_{10}$ in Binary)	1	101-104
	3	Block Time (GMT)	Milliseconds * 10	1 4	105-108 121-124
	4	Right Ascension of Greenwich Meridian	Degrees * 2^{21}	1	109-112
	5	Geodetic Latitude of Subsatellite Point	Degrees * 2^{21}	1	113-116
	6	Longitude of Subsatellite Point	Degrees * 2^{21}	1	117-120
	7	Height Above Oblate Earth	Kilometers * 2^{13}	1	121-124
	8	X — Cartesian Components in Celestial Coordinates	Kilometers * 2^{13}	2	101-104
	9	Y — Cartesian Components in Celestial Coordinates	Kilometers * 2^{13}	2	105-108
	10	Z — Cartesian Components in Celestial Coordinates	Kilometers * 2^{13}	2	109-112
	11	$\dot{X}$ — Satellite Velocity in Celestial Coordinates	Kilometers per Hour * 2^{13}	2	113-116
	12	$\dot{Y}$ — Satellite Velocity in Celestial Coordinates	Kilometers per Hour * 2^{13}	2	117-120
	13	$\dot{Z}$ — Satellite Velocity in Celestial Coordinates	Kilometers per Hour * 2^{13}	2	121-124
	14	Spin Period	Microseconds	3	101-104
	15	Spin Axis Right Ascension	Degrees * 2^{21}	3	105-108
	16	Spin Axis Declination	Degrees * 2^{21}	3	109-112
For odd blocks	17	Pitch — Camera Misalignment Angles	Degrees * 2^{21}	3	113-116
For odd blocks	18	Roll — Camera Misalignment Angles	Degrees * 2^{21}	3	117-120
For odd blocks	19	Yaw — Camera Misalignment Angles	Degrees * 2^{21}	3	121-124

Table B-3 (Continued)
Description of O/A Block Contained in IR Documentation

O/A Data Block Description			Location in IR Documentation	
Block Word (32-Bit)	Description	Units	Quarter Block Number	9-Bit Documentation Words
For even blocks: 17	North-South Stepping Angle (IR)	Degrees $* 2^{21}$	3	113-116
For even blocks: 18	East-West Sampling Angle (IR)	Degrees $* 2^{21}$	3	117-120
For even blocks: 19	Attitude ID, Where 0 = some other method 1 = Sun/Earth sensors 2 = landmark (2-mile imagery) 3 = PICATT (Earth edge data) 4, etc., to be used for later methods	Binary Integer	3	121-124
20	Right Ascension of Satellite-Sun Vector, Celestial System	Degrees $* 2^{21}$	4	113-116
21	Declination of Satellite-Sun Vector, Celestial System	Degrees $* 2^{21}$	4	117-120

Table B-4
Mode A/B Stretched Video Documentation (512/256 6-bit words)

Position	Word Contents
Words 1-3	Sector Code * (1-8) uses three words; each word represents a zero or one state. The most significant word is first. In mode A, the sectors (following IR) have numbers 000, 001, ..., 111; in mode B, the sector numbers are 000, 001, 010, and 011.
Word 4	Frame Code * — One indicates picture transmission.
Word 5	Change Code * — One indicates start of picture if frame code is one or end of picture if frame code is zero.
Word 6	Step Code * — One indicates normal line transmission; zero indicates that this is not to be used to expose film and facsimile recorder line is not to be incremented (stepped).
Word 7	Line Offset — This is a three bit word from the line offset logic inserted into the last three bit positions with 0's inserted into the first three positions, i.e., (000XXX).

* All but the last bit in each code word are identical, e.g., 000001 (zero) or 111110 (one).

Table B-5
Mode C/D Video Documentation (16 8-bit words)

Position	Word Contents
Word 1	Unused
Word 2	C/D Mode (Note 1) One indicates Mode C Zero indicates Mode D
Word 3	C/D Data In Mode C, a one (Note 1) denotes that C-Cal is not used. Otherwise only one of the eight bits will be one denoting the channel (V_1-V_8) used for C-Cal; V_1 will use the LSB, etc. In Mode D, this is the mean value of IR1-IR2.
Word 4	Frame Code (Note 1) One indicates picture transmission.
Word 5	Change Code (Note 1) One indicates first line of picture if frame code is one or last line plus one picture if frame code is zero.
Word 6	Step Code (Note 1) One indicates normal line transmission; zero indicates that this line is not to be used to expose film and facsimile recorder line is not to be incremented (stepped).
	Scan Count BCD value split into 2 characters/word
Word 7	2 most significant BCD characters
Word 8	2 least significant BCD characters
	Bit Error Count MSB LSB
Word 9	0 8 MSB
Word 10	0 5 LSB 000
	Computer Error Messages
Word 11	Undefined
Word 12	Undefined
Words 13-16	Unused

Note 1: Zero = 1_{16} One = FE_{16}

Table B-6
Digital Buffer Tape File Label Format

Word No.	Contents
1-8	Satellite ID (ME01)
9-15	Date of Recording (YYMMDD)
16-19	Station Code (WAL)
20-21	Analog Tape Deck (A)
22	Analog Tape Number (TTTTTF)
29-33	Scan Start Line
34-38	Scan Stop Line
39-45	Date of Digitization (YYMMDD)
46-53	Buffer Tape Number
54-90	Blank
91-92	Processing Mode
93-131	Blank
132-133	Digital Tape Deck
134-3957	Blank

Note: Last word of each field will be a blank.

Table B-7
Picture Data Format

Characteristic	All Modes		Mode		
	Pre-IR	IR	A	B	C/D
Resolution (miles)	--	4 × 2	1/2 × 1/2	1 × 1	4 × 4
Bits/Sample	9	9	6	6	8
Counts/Bit Out	20	20	6	24	315
Total Samples/Line	13104 (3/4 Sector)	4368 (1/5 Sector)	17472 (1 Sector)	8736 (1/2 Sector)	1996 (1/8 Sector)
Video Samples/Line	---	3822	15288	7644	1911
Other Samples/Line	---	546	2184	1092	85
Samples: S/C Rotation	34944	34944	174720	43680	2496
Facsimile: S/C Rotations	---	8	10	5	1
Time Interval (ms)	45	75	60	60	479.80
Bit Rate (b/s)	524160	524160	1747200	436800	33280

- Data rates assume 100 r/m.
- At 28 mb/s, S/C samples are 20.944 μr apart at 100 r/m.
- S/DB sampling = 20.978 μr apart.
- There are 21 VCO counts per S/DB visible sample.
- S/DB VCO frequency is $\frac{21 \times 299,520}{0.6 \text{ sec}} = 10,483,200.$
- 18 3/8° angular coverage on all stretched transmissions.
- Duty cycle 7/8 of time interval used except for maximum stretch which is $(7/8)^2$ of S/C rotation.

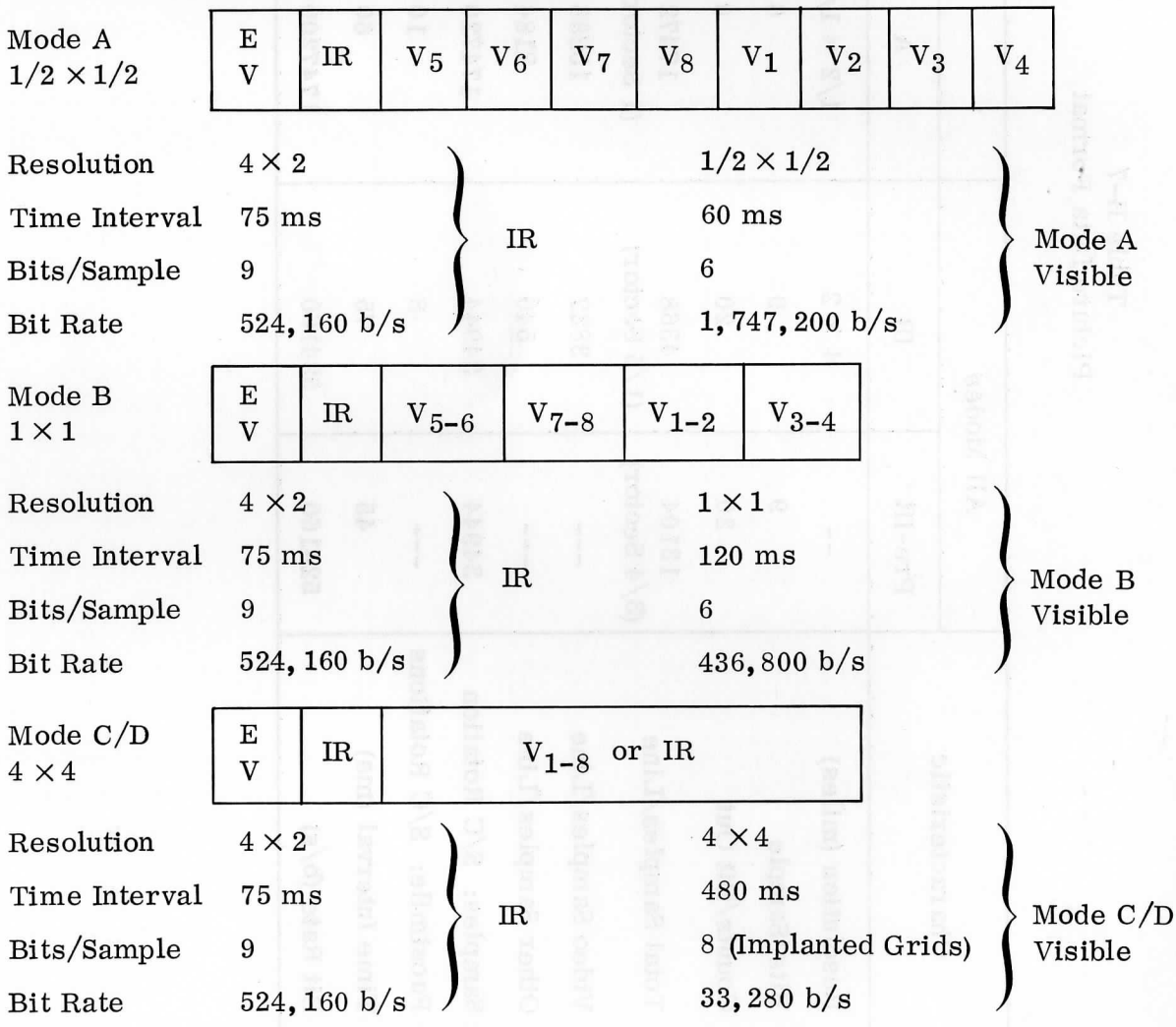


Figure B-1. Stretched Video Format

Table B-8

Data Format Summary

Mode	Time	Bits	Bits/ Word	Words	No. of Times	Bit Rate (bps)
Mode A						
Earth Scan	45 ms				1	
IR PN	7.2 ms	3762	Random Seq.		1	524.6×10^3
IR DOC	12.2 ms	1152	9	128	1	524.6×10^3
IR Video	55.6 ms	34398	9	3822	1	524.6×10^3
Vis PN	6.0 ms	10032	Random Seq.		8	1.7472×10^6
Vis DOC	2.0 ms	3072	6	512	8	1.7472×10^6
Vis Video	52.0 ms	91728	6	15288	8	1.7472×10^6
Mode B						
Earth Scan	45 ms				1	
IR PN	7.2 ms	3762	Random Seq.		1	524.6×10^3
IR DOC	12.2 ms	1152	9	128	1	524.6×10^3
IR Video	55.6 ms	34398	9	3822	1	524.6×10^3
Vis PN	12.0 ms	5016	Random Seq.		4	436.8×10^3
Vis DOC	3.0 ms	1536	6	256	4	436.8×10^3
Vis Video	105 ms	45864	6	7644	4	436.8×10^3
Mode C/D						
Earth Scan	45 ms				1	
IR PN	7.2 ms	3762	Random Seq.		1	524.6×10^3
IR DOC	12.2 ms	1152	9	128	1	524.6×10^3
IR Video	55.6 ms	34398		3822	1	524.6×10^3
Vis PN	16.0 ms		Random Seq.		1	33.28×10^3
Vis DOC	4.0 ms		8	16	1	33.28×10^3
Vis Video	460 ms		8	1911	1	33.28×10^3

Note: Times and bit rates are nominal for 100 RPM satellite rotation.

Table B-9
SMS VISSR IPD File Label and Shipping Letter Format

CHARACTER[1]	NOTE	DESCRIPTION	SIZE	PRESENT ON[2]						
				BT	PET	MDT	EHT	DPT	IPT	APT
1-7		INTERNATIONAL CODE	7	X	X	X	X	X	X	X
9-14		DATE OF ANALOG RECORDING (YYMMDD)	6	X	X	X	X	X	X	X
16-18		STATION CODE	3	X	X	X	X	X	X	X
20		ANALOG TAPE DECK IDENTIFICATION	1	X	X	X	X	X	X	X
22-27	1	ANALOG TAPE AND FILE NUMBER (TTTTTF)	6	X	X	X	X	X	X	X
29-32	6	START TIME OF ANALOG TAPE (HHMM)	4	X	X	X	X	X	X	X
34-37	6	STOP TIME OF ANALOG TAPE (HHMM)	4	X	X	X	X	X	X	X
39-44		DATE OF DIGITIZATION (YYMMDD)	6	X	X	X	X	X	X	X
46-52	7	BUFFER TAPE IDENTIFICATION	7	X						
46		PICTURE SECTION NUMBER	1		X	X	X	X	X	X
48	2	BUFFER TAPE REEL NUMBER	1		X	X	X	X	X	X
50		BUFFER TAPE FILE NUMBER	1		X	X	X	X	X	X
52	3	BUFFER TAPE SECTION FILE NUMBER	1		X	X	X	X	X	X
54-55		PASS TWO LINE IDENTIFICATION	2		X	X	X	X	X	X
57	2	PREEDIT TAPE REEL NUMBER	1		X	X	X	X	X	X
59		PREEDIT TAPE FILE NUMBER	1		X	X	X	X	X	X
61	3	PREEDIT TAPE SECTION FILE NUMBER	1		X	X	X	X	X	X
63	2,9	MDT REEL NUMBER	1			X	X	X	X	X
65	9	MDT FILE NUMBER	1			X	X	X	X	X
66-67	3,9	MDT SECTION FILE NUMBER	2			X	X	X	X	X
69-71		START DAY OF YEAR	3	X	X	X	X	X	X	X
72-77		START TIME (HHMMSS)	6	X	X	X	X	X	X	X
79-84	4	STOP TIME (HHMMSS)	6			X	X	X	X	X
86-89	4	ELAPSED TIME (MMSS)	4			X	X	X	X	X
91	11	DATA MODE (A, B, G, I OR K)	1	X	X	X	X	X	X	X
93		IR DATA ONLY (Y OR N)	4	X	X	X	X	X	X	X
95-98	8	INITIAL IMAGE LINE NUMBER	4		X	X	X	X	X	X
100-103	8	FINAL IMAGE LINE NUMBER	4							
105-109		DECOM RUN NUMBER	5				X	X	X	X
111-112	2	DECOM REEL NUMBER	2				X	X	X	X
114		DECOM REEL FILE NUMBER	1				X	X	X	X
115-116	3	DECOM SECTION FILE NUMBER	1				X	X	X	X
118-120		PERCENTAGE OF DATA RECOVERED	3							
122		O/A/TM DATA PRESENT (Y OR N)	1			X	X	X	X	X
124	10	GMT PRESENT FROM TIME TRACK (Y, N OR D)	1		X	X	X	X	X	X
126-130		CREATION DATE (YMMDD)	5		X	X	X	X	X	X
132	5	TAPE IDENTIFICATION	1		X	X	X	X	X	X
134-137		START PIXEL (RELATIVE TO IR)	4					X	X	X
139		SECTOR SIZE CODE	1					X	X	X
141-144		SCALING TABLE ID	4					X	X	X
145-149		SCALING TABLE DATE (YYDDD)	5					X	X	X

[1]ON 9-TRACK TAPES, THE LABELS ARE RECORDED IN EBCDIC. ON 7-TRACK TAPES, THEY ARE RECORDED IN BCD, BLANKS SEPARATE EACH FIELD, AND UNUSED FIELDS ARE FILLED WITH BLANKS.

[2]COLUMN HEADINGS ARE AS FOLLOWS:

BT – BUFFER TAPE
PET – PREEDIT TAPE
APT – AOIPS PICTURE TAPE
MDT – MASTER DATA TAPE
EHT – EXPERIMENTER HISTORY TAPE
DPT – DICOMED PICTURE TAPE
IPT – IDAMS PICTURE TAPE

NOTES:

1. THE ANALOG TAPE AND FILE NUMBER ARE SYNONYMOUS WITH THE PICTURE NUMBER. THIS NUMBER IS ALSO THE TAPE NUMBER FOR BUFFER, PREEDIT, MASTER DATA, EXPERIMENTER HISTORY, AND PICTURE TAPES.
2. EACH TAPE REEL IS IDENTIFIED EXTERNALLY BY THE PICTURE NUMBER (SEE NOTE 1) CONCATENATED WITH THE REEL NUMBER IN THE FORMAT PPPPPR.
3. THE SECTION FILE NUMBER IS THE NUMBER OF THE FILE RELATIVE TO THE FIRST FILE IN THE SECTION.
4. ON MDTs, AND EHTs, STOP TIME AND ELAPSED TIME REFER TO THE ORIGINAL PET FILE AND ARE SUPPLIED ON THE PREEDIT CONTROL CARD.
5. TAPE IDENTIFICATION IS AS FOLLOWS:
   - A – AOIPS PICTURE TAPE
   - O – ORBIT DETERMINATION TAPE
   - S – SECTORIZED EXPERIMENTER TAPE
   - P – PREEDIT TAPE
   - M – MASTER DATA TAPE
   - E – EXPERIMENTER HISTORY TAPE
   - I – IDAMS PICTURE TAPE
   - D – DICOMED PICTURE TAPE
6. ON BUFFER TAPES, THE ANALOG TAPE START AND STOP TIME FIELDS CONTAIN THE START AND STOP IMAGE LINE NUMBERS REQUESTED FOR DIGITIZATION RATHER THAN THE TIMES.
7. THE BUFFER TAPE IDENTIFICATION CONSISTS OF THE FOUR LOW-ORDER DIGITS OF THE ANALOG TAPE AND FILE NUMBER (PICTURE NUMBER) FIELD (PPPP). THE BUFFER TAPE REEL NUMBER (R), THE PICTURE SECTION (S), AND THE SECTION FILE NUMBER (F) CONCATENATED IN THE FORMAT PPPPRSF.
8. ON PETs, THE START AND STOP IMAGE LINE FIELDS CONTAIN THE REQUESTED START AND STOP IMAGE LINE NUMBERS FROM COLUMNS 29-37 OF THE BUFFER TAPE LABEL.
9. ON EHTs AND PICTURE TAPES, THIS FIELD IS USED ONLY WHEN THE TAPE IS CREATED FROM AN INPUT MDT.
10. IN THE GMT PRESENT FIELD, Y INDICATES VALID GMT, N INDICATES FLYWHEEL GMT, AND D INDICATES THAT NO GMT WAS AVAILABLE AND THE GMT FIELD FOR EACH SENSOR IS DERIVED FROM THE DOCUMENTATION TIME.
11. DATA MODES A AND B INDICATE THE RESOLUTION AND FORMAT OF THE VISIBLE DATA. DATA MODE G INDICATES AN IR GRID DATA FILE ON AOIPS PICTURE TAPES. DATA MODE 1 INDICATES AN IR IMAGE DATA FILE ON AOIPS PICTURE TAPES OR MAY BE USED FOR FILES CONTAINING ONLY IR DATA ON ANY OF THE OTHER TAPES. DATA MODE K INDICATES AN IR CALIBRATION DATA FILE ON AOIPS PICTURE TAPES.

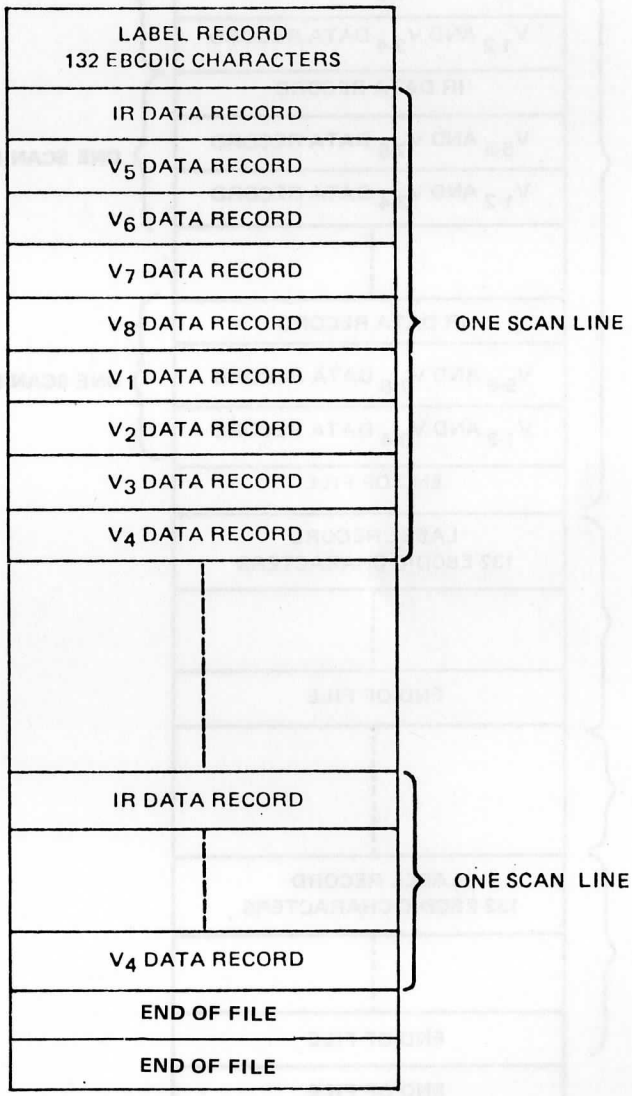


Figure B-2. VISSR Preedit Tape File Format for Mode A Data

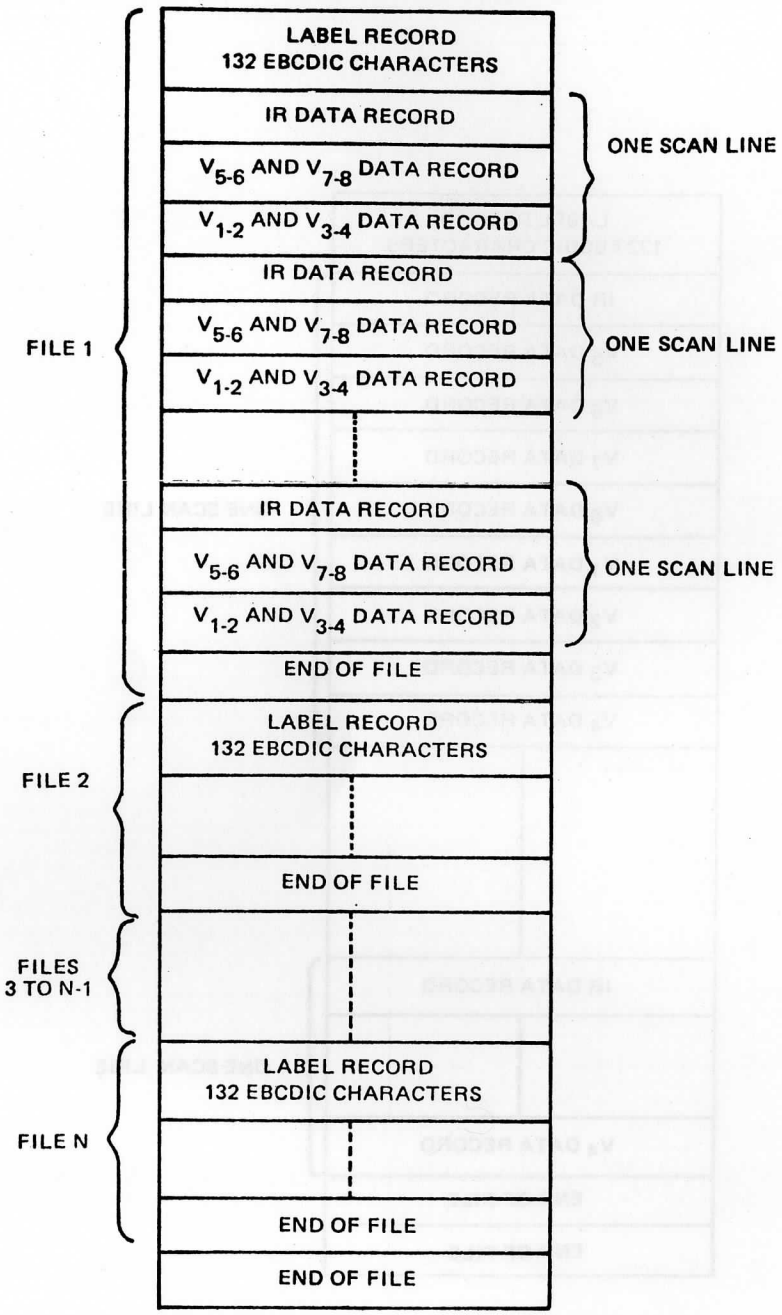


Figure B-3. VISSR Preedit Tape File Format for Mode B Data

1108 WORD NUMBER (36 BITS/WORD)	WORD SUBFIELD (BITS)	CONTENTS
1 TO 32		DOCUMENTATION (128 9-BIT WORDS)
33-987		IR VIDEO DATA (3822 9-BIT WORDS)
988	35-18	
	17-0	ZERO FILL
989-2635		ZERO FILL
2636	35-12	
	11-0	F1 PREEDIT TAPE DATA FLAGS (12 BITS)
2637	35-24	NOT USED (12 BITS)
	23-12	F3 UNCORRECTED IMAGE LINE NUMBER (12 BITS)
	11-0	NOT USED (12 BITS)
2638		GMT OR FLYWHEEL TIME (BITS 35-27 ARE DAY OF YEAR; BITS 26-0 ARE MILLISECOND OF DAY)

Figure B-4. Pre-edit Tape Infrared Sensor Data Record Format

1108 WORD NUMBER (36 BITS/WORD)	WORD SUBFIELD (BITS)	CONTENTS
1-85		DOCUMENTATION (512 6-BIT WORDS)
86	35-24	
	23-0	VISIBLE SENSOR LINE DATA (15,288 6-BIT ELEMENTS)
87-2633		
2634	35-24	
	23-0	ZERO FILL
2635		
2636	35-12	
	11-0	F1 PREEDIT TAPE DATA FLAGS (12 BITS)
2637	35-24	NOT USED (12 BITS)
	23-12	F3 UNCONNECTED IMAGE LINE NUMBER
	11-0	NOT USED
2638		GMT OR FLYWHEEL TIME (BITS 35-27 ARE DAY OF YEAR; BITS 26-0 ARE MILLISECONDS OF DAY)

Figure B-5. Pre-edit Tape Visible Data Record Format for Mode A

	1108 WORD NUMBER (36 BITS/WORD)	WORD SUBFIELD (BITS)	CONTENTS
DATA FOR V_{5-6} OR V_{1-2} SENSOR	1-42		DOCUMENTATION (256 6-BIT WORDS)
	43	35-12	
		11-0	V_{5-6} OR V_{1-2} VISIBLE SENSOR LINE DATA (7644 6-BIT ELEMENTS)
	44-1316		
	1317	35-12	
		11-0	F1 PREEDIT TAPE DATA FLAGS (12 BITS)
	1318	35-24	NOT USED (12 BITS)
		23-12	F3 UNCORRECTED IMAGE LINE NUMBER
		11-0	NOT USED
	1319		GMT (BITS 35-27 ARE DAY OF YEAR; BITS 26-0 ARE MILLISECONDS OF DAY)
DATA FOR V_{7-8} OR V_{3-4} SENSOR	1320-1361		DOCUMENTATION (256 6-BIT WORDS)
	1362	35-12	
		11-0	V_{7-8} OR V_{3-4} VISIBLE SENSOR LINE DATA (7644 6-BIT WORDS)
	1363-2635		
	2636	35-12	
		11-0	F1 PREEDIT TAPE DATA FLAGS (12 BITS)
	2637	35-24	MDT AND EHT DATA FLAGS (12 BITS)
		23-12	F3 UNCORRECTED IMAGE LINE NUMBER (12 BITS)
		11-0	NOT USED
	2638		GMT OR FLYWHEEL TIME (BITS 35-27 ARE DAY OF YEAR; BITS 26-0 ARE MILLISECOND OF DAY)

Figure B-6. Pre-edit Tape Visible Data Record Format for Mode B

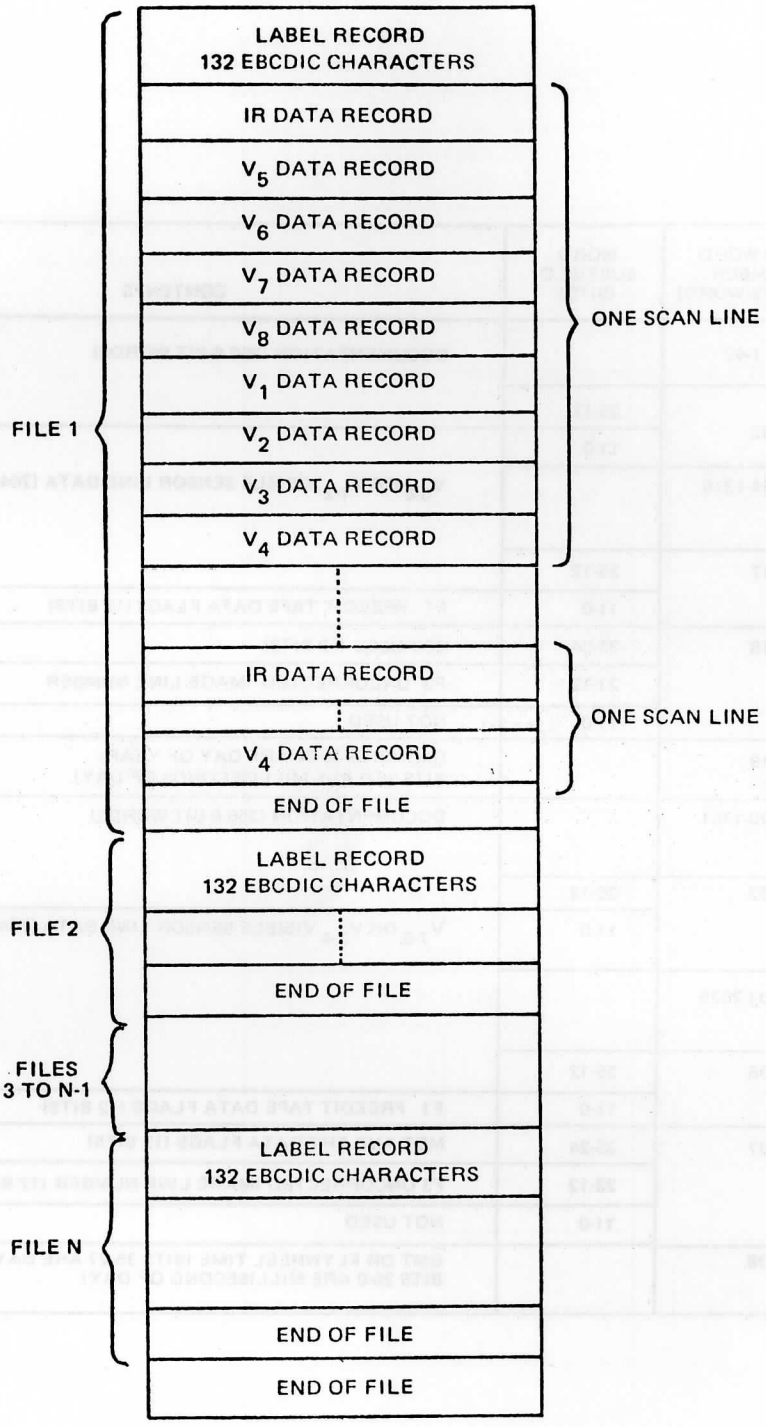


Figure B-7. Master Data and Experimenter History Tape File Format for Mode A Data

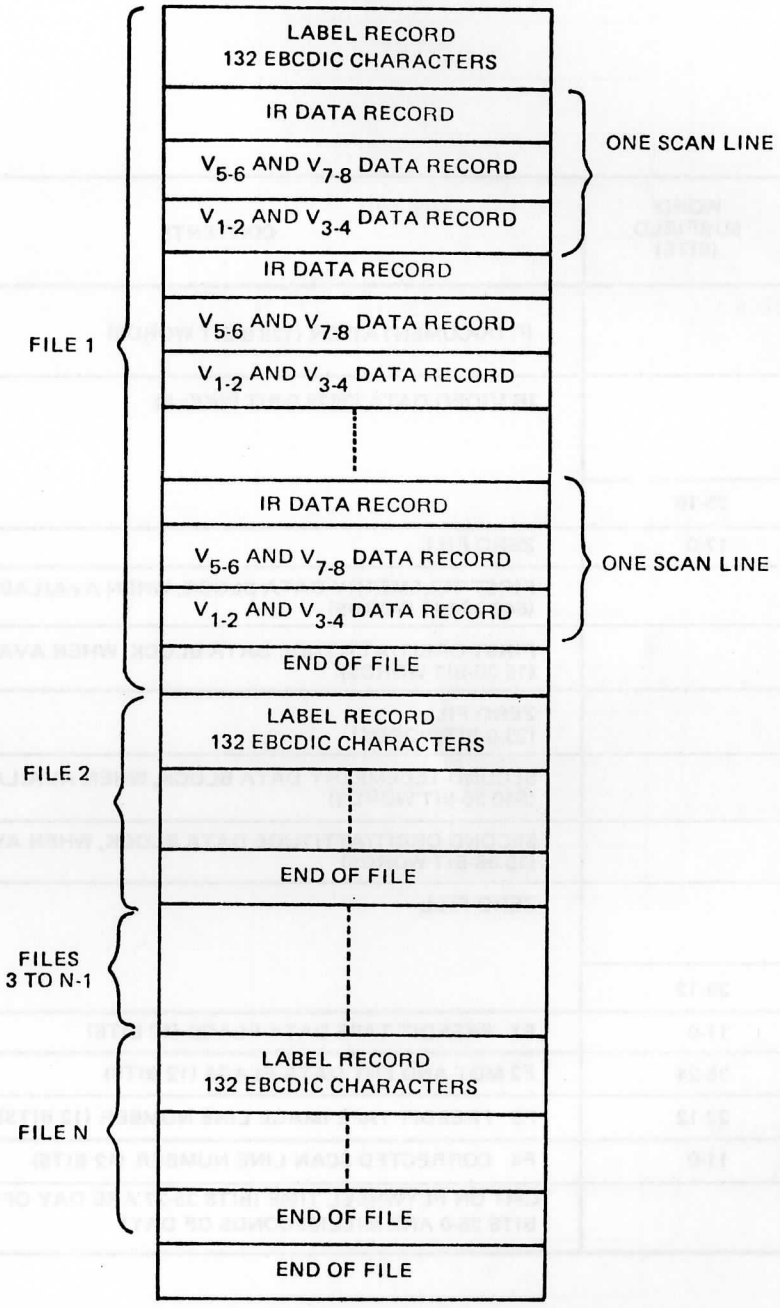


Figure B-8. Master Data and Experimenter History Tape File Format for Mode B Data

1108 WORD NUMBER (36 BITS/WORD)	WORD SUBFIELD (BITS)	CONTENTS
1 TO 32		IR DOCUMENTATION (128 9-BIT WORDS)
33-987		IR VIDEO DATA (3822 9-BIT PIXELS)
988	35-18	
	17-0	ZERO FILL
989-1628		FIRST TELEMETRY DATA BLOCK, WHEN AVAILABLE (640 36-BIT WORDS)
1627-1641		FIRST ORBIT/ATTITUDE DATA BLOCK, WHEN AVAILABLE (15 36-BIT WORDS)
1642-1658		ZERO FILL (23 9-BIT WORDS)
1659-2298		SECOND TELEMETRY DATA BLOCK, WHEN AVAILABLE (640 36-BIT WORDS)
2299-2313		SECOND ORBIT/ATTITUDE DATA BLOCK, WHEN AVAILABLE (15 36-BIT WORDS)
2314-2635		ZERO FILL
2636	35-12	
	11-0	F1 PREEDIT TAPE DATA FLAGS (12 BITS)
2637	35-24	F2 MDT AND EHT DATA FLAGS (12 BITS)
	23-12	F3 PREEDIT TAPE IMAGE LINE NUMBER (12 BITS)
	11-0	F4 CORRECTED SCAN LINE NUMBER (12 BITS)
2638		GMT OR FLYWHEEL TIME (BITS 35-27 ARE DAY OF YEAR; BITS 26-0 ARE MILLISECONDS OF DAY)

Figure B-9. Master Data and Experimenter History Tape Infrared Data Record Format.

1108 WORD NUMBER (36 BITS/WORD)	WORD SUBFIELD (BITS)	CONTENTS
1		VISIBLE DOCUMENTATION (7 6-BIT WORDS)
2	35-30	
	29-0	
3-40		UNUSED VISIBLE DOCUMENTATION
41	35-18	CORRECTED EQUATORIAL SCAN COUNT
	17-0	CORRECTED YEAR (2 DECIMAL DIGITS IN BINARY)
42		CORRECTED DOCUMENTATION TIME (BITS 35-27 ARE DAY; BITS 26-0 ARE MILLISECONDS OF DAY)
43-85		UNUSED VISIBLE DOCUMENTATION
86	35-24	
	23-0	VISIBLE SENSOR LINE DATA (15,288 6-BIT PIXELS)
87-2633		
2634	35-24	
	23-0	
2635		ZERO FILL
2636	35-12	
	11-0	F1 PREEDIT TAPE DATA FLAGS (12 BITS)
2637	35-24	F2 MDT AND EHT DATA FLAGS (12 BITS)
	23-12	F3 PREEDIT TAPE IMAGE LINE NUMBER (12 BITS)
	11-0	F4 CORRECTED SCAN LINE NUMBER (MDT AND EHT) (12 BITS)
2638		GMT OR FLYWHEEL TIME (BITS 35-27 ARE DAY OF YEAR: BITS 26-0 ARE MILLISECONDS OF DAY)

Figure B-10. Master Data and Experimenter History Tape Visible Data Record Format for Mode A

	1108 WORD NUMBER (36 BITS/WORD)	WORD SUBFIELD (BITS)	CONTENTS
DATA FOR V_{5-6} OR V_{1-2} SENSOR	1		VISIBLE DOCUMENTATION (7 6-BIT WORDS)
	2	35-30	
		29-0	
	3-40		UNUSED VISIBLE DOCUMENTATION
	41	35-18	CORRECTED EQUATORIAL SCAN COUNT
		17-0	CORRECTED YEAR (2 DECIMAL DIGITS IN BINARY)
	42		CORRECTED DOCUMENTATION TIME (BITS 35-27 ARE DAY; BITS 26-0 ARE MILLISECONDS OF DAY)
	43	35-12	UNUSED VISIBLE DOCUMENTATION
		11-0	V_{5-6} OR V_{1-2} VISIBLE SENSOR LINE DATA (7644 6-BIT PIXELS)
	44-1316		
	1317	35-12	
		11-0	F1 PREEDIT TAPE DATA FLAGS (12 BITS)
	1318	35-24	F2 MDT AND EHT DATA FLAGS (12 BITS)
		23-12	F3 PREEDIT TAPE IMAGE LINE NUMBER (12 BITS)
		11-0	F4 CORRECTED SCAN LINE NUMBER (MDT AND EHT) (12 BITS)
	1319		GMT (BITS 35-27 ARE DAY OF YEAR, BITS 26-0 ARE MILLISECONDS OF DAY)
	1320		VISIBLE DOCUMENTATION (7 6-BIT WORDS)
	1321	35-30	
		29-0	UNUSED VISIBLE DOCUMENTATION
	1322-1359		
DATA FOR V_{7-8} OR V_{3-4} SENSOR	1360	35-18	CORRECTED EQUATORIAL SCAN COUNT
		17-0	CORRECTED YEAR (2 DECIMAL DIGITS IN BINARY)
	1361		CORRECTED DOCUMENTATION TIME (BITS 35-27 ARE DAY; BITS 26-0 ARE MILLISECOND OF DAY)
	1362	35-12	UNUSED VISIBLE DOCUMENTATION
		11-0	V_{7-8} OR V_{3-4} VISIBLE SENSOR LINE DATA (7644 6-BIT PIXELS)
	1363-2635		
	2636	35-12	
		11-0	F1 PREEDIT TAPE DATA FLAGS (12 BITS)
	2637	35-24	F2 MDT & EHT DATA FLAGS (12 BITS)
		23-12	F3 PREEDIT TAPE IMAGE LINE NUMBER (12 BITS)
		11-0	F4 CORRECTED SCAN LINE NUMBER (MDT AND EHT) (12 BITS)
	2368		GMT OR FLYWHEEL TIME (BITS 35-27 ARE DAY OF YEAR; BITS 26-0 ARE MILLISECOND OF DAY)

Figure B-11. Master Data and Experimenter History Tape Visible Data Record Format for Mode B

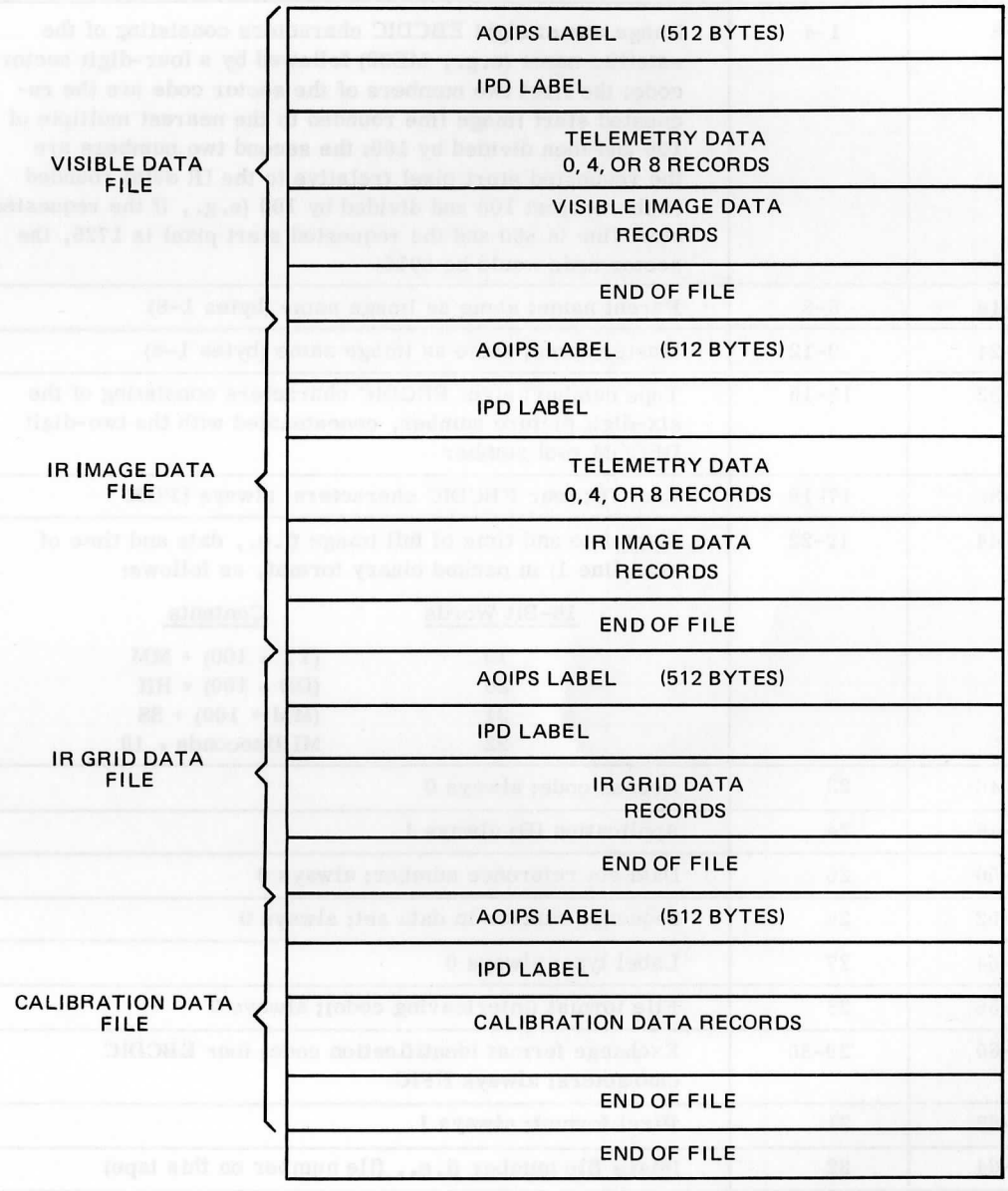


Figure B-12. AOIPS Tape Format

Table B-10
AOIPS Tape Label Format

Byte No. 8 Bits/Byte	16-Bit Word No.	Description*
1-8	1-4	Image name; eight EBCDIC characters consisting of the satellite name (e.g., ME02) followed by a four-digit sector code; the first two numbers of the sector code are the requested start image line rounded to the nearest multiple of 100 and then divided by 100; the second two numbers are the requested start pixel (relative to the IR data) rounded to the nearest 100 and divided by 100 (e.g., if the requested start line is 860 and the requested start pixel is 1725, the sector code would be 0917)
9-16	5-8	Parent name; same as image name (bytes 1-8)
17-24	9-12	Master name; same as image name (bytes 1-8)
25-32	13-16	Tape number; eight EBCDIC characters consisting of the six-digit picture number, concatenated with the two-digit DECOM reel number
33-36	17-18	User ID; four EBCDIC characters; always IPDM
37-44	19-22	Start date and time of full image (i.e., date and time of scan line 1) in packed binary format, as follows: 16-Bit Words — Contents 19 — (YY * 100) + MM 20 — (DD * 100) + HH 21 — (MM * 100) + SS 22 — Milliseconds * 10
45-46	23	Access code; always 0
47-48	24	Application ID; always 1
49-50	25	Data set reference number; always 0
51-52	26	Sequence number in data set; always 0
53-54	27	Label type; always 0
55-56	28	File format (interleaving code); always 0
57-60	29-30	Exchange format identification code; four EBCDIC characters; always EFIC
61-62	31	Pixel format; always 1
63-64	32	Image file number (i.e., file number on this tape)
65-66	33	Record length in 8-bit bytes
67-68	34	File length; number of records in file excluding the AOIPS label; this is the maximum value, and actual length may be less

*All fields are binary unless indicated otherwise.

Table B-10 (Continued)
AOIPS Tape Label Format

Byte No. 8 Bits/Byte	16-Bit Word No.	Description*
69-70	35	Left edge fill; number of 8-bit bytes preceding first image pixel; always 0
71-72	36	Top edge fill; number of records between AOIPS label record and first image data record (i.e., count of records used for IPD label and telemetry data)
73-74	37	Number of image pixels; number of 8-bit bytes of image data in each image data record
75-76	38	Number of image lines; maximum number of records containing image data
77-78	39	Image start pixel; pixel number of first image pixel in each image data record of this tape, corresponding to pixel numbers assigned to full-Earth image taking data type and mode into account. For IR data files, this is the requested start pixel; for mode A visible data files. This is the visible pixel number (visible pixels are numbered 1 to 15288) corresponding to the left edge of the requested start IR pixel and is computed using the formula: start visible pixel = (start IR pixel * 4) - 3
79-80	40	Image start line; line number of first image data record on this tape corresponding to line numbers assigned to full-Earth image taking data type and mode into account. For IR data files, this is the scan line number of the first image data record; for mode A visible data, this is the visible sensor line number (mode A visible sensor lines are numbered 1 to 14568) of the first image data record
81-82	41	Parent start pixel; same as bytes 77-78
83-84	42	Parent start line; same as bytes 79-80
85-86	43	Pixel zoom factor; always 1
87-88	44	Line zoom factor; always 1
89-90	45	Parent pixel scale (numerator); always 1
91-92	46	Parent pixel scale (denominator); always 1
93-94	47	Parent line scale (numerator); always 1
95-96	48	Parent line scale (denominator); always 1
97-98	49	Pixel offset; always 0
99-100	50	Line offset; always 0
101-106	51-53	Not used; zero filled

*All fields are binary unless indicated otherwise.

Table B-10 (Continued)
AOIPS Tape Label Format

Byte No. 8 Bits/Byte	16-Bit Word No.	Description*
107-108	54	Maximum number of secondary data records included in top fill; number of records preceding the first image data record which contain useful information; always 9
109-110	55	Logical record length of secondary data records (i.e., maximum number of 8-bit bytes containing useful information in the secondary data records); always 720
111-112	56	Line documentation length; number of 8-bit bytes, following the image data in each record, which contain useful information
113-118	57-59	Not used; zero filled
119-120	60	Program ID; always 1 for tapes created by SMS VISSR DPP
121-122	61	Program version ID; program version creation date: (MM * 100) + (DD * 10) + Y, where Y is unit digit of year
123-192	62-96	Not used; zero filled
193-194	97	Band code; equals 1 for visible files, 2 for IR image files, 3 for IR grid files, and 4 for IR calibration files
195-196	98	Pixel width (pixel mode); nominal width of each pixel in 1/2-mile units; always 4 for IR data, 2 for mode B visible data, and 1 for mode A visible data
197-198	99	Line height (line mode); nominal height of each image line (or of each pixel) in 1/2-mile units; always 8 for IR data, 4 for mode B visible data, and 1 for mode A visible data
199-200	100	Number of orbit/attitude blocks present in label; always 0, 1, or 2
201-202	101	Number of file containing IR calibration data; zero if IR calibration data file not present
203-204	102	Scaling table ID
205-208	103-104	DSCL (degree scale factor); all orbit/attitude data which are expressed in degrees must be divided by this factor; always $2^{16} = 65536$
209-212	105-106	KSCL (kilometer scale factor); all orbit/attitude data which are expressed in kilometers or kilometers per hour must be divided by this factor; always $2^{11} = 2048$

*All fields are binary unless indicated otherwise.

Table B-10 (Continued)
AOIPS Tape Label Format

Byte No. 8 Bits/Byte	16 Bit Word No.	Description*	
213-216	107-108	Date of orbit/attitude data; (YY * 1000) + day	Data for first orbit/attitude block
217-220	109-110	Time of orbit attitude data; milliseconds of day	
221-224	111-112	Attitude ID	
225-228	113-114	Geodetic latitude (degrees) multiplied by DSCL (words 103-104), plus north	
229-232	115-116	Longitude (degrees) multiplied by DSCL (words 103-104), plus East	
233-236	117-118	Height above oblate Earth (kilometers), multiplied by KSCL (words 105-106)	
235-240	119-120	Right ascension of spin axis (degrees), multiplied by DSCL (words 103-104)	
241-244	121-122	Declination of spin axis (degrees), multiplied by DSCL (words 103-104)	
245-248	123-124	Spin period (microseconds)	
247-252	125-126	Right ascension of position vector with respect to first point of aries (degrees) multiplied by DSCL (words 103-104)	
251-264	127-132	Cartesian coordinates of position vector in true of date geocentric equatorial coordinate system, in kilometers and multiplied by KSCL (words 105-106): 16-Bit Words — Contents 127-128 X position vector 129-130 Y position vector 131-132 Z position vector	
265-276	133-138	Corresponding Cartesian components of velocity vector, in kilometers per hour and multiplied by KSCL (words 105-106): 16-Bit Words — Contents 133-134 X velocity vector 135-136 Y velocity vector 137-138 Z velocity vector	
277-340	139-170	Data for second block of orbit/attitude data; format is identical to that of the first block in 16-bit words 107-138	Data for second orbit/attitude block
341-512	171-256	Not used; zero filled	

*All fields are binary unless indicated otherwise.

Table B-11
Label Parameters for Each Possible Sector Size

	SECTOR SIZE			IR IMAGE AND IR GRID DATA						VISIBLE DATA								APPROX. TAPE LENGTH (FEET)
	SCAN LINES	IR PIXELS	SECTOR SIZE CODE	NO. IMAGE REC'DS	NO. PIXELS	IR DOC & FLAG BYTES	REC'D LENGTH BYTES	PIXEL WIDTH	LINE WIDTH	VIS. DATA MODE	RESOLUTION FACTOR	NO. IMAGE REC'DS	NO. PIXELS	LEFT FILL	REC'D LENGTH	PIXEL WIDTH	LINE WIDTH	
AOIPS LABEL WORD	–	–	–	(38)	(37)	–	(33)	(24)	(25)	–	–	(28)	(37)	(35)	(33)	(24)	(25)	–
250		488	L	250	488	272	760	4	8	A B	1 1	2000 1000	1952 976	272 272	2224 1248	1 2	1 2	420 190
		976	M	250	976	272	1248	4	8	A B	1 1	2000 1000	3904 1952	272 272	4176 2224	1 2	1 2	635 250
		1952	N	250	1952	272	2224	4	8	A B	1 1	2000 1000	7644 3904	272 272	7916 4176	1 2	1 2	1050 380
		3822	O	250	3822	270	4092	4	8	A B	½ 1	1000 1000	7644 7644	272 272	7916 7916	2 2	2 2	620 620
500		976	P**	500	976	272	1248	4	8	A B	1 1	4000 2000	3904 1952	272 272	4176 2224	1 2	1 2	1269 500
		1952	Q	500	1952	272	2224	4	8	A B	1 1	4000 2000	7644 3904	272 272	7916 4176	1 2	1 2	2100 755
		3822	R	500	3822	270	4092	4	8	A B	½ 1	2000 2000	7644 7644	272 272	7916 7916	2 2	2 2	1240 1240
1000		1952	S***	1000	1952	272	2224	4	8	A B	½ 1	4000 4000	3904 3904	272 272	4176 4176	2 2	2 2	1505 1505
		3822	T	1000	3822	270	4092	4	8	A B	¼ ½	2000 2000	3822 3822	270 270	4092 4092	4 4	4 4	1120 1120
1818		3822	U*	1818	3822	270	4092	4	8	A B	¼ ½	3636 3636	3822 3822	270 270	4092 4092	4 4	4 4	2040 2040

*STANDARD SECTOR SIZE - IR DATA ONLY
**STANDARD SECTOR SIZE - IR AND/OR MODE A VISIBLE
***STANDARD SECTOR SIZE - IR AND/OR MODE B VISIBLE

Note: AOIPS Tapes available in standard sizes P, S, U.

TAPE BYTE (8-BITS)	CONTENTS
1-720	16 TELEMETRY FRAMES. 40 9-BIT WORDS PER FRAME FOR A TOTAL OF 640 CONTIGUOUSLY PACKED 9-BIT WORDS. A FULL NORMAL MODE TELEMETRY BLOCK CONTAINS 64 FRAMES AND REQUIRES FOUR RECORDS. UP TO TWO BLOCKS MAY BE PRESENT IN EACH FILE WITH FRAMES ALLOCATED TO RECORDS AS FOLLOWS: FRAMES — BLOCK 1 RECORD — BLOCK 2 RECORD 1-16 — 1 — 5 17-32 — 2 — 6 33-48 — 3 — 7 49-64 — 4 — 8 PRESENCE OF A VALID FRAME IS INDICATED BY A NON-ZERO TIME FOR THAT FRAME.
721 TO END	FILL. TELEMETRY DATA RECORDS ARE FILLED TO SAME LENGTH AS IMAGE DATA RECORDS IN FILE.

Figure B-13. AOIPS Telemetry Data Record Format

TAPE BYTE (8 BITS/BYTE)	CONTENTS
1 TO N	IMAGE DATA. N EQUALS THE NUMBER OF IMAGE PIXELS IN AOIPS LABEL (WORD 37) PACKED ONE PIXEL PER BYTE.
N + 1 TO N + 256	IR DOCUMENTATION. 128 9-BIT WORDS. TWO BYTES ARE USED FOR EACH WORD. MOST SIGNIFICANT BITS ARE IN ODD-NUMBERED BYTES. LEAST SIGNIFICANT BITS ARE IN EVEN-NUMBERED BYTES. LEFTMOST BIT OF FIRST BYTE SET TO 1 IF DOCUMENTATION PRESENT.
N + 257 TO N + 258	DAY OF YEAR (16 BITS, BINARY)
N + 259 TO N + 262	MILLISECOND OF DAY (32 BITS, BINARY)
N + 263 TO N + 268	DATA FLAGS (48 BITS) F1 PREEDIT DATA FLAGS (12 BITS) F2 MDT DATA FLAGS (12 BITS) F3 IMAGE LINE NUMBER (12 BITS) F4 SCAN LINE NUMBER (12 BITS)
N + 269 TO N + 270	PAD (ONLY PRESENT WHEN NECESSARY TO MAKE RECORD LENGTH AN AN EVEN MULTIPLE OF 32 BITS)

Figure B-14. AOIPS Image Data Record Format

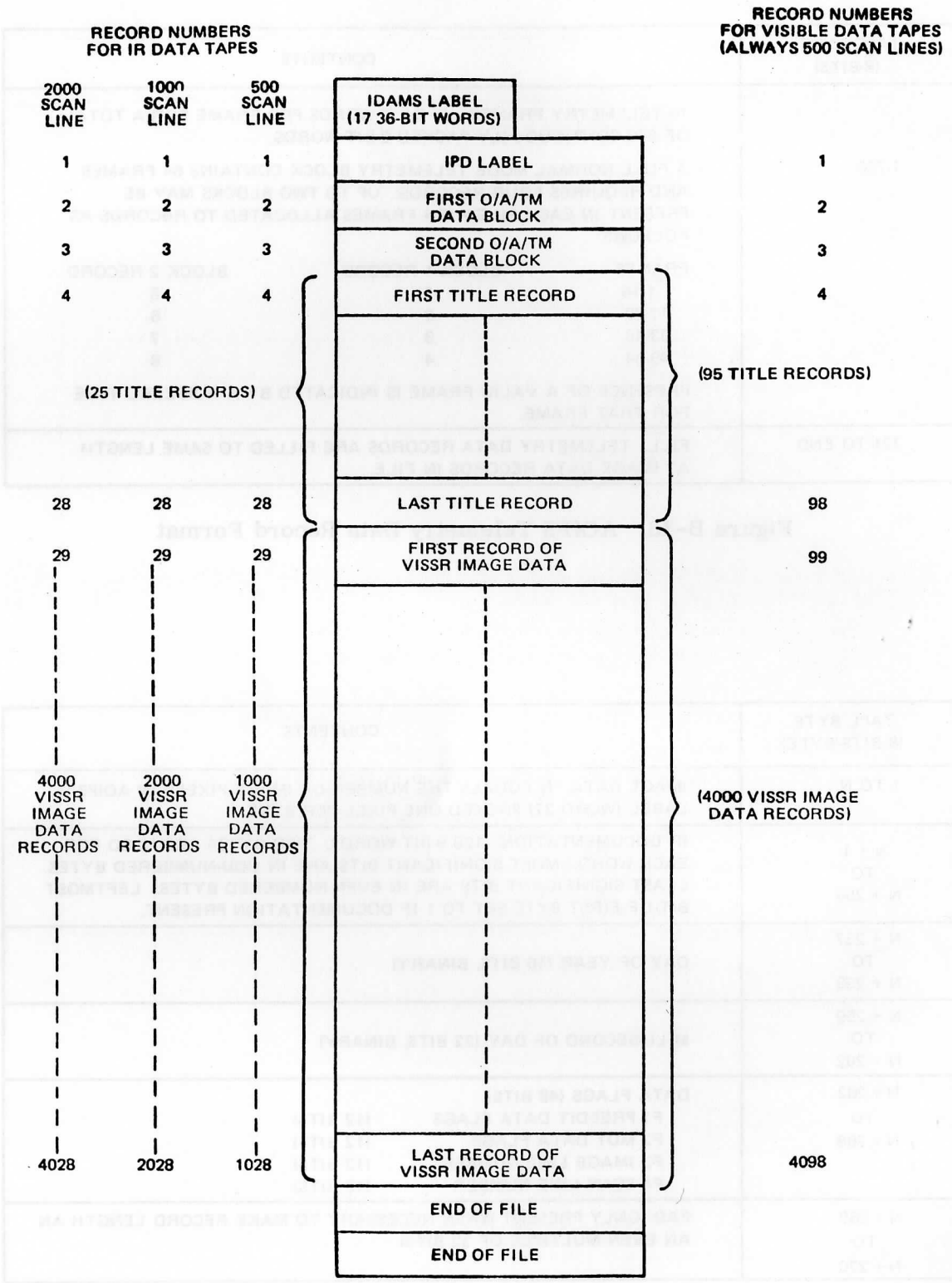


Figure B-15. VISSR IDAMS Picture Tape Format

CDC 3200 WORD (24 BITS)	DESCRIPTION
1-2	TITLE (IN BCD) FORMAT: S{I, A, B}NNNNNNN (S = SMSA; I = IR, A = MODE A VISIBLE; B = MODE B VISIBLE; NNNNNNN = PICTURE NUMBER)
3	NUMBER OF (6-BIT) PICTURE ELEMENTS PER LINE (PIXELS), INCLUDING GRAY SCALE
4	NUMBER OF LINES (BINARY) (IPD LABEL, TELEMETRY RECORDS, AND TITLE RECORDS ARE COUNTED)
5	FIRST 12 BITS = ACTUAL RECORD SIZE IN 24-BIT WORDS SECOND 12 BITS = SCALING TABLE ID
6	FILE NUMBER (BINARY ONE)
7	YEAR AND DAY OF PICTURE (BINARY) (YEAR (TWO DECIMAL DIGITS) x 1000 + DAY) (SEE NOTE 2)
8	START TIME OF PICTURE = (HOURS x 1000) + (MINUTES x 100) + SECONDS (SEE NOTE 2)
9	START PIXEL (SEE NOTE 3)
10	START LINE (SEE NOTE 4)
11	SPIN PERIOD OF SPACECRAFT (MICROSECONDS)
12	RIGHT ASCENSION OF SPIN AXIS x 10^4 (DEGREES)
13	DECLINATION OF SPIN AXIS x 10^4 (DEGREES)
14	YEAR AND DAY OF O/A DATA (YEAR (TWO DECIMAL DIGITS) x 1000 + DAY)
15	GMT OF O/A DATA (MILLISECONDS/12)
16	X POSITION COORDINATE x RFACT (WORD 22) (KILOMETERS)
17	Y POSITION COORDINATE x RFACT (WORD 22) (KILOMETERS)
18	Z POSITION COORDINATE x RFACT (WORD 22) (KILOMETERS)
19	X VELOCITY VECTOR x VFACT (WORD 23) (KILOMETERS PER HOUR)
20	Y VELOCITY VECTOR x VFACT (WORD 23) (KILOMETERS PER HOUR)
21	Z VELOCITY VECTOR x VFACT (WORD 23) (KILOMETERS PER HOUR)
22	RFACT (RANGE SCALE FACTOR)
23	VFACT (VELOCITY SCALE FACTOR)
24	RIGHT ASCENSION OF POSITION VECTOR WITH RESPECT TO FIRST POINT OF ARIES x 10^4 (DEGREES)
25	ATTITUDE ID

NOTES:

1. ALL FIELDS ARE INTEGER EXCEPT FOR WORDS 1 AND 2 WHICH ARE BCD.
2. THE START DATE AND TIME OF THE PICTURE, WORDS 7 AND 8, REFER TO THE DOCUMENTATION TIME OF SCAN LINE NUMBER 1 OF THE FULL EARTH IMAGE.
3. THE START PIXEL, WORD 9, IS THE PIXEL NUMBER, RELATIVE TO THE SENSOR TYPE, OF THE FIRST PIXEL EXTRACTED FROM EACH SENSOR AND PLACED IN THE FIRST PIXEL POSITION IN EACH RECORD. START PIXEL MAY HAVE THE FOLLOWING RANGE OF VALUES DEPENDING ON SENSOR TYPE:

IR	1-3822
MODE A VISIBLE	1-15288
MODE B VISIBLE	1-7644

4. THE START LINE, WORD 10, IS THE LINE NUMBER WHICH SHOULD BE ASSIGNED TO THE RECORD IMMEDIATELY FOLLOWING THE IDAMS LABEL AND INCREMENTED FOR EACH SUBSEQUENT RECORD, INCLUDING TELEMETRY, TITLE, AND FILL RECORDS, TO DETERMINE THE CORRECT SENSOR LINE NUMBER FOR EACH VISSR DATA RECORD. THE SENSOR LINE NUMBER OF EACH VISSR DATA RECORD IS THE NUMBER OF THE SENSOR RELATIVE TO A FULL-EARTH IMAGE FOR THAT SENSOR TYPE (TAKING INTO ACCOUNT THE FACT THAT IR SENSORS ARE REPEATED TO CORRECT THE PIXEL ASPECT RATIO) WITH EACH OCCURRENCE OF THE SENSOR ASSIGNED A UNIQUE SEQUENTIAL SENSOR NUMBER STARTING WITH 1 FOR THE FIRST SENSOR IN SCAN LINE 1.

Figure B-16. VISSR IDAMS Label Format

1108 WORD NUMBER (36 BITS)	CDC 3200 WORD NUMBER (24 BITS)	CONTENTS
1	1	LINE COUNTER (2 OR 3)
	2 (BITS 23-12)	
2	2 (BITS 11-0)	ZERO FILL
	3	
3-642	4-963	TELEMETRY DATA (2560 9-BIT FRAMES FORMATTED SAME AS BLOCK ON O/A/TM TAPE)
643-657	964-985	ORBIT/ATTITUDE DATA (15 36-BIT WORDS)
	986 (BITS 23-12)	
658-686	986 (BITS 11-0)	ZERO FILL
	987-1029	
687	1030	
	1031	PRESENCE OF VALID TELEMETRY DATA INDICATED IF LOW-ORDER BIT SET TO 1
688	1032	ZERO FILL

Figure B-17. IDAMS Picture Tape Telemetry Record Format

1108 WORD (36-BITS)	6-BIT BYTE NUMBER	CONTENTS
1	1-4	LINE COUNTER (BINARY, 24 BITS)
	5-6	IR PICTURE DATA 976 (6 BIT) ELEMENTS
2-171	7-980	
		GRAY SCALE 48 (6 BIT) ELEMENTS
172	1027-1028	
	1029-1032	ZERO FILL
173-683	1033-4098	
684	4099-4102	
	4103-4104	PREEDIT TAPE DATA FLAGS (F1)
685	4105-4106	MDT DATA FLAGS (F2)
	4107-4108	UNCORRECTED IMAGE LINE NUMBER
	4109-4110	CORRECTED SCAN LINE NUMBER
686	4111-4116	GMT OR FLYWHEEL TIME - DAY (9 BITS), MILLISECONDS (27 BITS)
687	4117-4122	DOCUMENTATION TIME - DAY (9 BITS), MILLISECONDS (27 BITS)
688	4123-4124	PRESENCE OF VALID BETA COUNT IS INDICATED IF LOW-ORDER BIT IS SET TO 1
	4125-4128	BETA COUNT FROM IR DOCUMENTATION

Figure B-18. VISSR IDAMS Picture Tape IR Video Data Record Format for 500 Scan Line Image

1108 WORD NUMBER (36 BITS)	6-BIT BYTE NUMBER	CONTENTS	
1	1-4	LINE COUNTER (BINARY, 24 BITS)	
	5-6		
2-683	7-4098	PICTURE DATA 4096 6-BIT ELEMENTS INCLUDING 192 ELEMENTS OF GRAY SCALE	
684	4099-4100		
	4101-4102	ZERO FILL	(12 BITS)
	4103-4104	PREEDIT TAPE DATA FLAGS (F1)	(12 BITS)
685	4105-4106	MDT DATA FLAGS (F2)	(12 BITS)
	4107-4108	UNCORRECTED IMAGE LINE NUMBER	(12 BITS)
	4109-4110	CORRECTED SCAN LINE NUMBER	(12 BITS)
686	4111-4116	GMT OR FLYWHEEL TIME, DAY (9 BITS), MILLISECONDS (27 BITS)	(36 BITS)
687	4117-4122	DOCUMENTATION TIME, DAY (9 BITS) MILLISECONDS (27 BITS)	(36 BITS)
688	4123-4124	PRESENCE OF VALID BETA COUNT IS INDICATED IF LOW-ORDER BIT IS SET TO 1	
	4125-4128	BETA COUNT FROM IR DOCUMENTATION	

Figure B-19. VISSR IDAMS Picture Tape Visible Video Data Record Format

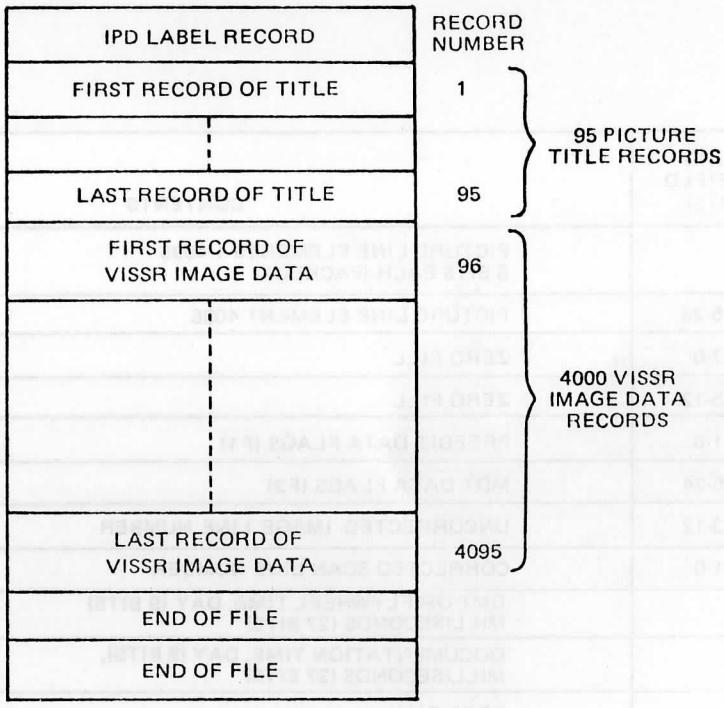


Figure B-20. Dicomed Picture Tape File Format

1108 WORD (36 BITS)	WORD SUBFIELD (BITS)	CONTENTS	
1-910		PICTURE LINE ELEMENTS 1-4095 8 BITS EACH (PACKED)	
911	35-28	PICTURE LINE ELEMENT 4096	(8 BITS)
911	27-0	ZERO FILL	(28 BITS)
912	35-12	ZERO FILL	(24 BITS)
912	11-0	PREEDIT DATA FLAGS (F1)	(12 BITS)
913	35-24	MDT DATA FLAGS (F2)	(12 BITS)
913	23-12	UNCORRECTED IMAGE LINE NUMBER	(12 BITS)
913	11-0	CORRECTED SCAN LINE NUMBER	(12 BITS)
914		GMT OR FLYWHEEL TIME, DAY (9 BITS) MILLISECONDS (27 BITS)	(36 BITS)
915		DOCUMENTATION TIME, DAY (9 BITS), MILLISECONDS (27 BITS)	(36 BITS)
916		ZERO FILL	(36 BITS)

Figure B-21. Dicomed Picture Tape Record Format

WORD (36-BIT)	BITS 35 34 33 32 31 30	29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
1	TABLE TYPE 11 = VISIBLE 12 = IR	TABLE NUMBER
2	SCALED VALUE FOR INPUT PIXEL = 0	SCALED VALUE FOR INPUT PIXEL = 1 / SCALED VALUE FOR INPUT PIXEL = 2 / SCALED VALUE FOR INPUT PIXEL = 3 / SCALED VALUE FOR INPUT PIXEL = 4 / SCALED VALUE FOR INPUT PIXEL = 5
3 TO 86	SCALED VALUES FOR INPUT PIXEL VALUES OF 6 TO 509, PACKED 6 PER WORD AS SHOWN FOR WORD 2	
87	SCALED VALUE FOR INPUT PIXEL = 510	SCALED VALUE FOR INPUT PIXEL = 511 / ZERO FILL
88 TO 173	ZERO FILL	
174	YEAR OF TABLE CREATION (2 DECIMAL DIGITS IN BINARY)	JULIAN DAY OF TABLE CREATION
175	ZERO FILL	F* A
176	PIXEL VALUE FOR GRAY LEVEL 1	PIXEL VALUE FOR GRAY LEVEL 2 / PIXEL VALUE FOR GRAY LEVEL 3
177 TO 186	PIXEL VALUES FOR GRAY LEVELS 4 TO 33, PACKED 3 VALUES PER WORD AS SHOWN FOR WORD 176	
187	3 FIELDATA CHARACTER FOR GRAY LEVEL 1 ANNOTATION	UNDEFINED
188	3 FIELDATA CHARACTERS FOR GRAY LEVEL 2 ANNOTATION	UNDEFINED
189 TO 219	FIELDATA ANNOTATION CHARACTERS FOR GRAY LEVELS 3 TO 33, FORMATTED AS SHOWN FOR WORDS 187 AND 188	
220	ZERO FILL	

*FA – FLAG BIT WHICH, WHEN SET TO 0, INDICATES PRESENCE OF GRAY LEVEL PIXEL VALUE TABLE (WORDS 176 – 186) AND GRAY LEVEL ANNOTATION (WORDS 187 – 219)

Figure B-22. Picture Scaling Table Tape/IDAMS Scaling Table Record Format

WORD (36-BIT)	BITS 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
1	TABLE TYPE 13 = VISIBLE 14 = IR | TABLE NUMBER
2	NOT USED | SCALED VALUE FOR INPUT PIXEL = 0 | NOT USED | SCALED VALUE FOR INPUT PIXEL = 1 | NOT USED | SCALED VALUE FOR INPUT PIXEL = 2
3 TO 171	SCALED VALUES FOR INPUT PIXEL VALUES OF 6 TO 509, PACKED 6 PER WORD AS SHOWN FOR WORD 2
172	NOT USED | SCALED VALUE FOR INPUT PIXEL = 510 | NOT USED | SCALED VALUE FOR INPUT PIXEL = 511 | ZERO FILL
173	ZERO FILL
174	YEAR OF TABLE CREATION (2 DECIMAL DIGITS IN BINARY) | JULIAN DAY OF TABLE CREATION
175	ZERO FILL | F* A
176	PIXEL VALUE FOR GRAY LEVEL 1 | PIXEL VALUE FOR GRAY LEVEL 2 | PIXEL VALUE FOR GRAY LEVEL 3
177 TO 186	PIXEL VALUES FOR GRAY LEVELS 4 TO 33, PACKED 3 VALUES PER WORD AS SHOWN FOR WORD 176
187	3 FIELDATA CHARACTERS FOR GRAY LEVEL 1 ANNOTATION | UNDEFINED
188	3 FIELDATA CHARACTERS FOR GRAY LEVEL 2 ANNOTATION | UNDEFINED
189 TO 219	FIELDATA ANNOTATION CHARACTERS FOR GRAY LEVELS 3 TO 33, FORMATTED AS SHOWN FOR WORDS 187 AND 188
220	ZERO FILL

*FA – FLAG BIT WHICH, WHEN SET TO 0, INDICATES PRESENCE OF GRAY LEVEL PIXEL VALUE TABLE (WORDS 176 – 186) AND GRAY LEVEL ANNOTATION (WORDS 187 – 219)

Figure B-23. Picture Scaling Table Tape/Dicomed Scaling Table Record Format

APPENDIX C

EXPERIMENTER TAPE DISTRIBUTION LIST

APPENDIX C

EXPERIMENTER TAPE DISTRIBUTION LIST

The experimenter tapes, which are eventually returned to IPD for reuse, are mailed to the participating experimenters at the following addresses:

Experiment Member	Mailing Address
XO2 (VISSR)*	William E. Shenk Code 651.0, Bldg. 21 GSFC
APT (AOIPS) IPV (IDAMS Visible) IPI (IDAMS IR) EXH (Experimenter History)	Elizabeth Clevland Code 931, Bldg. 16A GSFC

*Not required for SMS/GOES-B

APPENDIX D

DICOMED AND CELCO IMAGE RECORDING SYSTEMS

APPENDIX D

DICOMED AND CELCO IMAGE RECORDING SYSTEM

The Dicomed and CELCO image recording systems are both used for the production of SMS/GOES images. However, the CELCO image recording system is used to produce images for VISSR data. Sample CELCO outputs are shown but the text of this appendix is devoted to the Dicomed image recording system.

The Dicomed Model D162 is an off-line, stand-alone image recording system designed for image generation. The system reads digital information from magnetic tape and records that information on photographic film. Because film recording is a relatively routine procedure, a large-scale computer system is not required for this task.

The system is designed to control roll film cameras, provide image annotation, and utilize plotting resolutions of the D47 Color Image Recorder. The information that is read from the magnetic tape is generally formatted by a conventional data processing system.

The system is configured using standard Dicomed products. A Model D47 Color Image Recorder and a Model D15 Magnetic Tape Unit are connected by a B250 Character Generator and a Microprogrammable Controller (MPC). Figure D-1 shows a block diagram of the system.

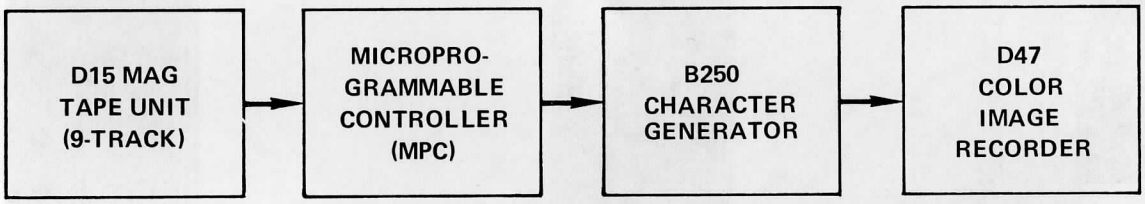


Figure D-1. D162 System Block Diagram

A picture of the Dicomed Image Recording System is shown in Figure D-2. Figure D-3 and D-4 show sample pictures produced by this system. The general specifications for the D47 Color Image Recorder are given in Table D-1.

The D15 Magnetic Tape Unit is designed to record and retrieve data on magnetic tape that is in a 9-track, industry-compatible format. The magnetic tape transport synchronously reads and writes on magnetic tape at a density of 800 bits-per-inch in the non-return to zero indicator (NRZI) format. Tape reading and writing speed is a system option. Rewind and high speed search rates are 150 inches-per-second.

Figure D-2. Dicomed Image Recording System

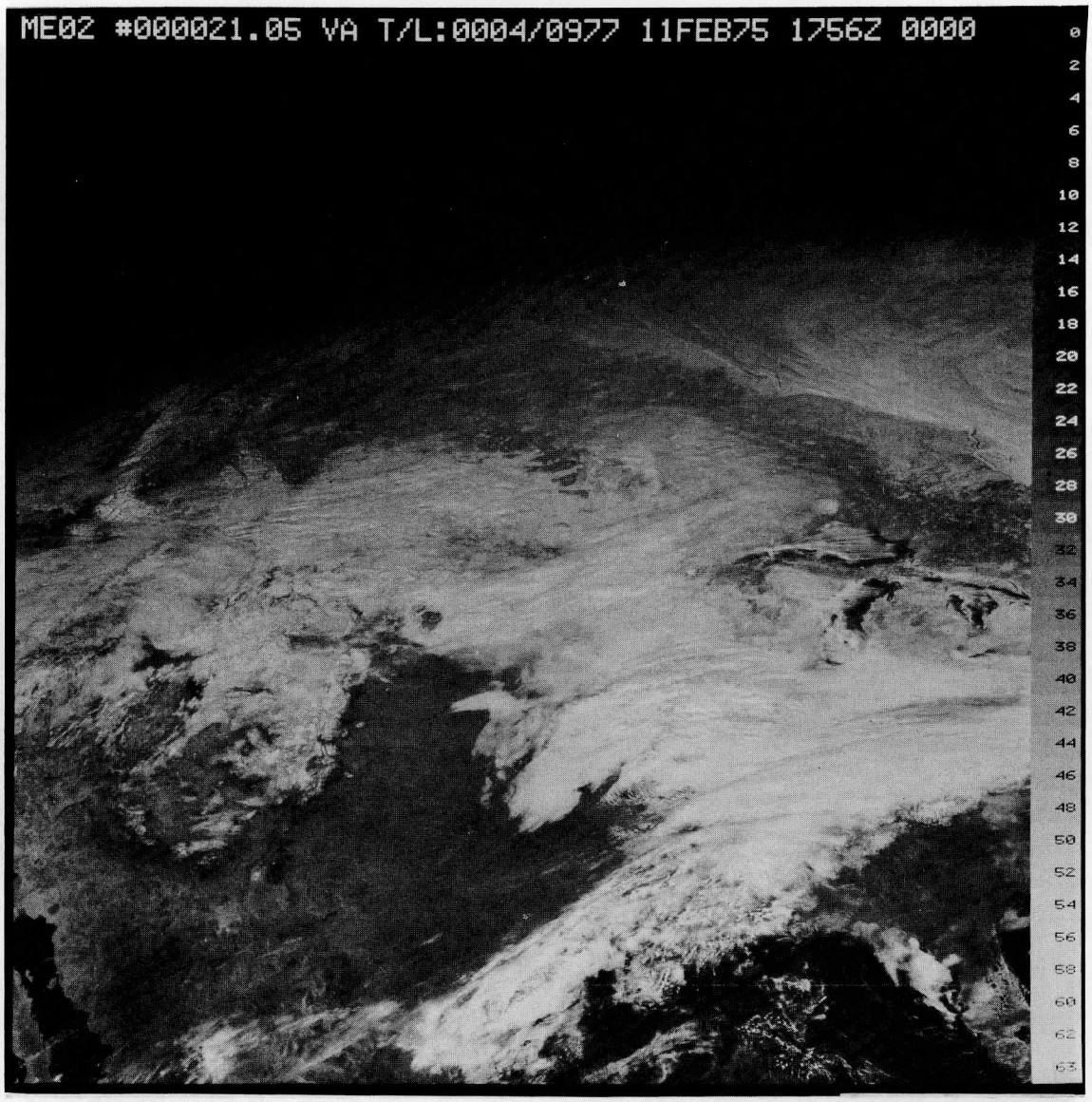


Figure D-3. SMS-2 Image Produced by the Dicomed

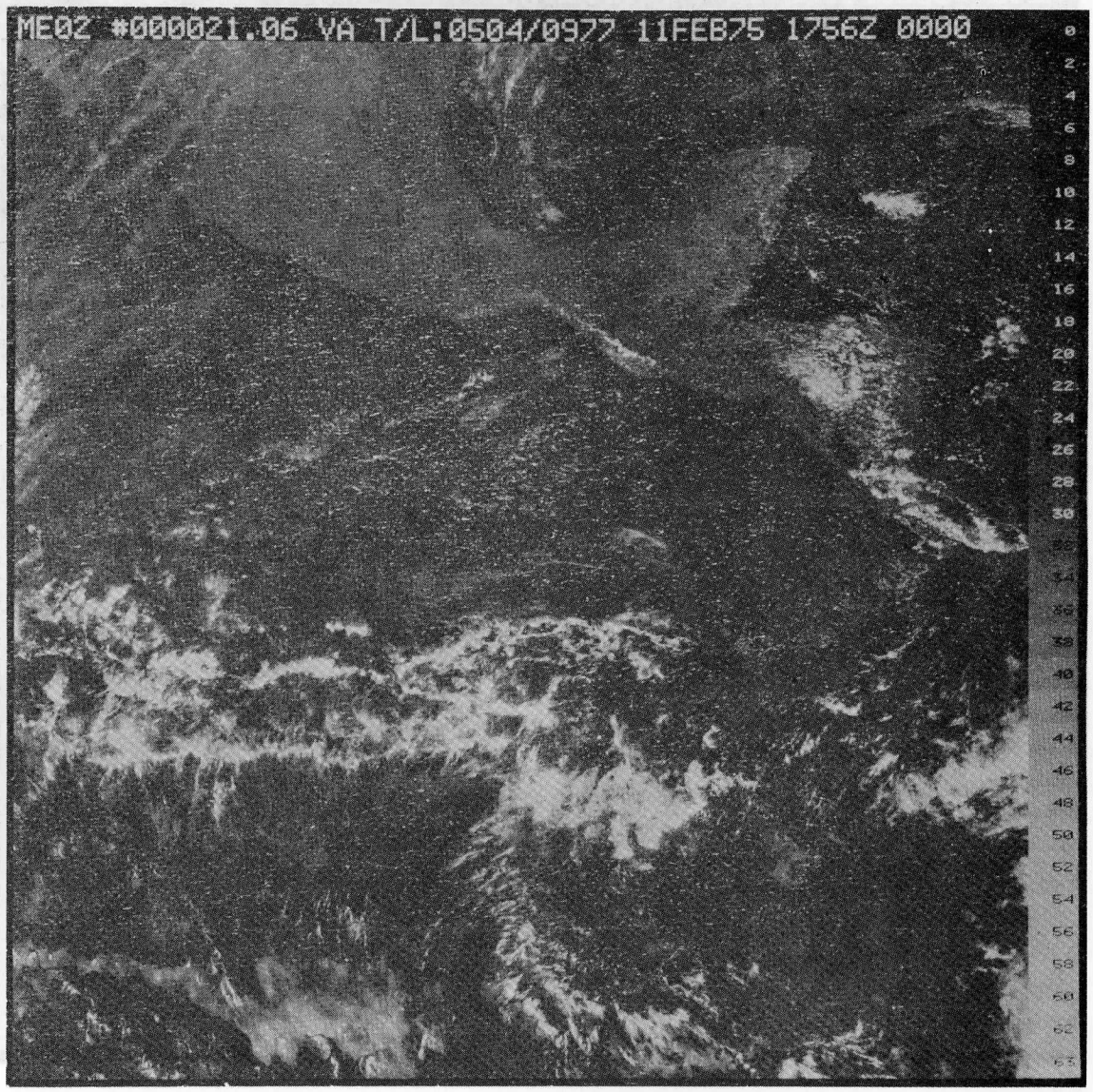


Figure D-4. SMS-2 Sectorized Image Produced by the Dicomed

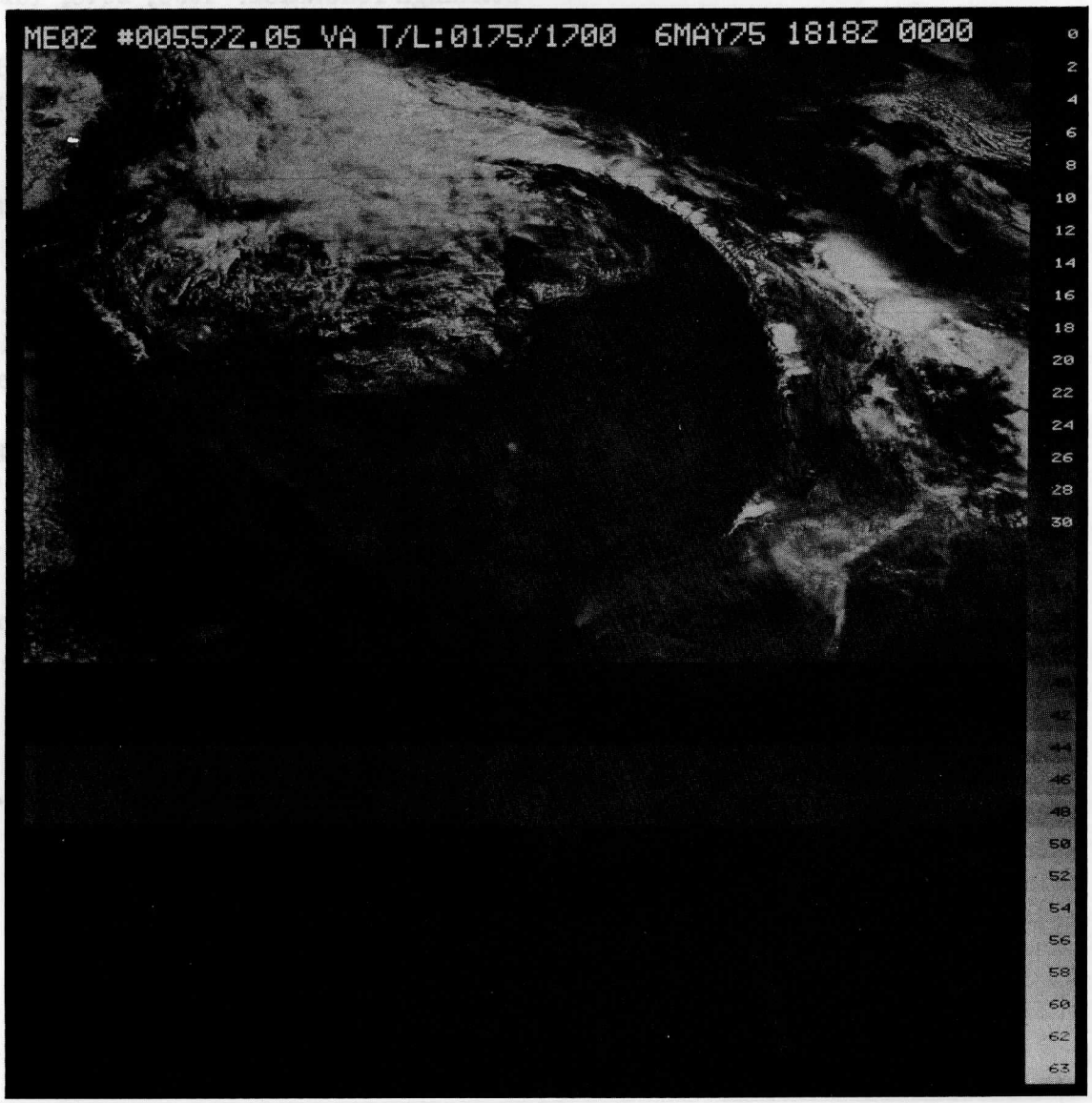


Figure D-5. Dicomed Produced Limited Scan Image

Table D-1
Dicomed D47 Color Image Recorder Specifications

Cathode Ray Tube:	Ultrahigh resolution: 4096, 2048, 1024 pixels per axis, 5" diameter screen, P-48, .80 mil. High resolution: 2048, 1024, 512 pixels per axis, 5" diameter screen, P-48, 1.3 mil.
Exposure Energy Range:	256 possible levels
Average Image Generation Time: (log mode)	Ultrahigh resolution: (4096) 5.5 minutes for black and white, 16.5 minutes for color. High resolution: (2048) 1.5 minutes for black and white, 4.5 minutes for color. Actual image generation time depends upon the raster size, the number of color filters selected, and the overall value of the exposure energy levels making up the image and speed of connected equipment.
Beam Positioning Time:	1 millisecond per axis (in Random Point Positioning mode) maximum.
Flyback Time:	1 millisecond (adjacent line) maximum.
Point to Point Positioning Time:	8 microseconds (adjacent points) max.
Film Format:	4 × 5 inch sheet film standard (3.4 × 3.4 useable record area). All other film optional.
Spatial Repeatability:	0.05% full axis for successive images.
Power Requirements:	115 VAC + 10% 50 - 60 Hz, single phase 10 Amps
Environment:	55° F to 95° F
Weight:	300 pounds
Size:	58 inches high 28 inches wide 29 inches deep

The Microprogrammable Controller consists of a microprocessor, read/write fast access memory, read-only memory, and core memory. The microprocessor features a repetoire of 42 16-bit instructions. The average execution time of the processor is approximately 500 nanoseconds. Types of instructions include:

- Shift
- Logical
- Arithmetic
- Literal
- Register-to-register
- Jump

The character generator monitors all communication between the MPC and the D47 Color Image Recorder. This unit responds to a unique set of commands and then communicates directly with the D47. The command structure allows the user to generate a set of 64 characters in four different sizes. The commands necessary to annotate an image can be formatted as a separate file on tape.

The character generator can be commanded to produce a number of useful test patterns. The following list enumerates the test patterns that are included in the system in various sizes:

- Constant intensity
- Dot pattern
- Border paint
- Grid pattern
- Vertical bars
- Horizontal bars
- Exposure step wedge
- Point checkerboard

The D47 Color Image Recorder is a high-performance cathode ray tube (CRT) film recorder capable of producing photographs in color or black and white from digitally encoded pictorial data. Commands or image data can be received from the MPC or the character generator. Data is converted into exposure energy levels with values up to 256, which make up the picture elements (pixels) and is recorded at resolutions of 512, 1024, 2048, or 4096 pixels per axis. Only three resolutions are selectable on any one specific unit: 1024, 2048, and 4096.

With a 4096 point-per-axis unit operating at a resolution of 1024, 16 points are exposed for each pixel. When operating the same unit at a resolution of 2048, four points are exposed for each pixel. When operating at a resolution of 4096, one point is exposed for each pixel.

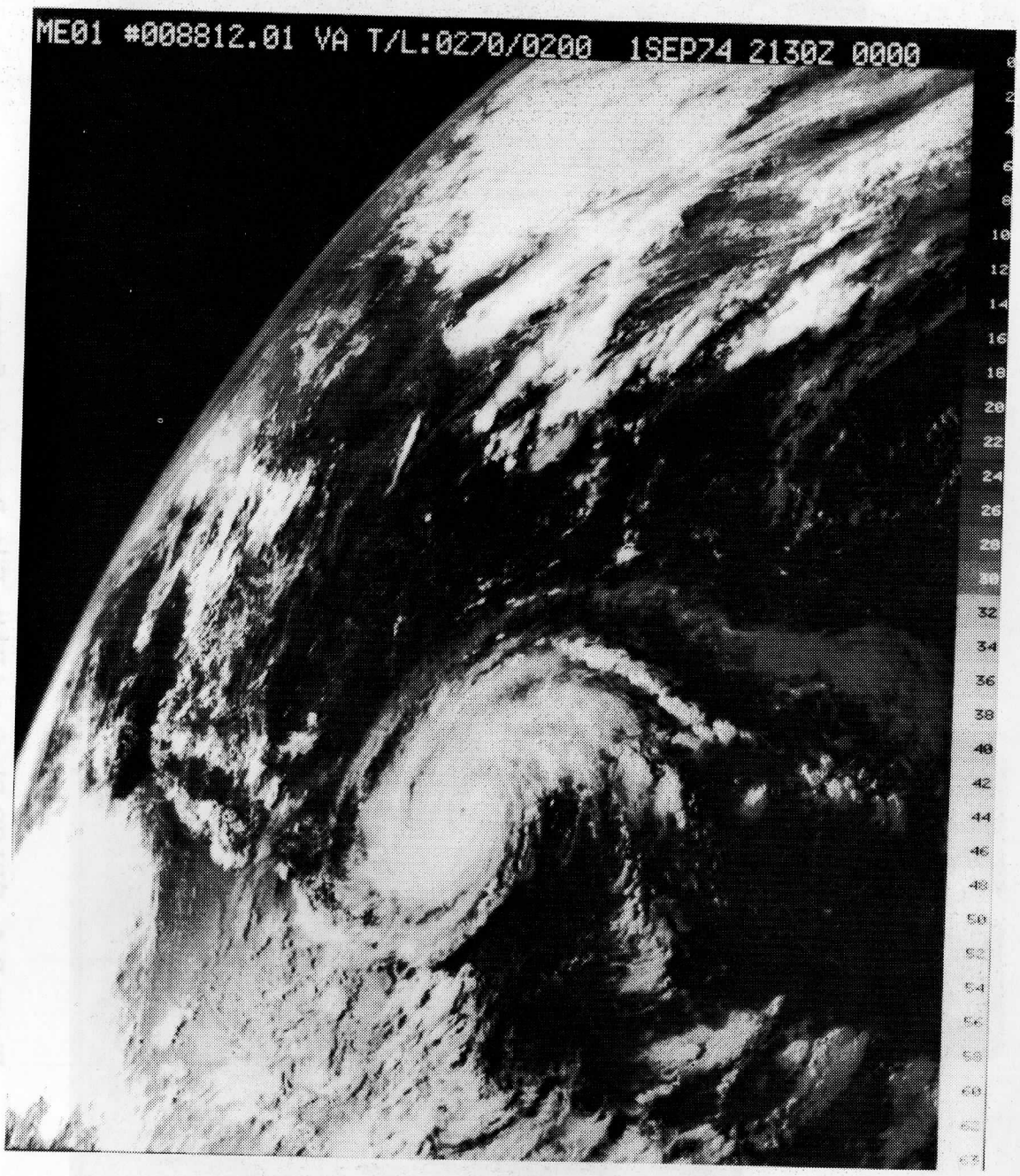
With a 2048 point-per-axis unit operating at a resolution of 512, 16 points are exposed for each pixel. When operating the same unit at a resolution of 1024, four points are exposed for each pixel. When operating at a resolution of 2048, one point is exposed for each pixel.

The recorder comes equipped with an automatic color filter advance which can be controlled from the operator control panel or from the MPC. The three primary color filters selectable are blue, green, and red. A neutral filter is available for black and white image recording.

The image recorder can construct either single or multiple images using a full raster scan or a random position format. A command and status code structure is included in the logic to allow the recorder to be operated automatically under program control or semiautomatically under operator control.

The CELCO equipment (Figure D-6) is limited to the production of black and white images only. However, it has the capability of sectorizing image data and producing 2 x 1 and 4 x 1 images. Figure D-7 is a typical image produced by CELCO. Figure D-8 illustrates the 2 x 1 capability and Figure D-9 illustrates the 4 x 1 capability of CELCO. Notice that all figures are produced from the same image data.

Figure D-6. CELCO Black and White Film Recording System



Note: Documentation at the top of image has been reconstructed as indicated in Table 2-5.

Figure D-7. CELCO Produced SMS-1 Image

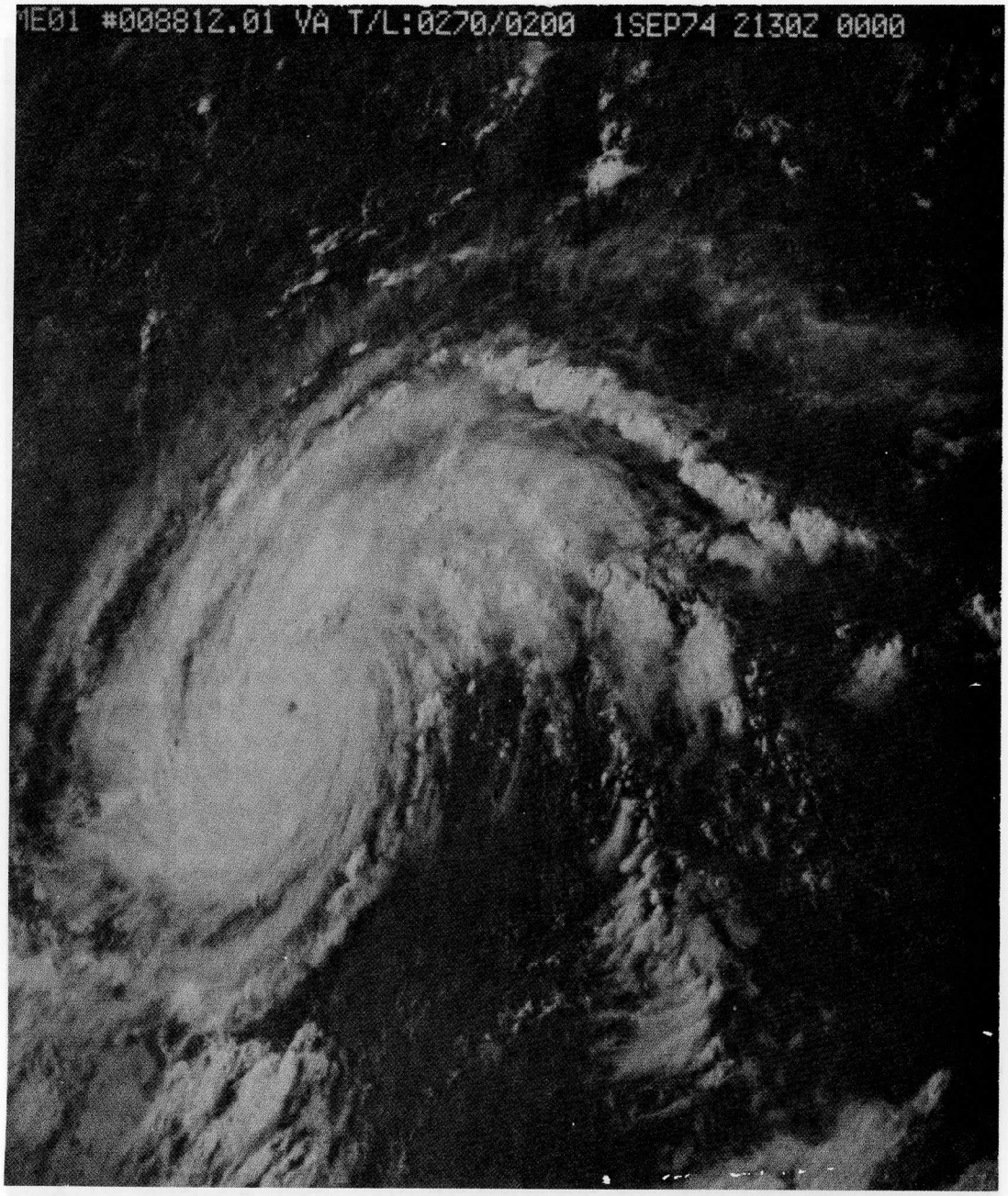


Figure D-8. CELCO Produced 2 x 1 SMS-1 Image

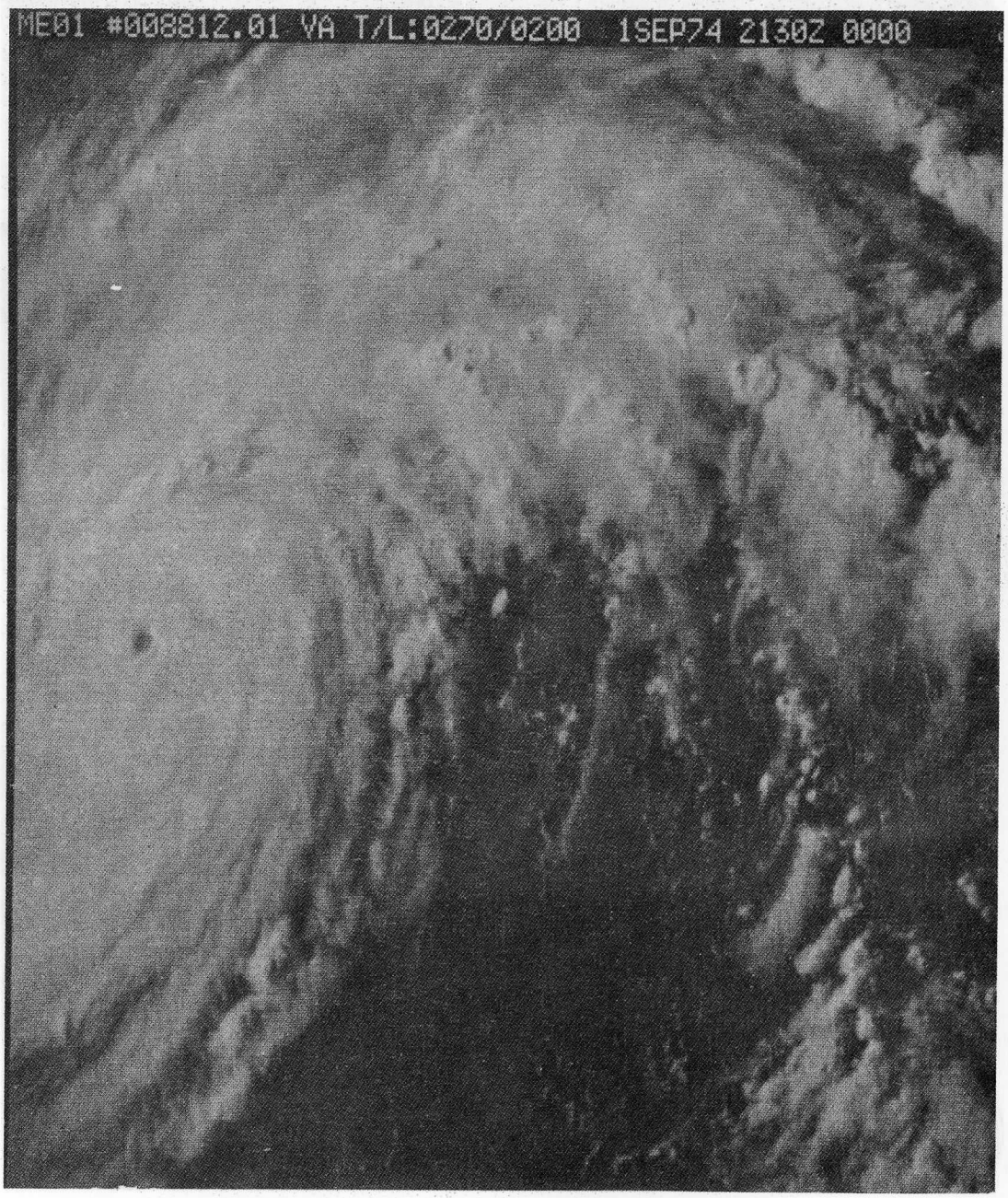


Figure D-9. CELCO Produced 4 x 1 SMS-1 Image