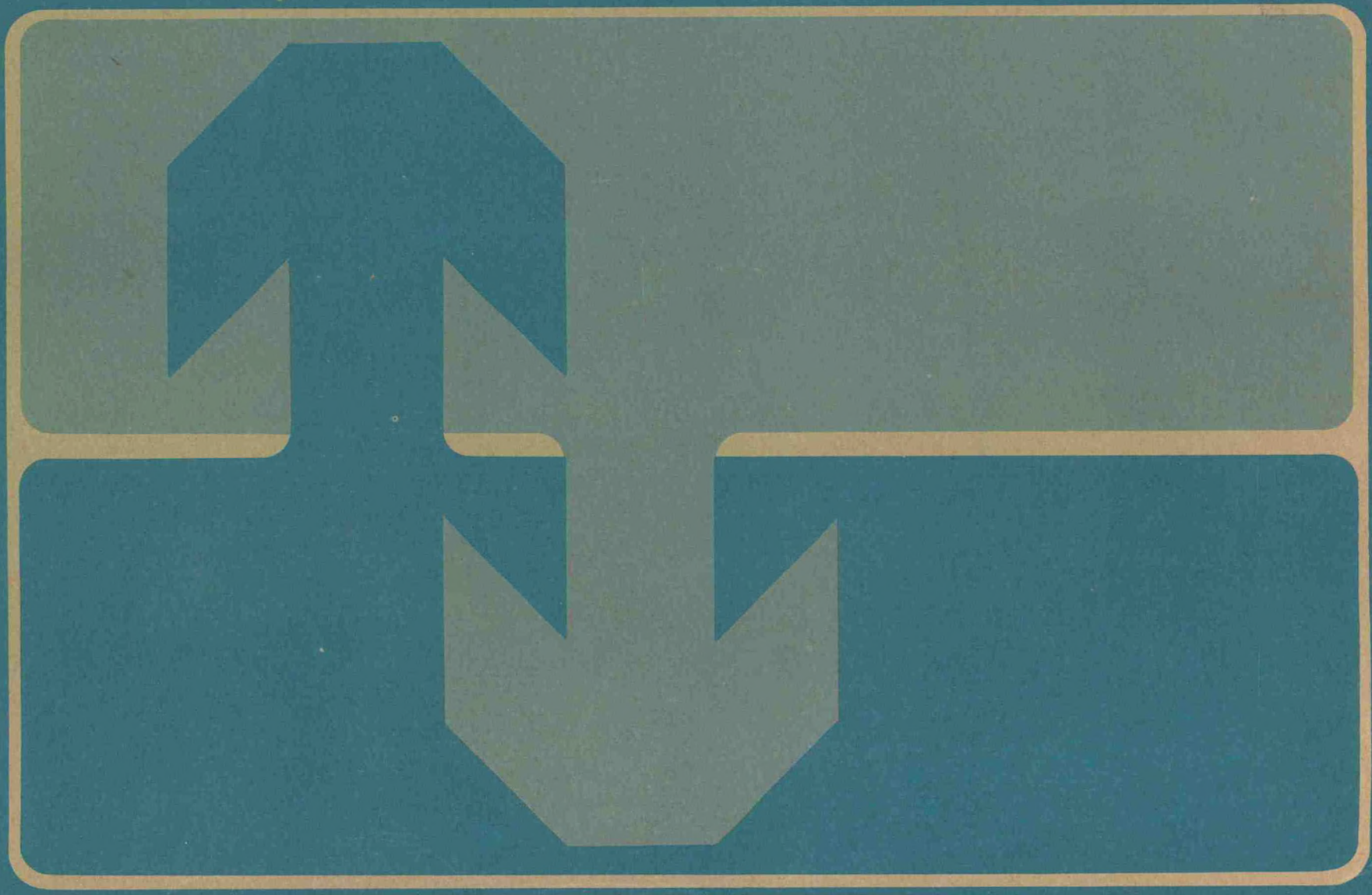
BOMEX

Period III High-Level Cloud Photography Atlas



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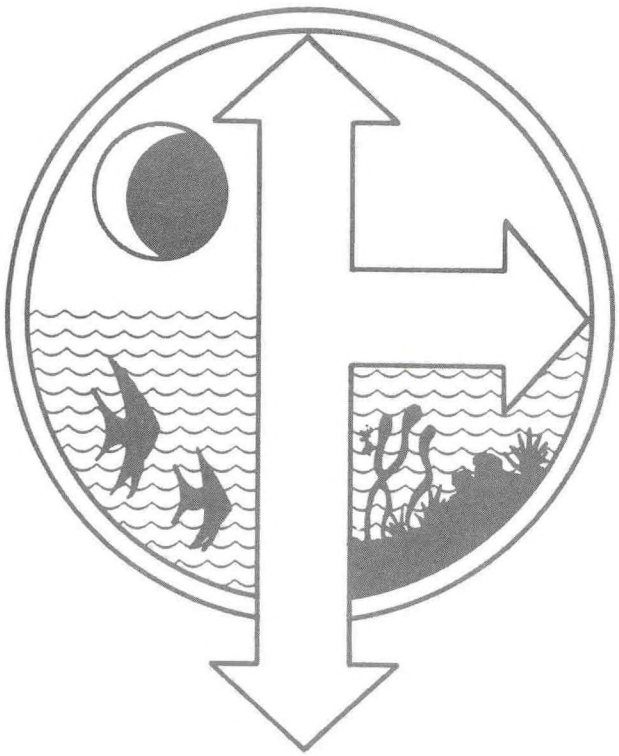

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Period III High-Level Cloud Photography Atlas

Barbados Oceanographic and Meteorological
Analysis Project Office

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ACKNOWLEDGMENT

The high-level cloud photography for BOMEX Period III, June 19 to July 2, 1969, was obtained by the 58th Weather Reconnaissance Squadron, 9th Weather Wing, Air Weather Service, U.S. Air Force. The flights originated and terminated at Ramey Air Force Base, Puerto Rico. This atlas was compiled at the Barbados Oceanographic and Meteorological Analysis Project (BOMAP) Office, National Oceanic and Atmospheric Administration, Rockville, Md., by Vance A. Myers, Meteorologist, assisted by Bob Rooney. Loran A. Weaver, BOMEX Flight Operations Officer, aided in interpretation of flight data. The atlas was prepared under the general control of Joshua Z. Holland, BOMAP Director.

ABSTRACT

B-57 jet aircraft of the 58th Weather Reconnaissance Squadron, 9th Weather Wing, Air Weather Service, U.S. Air Force, flew high-level cloud photography missions during the Barbados Oceanographic and Meteorological Experiment (BOMEX) of May, June, and July 1969. Cloud pictures taken from 50,000 feet on twelve flights and from 60,000 feet on two flights (between June 21 and July 2 of BOMEX Period III) are presented in composite format for the south, east, and north legs of each flight. This atlas makes available a picture inventory of mid-day cloud conditions over much of the BOMEX area on June 21, 22, 23, 24, 25, 26, 28, 29, 30, and July 2, 1969. It facilitates correlation studies of cloud conditions as viewed from 50,000 and 60,000 feet with low-level cloud photography, satellite cloud pictures, radar precipitation measurements, and other BOMEX weather observations.

INTRODUCTION

The Barbados Oceanographic and Meteorological Experiment (BOMEX) of May, June, and July 1969 was conducted over the tropical Atlantic east of Barbados with the cooperation of the Government of Barbados. BOMEX was a United States contribution to the Global Atmospheric Research Program (GARP) and was intended as a prototype for a series of large-scale environmental experiments to be carried out by GARP during the early 1970's. Seven U.S. Government agencies—the Environmental Science Services Administration, U.S. Department of Commerce, which functioned as the lead agency; the Air Force, Army, Navy, and National Guard, U.S. Department of Defense; the Bureau of Commercial Fisheries, U.S. Department of the Interior; the Coast Guard, U.S. Department of Transportation; the Atomic Energy Commission; the National Aeronautics and Space Administration; and the National Science Foundation—and independent research institutions and universities from the United States and Canada participated in the two major field investigations: the investigation of sea-air interaction and the investigation of tropical convective systems.

During the two major investigations and the respective field programs—the Sea-Air Interaction Program of BOMEX Periods I, II, and III and the Tropical Convection Program of Period IV—cloud photography was a vital part of the data acquisition phases. Clouds are the visible revelation of weather processes, especially in the tropics. Therefore, extensive cloud photography was planned for BOMEX in spite of the known difficulty of readily reducing cloud pictures to numbers that can be processed by electronic computer for use in scientific analyses.

All BOMEX observations during Periods I, II, and III were concentrated on the atmospheric volume overlying, and the upper oceanic layer underlying, the BOMEX square—an area 500 km on each side, centered at 15°N, 56°36′ W, east of Barbados (fig. 1). To secure detailed, comprehensive, panoramic views of clouds over this area, the 58th Weather Reconnaissance Squadron of the U.S. Air Force Air Weather Service's 9th Weather Wing flew daily high-level cloud photography missions. These missions were flown at altitudes of 50,000 or 60,000 feet by high-performance B–57 jet aircraft, operating from Ramey Air Force Base, Puerto Rico. About 5 hours flight time were required for each daily mission. A high-quality aerial reconnaissance camera was pointed vertically downward and the time interval between photographs was adjusted to provide overlapping photographs. This volume documents the time, location, and areal coverage of each BOMEX Period III high-level cloud photograph and provides a cloud picture record that facilitates correlation with other BOMEX data.

The 58th Weather Reconnaissance Squadron of the 9th Weather Wing also flew high-level cloud photography missions during BOMEX Period IV. Period IV flights, and times and locations of photographs, are documented in Vance A. Myers, *High-Level Cloud Photography Inventory, BOMEX Period IV, July 11–28, 1969,* ESSA Technical Memorandum ERL BOMAP 1, The BOMAP Office, Research Laboratories, Environmental Science Services Administration, U.S. Department of Commerce, September 1970. Insofar as possible all BOMEX aircraft flights were multipurpose flights. During high-level cloud photography flights, the B–57 aircraft were also used to gather air samples at selected levels and locations for analysis of radioactivity and other particulate matter.

BOMEX cloud photography was also obtained by aircraft of other organizations and by satellites. Lower level cloud pictures were secured from aircraft equipped with side-viewing and forward-viewing cameras. The lowest level was 1,000 feet. Several earth orbiting satellites provided pictures of cloud bands and cloud clusters. Individual clouds, however, generally cannot be detected by this system. Together, the satellites, high-flying aircraft, and low-flying aircraft provide complimentary views of cloud structure at different scales during BOMEX. Other cloud photography is documented in *BOMEX Field Observations and Basic Data Inventory,* The BOMAP Office, Environmental Research Laboratories, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, in press.

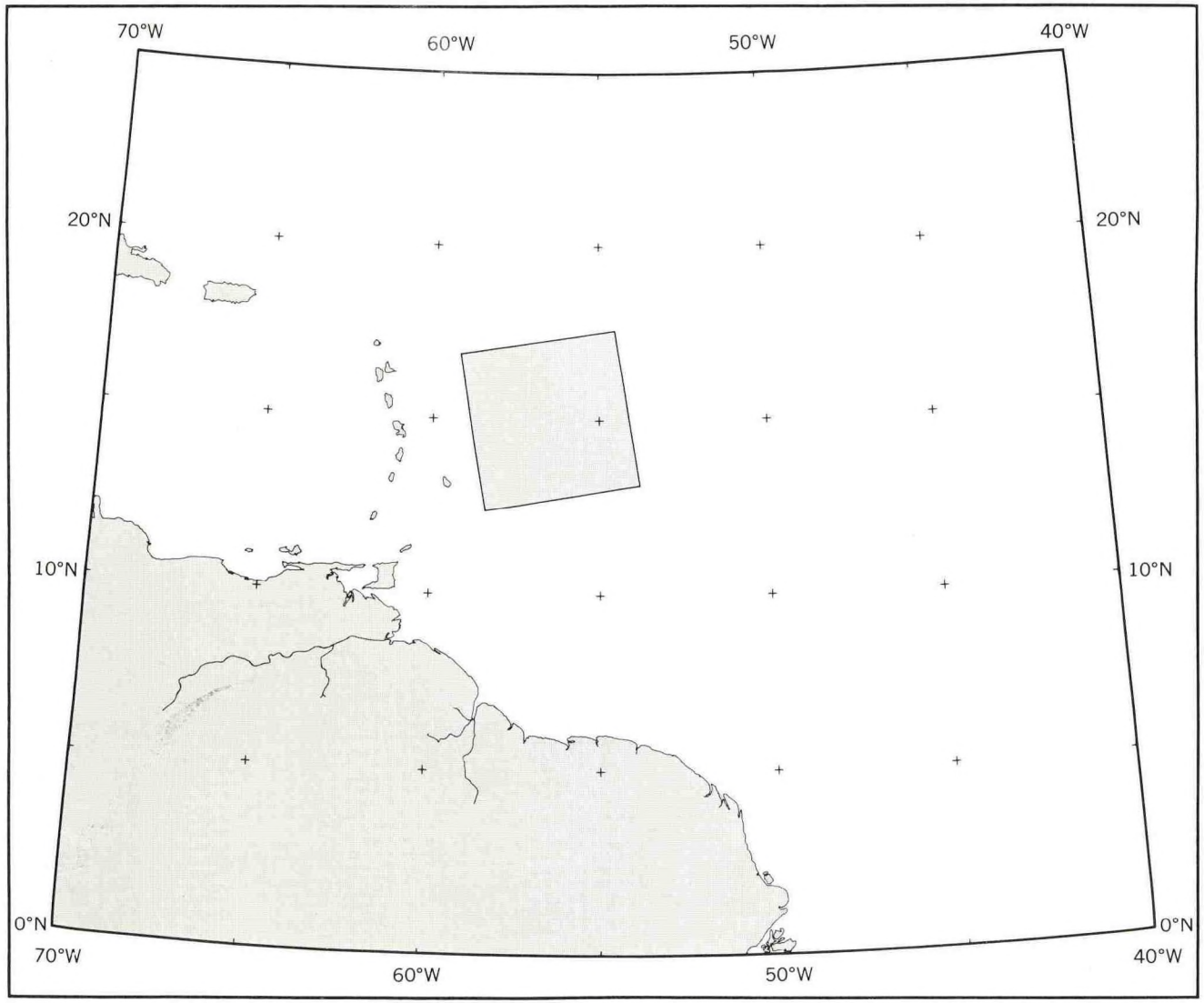

FIGURE 1. Location of "BOMEX square" during Barbados Oceanographic and Meteorological Experiment of May, June, and July 1969.

SUMMARY OF FLIGHTS

High-level cloud photography flights on June 21 through July 2—during BOMEX Period III—are summarized in table 1. Flights were made daily (except June 27) at an altitude of 50,000 feet along a standard track parallel to, and 35 nautical miles inside, the south, east, and north sides of the BOMEX square (fig. 2). In addition to cloud photography, the RB–57 aircraft collected air samples at 40,000 and 50,000 feet at each corner of the BOMEX square for chemical and radioactivity analyses. On June 21 and July 2, a second RB–57 aircraft obtained simultaneous cloud photographs from 60,000 feet. This aircraft flew around the perimeter of the BOMEX square (fig. 3) to secure air samples at the higher level. Photographs of the same cloud systems from the two aircraft are compared later in this volume.

A total of 1,344 high-level cloud photographs were obtained during 77 hours total flight time covering 28,000 nautical miles. The July 1 pictures are defective and are not published. The originals show qualitatively the general amount and character of cloudiness. A malfunction in the camera (presumably a sticking in the prism rotation mechanism) caused an irregular compression of the photographs from left to right. This also occurred June 30, but to a lesser degree and the photographs are included in this atlas.

TABLE 1. Summary of BOMEX Period III high-level cloud photography flights

Date	Time departed Ramey AFB	Time landed Ramey AFB	Flight time	Flight distance	Indicated altitude	Number of photographs
1969	GCT	GCT	hr:min	n mi	ft	
June 21	1243	1805	5:22	2006	50,000	94
21	1230	1752	5:22	1911	60,000	103
22	1246	1825	5:39	2006	50,000	102
23	1337	1900	5:23	2006	50,000	104
24	1247	1810	5:23	2006	50,000	105
25	1241	1806	5:25	2006	50,000	104
26	1247	1823	5:36	1929	50,000	105
27	1230	1800	5:30	1929	60,000	0*
28	1236	1815	5:39	2051	50,000	106
29	1233	1750	5:17	2006	50,000	105
30	1239	1805	5:26	2006	50,000	102†
July 1	1241	1808	5:27	2006	50,000	105‡
2	1249	1815	5:31	2006	50,000	104
2	1242	1815	5:33	1911	60,000	105
TOTALS:			**76:33**	**27,862**		**1344**

** No photographs; air sample mission only.*
† Photographs partially compressed from left to right, but are published in this atlas.
‡ Photographs are defective, compressed from left to right, and are not published.

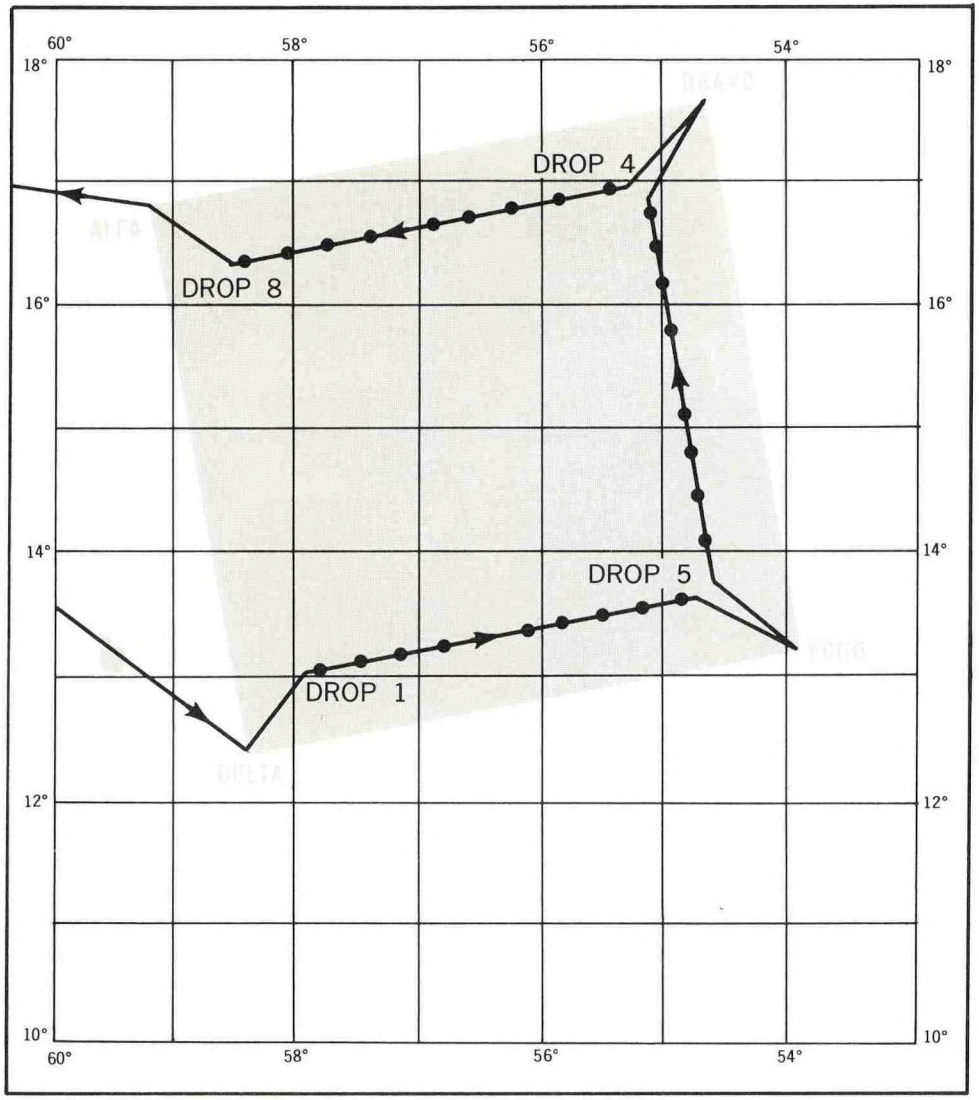

FIGURE 2. Flight track for 50,000-foot photography missions. Dots indicate positions of photographs along track.

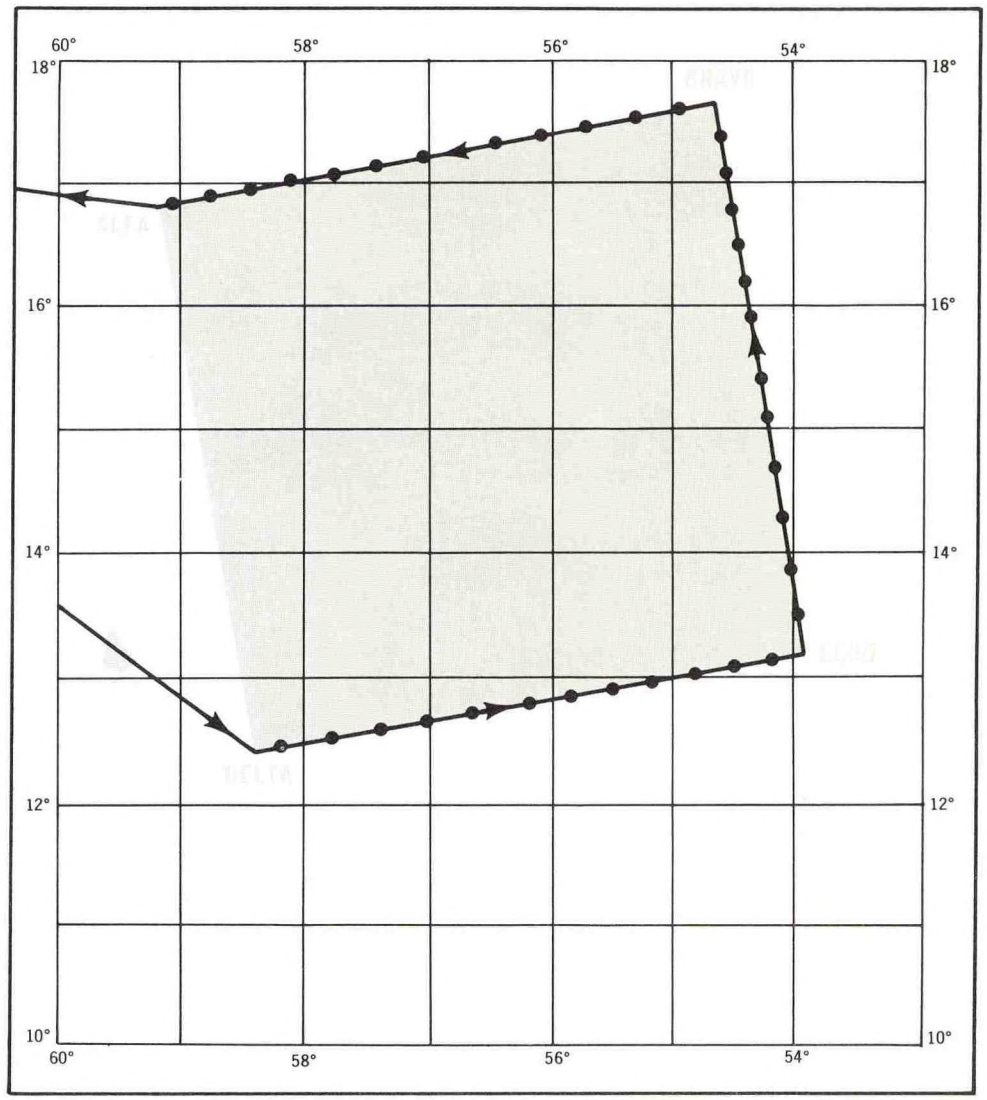

FIGURE 3. Flight track for 60,000-foot photography missions. Dots indicate positions of photographs along track.

FLIGHT LOGS

Logs for each BOMEX Period III high-level cloud photography mission (tables 2–13) have been prepared from: the aircraft navigator's flight documents, the frame number and time recorded on each photograph, and examination of surface features depicted on the photographs. Each log consists of two parts—Navigation Notes and Photograph Data.

NAVIGATION NOTES

The first part of each table presents selected navigation information in chronological sequence for each flight. The information is abstracted from the following navigator's flight documents.

1. *Track map.* This is a flight plan track, prepared before takeoff, on a 1:5,000,000 Jet Navigation Chart. In-flight navigational fixes and times of turning the camera on and off were added to the map during the flight.
2. RB–57F Flight Plan (9th Weather Wing Test Form 31). This form is prepared before takeoff and is added to during the flight. It lists planned arrivals, departures, air and ground speeds, headings, distances, and forecast winds; and actual arrival times, speeds, and winds.
3. *Weather Message (Combar Code).* This is the weather message transmitted by the aircraft radio during flight in standard meteorological aircraft code. Of particular interest for flight reconstruction are position, altitude, and flight-level wind.

The Navigation Notes include a listing of the navigational fixes on the track map that are determined from two intersecting radio direction lines, or a radio direction line and a sun line, but omit fixes from single lines of position or dead reckoning and positions on the weather message form—the latter are only approximate.

In the Navigation Notes, the code names ALFA, BRAVO, DELTA, and ECHO refer to the corners of the BOMEX square. Drops 1, 4, 5, and 8 refer to the end points of the south, east, and north legs of the standard flight track (fig. 2) where the camera was turned on and off. The designation "drop" derives from the points being positions of dropsonde observations by other aircraft.

PHOTOGRAPH DATA

The second part of each table gives information to aid in locating, orienting, and interpreting each photograph—the photograph number and time and the aircraft heading, attitude, and altitude. Each exposure pictured the frame counter and clock of the camera system together with the panorama view. Both the frame number and clock time have been deleted from the photographs in this atlas, but are included in the Photograph Data as photograph number and indicated time of photograph.

The *photograph number* is used to identify both the photographs and the geographic positions of photographs for each flight. The first photograph number in each table is that of the first panoramic picture on the flight. Initial frame numbers, during testing and adjusting of the camera system, are omitted.

The *photograph time* is given as an indicated time and corrected time. The indicated photograph time is that of the photograph clock pictured on the original photographs. It is recorded to the nearest second to document the elapsed time interval between successive photographs. The clock time usually differed from the navigator's time by a few minutes. It was found that a fixed time correction could be applied each flight to adjust the photograph time to the navigator's time, which is considered the standard and is listed as the corrected time in the tables. Corrected times are used on the flight tracks in this atlas.

The *aircraft heading* under Photograph Data is that of the nominal track flown by the aircraft along the south, east, and north legs of the high-level cloud photography flights.

The *aircraft attitude* at the time of each photograph can be determined by inspecting the left and right horizons in the picture. This clearly reveals turns. When the aircraft is in level flight (with camera pointed vertically downward) the left and right horizons are perpendicular to the forward and trailing edges of the picture. Usually in the original photographs one or both wing tips of the aircraft are visible just above the horizons. If the aircraft is nose down or nose up, there is a corresponding change in the angle between horizon and edge of picture. If the aircraft is in a roll or bank, one wing tip rises above the horizon and the other wing tip drops below the horizon. Aircraft attitude was de-

rived by inspecting the horizons on each photograph and is indicated in the tables as level, right roll, left roll, descent, or ascent. The normal flying mode was 1° to 1½° nose down, as judged by horizons. This attitude is recorded as "level" in the tables.

The *true altitude* has been determined by comparing the temperature-pressure relationship of the standard atmosphere (on which aircraft altimeter settings are based) with typical BOMEX temperature-pressure soundings of the atmosphere by radiosonde and making the appropriate conversion from indicated to true altitude. Day-to-day variation of vertical temperature-pressure values in the BOMEX area are insignificant in converting indicated to true altitude. An indicated altitude of 50,000 feet is equal to 51,700 feet and an indicated altitude of 60,000 feet is equal to 61,500 feet.

TABLE 2. Log for high-level cloud photography mission along standard track at 50,000 feet, 21 June 1969

NAVIGATION NOTES

Time	Location			Indicated altitude	True heading	Drift	Speed		Wind	
	Log entry	Latitude	Longitude				Air	Ground	Direction	Speed
GCT		°′N	°′W	*	deg.	deg.	kt	kt	deg.	kt
1243	Ramey AFB	1830	6708							
1312	St. Croix	1744	6442		098	−2	405	410	213	15
1353	Fort-de-France	1436	6100		133	−2	400	398	218	13
1413	Barbados	1304	5929							
1424	DELTA	1223	5823	50					230	20
1428	DELTA	1223	5823	40					060	20
1434	Drop 1	1302	5754	50						
1445				50	082	0	405	415	276	10
1450				50					230	10
1505	Drop 5	1336	5431	50						
1512	ECHO	1308	5351	50					290	20
1515	ECHO	1308	5351	40					290	30
1522	Drop 5	1336	5431	50						
1538				50	348	−1	405	395	290	20
1554	Drop 4	1657	5503	50						
1601	BRAVO	1736	5434	50					130	5
1604	BRAVO	1736	5434	40					260	50
1611	Drop 4	1657	5503	50						
1627				50	260	−3	405	400	337	20
1642	Drop 8	1622	5832	50						
1650	ALFA	1650	5912	50					020	20
1654	ALFA	1650	5912	40					280	40
1718	Antigua	1708	6147		281	−3	405	405	025	8
1744	St. Croix	1744	6442							
1805	Ramey AFB	1830	6708							

**Indicated altitude in thousands of feet. 50,000 feet indicated altitude equals 51,700 feet (8.5 nautical miles) true altitude.*

TABLE 2. Log for high-level cloud photography mission along standard track at 50,000 feet, 21 June 1969—Continued

PHOTOGRAPH DATA					PHOTOGRAPH DATA					PHOTOGRAPH DATA				
Photograph number	Time (GCT) Indicated	Corrected	Nominal track	Aircraft attitude	Photograph number	Time (GCT) Indicated	Corrected	Nominal track	Aircraft attitude	Photograph number	Time (GCT) Indicated	Corrected	Nominal track	Aircraft attitude
	hr:min:sec	hr:min	deg.			hr:min:sec	hr:min	deg.			hr:min:sec	hr:min	deg.	
7	1404:48	1434	80	Level	42	1459:13	1528	351	Level	77	1553:43	1623	260	Level
8	1405:52	1435	80	"	43	1500:17	1529	351	"	78	1554:47	1624	260	"
9	1406:56	1436	80	"	44	1501:21	1530	351	"	79	1555:51	1625	260	"
10	1408:00	1437	80	"	45	1502:25	1531	351	"	80	1556:55	1626	260	"
11	1409:04	1438	80	"	46	1503:29	1532	351	"	81	1557:58	1627	260	"
12	1410:08	1439	80	"	47	1504:33	1534	351	"	82	1559:02	1628	260	"
13	1411:13	1440	80	"	48	1505:37	1535	351	"	83	1600:06	1629	260	"
14	1412:17	1441	80	"	49	1506:41	1536	351	"	84	1601:10	1630	260	"
15	1413:21	1442	80	"	50	1507:44	1537	351	"	85	1602:14	1631	260	"
16	1414:25	1443	80	"	51	1508:48	1538	351	"	86	1603:18	1632	260	"
17	1415:28	1444	80	"	52	1509:52	1539	351	"	87	1604:22	1633	260	"
18	1416:33	1446	80	"	53	1510:56	1540	351	"	88	1605:26	1634	260	"
19	1417:37	1447	80	Left roll	54	1512:00	1541	351	"	89	1606:30	1635	260	"
20	1418:41	1448	80	Level	55	1513:04	1542	351	"	90	1607:33	1637	260	"
21	1419:45	1449	80	"	56	1514:08	1543	351	"	91	1608:37	1638	269	"
22	1420:48	1550	80	"	57	1515:12	1544	351	"	92	1609:41	1639	260	"
23	1421:52	1451	80	"	58	1516:16	1545	351	"	93	1610:45	1640	260	"
24	1422:56	1452	80	"	59	1517:20	1546	351	"	94	1611:49	1641	260	"
25	1424:00	1453	80	"	60	1518:24	1547	351	"	95	1738:10			Approach to
26	1425:04	1454	80	"	61	1519:28	1548	351	"	96	1739:23			Ramey
27	1426:08	1455	80	"	62	1520:32	1549	351	"	97	1740:32			
28	1427:12	1456	80	"	63	1521:36	1551	351	"	98	1741:38			
29	1428:16	1457	80	"	64	1522:40	1552	351	"	99	1742:44			
30	1429:20	1458	80	"	65	1523:44	1553	351	"	100	1743:49			Land at
31	1430:24	1459	80	"	66	1541:58	1611	260	Right roll					Ramey
32	1431:28	1500	80	"	67	1543:02	1612	260	Level					
33	1432:32	1502	80	"	68	1544:06	1613	260	"					
34	1433:36	1503	80	"	69	1545:10	1614	260	Climb					
35	1434:40	1504	80	"	70	1546:15	1615	260	Level					
36	1452:49	1522	351	Right roll	71	1547:19	1616	260	"					
37	1453:53	1523	351	Level	72	1548:23	1617	260	"					
38	1454:57	1524	351	"	73	1549:27	1618	260	"					
39	1456:01	1525	351	"	74	1550:31	1620	260	"					
40	1457:05	1526	351	"	75	1551:35	1621	260	"					
41	1458:09	1527	351	"	76	1552:39	1622	260	"					

TABLE 3. Log for high-level cloud photography mission along perimeter at 60,000 feet, 21 June 1969

NAVIGATION NOTES

Time	Location			Indicated altitude	True heading	Drift	Speed		Wind	
	Log entry	Latitude	Longitude				Air	Ground	Direction	Speed
GCT		°′N	°′W	*	deg.	deg.	kt	kt	deg.	kt
1230	Ramey AFB	1830	6708							
1257	St. Croix	1744	6442							
1341	Fort-de-France	1436	6100		131	+3	420	395		
1401	Barbados	1304	5929							
1412	DELTA	1223	5823	60	132	+3	415	395	090	25
1433				60					090	30
1455	ECHO	1308	5351	60	083	0	410	382	090	25
1513	ECHO	1308	5351	60						
1530				60					100	30
1551	BRAVO	1736	5434	60	354	−4	410	410	080	30
1607	BRAVO	1736	5434	60						
1625				60					080	35
1643	ALFA	1650	5918	60	268	0	415	451	080	30
1702	Antigua	1708	6147							
1724	St. Croix	1744	6442							
1752	Ramey AFB	1830	6708							

* *Indicated altitude in thousands of feet. 60,000 feet indicated altitude equals 61,500 feet (10.1 nautical miles) true altitude.*

TABLE 3. Log for high-level cloud photography mission along perimeter at 60,000 feet, 21 June 1969—Continued

PHOTOGRAPH DATA					PHOTOGRAPH DATA					PHOTOGRAPH DATA				
Photograph number	Time (GCT) Indicated	Corrected	Nominal track	Aircraft attitude	Photograph number	Time (GCT) Indicated	Corrected	Nominal track	Aircraft attitude	Photograph number	Time (GCT) Indicated	Corrected	Nominal track	Aircraft attitude
	hr:min:sec	hr:min	deg.			hr:min:sec	hr:min	deg.			hr:min:sec	hr:min	deg.	
4	1412:55	1412	80	Left roll	39	1443:42	1443	80	Level	73	1526:51	1526	351	Level
5	1413:47	1413	80	Level	40	1444:35	1444	80	"	74	1527:44	1527	351	"
6	1414:40	1414	80	"	41	1445:27	1444	80	"	75	1528:37	1528	351	"
7	1415:32	1415	80	"	42	1446:20	1445	80	"	76	1529:29	1528	351	"
8	1416:25	1415	80	"	43	1447:13	1446	80	Slight right roll	77	1530:22	1529	351	"
9	1417:17	1416	80	"						78	1531:15	1530	351	"
10	1418:10	1417	80	"	44	1448:06	1447	80	Level	79	1532:08	1531	351	"
11	1419:02	1418	80	"	45	1448:59	1448	80	"	80	1533:01	1532	351	"
12	1419:55	1419	80	"	46	1449:51	1449	80	"	81	1533:54	1533	351	"
13	1420:48	1420	80	"	47	1450:44	1450	80	"	82	1534:47	1534	351	"
14	1421:41	1421	80	"	48	1451:37	1451	80	"	83	1535:40	1535	351	"
15	1422:33	1422	80	"	49	1452:30	1452	80	"	84	1536:33	1536	351	"
16	1423:26	1422	80	"	50	1453:21	1452	80	"	85	1537:25	1536	351	"
17	1424:18	1423	80	"	51	1454:14	1453	80	"	86	1538:18	1537	351	"
18	1425:11	1424	80	"	52	1455:07	1454	80	"	87	1539:11	1538	351	"
19	1426:04	1425	80	"	53	1456:00	1455	80	"	88	1540:04	1539	351	"
20	1426:57	1426	80	"	54	1456:53	1456	80	"	89	1540:57	1540	351	"
21	1427:49	1427	80	"	55	1457:45	1457	80	"	90	1541:51	1541	351	"
22	1428:42	1428	80	"	56	1458:38	1458	80	"	91	1542:44	1542	351	"
23	1429:35	1429	80	"	57	1459:30	1459	80	"	92	1543:37	1543	351	"
24	1430:28	1429	80	"	58	1500:23	1459	80	"	93	1544:29	1543	351	"
25	1431:21	1430	80	"	59	1514:33	1513	351	"	94	1545:21	1544	351	"
26	1432:14	1431	80	"	60	1515:26	1514	351	"	95	1546:14	1545	351	"
27	1433:07	1432	80	"	61	1516:19	1515	351	"	96	1547:07	1546	351	"
28	1434:00	1433	80	"	62	1517:12	1516	351	"	97	1548:00	1547	351	"
29	1434:53	1434	80	"	63	1518:04	1517	351	"	98	1548:53	1548	351	"
30	1435:45	1435	80	"	64	1518:57	1518	351	"	99	1549:46	1549	351	"
31	1436:38	1436	80	"	65	1519:49	1519	351	"	100	1550:39	1550	351	"
32	1437:31	1437	80	"	66	1520:42	1520	351	"	101	1551:32	1551	351	"
33	1438:24	1437	80	"	67	1521:34	1521	351	"	102	1552:25	1551	351	"
34	1439:17	1438	80	"	68	1522:27	1521	351	"	103	1553:17	1552	351	"
35	1440:10	1439	80	"	69	1523:19	1522	351	"	104	1554:10	1553	351	"
36	1441:03	1440	80	"	70	1524:12	1523	351	"	105	1555:03	1554	351	"
37	1441:56	1441	80	"	71	1525:05	1524	351	"	106	1555:56	1555	351	"
38	1442:49	1442	80	"	72	1525:58	1525	351	"					

TABLE 4. Log for high-level cloud photography mission along standard track at 50,000 feet, 22 June 1969

NAVIGATION NOTES

Time	Location			Indicated altitude	True heading	Drift	Speed		Wind	
	Log entry	Latitude	Longitude				Air	Ground	Direction	Speed
GCT		°′N	°′W	*	deg.	deg.	kt	kt	deg.	kt
1246	Ramey AFB	1830	6708							
1314	St. Croix	1744	6442							
1356	Fort-de-France	1436	6100		130	0	400	405	310	5
1415	Barbados	1304	5929							
1425	DELTA	1223	5823	50					300	10
1432	DELTA	1223	5823	40					290	25
1436	Drop 1	1302	5754	50						
1450	Sun line and radio fix	1307	5618	50	080	0	400	400	—	5
1507	Drop 5	1336	5431	50						
1514	ECHO	1308	5351	50					—	5
1518	ECHO	1308	5351	40					300	45
1525	Drop 5	1336	5431	50						
1535				50	350	+1	400	380	325	25
1540				50					330	25
1557	Drop 4	1657	5503	50						
1605	BRAVO	1736	5434	50					310	25
1608	BRAVO	1736	5434	40					270	60
1615	Drop 4	1657	5503	50						
1630				50					320	40
1640	Sun line and radio fix	1616	5735	50	268	−5	405	370	310	40
1649	Drop 8	1622	5832	50						
1658	ALFA	1650	5912	50					320	45
1702	ALFA	1650	5912	40					300	55
1731	Antigua	1708	6147		278	−4	405	370	310	40
1756	St. Croix	1744	6442							
1815					280	−4	405	380	320	35
1825	Ramey AFB	1830	6708							

**Indicated altitude in thousands of feet. 50,000 feet indicated altitude equals 51,700 feet (8.5 nautical miles) true altitude.*

TABLE 4. Log for high-level cloud photography mission along standard track at 50,000 feet, 22 June 1969—Continued

PHOTOGRAPH DATA				
Photograph number	Time (GCT)		Nominal track	Aircraft attitude
	Indicated	Corrected		
	hr:min:sec	hr:min	deg.	
6	1436:25	1436	35	Right roll
7	1437:26	1437	80	"
8	1438:27	1438	80	Level
9	1439:28	1439	80	"
10	1440:30	1441	80	"
11	1441:31	1442	80	"
12	1442:32	1443	80	"
13	1443:33	1444	80	"
14	1444:34	1445	80	"
15	1445:35	1446	80	"
16	1446:36	1447	80	"
17	1447:37	1448	80	"
18	1448:39	1449	80	"
19	1449:40	1450	80	"
20	1450:41	1451	80	"
21	1451:42	1452	80	"
22	1452:43	1453	80	"
23	1453:44	1454	80	"
24	1454:45	1455	80	"
25	1455:46	1456	80	"
26	1456:47	1457	80	"
27	1457:48	1458	80	"
28	1458:49	1459	80	"
29	1459:50	1500	80	"
30	1500:51	1501	80	"
31	1501:52	1502	80	"
32	1502:53	1503	80	"
33	1503:54	1504	80	"
34	1525:23	1525	351	Right roll
35	1526:24	1526	351	Level
36	1527:25	1527	351	"
37	1528:26	1528	351	"
38	1529:27	1529	351	"
39	1530:29	1530	351	"
40	1531:30	1532	351	"

PHOTOGRAPH DATA				
Photograph number	Time (GCT)		Nominal track	Aircraft attitude
	Indicated	Corrected		
	hr:min:sec	hr:min	deg.	
41	1532:31	1533	351	Level
42	1533:32	1534	351	"
43	1534:33	1535	351	"
44	1535:34	1536	351	"
45	1536:35	1537	351	"
46	1537:36	1538	351	"
47	1538:37	1539	351	"
48	1539:38	1540	351	"
49	1540:39	1541	351	"
50	1541:40	1542	351	"
51	1542:41	1543	351	"
52	1543:42	1544	351	"
53	1544:43	1545	351	"
54	1545:44	1546	351	"
55	1546:44	1547	351	"
56	1547:45	1548	351	"
57	1548:46	1549	351	"
58	1549:47	1550	351	"
59	1550:48	1551	351	"
60	1551:49	1552	351	"
61	1552-50	1553	351	"
62	1615:29	1615	260	Right roll
63	1616:30	1617	260	Level
64	1617:31	1618	260	"
65	1618:32	1619	260	"
66	1619:33	1620	260	"
67	1620:35	1621	260	"
68	1621:36	1622	260	"
69	1622:37	1623	260	"
70	1623:38	1624	260	"
71	1624:39	1625	260	"
72	1625:40	1626	260	"
73	1626:41	1627	260	"
74	1627:42	1628	260	"
75	1628:42	1629	260	"

PHOTOGRAPH DATA				
Photograph number	Time (GCT)		Nominal track	Aircraft attitude
	Indicated	Corrected		
	hr:min:sec	hr:min	deg.	
76	1629:43	1630	260	Level
77	1630:44	1631	260	"
78	1631:45	1632	260	"
79	1632:46	1633	260	"
80	1633:47	1634	260	"
81	1634:48	1635	260	"
82	1635:49	1636	260	"
83	1636:49	1637	260	"
84	1637:50	1638	260	"
85	1638:51	1639	260	"
86	1639:52	1640	260	"
87	1640:53	1641	260	"
88	1641:53	1642	260	"
89	1642:54	1643	260	"
90	1643:55	1644	260	"
91	1644:55	1645	260	"
92	1645:56	1646	260	"
93	1646:57	1647	260	"
94	1647:58	1648	260	"
95	1648:59	1649	260	"
96	1649:59	1650	260	"
97	1651:00	1651		Slight right roll
98	1652:01	1652	305	Level
99	1653:02	1653	305	"
100	1654:02	1654	305	"
101	1655:03	1655	305	"
102	1656:04	1656	305	"
103	1657:05	1657	305	"
104	1658:06	1658	305	"
105	1659:06	1659		Right roll
*106	1700:07	1700		"
*107	1701:08	1701		"

**Descent 50,000 feet to 40,000 feet; Photographs not used on composite.*

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TABLE 5. Log for high-level cloud photography mission along standard track at 50,000 feet, 23 June 1969

NAVIGATION NOTES

Time	Location			Indicated altitude	True heading	Drift	Speed		Wind	
	Log entry	Latitude	Longitude				Air	Ground	Direction	Speed
GCT		°′N	°′W	*	deg.	deg.	kt	kt	deg.	kt
1337	Ramey AFB	1830	6708							
1405	St. Croix	1744	6442		130	−1	405	405	230	5
1447	Fort-de-France	1436	6100		124	−1	405	410	270	10
1505	Barbados	1304	5929							
1516	DELTA	1223	5823	50					250	15
1519	DELTA	1223	5823	40					330	25
1526	Drop 1	1302	5754	50						
1536				50	078	0	405	410	258	5
1557	Drop 5	1336	5431	50						
1604	ECHO	1308	5351	50					220	25
1608	ECHO	1308	5351	40					300	50
1614	Drop 5	1336	5431	50						
1623				50	347	+2	405	390	304	20
1647	Drop 4	1657	5503	50						
1654	BRAVO	1736	5434	50					290	5
1658	BRAVO	1736	5434	40					270	50
1704	Drop 4	1657	5503	50						
1719				50	261	−2	405	380	289	29
1737	Drop 8	1622	5832	50						
1745	ALFA	1650	5912	50					330	30
1750	ALFA	1650	5912	40					310	35
1813	Antigua	1708	6147		276	−5	405	385	332	38
1838	St. Croix	1744	6442							
1900	Ramey AFB	1830	6708							

**Indicated altitude in thousands of feet. 50,000 feet indicated altitude equals 51,700 feet (8.5 nautical miles) true altitude.*

TABLE 5. Log for high-level cloud photography mission along standard track at 50,000 feet, 23 June 1969—Continued

PHOTOGRAPH DATA					PHOTOGRAPH DATA					PHOTOGRAPH DATA				
Photograph number	Time (GCT) Indicated	Corrected	Nominal track	Aircraft attitude	Photograph number	Time (GCT) Indicated	Corrected	Nominal track	Aircraft attitude	Photograph number	Time (GCT) Indicated	Corrected	Nominal track	Aircraft attitude
	hr:min:sec	hr:min	deg.			hr:min:sec	hr:min	deg.			hr:min:sec	hr:min	deg.	
5	1427:14	1526	80	Right roll	40	1517:16	1616	351	Level	75	1611:38	1711	260	Level
6	1428:18	1527	80	Level	41	1518:20	1617	351	"	76	1612:42	1712	260	"
7	1429:22	1528	80	"	42	1519:25	1618	351	"	77	1613:46	1713	260	"
8	1430:26	1529	80	"	43	1520:29	1619	351	"	78	1614:51	1714	260	"
9	1431:30	1531	80	"	44	1521:33	1621	351	"	79	1615:55	1715	260	"
10	1432:34	1532	80	"	45	1522:37	1622	351	"	80	1616:59	1716	260	"
11	1433:38	1533	80	"	46	1523:41	1623	351	"	81	1618:04	1717	260	"
12	1434:42	1534	80	"	47	1524:45	1624	351	"	82	1619:08	1718	260	"
13	1435:46	1535	80	"	48	1525:50	1625	351	"	83	1620:12	1719	260	"
14	1436:50	1536	80	"	49	1526:55	1626	351	"	84	1621:16	1720	260	"
15	1437:55	1537	80	"	50	1527:59	1627	351	"	85	1622:20	1721	260	"
16	1438:59	1538	80	"	51	1529:03	1628	351	"	86	1623:25	1722		Right roll
17	1440:03	1539	80	"	52	1530:07	1629	351	"	87	1624:29	1723	260	Level
18	1441:07	1540	80	"	53	1531:11	1630	351	"	88	1625:33	1725	260	"
19	1442:11	1541	80	"	54	1532:15	1631	351	"	89	1626:37	1726	260	"
20	1443-15	1542	80	"	55	1533:19	1632	351	"	90	1627:41	1727	260	"
21	1444:19	1543	80	"	56	1534:23	1633	351	"	91	1628:45	1728	260	"
22	1445:23	1544	80	"	57	1535:28	1634	351	"	92	1629:49	1729	260	"
23	1446:27	1545	80	"	58	1536:32	1636	351	"	93	1630:53	1730	260	"
24	1447:32	1547	80	"	59	1537:36	1637	351	"	94	1631:57	1731	260	"
25	1448:36	1548	80	"	60	1538:40	1638	351	"	95	1633:02	1732	260	"
26	1449:40	1549	80	"	61	1539:43	1639	351	"	96	1634:06	1733	260	"
27	1450:43	1550	80	"	62	1540:48	1640	351	"	97	1635:10	1734	260	"
28	1451:47	1551	80	"	63	1541:52	1641	351	"	98	1636:14	1735	260	"
29	1452:51	1552	80	"	64	1542:56	1642	351	"	99	1637:18	1736	260	"
30	1453:56	1553	80	"	65	1544:01	1643	351	"	100	1638:22	1737		Right roll
31	1455:00	1554	80	"	66	1545:05	1644	351	"	101	1639:26	1738	305	Level
32	1456:04	1555	80	"	67	1546:09	1645	351	"	102	1640:30	1740	305	"
33	1457:08	1556	80	"	68	1547:13	1646	351	"	103	1641:34	1741	305	"
34	1458:12	1557		Right roll	69	1605:12	1704		Right roll	104	1642:38	1742	305	"
35	1459:16	1558	125	Level	70	1606:16	1705	260	Level	105	1643:42	1743	305	"
36	1500:20	1559	125	"	71	1607:21	1706	260	"	106	1644:46	1744	305	"
37	1501:24	1600	125	"	72	1608:25	1707	260	"	107	1645:50	1745	305	"
38	1502:28	1601	125	"	73	1609:29	1708	260	"	108	1646:55	1746		Descent
39	1516:12	1615		Right roll	74	1610:34	1710	260	"					

TABLE 6. Log for high-level cloud photography mission along standard track at 50,000 feet, 24 June 1969

NAVIGATION NOTES

Time	Location			Indicated altitude	True heading	Drift	Speed		Wind	
	Log entry	Latitude	Longitude				Air	Ground	Direction	Speed
GCT		°'N	°'W	*	deg.	deg.	kt	kt	deg.	kt
1247	Ramey AFB	1830	6708							
1313	St. Croix	1744	6442							
1355					132	+2	405	410		
1413	Barbados	1304	5929							
1424	DELTA	1223	5823	50					220	25
1427	DELTA	1223	5823	40					310	10
1436	Drop 1	1302	5754	50	035	+2	360	355		
1452				50					260	15
1506	Drop 5	1336	5431	50						
1516	ECHO	1308	5351	50					230	35
1518	ECHO	1308	5351	40					220	10
1526	Drop 5	1336	5431	50	301	0	350	310		
1541		1516	5447	50					360	30
1557	Drop 4	1657	5503	50						
1605	BRAVO	1736	5434	50					330	35
1607	BRAVO	1736	5434	40					280	30
1616	Drop 4	1657	5503	50	226	−5	340	315		
1632				50					310	25
1640	Radio fix	1621	5710	50						
1648	Radio fix	1627	5812	50						
1651	Drop 8	1622	5832	50						
1659	ALFA	1650	5912	50	307	−5	405	385	340	30
1702	ALFA	1650	5912	40					310	30
1722	Antigua	1708	6147							
1747	St. Croix	1744	6442							
1810	Ramey AFB	1830	6708		277	−3	405	375		

**Indicated altitude in thousands of feet. 50,000 feet indicated altitude equals 51,700 feet (8.5 nautical miles) true altitude.*

TABLE 6. Log for high-level cloud photography mission along standard track at 50,000 feet, 24 June 1969—Continued

PHOTOGRAPH DATA				
Photograph number	Time (GCT) Indicated	Time (GCT) Corrected	Nominal track	Aircraft attitude
	hr:min:sec	hr:min	deg.	
4	1357:48	1437	80	Level
5	1358:56	1438	80	"
6	1400:06	1439	80	"
7	1401:07	1440	80	"
8	1402:11	1441	80	"
9	1403:15	1442	80	"
10	1404:18	1443	80	"
11	1405:23	1445	80	"
12	1406:27	1446	80	"
13	1407:31	1447	80	"
14	1408:36	1448	80	"
15	1409:40	1449	80	"
16	1410:43	1450	80	"
17	1411:47	1451	80	"
18	1412:51	1452	80	"
19	1413:57	1453	80	"
20	1414:59	1454	80	"
21	1416:06	1455	80	"
22	1417:07	1456	80	"
23	1418:12	1457	80	"
24	1419:14	1458	80	"
25	1420:18	1500	80	"
26	1421:22	1501	80	"
27	1422:26	1502	80	"
28	1423:31	1503	80	"
29	1424:35	1504	80	"
30	1425:39	1505	80	"
31	1426:42	1506	80	"
32	1446:56	1526	351	Right roll
33	1448:00	1527	351	Level
34	1449:04	1528	351	"
35	1450:07	1529	351	"
36	1451:11	1530	351	"
37	1452:15	1532	351	"
38	1453:18	1533	351	"

PHOTOGRAPH DATA				
Photograph number	Time (GCT) Indicated	Time (GCT) Corrected	Nominal track	Aircraft attitude
	hr:min:sec	hr:min	deg.	
39	1454:22	1534	351	Level
40	1455:26	1535	351	"
41	1456:04	1536	351	"
42	1457:05	1537	351	"
43	*	1538	351	"
44	*	1539	351	"
45	*	1540	351	"
46	*	1541	351	"
47	*	1542	351	"
48	*	1543	351	"
49	*	1545	351	"
50	*	1546	351	"
51	*	1547	351	"
52	*	1548	351	"
53	*	1549	351	"
54	*	1550	351	"
55	*	1551	351	"
56	*	1552	351	"
57	*	1553	351	"
58	*	1554	351	"
59	*	1556	351	"
60	*	1557	351	"
61	*	1617	260	"
62	*	1618	260	"
63	*	1619	260	"
64	*	1620	260	"
65	*	1621	260	"
66	*	1622	260	"
67	*	1623	260	"
68	*	1624	260	"
69	*	1625	260	"
70	*	1627	260	"
71	*	1628	260	"
72	*	1629	260	"
73	*	1630	260	"

PHOTOGRAPH DATA				
Photograph number	Time (GCT) Indicated	Time (GCT) Corrected	Nominal track	Aircraft attitude
	hr:min:sec	hr:min	deg.	
74	*	1631	260	Level
75	*	1632	260	"
76	*	1633	260	"
77	*	1634	260	"
78	*	1635	260	"
79	*	1636	260	"
80	*	1637	260	"
81	*	1638	260	"
82	*	1639	260	"
83	*	1640	260	"
84	*	1641	260	"
85	*	1642	260	"
86	*	1643	260	"
87	*	1645	260	"
88	*	1646	260	"
89	*	1647	260	"
90	*	1648	260	"
91	*	1649	260	"
92	*	1650	260	"
93	*	1651		Right roll
94	*	1652	305	Level
95	*	1653	305	"
96	*	1654	305	"
97	*	1655	305	"
98	*	1656	305	"
99	*	1657	305	"
100	*	1658	305	"
101	*	1659		Left roll
102	*	1700		Descent
103	*	1701		"
104	*	1702		Level
105	*	1704		"
106	*	1705		"
107	*	1706		"
108	*	1707		"

*Clock stopped.

TABLE 7. Log for high-level cloud photography mission along standard track at 50,000 feet, 25 June 1969

NAVIGATION NOTES

Time	Location			Indicated altitude	True heading	Drift	Speed		Wind	
	Log entry	Latitude	Longitude				Air	Ground	Direction	Speed
GCT		°′N	°′W	*	deg.	deg.	kt	kt	deg.	kt
1241	Ramey AFB	1830	6708							
1310	St. Croix	1744	6442							
1351					131	−2	400	410	255	15
1410	Barbados	1304	5929							
1421	DELTA	1223	5823	50					240	25
1423	DELTA	1223	5823	40					270	10
1432	Drop 1	1302	5754	50						
1440	Sun line and radio fix	1305	5643	50	082	0	400	415	270	15
1500	Drop 5	1336	5431	50						
1506	ECHO	1308	5351	50					240	30
1510	ECHO	1308	5351	40					290	25
1518	Drop 5	1336	5431	50						
1530	Sun line and radio fix	1504	5443	50	356	+2	400	400	080	10
1546	Drop 4	1657	5503	50						
1553	BRAVO	1736	5434	50					070	15
1557	BRAVO	1736	5434	40					260	40
1604	Drop 4	1657	5503	50						
1620				50	264	−4	400	400	335	25
1634	Drop 8	1622	5832	50						
1640	ALFA	1650	5912	50					350	30
1643	ALFA	1650	5912	40					310	40
1707	Antigua	1708	6147	40	275	−4	400	380	320	40
1733	St. Croix	1744	6442	40						
1745					275	−4	400	380	320	40
1806	Ramey AFB	1830	6708							

**Indicated altitude in thousands of feet. 50,000 feet indicated altitude equals 51,700 feet (8.5 nautical miles) true altitude.*

TABLE 7. Log for high-level cloud photography mission along standard track at 50,000 feet, 25 June 1969—Continued

Photograph number	Time (GCT) Indicated	Time (GCT) Corrected	Nominal track	Aircraft attitude
	hr:min:sec	hr:min	deg.	
5	1437:29	1434	80	Slight right roll
6	1438:28	1435	80	Level
7	1439:27	1436	80	"
8	1440:25	1437	80	"
9	1441:24	1438	80	"
10	1442:23	1439	80	"
11	1443:21	1440	80	"
12	1444:20	1441	80	"
13	1445:19	1442	80	"
14	1446:17	1443	80	"
15	1447:16	1444	80	"
16	1448:15	1445	80	"
17	1449:14	1446	80	"
18	1450:12	1447	80	"
19	1451:11	1448	80	"
20	1452:10	1449	80	"
21	1453:08	1450	80	"
22	1454:07	1451	80	"
23	1455:05	1452	80	"
24	1456:04	1453	80	"
25	1457:03	1454	80	"
26	1458:01	1455	80	"
27	1459:00	1456	80	"
28	1459:58	1457	80	"
29	1500:57	1458	80	"
30	1501:56	1459	80	"
31	1502:54	1500	80	Right roll
32	1503:53	1501	80	"
33	1521:12	1518	351	Level
34	1522:11	1519	351	"
35	1523:09	1520	351	"
36	1524:08	1521	351	"
37	1525:07	1522	351	"
38	1526:05	1523	351	"
39	1527:04	1524	351	Level
40	1528:03	1525	351	"
41	1529:02	1526	351	"
42	1530:00	1527	351	"
43	1530:58	1528	351	"
44	1531:57	1529	351	"
45	1532:56	1530	351	"
46	1533:55	1531	351	"
47	1534:53	1532	351	"
48	1535:52	1533	351	"
49	1536:51	1534	351	"
50	1537:49	1535	351	"
51	1538:48	1536	351	"
52	1539:46	1537	351	"
53	1540:45	1538	351	"
54	1541:44	1539	351	"
55	1542:43	1540	351	"
56	1543:41	1541	351	"
57	1544:40	1542	351	"
58	1545:38	1543	351	"
59	1546:37	1544	351	"
60	1547:36	1545	351	Right roll
61	1548:35	1546	037	Level
62	1549:33	1547	037	"
63	1550:32	1548	037	"
64	1551:31	1549	037	"
65	1552:29	1549	037	"
66	1553:28	1550	037	"
67	1554:27	1551	037	"
68	1555:25	1552	037	"
69	1556-23	1553	037	"
*70	1557:22	1554		Left roll
*71	1558:21	1555		"
*72	1559:20	1556		Descent
73	1600:19	1557	217	Level
74	1601:17	1558	217	Level
75	1602:16	1559	217	"
76	1603:14	1600	217	"
77	1604:13	1601	217	"
78	1605:12	1602	217	"
79	1606:11	1603	217	"
80	1607:10	1604	260	Right roll
81	1608:08	1605	260	Level
82	1609:07	1606	260	"
83	1610:05	1607	260	"
84	1611:04	1608	260	"
85	1612:03	1609	260	"
86	1613:01	1610	260	"
87	1614:00	1611	260	"
88	1614:58	1612	260	"
89	1615:57	1613	260	"
90	1616:56	1614	260	"
91	1617:55	1615	260	"
92	1618:53	1616	260	"
93	1619:52	1617	260	"
94	1620:50	1618	260	"
95	1621:49	1619	260	"
96	1622:47	1620	260	"
97	1623:46	1621	260	"
98	1624:44	1622	260	"
99	1625:43	1623	260	"
100	1626:42	1624	260	"
101	1627:40	1625	260	"
102	1628:39	1626	260	"
103	1629:37	1627	260	"
104	1630:36	1628	260	"
105	1631:35	1629	260	"
106	1632:33	1630	260	"
107	1633:32	1631	260	"
108	1634:30	1632	260	"

*Descent 50,000 feet to 40,000 feet. Photographs not used on composite.

TABLE 8. Log for high-level cloud photography mission along standard track at 50,000 feet, 26 June 1969

NAVIGATION NOTES

Time	Location			Indicated altitude	True heading	Drift	Speed		Wind	
	Log entry	Latitude	Longitude				Air	Ground	Direction	Speed
GCT		°′N	°′W	*	deg.	deg.	kt	kt	deg.	kt
1247	Ramey AFB	1830	6708							
1316	St. Croix	1744	6442		131	−1	400	390	166	10
1358	Fort-de-France	1436	6100							
1416	Barbados	1304	5929	50						
1427	DELTA	1223	5823	50					260	30
1431	DELTA	1223	5823	40					280	20
1437	Drop 1	1302	5754	50						
1445				50	081	+1	405	422	284	20
1507	Drop 5	1336	5431	50						
1514	ECHO	1308	5351	50					270	20
1517	ECHO	1308	5351	40					260	30
1525	Drop 5	1336	5431	50						
1535				50	349	0	405	390	349	15
1557	Drop 4	1657	5503	50						
1605	BRAVO	1736	5434	50					030	5
1608	BRAVO	1736	5434	40					290	20
1616	Drop 4	1657	5503	50						
1625				50	262	−3	405	390	313	26
1648	Drop 8	1622	5832	50						
1655	ALFA	1650	5912	50					310	35
1658	ALFA	1650	5912	40					340	10
1723	Antigua	1708	6147		280	−2	405	390	322	20
1748	St. Croix	1744	6442							
1823	Ramey AFB	1830	6708							

**Indicated altitude in thousands of feet. 50,000 feet indicated altitude equals 51,700 feet (8.5 nautical miles) true altitude.*

TABLE 8. Log for high-level cloud photography mission along standard track at 50,000 feet, 26 June 1969—Continued

PHOTOGRAPH DATA

Photograph number	Time (GCT) Indicated	Time (GCT) Corrected	Nominal track	Aircraft attitude
	hr:min:sec	hr:min	deg.	
4	1439:48	1438	80	Right roll
5	1440:48	1439	80	Level
6	1441:47	1440	80	"
7	1442:46	1441	80	"
8	1443:46	1442	80	"
9	1444:45	1443	80	"
10	1445:45	1444	80	"
11	1446:45	1445	80	"
12	1447:45	1446	80	"
13	1448:44	1447	80	"
14	1449:43	1448	80	Slight left roll
15	1450:43	1449	80	Level
16	1451:42	1450	80	"
17	1452:42	1451	80	"
18	1453:42	1452	80	"
19	1454:42	1453	80	"
20	1455:42	1454	80	"
21	1456:41	1455	80	"
22	1457:40	1456	80	"
23	1458:40	1457	80	"
24	1459:40	1458	80	"
25	1500:39	1459	80	"
26	1501:39	1500	80	"
27	1502:38	1501	80	"
28	1503:38	1502	80	"
29	1504:38	1503	80	"
30	1505:37	1504	80	"
31	1506:37	1505	80	"
32	1507:37	1506	80	"
33	1508:37	1507	80	"
34	1526:37	1525	351	Right roll
35	1527:37	1526	351	Slight left roll
36	1528:37	1527	351	Level
37	1529:37	1528	351	Level
38	1530:37	1529	351	"
39	1531:38	1530	351	"
40	1532:36	1531	351	"
41	1533:36	1532	351	"
42	1534:36	1533	351	"
43	1535:36	1534	351	"
44	1536:37	1535	351	"
45	1537:37	1536	351	"
46	1538:38	1537	351	"
47	1539:38	1538	351	"
48	1540:38	1539	351	"
49	1541:38	1540	351	"
50	1542:38	1541	351	"
51	1543:37	1542	351	"
52	1544:37	1543	351	"
53	1545:37	1544	351	"
54	1546:36	1545	351	"
55	1547:36	1546	351	"
56	1548:36	1547	351	"
57	1549:36	1548	351	"
58	1550:35	1549	351	"
59	1551:35	1550	351	"
60	1552:35	1551	351	"
61	1553:35	1552	351	"
62	1554:34	1553	351	"
63	1555:34	1554	351	"
64	1556:34	1555	351	"
65	1557:33	1556	351	"
66	1558:33	1557	351	Right roll
67	1617:35	1616	260	"
68	1618:35	1617	260	Level
69	1619:35	1618	260	"
70	1620:35	1619	260	"
71	1621:36	1620	260	"
72	1622:36	1621	260	Level
73	1623:36	1622	260	"
74	1624:36	1623	260	"
75	1625:36	1624	260	"
76	1626:36	1625	260	"
77	1627:36	1626	260	"
78	1628:36	1627	260	"
79	1629:37	1628	260	"
80	1630:37	1629	260	"
81	1631:37	1630	260	"
82	1632:37	1631	260	"
83	1633:37	1632	260	"
84	1634:37	1633	260	"
85	1635:37	1634	260	"
86	1636:37	1635	260	"
87	1637:37	1636	260	"
88	1638:37	1637	260	"
89	1639:37	1638	260	Slight right roll
90	1640:37	1639	260	Level
91	1641:37	1640	260	"
92	1642:37	1641	260	"
93	1643:37	1642	260	"
94	1644:37	1643	260	"
95	1645:37	1644	260	"
96	1646:37	1645	260	"
97	1647:37	1646	260	"
98	1648:36	1647	260	"
99	1649:36	1648	305	Right roll
100	1650:36	1649	305	Level
101	1651:35	1650	305	"
102	1652:35	1651	305	"
103	1653:35	1652	305	"
104	1654:35	1653	305	"
105	1655:35	1654	305	"
106	1656:35	1655	305	Right roll
107	1657:35	1656	305	"
108	1658:35	1657	305	"

TABLE 9. Log for high-level cloud photography mission along standard track at 50,000 feet, 28 June 1969

NAVIGATION NOTES

Time	Location			Indicated altitude	True heading	Drift	Speed		Wind	
	Log entry	Latitude	Longitude				Air	Ground	Direction	Speed
GCT		°′N	°′W	*	deg.	deg.	kt	kt	deg.	kt
1236	Ramey AFB	1830	6708							
1303	St. Croix	1744	6442							
1344	Fort-de-France	1436	6100	50	132	−5	405	425	243	40
1402	Barbados	1304	5929	50	141	−6	395	415		
1413	DELTA	1223	5823	50	125	−3	395	412	240	37
1417	DELTA	1223	5823	40					040	5
1426	Drop 1	1302	5754	50	033	+2	345	340		
1443				50					260	35
1456	Drop 5	1336	5431	50	071	+2	370	392		
1503	ECHO	1308	5351	50	125	−3	370	400	280	35
1506	ECHO	1308	5351	40					290	30
1516	Drop 5	1336	5431	50	304	+2	345	320		
1532				50					310	45
1547	Drop 4	1657	5503	50	346	+3	405	380		
1554	BRAVO	1736	5434	50	034	+2	415	405	340	10
1557	BRAVO	1736	5434	40					240	25
1606	Drop 4	1657	5503	50	219	+2	355	330		
1623				50					260	45
1637	Drop 8	1622	5832	50						
1644	ALFA	1650	5912	50	304	0	415	395	300	32
1650	ALFA	1650	5912	40					280	35
1709	Antigua	1708	6147							
1734	St. Croix	1744	6442							
1815	Ramey AFB	1830	6708							

**Indicated altitude in thousands of feet. 50,000 feet indicated altitude equals 51,700 feet (8.5 nautical miles) true altitude.*

TABLE 9. Log for high-level cloud photography mission along standard track at 50,000 feet, 28 June 1969—Continued

PHOTOGRAPH DATA					PHOTOGRAPH DATA					PHOTOGRAPH DATA				
Photograph number	Time (GCT) Indicated	Corrected	Nominal track	Aircraft attitude	Photograph number	Time (GCT) Indicated	Corrected	Nominal track	Aircraft attitude	Photograph number	Time (GCT) Indicated	Corrected	Nominal track	Aircraft attitude
	hr:min:sec	hr:min	deg.			hr:min:sec	hr:min	deg.			hr:min:sec	hr:min	deg.	
3	.....	1426	80	Right roll	38	1523:19	1522	351	Level	73	1618:58	1618	260	Level
4	1428:25	1427	80	Level	39	1524:22	1523	351	"	74	1620:02	1619	260	"
5	1429:29	1428	80	"	40	1525:25	1524	351	"	75	1621:05	1620	260	"
6	1430:33	1430	80	"	41	1526:29	1525	351	"	76	1622:08	1621	260	"
7	1431:38	1431	80	"	42	1527:33	1527	351	"	77	1623:12	1622	260	"
8	1432:42	1432	80	"	43	1528:37	1528	351	"	78	1624:15	1623	260	"
9	1433:46	1433	80	"	44	1529:41	1529	351	"	79	1625:18	1624	260	"
10	1434:49	1434	80	"	45	1530:44	1530	351	"	80	1626:21	1625	260	"
11	1435:53	1435	80	"	46	1531:48	1531	351	"	81	1627:24	1626	260	"
12	1436:57	1436	80	"	47	1532:51	1532	351	"	82	1628:27	1627	260	"
13	1438:01	1437	80	"	48	1533:54	1533	351	"	83	1629:30	1629	260	"
14	1439:05	1438	80	"	49	1534:58	1534	351	"	84	1630:33	1630	260	"
15	1440:08	1439	80	"	50	1536:01	1535	351	"	85	1631:37	1631	260	"
16	1441:12	1440	80	"	51	1537:05	1536	351	"	86	1632:40	1632	260	"
17	1442:16	1441	80	"	52	1538:08	1537	351	"	87	1633:44	1633	260	"
18	1443:19	1442	80	"	53	1539:11	1538	351	"	88	1634:47	1634	260	"
19	1444:23	1443	80	"	54	1540:14	1539	351	"	89	1635:50	1635	260	"
20	1445:27	1444	80	"	55	1541:17	1540	351	"	90	1636:53	1636	260	"
21	1446:30	1446	80	"	56	1542:21	1541	351	"	91	1637:56	1637	260	"
22	1447:34	1447	80	"	57	1543:25	1542	351	"	92	1638:59	1638		Right roll
23	1448:38	1448	80	"	58	1544:28	1543	351	"	93	1640:03	1639	305	Level
24	1449:42	1449	80	"	59	1545:32	1545	351	"	94	1641:06	1640	305	"
25	1450:45	1450	80	"	60	1545:35	1546	351	"	95	1642:09	1641	305	"
26	1451:48	1451	80	"	61	1547:38	1547	351	"	96	1643:12	1642	305	"
27	1452:52	1452	80	"	62	1607:20	1606	260	"	97	1644:15	1643	305	"
28	1453:56	1453	80	"	63	1608:24	1607	260	"	98	1645:18	1644	305	"
29	1454:59	1454	80	"	64	1609:27	1608	260	"	99	1646:22	1645	305	Level*
30	1456:03	1455	80	"	65	1610:31	1610	260	"	100	1647:25	1646		"
31	1457:07	1456	80	"	66	1611:34	1611	260	"	101	1648:29	1647	278	"
32	1516:55	1516	351	Right roll	67	1612:38	1612	260	"	102	1649:32	1649	278	Descent
33	1517:59	1517	351	Level	68	1613:42	1613	260	"	103	1650:35	1650	278	"
34	1519:03	1518	351	"	69	1614:45	1614	260	"	104	1651:38	1651	278	Level
35	1520:07	1519	351	"	70	1615:49	1615	260	"	105	1652:42	1652	278	"
36	1521:11	1520	351	"	71	1616:52	1616	260	"	106	1653:45	1653	278	"
37	1522:15	1521	351	"	72	1617:55	1617	260	"	107	1654:49	1654	278	"
										108	1655:52	1655	278	"

* *Left turn between pictures according to cloud and sun glint positions.*

TABLE 10. Log for high-level cloud photography mission along standard track at 50,000 feet, 29 June 1969

NAVIGATION NOTES

Time	Location			Indicated altitude	True heading	Drift	Speed		Wind	
	Log entry	Latitude	Longitude				Air	Ground	Direction	Speed
GCT		°′N	°′W	*	deg.	deg.	kt	kt	deg.	kt
1233	Ramey AFB	1830	6708							
1302	St. Croix	1744	6442		100	−3	410	410	194	20
1342	Fort-de-France	1436	6100							
1359	Barbados	1304	5929							
1410	DELTA	1223	5823	50					260	40
1414	DELTA	1223	5823	40					150	10
1420	Drop 1	1302	5754	50						
1425				50	081	−1	405	412	229	8
1450	Drop 5	1336	5431	50						
1457	ECHO	1308	5351	50					250	25
1459	ECHO	1308	5351	40					280	30
1506	Drop 5	1336	5431	50						
1512				50	351	+1	405	385	333	22
1537	Drop 4	1657	5503	50						
1544	BRAVO	1736	5434	50					090	15
1548	BRAVO	1736	5434	40					250	50
1554	Drop 4	1657	5503	50						
1603					263	−5	405	390	326	35
1627	Drop 8	1622	5832	50						
1634	ALFA	1650	5912	50					340	25
1637	ALFA	1650	5912	40					300	30
1702	Antigua	1708	6147		279	−2	405	395	328	15
1725	St. Croix	1744	6442							
1750	Ramey AFB	1830	6708							

**Indicated altitude in thousands of feet. 50,000 feet indicated altitude equals 51,700 feet (8.5 nautical miles) true altitude.*

TABLE 10. Log for high-level cloud photography mission along standard track at 50,000 feet, 29 June 1969—Continued

PHOTOGRAPH DATA				
Photograph number	Time (GCT) Indicated	Time (GCT) Corrected	Nominal track	Aircraft attitude
	hr:min:sec	hr:min	deg.	
4	1421:02	1420	80	Level
5	1422:06	1421	80	"
6	1423:10	1422	80	"
7	1424:14	1423	80	"
8	1425:18	1424	80	"
9	1426:22	1425	80	"
10	1427:26	1426	80	"
11	1428:30	1427	80	"
12	1429:35	1429	80	"
13	1430:39	1430	80	"
14	1431:43	1431	80	"
15	1432:47	1432	80	"
16	1433:51	1433	80	"
17	1434:55	1434	80	"
18	1435:59	1435	80	"
19	1437:03	1436	80	"
20	1438:07	1437	80	"
21	1439:11	1438	80	"
22	1440:15	1439	80	"
23	1441:19	1440	80	"
24	1442:22	1441	80	"
25	1443:26	1442	80	"
26	1444:30	1443	80	"
27	1445:34	1444	80	"
28	1446:38	1445	80	"
29	1447:42	1447	80	"
30	1448:46	1448	80	"
31	1449:50	1449	80	"
32	1450:53	1450	80	Right roll
33	1507:05	1506	351	Slight right roll
34	1508:09	1507	351	Level
35	1509:13	1508	351	"
36	1510:18	1509	351	"
37	1511:22	1510	351	"

PHOTOGRAPH DATA				
Photograph number	Time (GCT) Indicated	Time (GCT) Corrected	Nominal track	Aircraft attitude
	hr:min:sec	hr:min	deg.	
38	1512:26	1511	351	Level
39	1513:30	1512	351	"
40	1514:34	1514	351	"
41	1515:38	1515	351	"
42	1516:42	1516	351	"
43	1517:46	1517	351	"
44	1518:50	1518	351	"
45	1519:54	1519	351	"
46	1520:58	1520	351	"
47	1522:01	1521	351	"
48	1523:05	1522	351	"
49	1524:09	1523	351	"
50	1525:13	1524	351	"
51	1526:17	1525	351	"
52	1527:21	1526	351	"
53	1528:25	1527	351	"
54	1529:29	1528	351	"
55	1530:33	1530	351	"
56	1531:37	1531	351	"
57	1532:41	1532	351	"
58	1533:45	1533	351	"
59	1534:49	1534	351	"
60	1535:53	1535	351	"
61	1536:57	1536	351	"
62	1555:02	1554	260	Right roll
63	1555:05	1554	260	"
64	1556:09	1555	260	Level
65	1557:13	1556	260	"
66	1558:17	1557	260	"
67	1559:21	1558	260	"
68	1600:25	1559	260	"
69	1601:29	1600	260	"
70	1602:33	1602	260	"
71	1603:37	1603	260	"
72	1604:41	1604	260	"

PHOTOGRAPH DATA				
Photograph number	Time (GCT) Indicated	Time (GCT) Corrected	Nominal track	Aircraft attitude
	hr:min:sec	hr:min	deg.	
73	1605:45	1605	260	Level
74	1606:49	1606	260	"
75	1607:53	1607	260	"
76	1608:57	1608	260	"
77	1610:00	1609	260	"
78	1611:04	1610	260	"
79	1612:07	1611	260	"
80	1613:11	1612	260	"
81	1614:15	1613	260	"
82	1615:19	1614	260	"
83	1616:23	1615	260	"
84	1617:27	1616	260	"
85	1618:31	1618	260	"
86	1619:34	1619	260	"
87	1620:38	1620	260	"
88	1621:42	1621	260	"
89	1622:46	1622	260	"
90	1623:50	1623	260	"
91	1624:54	1624	260	"
92	1625:58	1625	260	"
93	1627:01	1626	260	"
94	1628:05	1627		Right roll
95	1629:09	1628	305	Level
96	1630:13	1629	305	"
97	1631:17	1630	305	"
98	1632:21	1631	305	"
99	1633:24	1632	305	"
100	1634:28	1633	305	"
101	1635:32	1634		Left roll and descent
102	1636:36	1636		"
103	1637:40	1637	278	"
104	1638:44	1638	278	Level
105	1639:48	1639	278	"
106	1640:52	1640	278	"
107	1641:56	1641	278	"
108	1643:00	1642	278	"

TABLE 11. Log for high-level cloud photography mission along standard track at 50,000 feet, 30 June 1969

Time	Location			Indicated altitude	NAVIGATION NOTES heading Drift	True	Speed		Wind	
	Log entry	Latitude	Longitude				Air	Ground	Direction	Speed
GCT		°′N	°′W	*	deg.	deg.	kt	kt	deg.	kt
1239	Ramey AFB	1830	6708							
1306	St. Croix	1744	6442							
1346	Fort-de-France	1436	6100		135	−4	400	410	245	30
1405	Barbados	1304	5929							
1415	DELTA	1223	5823	50					—	5
1420	DELTA	1223	5823	40					220	25
1428	Drop 1	1302	5754	50						
1440				50	080	+1	400	410	300	15
1458	Drop 5	1336	5431	50						
1504	ECHO	1308	5351	50					220	15
1510	ECHO	1308	5351	40					280	30
1518	Drop 5	1336	5431	50						
1530				50	348	+2	400	400	270	15
1548	Drop 4	1657	5503	50						
1554	BRAVO	1736	5434	50					260	20
1557	BRAVO	1736	5434	40					250	45
1608	Drop 4	1657	5503	50						
1620				50	266	+2	400	380	230	25
1631	Radio fix	1626	5713	50						
1641	Drop 8	1622	5832	50						
1647	ALFA	1650	5912	50					250	15
1651	ALFA	1650	5912	40					250	55
1708				40	278	+1	400	390	240	15
1717	Antigua	1708	6147							
1742	St. Croix	1744	6442							
1805	Ramey AFB	1830	6708							

**Indicated altitude in thousands of feet. 50,000 feet indicated altitude equals 51,700 feet (8.5 nautical miles) true altitude.*

TABLE 11. Log for high-level cloud photography mission along standard track at 50,000 feet, 30 June 1969—Continued

PHOTOGRAPH DATA					PHOTOGRAPH DATA					PHOTOGRAPH DATA				
Photograph number	Time (GCT) Indicated	Corrected	Nominal track	Aircraft attitude	Photograph number	Time (GCT) Indicated	Corrected	Nominal track	Aircraft attitude	Photograph number	Time (GCT) Indicated	Corrected	Nominal track	Aircraft attitude
	hr:min:sec	hr:min	deg.			hr:min:sec	hr:min	deg.			hr:min:sec	hr:min	deg.	
5	1428:37	1428	80	Slight right roll	38	1525:15	1524	351	Level	73	1624:26	1623	260	Level
6	1429:42	1429	80	Level	39	1526:20	1525	351	"	74	1625:30	1624	260	"
7	1430:46	1430	80	"	40	1527:25	1526	351	"	75	1626:34	1626	260	"
8	1431:51	1431	80	"	41	1528:30	1527	351	"	76	1627:39	1627	260	"
9	1432:55	1432	80	"	42	1529:34	1529	351	"	77	1628:43	1628	260	"
10	1433:59	1433	80	"	43	1530:39	1530	351	"	78	1629:47	1629	260	"
11	1435:03	1434	80	"	44	1531:43	1531	351	"	79	1630:52	1630	260	"
12	1436:08	1435	80	"	45	1532:48	1532	351	"	80	1631:56	1631	260	"
13	1437:12	1436	80	"	46	1533:52	1533	351	"	81	1633:00	1632	260	"
14	1438:16	1437	80	"	47	1534:57	1534	351	"	82	1634:05	1633	260	"
15	1439:21	1438	80	"	48	1536:01	1535	351	"	83	1635:09	1634	260	"
16	1440:25	1439	80	"	49	1537:06	1536	351	"	84	1636:13	1635	260	"
17	1441:29	1440	80	"	50	1538:10	1537	351	"	85	1637:18	1636	260	"
18	1442:34	1442	80	"	51	1539:14	1538	351	"	86	1638:22	1637	260	"
19	1443:38	1443	80	"	52	1540:19	1539	351	"	87	1639:27	1638	260	"
20	1444:42	1444	80	"	53	1541:23	1540	351	"	88	1640:31	1640		Right roll
21	1445:46	1445	80	"	54	1542:28	1541	351	"	89	1641:35	1641	305	Level
22	1446:51	1446	80	"	55	1543:33	1543	351	"	90	1642:39	1642	305	"
23	1447:55	1447	80	"	56	1544:37	1544	351	"	91	1643:44	1643	305	"
24	1448:59	1448	80	"	57	1545:42	1545	351	"	92	1644:48	1644	305	"
25	1450:03	1449	80	"	58	1546:46	1546	351	"	93	1645:52	1645	305	"
26	1451:07	1450	80	"	59	1547:50	1547	351	"	94	1646:57	1646	305	"
27	1452:11	1451	80	"	60	1610:27	1610	260	"	95	1648:01	1647	305	"
28	1453:15	1452	80	"	61	1611:32	1611	260	"	96	1649:05	1648		Spiral descent
29	1454:19	1453	80	"	62	1612:37	1612	260	"	97	1650:09	1649		"
30	1455:23	1454	80	"	63	1613:41	1613	260	"	98	1651:13	1650		"
31	1456:27	1455	80	"	64	1614:46	1614	260	"	99	1652:17	1651		"
32	1518:49	1518	351	"	65	1615:50	1615	260	"	100	1653:21	1652	278	"
33	1519:53	1519	351	Slight left roll	66	1616:55	1616	260	"	101	1654:26	1653	278	"
34	1520:57	1520	351	Level	67	1617:59	1617	260	"	102	1655:30	1654	278	"
35	1522:02	1521	351	"	68	1619:03	1618	260	"	103	1656:35	1656	278	"
36	1523:06	1522	351	"	69	1620:07	1619	260	"	104	1657:39	1657	278	"
37	1524:11	1523	351	"	70	1621:12	1620	260	"	105	1658:43	1658	278	"
					71	1622:16	1621	260	"	106	1659:48	1659	278	"
					72	1623:21	1622	260	"					

TABLE 12. Log for high-level cloud photography mission along standard track at 50,000 feet, 2 July 1969

NAVIGATION NOTES

Time	Location			Indicated altitude	True heading	Drift	Speed		Wind	
	Log entry	Latitude	Longitude				Air	Ground	Direction	Speed
GCT		°′N	°′W	*	deg.	deg.	kt	kt	deg.	kt
1244	Ramey AFB	1830	6708							
1312	St. Croix	1744	6442							
1354	Fort-de-France	1436	6100	50	129	−2	400	410	225	15
1413	Barbados	1304	5929	50						
1423	DELTA	1223	5823	50					180	20
1430	DELTA	1223	5823	40					330	20
1438	Drop 1	1302	5754	50						
1450	Radio fix	1318	5637	50	081	+1	400	400	—	5
1509	Drop 5	1336	5431	50						
1515	ECHO	1308	5351	50					—	5
1520	ECHO	1308	5351	40					290	15
1527	Drop 5	1336	5431	50						
1535				50	350	−1	400	410	215	15
1543				50					220	15
1555	Drop 4	1657	5503	50						
1602	BRAVO	1735	5434	50					250	10
1607	BRAVO	1736	5434	40					230	25
1614	Drop 4	1657	5503	50						
1625				50	257	−1	400	390	225	15
1637	Radio fix	1617	5722	50						
1642	Radio fix	1618	5754	50						
1646	Drop 8	1622	5832	50						
1652	ALFA	1650	5912	50					220	15
1657	ALFA	1650	5912	40					220	30
1721	Antigua	1708	6147	40	273	+3	400	390	175	30
1747	St. Croix	1744	6442							
1815	Ramey AFB	1830	6708							

**Indicated altitude in thousands of feet. 50,000 feet indicated altitude equals 51,700 feet (8.5 nautical miles) true altitude.*

TABLE 12. Log for high-level cloud photography mission along standard track at 50,000 feet, 2 July 1969—Continued

PHOTOGRAPH DATA					PHOTOGRAPH DATA					PHOTOGRAPH DATA				
Photograph number	Time (GCT) Indicated	Time (GCT) Corrected	Nominal track	Aircraft attitude	Photograph number	Time (GCT) Indicated	Time (GCT) Corrected	Nominal track	Aircraft attitude	Photograph number	Time (GCT) Indicated	Time (GCT) Corrected	Nominal track	Aircraft attitude
	hr:min:sec	hr:min	deg.			hr:min:sec	hr:min	deg.			hr:min:sec	hr:min	deg.	
5	1438:54	1439	80	Right roll	40	1501:33	1502	80	Level	75	1618:51	1619	260	Level
6	1439:32	1440	80	Level	41	1502:17	1502	80	"	76	1619:55	1620	260	"
7	1440:09	1440	80	"	42	1503:00	1503	80	"	77	1620:59	1621	260	"
8	1440:47	1441	80	"	43	1503:43	1504	80	"	78	1622:03	1622	260	"
9	1441:24	1441	80	"	44	1504:27	1504	80	"	79	1623:07	1623	260	"
10	1442:02	1442	80	"	45	1505:11	1505	80	"	80	1624:11	1624	260	"
11	1442:39	1443	80	"	46	1505:54	1506	80	"	81	1625:15	1625	260	"
12	1443:17	1443	80	"	47	1506:37	1507	80	"	82	1626:19	1626	260	"
13	1443:55	1444	80	"	48	1507:21	1507	80	"	83	1627:23	1627	260	"
14	1444:32	1445	80	"	49	1508:05	1508	80	"	84	1628:27	1628	260	"
15	1445:10	1445	80	"	50	1508:48	1509	80	"	85	1629:30	1630	260	"
16	1445:47	1446	80	"	51	1529:08	1529	351	"	86	1630:34	1631	260	"
17	1446:25	1446	80	"	52	1530:12	1530	351	"	87	1631:38	1632	260	"
18	1447:02	1447	80	"	53	1531:16	1531	351	"	88	1632:42	1633	260	"
19	1447:40	1448	80	"	54	1532:20	1532	351	"	89	1633:46	1634	260	"
20	1448:17	1448	80	"	55	1533:24	1533	351	"	90	1634:50	1635	260	"
21	1448:55	1449	80	"	56	1534:28	1534	351	"	91	1635:54	1636	260	"
22	1449:32	1450	80	"	57	1535:31	1536	351	"	92	1636:58	1637	260	"
23	1450:10	1450	80	"	58	1536:35	1537	351	"	93	1638:02	1638	260	"
24	1450:48	1451	80	"	59	1537:39	1538	351	"	94	1639:05	1639	260	"
25	1451:25	1451	80	"	60	1538:43	1539	351	"	95	1640:09	1640	260	"
26	1452:03	1452	80	"	61	1539:47	1540	351	"	96	1641:13	1641	260	"
27	1452:40	1453	80	"	62	1540:51	1541	351	"	97	1642:17	1642	260	"
28	1453:18	1453	80	"	63	1541:55	1542	351	"	98	1643:21	1643	260	"
29	1453:55	1454	80	"	64	1542:58	1543	351	"	99	1644:25	1644	260	"
30	1454:33	1455	80	"	65	1544:03	1544	351	"	100	1645:28	1645	260	Descent
31	1455:10	1455	80	"	66	1545:07	1545	351	"	101	1646:32	1647		Right roll
32	1455:48	1456	80	"	67	1546:10	1546	351	"	102	1647:35	1648	305	Level
33	1456:29	1456	80	"	68	1547:14	1547	351	"	103	1648:39	1649	305	"
34	1457:13	1457	80	"	69	1548:18	1548	351	"	104	1649:43	1650	305	"
35	1457:56	1458	80	"	70	1549:22	1549	351	"	105	1650:47	1651	305	"
36	1458:40	1459	80	"	71	1550:26	1550	351	"	106	1651:51	1652	305	"
37	1459:23	1459	80	"	72	1551:29	1551	351	"	107	1652:55	1653	305	"
38	1500:07	1500	80	"	73	1616:43	1617	260	Left, roll,	108	1653:58	1654	305	"
39	1500:50	1501	80	"	74	1617:47	1618	260	climb					

TABLE 13. Log for high-level cloud photography mission along perimeter at 60,000 feet, 2 July 1969

NAVIGATION NOTES

Time	Location			Indicated altitude	True heading	Drift	Speed		Wind	
	Log entry	Latitude	Longitude				Air	Ground	Direction	Speed
GCT		°′N	°′W	*	deg.	deg.	kt	kt	deg.	kt
1242	Ramey AFB	1830	6708							
1309	St. Croix	1744	6442							
1352	Fort-de-France	1436	6100		130	+2	410	385		
1412	Barbados	1304	5929	60	133	+2	410	385		
1424	DELTA	1223	5823	60	118	+2	410	385	110	25
1445				60					080	25
1506	ECHO	1308	5351	60	082	−1	410	387	100	35
1523	ECHO	1308	5351	60						
1541				60					090	35
1601	BRAVO	1736	5434	60	355	−5	410	420	110	35
1618	BRAVO	1736	5434	60						
1637				60					080	20
1640	Radio fix	1651	5743	60						
1650	Radio fix	1644	5848	60	260	+1	410	435		
1653	ALFA	1650	5912	60					100	25
1713	Antigua	1708	6147	60	279	0	410	435		
1737	St. Croix	1744	6442							
1815	Ramey AFB	1830	6708							

**Indicated altitude in thousands of feet. 60,000 feet indicated altitude equals 61,500 feet (10.1 nautical miles) true altitude.*

TABLE 13. Log for high-level cloud photography mission along perimeter at 60,000 feet, 2 July 1969—Continued

PHOTOGRAPH DATA				
Photograph number	Time (GCT)		Nominal track	Aircraft attitude
	Indicated	Corrected		
	hr:min:sec	hr:min	deg.	
5	1426:17	1425	80	Level
6	1427:16	1426	80	"
7	1428:15	1427	80	"
8	1429:15	1428	80	"
9	1430:14	1429	80	"
10	1431:14	1430	80	"
11	1432:13	1431	80	"
12	1433:12	1432	80	"
13	1434:12	1433	80	"
14	1435:11	1434	80	'
15	1436:11	1435	80	"
16	1437:11	1436	80	"
17	1438:11	1437	80	"
18	1439:11	1438	80	"
19	1440:11	1439	80	"
20	1441:10	1440	80	"
21	1442:10	1441	80	"
22	1443:10	1442	80	"
23	1444:10	1443	80	"
24	1445:10	1444	80	"
25	1446:10	1445	80	"
26	1447:10	1446	80	"
27	1448:09	1447	80	"
28	1449:09	1448	80	"
29	1450:09	1449	80	"
30	1451:08	1450	80	"
31	1452:08	1451	80	"
32	1453:07	1452	80	"
33	1454:07	1453	80	"
34	1455:07	1454	80	"
35	1456:07	1455	80	"
36	1457:06	1456	80	"
37	1458:06	1457	80	"
38	1459:05	1458	80	"
39	1500:05	1459	80	"

PHOTOGRAPH DATA				
Photograph number	Time (GCT)		Nominal track	Aircraft attitude
	Indicated	Corrected		
	hr:min:sec	hr:min	deg.	
40	1501:05	1500	80	Level
41	1502:05	1501	80	"
42	1503:05	1502	80	"
43	1504:05	1503	80	"
44	1505:05	1504	80	"
45	1506:04	1505	80	"
46	1507:04	1506	80	"
47	1508:04	1507	80	"
48	1509:04	1508	80	"
49	1510:04	1509	80	"
50	1526:09	1525	351	"
51	1527:09	1526	351	"
52	1528:09	1527	351	"
53	1529:09	1528	351	"
54	1530:09	1529	351	"
55	1531:09	1530	351	"
56	1532:09	1531	351	"
57	1533:09	1532	351	"
58	1534:09	1533	351	"
59	1535:09	1534	351	"
60	1536:09	1535	351	"
61	1537:09	1536	351	"
62	1538:09	1537	351	"
63	1539:09	1538	351	"
64	1540:09	1539	351	"
65	1541:09	1540	351	"
66	1542:09	1541	351	"
67	1543:09	1542	351	"
68	1544:09	1543	351	"
69	1545:09	1544	351	"
70	1546:09	1545	351	"
71	1547:09	1546	351	"
72	1548:09	1547	351	"
73	1549:10	1548	351	"
74	1550:10	1549	351	"

PHOTOGRAPH DATA				
Photograph number	Time (GCT)		Nominal track	Aircraft attitude
	Indicated	Corrected		
	hr:min:sec	hr:min	deg.	
75	1551:11	1550	351	Level
76	1552:11	1551	351	"
77	1553:11	1552	351	"
78	1554:11	1553	351	"
79	1555:11	1554	351	"
80	1556:11	1555	351	"
81	1557:11	1556	351	"
82	1558:12	1557	351	"
83	1559:12	1558	351	"
84	1600:12	1559	351	"
85	1601:12	1600	351	"
86	1602:12	1601	351	"
87	1620:41	1620	260	"
88	1621:42	1621	260	"
89	1622:43	1622	260	"
90	1623:44	1623	260	"
91	1624:44	1624	260	"
92	1625:44	1625	260	"
93	1626:45	1626	260	"
94	1627:46	1627	260	"
95	1628:46	1628	260	"
96	1629:47	1629	260	"
97	1630:48	1630	260	"
98	1631:49	1631	260	"
99	1632:49	1632	260	"
100	1633:50	1633	260	"
101	1634:50	1634	260	"
102	1635:51	1635	260	"
103	1636:52	1636	260	"
104	1637:53	1637	260	"
105	1638:54	1638	260	"
106	1639:55	1639	260	"
107	1640:55	1640	260	"
108	1641:56	1641	260	"
109	1642:57	1642	260	"

CAMERA SYSTEM AND PHOTOGRAPHIC PRODUCT

The Fairchild F415P camera system was used for all high-level aircraft cloud photography during BOMEX. The camera is mounted in the aircraft pointed vertically down and contains a rotating prismatic mirror that optically scans 180° from left to right with each photograph. The rotational axis of the prism is parallel to the line of flight and perpendicular to the axis of the lens. The scan for one photograph requires one second. An automatic timer, which is adjustable on a control console in the cockpit, actuates the shutter, mirror, and the film advance mechanisms. Aperture control for light intensity variation is automatic. This system is described in *Operation and Maintenance Instruction Manual for F–415P Camera System,* Fairchild Space and Defense Systems, Syosset, N.Y., June 1, 1964.

Each flight the camera was loaded with a 100-foot roll of Ecktachrome film. A few more than 100 color transparencies were obtained from each roll of film. Size of the color transparencies is 4.5 by 10.8 inches, including the data recording area. The automatic timer was set to take pictures at approximately 1-minute intervals, providing a 40–50 percent overlap of successive pictures in the center of the field of view. The exact amount of overlap varied with aircraft speed.

Figure 4 is a black and white reproduction of a color photograph (original size) taken from 50,000 feet. The center of the photograph is vertically beneath the aircraft. The photograph is oriented so that the top of the picture is forward of the aircraft and the bottom of the picture is aft. The projection of the flight path is through the center of the picture from bottom to top. The left and right horizons are to the left and right, respectively. The right wing tip of the aircraft is visible at the extreme right outside the horizon. The clock face, frame counter, and identification slate, which appeared to the left of the left horizon on the original photograph, are not reproduced in figure 4.

PHOTOGRAPH GRID

A special grid must be used to interpret distances and relative distances on panoramic photographs. Figure 5 is the coordinate grid for the panoramic photograph shown as figure 4. The center of the coordinate system is directly beneath the aircraft in level horizontal flight. The flight path is the straight line projection from bottom to top of grid midway between left and right horizons. Coordinate distances are expressed in percent of flight altitude. Straight lines parallel to the flight path denote change in scale and surface distance away from the flight path. Lines that intersect the parallel lines and converge toward the left and right horizons indicate change in scale and surface distance fore and aft of the center position of the aircraft on the flight path. The coordinate lines are labeled with percent-of-flight-altitude distances. These are converted to sea surface distances by multiplying by the flight altitude.

In interpreting panoramic photographs, two aspects of the coordinate grid must be taken into account. One, away from the flight path, toward the horizons, distances and areal coverage increase greatly. Two, absolute dimensions for a given grid space vary with height of the viewed object. Thus, high clouds which occupy a given grid space actually occupy less atmospheric space than do low clouds which cover the same grid space. Height of the aircraft above the viewed object must be taken into account.

A grid showing only selected coordinate lines (fig. 6) is provided for use with the reduced photographs in the atlas. It includes only 0, 40, and 76 percent-of-flight-altitude coordinates fore and aft of center and only 0, 100, 200, 300, and 500 percent-of-flight-altitude coordinates to the left and right of the flight path. These percent-of-flight-altitude values are converted to equivalent sea surface distances for flight altitudes of 50,000 and 60,000 feet in table 14.

SHADING OF PHOTOGRAPHS

There are distinct variations in the shading of photographs that should be taken into account in their interpretation. These variations are caused by the presence or absence of haze, changes in the aperature of the camera, and differences in the photographic and printing processes. Pictures with few clouds, little haze, and dark colored sea in the original (color transparency) tend to print black. This is illustrated by the June 25 flight pictures 96 through 108. Other pictures taken at times of slight cloudiness tend to print white in the center because of haze, over-exposure, and sun glint (June 22 flight pictures 87 through 97). Photographs of continuous cloud deck beneath the aircraft are entirely white or gray in the original, but their corners are darker than the center. Such pictures tend to become

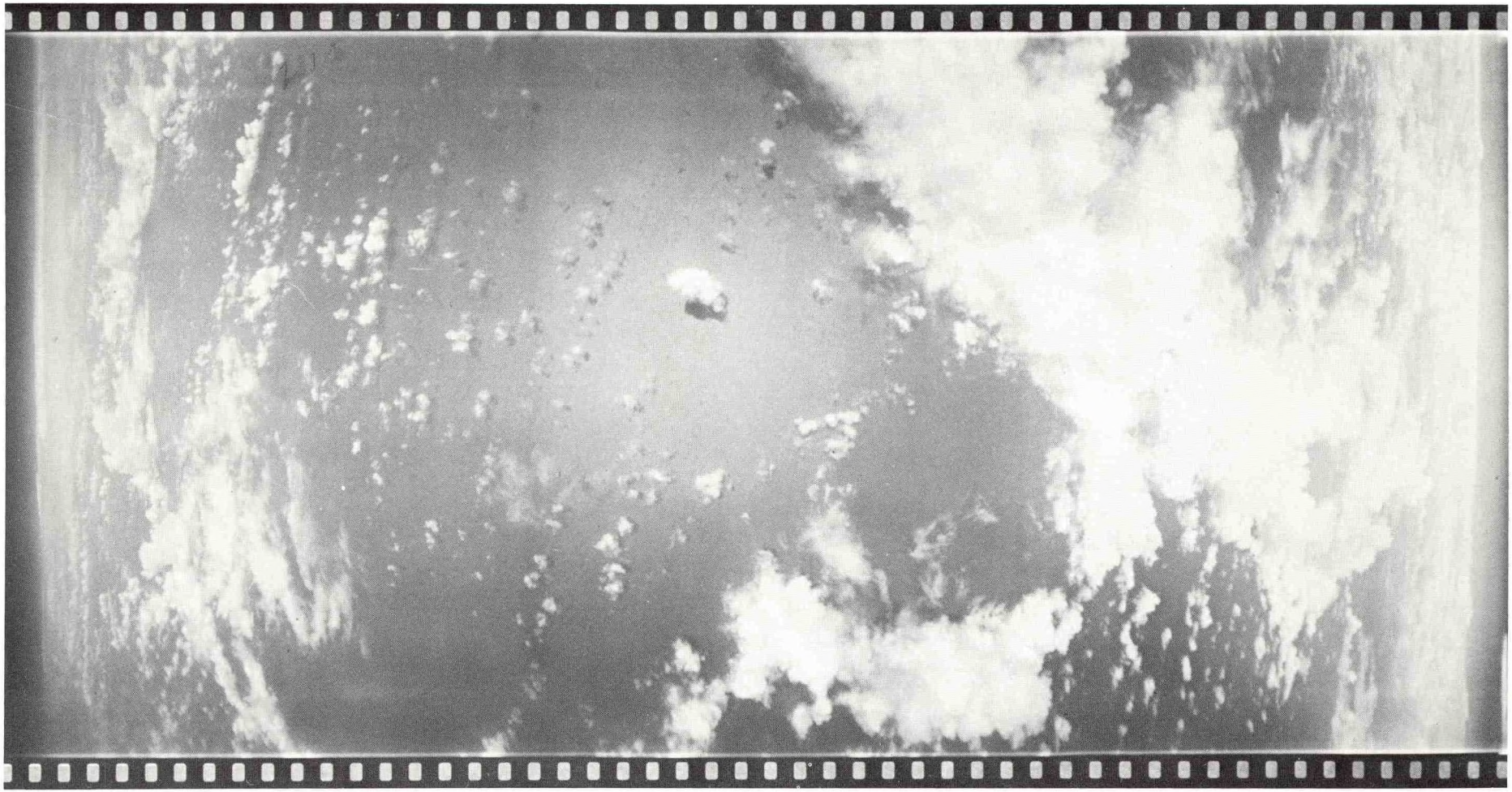


FIGURE 4. Panoramic cloud photograph from 50,000 feet at 13°23′N, 55°51′W, on June 28, 1969, 1444 GCT. Projected flight path extends from bottom to top through center of picture. Directional bearing is 80°.

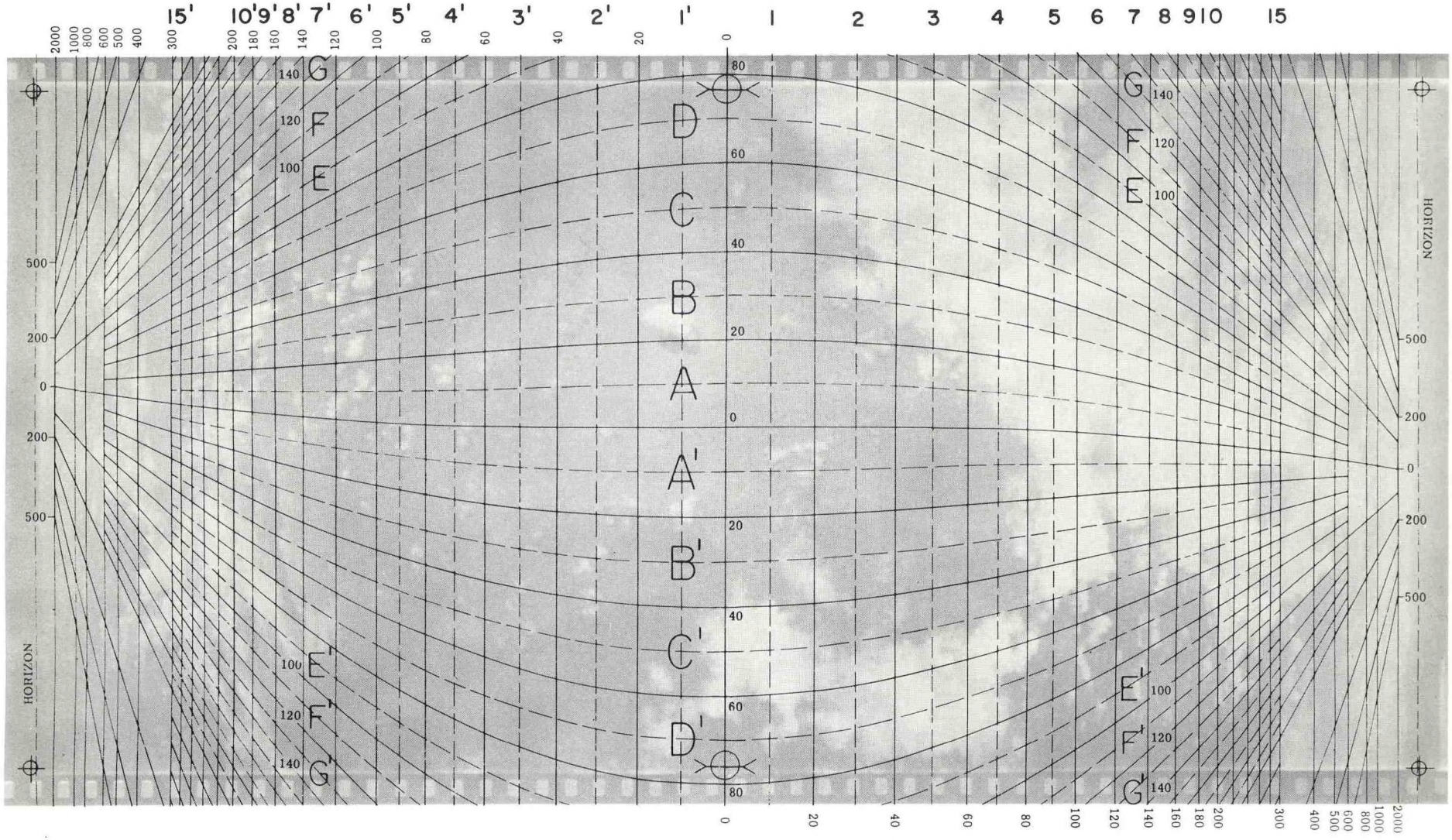


FIGURE 5. Detailed coordinate grid for panoramic photography shown as figure 4. Distances fore and aft of aircraft center position are indicated by alphabetically labeled coordinates; distances toward left and right horizons by numerically labeled coordinates. Small numbers indicate coordinate distances as percent of flight altitude—these numbers must be multiplied by flight altitude to convert to surface distances. (KA–56 Panoramic Photography Coordinate Grid, Fairchild Camera and Instrument Corporation, Space and Defense Systems Division, Syosset, L.I., N.Y.)

TABLE 14. Grid distance conversion

Sea surface distances		
In percent of flight altitude	**In nautical miles for indicated flight altitudes**	
	50,000 ft [1]	60,000 ft [2]
0	0	0
40	3.4	4.0
76	6.3	7.7
100	8.5	10.1
200	17.0	20.2
300	25.5	30.3
500	42.5	50.5

[1] *50,000 feet indicated altitude = 51,700 feet or 8.5 nautical miles true altitude.*

[2] *60,000 feet indicated altitude = 61,500 feet or 10.1 nautical miles true altitude.*

black in the corners in some of the reprints. This is illustrated in varying degrees by the June 21 flight pictures taken from 50,000 feet along the north leg and by the June 29 flight pictures 4 through 22 along the south leg. Corners also are dark on the June 28 flight pictures 18 through 31. Some clouds tend to disappear along the longer edges of the pictures. This is illustrated by the June 28 flight where some clouds at the center of picture 79 are lost in picture 80.

The photographs on the June 30 flight are partially compressed transverse to the flight direction. This presumably was caused by sticking of the rotating prism mechanism. The left third of each picture is reduced to a series of lines, which occupy about one-fifth of the area of a normal picture. A grid, when fitted to these pictures, should be alined with the right horizon.

SUN GLINT ON PHOTOGRAPHS

Daily cloud photography missions were scheduled so that local solar noon occurred about midway through each flight to provide optimum light for photography. As a result, sun glint or reflection from the sea shows as a bright spot on all photographs where the surface was not obscured by clouds or heavy haze.

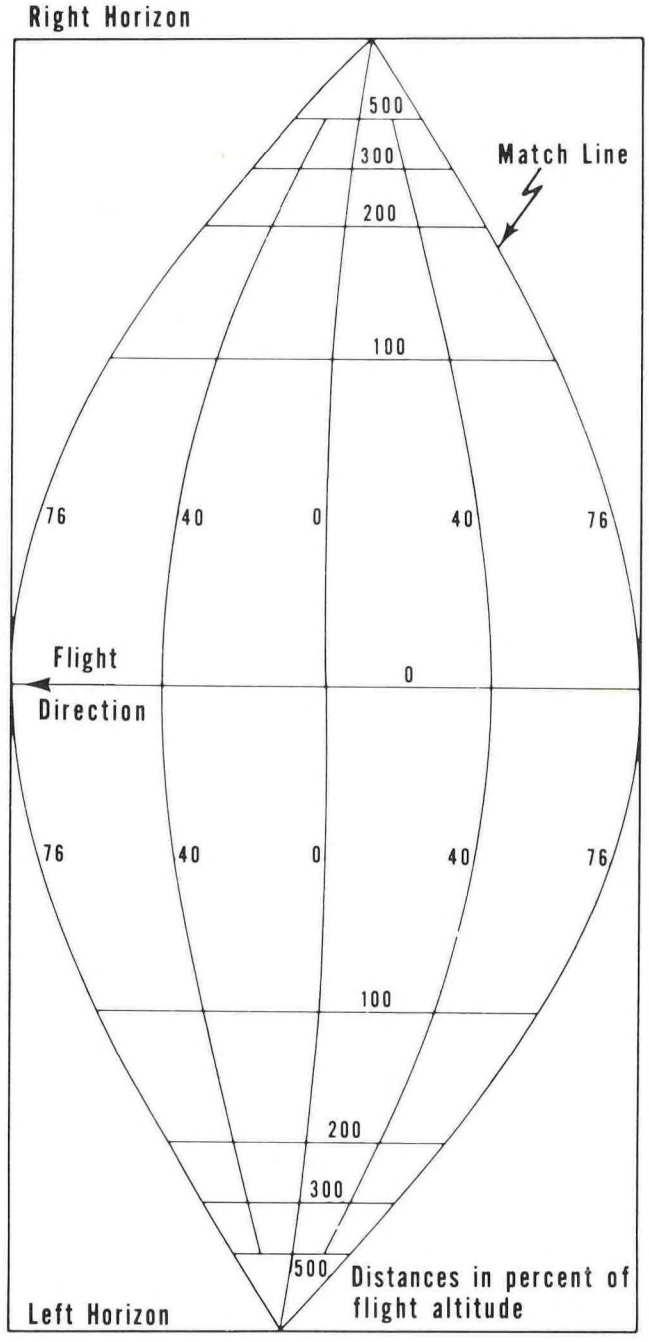


FIGURE 6. Simplified coordinate grid for figure 4. Distances indicated on selected coordinates in percent of flight altitude.

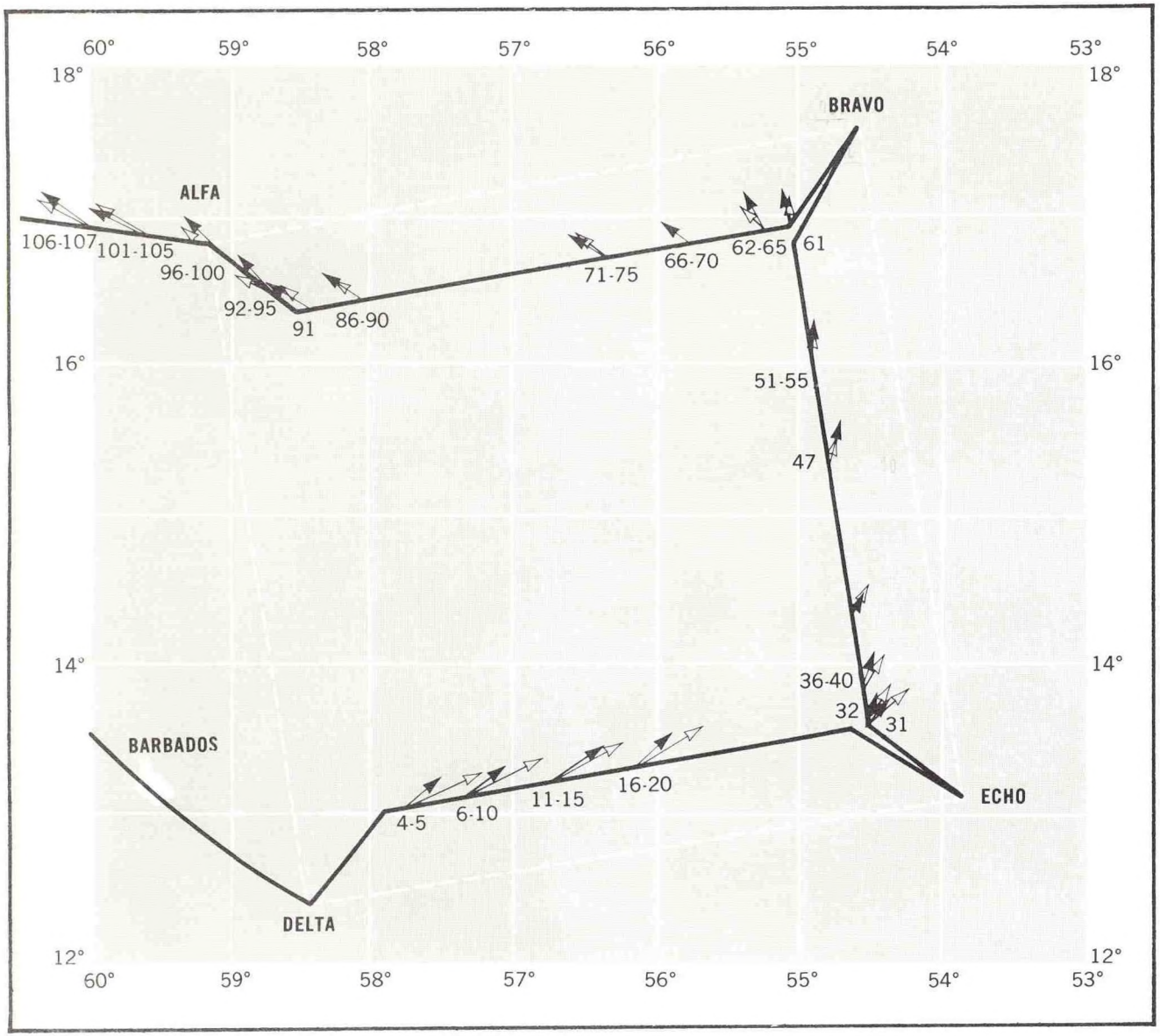


FIGURE 7. Comparison of observed (solid arrows) and calculated (open arrows) sun glint positions in panoramic cloud photographs of June 26, 1969.

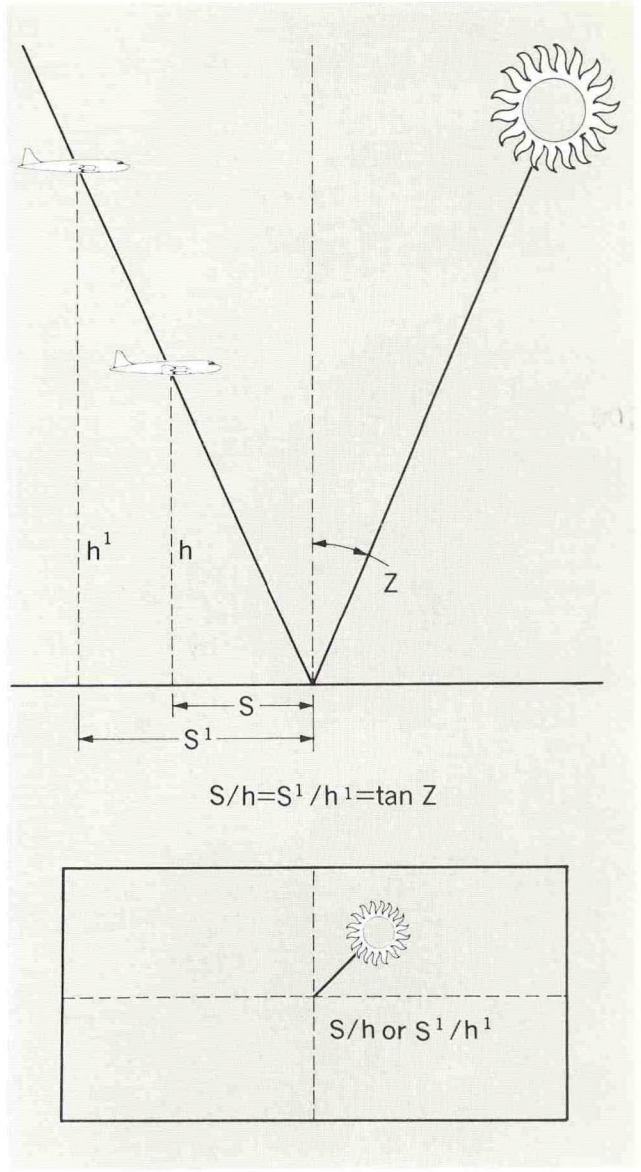


FIGURE 8. Sun glint diagram showing relation of sun's zenith angle to distance of sun glint spot from center of photograph. This distance is independent of aircraft altitude.

The glint appears near the center of the photographs in the atlas as a white spot about 1.25 cm (0.5 inches) in diameter.

Sun glint position check. The position of sun glint on the photograph relative to the position of origin vertically beneath the aircraft taking the picture can be computed for any aircraft position, elevation, and time from Air Almanac data. Sun glint positions have been computed for all photographs on which sun glint appears as a check on flight track positions. The agreement obtained in all cases is reasonable considering the imprecise nature of defining the position of sun glint on the photographs—by eye estimate of the geometric center of the bright spot. Computed and observed sun glint positions for the flight of June 26, 1969, are compared in figure 7. The deviations on this flight are typical of the other flights. To reduce the error introduced by eye-estimation of sun glint positions, the positions are averaged over five successive photographs.

Sun glint geometry. The zenith angle of the sun was less than 15 degrees for most of the near-noon, midsummer, low-latitude flights. Hence, the geometry of the sun glint is relatively uncomplicated and is not greatly affected by the distortion inherent in the panoramic photograph. The simplified sun glint geometry applied in calculating the vectors in figure 8 and in computing aircraft positions for the other flights is as follows.

Calculation of sun glint position on a photograph, when the zenith angle is small, involves the following steps:

1. Calculate local hour angle (LHA) for given aircraft position and time from *The Air Almanac,* U.S. Naval Observatory, Washington, D.C.
2. Calculate local declination (LD) for given position and time from *The Air Almanac.*
3. Calculate bearing of sun (B) from
$$B = \tan^{-1}(-LHA/LD) \quad (1)$$
4. Calculate relative bearing of sun (B′) to aircraft heading from
$$B' = B - A \quad (2)$$
5. Calculate zenith angle (Z) from
$$Z = (LHA^2 + LD^2)^{1/2} \quad (3)$$
6. Calculate relative distance (d), where $d = S/h$, from
$$d = \tan^{-1}(Z) \quad (4)$$
7. Plot calculated sun glint position on photograph using d and B′ as polar coordinates, and using photograph grid to scale relative distances.

Notation and units of measurement for calculating sun glint position are as follows:

Z —Zenith angle. The angle in degrees between the vertical direction from observer and a line from observer to sun.

LHA—Local hour angle. The east-west component of Z in degrees; by convention positive westward, negative eastward.

LD —Local declination. The north-south component of Z in degrees; positive northward.

B —Bearing of sun in degrees relative to north; East = 90°, etc.

B′ —Bearing of sun in degrees relative to aircraft heading; positive to right of heading, negative to left.

A —Aircraft heading in degrees relative to north; 90° = toward east, etc.

h —Height of aircraft above sea surface.

S —Distance of sun glint from point on sea surface vertically below aircraft.

d —S/h

Note that the position of origin (focal point) is displaced from the center of the photograph when the aircraft is not exactly horizontal and, therefore, the camera is not exactly vertical. If the aircraft is pitched 1° to 1½° nose down, which was the normal flying mode (indicated as "level" under photograph data in the tables), the corresponding adjustment in position of origin is small (compared to the uncertainty in finding the optical center of the observed sun glint) and may be omitted.

PHOTOGRAPH COMPOSITES AND FLIGHT TRACKS

This atlas is an actual photograph inventory of all usable high-level cloud photographs obtained during BOMEX Period III. Each photograph is a reduced black and white print of the original color transparency. The photographs are arranged in the same sequence as they were obtained along the south, east, and north legs of each flight, are properly spaced to coincide with their indicated positions along the flight tracks, and are oriented so that the center line of each photograph coincides with the projected flight path of the aircraft. The scale along the flight tracks is approximately 1:1,060,000. It is not possible to match pictures into true photomosaics, as is the general custom for aerial photographs, because of the nonlinearity of distance away from the center of each panoramic picture (fig. 5). For this reason, the surface area shown near the left and right horizons is much greater than in the center of the picture and clouds near these horizons are repeated in several successive photographs. The controlling criterion in spacing pictures is optimum visual consistency between adjacent pictures along the flight line path.

SEQUENCE OF PHOTOGRAPHS

Overlap of successive pictures varies from 35 to 60 percent, depending on the timer setting of the camera system, airspeed of the aircraft, and headwind. This overlap provides the control for relative positioning of the pictures. However, rather than overlap pictures to this extent, odd number pictures are arranged in consecutive sequence and even numbered pictures are arranged in consecutive sequence along two parallel lines. The side-by-side arrangement of odd and even numbered pictures has the advantage of correctly depicting the amount of overlap of successive pictures while retaining maximum cloud detail for study and documenting picture spacing in a more useful form.

POSITIONS OF PHOTOGRAPHS

Center positions of photographs are plotted along flight tracks according to positions in the flight logs. The following guidelines apply:

1. Positions are plotted along planned track lines unless there is definite evidence to indicate a deviation.
2. Positions are evenly spaced along the straight-line track segments. This spacing neglects changes in wind and airspeed along the segment, but such changes cannot be identified with sufficient definiteness to warrant modifying this procedure.
3. Ground speeds implied by adopted photograph positions agree favorably with ground speeds reported by the navigators—within the 4 percent required agreement.
4. Positions of turns are in agreement with horizons and sun glint depicted on the photographs.

On June 21 it was possible to identify the same clouds or cloud features on photographs from the two flights, at 50,000 and 60,000 feet, and to estimate the distance between the two aircraft. From this comparison, the two tracks were placed closer together than the nominal 35 miles. Drift of the clouds during the time interval between photographs was taken into account by using balloon (rawinsonde) wind data obtained by the surface ships.

The photograph positions have certain inherent inaccuracies that result from the following. On each flight, after a fix over Barbados, the aircraft flew about 1,000 miles over open sea, including several turns and changes in altitude, with only limited radio aids to navigation. The BOMEX ships, while nominal reference points, were not visible to the pilot who is unable to look vertically down from his cockpit position. Because of these circumstances, track and photograph positions can be in error by several dozens of miles. Track adjustments based on commonly observed cloud features during the two simultaneous flights of June 21 and July 2 are within these limitations.

ALINEMENT OF PHOTOGRAPHS

The alinement of photographs as they appear in this atlas is illustrated in figure 9 by pictures 37, 38, 39, and 40. Picture 38 controls the positions of 37 and 39 relative to each other and picture 39 controls the relative positions of 38 and 40. In working out the alinement, cloud features near the center of the pictures are selected to minimize the effects of grid distortion. The pictures are alined vertically as indicated by the vertical dashed arrows that connect the same cloud

feature in 37 Box A and 38 Box A, and in 38 Box B and 39 Box B. Similarly, the pictures are alined horizontally by selecting two horizontally adjacent points in the cloud field of picture 38 that are found in pictures 37 and 39, respectively. Picture 39 is alined relative to 37 to maintain this relationship as indicated by the horizontal arrows in figure 9. The same procedure is then applied to pictures 38, 39, and 40—comparing the horizontal relationship between two clouds in 39 with the relationship between the same two clouds in 38 and 40. Note that individual photographs do not necessarily retain a horizontal relationship. This can be accounted for by drift of the aircraft due to crosswind. Also, one set of clouds or cloud features can be used for vertical control and another set for horizontal control.

The following criteria were used in photograph alinement.

1. Low clouds (trade cumulus) near the flight tracks were used in preference to middle or high clouds.

2. Clouds away from the flight track were used only when necessary—making allowance for grid distortion to maintain proper spacing along flight track.

3. When the center of the picture was cloudless or covered by solid cloud deck to a distance of 10 miles, pictures were spaced by extrapolation from preceding and following pictures and reference to ground speed and drift angle in flight log.

4. When it was necessary to use middle or high clouds, pictures were alined as illustrated in figure 9 (without allowing for lesser vertical distance between cloud tops and aircraft) to maintain a pictorial composite along the flight track. Only a few pictures in the atlas are spaced on the basis of middle or high clouds.

5. Pictures were alined on turns by maintaining the same consistency in orientation of cloud lines and features near the center of the pictures.

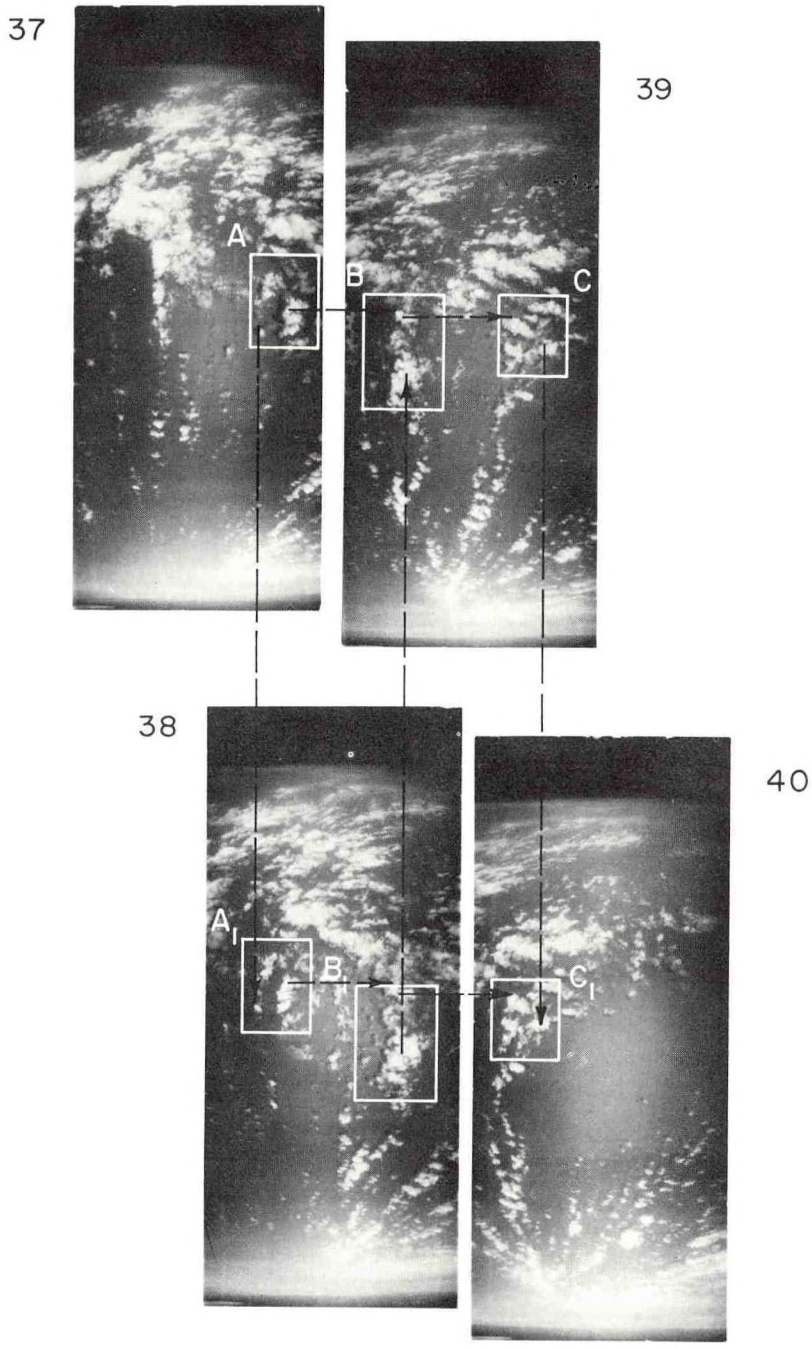


FIGURE 9. Alinement of photographs in atlas.

INVENTORY OF PHOTOGRAPHS

Cloud picture sequences and location maps for each sequence are arranged in the atlas and summarized in table 15 by daily flights and the south, east, and north legs of the flight track. Corrected picture times, from the "photograph data" of the flight logs, are indicated for each sequence. Omitted pictures in some sequences are accounted for under remarks in the table. Flight track and picture location maps for each sequence appear on the same page, or facing page, of the atlas as the picture sequence. Picture sequences along the north leg of the daily flight track read from right to left on the page, or across facing pages, in the east-to-west direction of flight as indicated by the consecutive picture numbers on the accompanying location map.

TABLE 15. Summary of cloud picture sequences and location maps

Date	Altitude	Leg of flight	Picture numbers and location Maps (M)	Time	Remarks
1969	1,000 ft			GCT	
June 21	50	South	7–20 M	1434–1443	
"	"	"	21–35	1449–1504	
"	"	East	36–50 M	1522–1537	
"	"	"	51–65	1538–1553	
"	"	North	66–79 M	1611–1625	
"	"	"	80–94	1626–1641	
June 21	60	South	4–23 M	1412–1429	
"	"	"	24–46	1429–1449	
"	"	"	47–58 M	1450–1459	
"	"	East	59–70 M	1513–1523	
"	"	"	71–88 M	1524–1539	
"	"	"	89–106	1540–1555	
June 22	50	South	6–19 M	1436–1450	
"	"	"	20–33	1451–1504	
"	"	East	34–47 M	1525–1539	
"	"	"	48–61	1540–1553	
"	"	North	62–80 M	1615–1634	
"	"	"	81–97	1635–1651	
"	"	"	M		
"	"	"	98–105	1652–1659	
June 23	50	South	5–21 M	1526–1543	
"	"	"	22–38	1544–1601	
"	"	East	39–53 M	1615–1630	
"	"	"	54–68	1631–1646	

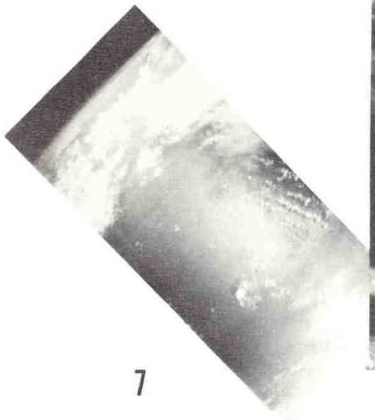
TABLE 15. Summary of cloud picture sequences and location maps—Continued

Date	Altitude	Leg of flight	Picture numbers and location Maps (M)	Time	Remarks
1969	1,000 ft			GCT	
"	"	North	69–88 M	1704–1725	
"	"	"	89–107	1726–1745	
June 24	50	South	4–17 M	1437–1451	
"	"	"	18–31	1452–1506	
"	"	East	32–45 M	1526–1540	
"	"	"	46–60	1541–1557	
"	"	North	61–78 M	1617–1635	
"	"	"	79–95	1636–1653	
"	"	"	M		
"	"	"	96–108	1654–1707	
June 25	50	South	5–18 M	1434–1447	
"	"	"	19–32	1448–1501	
"	"	East	33–51 M	1518–1536	
"	"	"	52–68	1537–1552	69; 70–72 omitted—descent.
"	"	North	73–89	1557–1613	
"	"	"	90–108M	1614–1632	
June 26	50	South	4–18 M	1438–1452	
"	"	"	19–33	1453–1507	
"	"	East	34–49 M	1525–1540	
"	"	"	50–66	1541–1557	
"	"	North	67–82 M	1616–1631	
"	"	"	83–98	1632–1647	
"	"	"	M		
"	"	"	99–106	1648–1655	
June 28	50	South	4–17 M	1427–1441	
"	"	"	18–31	1442–1456	
"	"	East	32–46 M	1516–1531	
"	"	"	47–61	1532–1547	
"	"	North	62–76 M	1606–1621	
"	"	"	77–91	1622–1637	
"	"	"	M		
"	"	"	92–108	1638–1655	
"	"	"	92–108	1638–1655	

TABLE 15. Summary of cloud picture sequences and location maps—Continued

Date	Altitude	Leg of flight	Picture numbers and location Maps (M)	Time	Remarks
1969	1,000 ft			GCT	
June 29	50	South	4–18 M	1420–1435	
"	"	"	19–32	1436–1450	
"	"	East	33–46 M	1506–1520	
"	"	"	47–61	1521–1536	62 omitted—taken 3 seconds before 63.
"	"	North	63–77 M	1554–1609	
"	"	"	78–93	1610–1626	
"	"	"	M		
"	"	"	94–108	1627–1642	
June 30	50	South	5–18 M	1428–1442	
"	"	"	19–31	1443–1455	
"	"	East	32–45 M	1518–1532	
"	"	"	46–59	1533–1547	
"	"	North	60–79 M	1610–1630	
"	"	"	80–95	1631–1647	
July 2	50	South	5–19 M	1439–1448	20–50 omitted—overcast.
"	"	East	71–72 M	1550–1551	51–70 omitted—overcast.
"	"	North	73–90 M	1617–1635	
"	"	"	91–108	1636–1654	
July 2	60	South	5–22 M	1425–1442	23–38 omitted—overcast.
"	"	"	39–46	1459–1506	47–49 omitted—overcast.
"	"	East	66–73 M	1541–1548	50–65 omitted—overcast.
"	"	"	74–86	1549–1601	
"	"	"	M		
"	"	North	87–108	1620–1641	

CLOUD PICTURE SEQUENCES AND LOCATION MAPS



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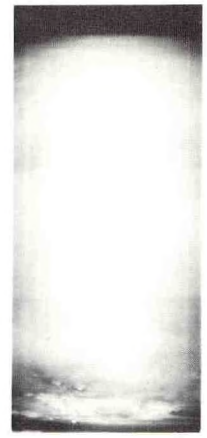

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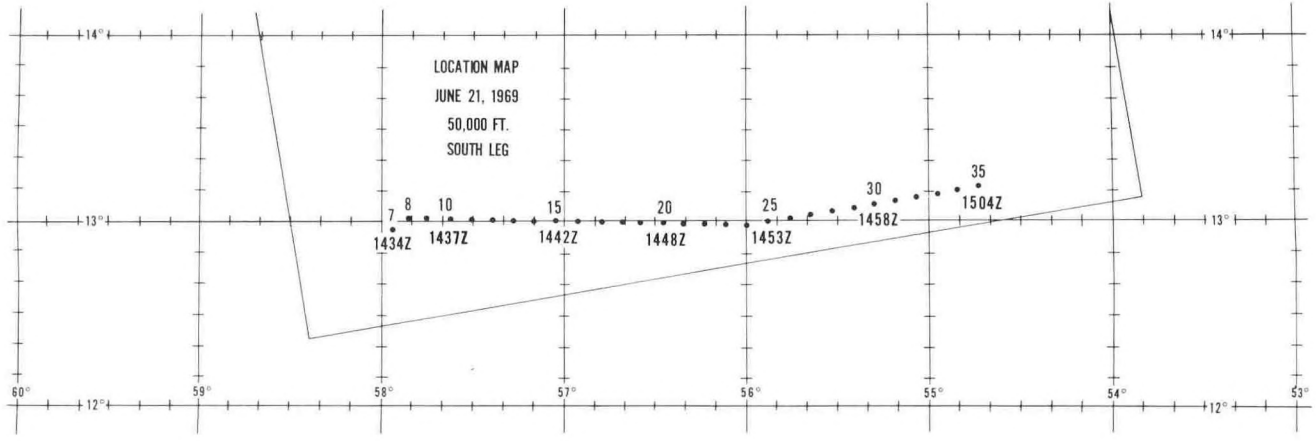
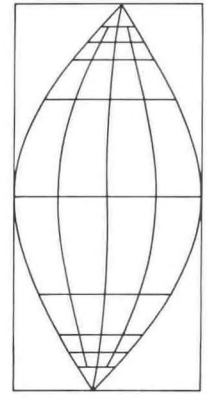
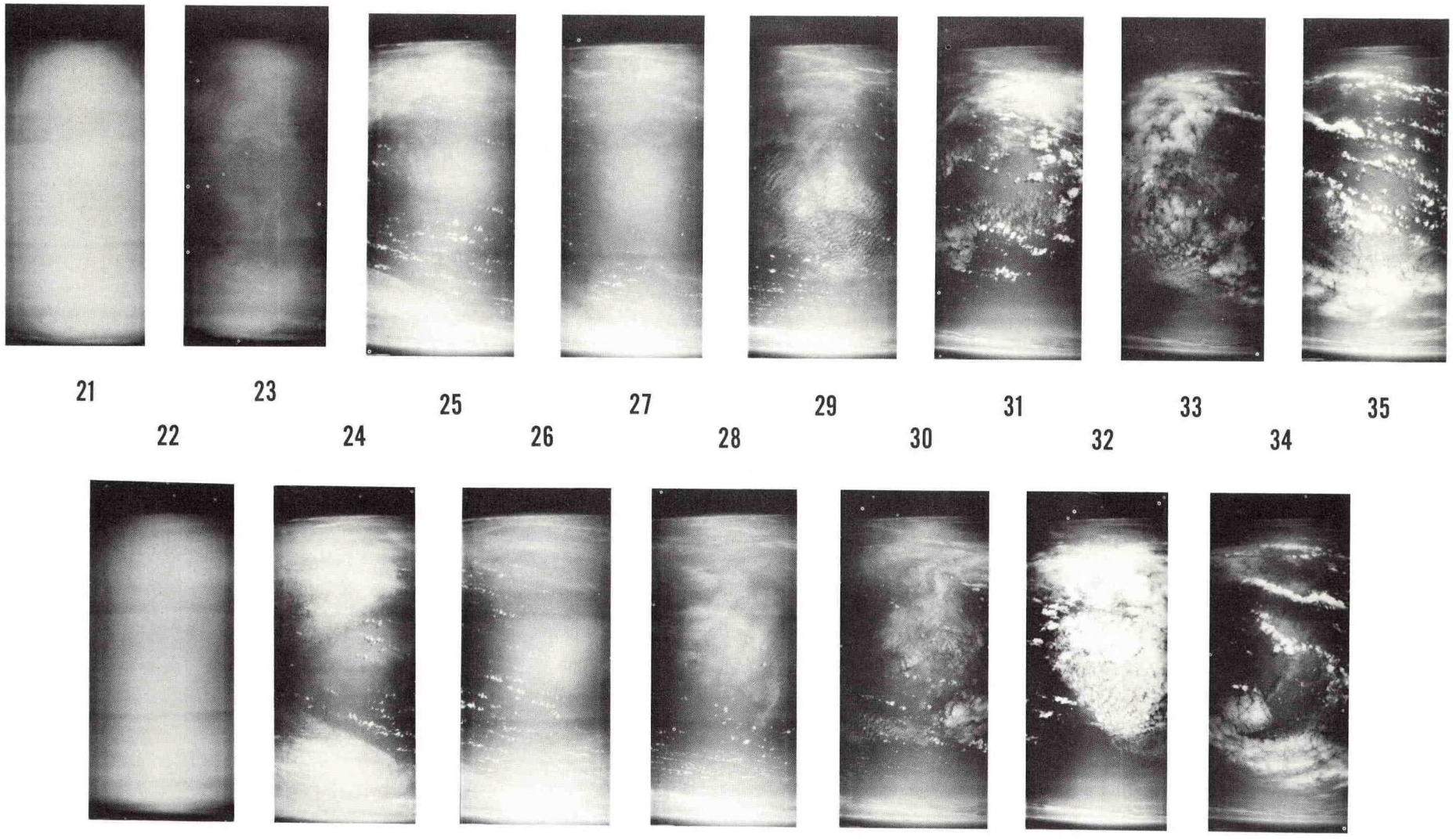
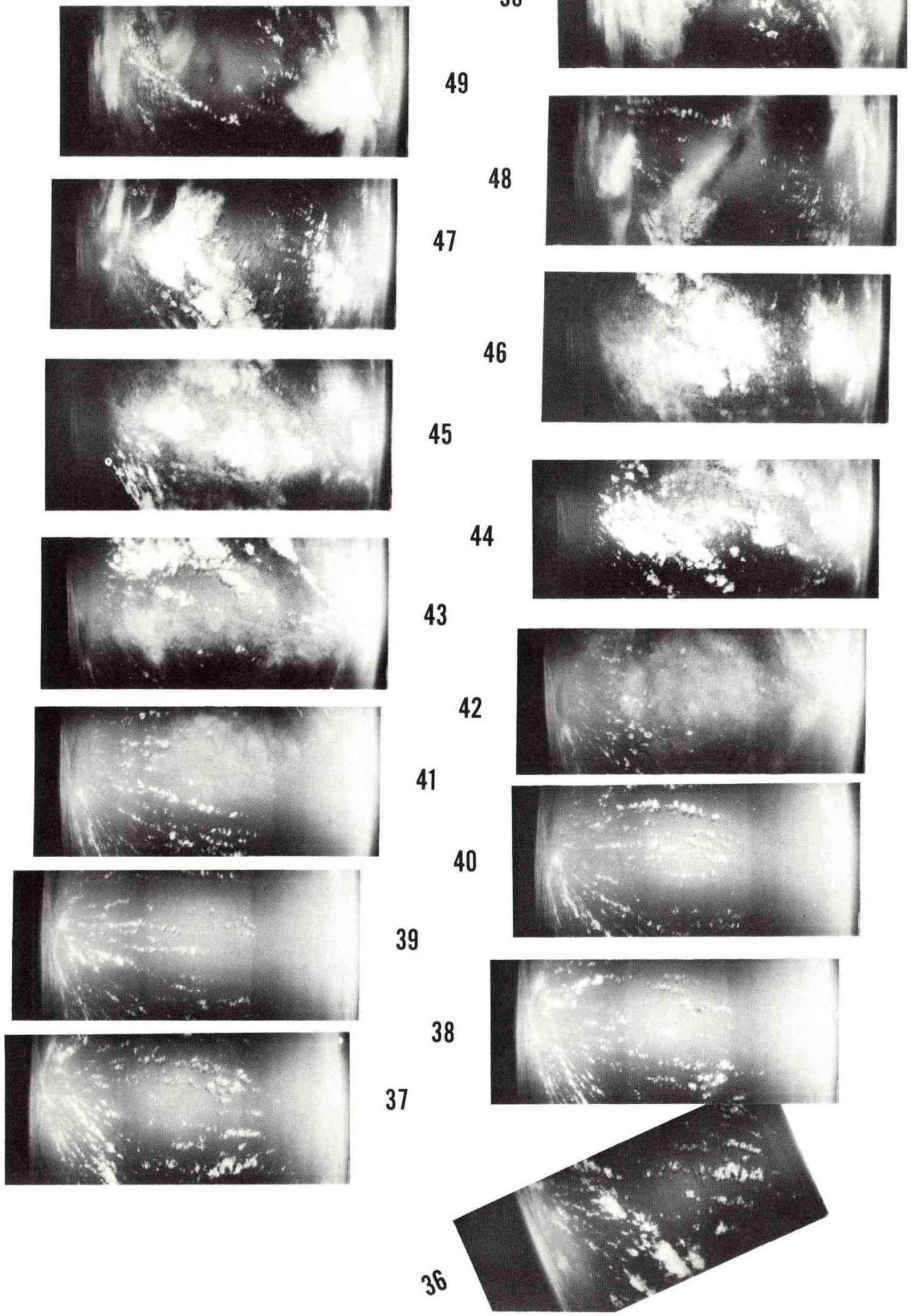






B57 CLOUD PHOTOS
50,000 FT.
JUNE 21, 1969
SOUTH LEG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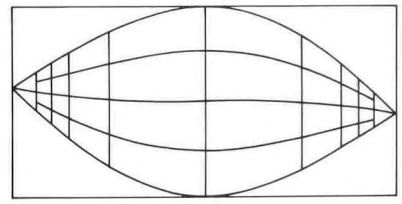
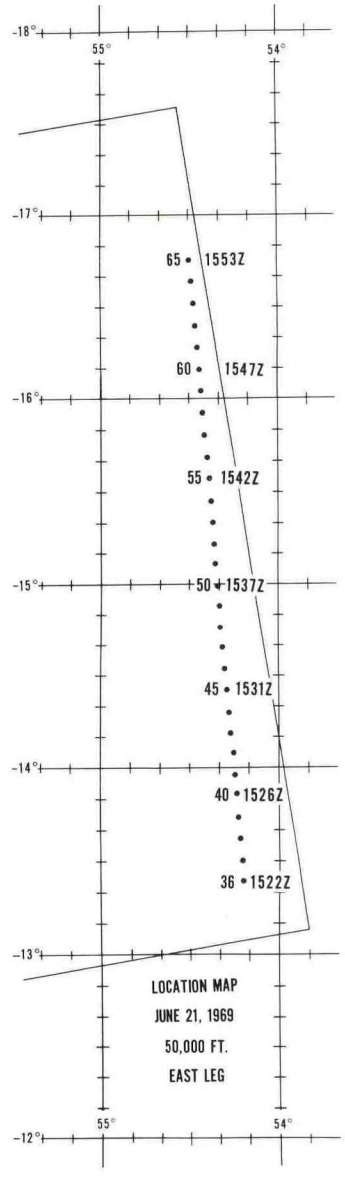
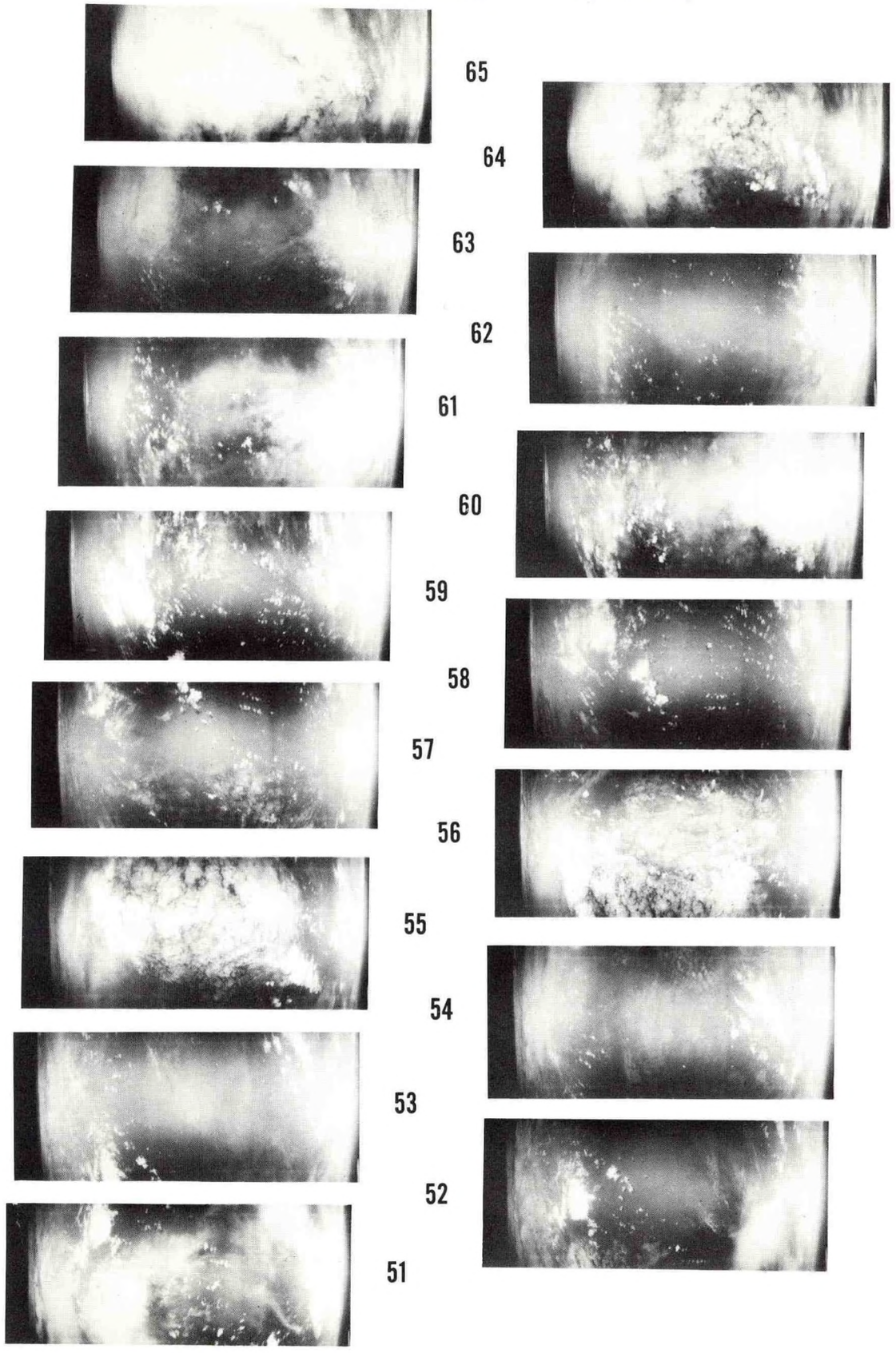
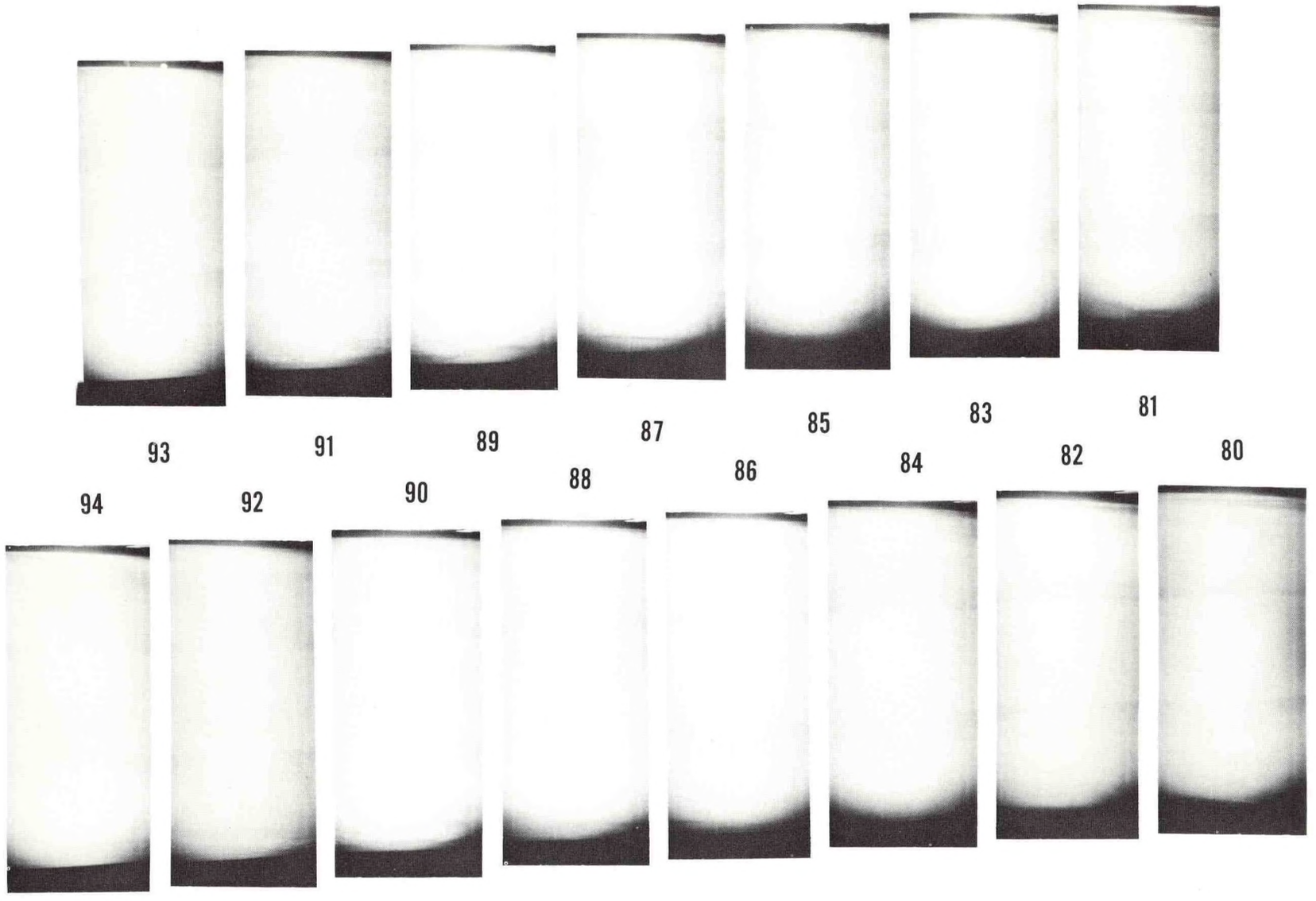


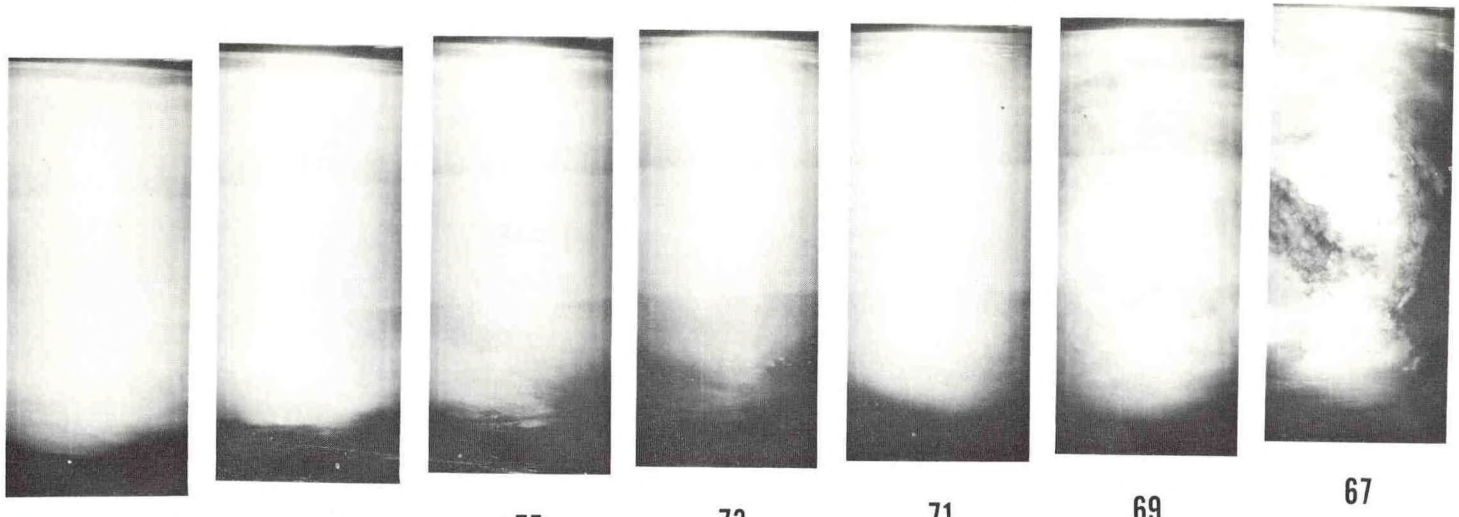

-18°
55°
54°
-17°
65 • 1553Z
60 • 1547Z
-16°
55 • 1542Z
-15°
50 • 1537Z
45 • 1531Z
-14°
40 • 1526Z
36 • 1522Z
-13°
LOCATION MAP
JUNE 21, 1969
50,000 FT.
EAST LEG
55°
54°
-12°



B57 CLOUD PHOTOS
50,000 FT
JUNE 21, 1969
EAST LEG



B57 CLOUD PHOTOS
50,000 FT.
JUNE 21, 1969
NORTH LEG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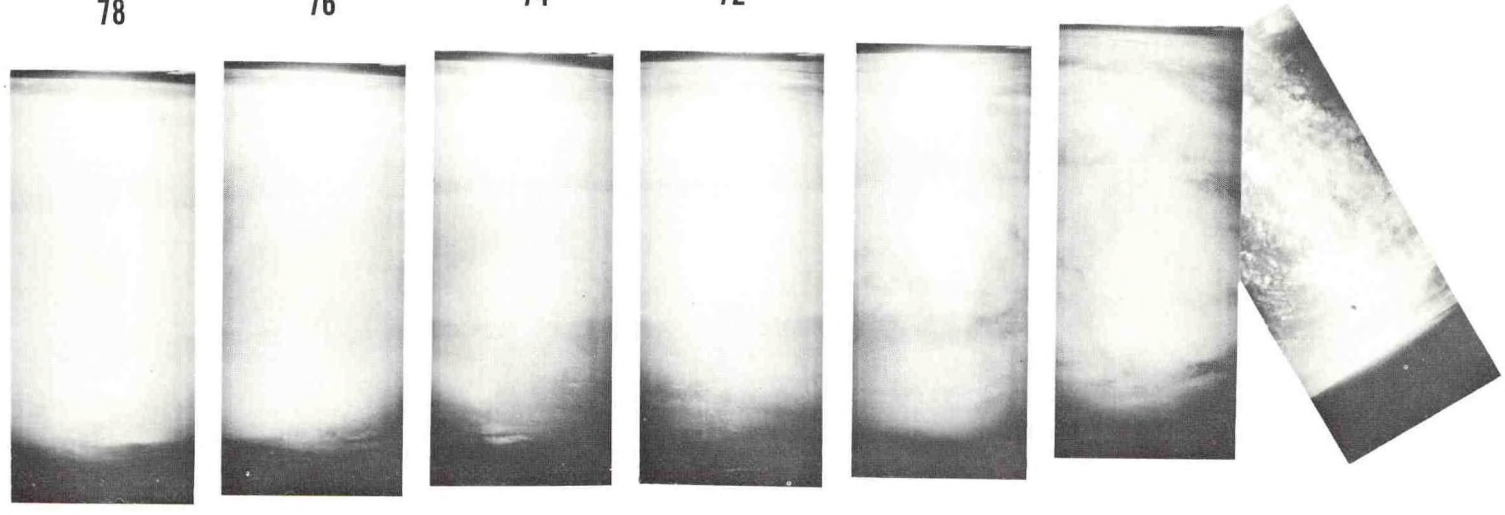
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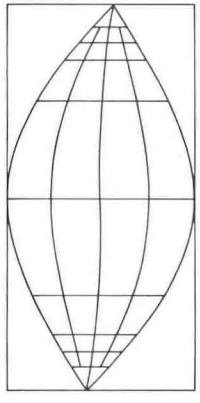
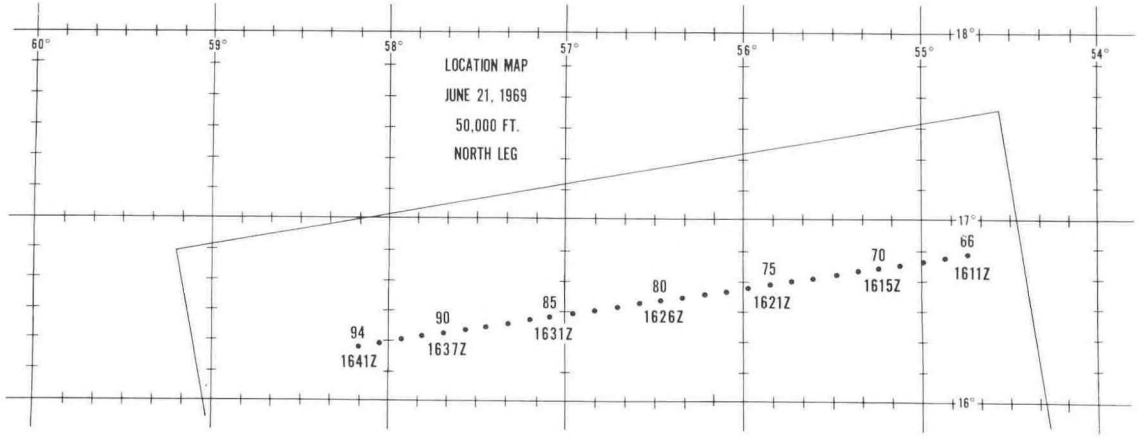
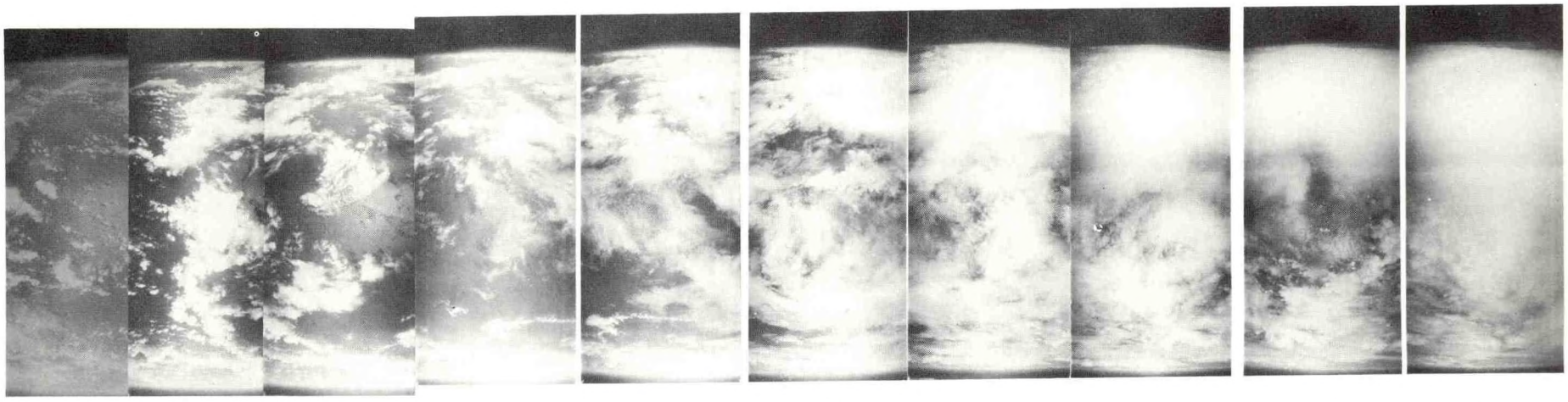



LOCATION MAP
JUNE 21, 1969
50,000 FT.
NORTH LEG
60°
59°
58°
57°
56°
55°
54°
18°
17°
16°
94
1641Z
90
1637Z
85
1631Z
80
1626Z
75
1621Z
70
1615Z
66
1611Z



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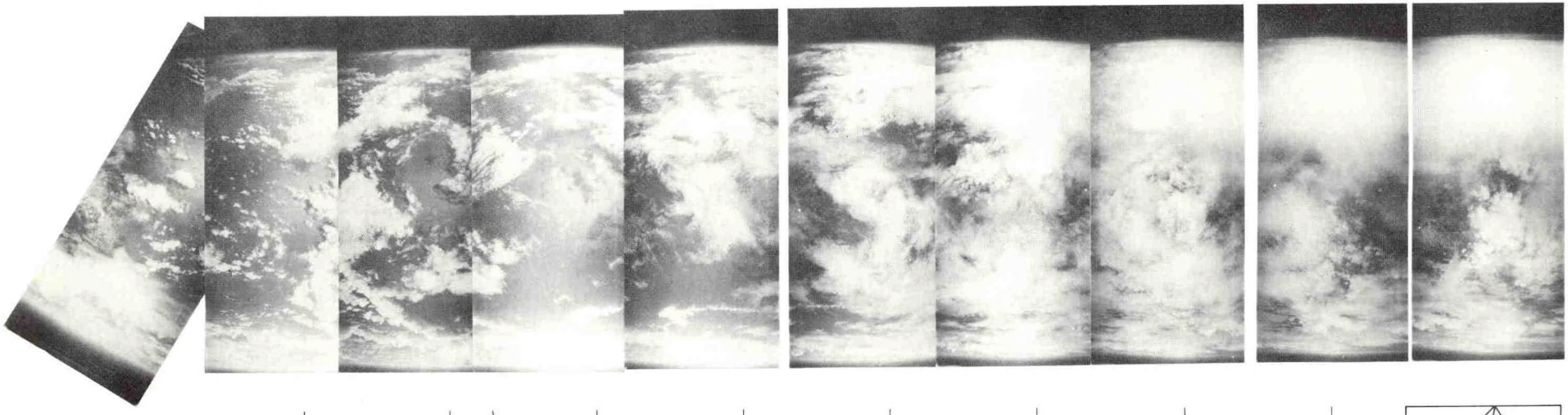
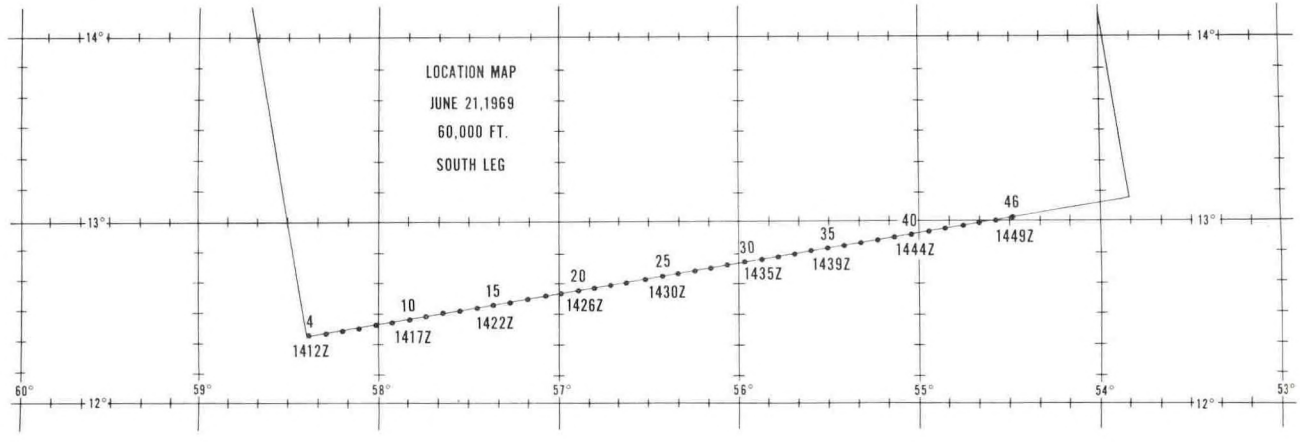
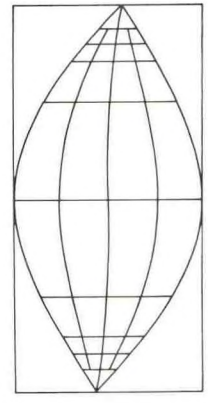
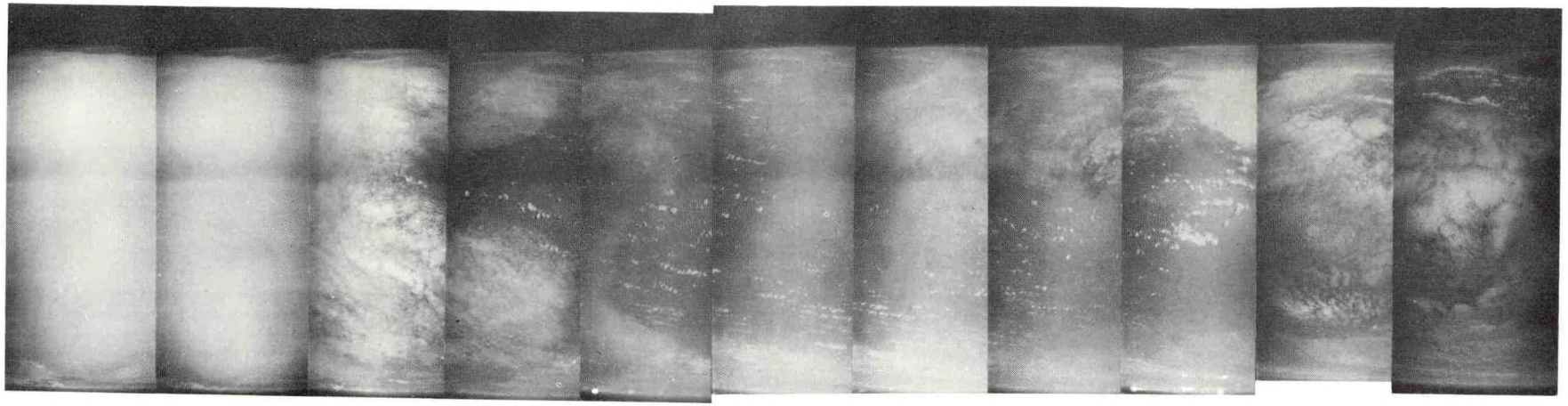
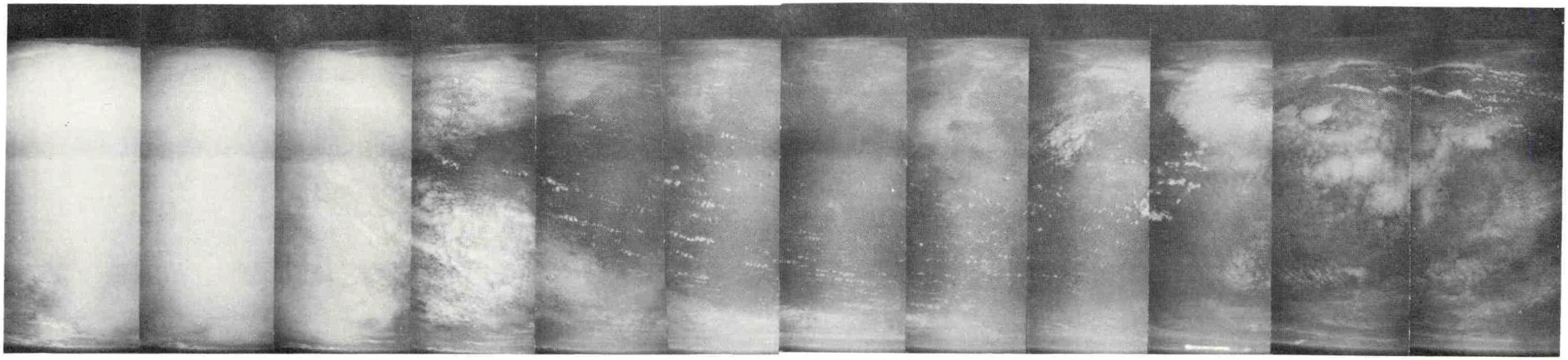


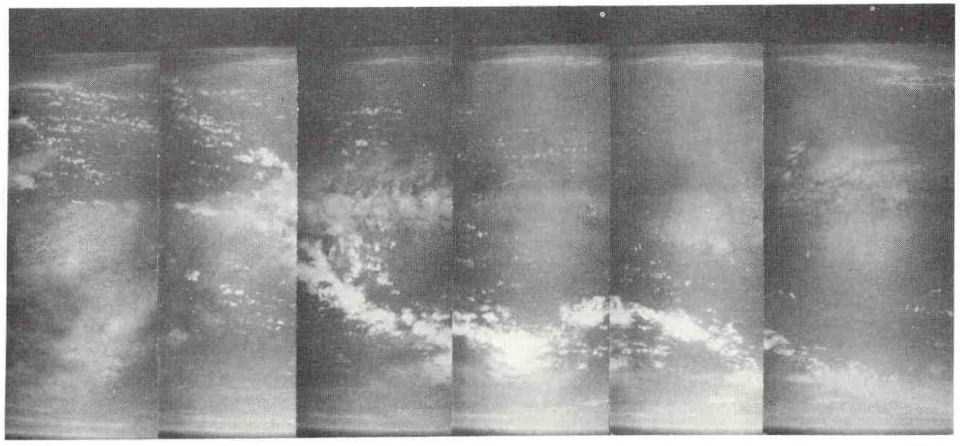








B57 CLOUD PHOTOS
60,000 FT.
JUNE 21, 1969
SOUTH LEG



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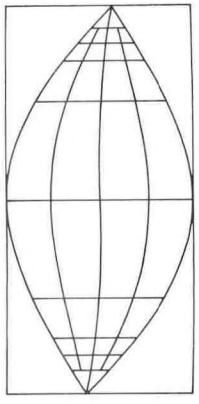
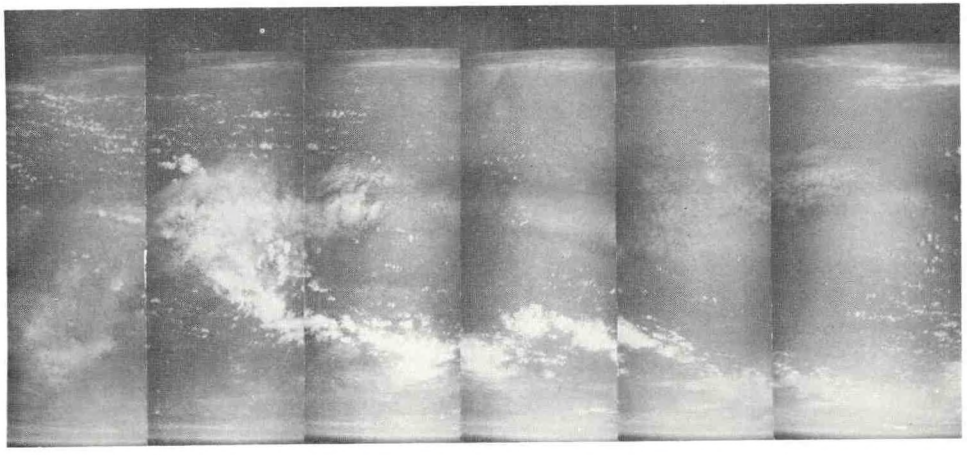
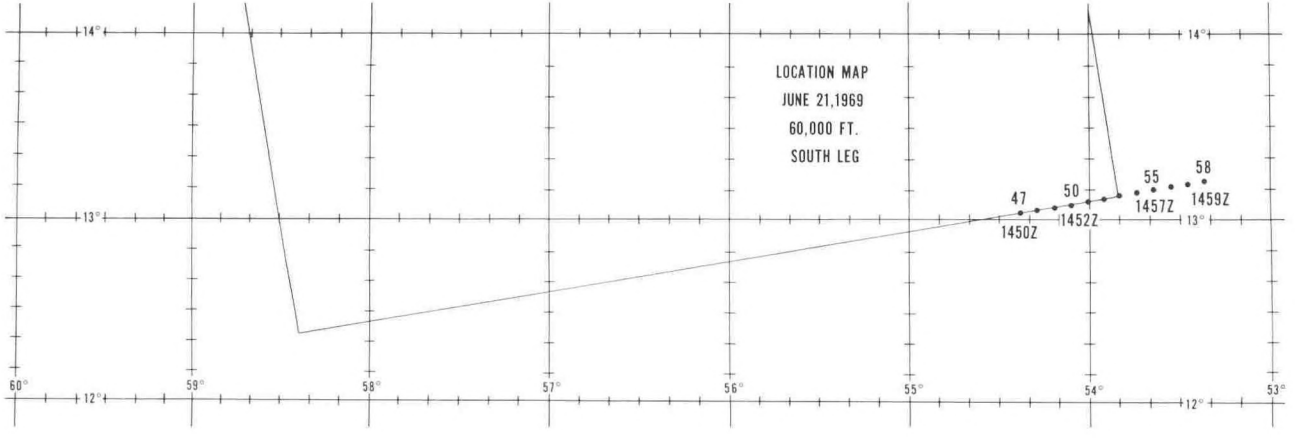
B57 CLOUD PHOTOS
60,000 FT.
JUNE 21,1969

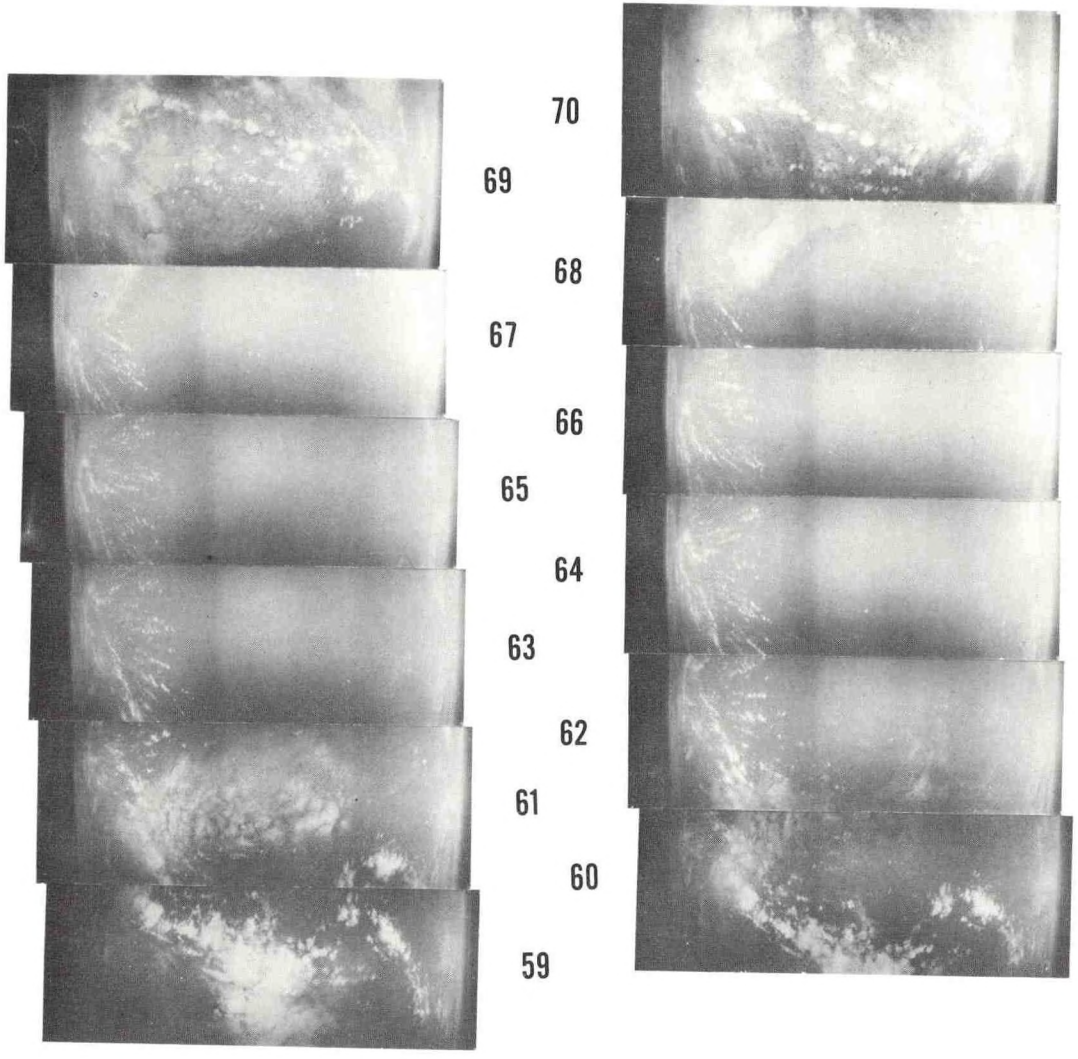
SOUTH LEG







EAST LEG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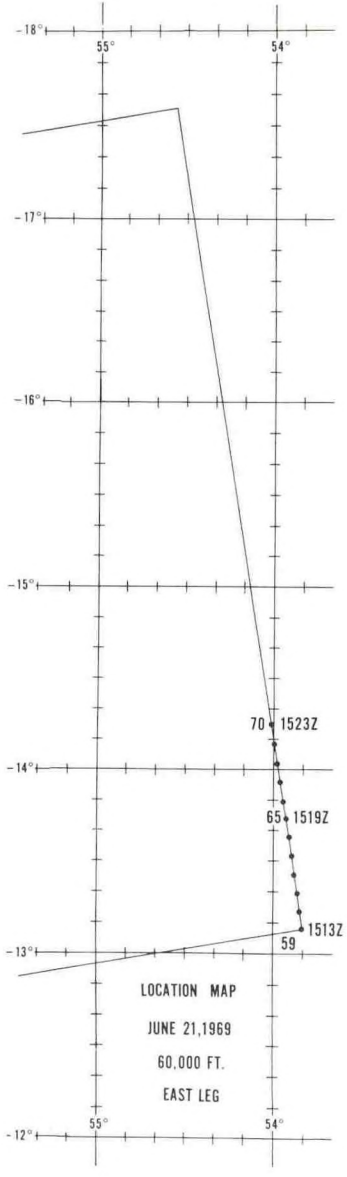
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70 1523Z
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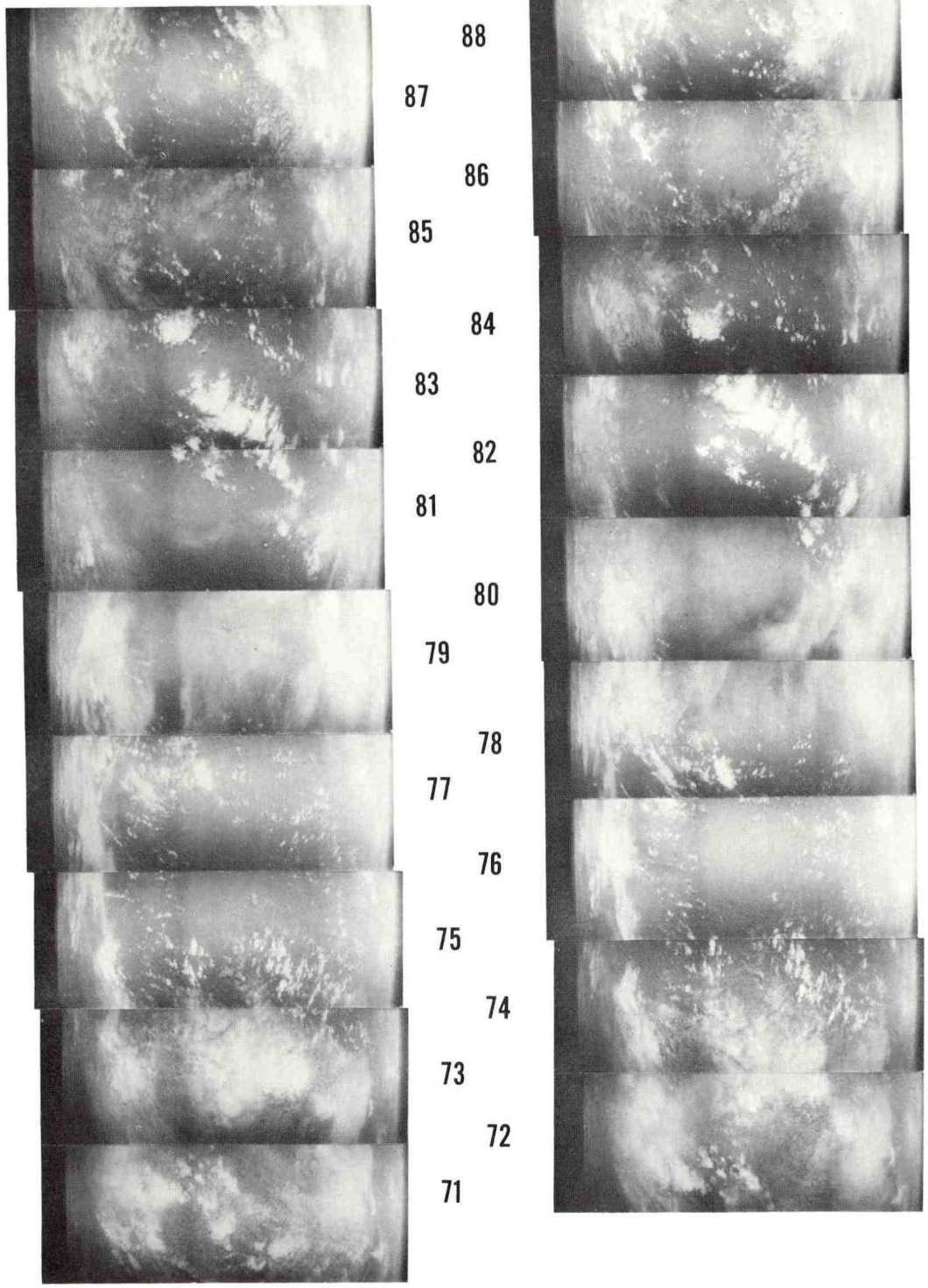
-13°
LOCATION MAP
JUNE 21,1969
60,000 FT.
EAST LEG
55°
54°
-12°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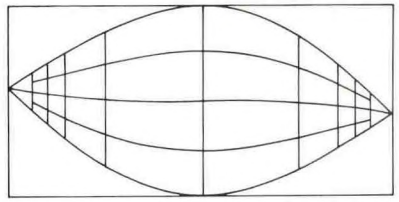

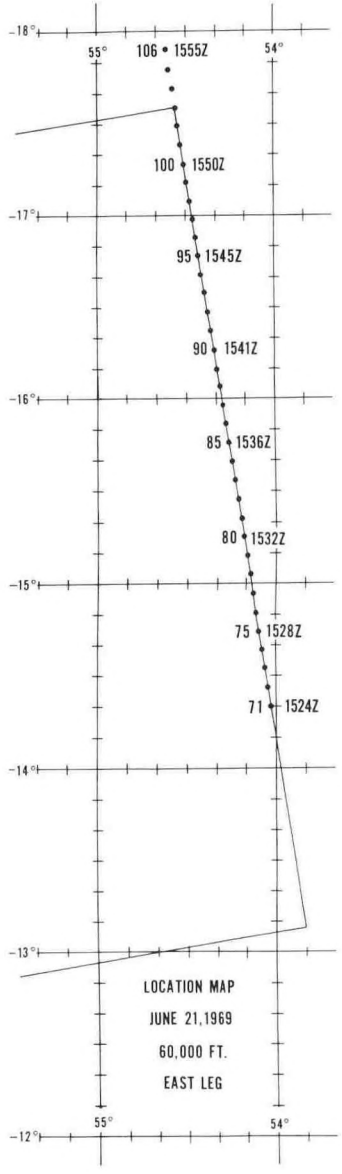
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106 • 1555Z
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100 • 1550Z
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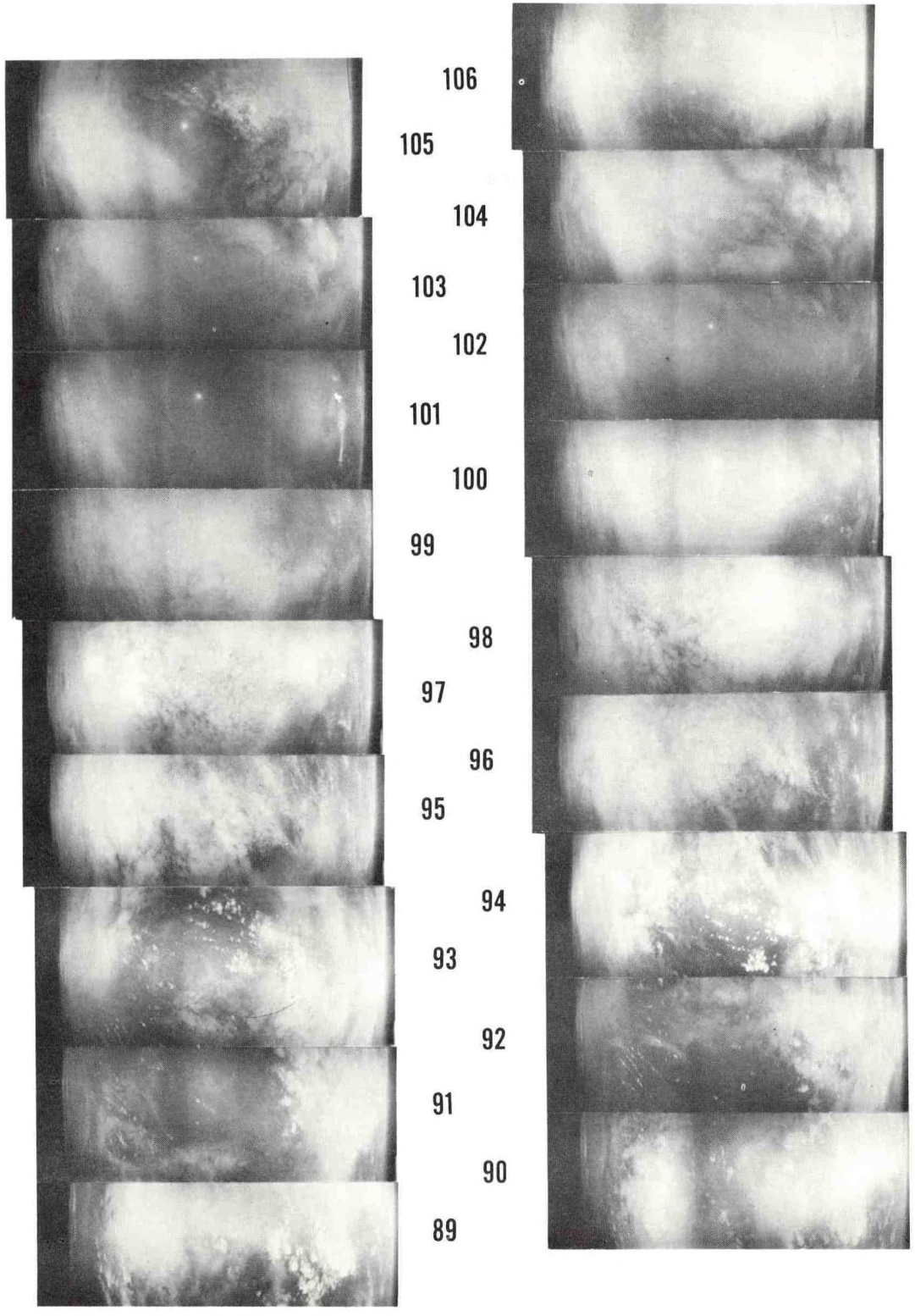
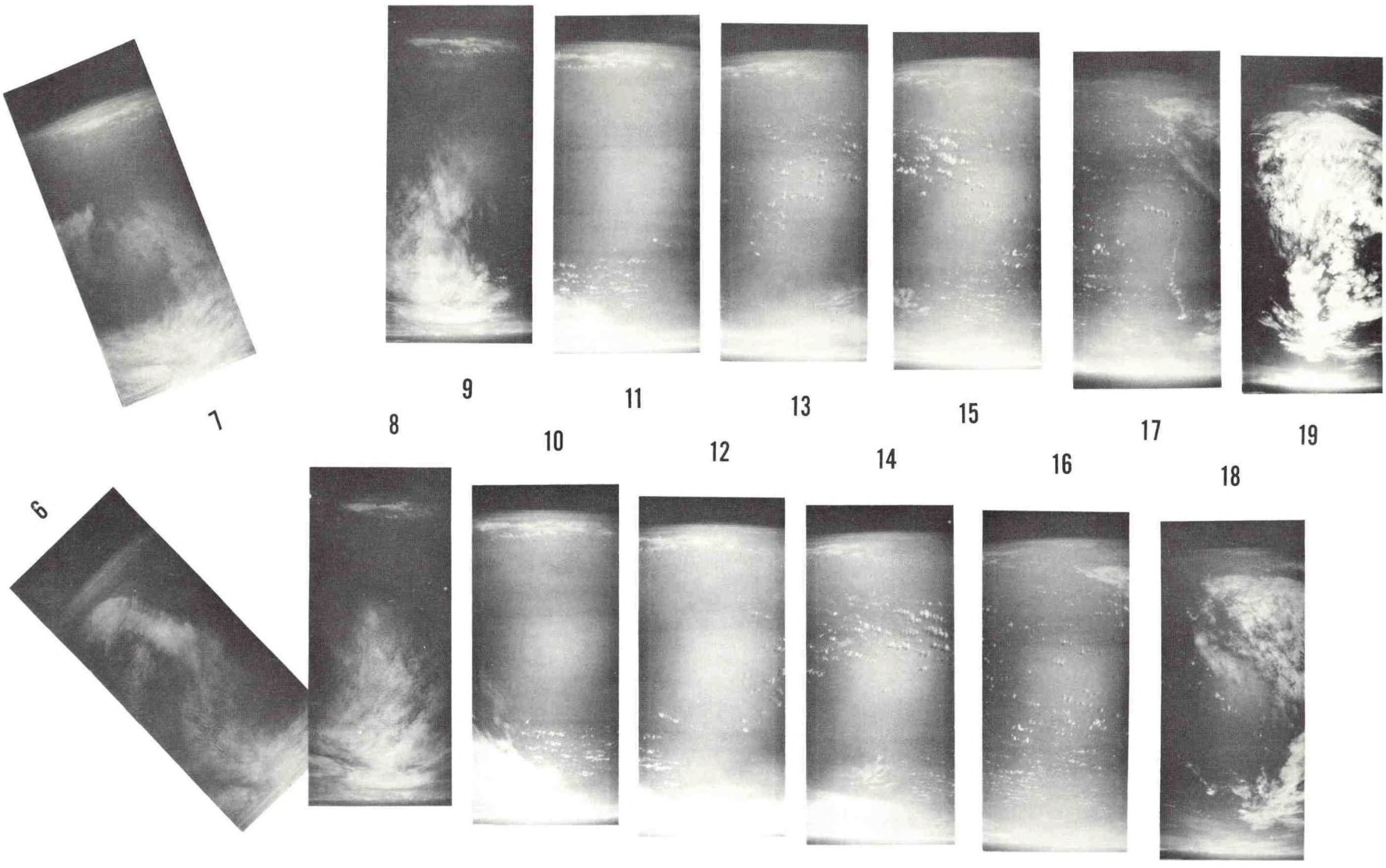
95 • 1545Z
90 • 1541Z
-16°
85 • 1536Z
80 • 1532Z
-15°
75 • 1528Z
71 • 1524Z
-14°
-13°
LOCATION MAP
JUNE 21,1969
60,000 FT.
EAST LEG
55°
54°
-12°



B57 CLOUD PHOTOS
60,000 FT.
JUNE 21, 1969
EAST LEG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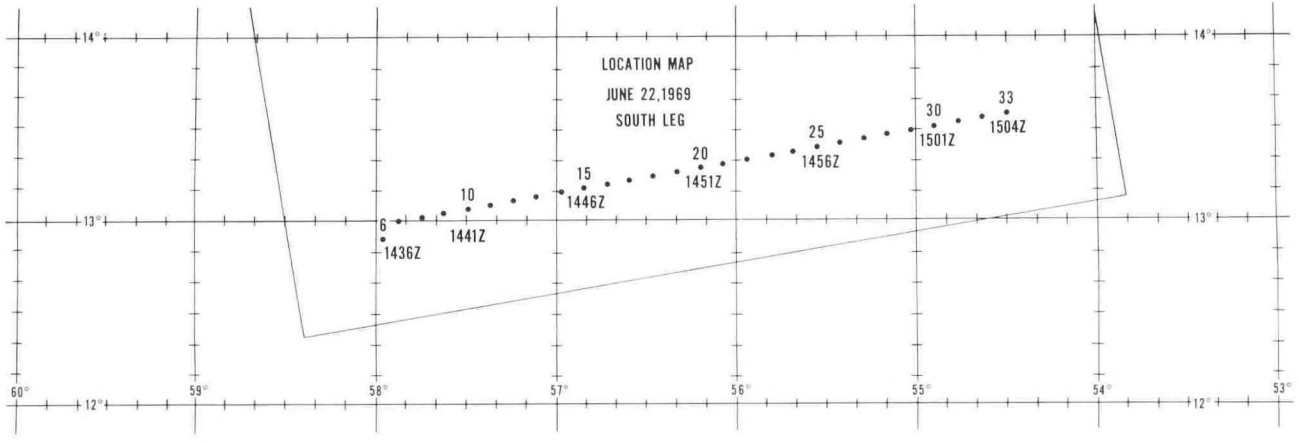
LOCATION MAP
JUNE 22,1969
SOUTH LEG
6
1436Z
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1441Z
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1446Z
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1451Z
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1456Z
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1501Z
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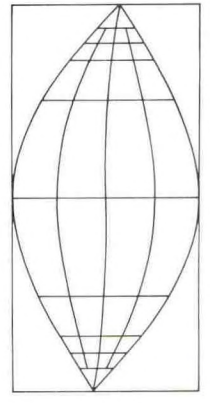
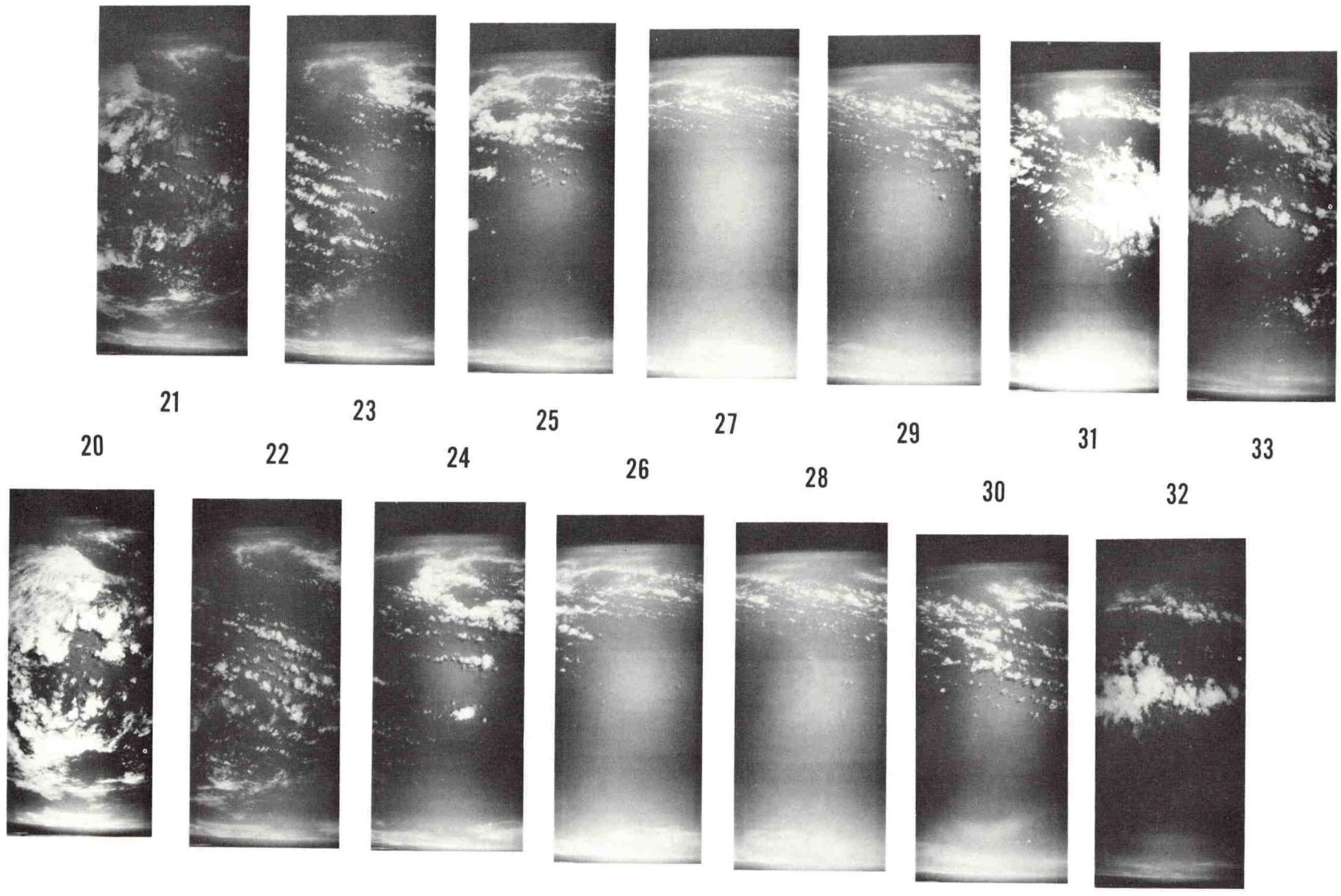
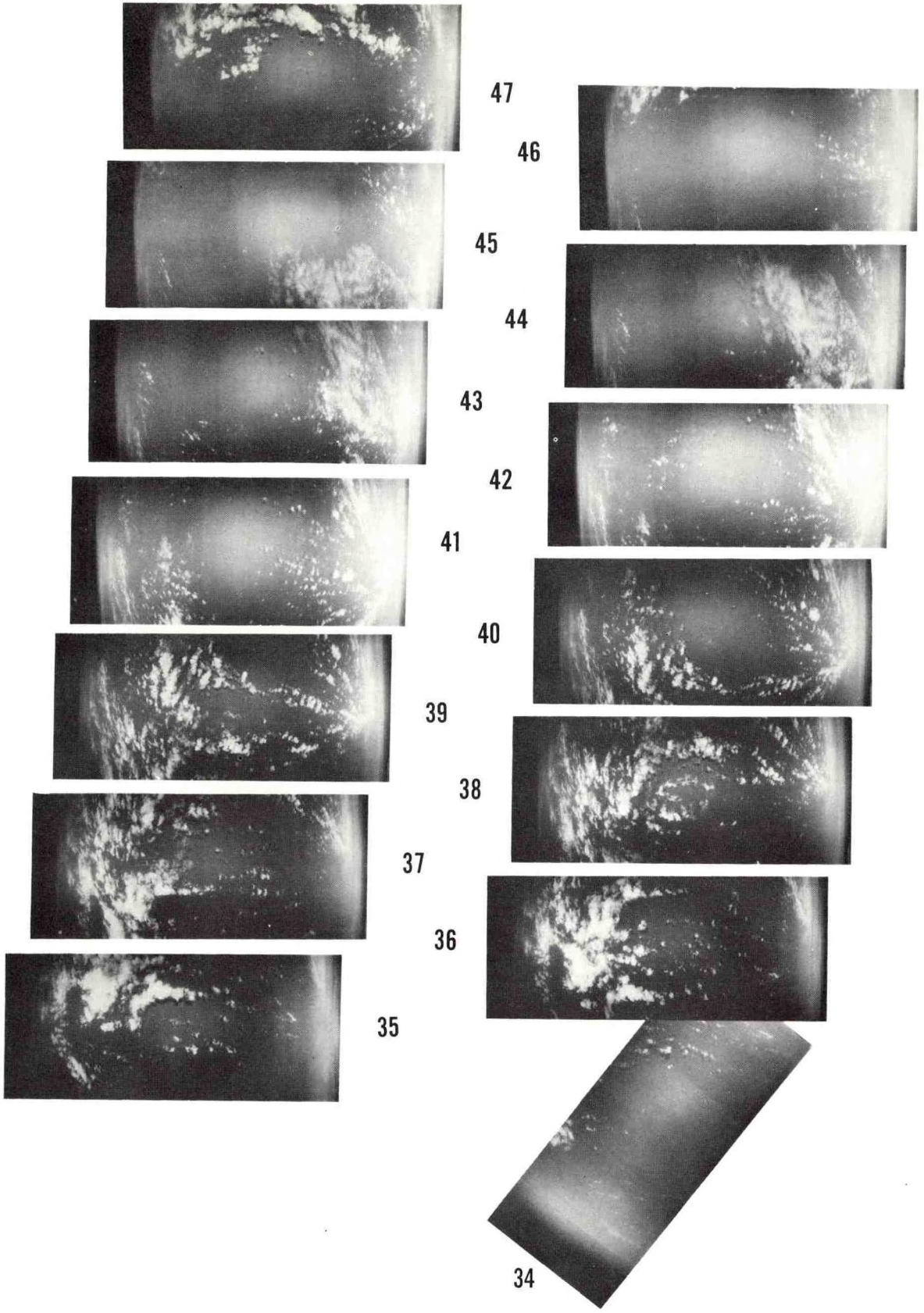




B57 CLOUD PHOTOS
50,000 FT.
JUNE 22, 1969
SOUTH LEG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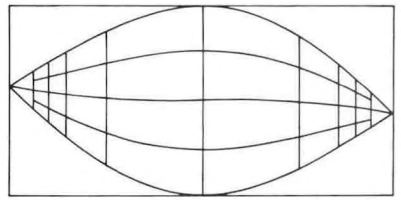

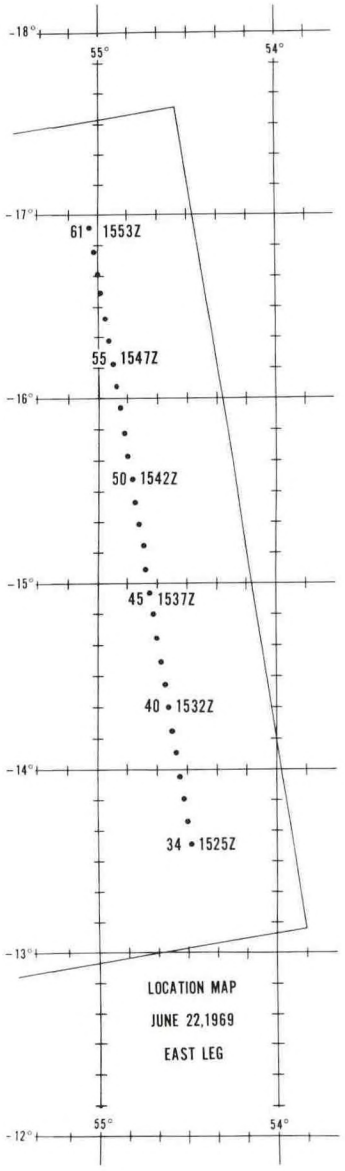
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61 • 1553Z
55 • 1547Z
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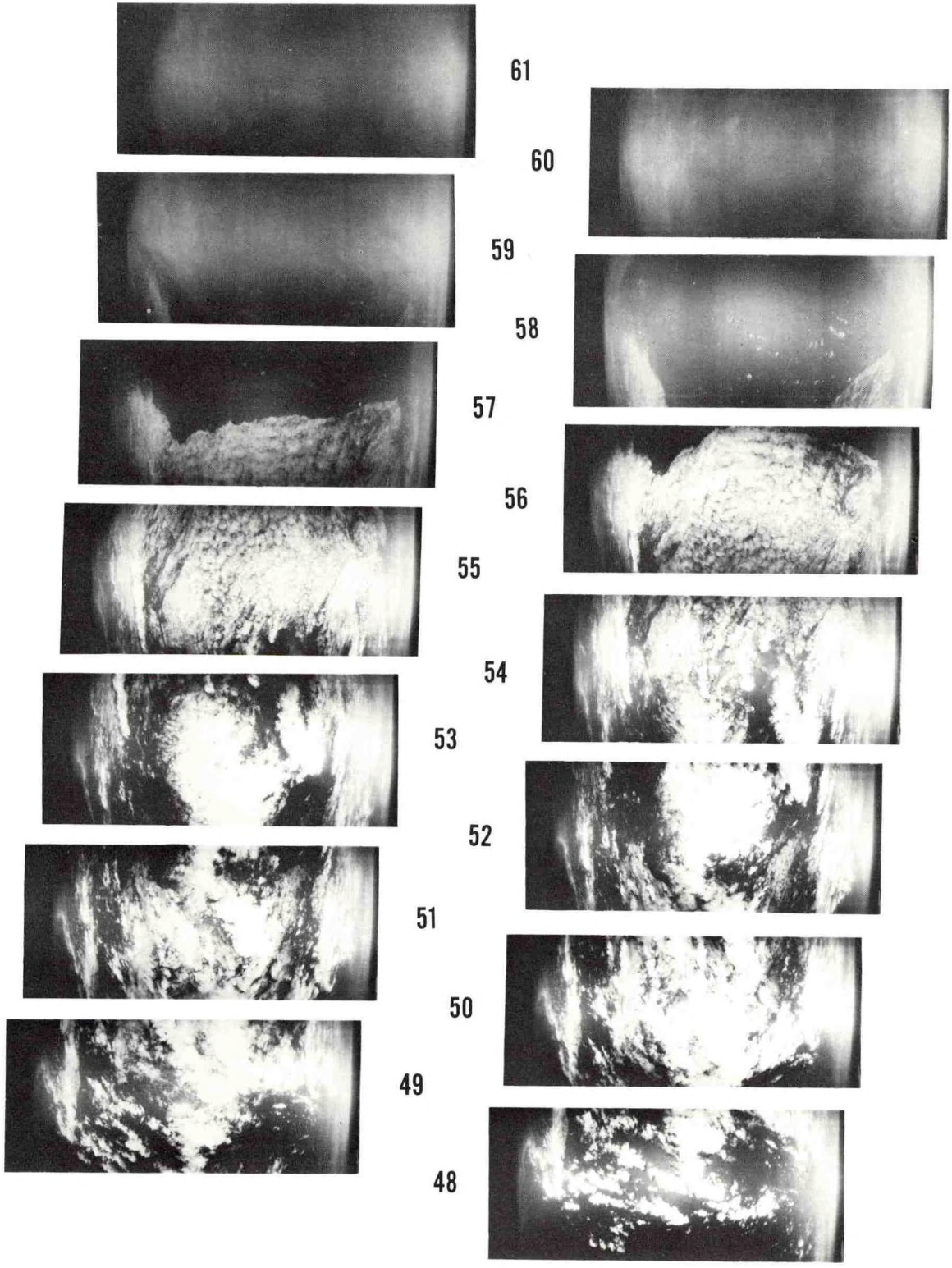
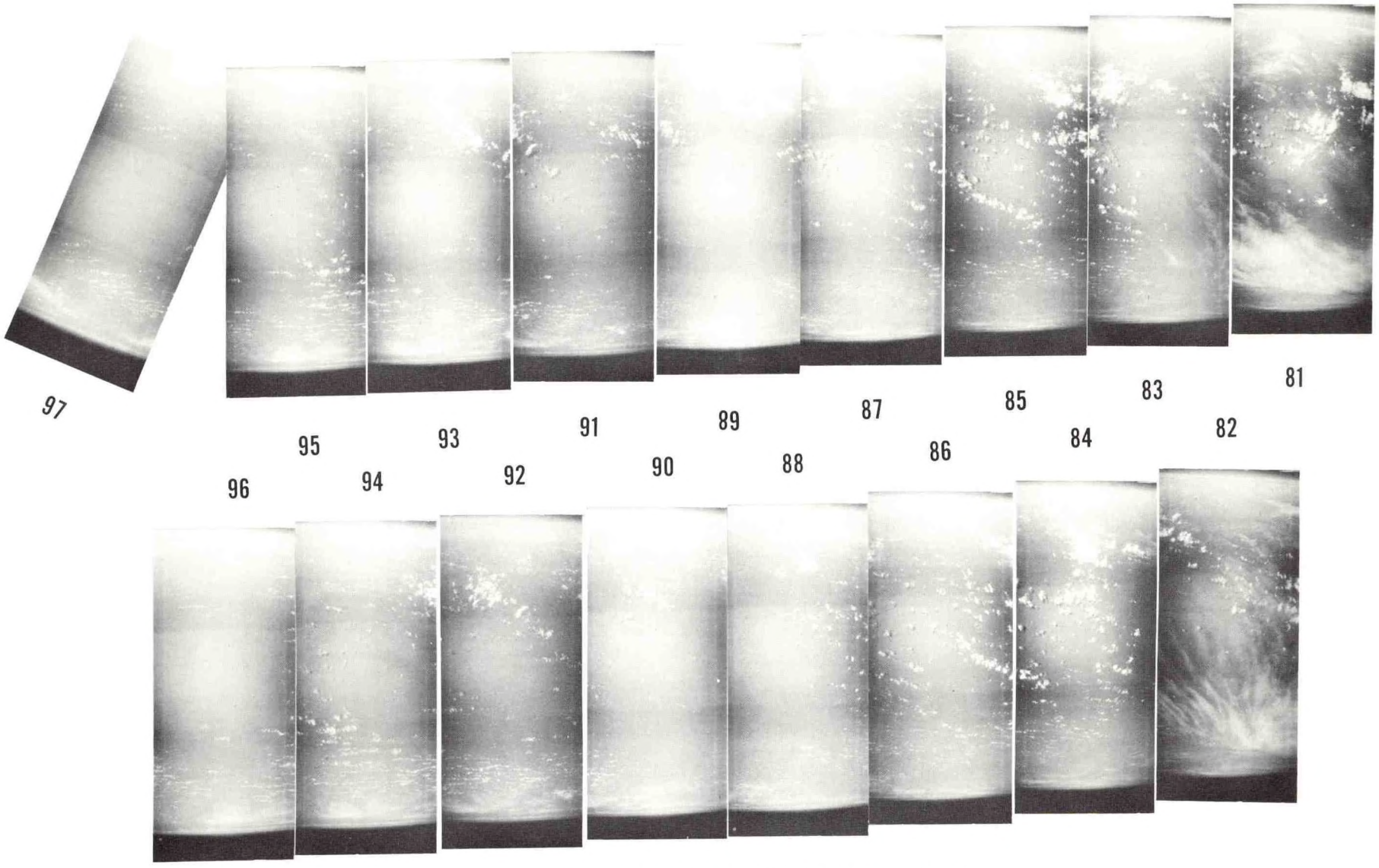
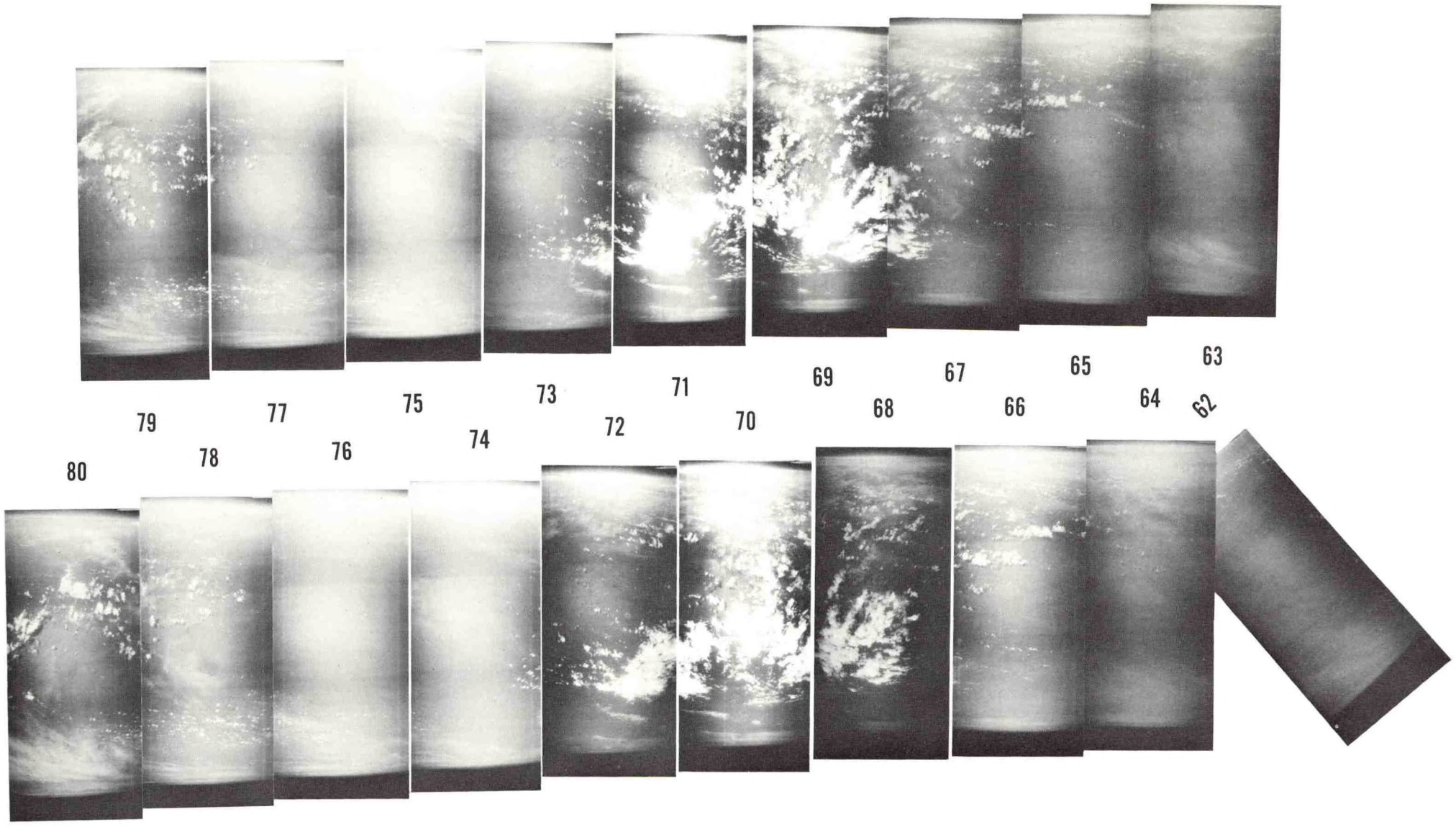
-14°
34 • 1525Z
-13°
LOCATION MAP
JUNE 22,1969
EAST LEG
55°
54°
-12°



B57 CLOUD PHOTOS
50,000 FT.
JUNE 22, 1969
EAST LEG



B57 CLOUD PHOTOS
50,000 FT.
JUNE 22, 1969
NORTH LEG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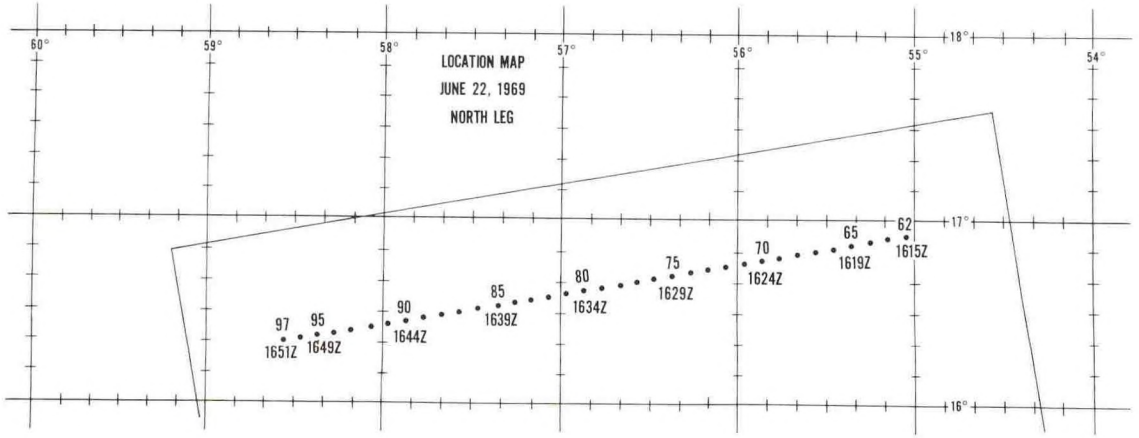
LOCATION MAP
JUNE 22, 1969
NORTH LEG
60°
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18°
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1651Z
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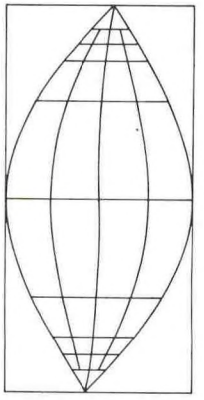

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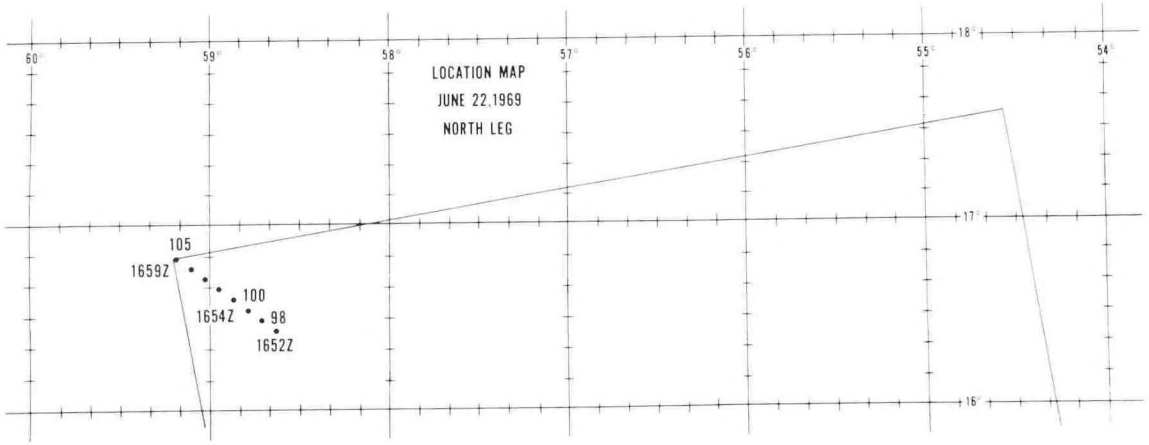
LOCATION MAP
JUNE 22,1969
NORTH LEG
60°
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1654Z
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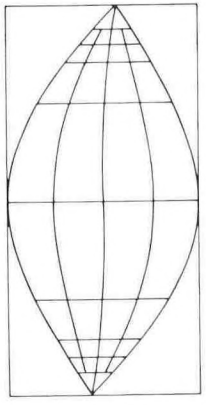

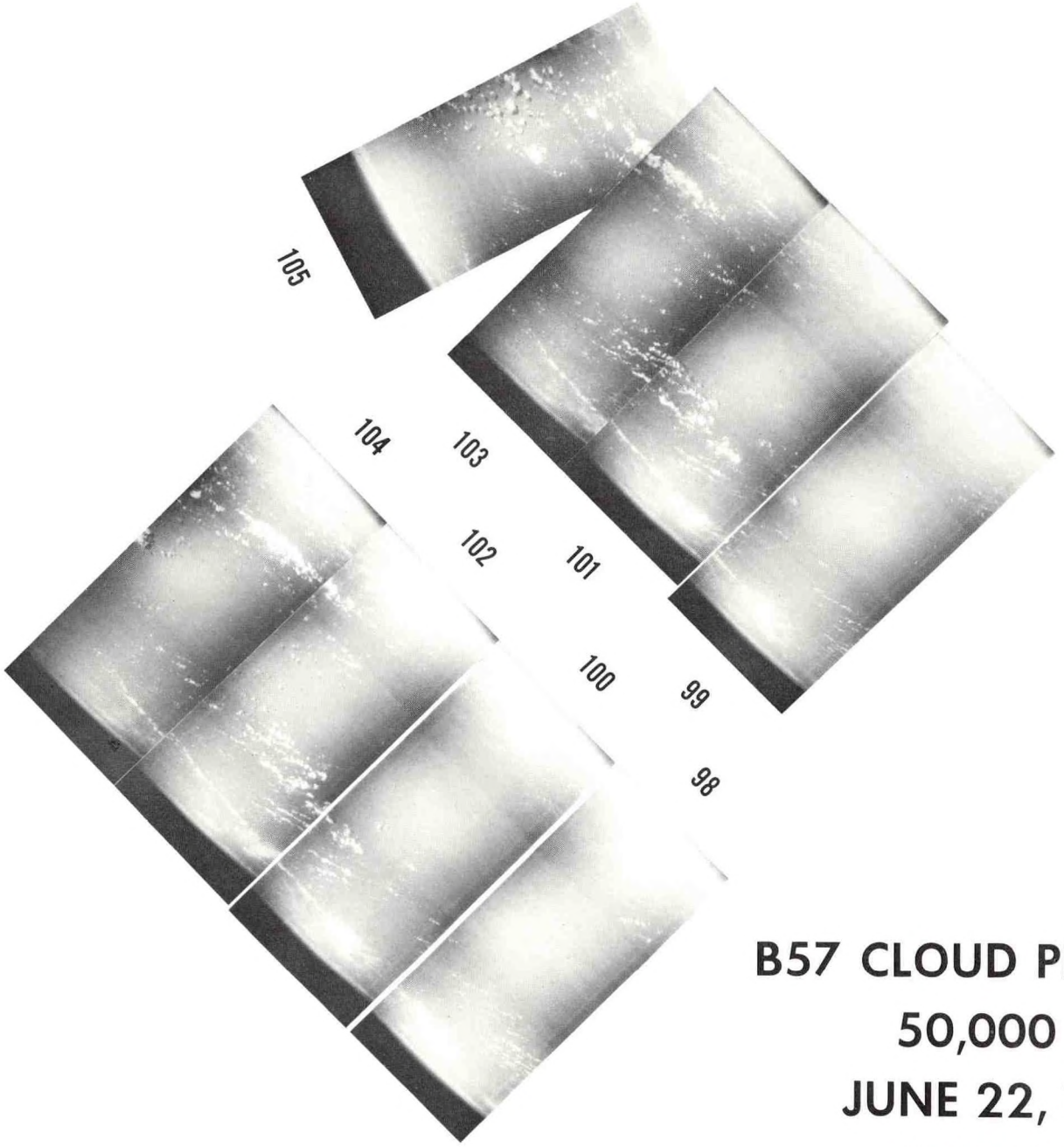

B57 CLOUD PHOTOS
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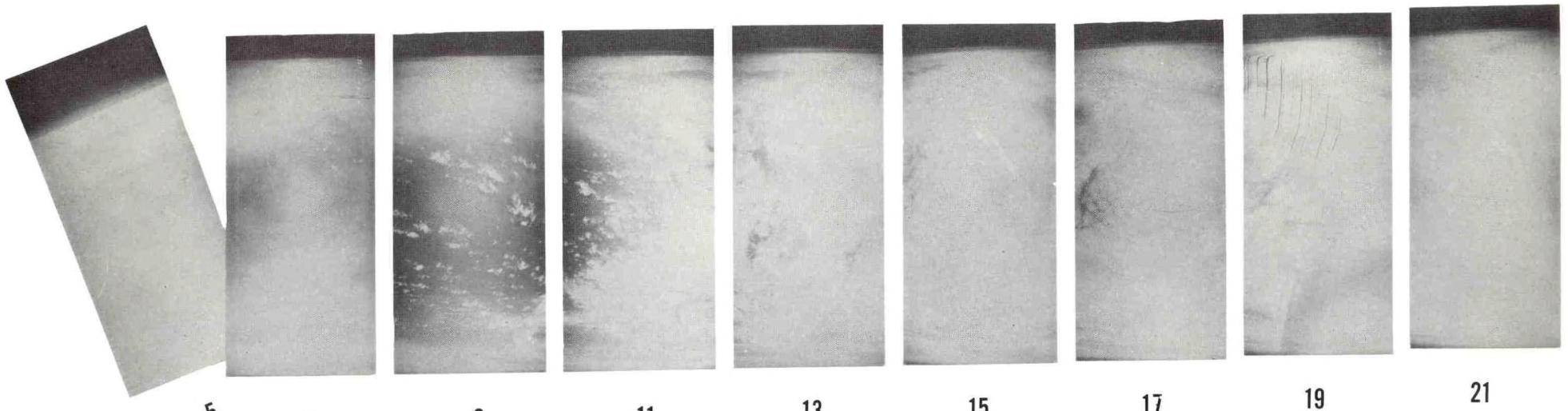
JUNE 22, 1969
NORTH LEG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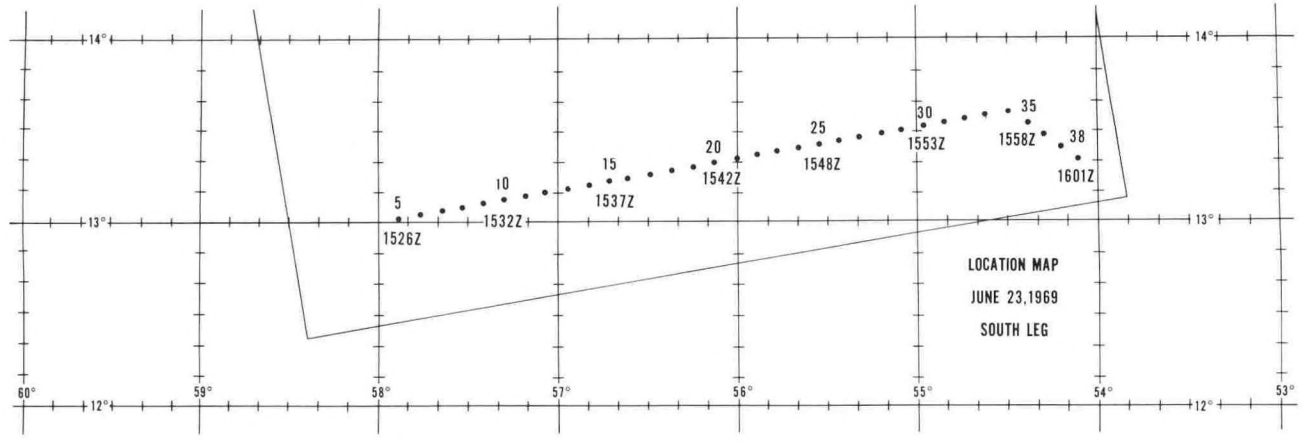
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1537Z
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1542Z
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1558Z
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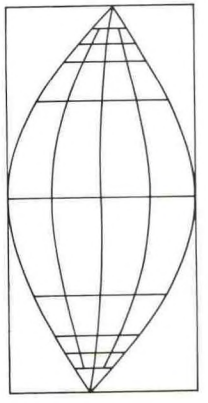
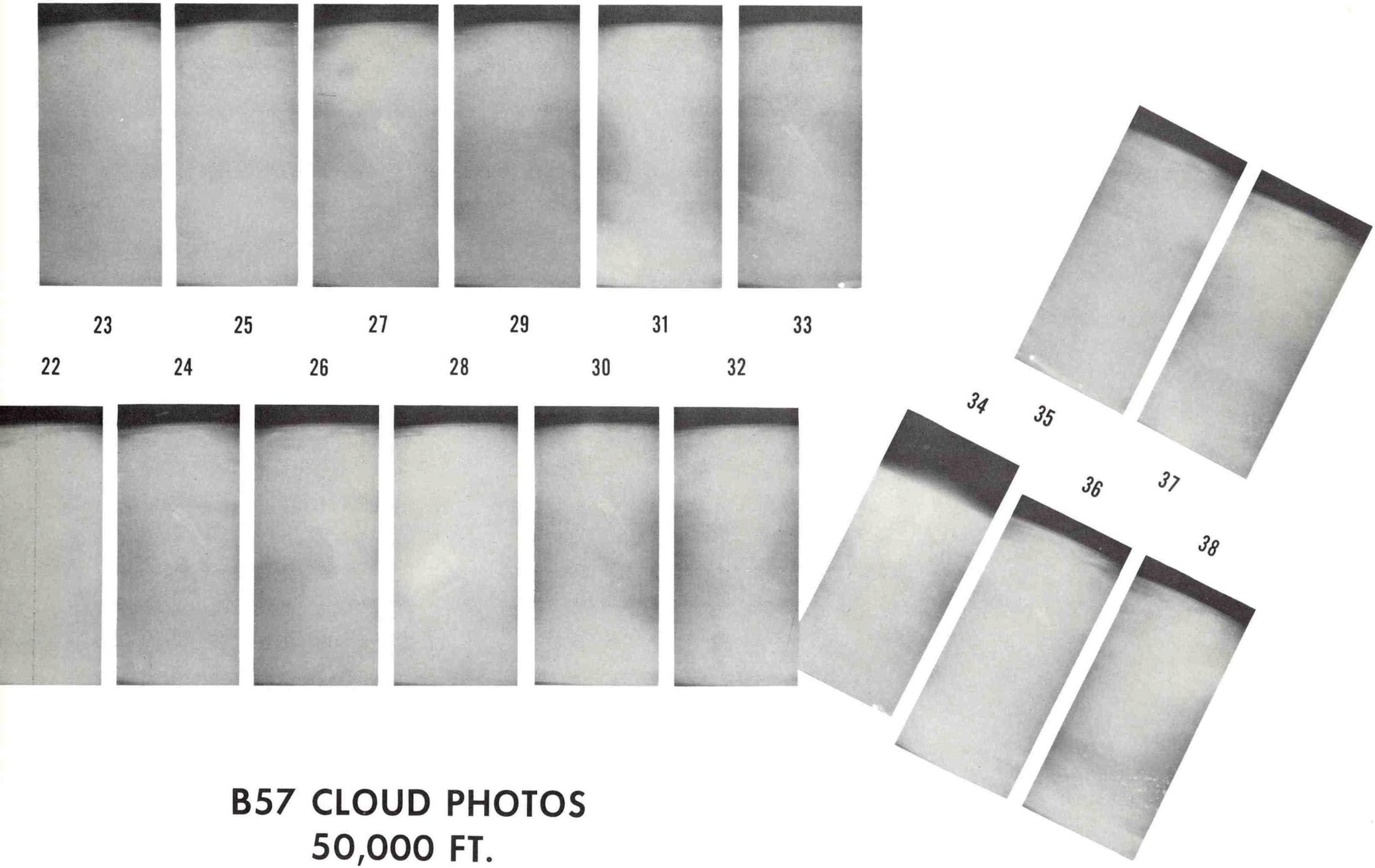
1601Z
LOCATION MAP
JUNE 23,1969
SOUTH LEG





B57 CLOUD PHOTOS
50,000 FT.
JUNE 23,1969
SOUTH LEG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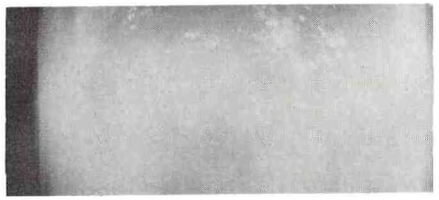
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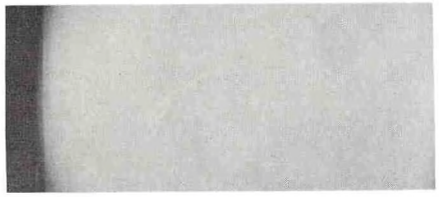
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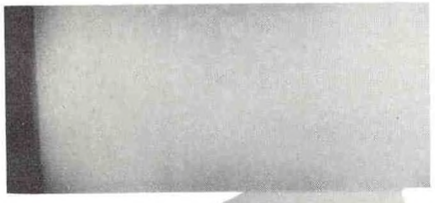
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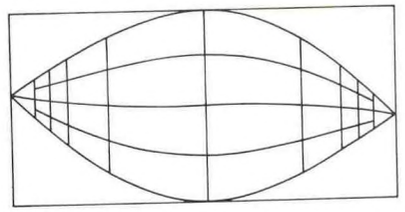

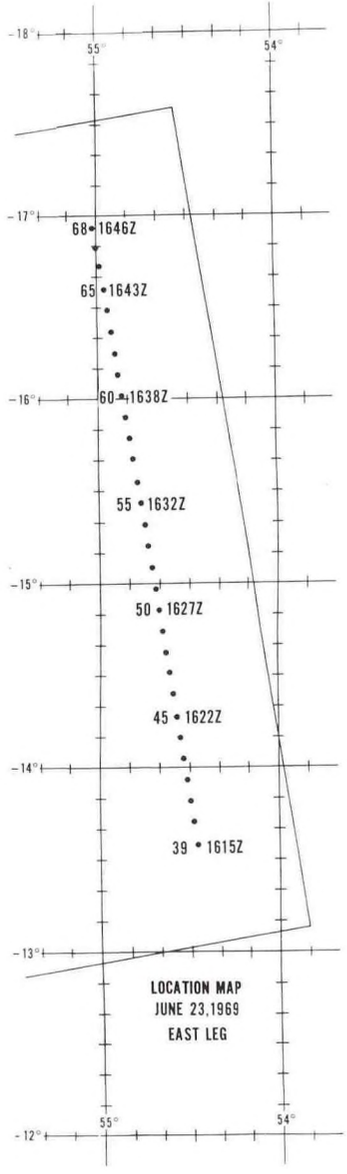
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LOCATION MAP
JUNE 23,1969
EAST LEG
55°
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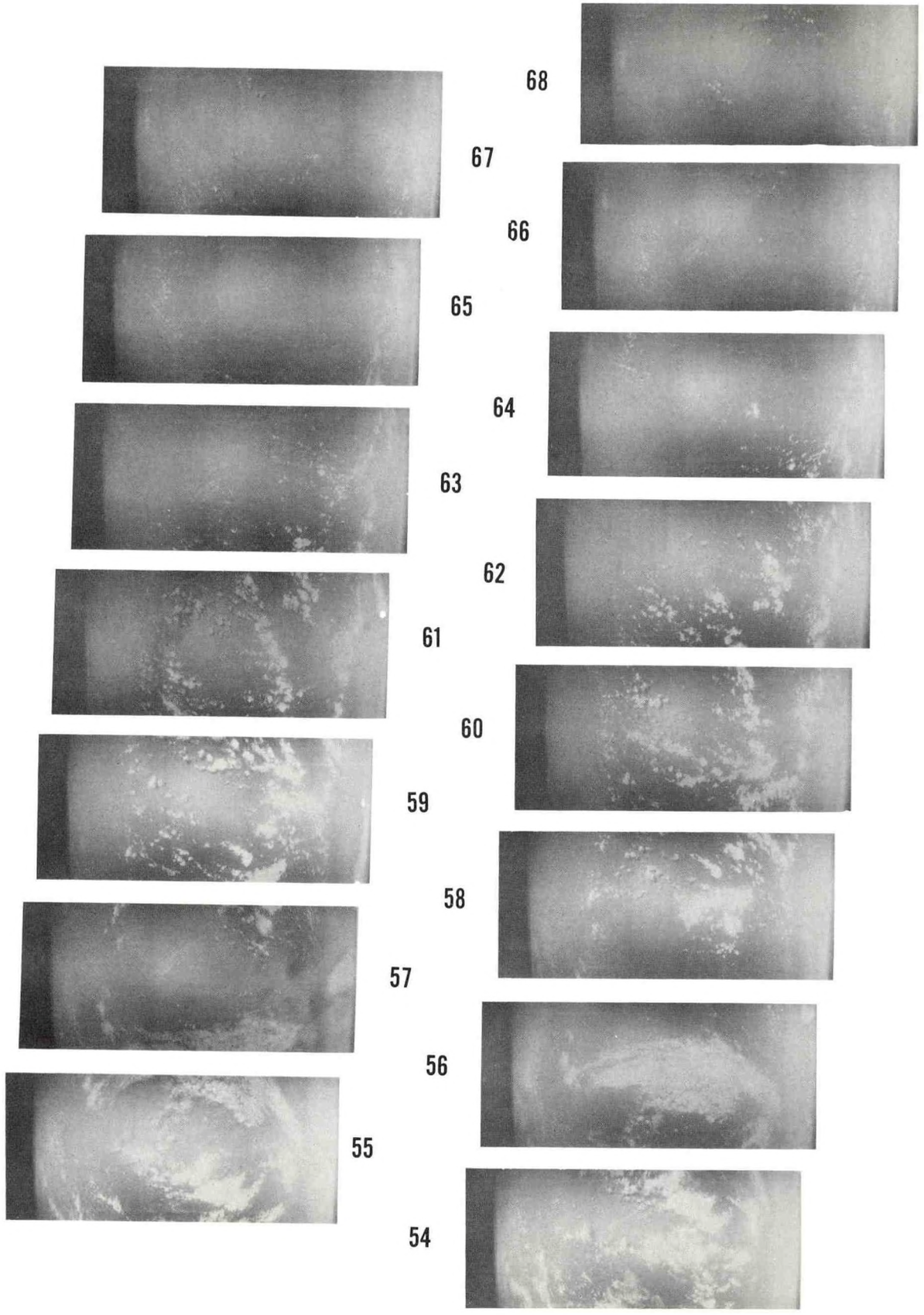
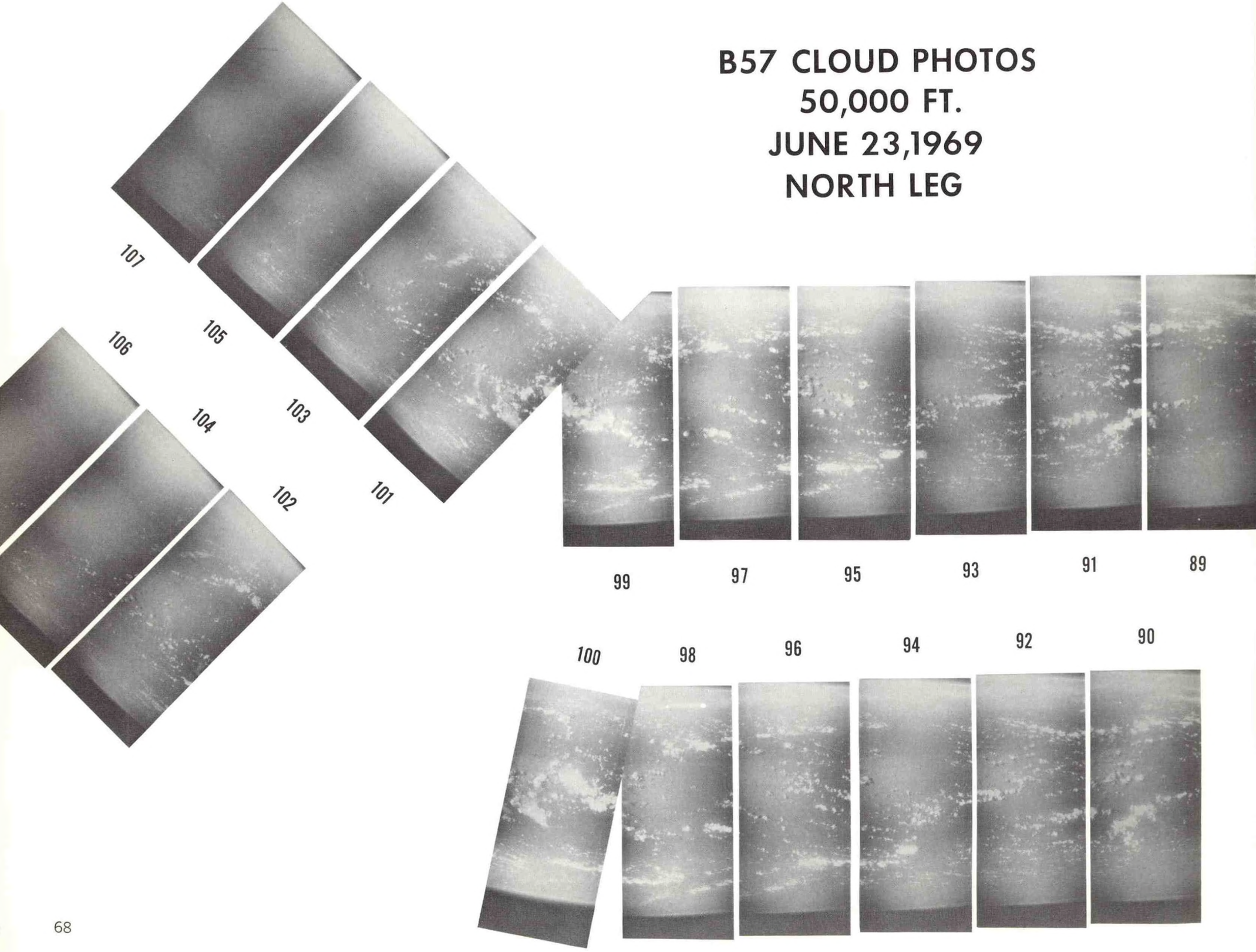
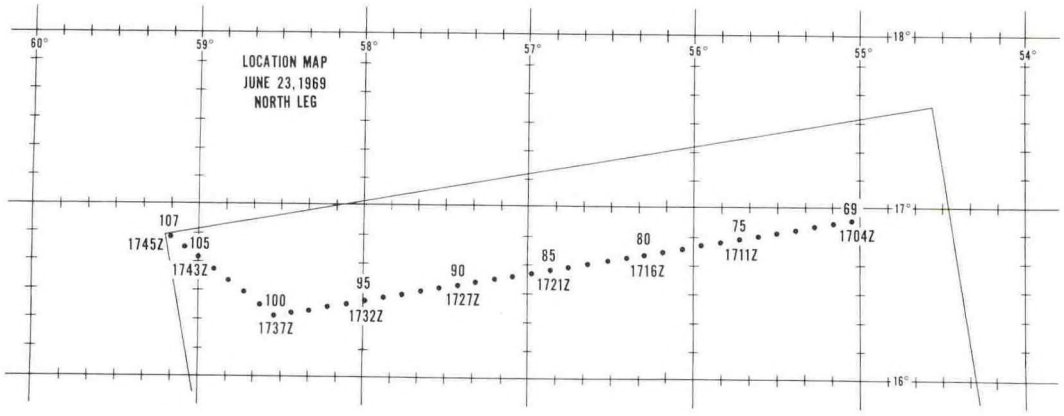


B57 CLOUD PHOTOS
50,000 FT.
JUNE 23,1969
EAST LEG

B57 CLOUD PHOTOS
50,000 FT.
JUNE 23,1969
NORTH LEG




LOCATION MAP
JUNE 23, 1969
NORTH LEG
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1745Z
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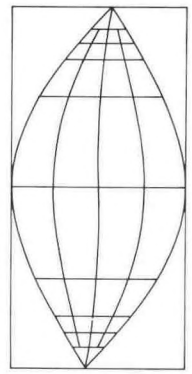

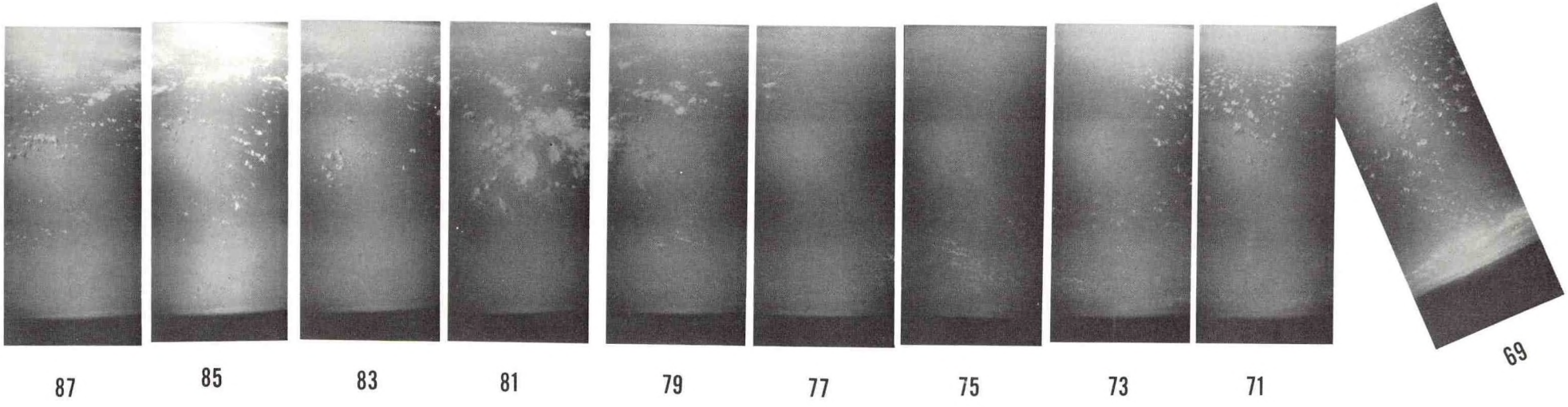
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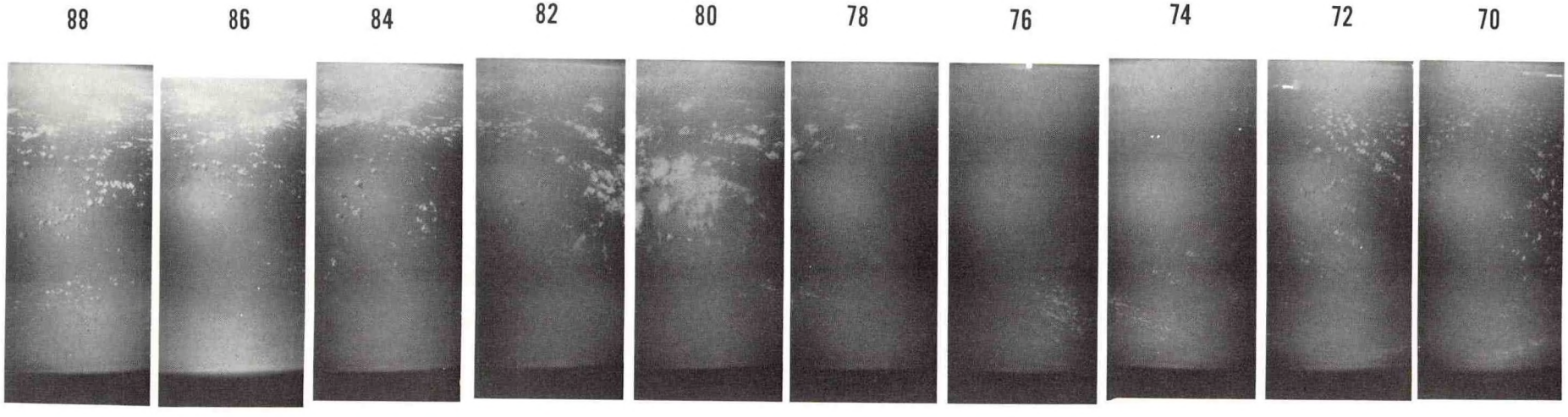
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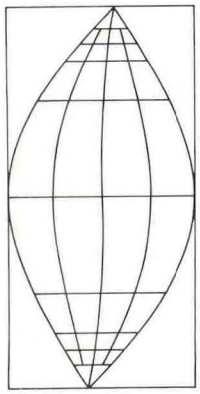

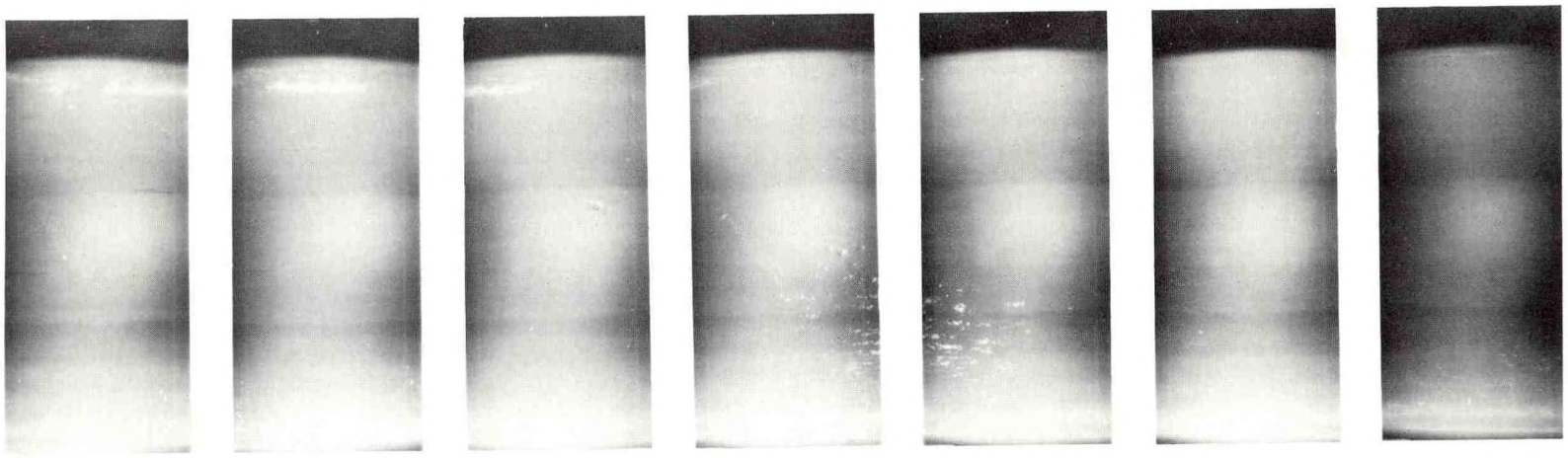

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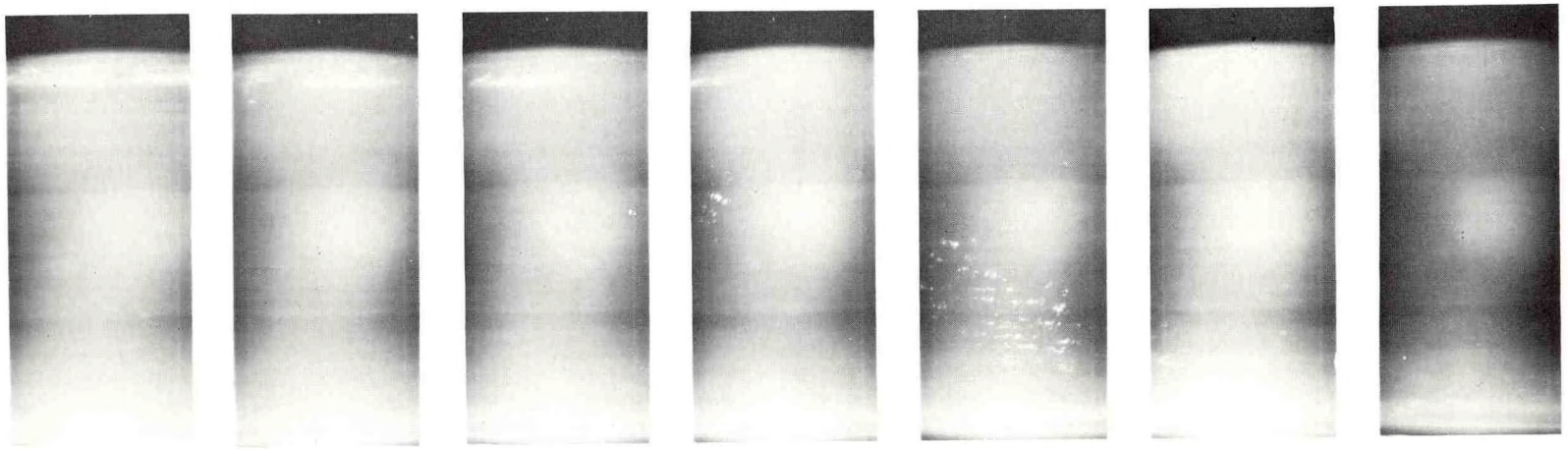
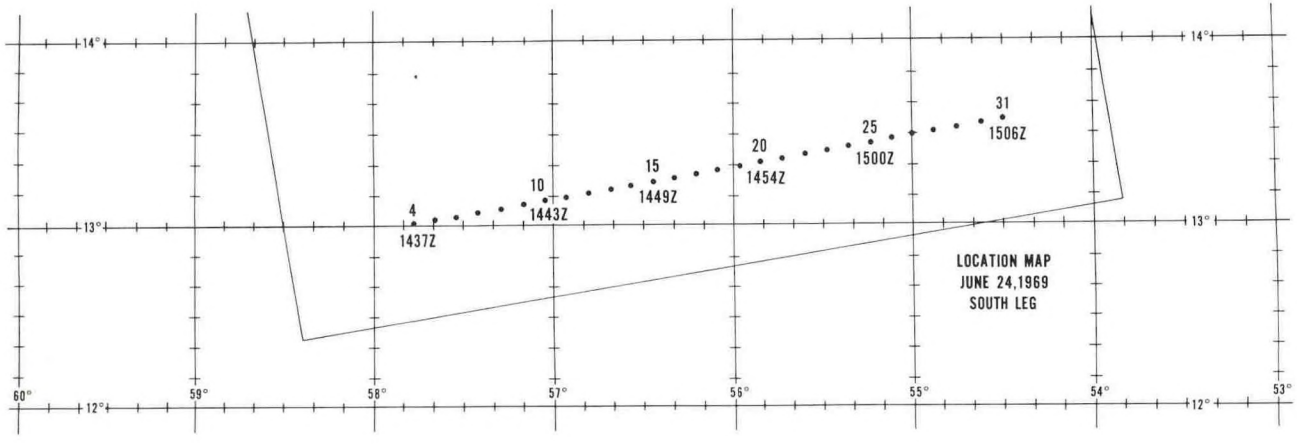
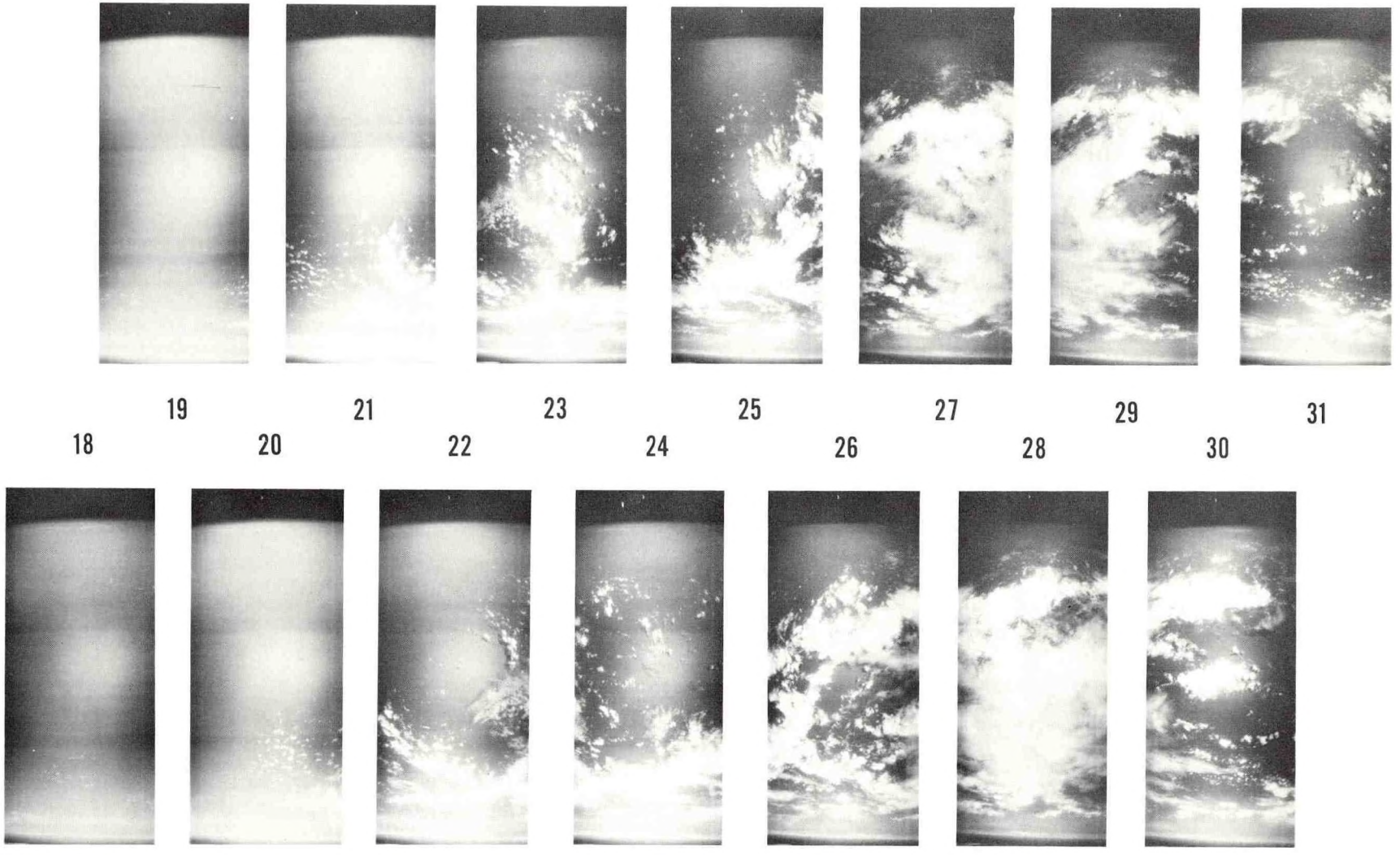
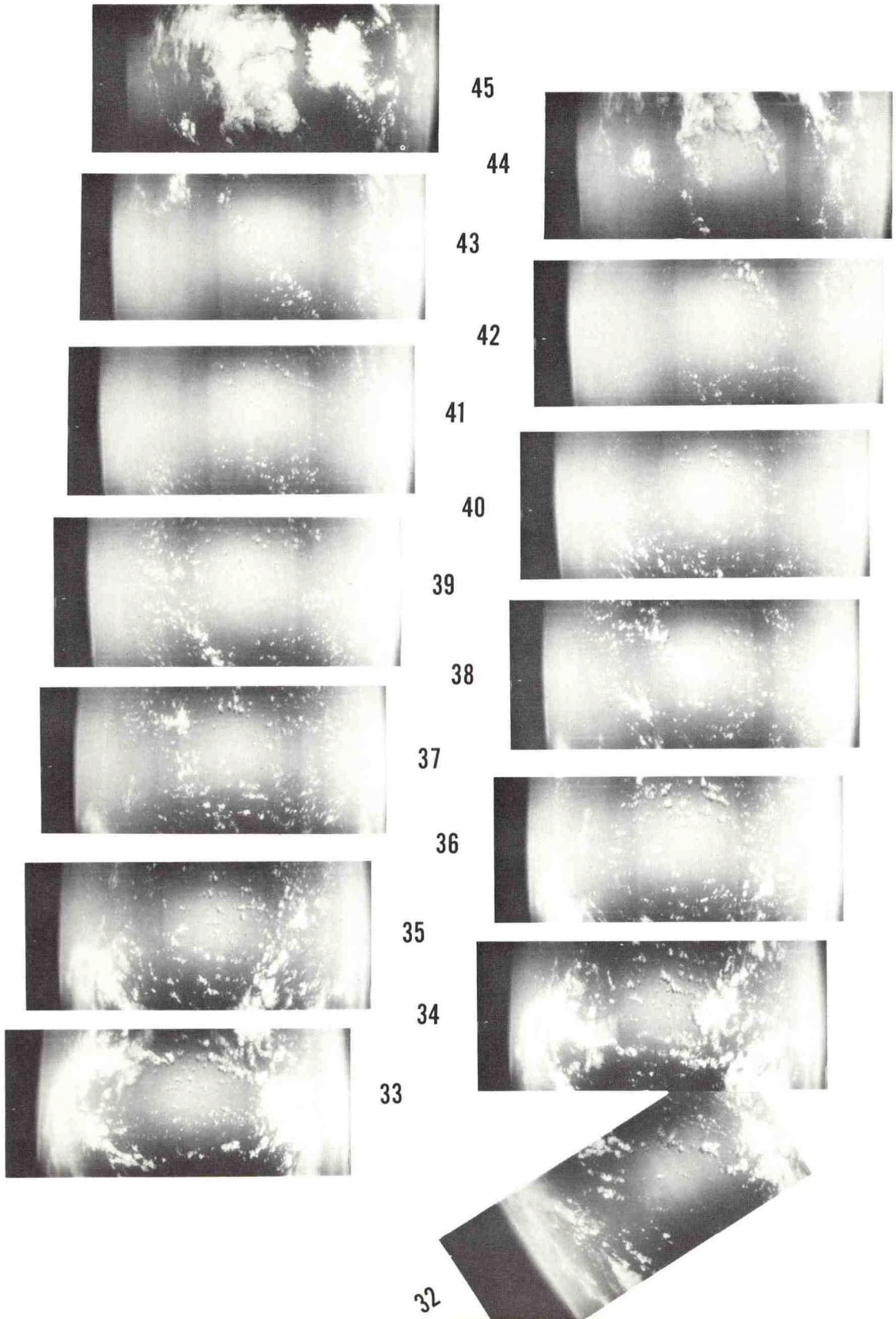






B57 CLOUD PHOTOS
50,000 FT.
JUNE 24, 1969
SOUTH LEG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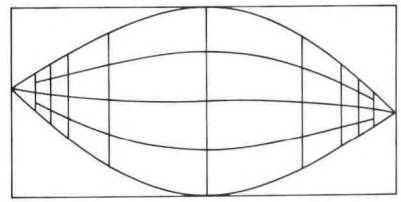

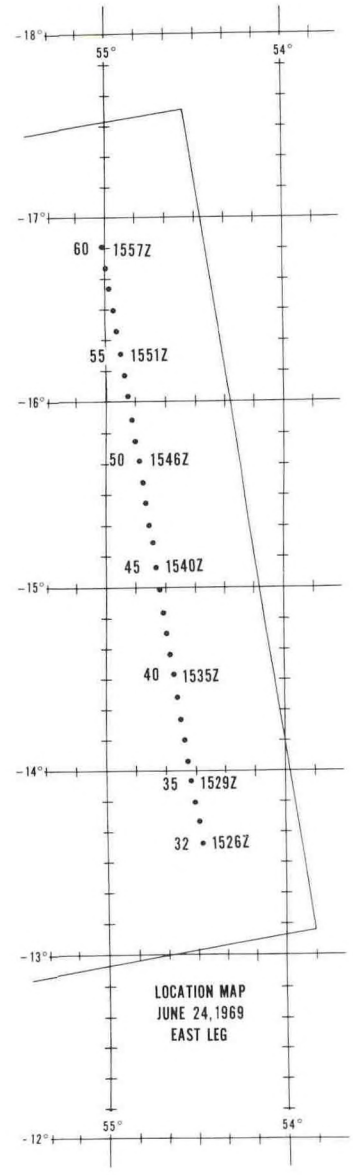
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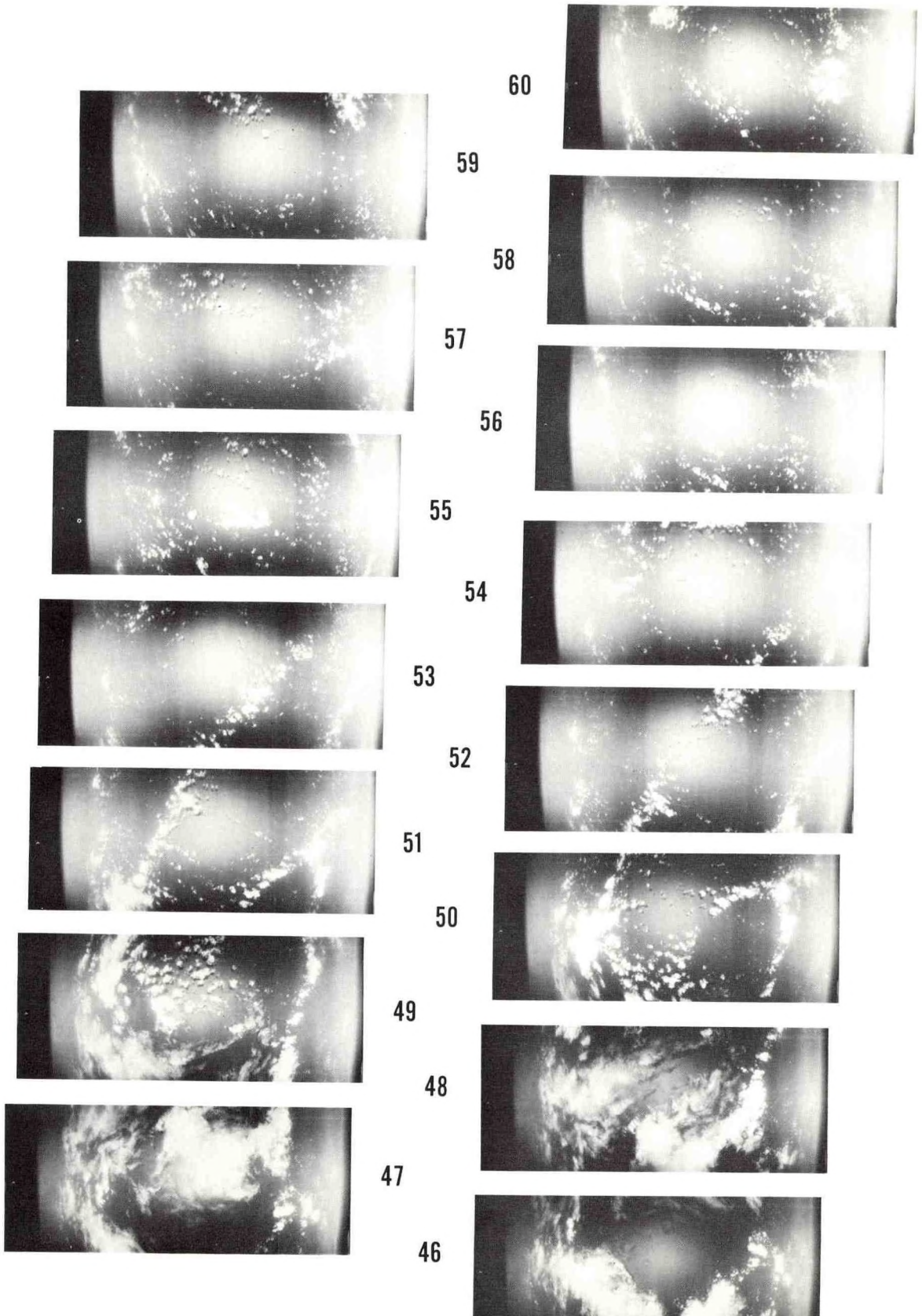
32 • 1526Z
-13°
LOCATION MAP
JUNE 24, 1969
EAST LEG
-12°
55°
54°



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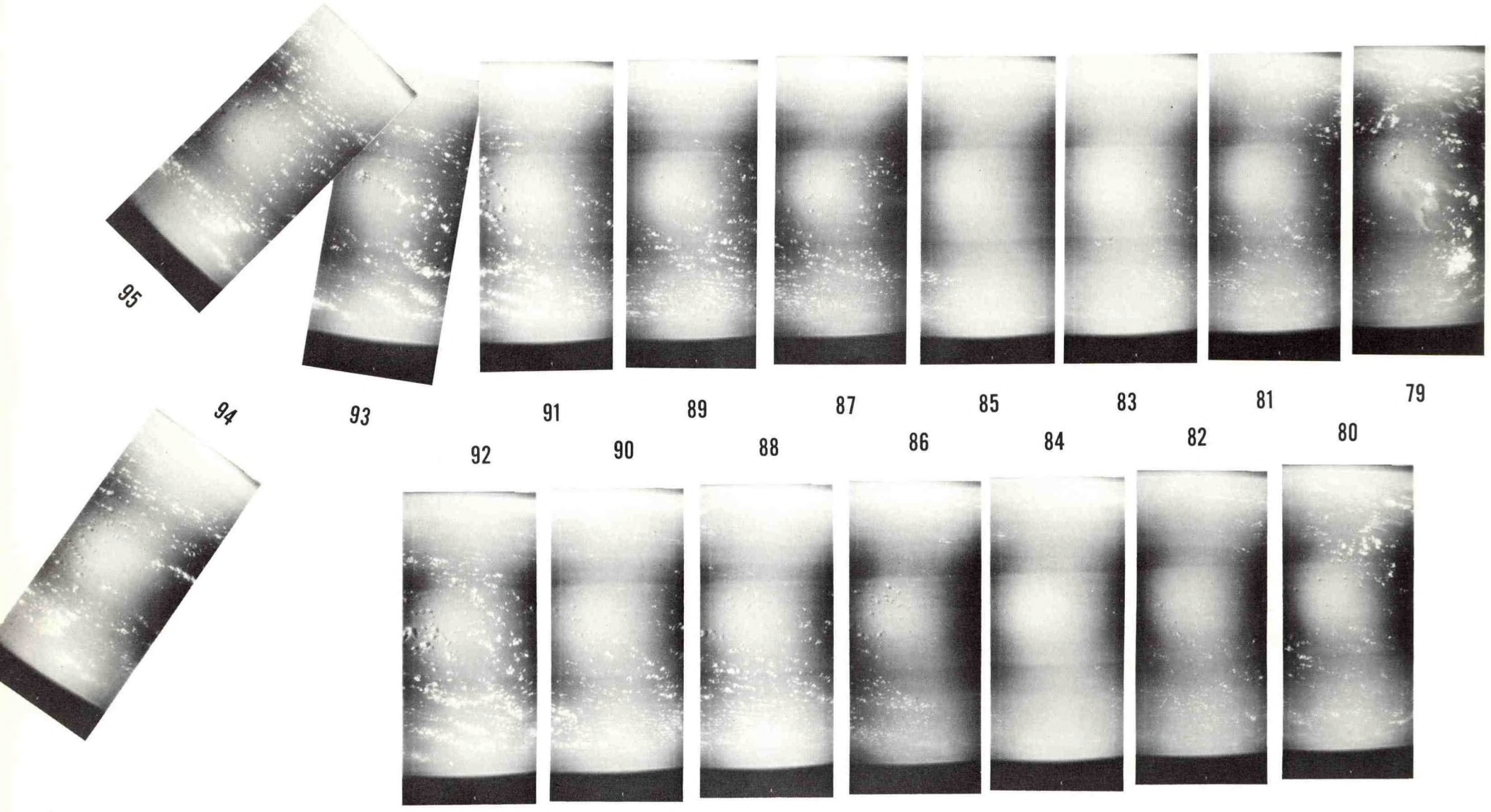
JUNE 24,1969
EAST LEG



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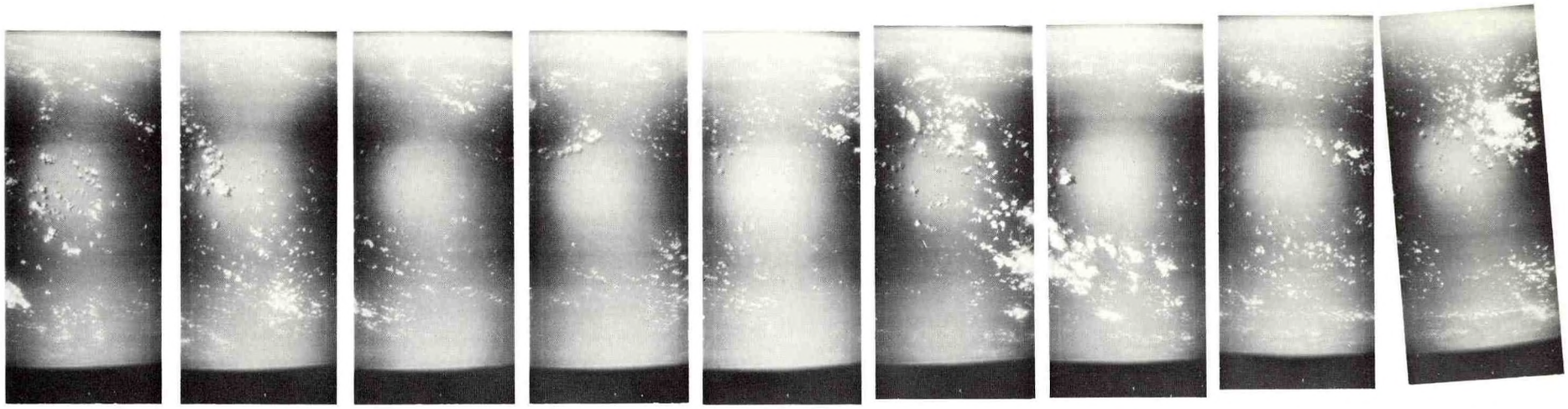
JUNE 24,1969
NORTH LEG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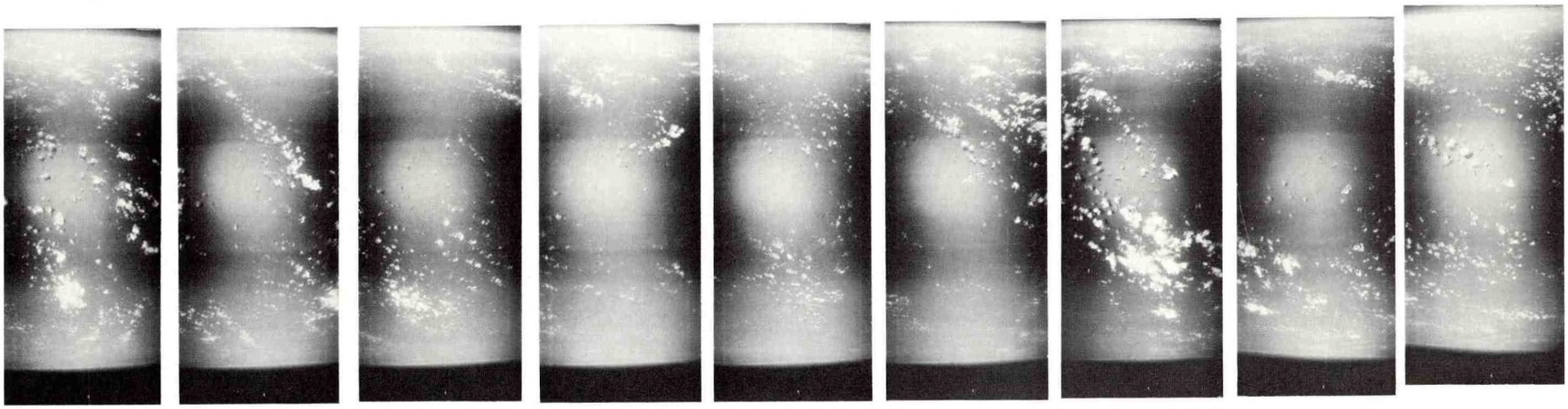
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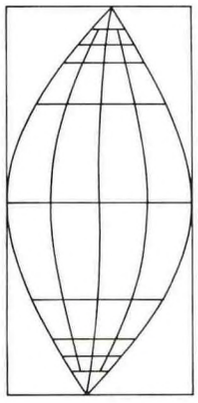

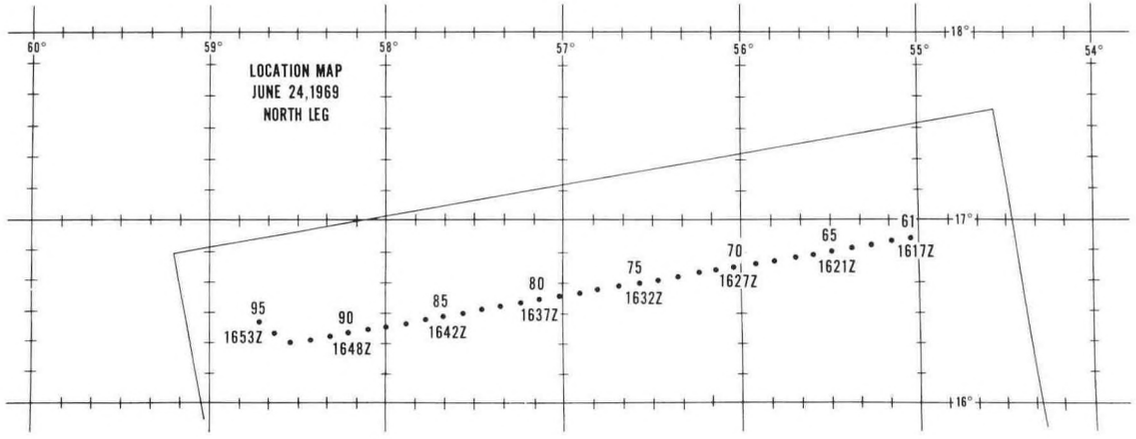
LOCATION MAP
JUNE 24,1969
NORTH LEG
60°
59°
58°
57°
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18°
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95
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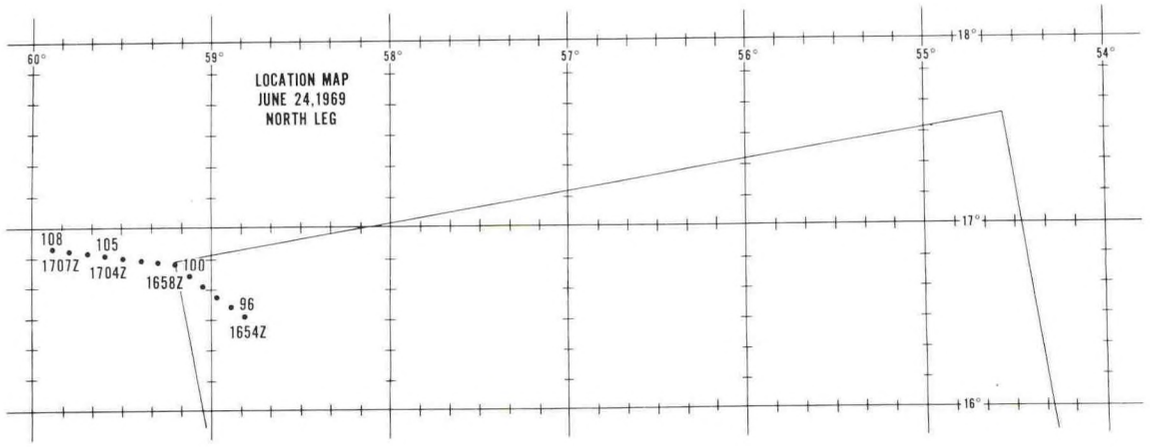
LOCATION MAP
JUNE 24,1969
NORTH LEG
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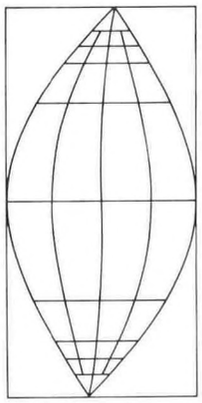

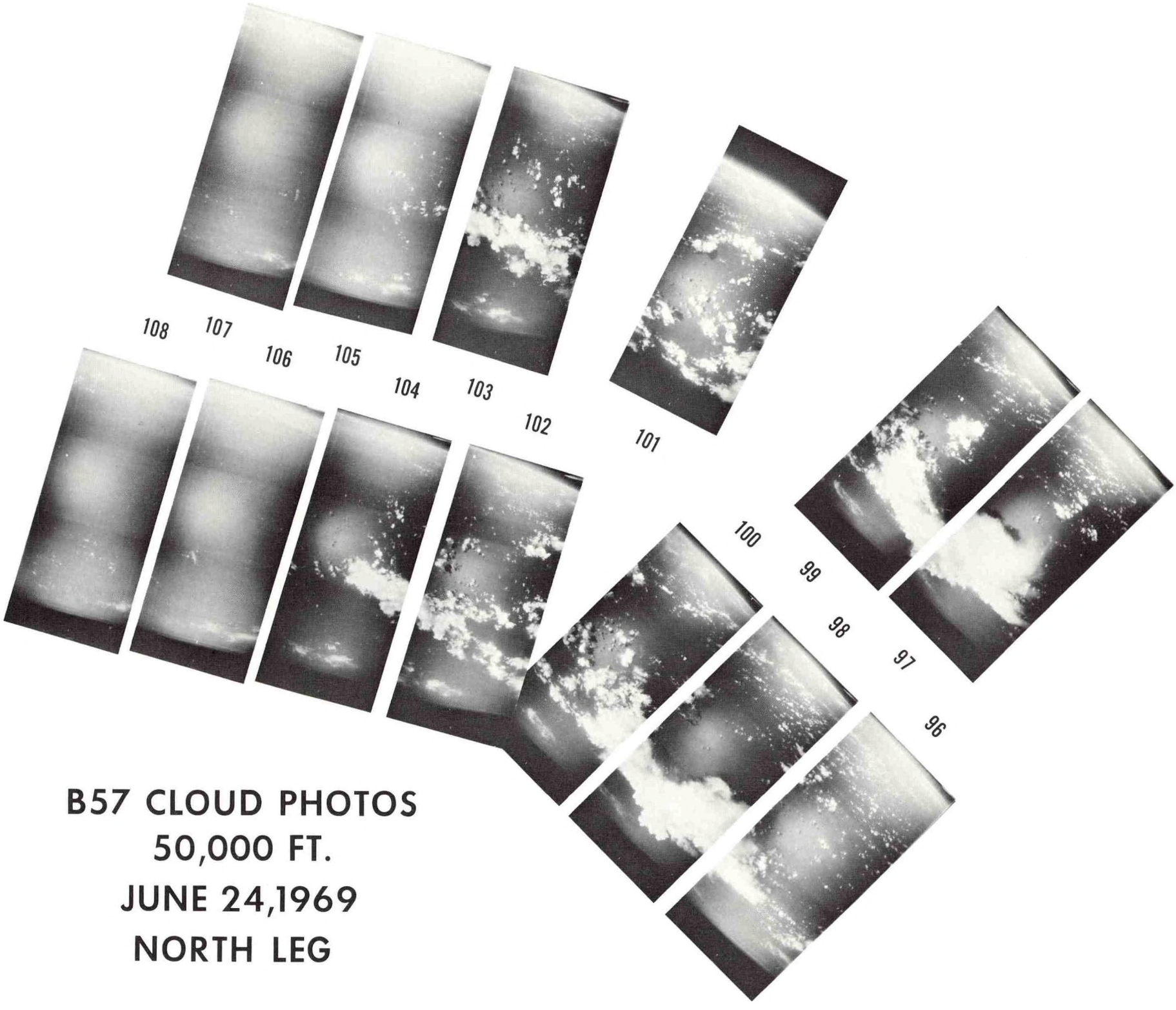

B57 CLOUD PHOTOS
50,000 FT.
JUNE 24,1969
NORTH LEG

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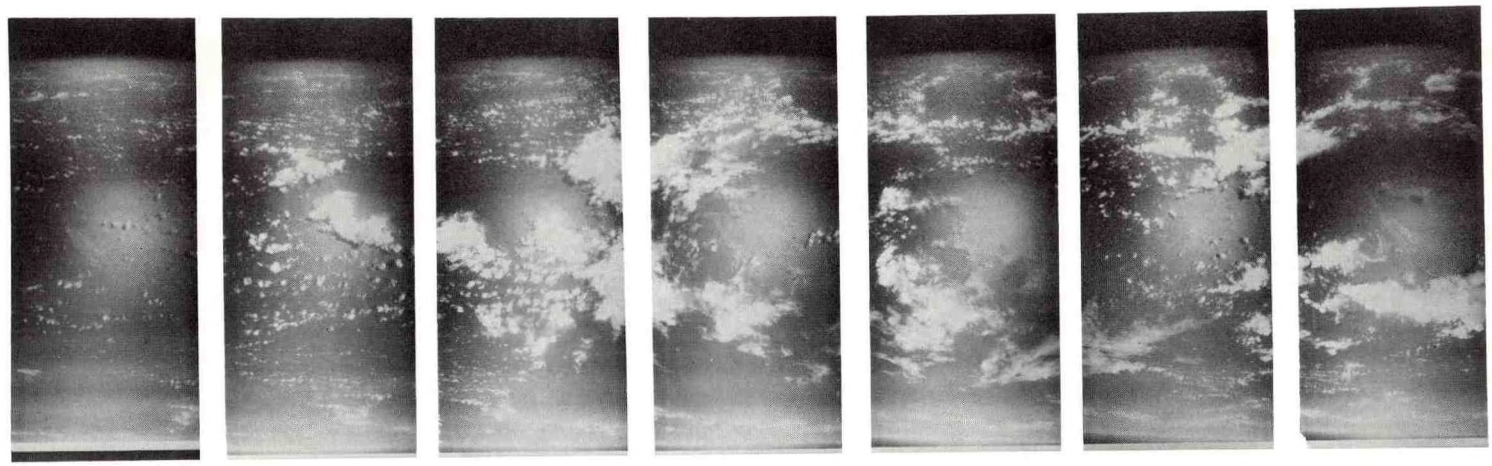

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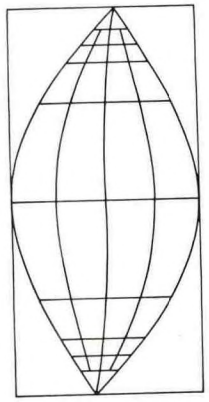

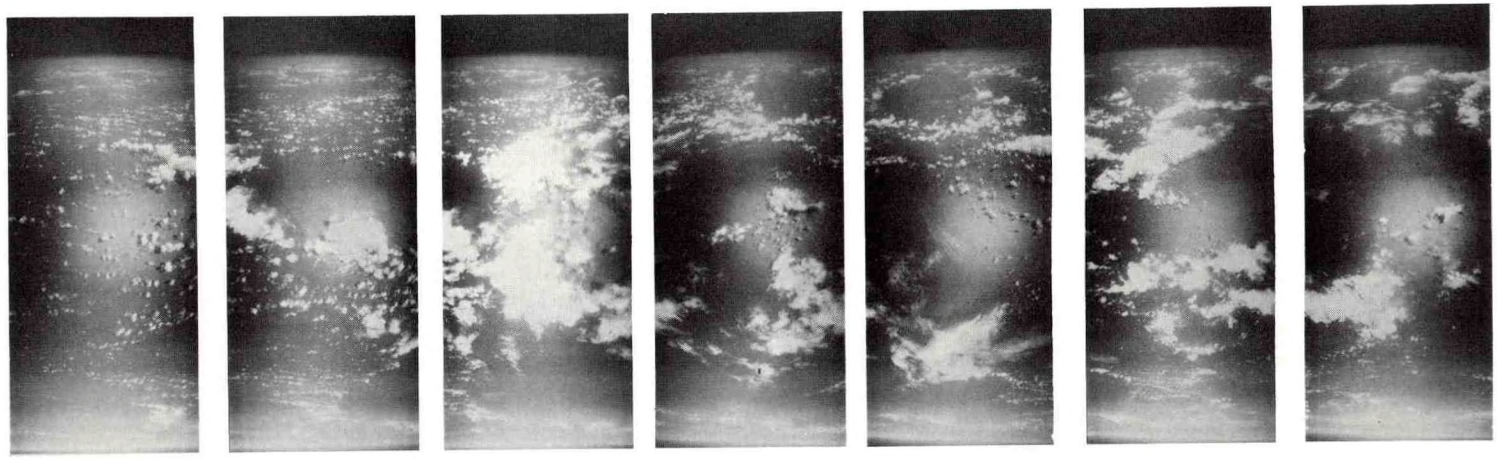

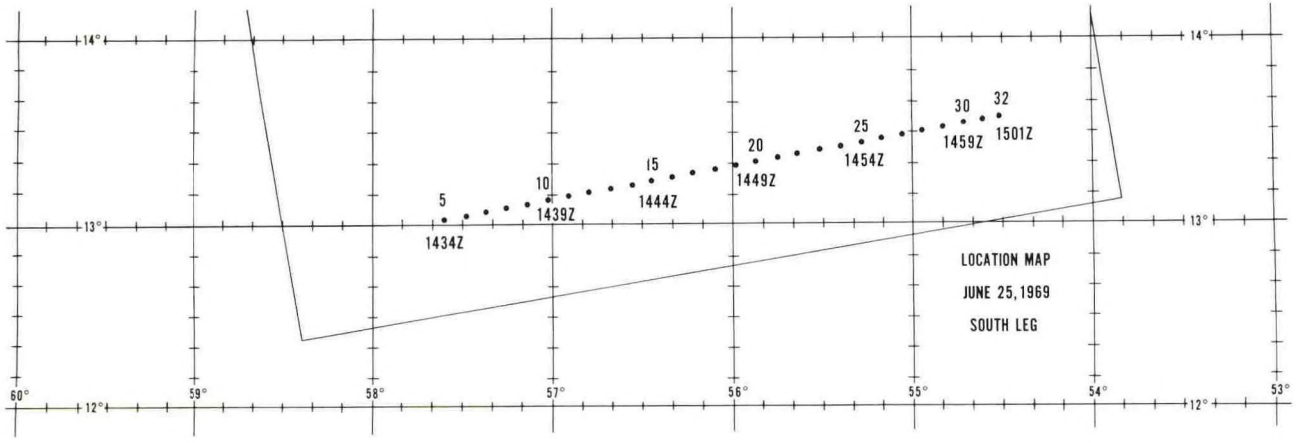

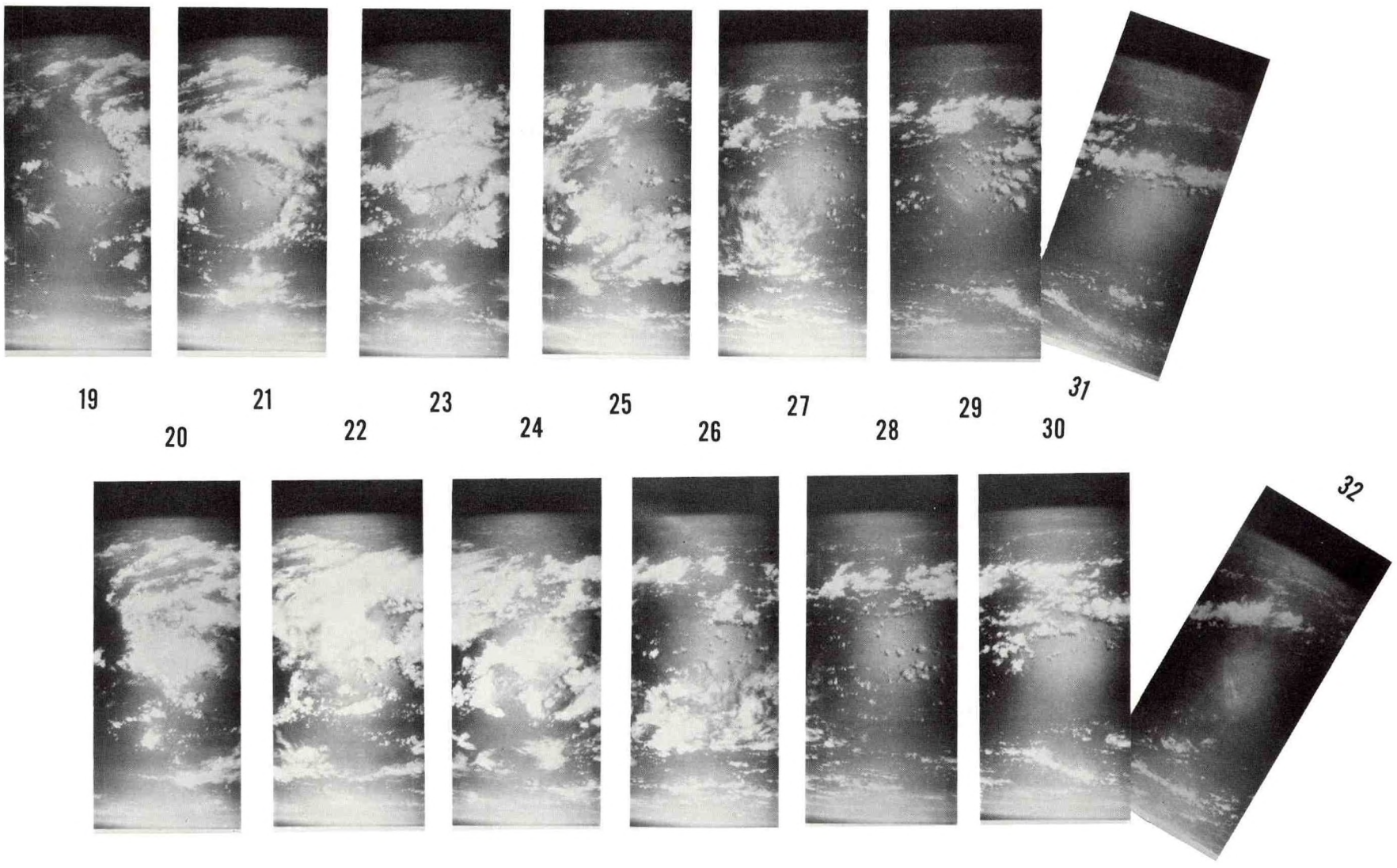

B57 CLOUD PHOTOS
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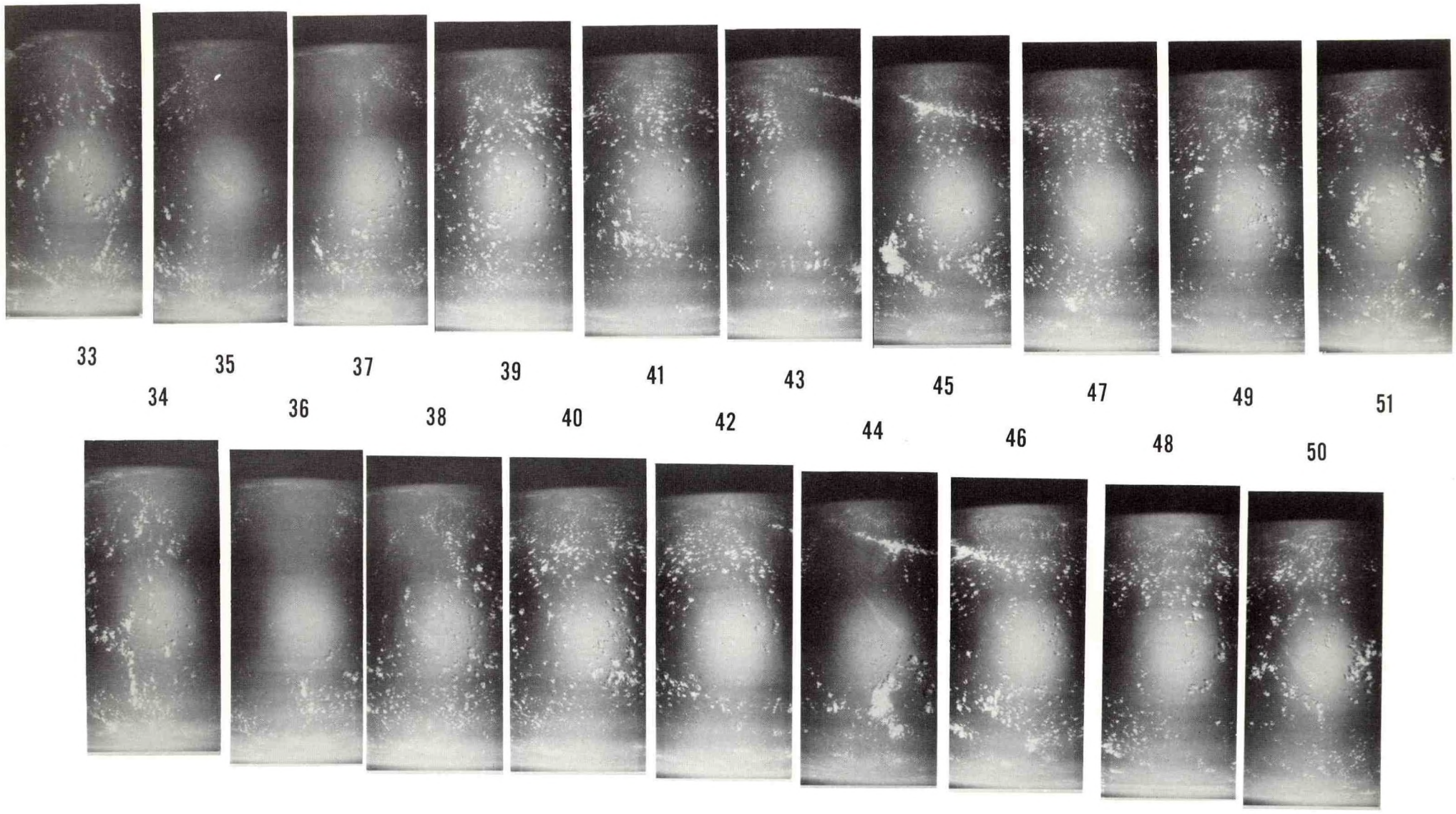
JUNE 25,1969
SOUTH LEG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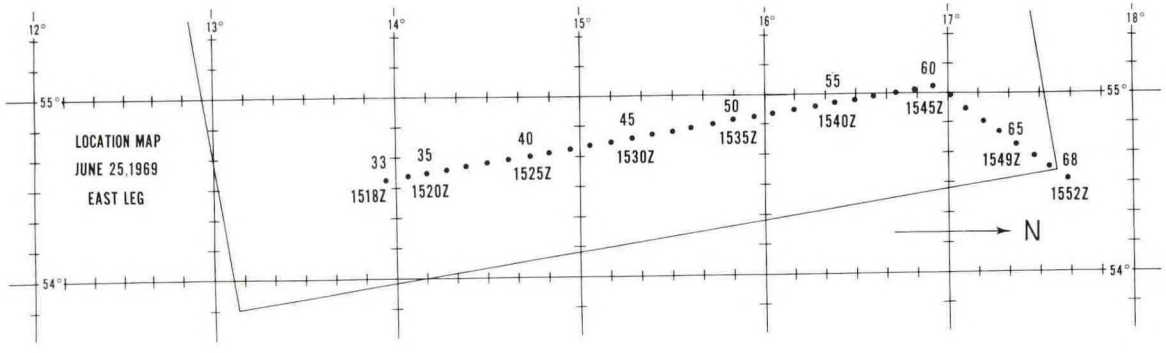
LOCATION MAP
JUNE 25,1969
EAST LEG
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1518Z
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1520Z
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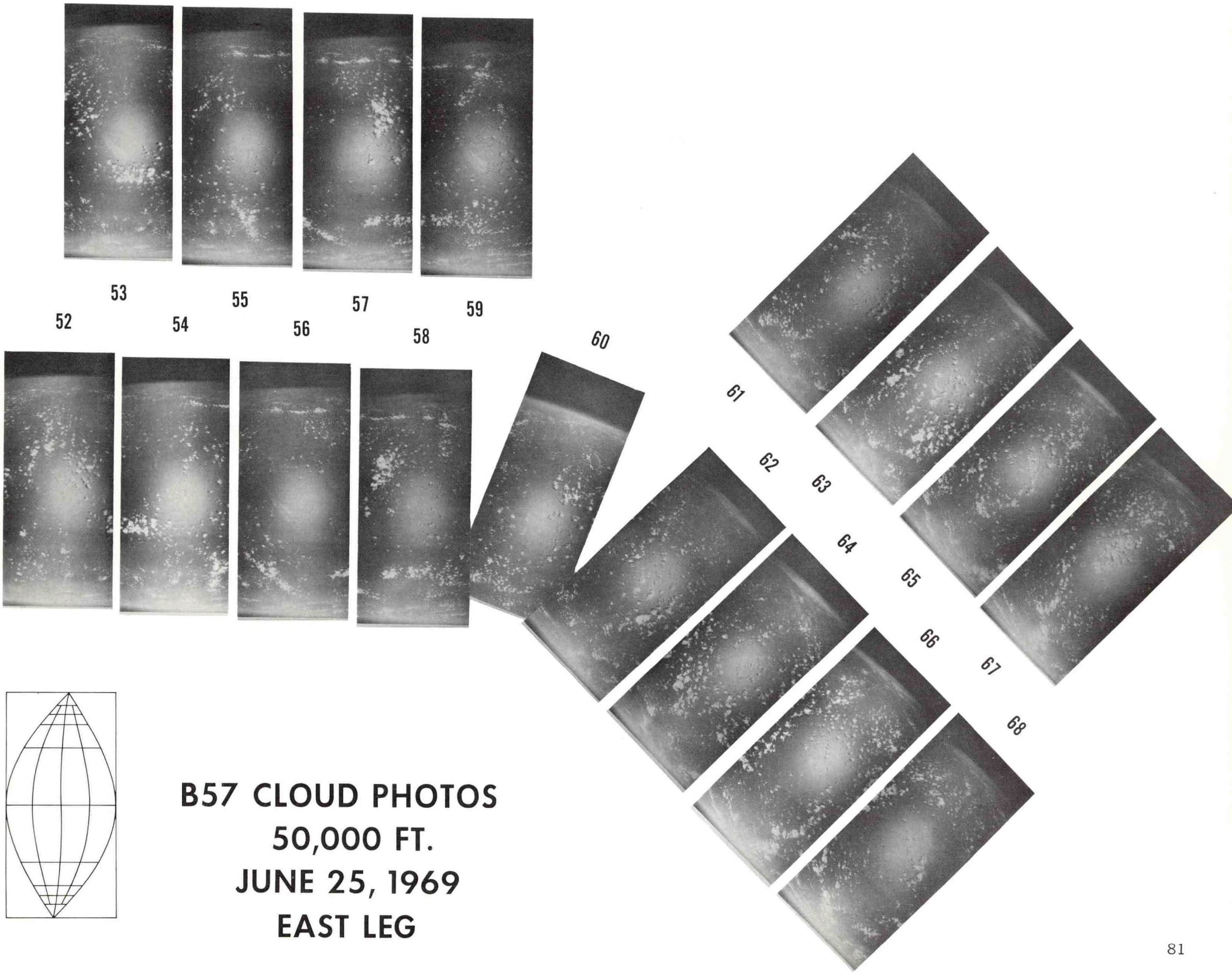

B57 CLOUD PHOTOS
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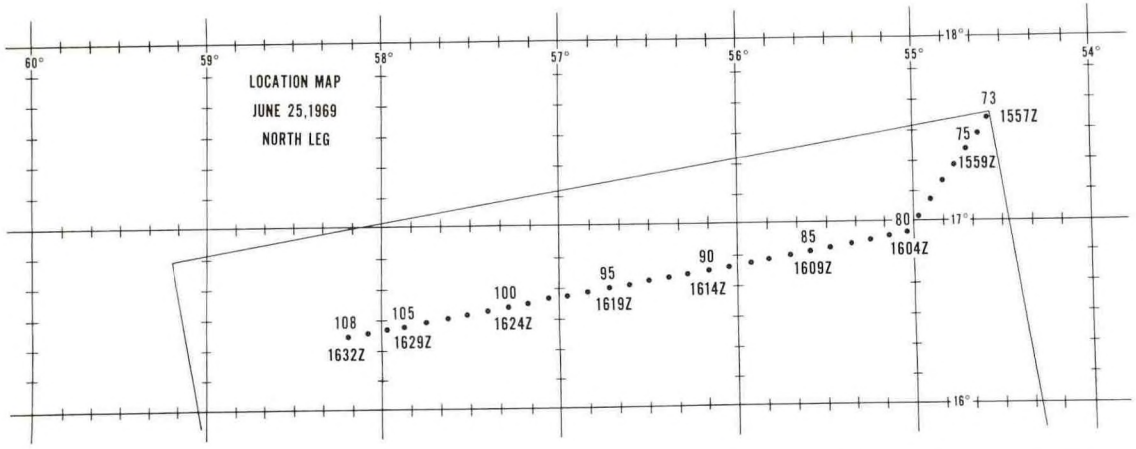
JUNE 25, 1969
EAST LEG


LOCATION MAP
JUNE 25,1969
NORTH LEG
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59°
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1557Z
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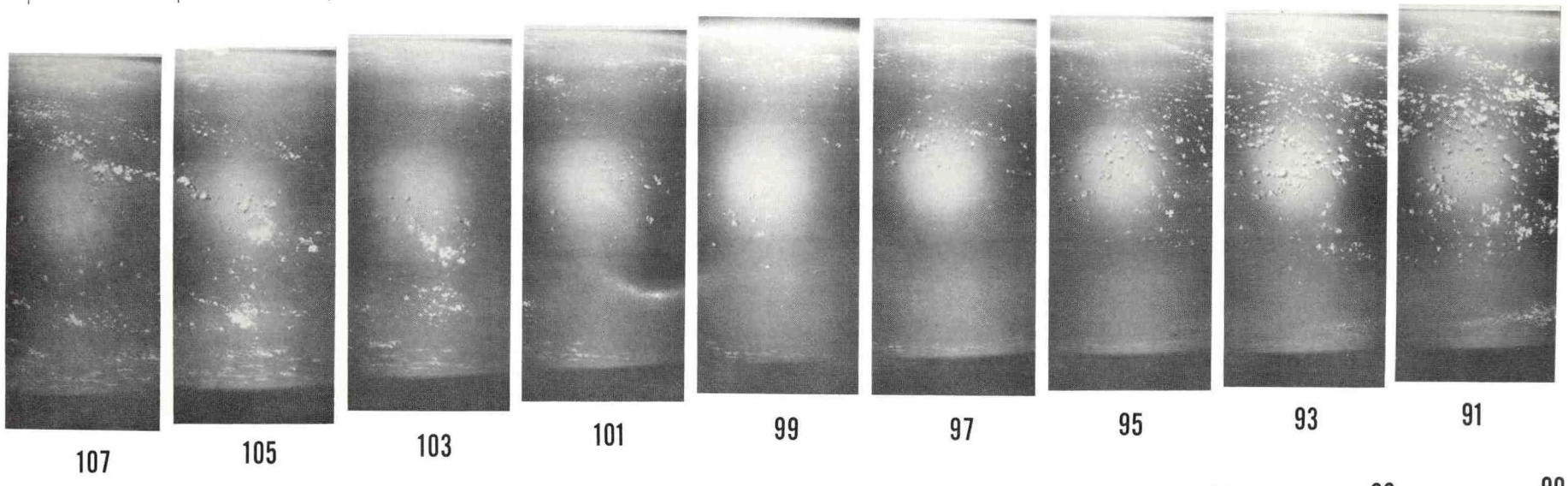
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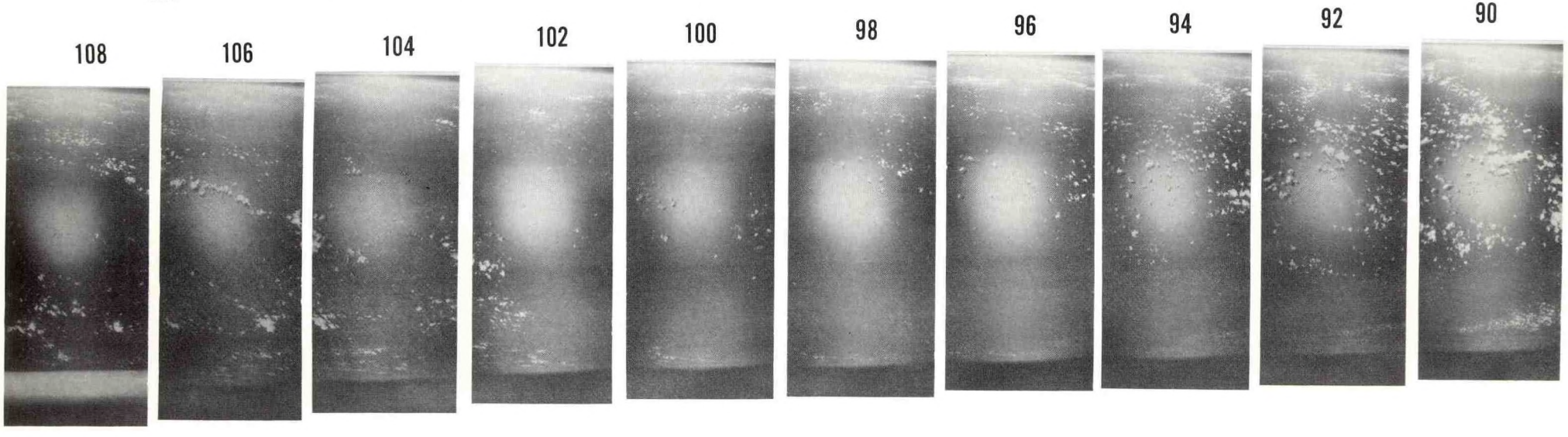
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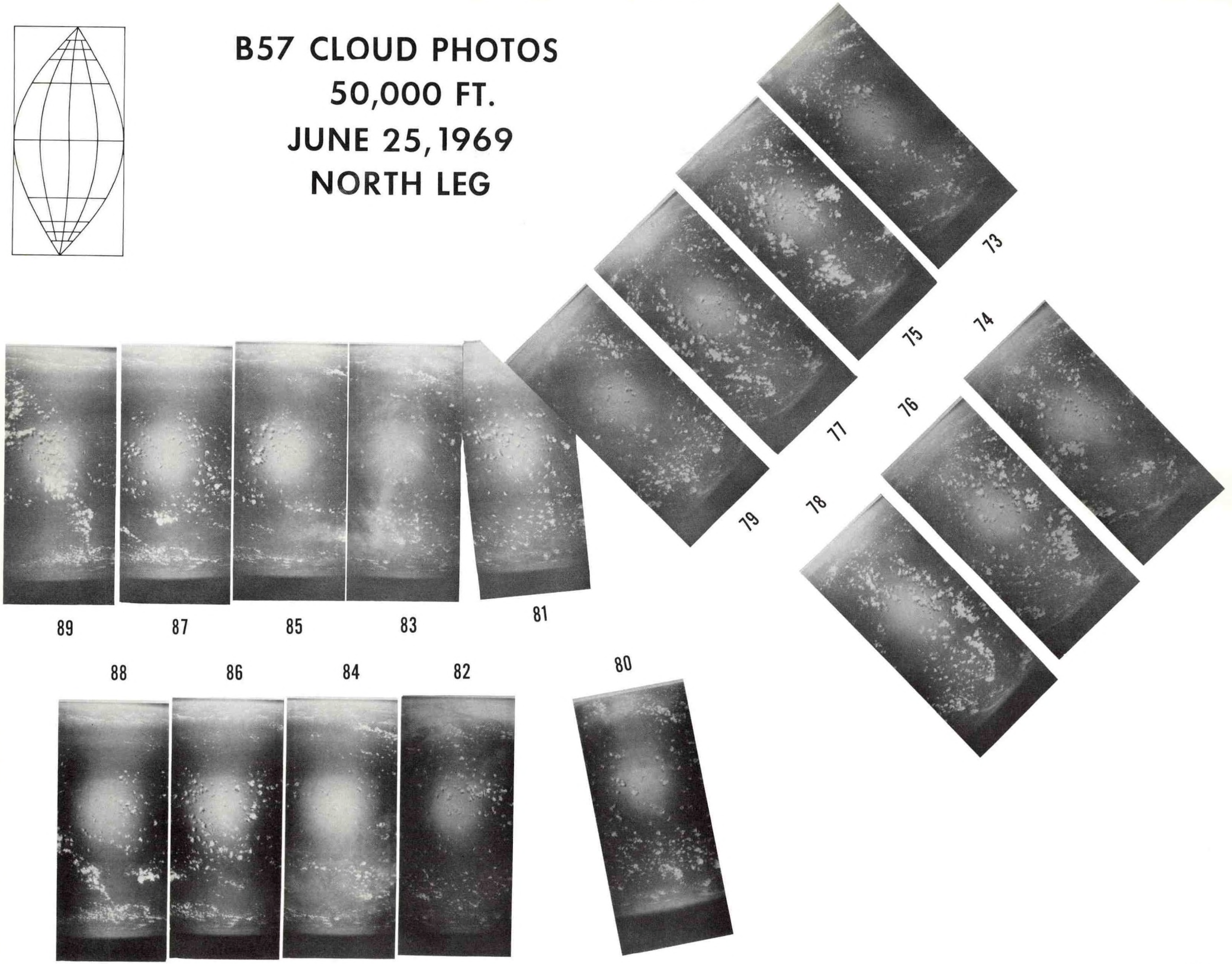
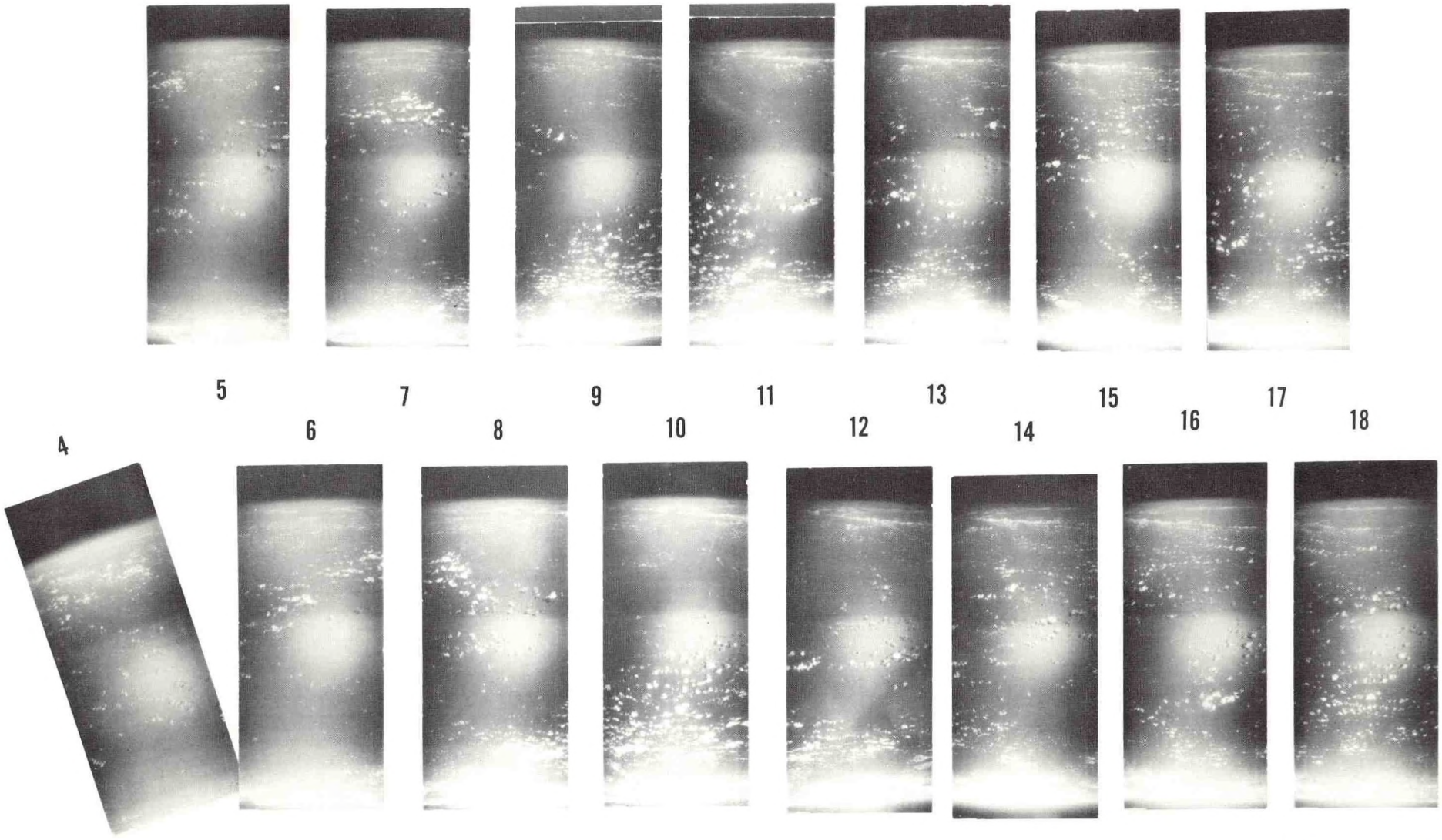
JUNE 25, 1969
NORTH LEG

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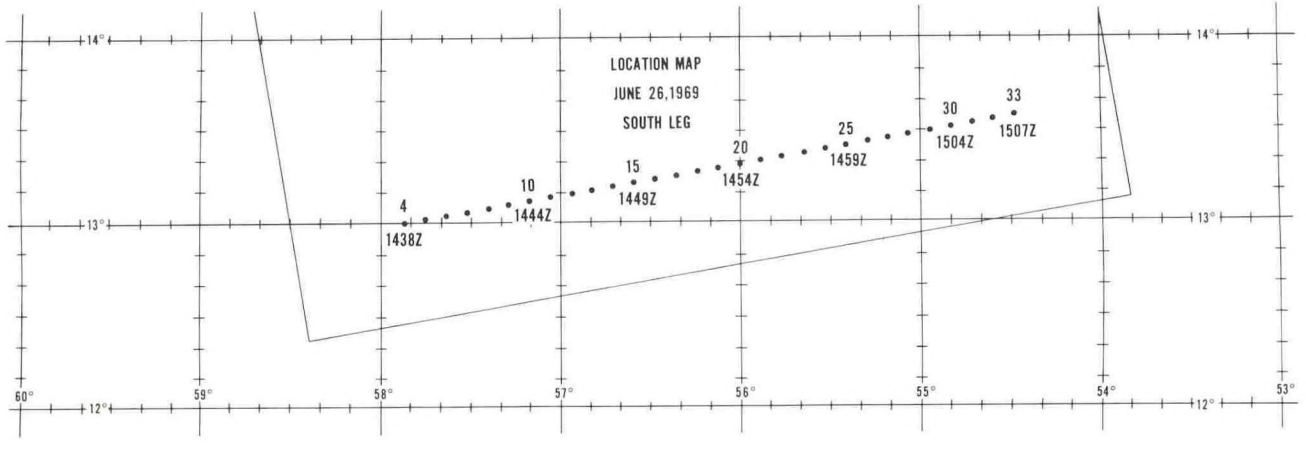
LOCATION MAP
JUNE 26,1969
SOUTH LEG
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1454Z
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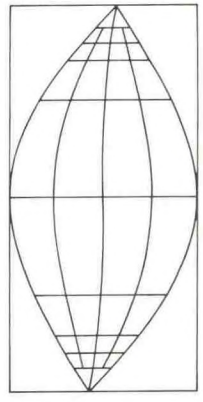
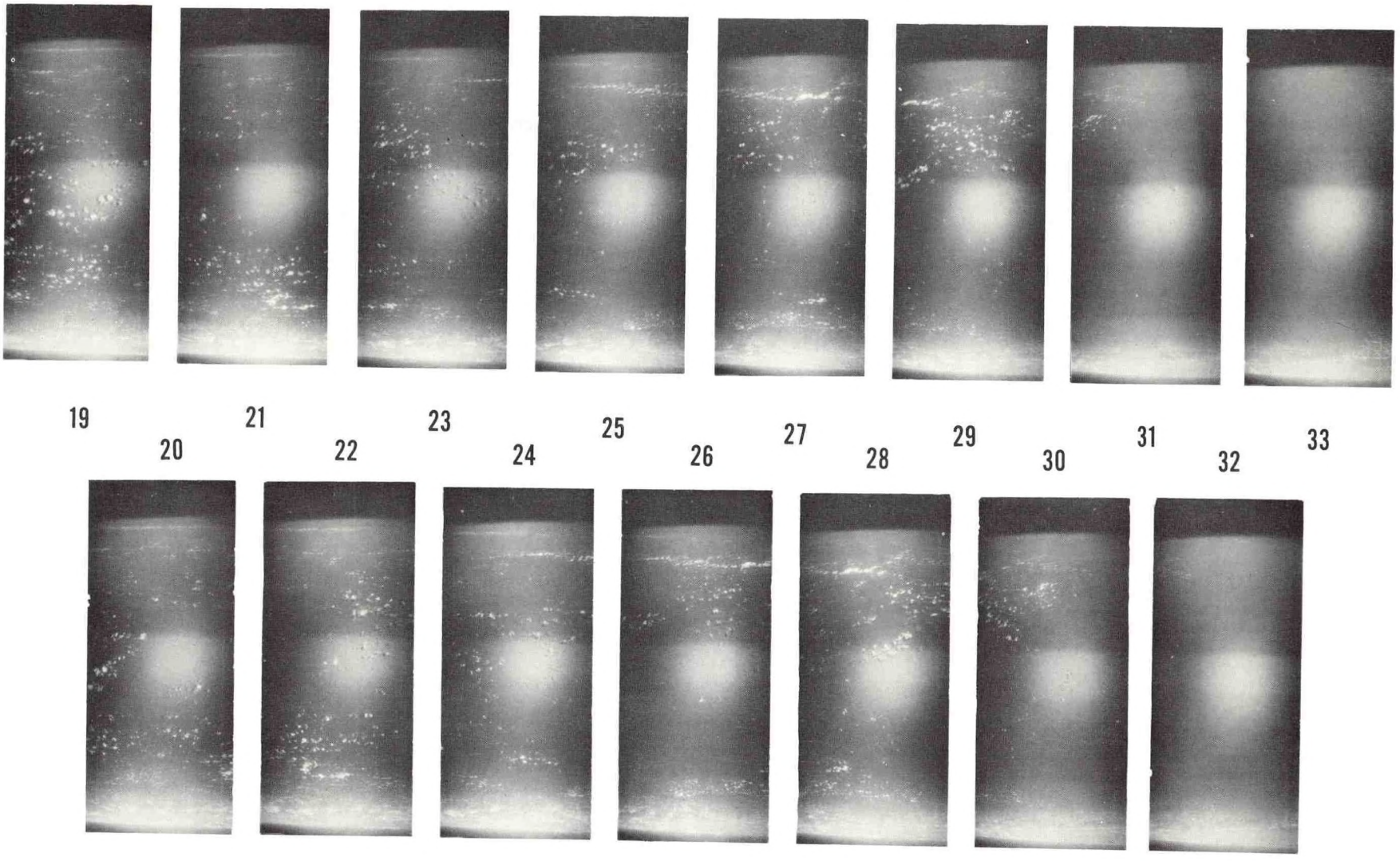
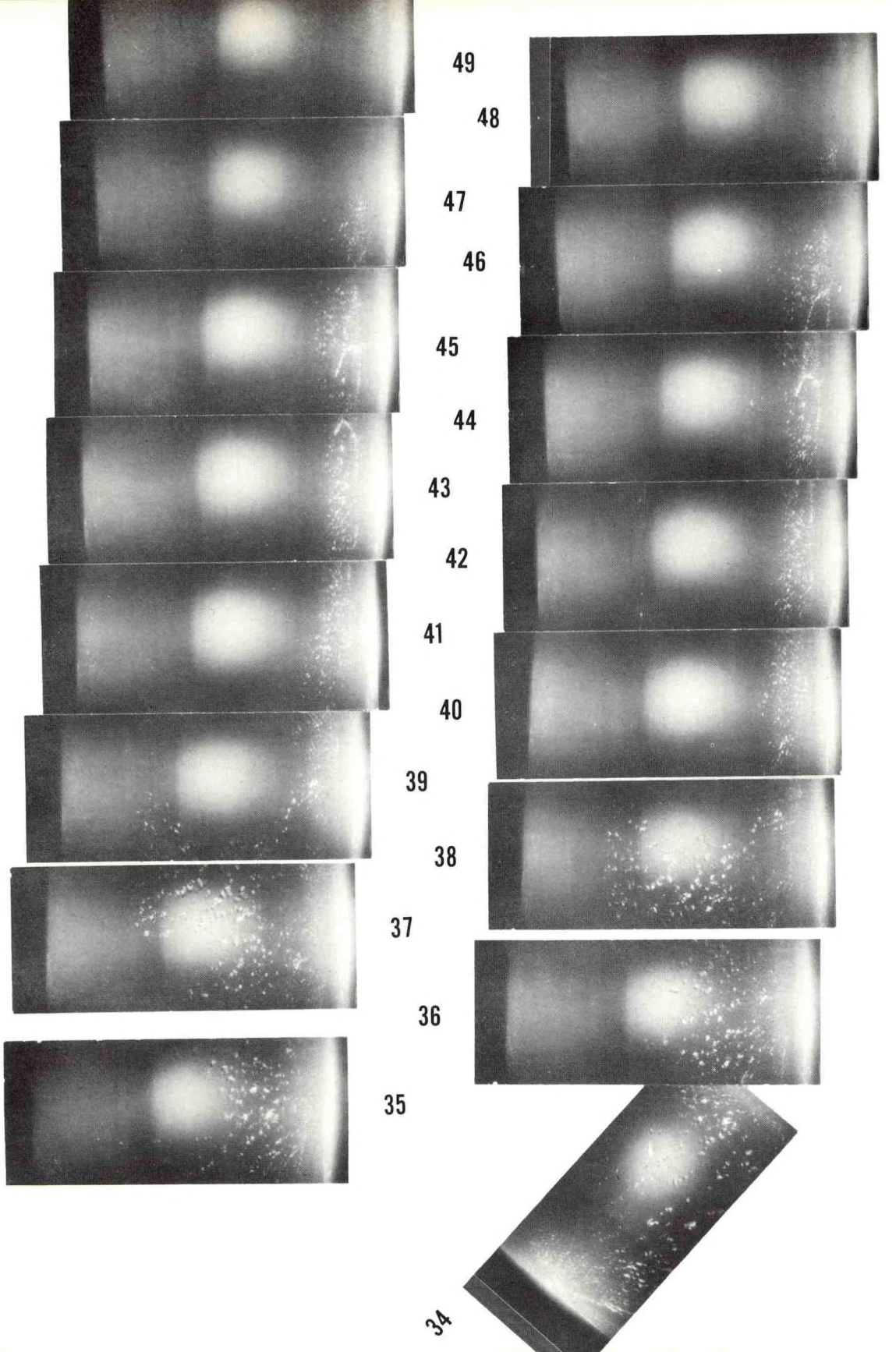




B57 CLOUD PHOTOS
50,000 FT.
JUNE 26,1969
SOUTH LEG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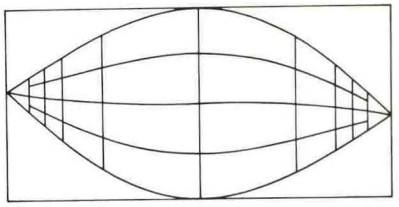

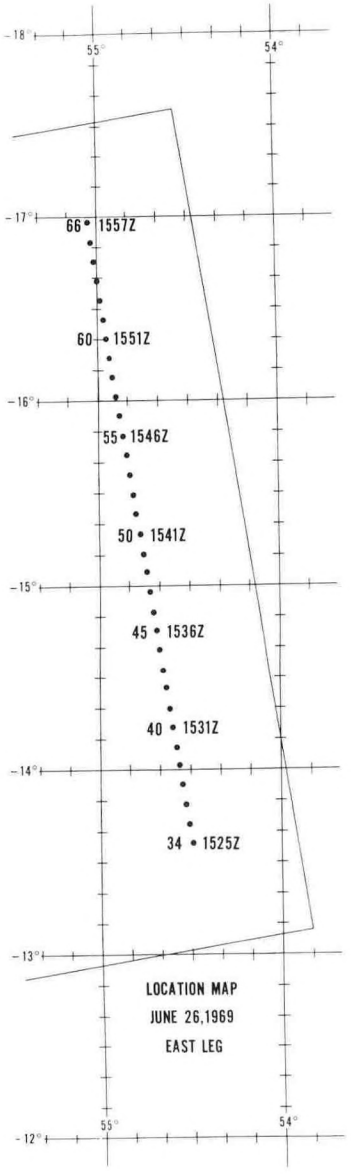
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LOCATION MAP
JUNE 26,1969
EAST LEG
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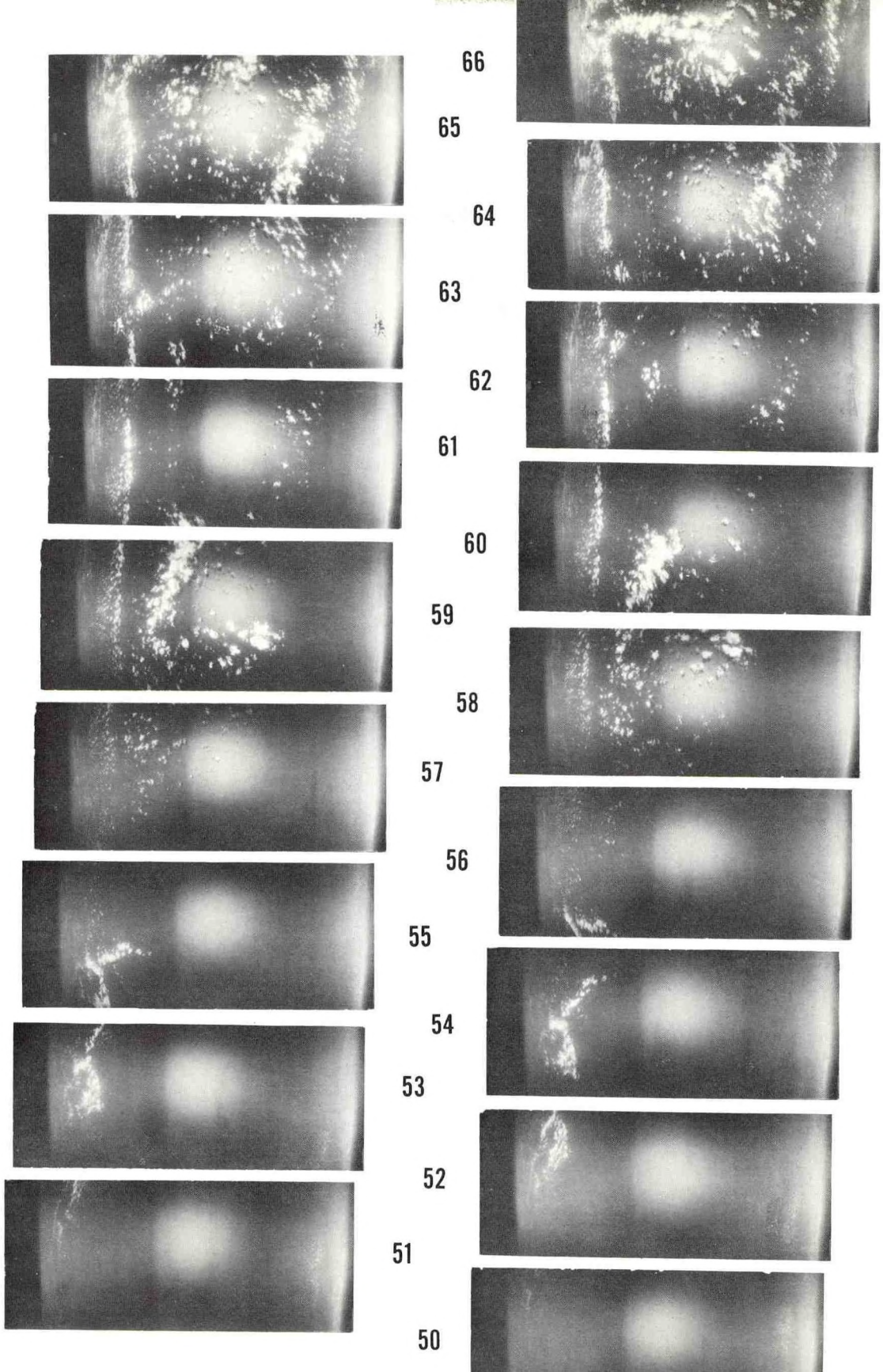

B57 CLOUD PHOTOS
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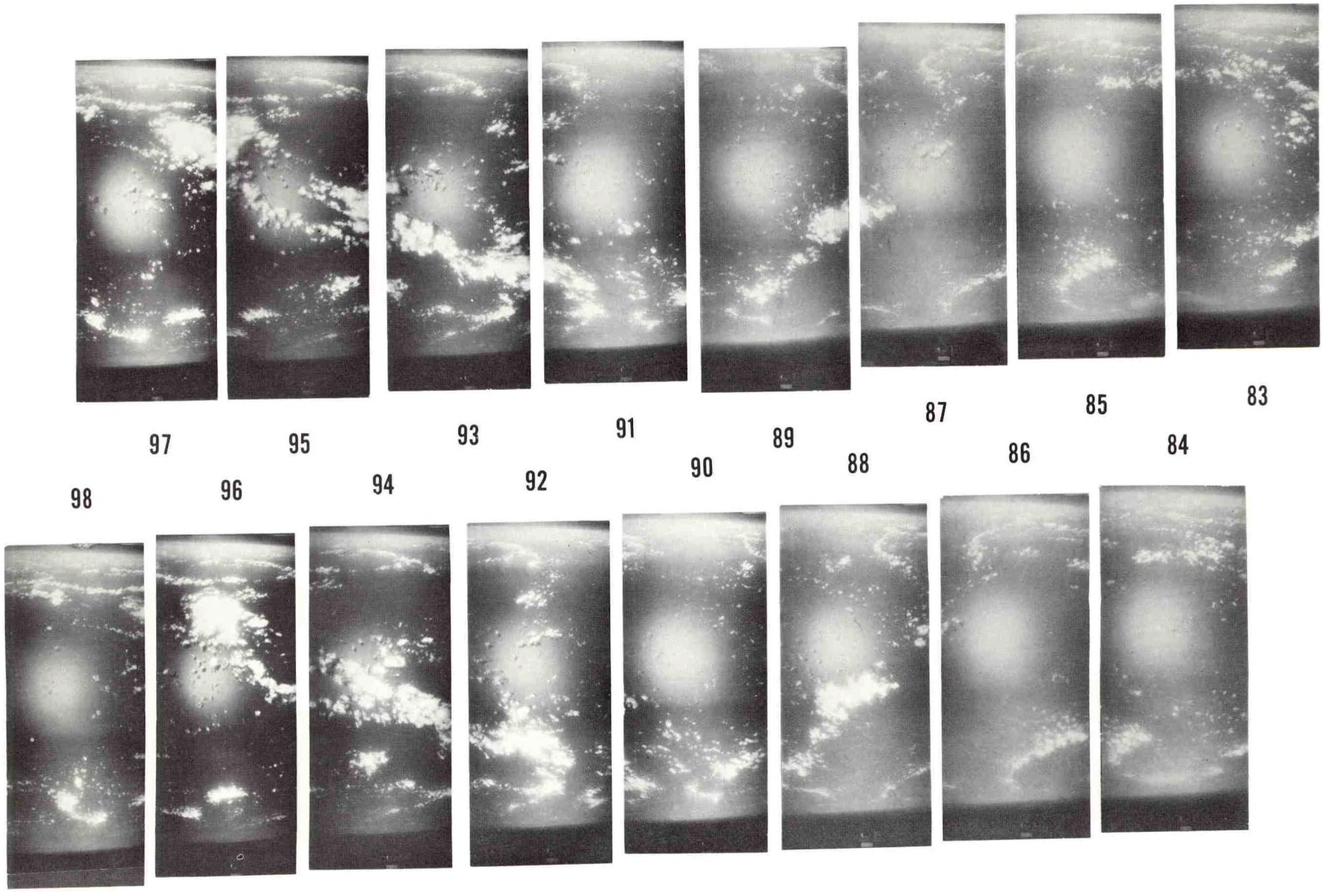
JUNE 26,1969
EAST LEG



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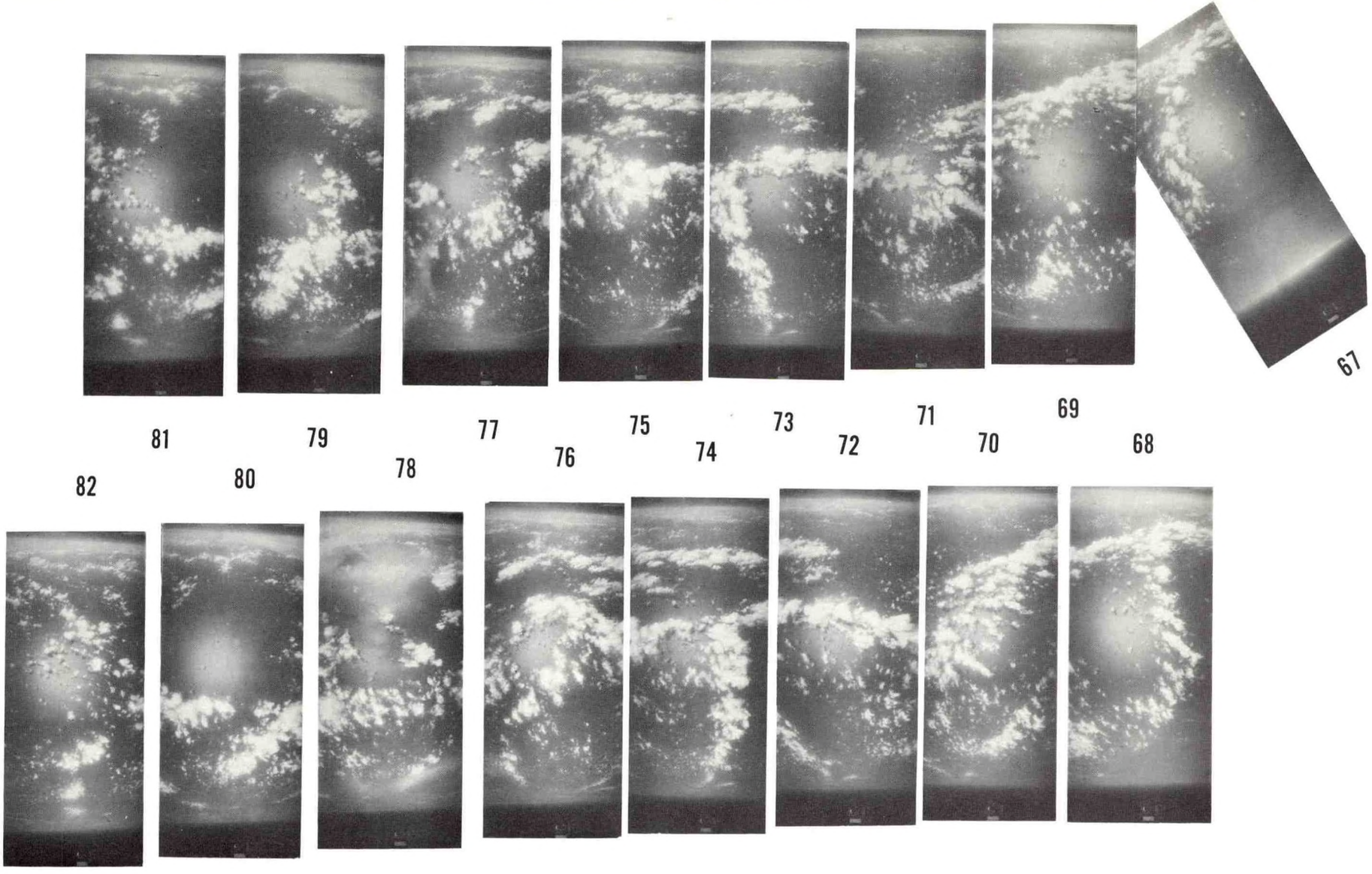
JUNE 26,1969
NORTH LEG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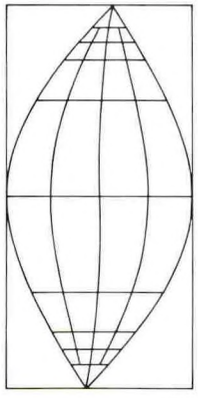

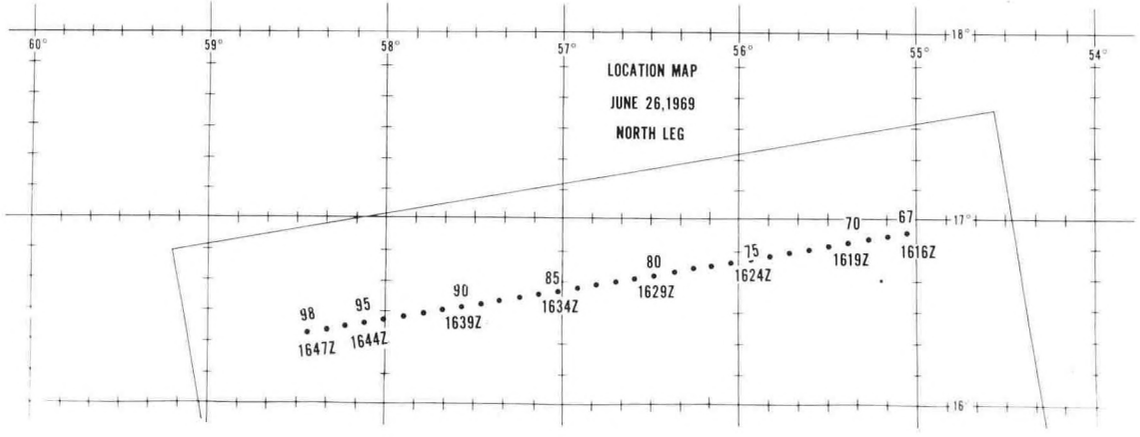
LOCATION MAP
JUNE 26,1969
NORTH LEG
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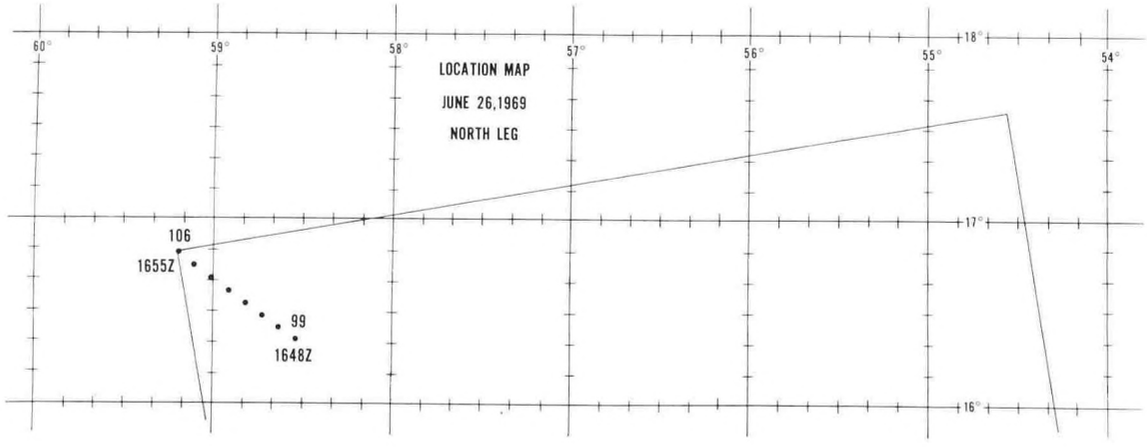
LOCATION MAP
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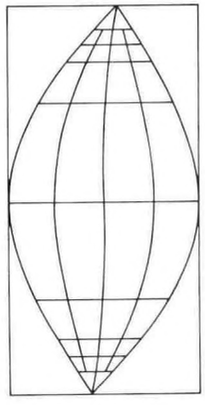

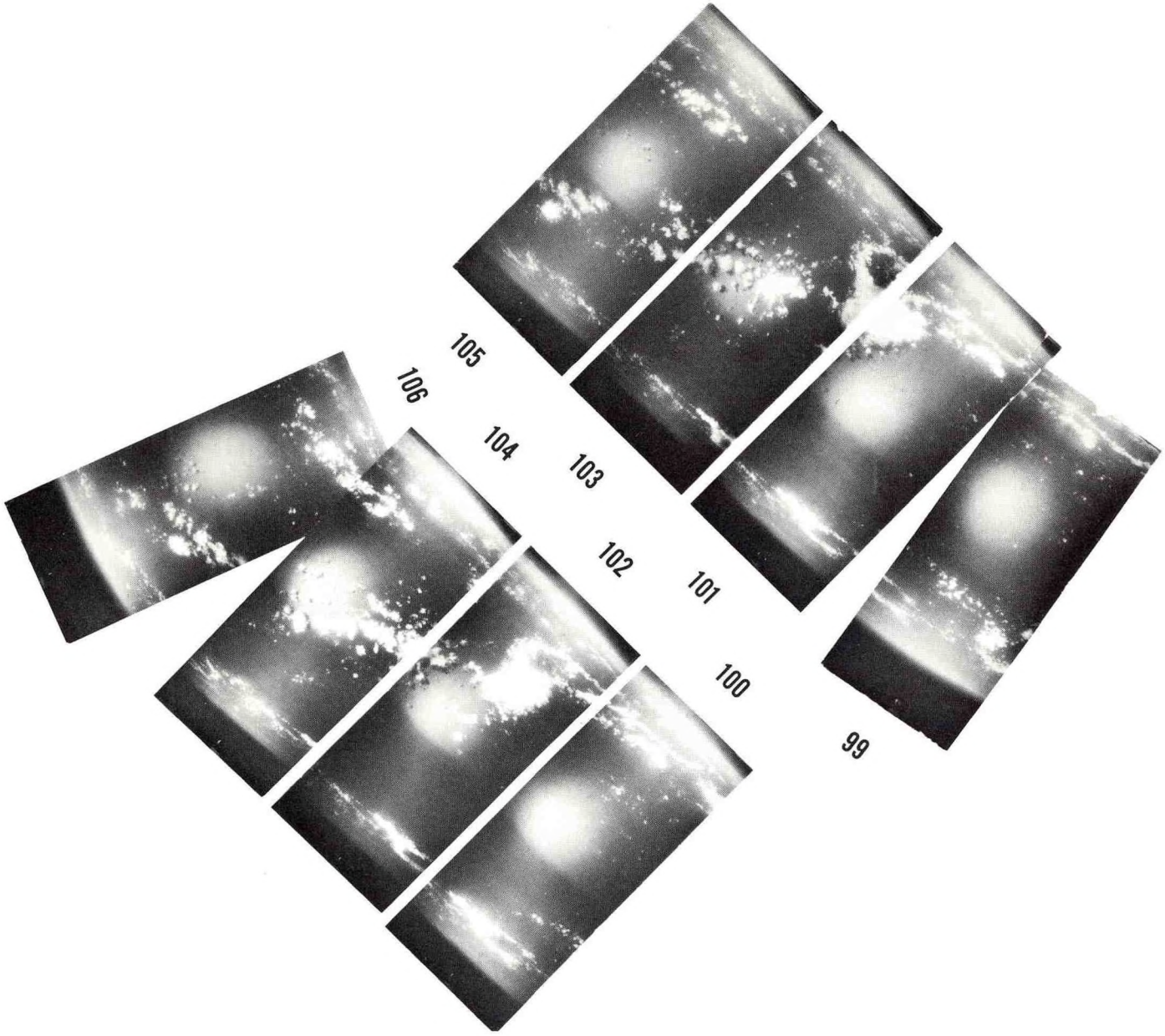

B57 CLOUD PHOTOS
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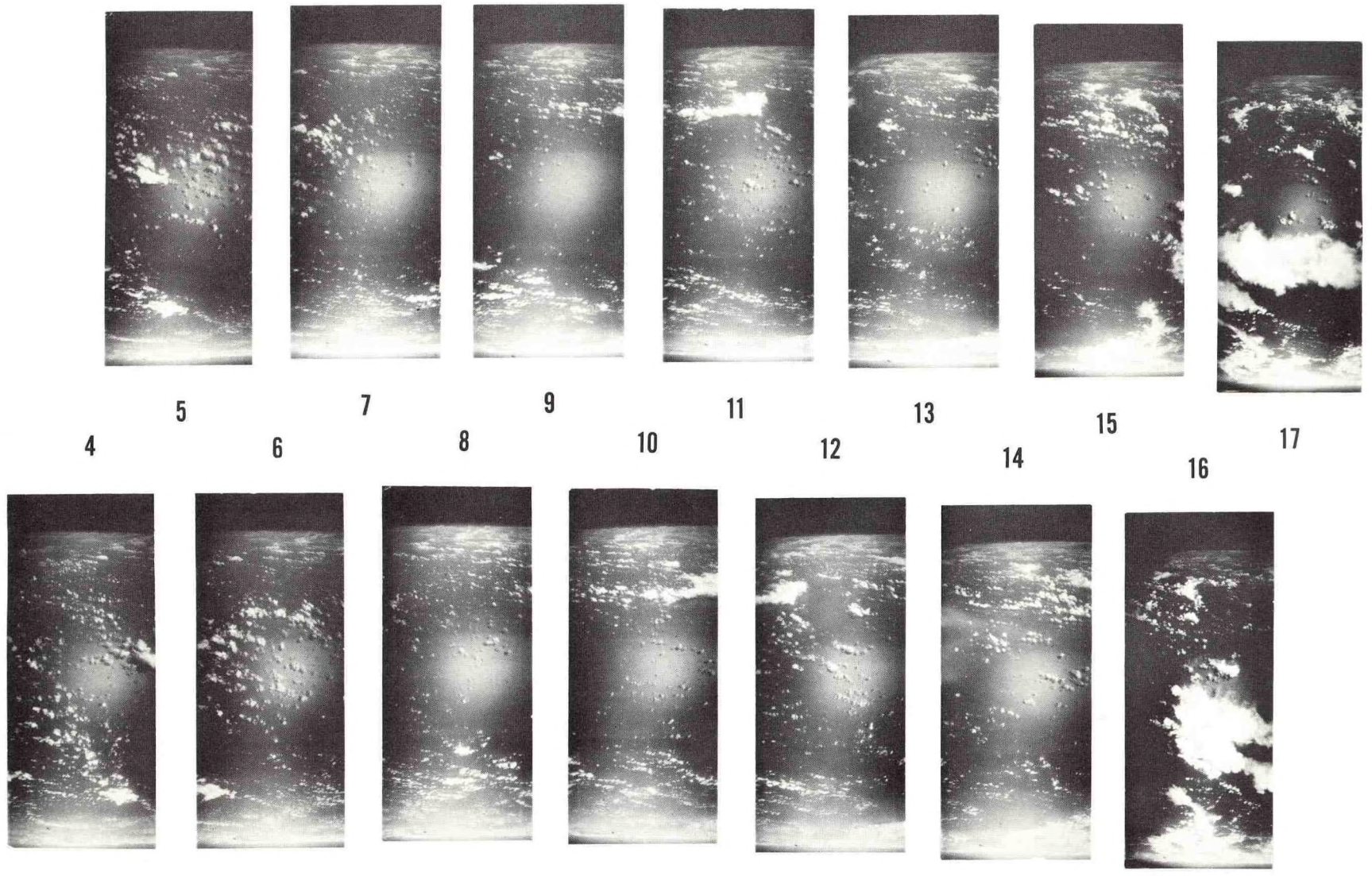
JUNE 26,1969
NORTH LEG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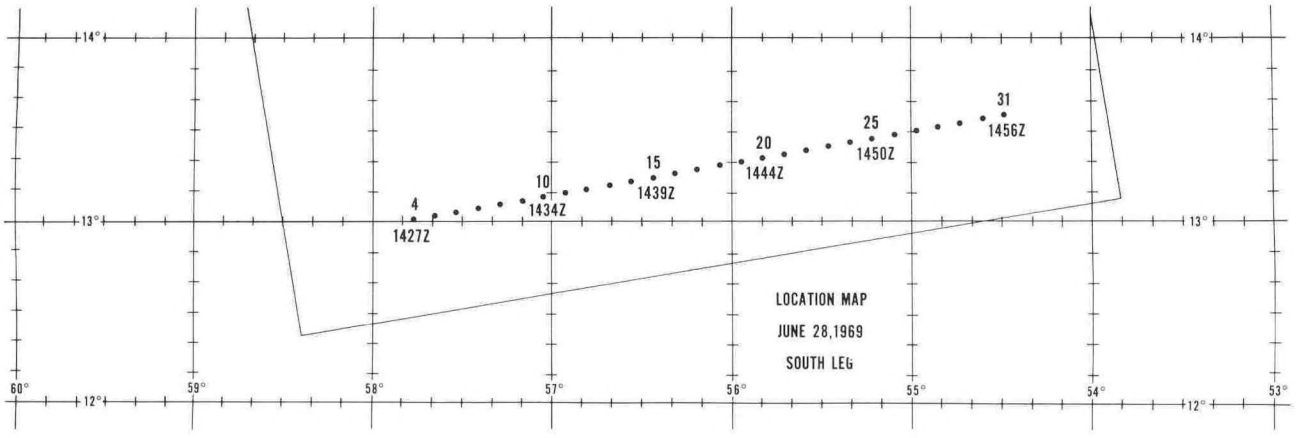
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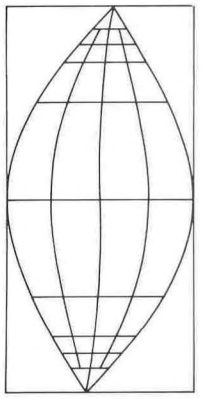
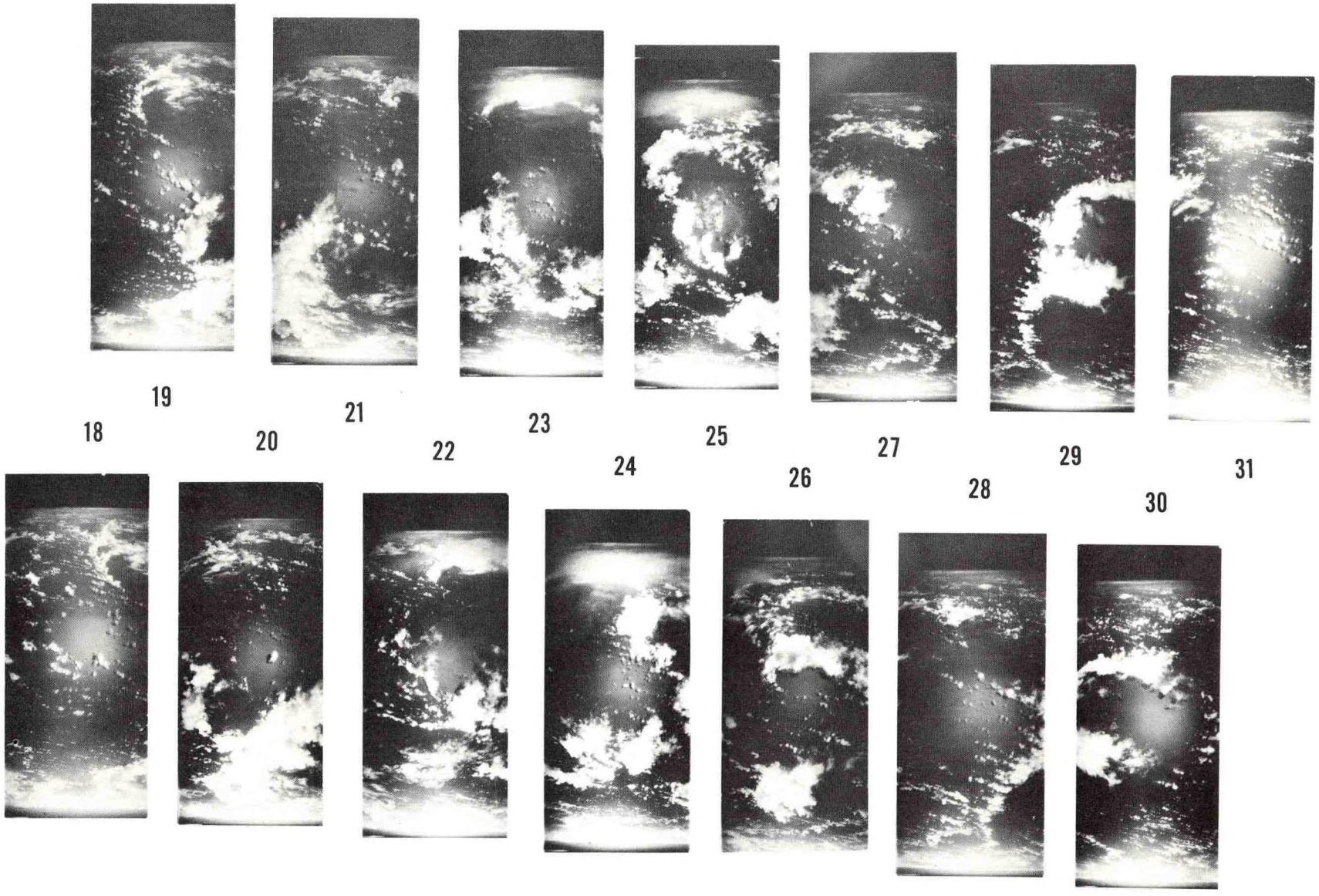
1456Z
LOCATION MAP
JUNE 28,1969
SOUTH LEG





B57 CLOUD PHOTOS
50,000 FT.
JUNE 28,1969
SOUTH LEG

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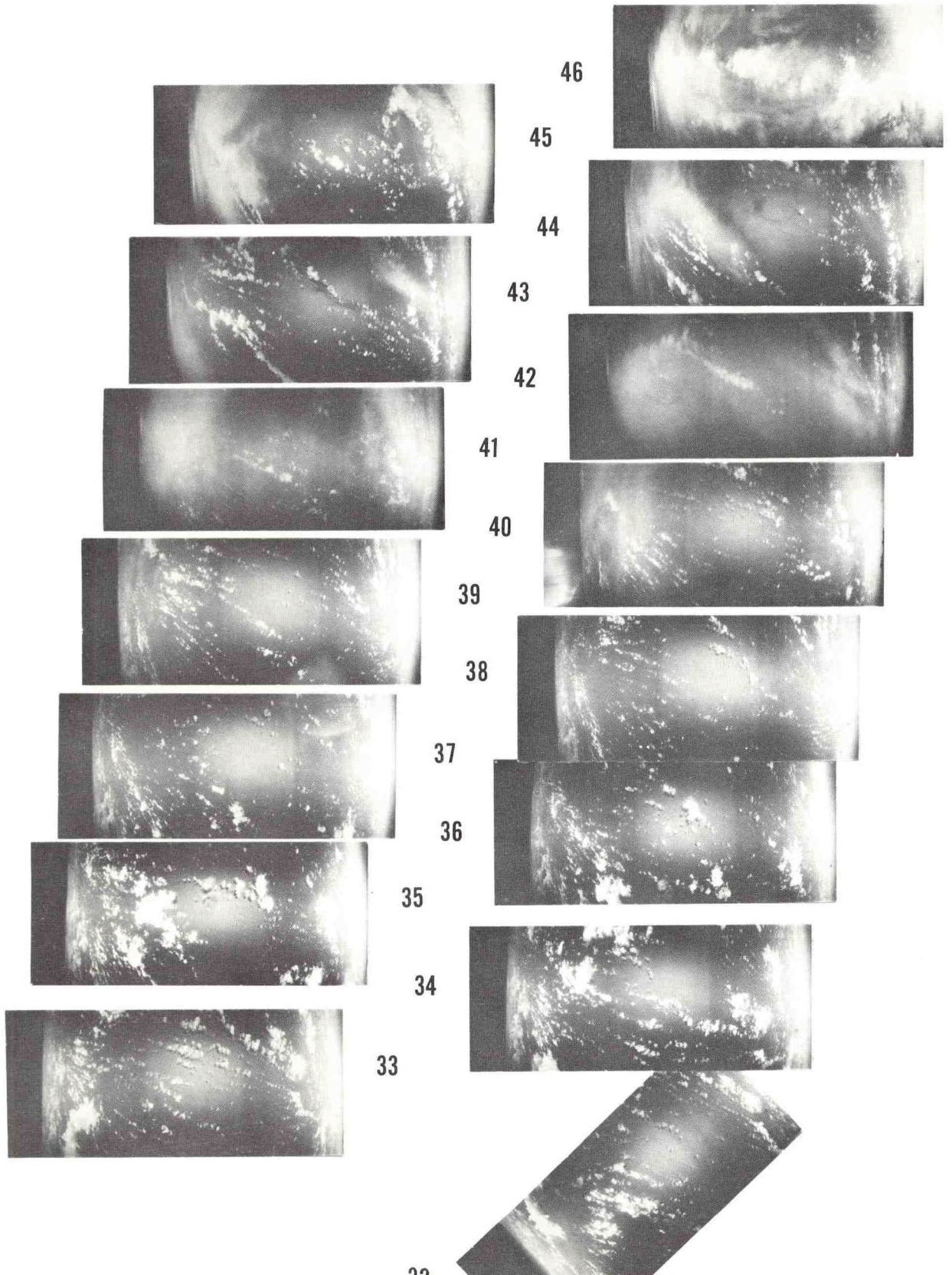
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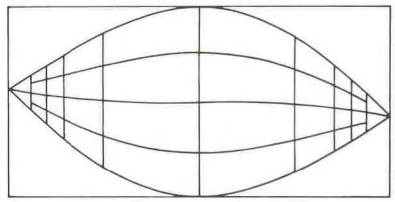

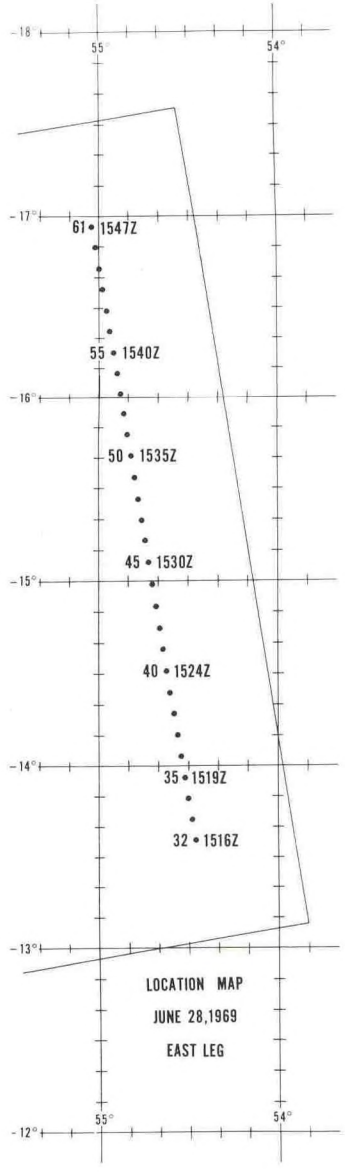
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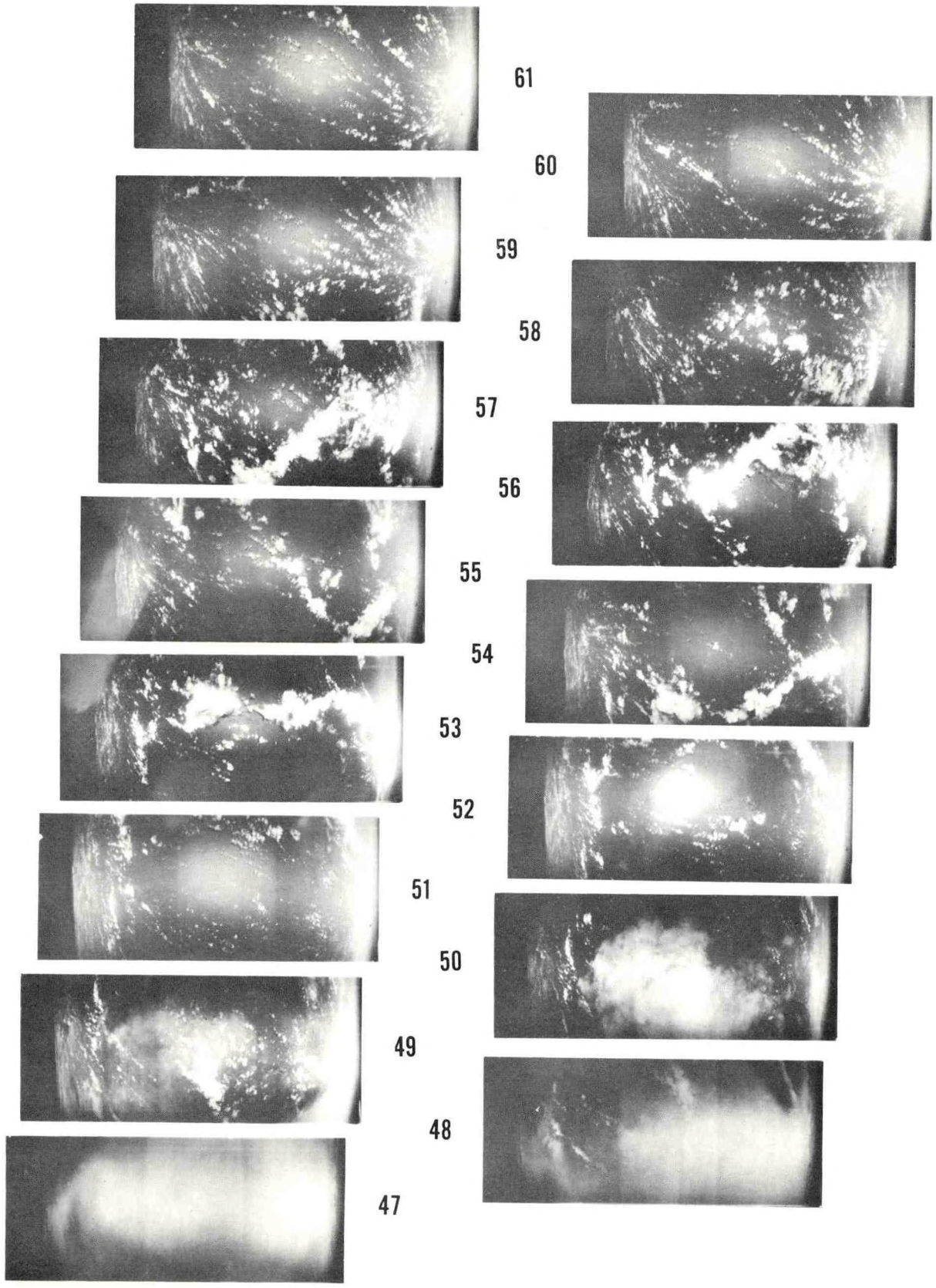
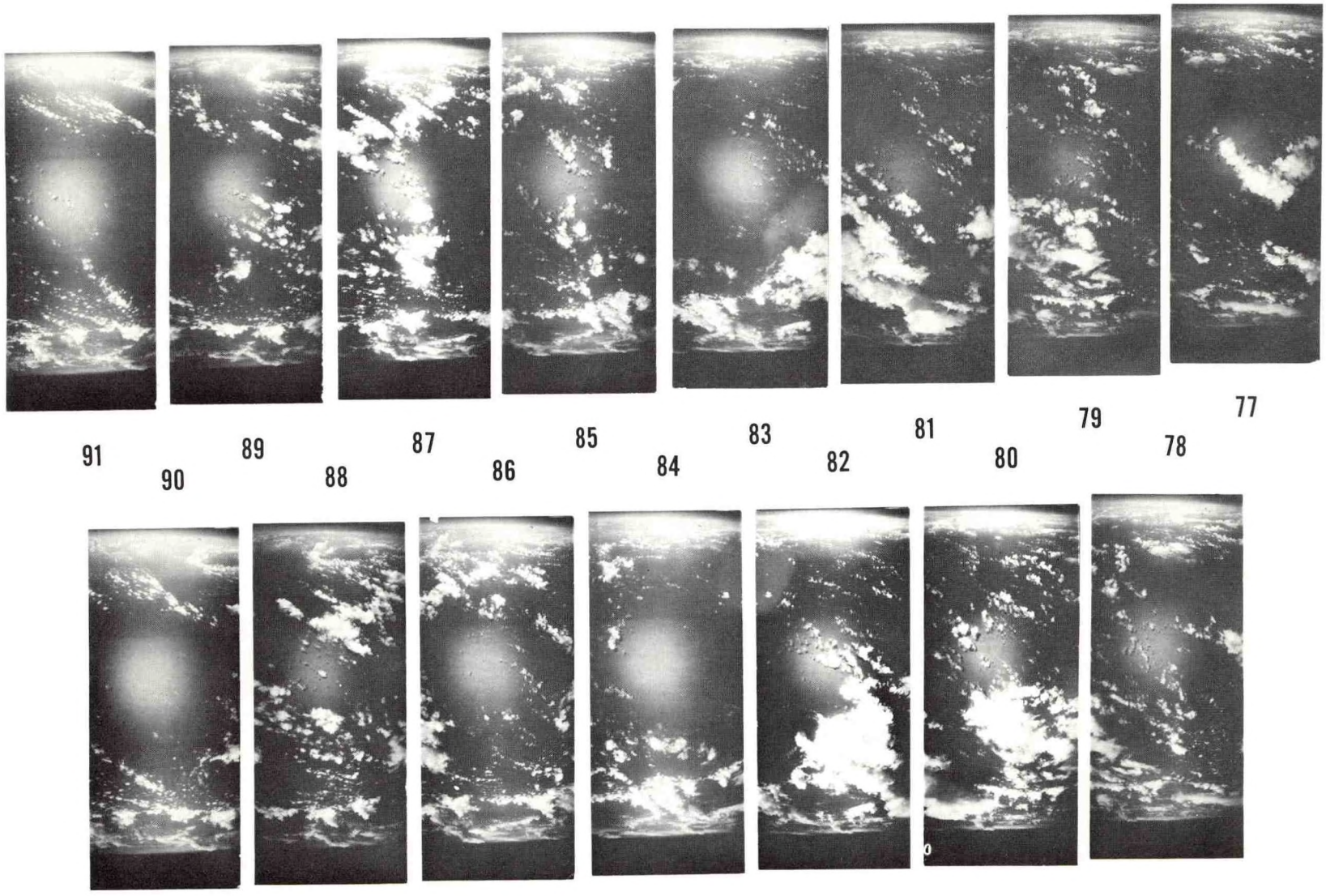
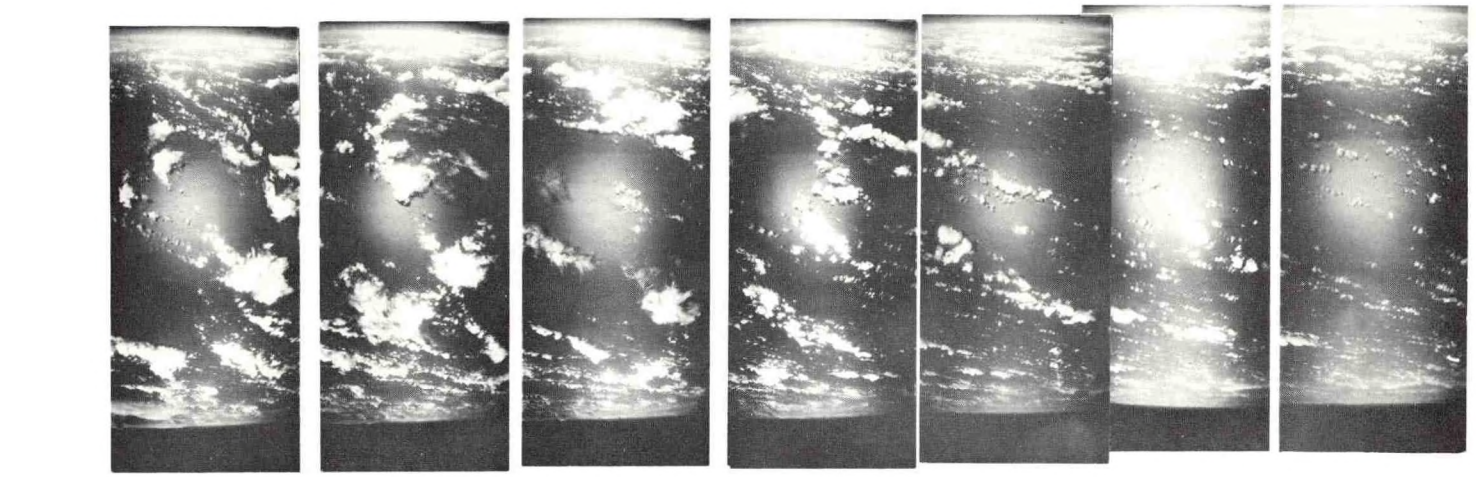
32 • 1516Z
13°
LOCATION MAP
JUNE 28,1969
EAST LEG
12°
55°
54°

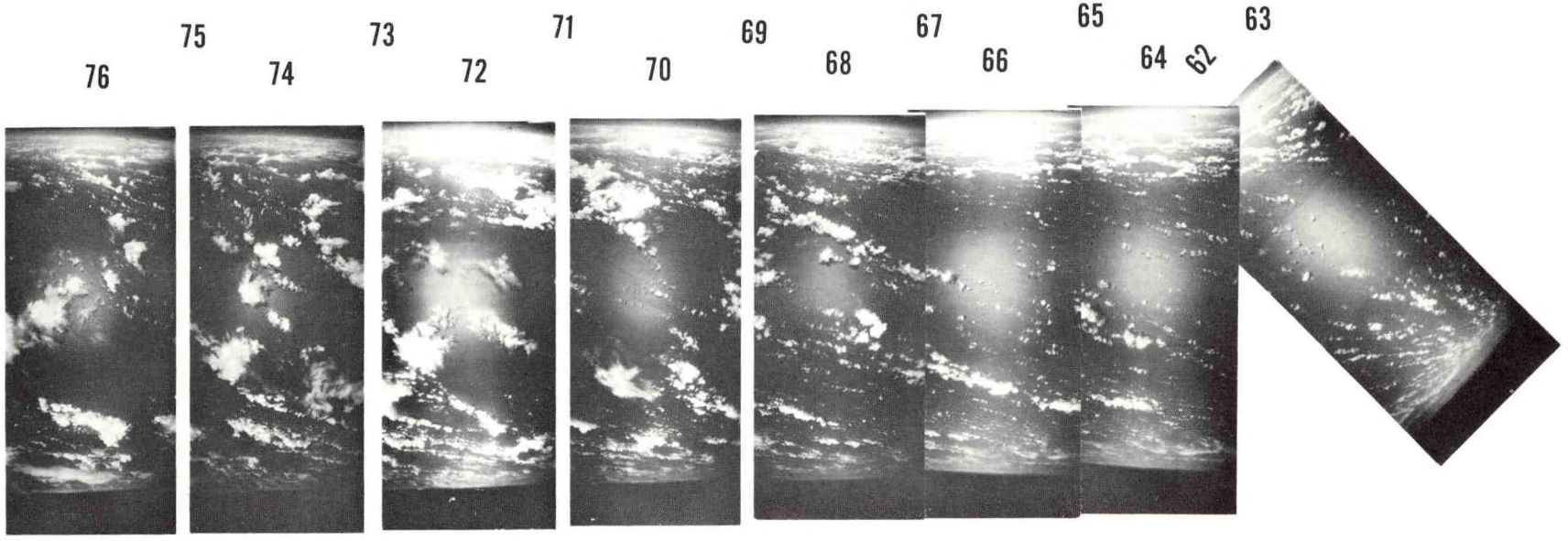


B57 CLOUD PHOTOS
50,000 FT.
JUNE 28,1969
EAST LEG



B57 CLOUD PHOTOS
50,000 FT.
JUNE 28,1969
NORTH LEG




76
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74
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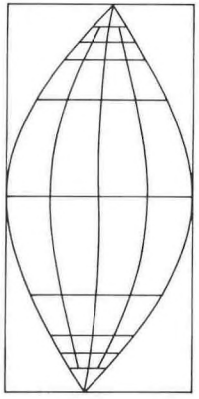
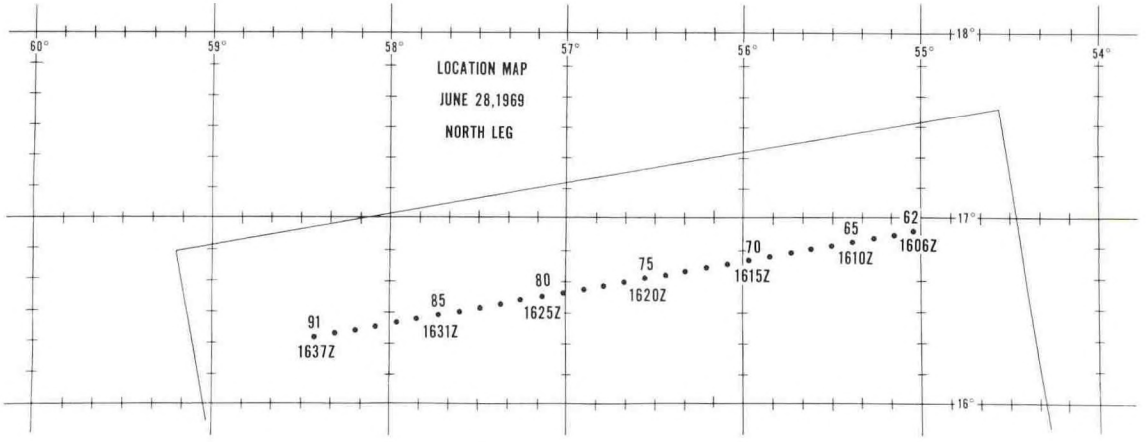
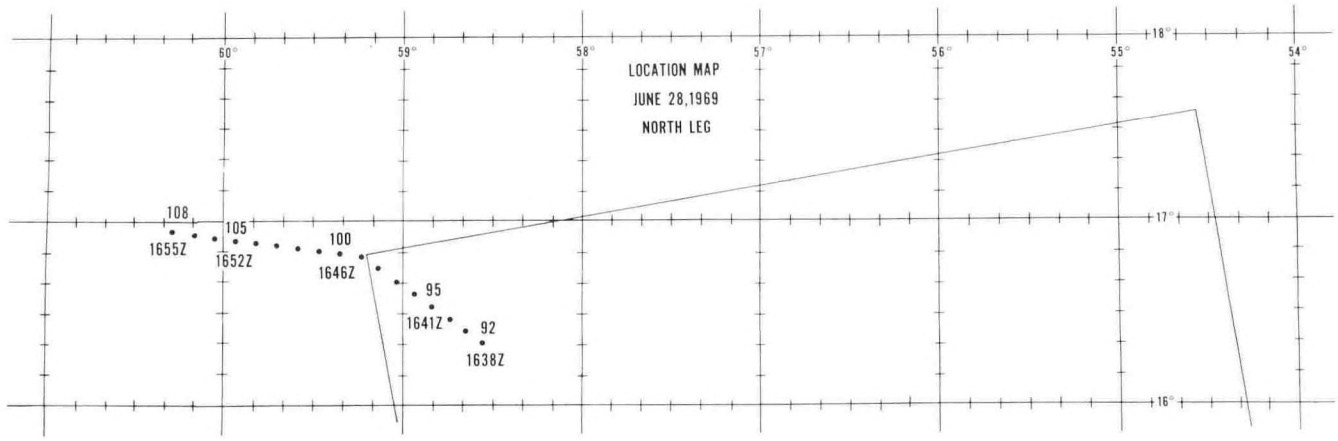
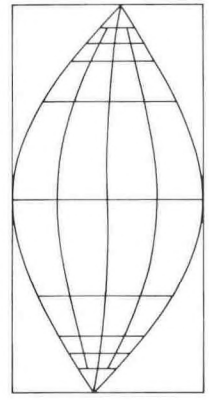
63
62

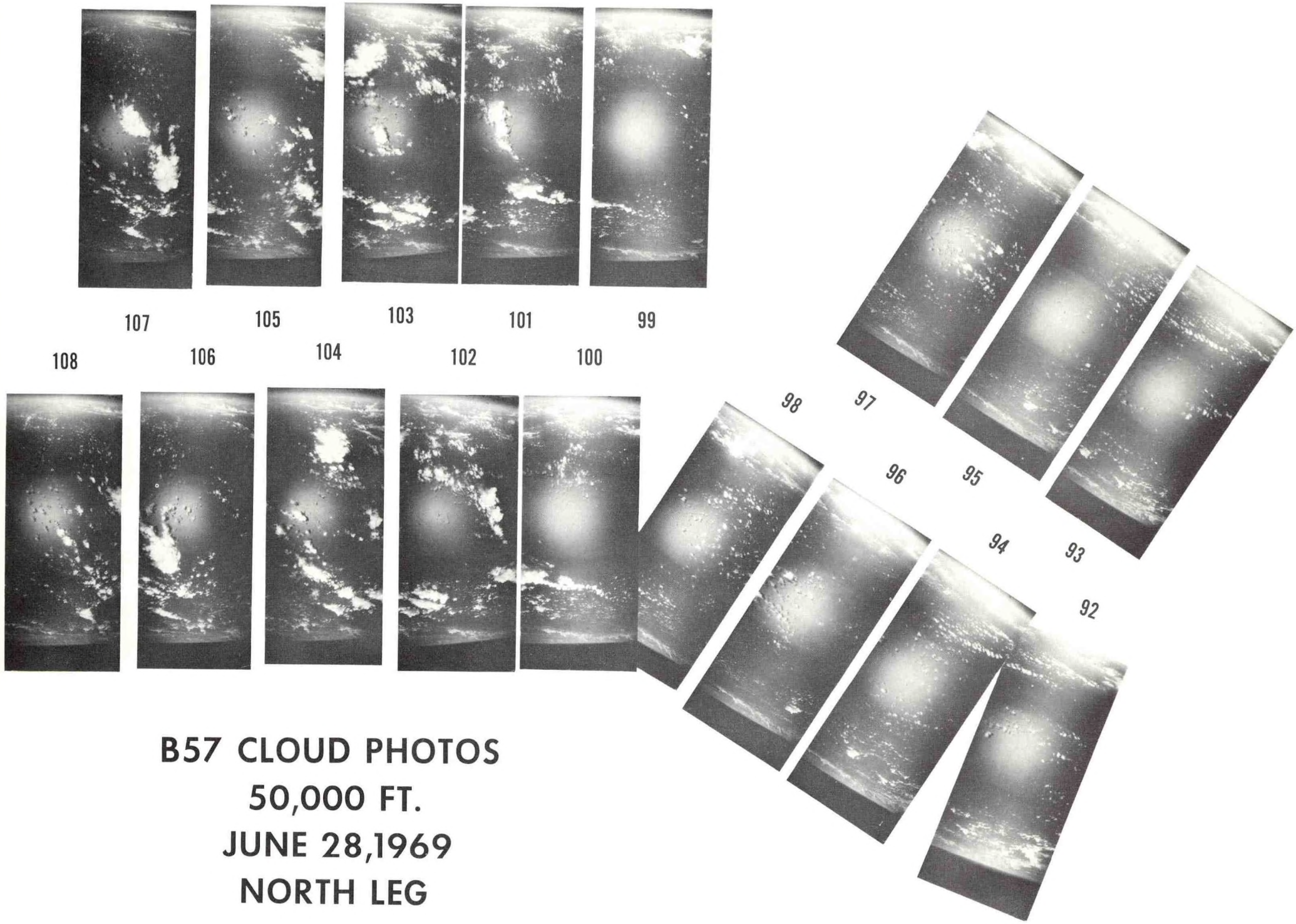



LOCATION MAP
JUNE 28,1969
NORTH LEG
60°
59°
58°
57°
56°
55°
54°
18°
17°
16°
91
1637Z
85
1631Z
80
1625Z
75
1620Z
70
1615Z
65
1610Z
62
1606Z

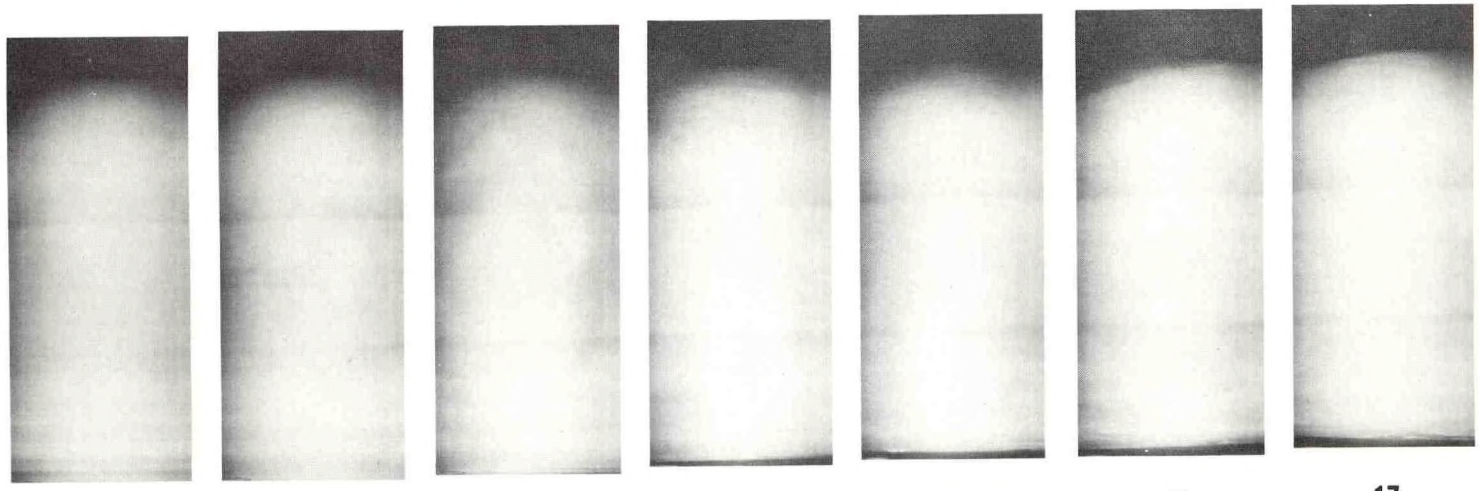


50,000 FT. TO PHOTOGRAPH 101, FOLLOWED BY DESCENT





B57 CLOUD PHOTOS
50,000 FT.
JUNE 28,1969
NORTH LEG


4
5
6
7
8
9
10
11
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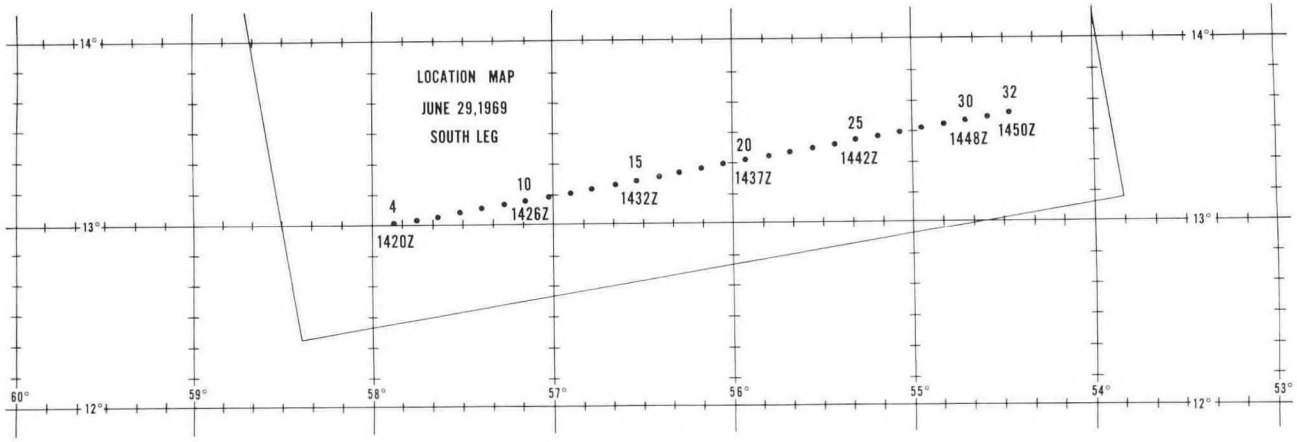
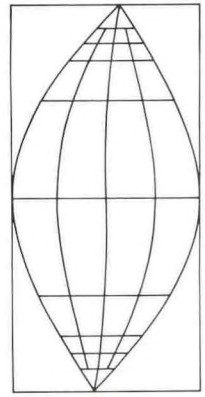
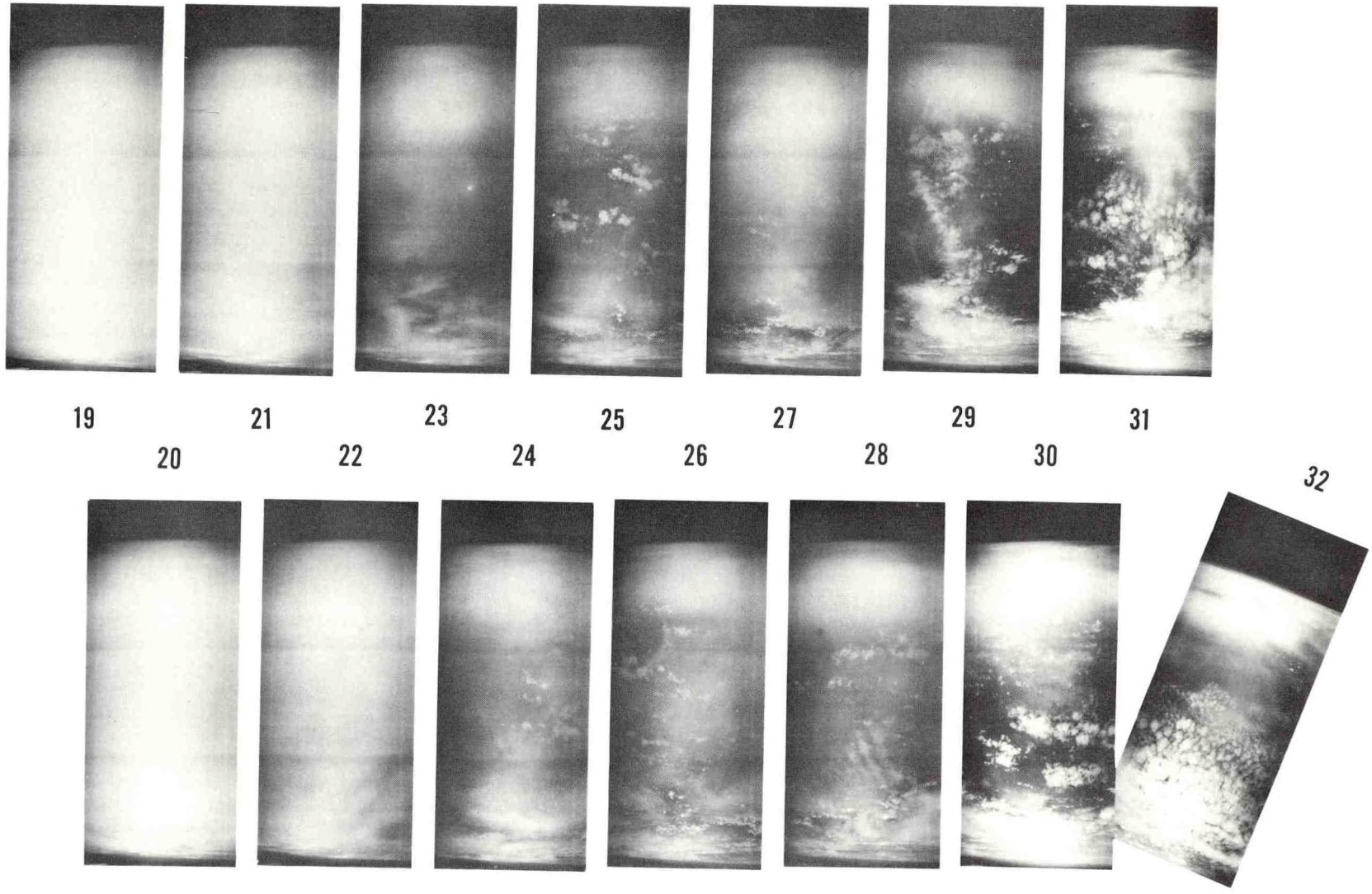
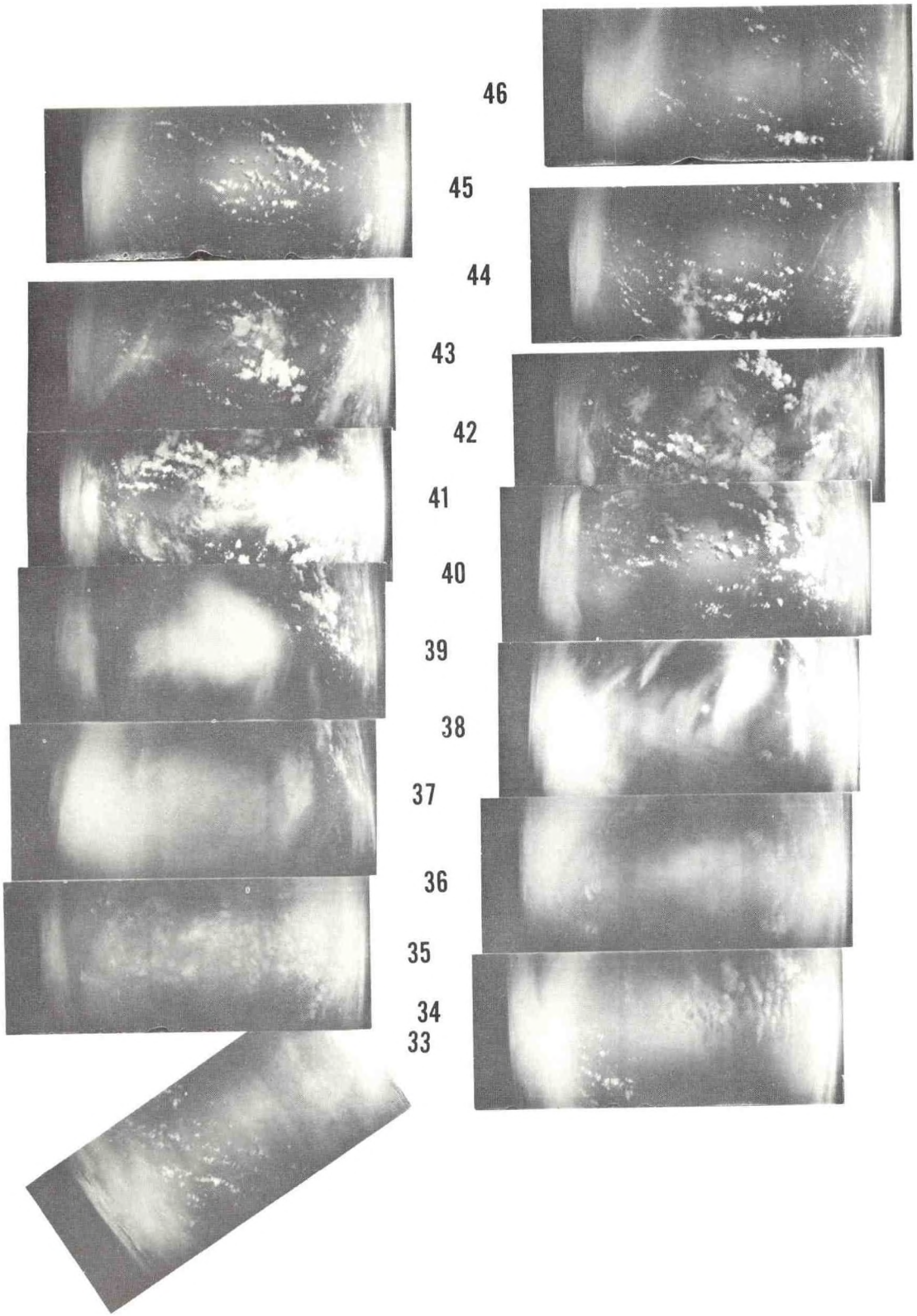
18


LOCATION MAP
JUNE 29,1969
SOUTH LEG
4
1420Z
10
1426Z
15
1432Z
20
1437Z
25
1442Z
30
1448Z
32
1450Z
14°
13°
12°
60°
59°
58°
57°
56°
55°
54°
53°





B57 CLOUD PHOTOS
50,000 FT.
JUNE 29,1969
SOUTH LEG


46
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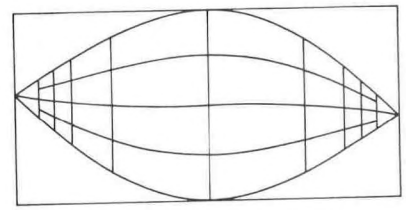
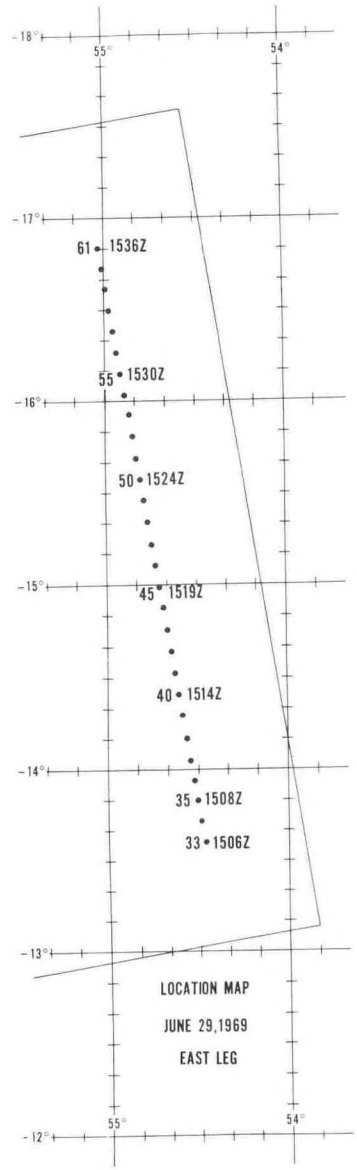
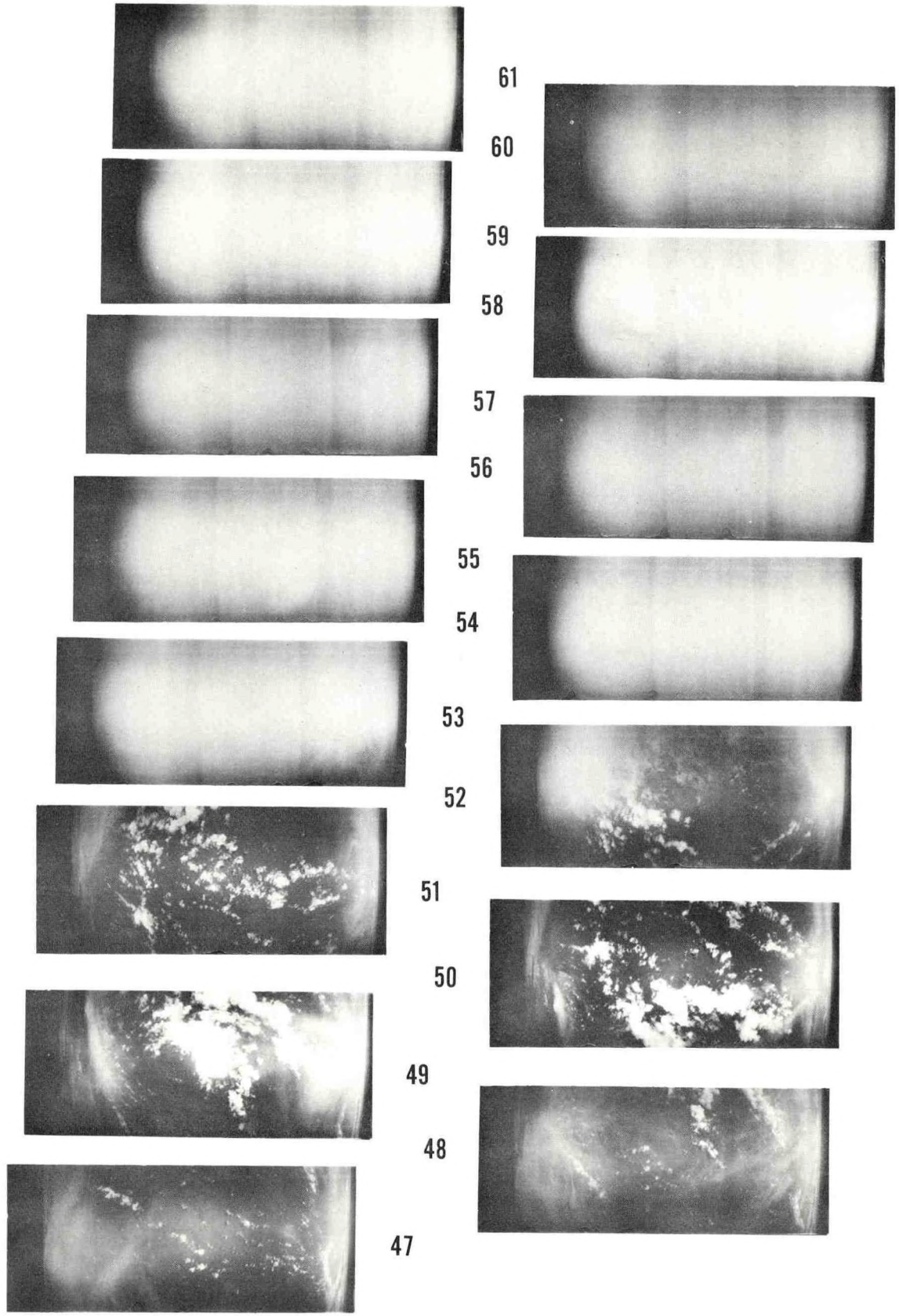
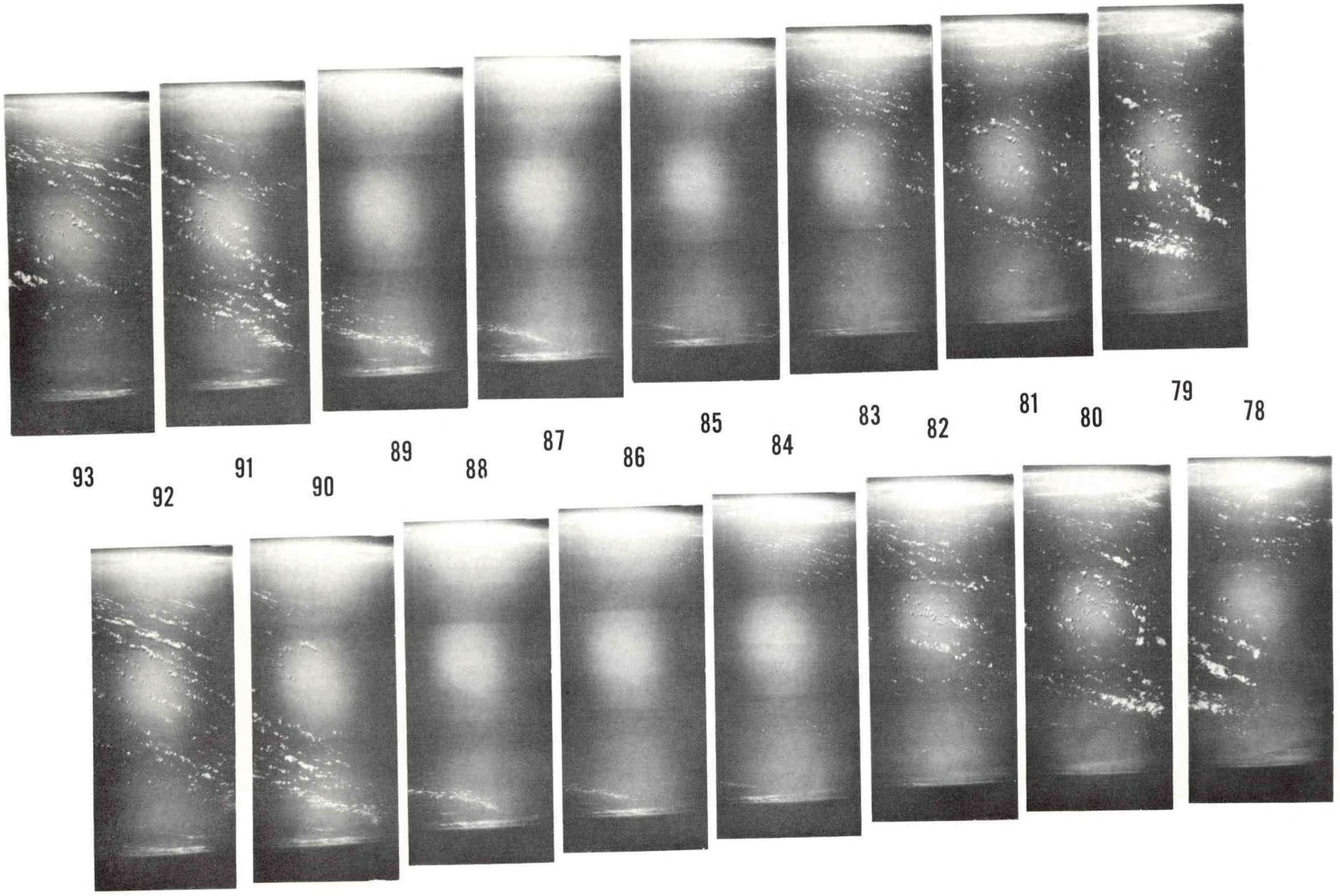
33



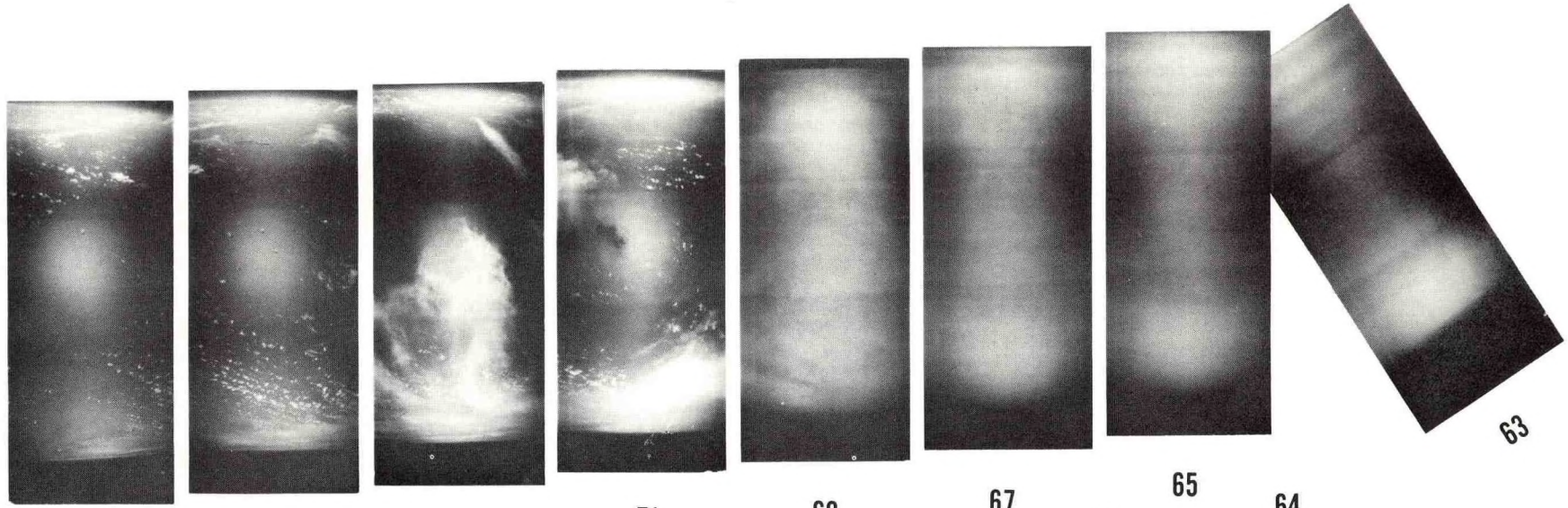

-18°
55°
54°
-17°
61 • 1536Z
55 • 1530Z
-16°
50 • 1524Z
-15°
45 • 1519Z
40 • 1514Z
-14°
35 • 1508Z
33 • 1506Z
-13°
LOCATION MAP
JUNE 29,1969
EAST LEG
55°
54°
-12°



B57 CLOUD PHOTOS
50,000 FT.
JUNE 29,1969
EAST LEG



B57 CLOUD PHOTOS
50,000 FT.
JUNE 29,1969
NORTH LEG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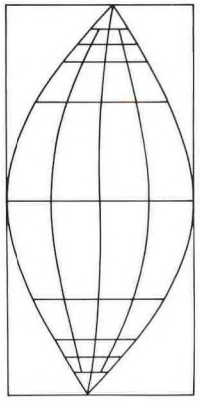
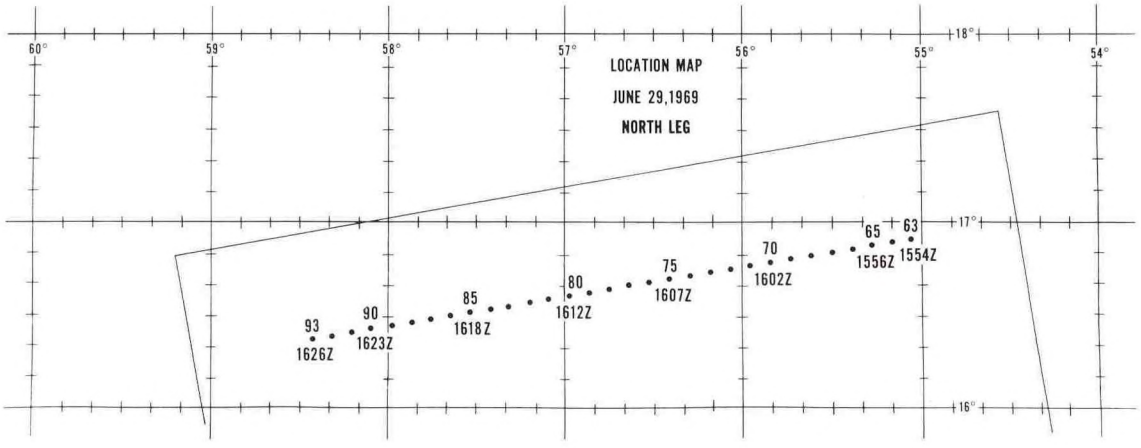
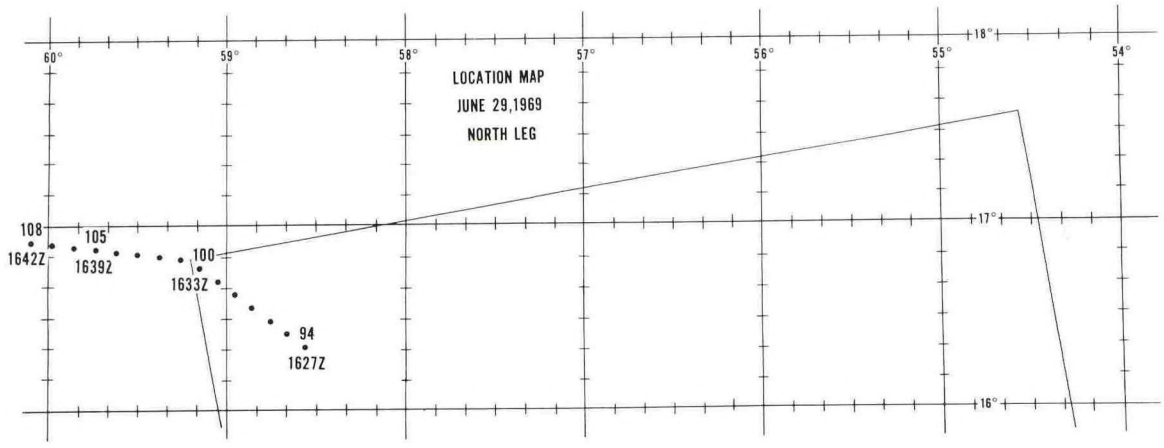
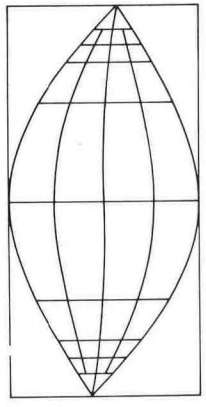
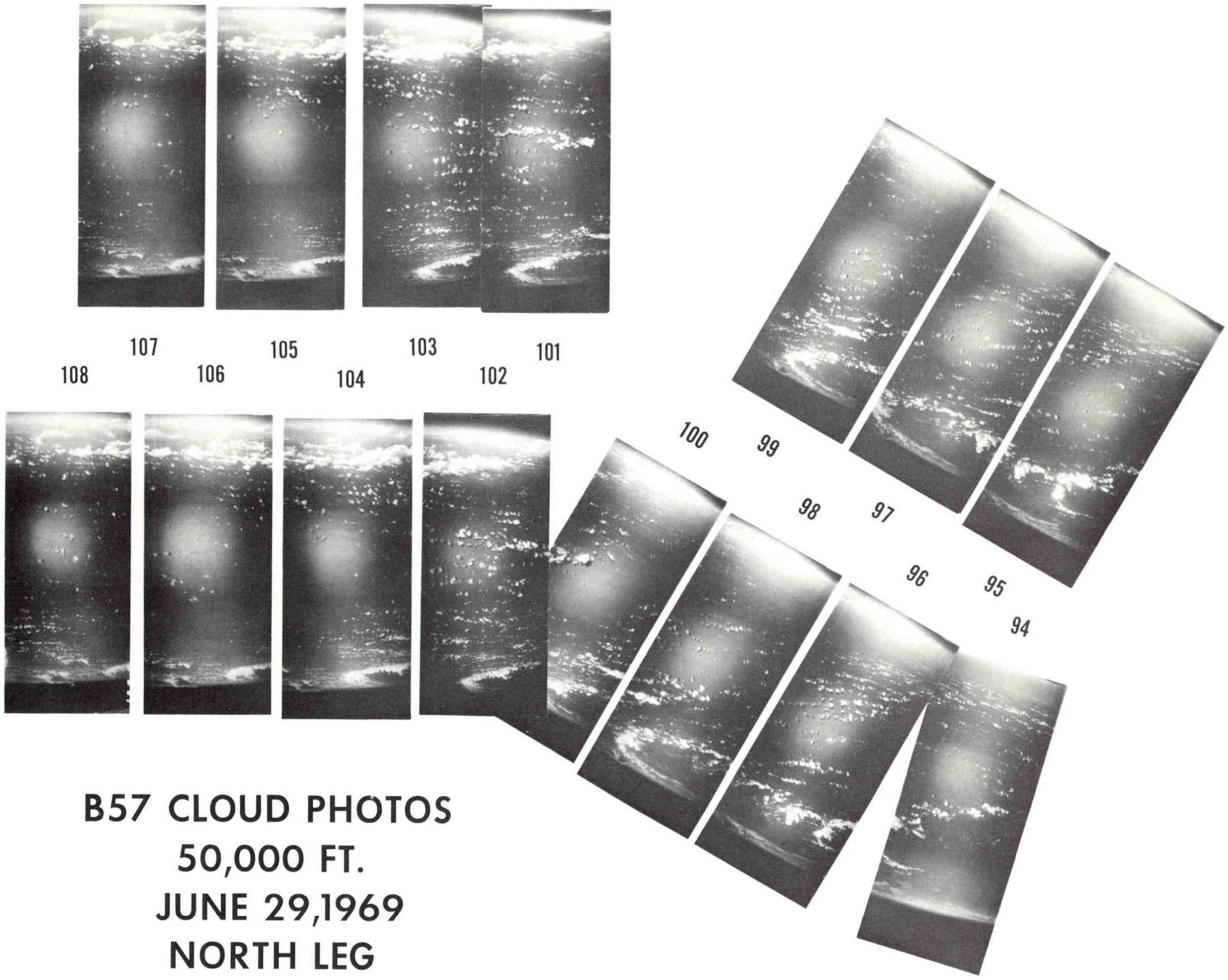
64



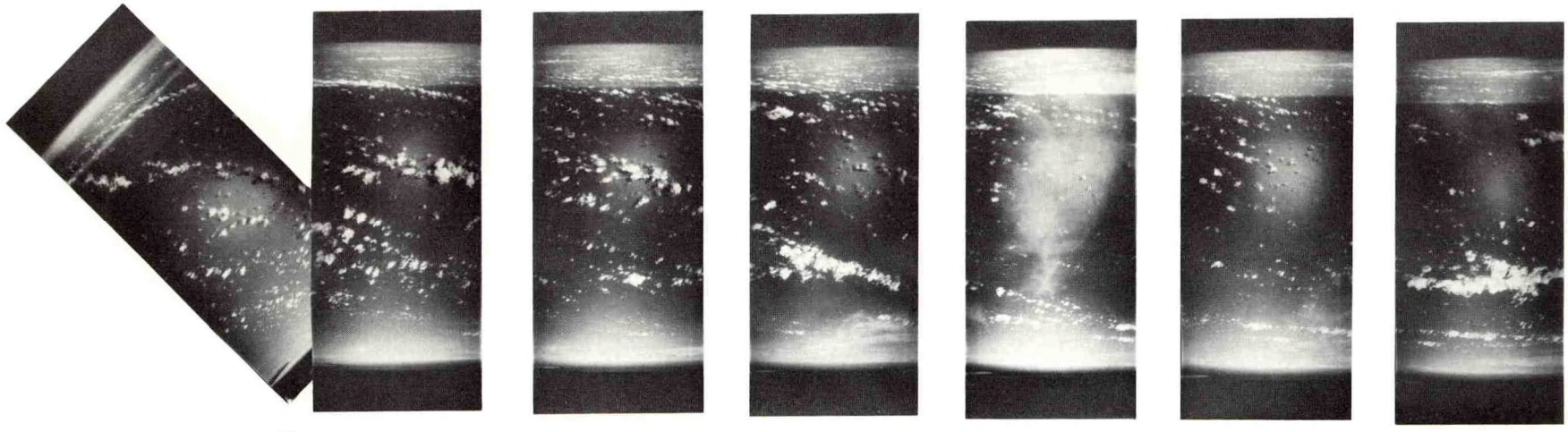

LOCATION MAP
JUNE 29,1969
NORTH LEG
60°
59°
58°
57°
56°
55°
54°
18°
17°
16°
93
1626Z
90
1623Z
85
1618Z
80
1612Z
75
1607Z
70
1602Z
65
1556Z
63
1554Z


LOCATION MAP
JUNE 29,1969
NORTH LEG
60°
59°
58°
57°
56°
55°
54°
18°
17°
16°
108
1642Z
105
1639Z
100
1633Z
94
1627Z



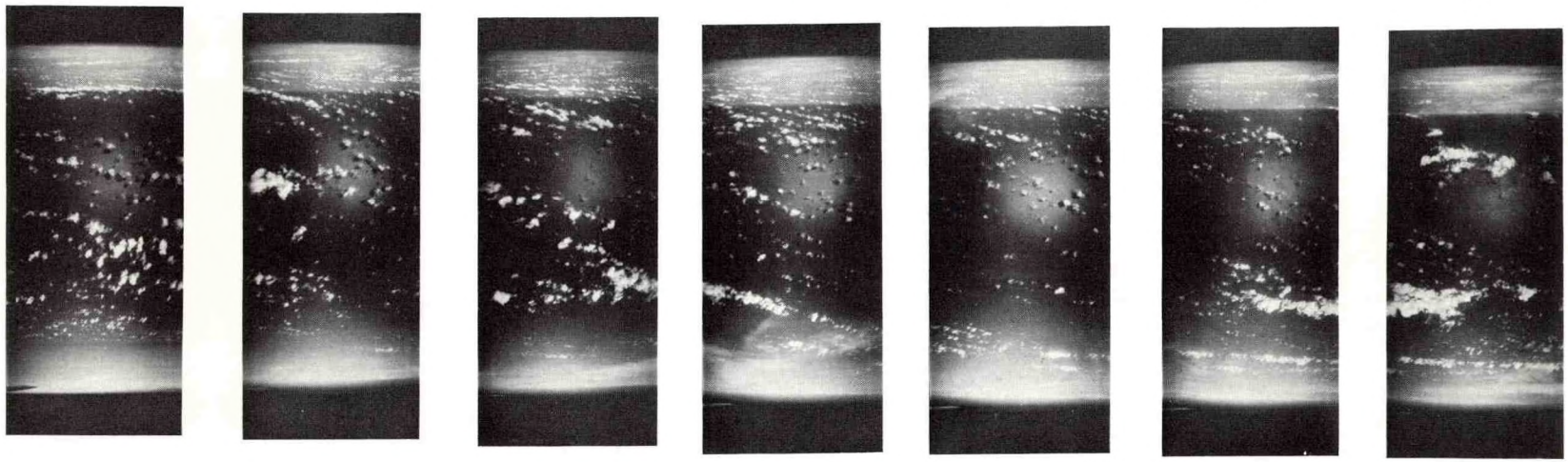


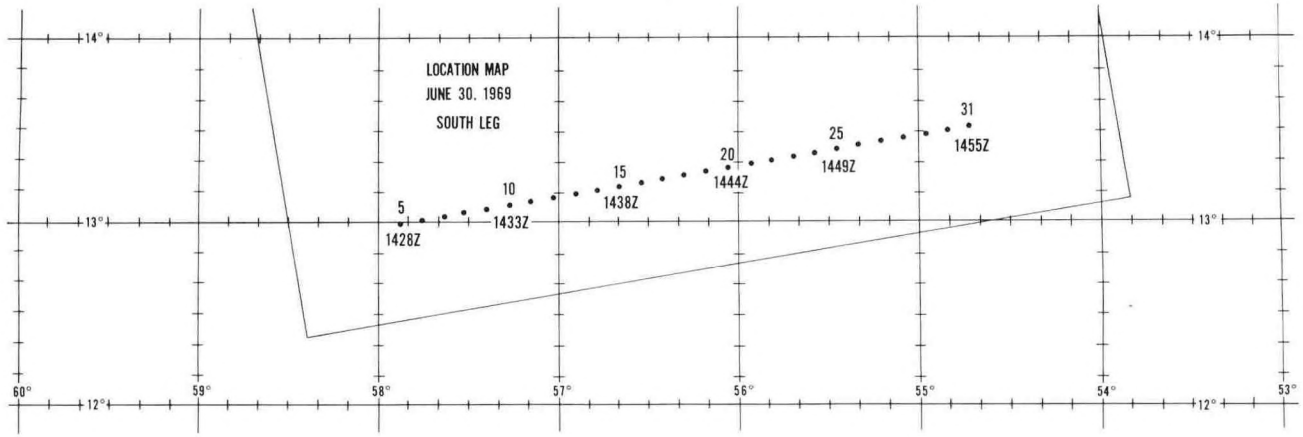
B57 CLOUD PHOTOS
50,000 FT.
JUNE 29,1969
NORTH LEG

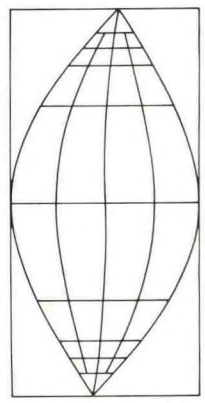


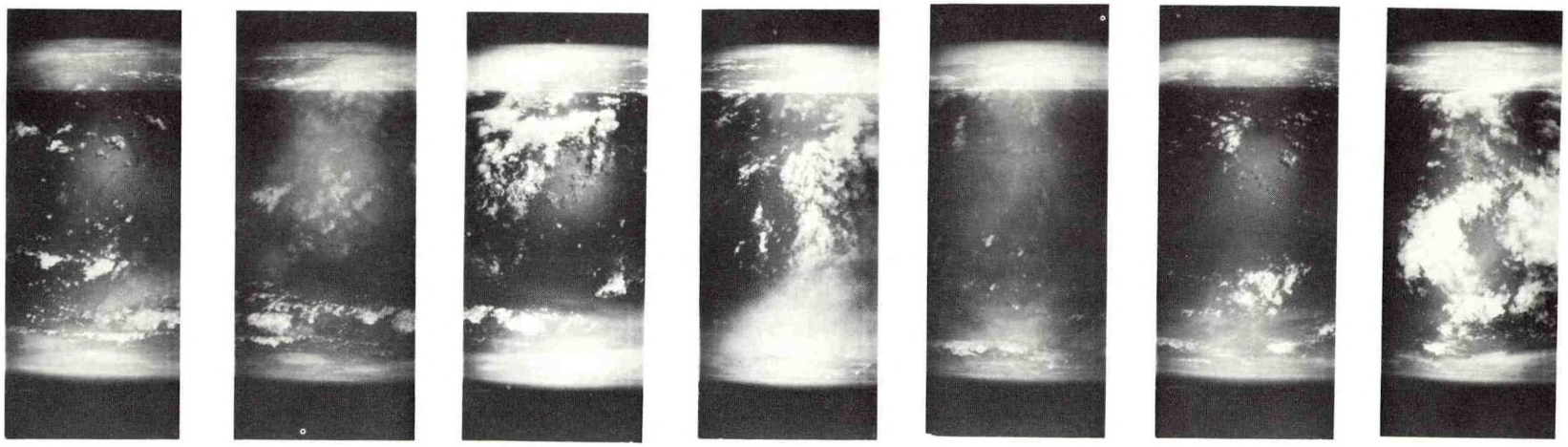
5 7 9 11 13 15 17

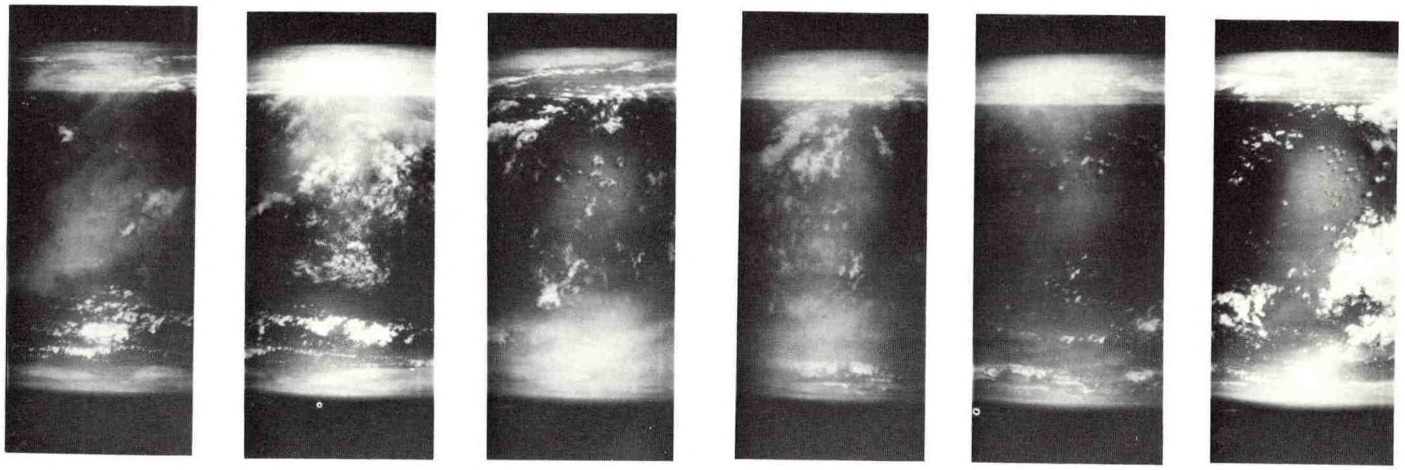
6 8 10 12 14 16 18



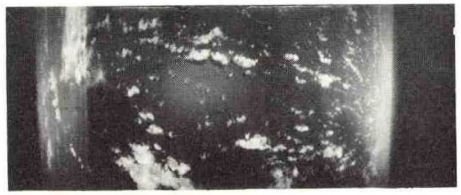








B57 CLOUD PHOTOS
50,000 FT.
JUNE 30, 1969
SOUTH LEG



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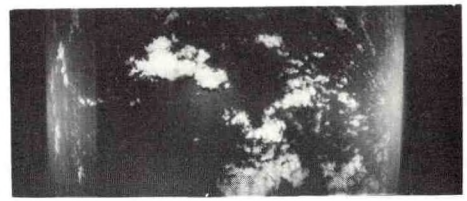
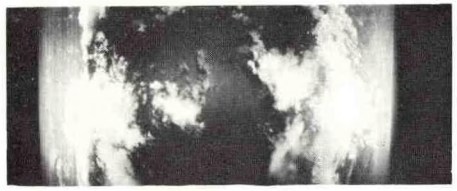


43



42

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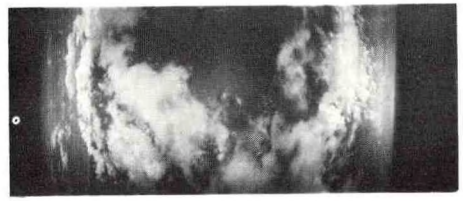

39

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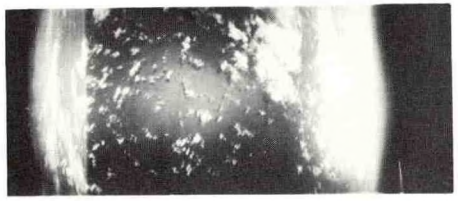
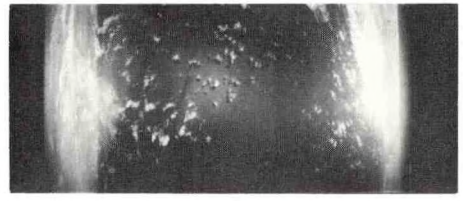
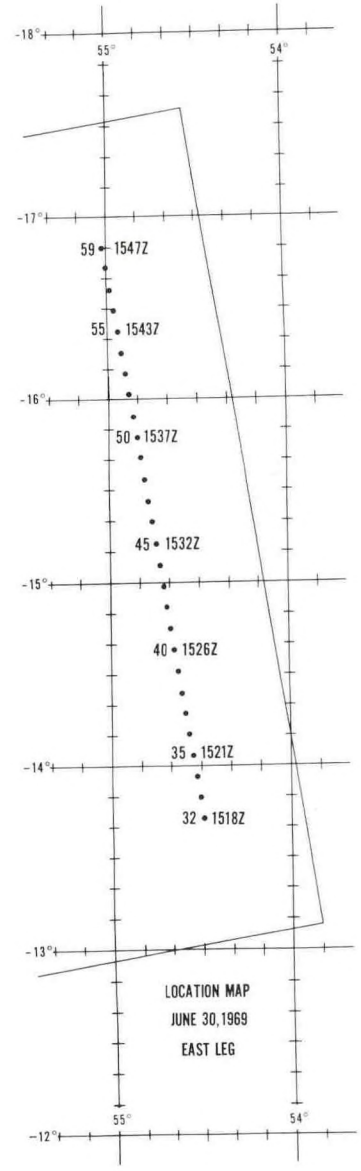


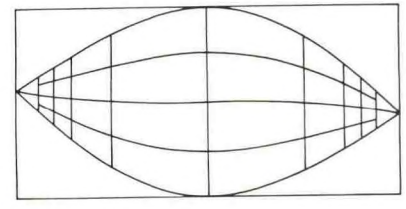
34

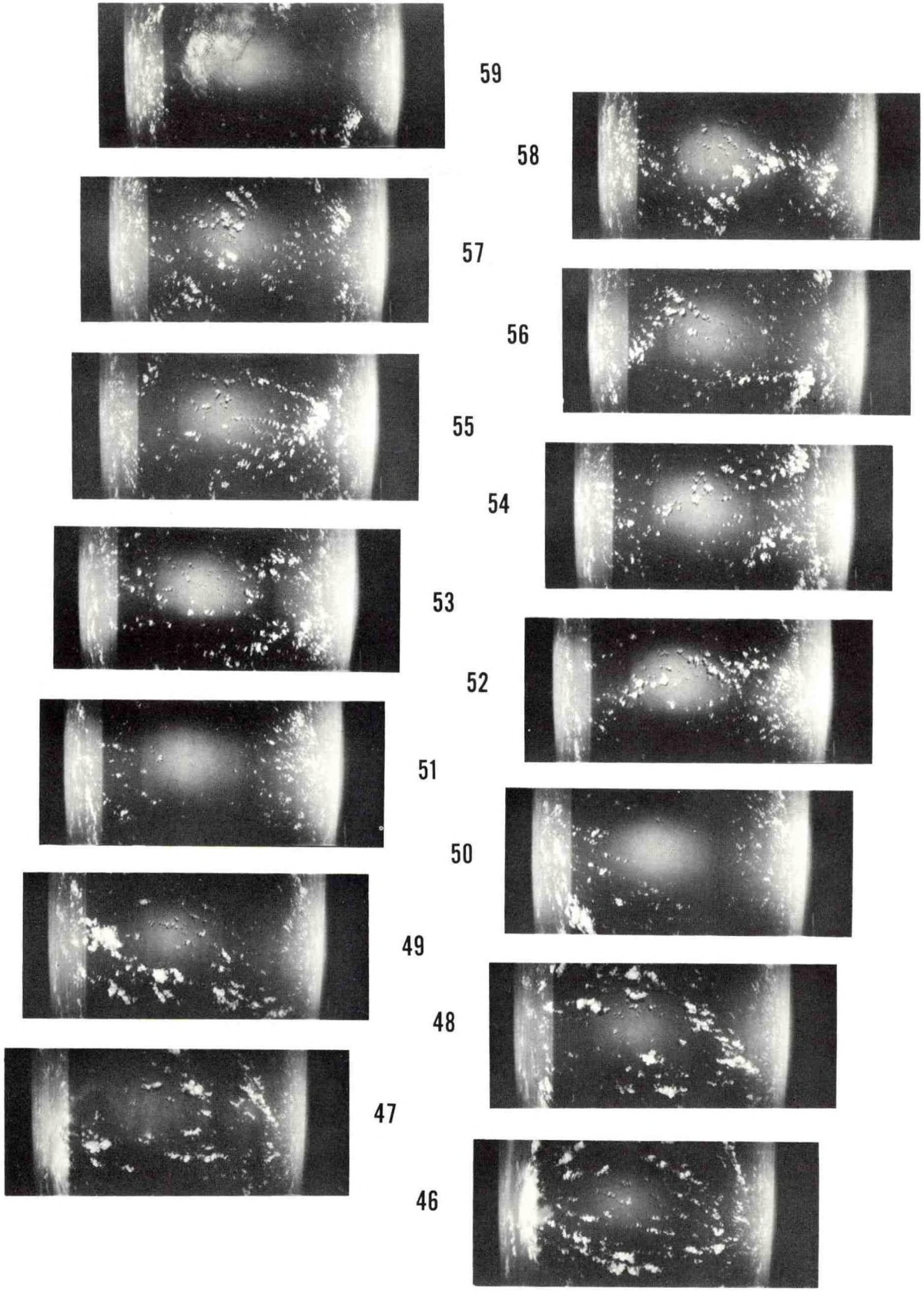
33



32

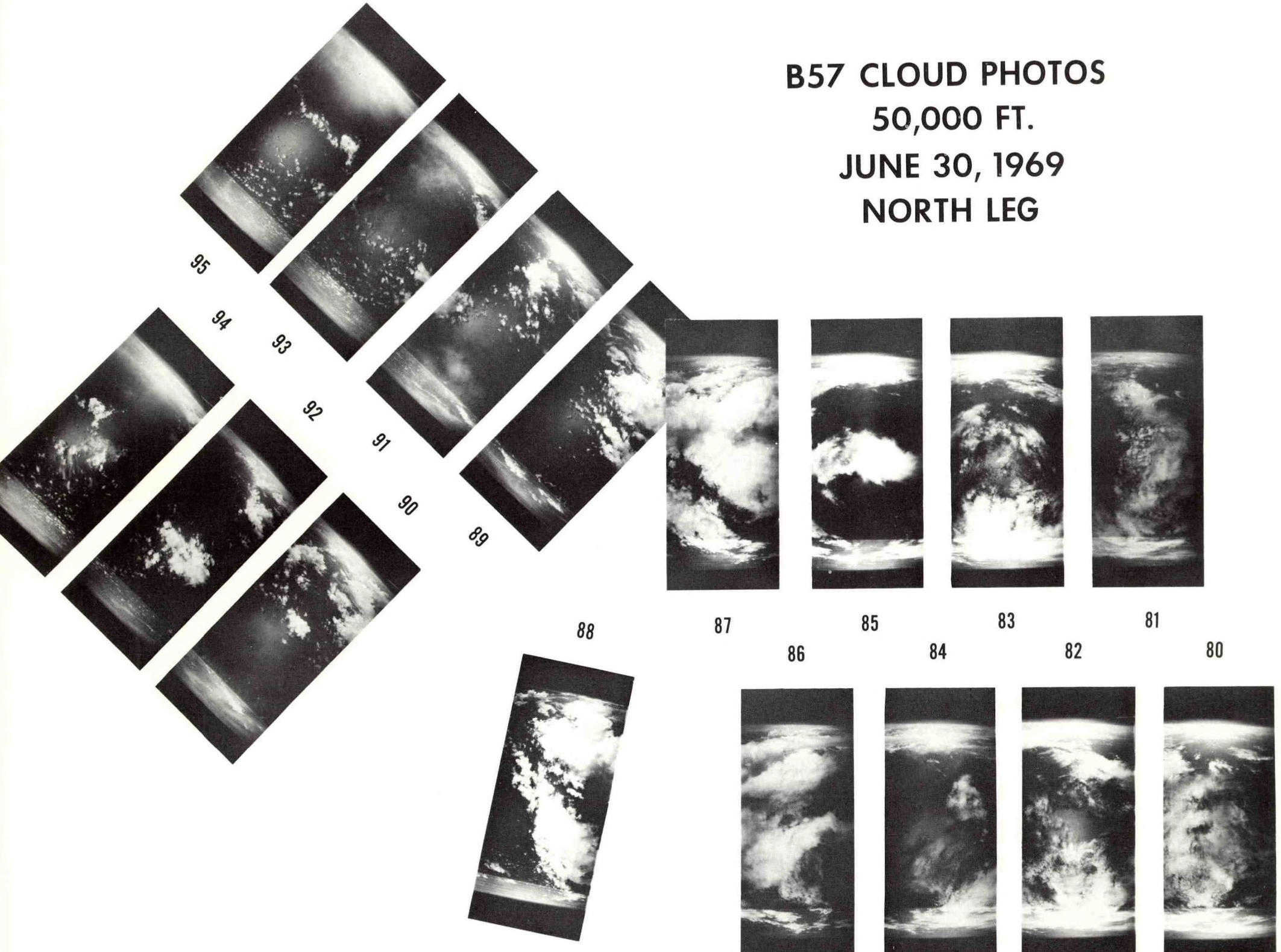


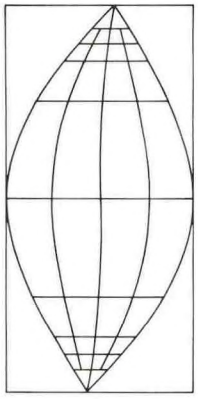


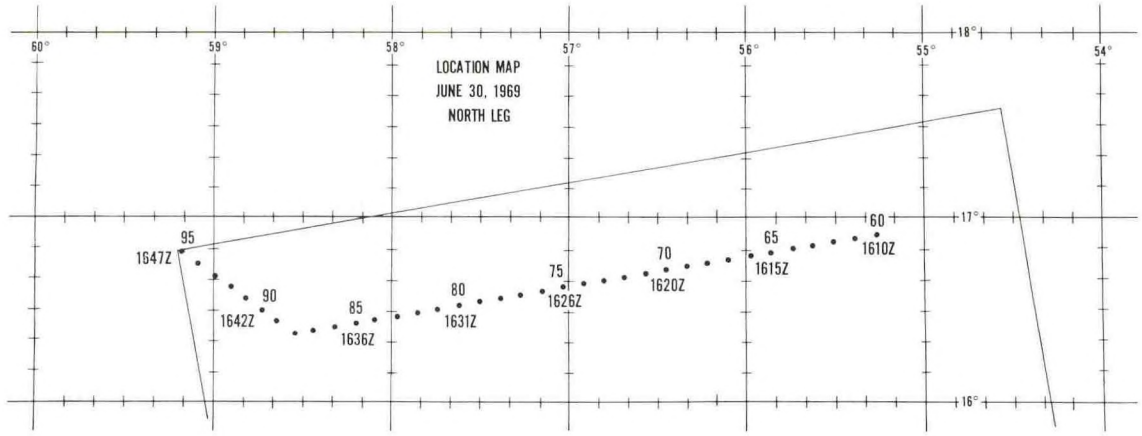


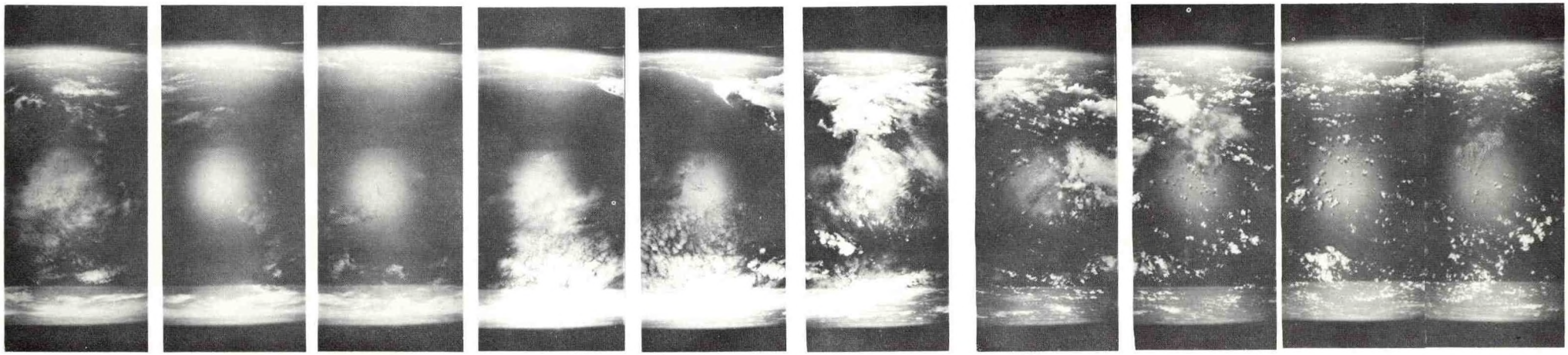
B57 CLOUD PHOTOS
50,000 FT.
JUNE 30,1969
EAST LEG

B57 CLOUD PHOTOS
50,000 FT.
JUNE 30, 1969
NORTH LEG

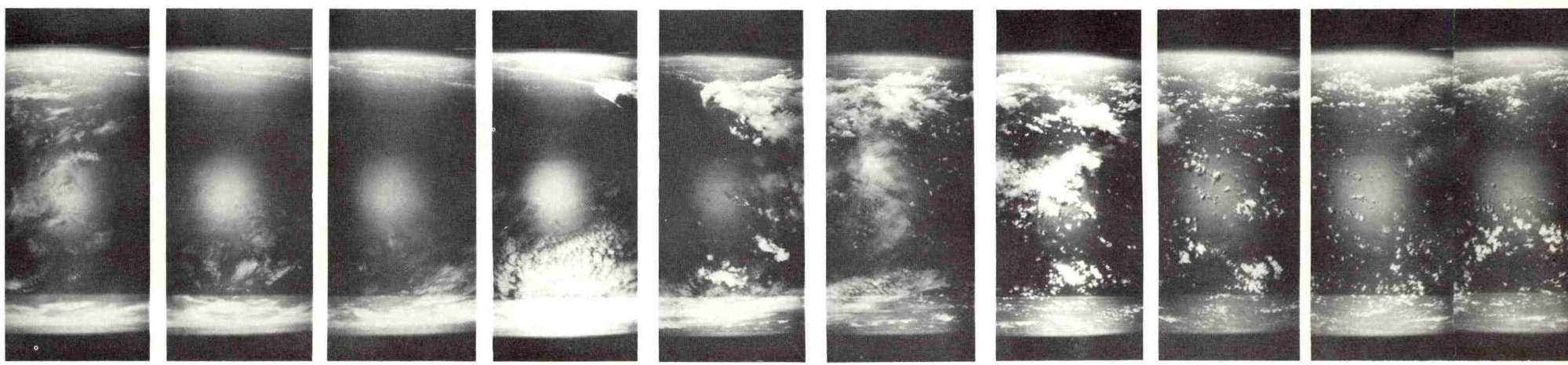


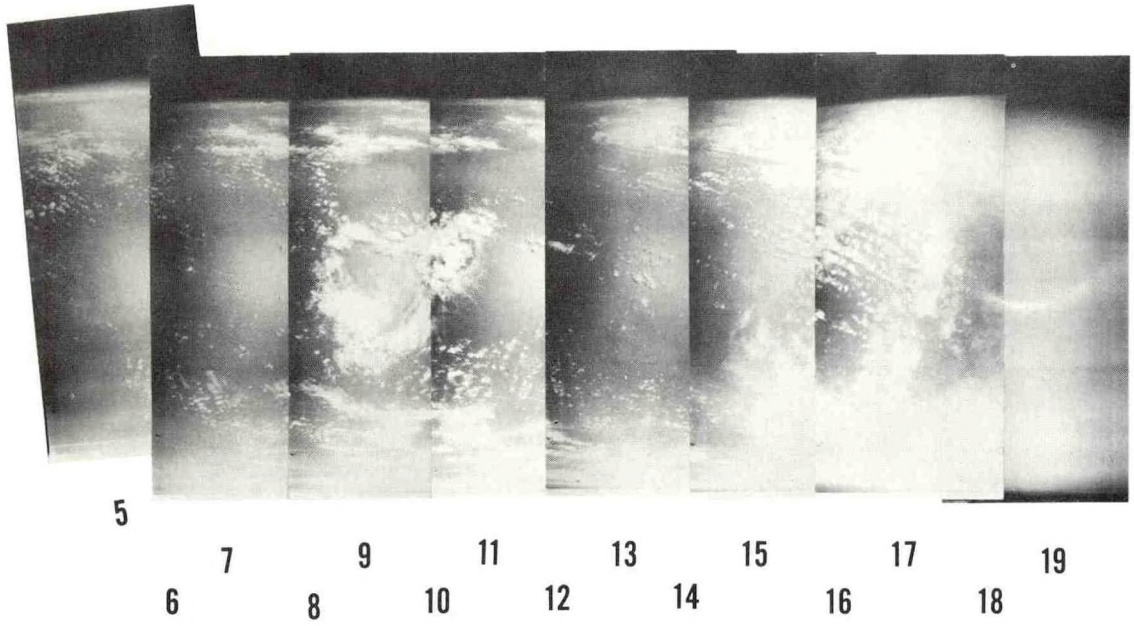




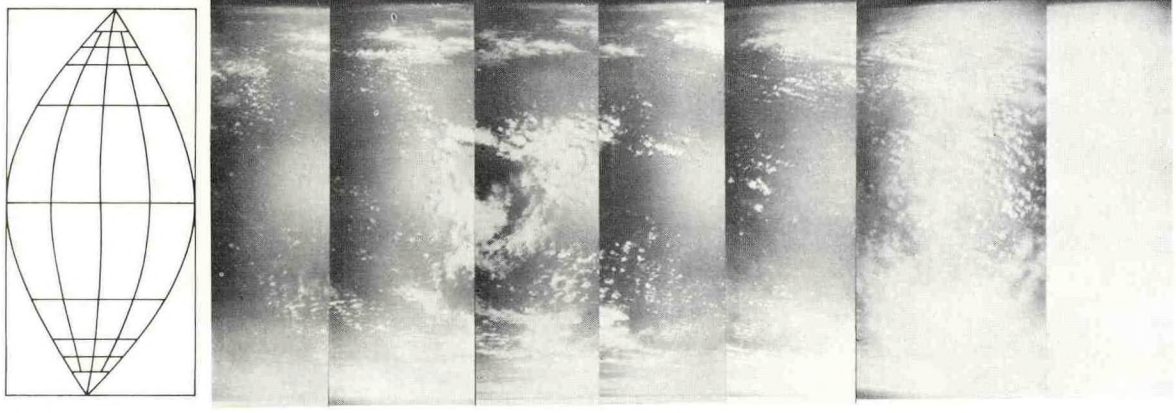


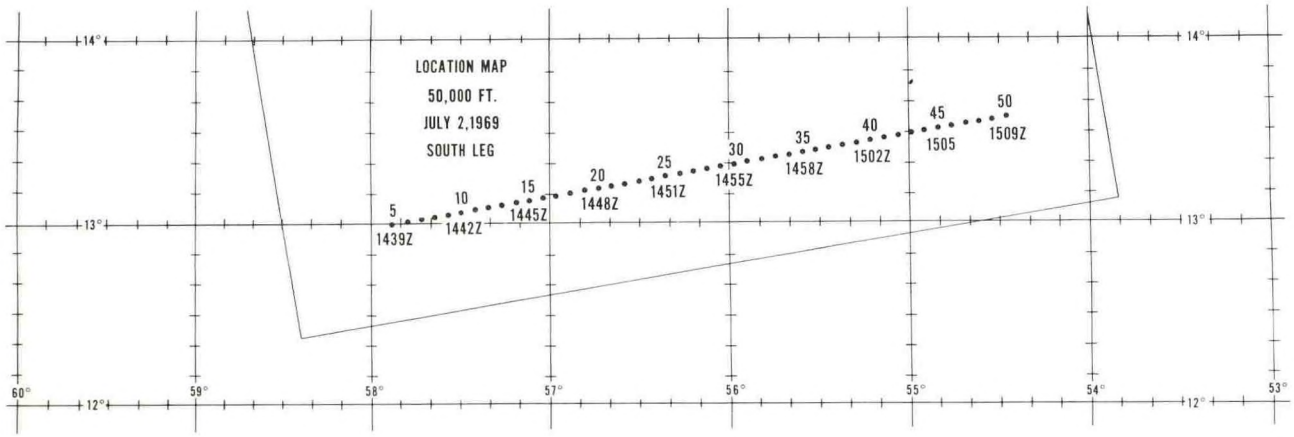
79 78 77 76 75 74 73 72 71 70 69 68 67 66 65 64 63 62 61 60



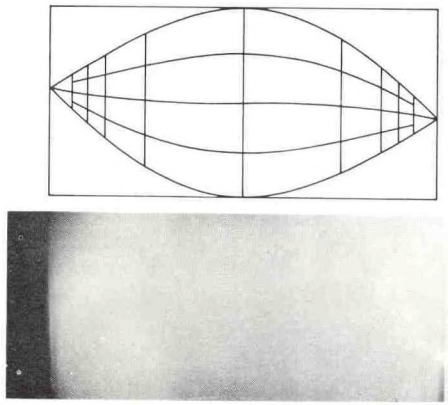


PHOTOGRAPHS 20 THROUGH 50 OMITTED. SHOW CONTINUOUS CLOUD DECK BELOW PLANE.



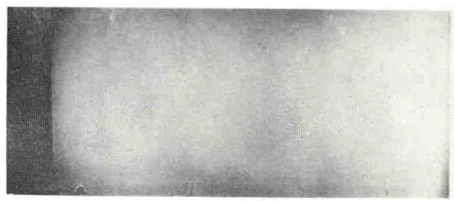


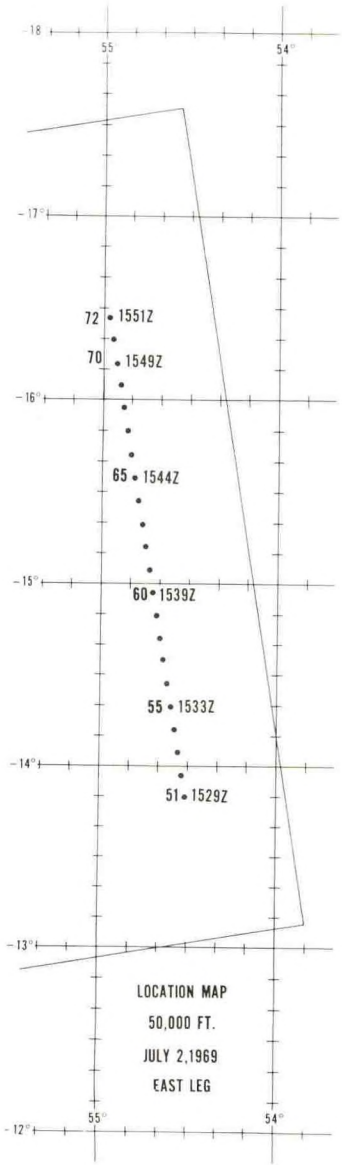
B57 CLOUD PHOTOS
50,000 FT.
JULY 2,1969
SOUTH LEG



72

71

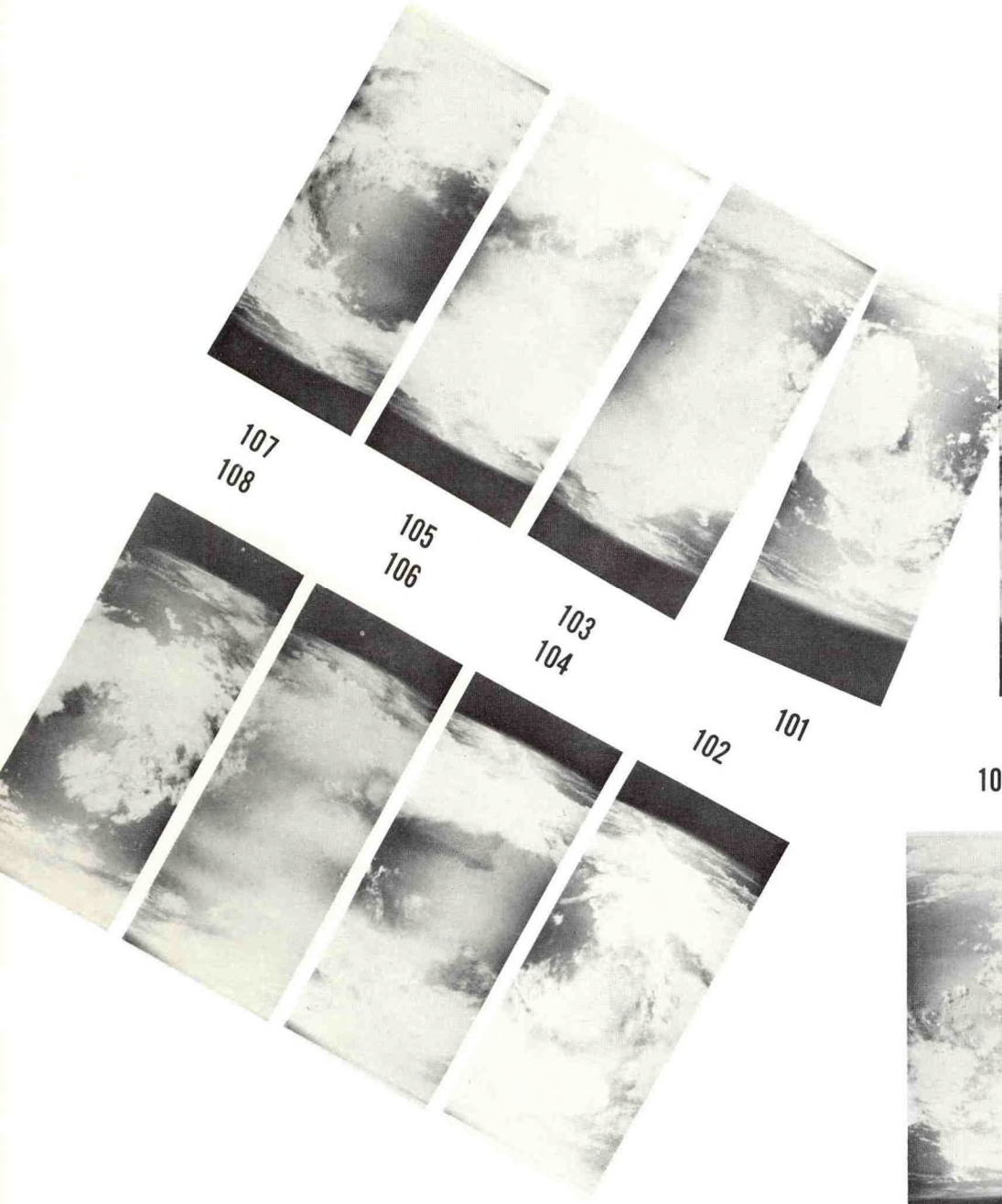


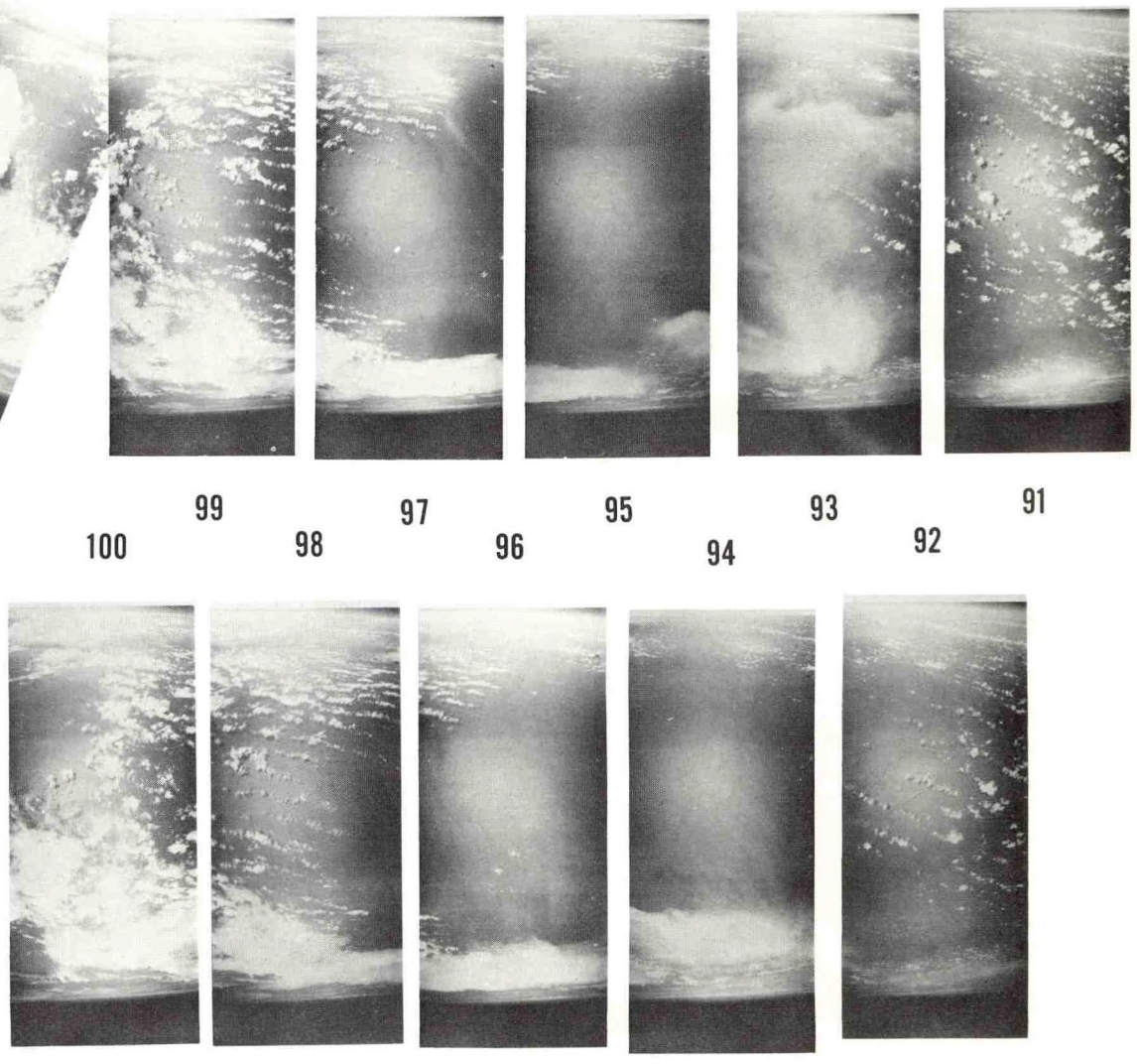


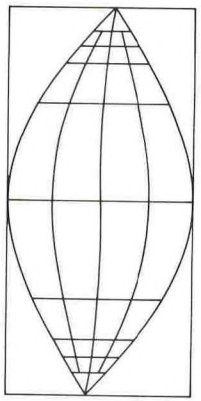
B57 CLOUD PHOTOS
50,000 FT.
JULY 2,1969
EAST LEG

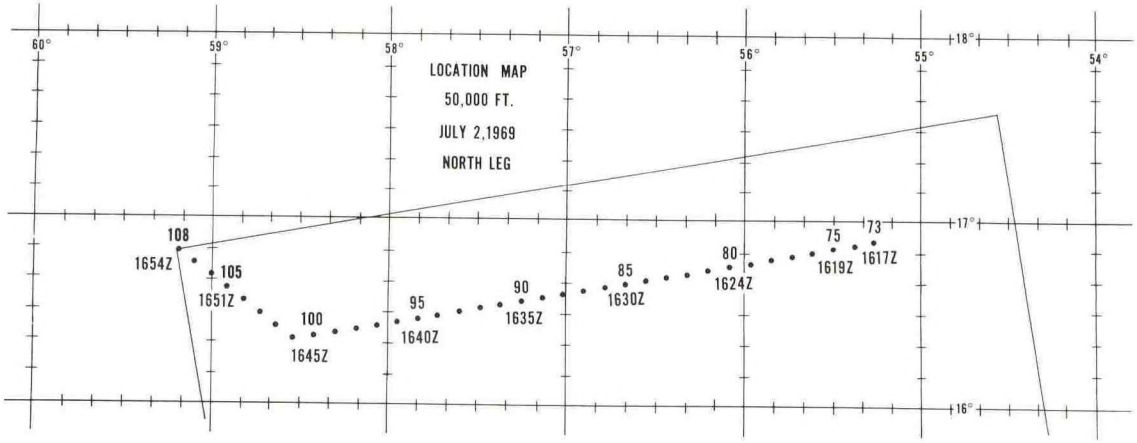
PHOTOGRAPHS 51 THROUGH 70 OMITTED . SHOW CONTINUOUS CLOUD DECK BELOW PLANE .

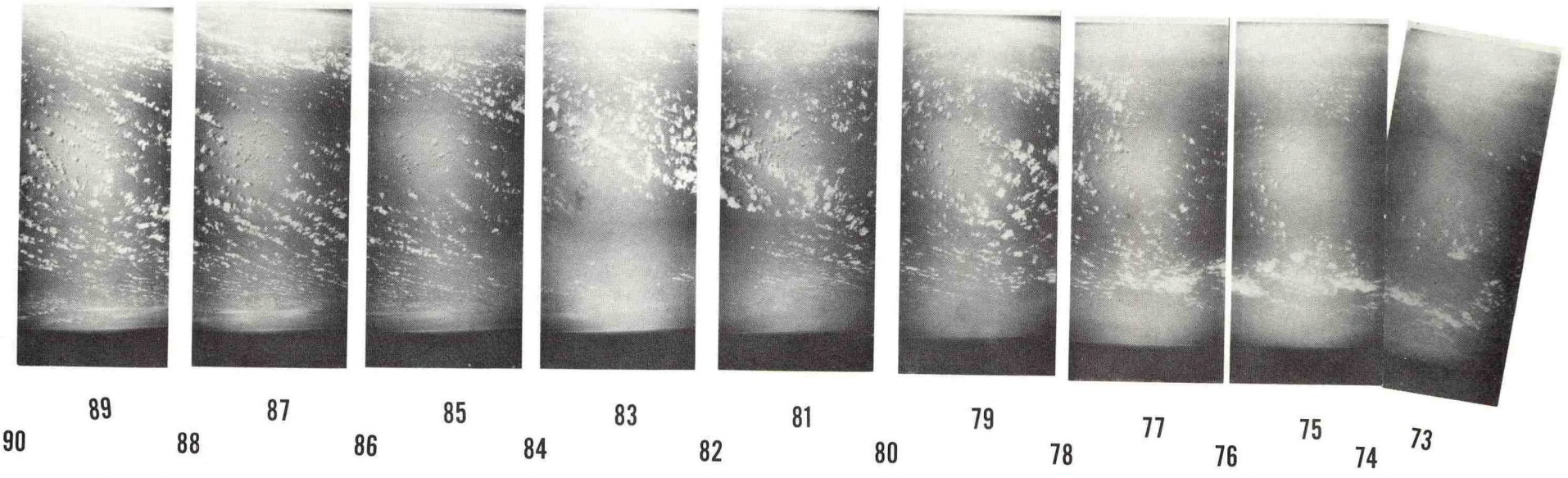
B57 CLOUD PHOTOS
50,000 FT.
JULY 2,1969
NORTH LEG








LOCATION MAP
50,000 FT.
JULY 2,1969
NORTH LEG
60°
59°
58°
57°
56°
55°
54°
18°
17°
16°
108
1654Z
105
1651Z
100
1645Z
95
1640Z
90
1635Z
85
1630Z
80
1624Z
75
1619Z
73
1617Z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80
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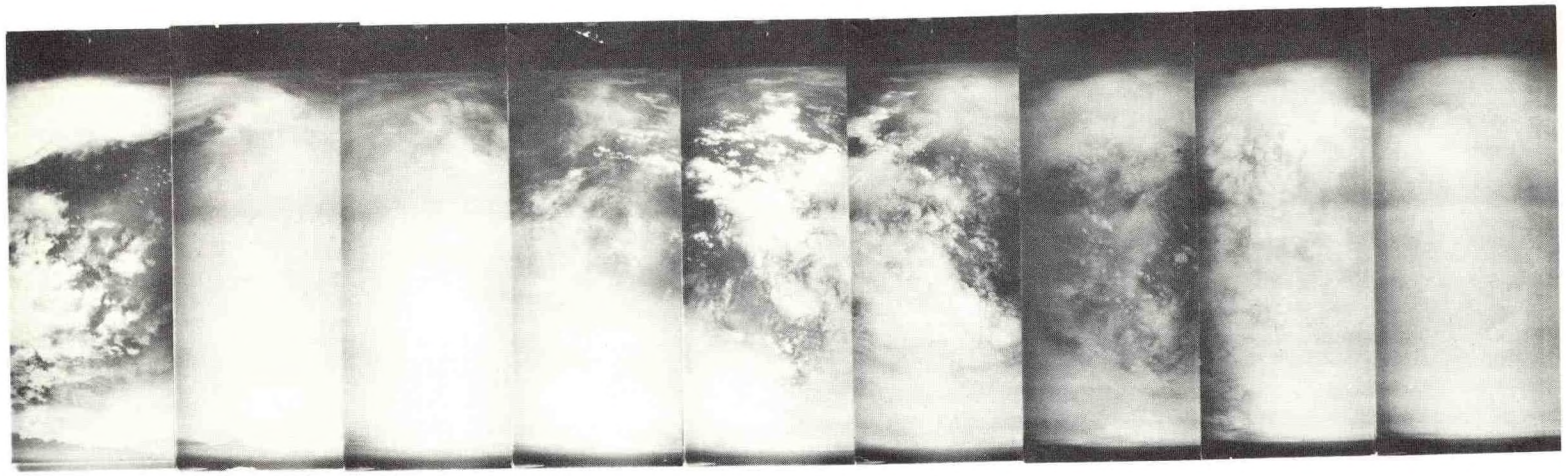
76
74



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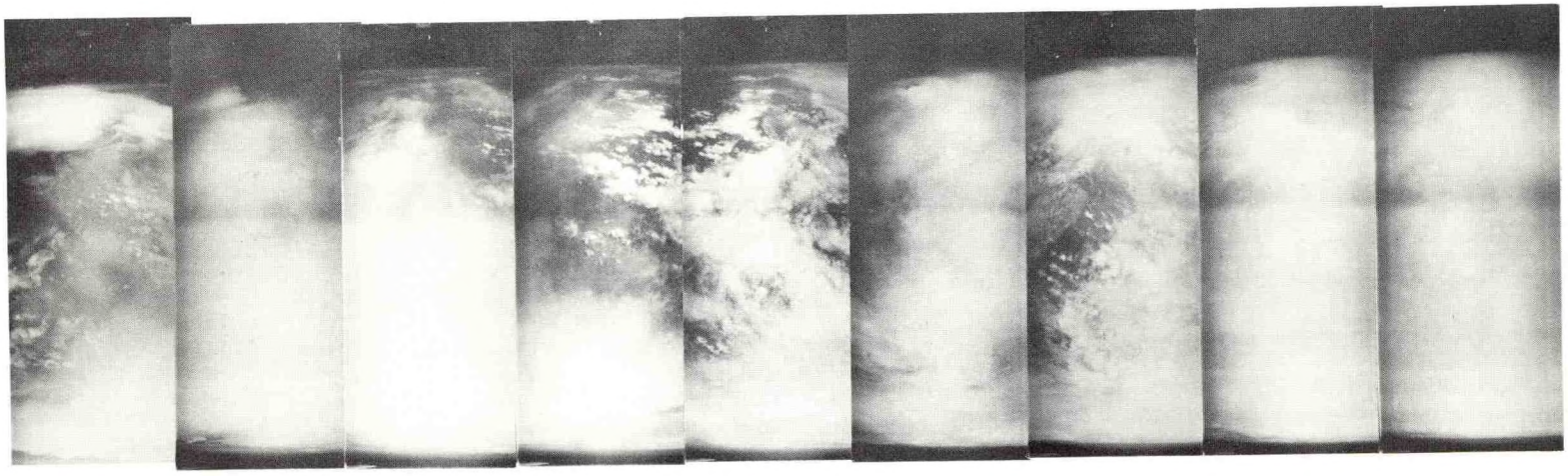

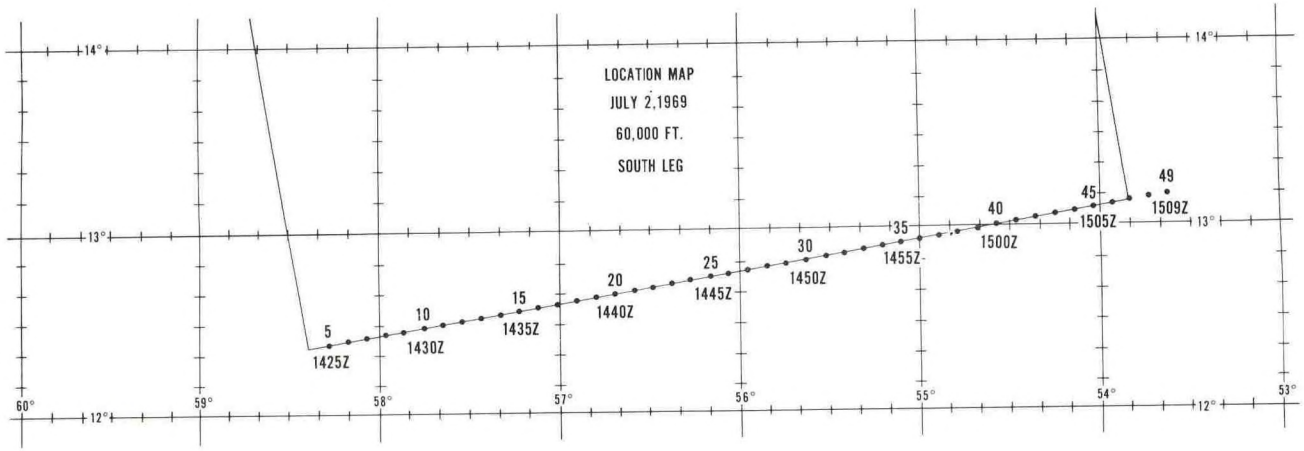

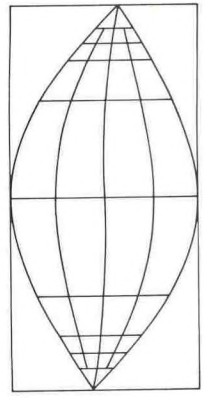

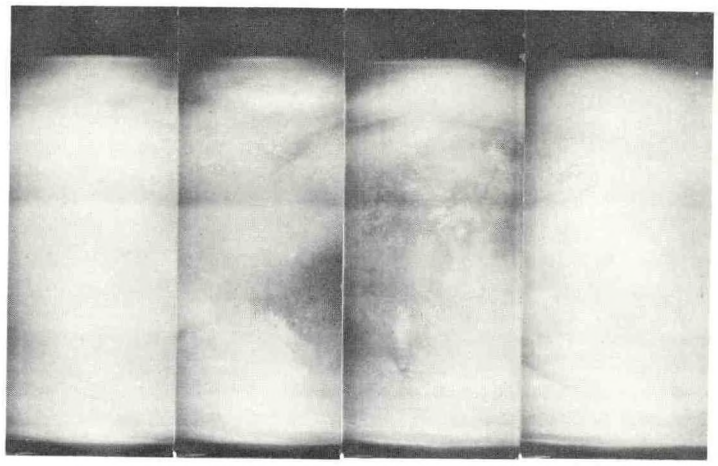

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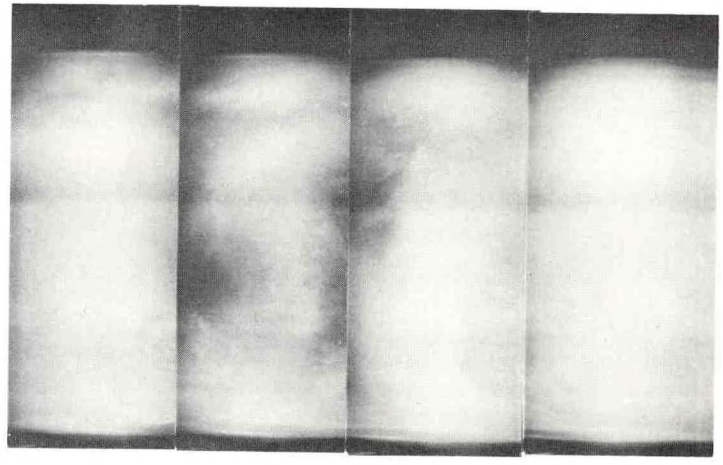
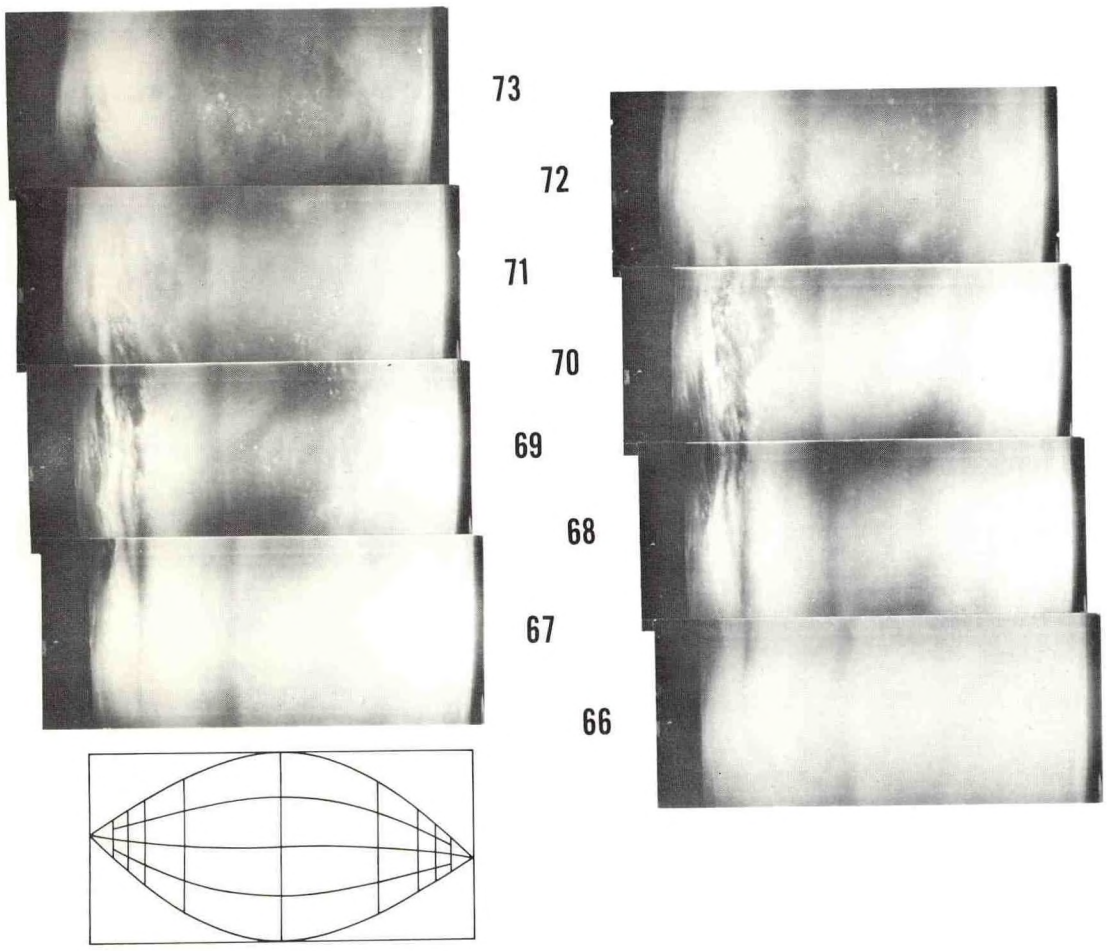
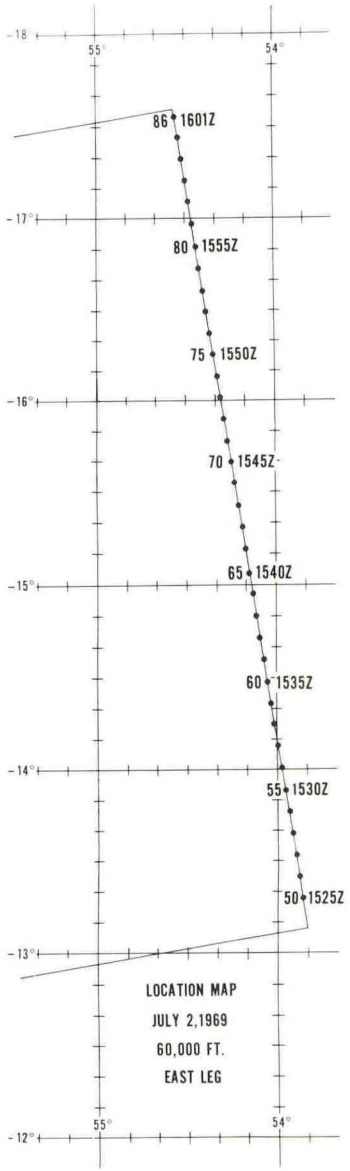


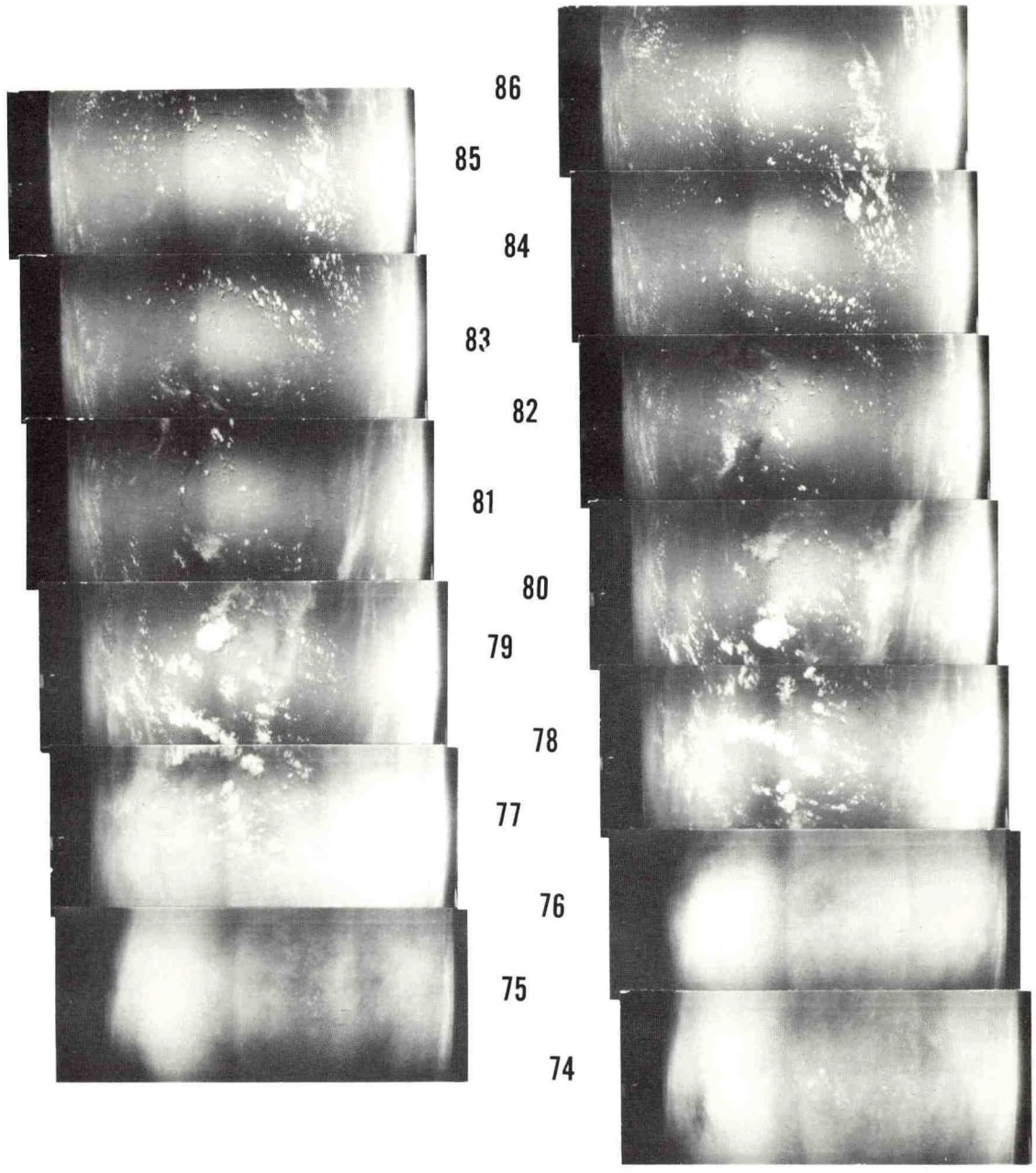
B57 CLOUD PHOTOS
60,000 FT.
JULY 2,1969
SOUTH LEG

PHOTOGRAPHS 23 THROUGH 38 AND 47 THROUGH 49 OMITTED.
SHOW CONTINUOUS CLOUD DECK BELOW PLANE.

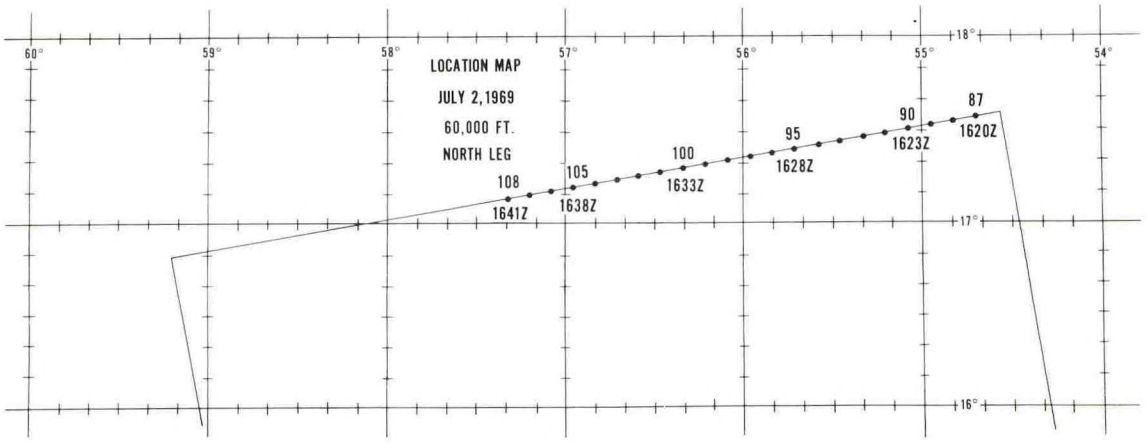


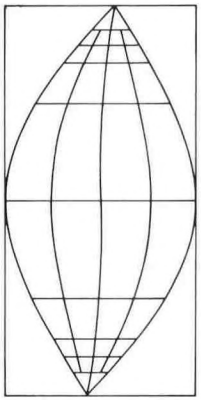
PHOTOGRAPHS 50 THROUGH 65 OMITTED.
SHOW CONTINUOUS CLOUD DECK BELOW PLANE.

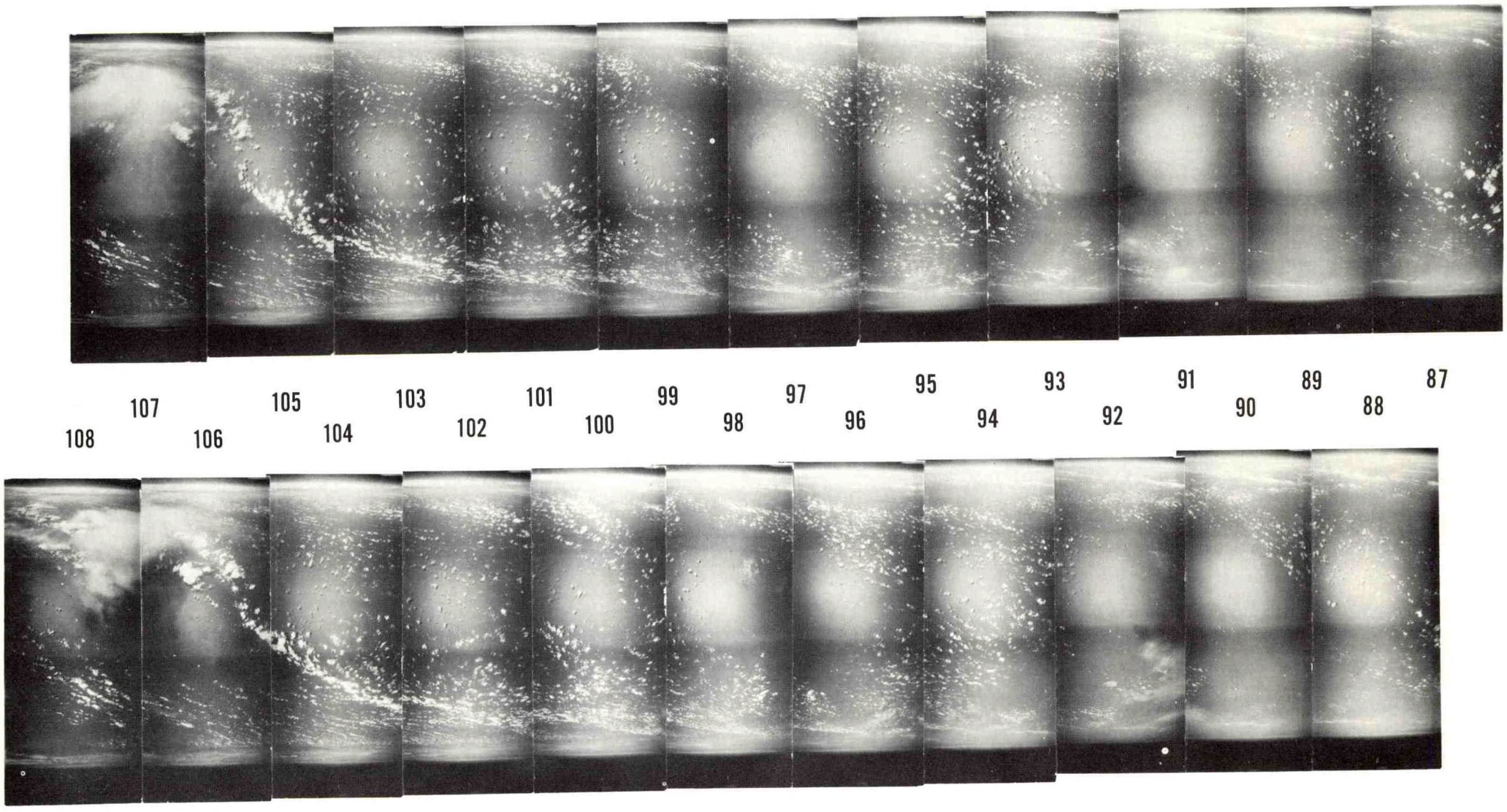




B57 CLOUD PHOTOS
60,000 FT.
JULY 2,1969
EAST LEG


LOCATION MAP
JULY 2, 1969
60,000 FT.
NORTH LEG
60°
59°
58°
57°
56°
55°
54°
18°
17°
16°
108
1641Z
105
1638Z
100
1633Z
95
1628Z
90
1623Z
87
1620Z





B57 CLOUD PHOTOS
60,000 FT.
JULY 2,1969
NORTH LEG

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