

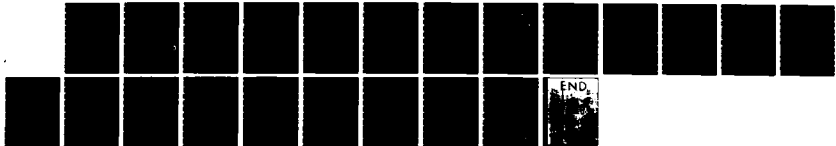
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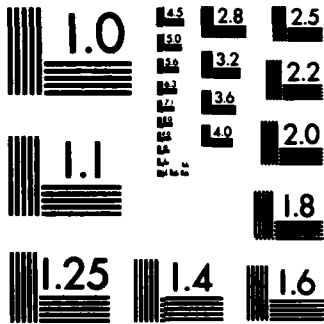
19313AT MLRS MISSILE NUMBER 4684 3705 3766 4835 3723  
4681 ROUND NUMBER 50 (U) ARMY ELECTRONICS RESEARCH AND  
DEVELOPMENT COMMAND WSMR NM ATM. D C KELLER NOV 83  
ERADCOM/ASL-DR-1322 F/G 4/2

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NATIONAL BUREAU OF STANDARDS-1963-A

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DR 1322  
Nov 83  
AD

(P)

METEOROLOGICAL DATA REPORT

Missile Number 4684, 3705, 3766  
4835, 3723, 4681  
Round Number 504 Thru 509  
9 November 1983

by

DONALD C. KELLER  
Program Support Coordinator  
Phone Number (505) 679-9568  
AVN Number 349-9568

AD-A136710

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ATMOSPHERIC SCIENCES LABORATORY  
WHITE SANDS MISSILE RANGE, NEW MEXICO

ECOM

UNITED STATES ARMY ELECTRONICS COMMAND

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| 4. TITLE (and Subtitle)<br>19313AT MLRS, Missile Numbers 4684,3705,3766,4835,<br>3723,4681<br>Round Number 504 Thru 509   | 5. TYPE OF REPORT & PERIOD COVERED                             |   |
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| 18. SUPPLEMENTARY NOTES   |  |   |
| 19. KEY WORDS (Continue on reverse side if necessary and identify by block number)  |  |   |
| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number)<br>Meteorological data gathered for the launching of the 19313 AT MLRS, Missile<br>Number 4684, 3705, 3766, 4835, 3723, 4681, Round Number 504 Thru 509 presented<br>in tabular form. |  |   |

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## INTRODUCTION

19313AT MLRS, Missile Numbers 4684, 3705, 3766, 4835, 3723 and 4681, Round Numbers 504 Thru 509, were launched from Tula Gate, White Sands Missile Range (WSMR). New Mexico, at 1053:20, 1053:25, 1053:29, 1053:34, 1053:38 and 1053:43 MST, 9Nov 1983. The scheduled launch times were 1000 MST with a 4.5 second separation.

## DISCUSSION

Meteorological data were recorded and reduced by the White Sands Meteorological Team, Atmospheric Sciences Laboratory (ASL), White Sands Missile Range, New Mexico. The data were obtained by the following methods:

### 1. Observations

#### a. Surface

(1) Standard surface observations to include pressure, temperature ( $^{\circ}\text{C}$ ), relative humidity, dew point ( $^{\circ}\text{C}$ ), density ( $\text{gm}/\text{m}^3$ ), wind direction and speed, and cloud cover were made at the Tula Gate Met Site at T-0 minutes.

(2) Anemometer data were provided from existing tower-mounted anemometers at Tula Gate. Monitor of wind speed and direction from one anemometer was also provided in the launch control room.

#### b. Upper Air

(1) Low level wind data were obtained from pilot-balloon observations at:

### SITE AND ALTITUDE

Tula Gate 1750 Meters  
Mal 2000 Meters

(2) Air structure data (rawinsonde) were collected at the following Met Sites.

### SITE AND TIME

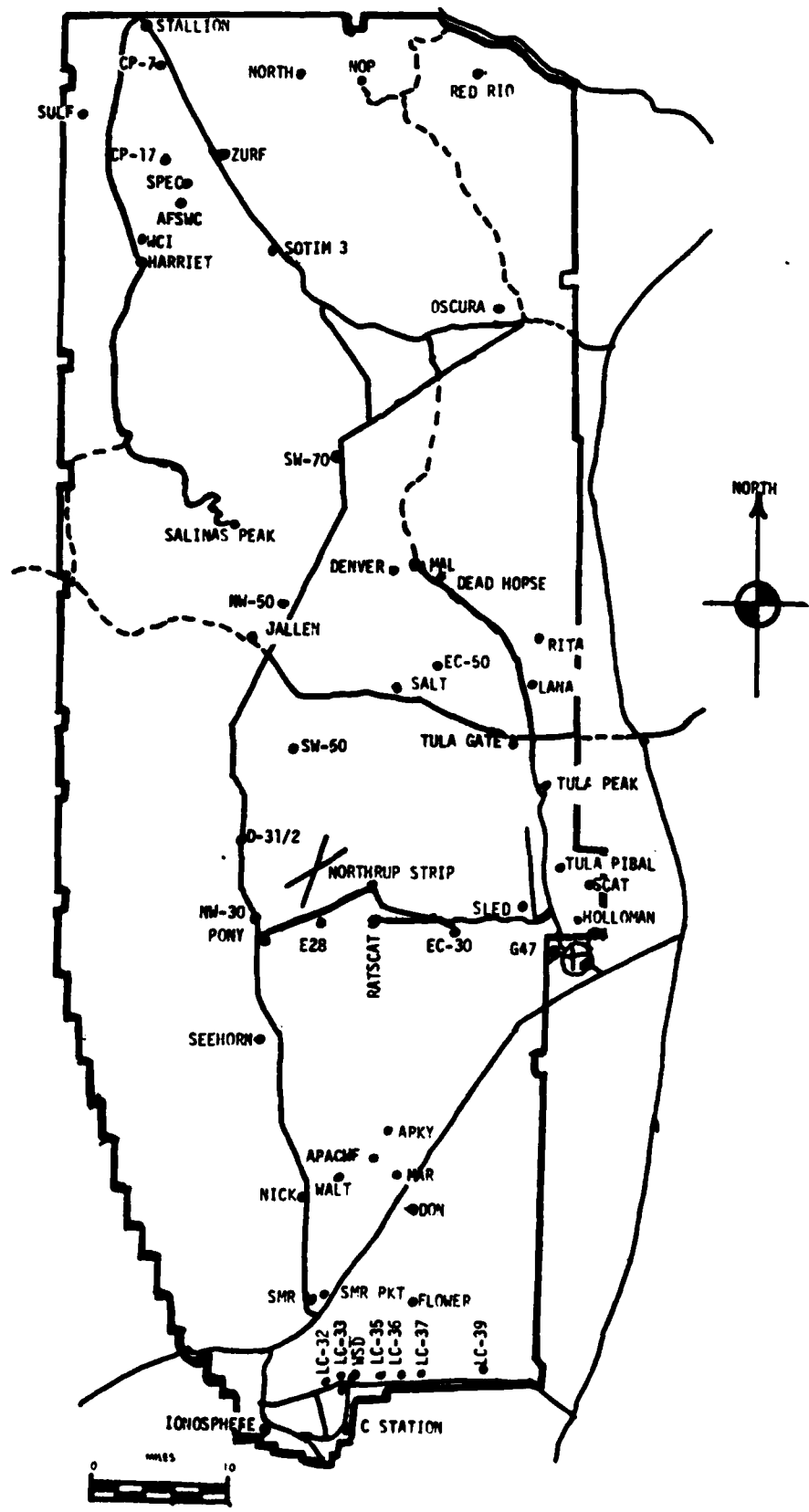
Rita 0800  
Rita 1100



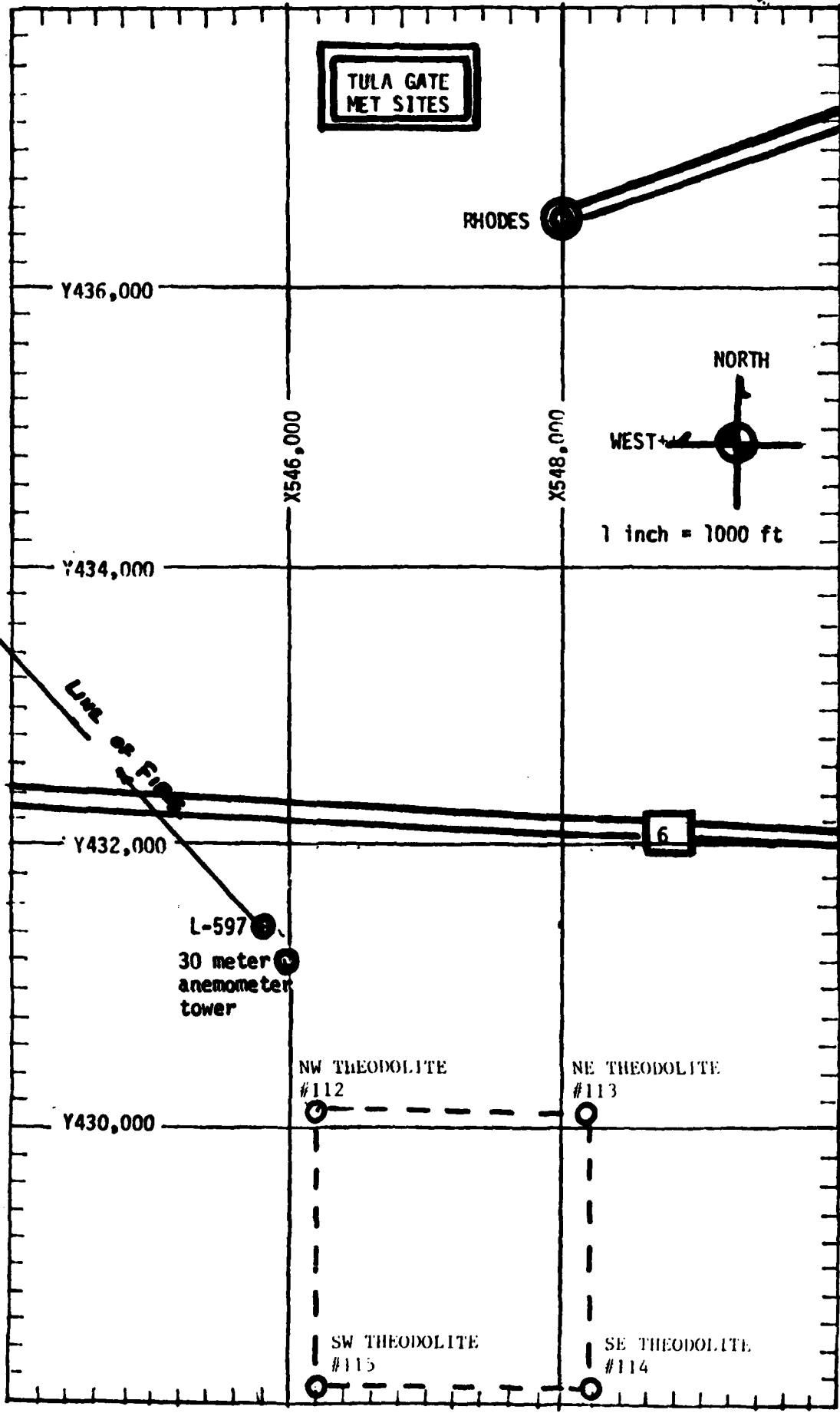
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| WTIS               |                          |
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| By                 |                          |
| Distribution/      |                          |
| Availability Codes |                          |
| Level and/or       |                          |
| Post               |                          |
| Special            |                          |

A-1

# WSMR METEOROLOGICAL SITES







PROJECT SURFACE OBSERVATION

| TABLE 1        |                 | STATION: <u>Tula Gat</u> |                    |                  |                  |                           |                              |                      |              |                   |                  |
|----------------|-----------------|--------------------------|--------------------|------------------|------------------|---------------------------|------------------------------|----------------------|--------------|-------------------|------------------|
| DATE <u>09</u> |                 | MONTH <u>11</u>          |                    | YEAR <u>83</u>   |                  | X = <u>545.785.2</u>      |                              | Y = <u>431.459.0</u> |              | H = <u>4103.3</u> |                  |
| TIME<br>M S T  | PRESSURE<br>mbs | TEMPERATURE<br>C/F       | TEMPERATURE<br>C/C | DEW POINT<br>C/F | DEW POINT<br>C/C | RELATIVE<br>HUMIDITY<br>% | DENSITY<br>gm/m <sup>3</sup> | WIND                 |              | VISIBIL-<br>ITY   |                  |
|                |                 |                          |                    |                  |                  |                           |                              | DIRECTION<br>degs In | SPEED<br>kts |                   | CHARACTER<br>kts |
| 1053           | 882.1           |                          | 11.5               |                  | -5.3             | 30                        | 1079.2                       | 350                  | 14           | 30                |                  |
|                |                 |                          |                    |                  |                  |                           |                              |                      |              |                   |                  |
|                |                 |                          |                    |                  |                  |                           |                              |                      |              |                   |                  |

| OBSTRUCTIONS<br>TO VISIBILITY | CLOUDS    |      |           |     |           |     | REMARKS |
|-------------------------------|-----------|------|-----------|-----|-----------|-----|---------|
|                               | 1st LAYER |      | 2nd LAYER |     | 3rd LAYER |     |         |
|                               | AMT       | TYPE | HGT       | AMT | TYPE      | HGT |         |
|                               | 1         | CI   | 25,000    |     |           |     |         |
|                               |           |      |           |     |           |     |         |
|                               |           |      |           |     |           |     |         |

PSYCHROMETRIC COMPUTATION

|                 |      |  |
|-----------------|------|--|
| TIME: MST       | 1053 |  |
| DRY BULB TEMP.  | 11.5 |  |
| WET BULB TEMP.  | 4.2  |  |
| WET BULB DEPR.  | 7.3  |  |
| DEW POINT       | -5.3 |  |
| RELATIVE HUMID. | 30   |  |

TABLE 2

ANEMOMETER DATA - 30 Ft Level of 30 Meter Tower

X= 545,944.89 Y= 431,158.70 H= 4102.47 (BASE)

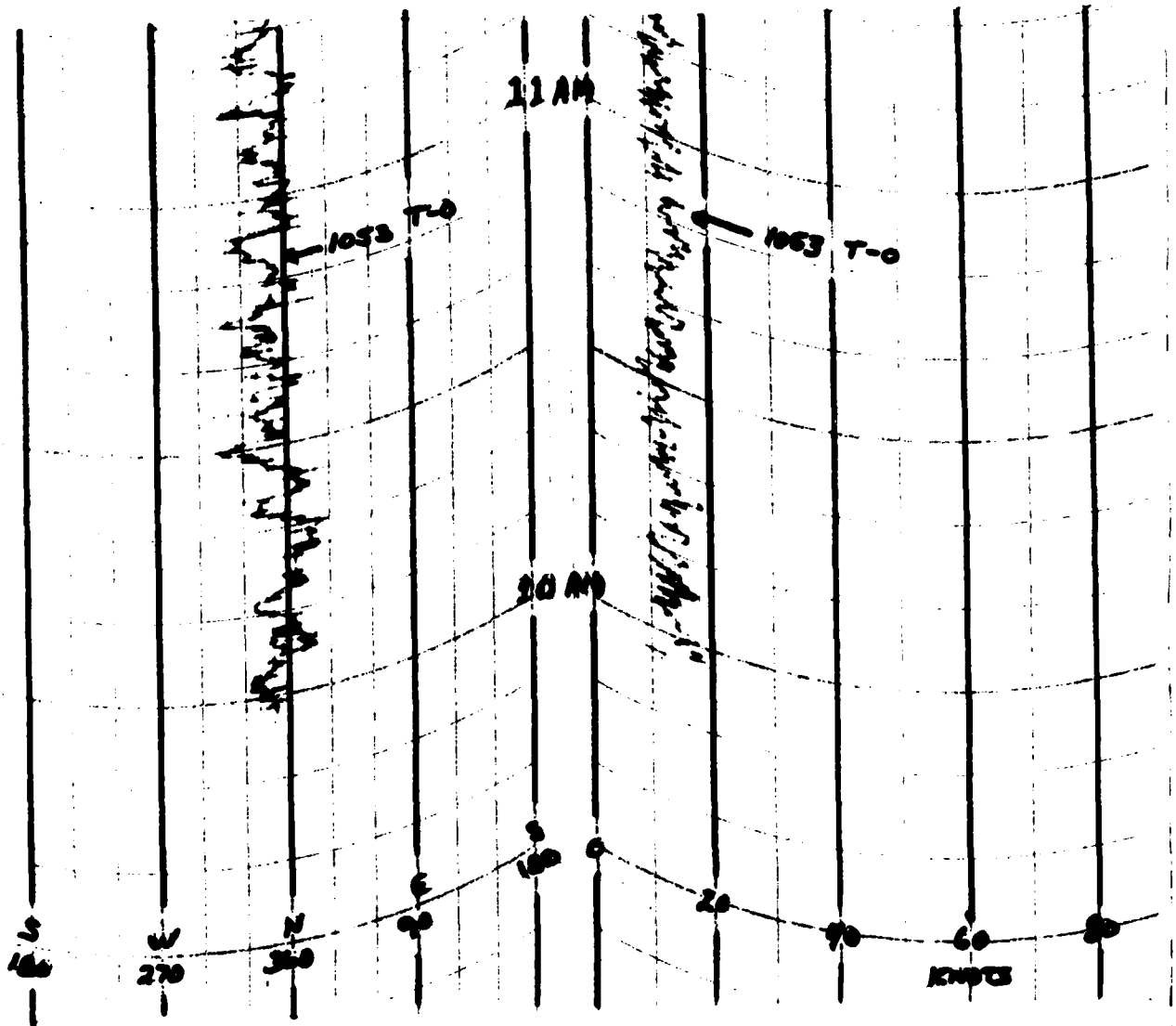


TABLE 3

ANEMOMETER DATA - 60 Ft Level of 30 Meter Tower  
X= 545,944.89 Y= 431,158.70 H= 4102.47 (BASE)

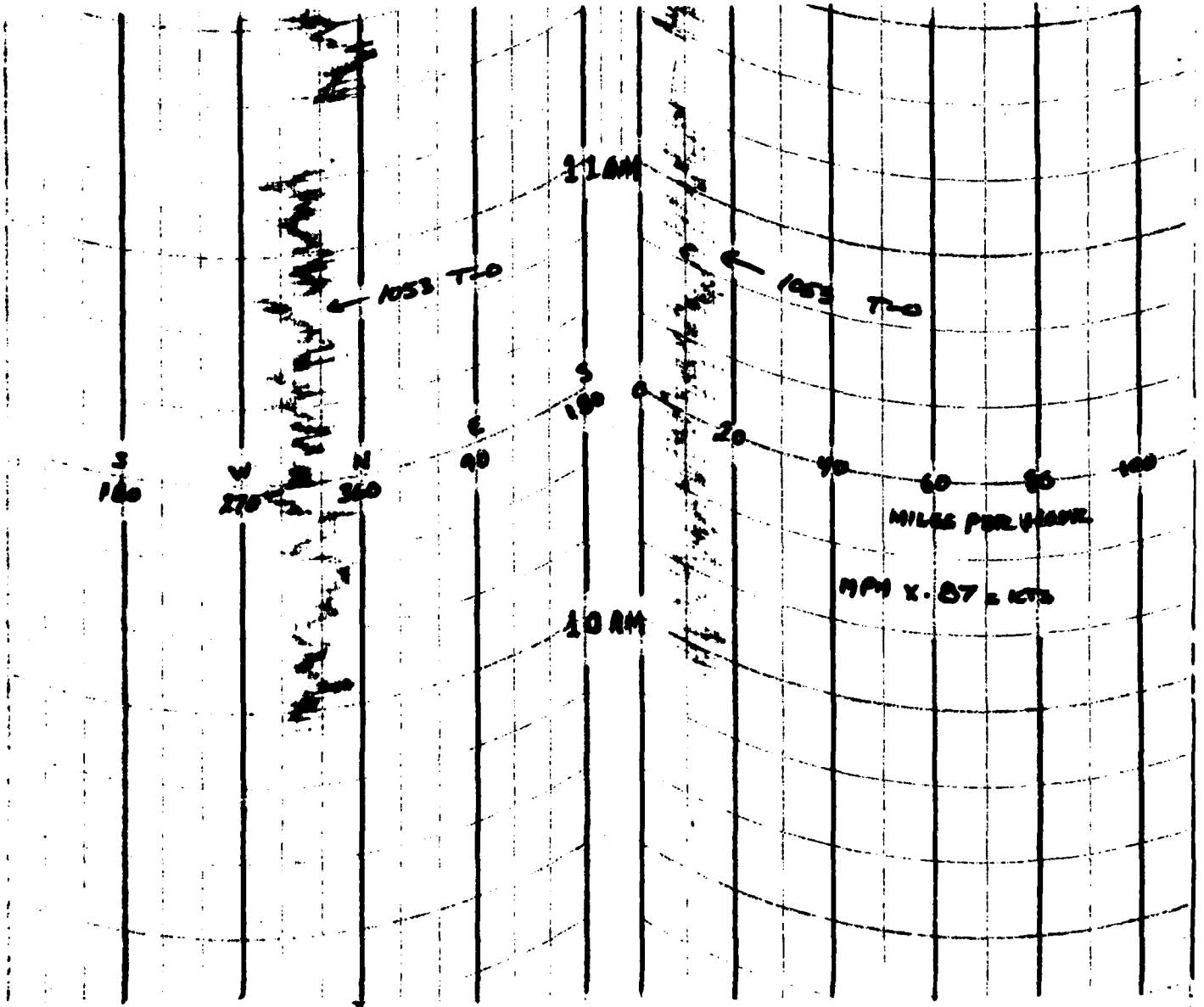
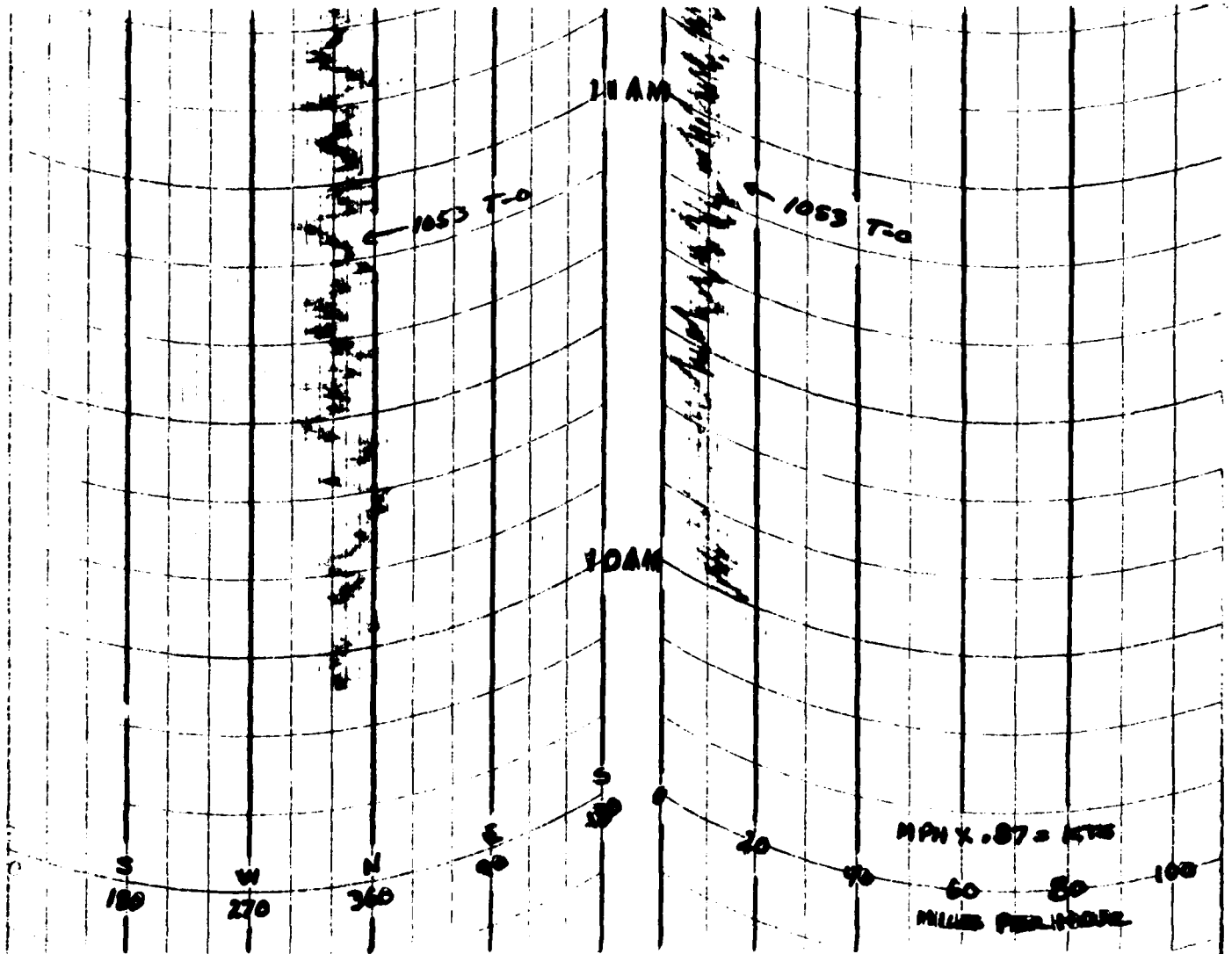


TABLE 4

ANEMOMETER DATA - 90 Ft Level of 30 Meter Tower

X= 545,944.89 Y= 431,158.70 H= 4102.47 (BASE)



## T-TIME PILOT-BALLOON MEASURED WIND DATA

DATE 09 Nov. 83

SITE: Tula Gate  
 TIME: 1053 MST  
 WSTM COORDINATES:  
 X= 546,204.20  
 Y= 430,125.39  
 H= 4,108.59

SITE: Mal  
 TIME 1054 MST  
 WSTM COORDINATES:  
 X= 509,421.05  
 Y= 497,563.78  
 H= 4,133.09

| LAYER MIDPOINT<br>METERS AGL | DIRECTION<br>DEGREES | SPEED<br>KNOTS |
|------------------------------|----------------------|----------------|
| SURFACE                      | 350                  | 14             |
| 150                          | 341                  | 18             |
| 210                          | 338                  | 15             |
| 270                          | 340                  | 16             |
| 330                          | 339                  | 17             |
| 390                          | 344                  | 16             |
| 500                          | 354                  | 16             |
| 650                          | 359                  | 18             |
| 800                          | 352                  | 19             |
| 950                          | 342                  | 18             |
| 1150                         | 349                  | 09             |
| 1350                         | 330                  | 10             |
| 1550                         | 321                  | 21             |
| 1750                         | 298                  | 20             |
| 2000                         |                      |                |

Data obtained from a Double  
 Theodolite Tracked pilot-  
 balloon observation.

| LAYER MIDPOINT<br>METERS AGL | DIRECTION<br>DEGREES | SPEED<br>KNOTS |
|------------------------------|----------------------|----------------|
| SURFACE                      | 360                  | 08             |
| 150                          | 360                  | 12             |
| 210                          | 360                  | 13             |
| 270                          | 359                  | 14             |
| 330                          | 357                  | 15             |
| 390                          | 360                  | 15             |
| 500                          | 006                  | 15             |
| 650                          | 005                  | 17             |
| 800                          | 009                  | 13             |
| 950                          | 355                  | 06             |
| 1150                         | 338                  | 08             |
| 1350                         | 349                  | 11             |
| 1550                         | 347                  | 18             |
| 1750                         | 319                  | 18             |
| 2000                         | 298                  | 23             |

Data obtained from a Single  
 Theodolite Tracked pilot-balloon  
 observation.

AIMING AND T-TIME COMPUTER MET MESSAGES

9 November 1983

RITA 0800 MST

METCM1332062

091500128880

00640015 28090880

01628020 28090870

02007022 27930843

03627018 27650803

04582018 27500755

05539012 27540710

06603020 27560667

07573025 27410627

08553033 27050589

09537028 26690553

10563028 26340518

11559032 25990486

12548032 25420440

13545034 24650384

14555035 23770333

15577040 22920288

16580033 22000248

RITA 1100 MST

METCM1332062

091800128882

00622009 28590882

01621012 28360872

02624012 28010846

03626011 27630805

04593012 27540757

05540013 27720712

06580016 27680669

07582025 27270629

08554029 26980591

09541028 26780554

10546026 26360520

11542028 25950487

12542032 25350441

13534030 24580385

14553029 23750334

15567034 22820289

16574037 21970248

STATION: ALTITUDE 4186.74 FEET MSL  
 9 NOV. 83  
 ASCENSION NO. 4  
 0800 HRS MST

SIGNIFICANT LEVEL DATA  
 3130210009  
 RITA

GEODETIC COORDINATES  
 33.18295 LAT DEG  
 106.15114 LONG DEG

TABLE 7

| PRESSURE GEOMETRIC<br>ALTITUDE<br>MILLIBARS MSL FEET | TEMPERATURE                  |                        | HALLIUM<br>PERCENT |      |
|--|------------------------------|------------------------|--------------------|------|
|  | AIR<br>DEGREES<br>CENTIGRADE | DEWPOINT<br>CENTIGRADE |                    |      |
| 887.2  | 4186.7                       | 7.0                    | -2.2               | 52.0 |
| 867.8  | 4539.1                       | 7.5                    | -3.4               | 49.0 |
| 857.0  | 5129.0                       | 5.9                    | -8.0               | 39.0 |
| 816.2  | 6216.0                       | 4.0                    | -9.3               | 37.0 |
| 786.6  | 7190.4                       | 1.9                    | -13.8              | 30.0 |
| 767.0  | 7865.4                       | .8                     | -13.2              | 34.0 |
| 754.3  | 8307.0                       | 2.0                    | -12.2              | 34.0 |
| 703.0  | 10287.2                      | 2.0                    | -16.4              | 24.0 |
| 690.5  | 10649.6                      | 2.4                    | -16.1              | 24.0 |
| 644.6  | 12474.7                      | 2.1                    | -15.4              | 29.0 |
| 617.1  | 13626.0                      | -0.3                   | -17.0              | 27.0 |
| 547.8  | 16720.1                      | -6.9                   | -22.7              | 27.0 |
| 535.8  | 17239.2                      | -8.3                   | -20.7              | 39.0 |
| 500.0  | 19039.6                      | -11.9                  | -24.2              | 35.0 |
| 441.0  | 22047.8                      | -18.7                  | -28.6              | 41.0 |
| 427.9  | 22993.3                      | -20.5                  | -31.0              | 36.0 |
| 400.0  | 24522.4                      | -25.1                  | -35.0              | 39.0 |
| 384.1  | 25489.7                      | -26.4                  | -37.5              | 34.0 |
| 317.5  | 29003.1                      | -38.9                  | -47.8              | 38.0 |
| 307.0  | 31170.1                      | -41.7                  |                    |      |
| 250.0  | 35150.3                      | -52.8                  |                    |      |
| 200.6  | 38914.6                      | -62.5                  |                    |      |
| 202.0  | 39567.7                      | -62.8                  |                    |      |
| 200.0  | 39760.7                      | -64.9                  |                    |      |



STATION ALTITUDE 4186.74 FEET MSL  
 4 NCV. M3  
 ASCENDING NO. 9

UPPER AIR DATA  
 3130210009  
 RITA

GEOMETRIC COORDINATES  
 33.18295 LAT DEG  
 106.15117 Lon DEG

TABLE 8

| GEOMETRIC ALTITUDE MSL FEET | PRESSURE MILLIBARS | AIR TEMPERATURE DEGREES CENTIGRADE | REL. HUM. PERCENT | DENSITY GM/CUBIC METER | SPEED OF SOUND KINOTS | DIRECTION OF WIND DEGREES (TH) | WIND DATA SPEED KINOTS | INDEX OF REFRACTION |
|-----------------------------|--------------------|------------------------------------|-------------------|------------------------|-----------------------|--------------------------------|------------------------|---------------------|
| 4186.7                      | 880.2              | 7.0                                | 52.0              | 1092.1                 | 652.6                 | 360.0                          | 15.0                   | 1.000268            |
| 4500.0                      | 870.1              | 7.4                                | 46.7              | 1077.9                 | 653.2                 | .5                             | 15.6                   | 1.000263            |
| 5000.0                      | 854.1              | 6.2                                | 38.2              | 1063.2                 | 651.7                 | .0                             | 16.7                   | 1.000254            |
| 5500.0                      | 838.3              | 5.3                                | 36.3              | 1047.5                 | 650.5                 | 1.0                            | 17.7                   | 1.000249            |
| 6000.0                      | 822.4              | 4.4                                | 36.8              | 1031.4                 | 649.5                 | 1.3                            | 18.8                   | 1.000245            |
| 6500.0                      | 807.5              | 3.4                                | 35.0              | 1015.0                 | 648.3                 | 3.5                            | 19.3                   | 1.000240            |
| 7000.0                      | 792.5              | 2.5                                | 31.4              | 1001.1                 | 648.9                 | 3.4                            | 20.0                   | 1.000234            |
| 7500.0                      | 777.7              | 1.4                                | 31.8              | 985.7                  | 645.9                 | 3.4                            | 19.7                   | 1.000230            |
| 8000.0                      | 763.1              | 1.2                                | 34.0              | 968.0                  | 645.6                 | 3.0                            | 18.1                   | 1.000227            |
| 8500.0                      | 748.8              | 2.0                                | 33.0              | 947.0                  | 646.6                 | 3.2                            | 16.7                   | 1.000223            |
| 9000.0                      | 734.8              | 2.0                                | 30.5              | 929.3                  | 646.6                 | 3.1                            | 14.4                   | 1.000218            |
| 9500.0                      | 721.1              | 2.0                                | 28.0              | 912.0                  | 646.6                 | 3.0                            | 13.0                   | 1.000213            |
| 10000.0                     | 707.6              | 2.0                                | 25.5              | 895.1                  | 646.5                 | 3.3                            | 12.5                   | 1.000208            |
| 10500.0                     | 694.4              | 2.2                                | 24.0              | 877.6                  | 646.8                 | 3.2                            | 12.9                   | 1.000204            |
| 11000.0                     | 681.4              | 2.5                                | 24.4              | 860.9                  | 646.9                 | 3.2                            | 15.9                   | 1.000201            |
| 11500.0                     | 668.7              | 2.5                                | 24.9              | 845.0                  | 646.9                 | 3.4                            | 19.1                   | 1.000197            |
| 12000.0                     | 656.2              | 2.2                                | 25.5              | 829.4                  | 646.6                 | 3.2                            | 22.7                   | 1.000194            |
| 12500.0                     | 644.0              | 2.0                                | 26.0              | 814.3                  | 646.6                 | 3.0                            | 26.4                   | 1.000191            |
| 13000.0                     | 631.9              | 1.0                                | 26.5              | 802.1                  | 645.4                 | 3.2                            | 28.5                   | 1.000187            |
| 13500.0                     | 620.1              | 0.0                                | 26.9              | 790.1                  | 644.1                 | 3.1                            | 29.7                   | 1.000184            |
| 14000.0                     | 608.5              | -1.1                               | 27.0              | 778.2                  | 642.9                 | 3.1                            | 30.5                   | 1.000181            |
| 14500.0                     | 596.7              | -2.2                               | 27.0              | 766.4                  | 641.6                 | 3.0                            | 30.2                   | 1.000178            |
| 15000.0                     | 585.3              | -3.2                               | 27.0              | 754.8                  | 640.3                 | 3.0                            | 30.8                   | 1.000175            |
| 15500.0                     | 574.1              | -4.3                               | 27.0              | 743.4                  | 639.0                 | 3.0                            | 28.7                   | 1.000172            |
| 16000.0                     | 563.2              | -5.4                               | 27.0              | 732.1                  | 637.7                 | 3.0                            | 27.7                   | 1.000169            |
| 16500.0                     | 552.5              | -6.4                               | 27.0              | 721.1                  | 636.5                 | 3.0                            | 27.0                   | 1.000166            |
| 17000.0                     | 541.8              | -7.7                               | 31.9              | 710.4                  | 635.0                 | 3.0                            | 26.4                   | 1.000164            |
| 17500.0                     | 531.3              | -8.8                               | 35.9              | 699.7                  | 633.6                 | 3.1                            | 27.5                   | 1.000162            |
| 18000.0                     | 520.4              | -9.8                               | 35.6              | 688.6                  | 632.4                 | 3.1                            | 28.7                   | 1.000159            |
| 18500.0                     | 510.8              | -10.8                              | 35.3              | 677.8                  | 631.2                 | 3.1                            | 30.0                   | 1.000156            |
| 19000.0                     | 500.6              | -11.8                              | 35.0              | 667.1                  | 630.0                 | 3.1                            | 31.2                   | 1.000153            |
| 19500.0                     | 490.8              | -12.9                              | 35.9              | 656.7                  | 628.6                 | 3.1                            | 32.2                   | 1.000151            |
| 20000.0                     | 481.0              | -14.1                              | 36.9              | 646.4                  | 627.2                 | 3.1                            | 32.7                   | 1.000148            |
| 20500.0                     | 471.5              | -15.2                              | 37.9              | 636.4                  | 625.9                 | 3.1                            | 33.1                   | 1.000146            |
| 21000.0                     | 462.1              | -16.3                              | 38.0              | 626.5                  | 624.5                 | 3.1                            | 32.8                   | 1.000143            |
| 21500.0                     | 452.4              | -17.5                              | 39.0              | 616.7                  | 623.1                 | 3.0                            | 32.6                   | 1.000141            |
| 22000.0                     | 443.4              | -18.6                              | 40.9              | 607.1                  | 621.7                 | 3.0                            | 31.2                   | 1.000139            |
| 22500.0                     | 434.4              | -19.7                              | 38.3              | 597.4                  | 620.4                 | 3.0                            | 29.7                   | 1.000136            |
| 23000.0                     | 426.0              | -20.8                              | 36.0              | 587.9                  | 619.0                 | 3.0                            | 29.6                   | 1.000133            |
| 23500.0                     | 417.3              | -22.2                              | 36.0              | 579.1                  | 617.2                 | 3.0                            | 29.9                   | 1.000131            |

STATION ALTITUDE 4186.74 FEET MSL  
 9 NOV. 85 0800 HRS MST  
 ASCENSION NO. 9

UPPER AIR DATA  
 3130210009  
 RITA

GEODETIC COORDINATES  
 33.10295 LAT DEG  
 106.15114 LONG DEG

TABLE 8 Con't

| GEOMETRIC ALTITUDE MSL FEET | PRESSURE MILLIBARS | AIR TEMPERATURE DEGREES, CENTIGRADE | REL. HUMIDITY PERCENT | DENSITY GM/CUBIC METER | SPEED OF SOUND KNOTS | WIND DIRECTION DEGREES(TN) | WIND SPEED KNOTS | INDEX OF REFRACTION |
|-----------------------------|--------------------|-------------------------------------|-----------------------|------------------------|----------------------|----------------------------|------------------|---------------------|
| 24000.0                     | 400.8              | -23.6                               | 36.0                  | 570.5                  | 615.3                | 306.4                      | 30.0             | 1.000129            |
| 24500.0                     | 400.4              | -25.0                               | 36.0                  | 562.0                  | 613.7                | 306.4                      | 32.2             | 1.000127            |
| 25000.0                     | 392.1              | -25.7                               | 35.0                  | 551.9                  | 612.9                | 306.1                      | 33.3             | 1.000125            |
| 25500.0                     | 383.9              | -26.4                               | 34.0                  | 542.0                  | 612.0                | 305.0                      | 34.2             | 1.000122            |
| 26000.0                     | 375.7              | -27.4                               | 34.5                  | 533.5                  | 610.2                | 305.7                      | 34.7             | 1.000120            |
| 26500.0                     | 367.7              | -29.0                               | 34.9                  | 525.1                  | 608.5                | 306.3                      | 34.7             | 1.000118            |
| 27000.0                     | 359.9              | -30.7                               | 35.4                  | 517.0                  | 606.7                | 307.3                      | 34.6             | 1.000116            |
| 27500.0                     | 352.2              | -32.1                               | 35.0                  | 508.9                  | 604.9                | 308.9                      | 34.0             | 1.000114            |
| 28000.0                     | 344.7              | -33.5                               | 36.3                  | 501.0                  | 603.1                | 310.0                      | 33.8             | 1.000112            |
| 28500.0                     | 337.3              | -34.9                               | 36.7                  | 493.2                  | 601.3                | 312.3                      | 34.9             | 1.000111            |
| 29000.0                     | 330.1              | -36.3                               | 37.2                  | 485.6                  | 599.5                | 313.9                      | 36.0             | 1.000109            |
| 29500.0                     | 323.1              | -37.8                               | 37.6                  | 478.1                  | 597.7                | 316.2                      | 38.3             | 1.000107            |
| 30000.0                     | 316.2              | -39.1                               | 35.2**                | 470.6                  | 596.0                | 318.2                      | 40.6             | 1.000105            |
| 30500.0                     | 309.2              | -40.2                               | 20.2**                | 462.4                  | 594.6                | 319.8                      | 41.7             | 1.000103            |
| 31000.0                     | 302.4              | -41.3                               | 5.3**                 | 454.4                  | 593.2                | 321.3                      | 42.0             | 1.000101            |
| 31500.0                     | 295.6              | -42.6                               |                       | 446.7                  | 591.5                | 322.8                      | 42.4             | 1.000099            |
| 32000.0                     | 288.9              | -44.0                               |                       | 439.2                  | 589.7                | 323.6                      | 41.3             | 1.000098            |
| 32500.0                     | 282.3              | -45.4                               |                       | 431.9                  | 587.9                | 324.3                      | 39.9             | 1.000096            |
| 33000.0                     | 275.9              | -46.8                               |                       | 424.7                  | 586.1                | 325.0                      | 38.5             | 1.000095            |
| 33500.0                     | 269.7              | -48.2                               |                       | 417.6                  | 584.3                | 325.4                      | 37.4             | 1.000093            |
| 34000.0                     | 263.6              | -49.6                               |                       | 410.7                  | 582.5                | 325.9                      | 36.2             | 1.000091            |
| 34500.0                     | 257.6              | -51.0                               |                       | 403.9                  | 580.7                | 326.3                      | 35.0             | 1.000090            |
| 35000.0                     | 251.7              | -52.4                               |                       | 397.2                  | 578.8                | 326.7                      | 33.4             | 1.000088            |
| 35500.0                     | 245.8              | -53.7                               |                       | 390.2                  | 577.1                | 327.1                      | 31.8             | 1.000087            |
| 36000.0                     | 240.0              | -55.0                               |                       | 383.2                  | 575.4                | 328.0                      | 30.3             | 1.000085            |
| 36500.0                     | 234.3              | -56.3                               |                       | 376.3                  | 573.7                | 329.0                      | 28.8             | 1.000084            |
| 37000.0                     | 228.7              | -57.6                               |                       | 369.6                  | 572.0                | 329.1                      | 29.0             | 1.000082            |
| 37500.0                     | 223.3              | -58.9                               |                       | 363.0                  | 570.3                | 328.5                      | 30.2             | 1.000081            |
| 38000.0                     | 218.0              | -60.1                               |                       | 356.5                  | 568.6                | 328.0                      | 32.1             | 1.000079            |
| 38500.0                     | 212.8              | -61.4                               |                       | 350.1                  | 566.9                | 327.7                      | 34.8             | 1.000078            |
| 39000.0                     | 207.7              | -62.5                               |                       | 343.6                  | 565.4                |                            |                  | 1.000077            |
| 39500.0                     | 202.7              | -62.8                               |                       | 335.6                  | 563.1                |                            |                  | 1.000075            |

\*\* AT LAST ONE ASSUMED RELATIVE HUMIDITY VALUE WAS USED IN THE INTERPOLATION.

STATION ALTITUDE 1186.74 FEET HSL  
 4 NOV. 83  
 ASCENSION ISL.

MANDATORY LEVELS  
 3130210009  
 RITA

GEOGRAPHIC COORDINATES  
 33.18295 LAT DEG  
 106.15114 LONG DEG

TABLE 9

| PRESSURE<br>MILLIBARS | GEOPOTENTIAL<br>FEET | AIR TEMPERATURE<br>DEGREES CENTIGRADE | TEMPERATURE<br>DEWPOINT<br>DEGREES CENTIGRADE | REL. HUMIDITY<br>PERCENT | WIND DATA<br>DIRECTION<br>DEGREES (TN) | SPEED<br>KNOTS |
|-----------------------|----------------------|---------------------------------------|---|--------------------------|--|----------------|
| 850.0                 | 5126.                | 5.9                                   | -4.0  | 36.                      | 07                                     | 16.9           |
| 800.0                 | 6745.                | 2.0                                   | -11.7   | 33.                      | 352.3                                  | 19.6           |
| 750.0                 | 8451.                | 2.0                                   | -12.5   | 33.                      | 321.3                                  | 17.0           |
| 700.0                 | 10278.               | 2.0                                   | -16.4   | 24.                      | 310.8                                  | 12.3           |
| 650.0                 | 12241.               | 2.1                                   | -15.4   | 26.                      | 331.6                                  | 24.6           |
| 600.0                 | 14347.               | -1.9                                  | -18.3   | 27.                      | 311.0                                  | 30.3           |
| 550.0                 | 16507.               | -6.7                                  | -22.5   | 27.                      | 305.9                                  | 26.9           |
| 500.0                 | 19014.               | -11.9                                 | -24.2   | 35.                      | 315.4                                  | 31.3           |
| 450.0                 | 21631.               | -17.8                                 | -28.0   | 40.                      | 309.3                                  | 32.3           |
| 400.0                 | 24443.               | -25.1                                 | -35.3   | 36.                      | 306.4                                  | 32.2           |
| 350.0                 | 27625.               | -32.5                                 | -42.5   | 36.                      | 309.5                                  | 33.8           |
| 300.0                 | 31118.               | -41.7                                 |   |                          | 321.8                                  | 42.1           |
| 250.0                 | 35076.               | -52.8                                 |   |                          | 326.8                                  | 33.0           |
| 200.0                 | 39676.               | -64.9                                 |   |                          |  |                |

\*\* AT LEAST ONE ASSUMED RELATIVE HUMIDITY VALUE WAS USED IN THE INTERPOLATION.

STATION: ALTITUDE 4146.74 FEET ASL  
 4 NOV. 63  
 ASCENDING HD. 19

SIGNIFICANT LEVEL DATA  
 3100210010  
 RITA

GEOLOGIC COORDINATES  
 33.1829° LAT DEG  
 106.15114° LONG DEG

TABLE 10

| PRESSURE<br>MILLIBARS | GEOLOGIC<br>ALTITUDE<br>MEL FEET | TEMPERATURE<br>AIR<br>DEGREES<br>CENTIGRADE | REL. HUM.<br>PERCENT |
|-----------------------|----------------------------------|---|----------------------|
| 881.2                 | 4130.7                           | 11.7  | 2.7                  |
| 863.7                 | 4765.2                           | 8.3   | -11.1                |
| 850.0                 | 5197.6                           | 7.1   | -11.1                |
| 803.5                 | 6703.4                           | 2.5   | -13.7                |
| 794.3                 | 7009.0                           | 2.3   | -15.2                |
| 782.6                 | 7401.6                           | 1.0   | -17.8                |
| 765.8                 | 8113.0                           | 1.3   | -19.1                |
| 740.0                 | 8530.1                           | 2.6   | -17.5                |
| 720.0                 | 8982.3                           | 3.8   | -17.7                |
| 715.1                 | 9795.5                           | 3.5   | -18.5                |
| 700.0                 | 10364.7                          | 4.1   | -18.0                |
| 671.7                 | 11460.8                          | 4.1   | -17.4                |
| 621.7                 | 13511.4                          | -1.6  | -21.6                |
| 587.2                 | 14993.0                          | -4.1  | -24.8                |
| 578.4                 | 15389.7                          | -3.6  | -24.4                |
| 565.9                 | 15950.5                          | -4.2  | -19.9                |
| 500.0                 | 19117.1                          | -12.3                                       | -26.3                |
| 475.1                 | 20394.1                          | -15.2                                       | -27.2                |
| 444.1                 | 22057.9                          | -19.5                                       | -25.6                |
| 437.8                 | 22400.5                          | -20.5                                       | -28.0                |
| 432.9                 | 22680.4                          | -20.9                                       | -30.4                |
| 400.0                 | 24587.5                          | -24.8                                       | -35.2                |
| 396.7                 | 24785.6                          | -25.3                                       | -36.2                |
| 370.9                 | 25875.6                          | -28.4                                       | -34.0                |
| 353.1                 | 27225.4                          | -32.6                                       | -41.3                |
| 340.7                 | 28351.7                          | -34.2                                       | -45.1                |
| 317.3                 | 29975.3                          | -38.8                                       | -49.2                |
| 300.0                 | 31230.9                          | -43.0                                       |                      |
| 250.0                 | 35190.0                          | -53.0                                       |                      |
| 234.3                 | 36550.5                          | -56.5                                       |                      |
| 220.1                 | 37482.2                          | -58.7                                       |                      |
| 200.0                 | 39000.5                          | -64.2                                       |                      |

GEODLTIC COORDINATES  
 53.1629, LAT DEG  
 106.35114, LONG DEG

UPPER AIR DATA  
 3130210010  
 RITA

TABLE 11

RATIO: ALTITUDE 4186.74 FEET ISL  
 9 NOV. 65 1100 HRS MST  
 ASCENDING NO. 10

| GEOMETRIC ALTITUDE<br>FSL FEET | PRESSURE<br>MILLIBARS | AIR TEMPERATURE<br>DEGREES CENTIGRADE | REL. HUM. PERCENT | DENSITY<br>GM/CM <sup>3</sup><br>METER | SPEED OF SOUND<br>KNOTS | DIRECTION<br>DEGREES(TN) | WIND DATA<br>SPEED<br>KNOTS | INDEX<br>OF<br>REFRACTION |
|--------------------------------|-----------------------|---------------------------------------|-------------------|--|-------------------------|--------------------------|-----------------------------|---------------------------|
| 4186.7                         | 882.2                 | 11.7                                  | 54.0              | 1075.5                                 | 658.6                   | 350.0                    | 8.9                         | 1.000274                  |
| 4500.0                         | 872.1                 | 9.9                                   | 37.8              | 1071.4                                 | 650.0                   | 350.6                    | 9.5                         | 1.000260                  |
| 5000.0                         | 853.2                 | 7.6                                   | 25.1              | 1061.0                                 | 653.2                   | 351.9                    | 10.4                        | 1.000249                  |
| 5500.0                         | 840.5                 | 6.2                                   | 26.6              | 1047.0                                 | 651.5                   | 352.9                    | 11.3                        | 1.000245                  |
| 6000.0                         | 824.6                 | 4.6                                   | 27.6              | 1033.3                                 | 649.7                   | 353.7                    | 12.2                        | 1.000242                  |
| 6500.0                         | 809.6                 | 3.1                                   | 28.6              | 1019.9                                 | 647.9                   | 351.3                    | 12.4                        | 1.000238                  |
| 7000.0                         | 794.6                 | 2.3                                   | 26.1              | 1004.0                                 | 646.9                   | 345.8                    | 12.0                        | 1.000233                  |
| 7500.0                         | 779.7                 | 1.0                                   | 22.6              | 989.9                                  | 645.3                   | 340.1                    | 11.7                        | 1.000228                  |
| 8000.0                         | 765.1                 | 1.3                                   | 20.5              | 970.6                                  | 645.6                   | 338.4                    | 11.3                        | 1.000223                  |
| 8500.0                         | 750.8                 | 2.3                                   | 20.4              | 948.0                                  | 647.1                   | 327.9                    | 11.2                        | 1.000219                  |
| 9000.0                         | 735.8                 | 3.3                                   | 19.8              | 927.5                                  | 648.1                   | 321.0                    | 11.3                        | 1.000214                  |
| 9500.0                         | 723.1                 | 3.7                                   | 18.6              | 909.2                                  | 648.4                   | 313.5                    | 11.7                        | 1.000210                  |
| 10000.0                        | 709.6                 | 3.7                                   | 18.0              | 892.2                                  | 648.5                   | 306.3                    | 12.3                        | 1.000206                  |
| 10500.0                        | 696.5                 | 4.1                                   | 18.1              | 874.4                                  | 648.9                   | 310.2                    | 13.0                        | 1.000202                  |
| 11000.0                        | 683.5                 | 4.1                                   | 18.6              | 858.2                                  | 649.0                   | 315.7                    | 13.8                        | 1.000199                  |
| 11500.0                        | 670.9                 | 4.0                                   | 19.0              | 842.5                                  | 648.9                   | 321.7                    | 15.9                        | 1.000195                  |
| 12000.0                        | 658.3                 | 2.6                                   | 19.3              | 830.9                                  | 647.2                   | 326.5                    | 18.6                        | 1.000192                  |
| 12500.0                        | 646.0                 | 1.2                                   | 19.5              | 819.5                                  | 645.5                   | 327.6                    | 21.0                        | 1.000189                  |
| 13000.0                        | 633.8                 | -0.2                                  | 19.7              | 808.3                                  | 643.9                   | 325.7                    | 22.8                        | 1.000186                  |
| 13500.0                        | 622.0                 | -1.6                                  | 20.0              | 797.3                                  | 642.2                   | 324.0                    | 24.7                        | 1.000183                  |
| 14000.0                        | 610.1                 | -2.4                                  | 19.3              | 784.6                                  | 641.2                   | 319.4                    | 26.5                        | 1.000180                  |
| 14500.0                        | 598.5                 | -3.3                                  | 18.7              | 772.1                                  | 640.2                   | 315.4                    | 28.4                        | 1.000177                  |
| 15000.0                        | 587.2                 | -4.1                                  | 18.0              | 759.8                                  | 639.2                   | 310.8                    | 28.7                        | 1.000174                  |
| 15500.0                        | 575.9                 | -3.7                                  | 19.9              | 744.2                                  | 639.7                   | 306.8                    | 29.0                        | 1.000171                  |
| 16000.0                        | 564.9                 | -4.3                                  | 28.0              | 731.4                                  | 639.0                   | 305.2                    | 28.3                        | 1.000169                  |
| 16500.0                        | 554.0                 | -5.6                                  | 28.3              | 720.7                                  | 637.5                   | 304.5                    | 27.6                        | 1.000167                  |
| 17000.0                        | 543.2                 | -6.9                                  | 29.7              | 710.2                                  | 635.9                   | 306.6                    | 27.2                        | 1.000164                  |
| 17500.0                        | 532.7                 | -8.2                                  | 29.0              | 699.8                                  | 634.4                   | 307.6                    | 26.8                        | 1.000161                  |
| 18000.0                        | 522.4                 | -9.4                                  | 29.3              | 689.6                                  | 632.8                   | 306.7                    | 26.2                        | 1.000158                  |
| 18500.0                        | 512.2                 | -10.7                                 | 29.6              | 679.6                                  | 631.3                   | 305.7                    | 26.0                        | 1.000156                  |
| 19000.0                        | 502.3                 | -12.0                                 | 29.9              | 669.7                                  | 629.7                   | 304.8                    | 26.7                        | 1.000153                  |
| 19500.0                        | 492.4                 | -13.2                                 | 31.5              | 659.4                                  | 628.3                   | 304.3                    | 27.6                        | 1.000151                  |
| 20000.0                        | 482.6                 | -14.3                                 | 33.5              | 649.2                                  | 626.9                   | 304.9                    | 28.8                        | 1.000148                  |
| 20500.0                        | 473.1                 | -15.5                                 | 36.4              | 639.2                                  | 625.5                   | 305.3                    | 29.9                        | 1.000146                  |
| 21000.0                        | 463.6                 | -16.8                                 | 43.0              | 629.5                                  | 624.0                   | 305.1                    | 30.0                        | 1.000144                  |
| 21500.0                        | 454.3                 | -18.1                                 | 49.6              | 620.0                                  | 622.4                   | 304.9                    | 30.0                        | 1.000142                  |
| 22000.0                        | 445.1                 | -19.4                                 | 56.2              | 610.6                                  | 620.8                   | 304.9                    | 31.1                        | 1.000140                  |
| 22500.0                        | 436.1                 | -20.6                                 | 47.0              | 601.4                                  | 619.2                   | 305.0                    | 32.5                        | 1.000137                  |
| 23000.0                        | 427.2                 | -21.6                                 | 41.2              | 591.3                                  | 618.1                   | 304.8                    | 33.5                        | 1.000134                  |
| 23500.0                        | 418.4                 | -22.6                                 | 39.0              | 581.5                                  | 616.8                   | 304.3                    | 34.2                        | 1.000132                  |

STATION: ALTITUDE 4136.74 FEET MSL  
 9 NOV. 63  
 ASCENSION NO. 10

UPPER AIR DATA  
 3130210010  
 RITA

GEODETIC COORDINATES  
 33.10295 LAT DEG  
 106.15114 LONG DEG

TABLE 11 Con't

| GEOMETRIC ALTITUDE<br>MSL FEET | PRESSURE<br>MILLIBARS | TEMPERATURE<br>AIR DEGREES<br>CENTIGRADE | REL. HUM.<br>PERCENT | DENSITY<br>GM/CUBIC<br>METER | SPEED OF<br>SOUND<br>KNOTS | DIRECTION<br>DEGREES (TH) | WIND DATA<br>SPEED<br>KNOTS | INDEX<br>OF<br>REFRACTION |
|--------------------------------|-----------------------|--|----------------------|------------------------------|----------------------------|---------------------------|-----------------------------|---------------------------|
| 24000.0                        | 409.9                 | -23.6                                    | 38.5                 | 572.0                        | 615.5                      | 303.9                     | 34.8                        | 1.000150                  |
| 24500.0                        | 401.5                 | -24.6                                    | 37.2                 | 562.0                        | 614.3                      | 303.2                     | 33.6                        | 1.000127                  |
| 25000.0                        | 393.1                 | -25.9                                    | 39.5                 | 553.8                        | 612.7                      | 302.3                     | 31.6                        | 1.000125                  |
| 25500.0                        | 384.9                 | -27.3                                    | 50.1                 | 545.4                        | 610.9                      | 301.2                     | 29.7                        | 1.000124                  |
| 26000.0                        | 376.9                 | -28.7                                    | 56.7                 | 537.0                        | 609.2                      | 299.5                     | 28.3                        | 1.000122                  |
| 26500.0                        | 368.9                 | -30.0                                    | 51.6                 | 528.4                        | 607.6                      | 300.2                     | 28.5                        | 1.000119                  |
| 27000.0                        | 361.1                 | -31.3                                    | 46.4                 | 520.0                        | 606.0                      | 303.1                     | 30.4                        | 1.000117                  |
| 27500.0                        | 353.5                 | -32.5                                    | 41.3                 | 511.7                        | 604.4                      | 306.9                     | 30.0                        | 1.000115                  |
| 28000.0                        | 345.9                 | -33.5                                    | 35.8                 | 502.8                        | 603.1                      | 310.0                     | 31.1                        | 1.000113                  |
| 28500.0                        | 338.5                 | -34.6                                    | 32.0                 | 494.3                        | 601.7                      | 312.8                     | 30.0                        | 1.000111                  |
| 29000.0                        | 331.2                 | -36.0                                    | 32.0                 | 486.3                        | 599.9                      | 313.7                     | 27.9                        | 1.000109                  |
| 29500.0                        | 324.0                 | -37.5                                    | 32.0                 | 478.8                        | 598.1                      | 314.2                     | 26.7                        | 1.000107                  |
| 30000.0                        | 317.0                 | -38.9                                    | 31.4**               | 471.3                        | 596.3                      | 314.0                     | 26.3                        | 1.000105                  |
| 30500.0                        | 310.0                 | -40.6                                    | 18.6**               | 464.2                        | 594.2                      | 315.0                     | 28.1                        | 1.000104                  |
| 31000.0                        | 303.1                 | -42.2                                    | 5.9**                | 457.3                        | 592.0                      | 315.5                     | 31.2                        | 1.000102                  |
| 31500.0                        | 296.3                 | -43.7                                    |                      | 449.8                        | 590.1                      | 317.4                     | 34.0                        | 1.000100                  |
| 32000.0                        | 289.6                 | -44.9                                    |                      | 442.0                        | 588.5                      | 318.0                     | 36.6                        | 1.000098                  |
| 32500.0                        | 283.0                 | -46.2                                    |                      | 434.4                        | 586.9                      | 318.7                     | 38.4                        | 1.000097                  |
| 33000.0                        | 276.5                 | -47.5                                    |                      | 426.9                        | 585.3                      | 319.7                     | 38.6                        | 1.000095                  |
| 33500.0                        | 270.2                 | -48.7                                    |                      | 419.3                        | 583.0                      | 320.6                     | 38.8                        | 1.000093                  |
| 34000.0                        | 264.1                 | -50.0                                    |                      | 412.3                        | 582.0                      | 321.5                     | 38.1                        | 1.000092                  |
| 34500.0                        | 258.1                 | -51.3                                    |                      | 405.2                        | 580.3                      | 322.5                     | 37.2                        | 1.000090                  |
| 35000.0                        | 252.2                 | -52.5                                    |                      | 398.2                        | 578.7                      | 323.2                     | 36.3                        | 1.000089                  |
| 35500.0                        | 246.3                 | -53.8                                    |                      | 391.2                        | 577.0                      | 323.4                     | 35.6                        | 1.000087                  |
| 36000.0                        | 240.6                 | -55.1                                    |                      | 384.3                        | 575.3                      | 323.6                     | 34.9                        | 1.000086                  |
| 36500.0                        | 234.9                 | -56.4                                    |                      | 377.5                        | 573.6                      | 323.3                     | 33.7                        | 1.000084                  |
| 37000.0                        | 229.4                 | -57.6                                    |                      | 370.6                        | 572.0                      | 322.9                     | 32.6                        | 1.000083                  |
| 37500.0                        | 223.9                 | -58.7                                    |                      | 363.8                        | 570.4                      | 323.3                     | 32.1                        | 1.000081                  |
| 38000.0                        | 218.5                 | -59.9                                    |                      | 357.0                        | 568.9                      | 324.3                     | 32.0                        | 1.000080                  |
| 38500.0                        | 213.2                 | -61.1                                    |                      | 350.3                        | 567.3                      |                           |                             | 1.000078                  |
| 39000.0                        | 208.1                 | -62.3                                    |                      | 343.7                        | 565.7                      |                           |                             | 1.000077                  |
| 39500.0                        | 203.0                 | -63.5                                    |                      | 337.3                        | 564.1                      |                           |                             | 1.000075                  |

\*\* AT LAST ONE ASSUMED RELATIVE HUMIDITY VALUE WAS USED IN THE INTERPOLATION.

STATION ALTITUDE 4186.74 FEET ASL  
 9 NOV. 85 1100 HRG. PST  
 ASCENSION IS. 10

MANDATORY LEVELS  
 3130210010  
 RITA

GEODETIC COORDINATES  
 53.1429, LAT DEG  
 106.1511, LONG DEG

TABLE 12

| PRESSURE GEOPHYSICAL |        | TEMPERATURE               | REL. HUM. | WIND DATA                |                |
|----------------------|--------|---------------------------|-----------|--------------------------|----------------|
| MILLIBARS            | FEET   | AIR DEGREES<br>CENTIGRADE | PERCENT   | DIRECTION<br>DEGREES(TN) | SPEED<br>KNOTS |
| 850.0                | 5174.  | 7.1                       | 26.       | 352.3                    | 10.0           |
| 800.0                | 6814.  | 2.4                       | 28.       | 347.7                    | 12.2           |
| 750.0                | 8519.  | 2.6                       | 21.       | 327.6                    | 11.2           |
| 700.0                | 10355. | 4.1                       | 16.       | 308.6                    | 12.8           |
| 650.0                | 12327. | 1.7                       | 19.       | 326.4                    | 20.4           |
| 600.0                | 14422. | -3.2                      | 19.       | 315.9                    | 28.1           |
| 550.0                | 16672. | -6.1                      | 28.       | 305.3                    | 27.5           |
| 500.0                | 19071. | -12.3                     | 30.       | 304.6                    | 26.9           |
| 450.0                | 21703. | -18.7                     | 53.       | 304.9                    | 30.3           |
| 400.0                | 24548. | -24.8                     | 37.       | 303.1                    | 35.3           |
| 350.0                | 27681. | -33.0                     | 39.       | 308.0                    | 30.9           |
| 300.0                | 31171. | -41.0                     |           | 316.9                    | 32.5           |
| 250.0                | 35116. | -53.0                     |           | 323.3                    | 30.1           |
| 200.0                | 39714. | -64.2                     |           |                          |                |

\*\* AT LEAST ONE ASSUMED RELATIVE HUMIDITY VALUE WAS USED IN THE INTERPOLATION.

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