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# NASCOM NETWORK GROUND COMMUNICATIONS RELIABILITY REPORT

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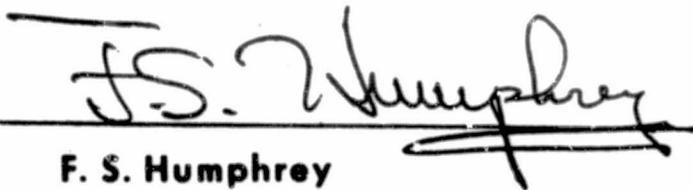
**NASCOM NETWORK  
GROUND COMMUNICATIONS RELIABILITY REPORT**

**NOVEMBER 1966**

Prepared by

**NETWORK REVIEW AND ANALYSIS BRANCH  
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Greenbelt, Maryland**

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**NASCOM NETWORK  
GROUND COMMUNICATIONS RELIABILITY REPORT  
NOVEMBER 1966  
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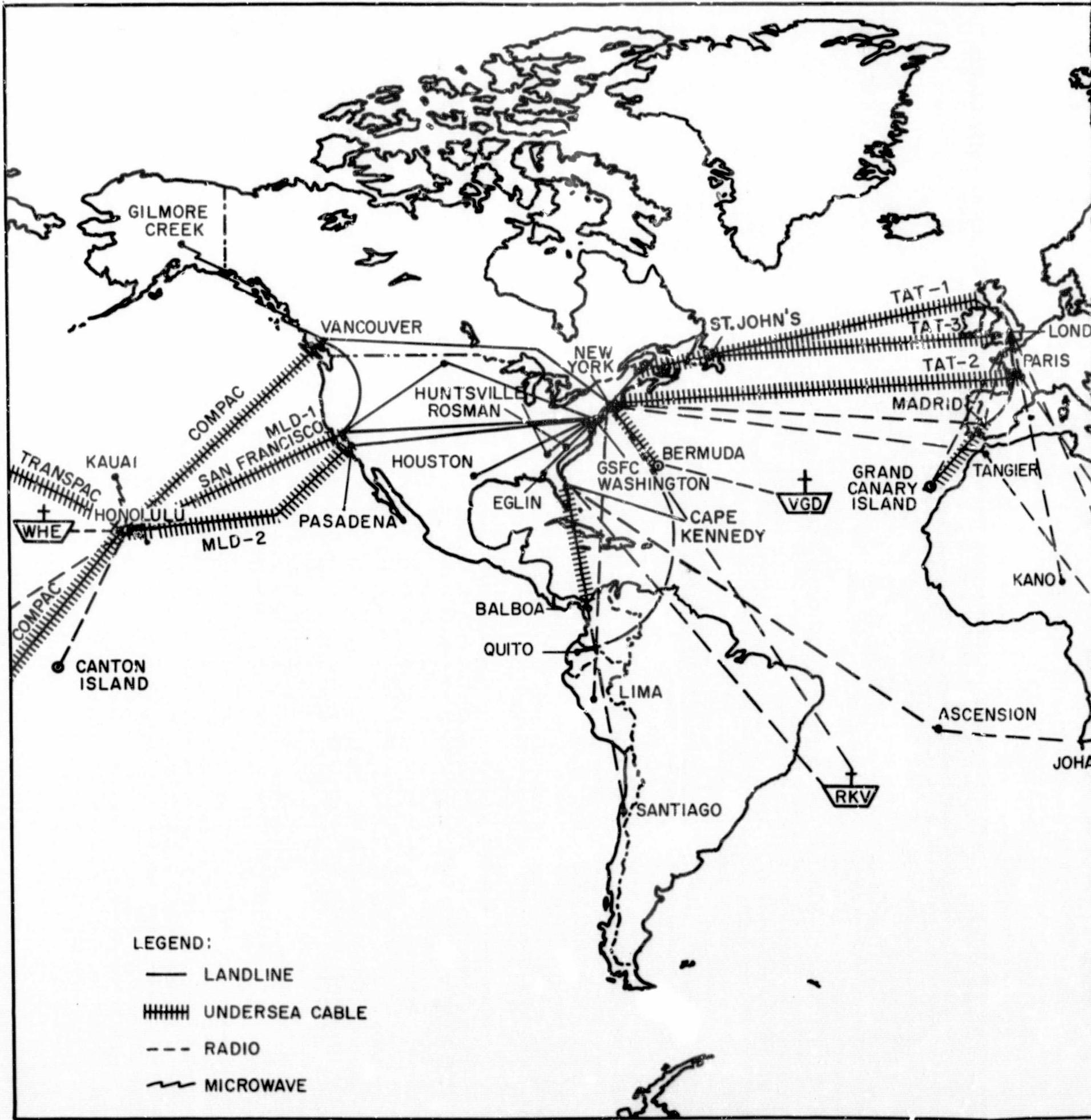
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\*Trouble categories, which are abbreviated in some tables, are spelled in full in Table 5. Code designations are also indicated in Table 5.



LEGEND:  
 — LANDLINE  
 ===== UNDERSEA CABLE  
 - - - RADIO  
 ~~~~~ MICROWAVE

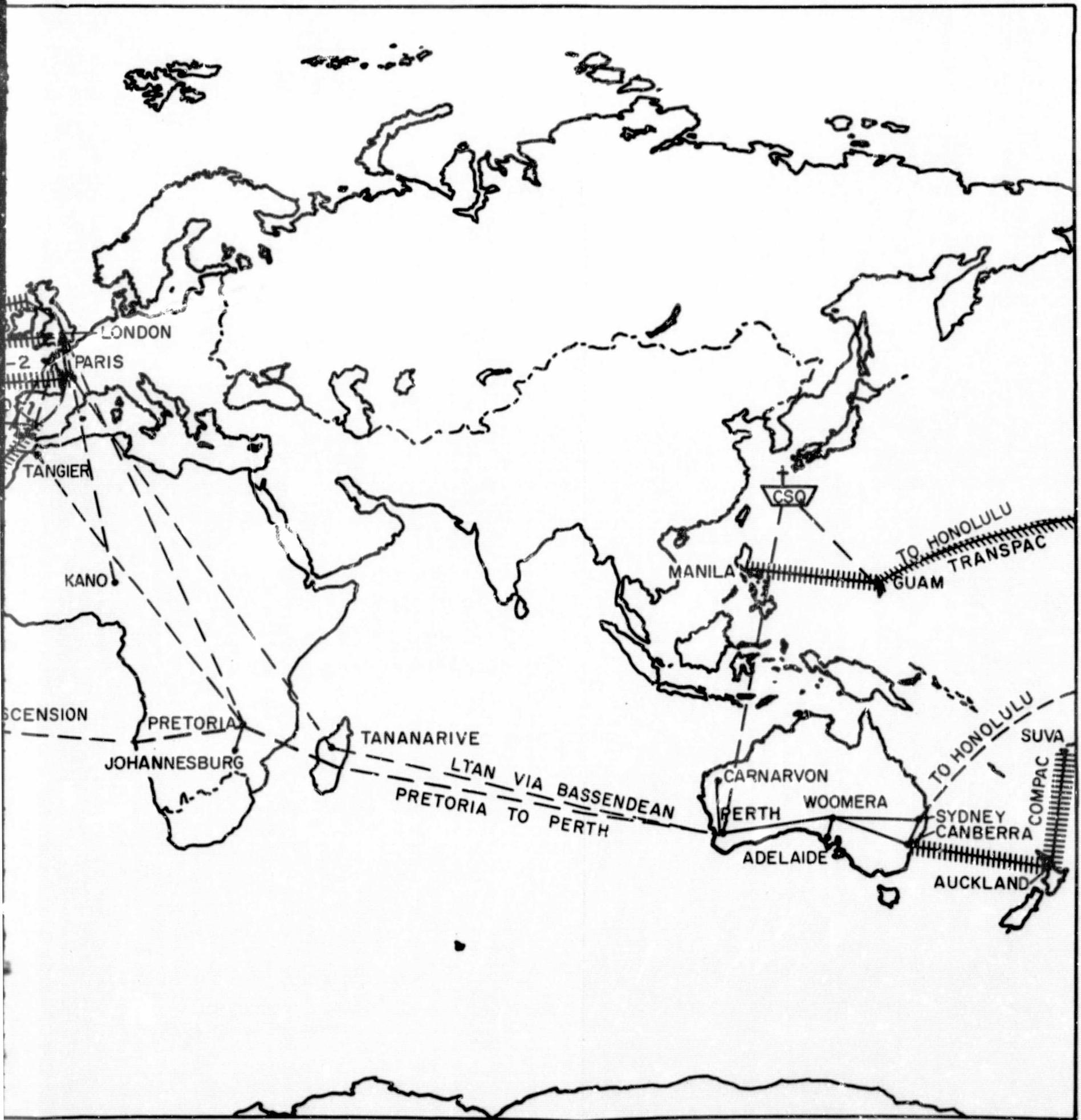


Figure 1. Map of NASCOM Network

# NASCOM NETWORK GROUND COMMUNICATIONS RELIABILITY REPORT

## INTRODUCTION

### General

The NASCOM Network is a global point-to-point communications system devoted to space project support, an integrated network in support of either manned vehicle space flights or unmanned scientific satellite missions. Stations throughout the world are interconnected by landline, undersea cable, and radio circuits. These circuits carry teletype, voice, and high-speed data in real-time support of missions of the National Aeronautics and Space Administration (NASA) of the United States of America.

The several teletype circuits comprising the network have been considered first as an integral network and then as individual circuits originating at specific stations. In many instances, multiple and diverse paths, each designated by a circuit number, originate at a single station. In these cases, more than one circuit will be the subject of discussion under the subheading of a station location. On the other hand, in some instances, circuits pass through one or more stations, while retaining the same circuit numbers. In these cases, the same circuit number will be encountered in discussions of several stations. However, reliability factors of all stations are considered.

Analyses of the NASCOM Voice/Data Network and Data Circuits will be found in the two latter sections of this report, following the analysis of individual teletype circuits.

### Definition of Terms

Operational reliability, as used in this report, is defined as the ratio of realized or actual station/circuit or network operating time to the total scheduled operating time, with this ratio then being expressed in percent.

In order to categorize stations/circuits for convenience in comparison, all percentages calculated for the various circuits have been rounded off to the nearest whole number. Thus, a calculated 86.32 percent is entered as 86 percent, and 99.65 percent as 100 percent. However, calculations in decimals are utilized in preparing Tables 1 and 2, with the result that rounded-off figures for the separate paths in Table 2 are not combined and again rounded off to prepare combined reliability in Table 1. It must always be inferred that comparisons are made with figures of the previous month unless a definite statement indicates a comparison with figures for a different period.

In this report the term "transmit" denotes transmission from Goddard Space Flight Center, and "receive" denotes reception at GSFC from an outlying station or site.

### Category Change

All wire defects, previously listed separately in Category F, are included in Equipment Failure, Category E, in order that Communications Processor Failures may be listed in Category F, separately from equipment failures at outlying stations.

## SUMMARY OF NASCOM NETWORK TELETYPE PERFORMANCE ANALYSIS

During November, the two GSFC-490 Communications Processors (CP) were removed with their functions taken over by the newer GSFC-494 CP units. The 490 "A" CP was disconnected on November 16 and the "B" 490 CP was removed on November 28. All equipment failures originating at the CP affect the operation of all circuits switched at GSFC during their operating hours. The CP functional reliability was 100 percent throughout 716 hours of scheduled operation.

The total outage of 3:56 hours resulted from 22 individual interruptions. This represents an increase of 1:26 hours and a decrease of three interruptions compared to last months. The increase in total outage can be attributed to interruptions resulting from the changeover to the newer CP systems. Of the 22 interruptions, 14 occurred while switching functions were being performed by one of the 494 CP units and these interruptions included those of longest duration.

During 494 CP operation, four equipment faults accounted for 1:51 hours outage and included interruptions of 57 minutes on November 16, 52 minutes on November 30 and two interruptions of one minute duration on November 26. Program faults, during 494 CP operation, accounted for 8 interruptions and a total outage of 1:35 hours. Included in these were outages of 53 minutes on November 28/29; 18 minutes and 16 minutes on November 2; two, two and one minute on November 17; one minute on November 24 and two minutes on November 30. Operator error resulted in two interruptions of three and ten minutes duration on November 2.

During the 490 CP operation, interruptions were caused by program faults and power switching. Five program faults resulted in outages of one and five minutes on November 4, one minute on each day November 6 and 15 and two minutes on November 12. Outages caused by power switching from diesel to commercial included three minutes on November 7 and two minutes on November 15, while switching from commercial to diesel caused a two minute interruption on November 10.

The average operational reliability of the teletype circuits was 99 percent, a figure consistent with the two preceding months. This reliability was achieved during 200,748 hours of scheduled operation compared to 185,014 hours during the preceding month.

In November, total teletype outage was 2,186:09 hours which is an increase of 207:16 hours over the total for October. Four outage categories; "CP Failure", "Poor Propagation", "Interference" and "Power Failure"; contributed to the increase. The increase in outage due to the GSFC-490/494 CP was from 368:19 to 569:51 hours with causes discussed above. Poor propagation conditions provided an increase of 175:18 hours or 33 percent over last month's figure of 530:34 hours. The largest percentage increase occurred in outages due to interference. The 154:44 hours total for November represented an increase of 113 percent over the figure of 72:45 hours for October. The total outage due to power problems, 12:21 hours, was 4:35 hours higher than the preceding month.

Significant improvement occurred in six outage categories. The total outage due to common carrier troubles was down to 603:35 hours from 749:05 hours, representing a decrease of 19 percent and a six-month low. Outage totals caused by operator error and maintenance had almost identical improvement with the former down to 8:54 from 21:46 hours and the latter down to 6:17 from 22:05 hours. Equipment failure problems totaled 48:21 hours, an improvement of 41 percent compared to the total of 82:33 hours for October. Frequency change outage total was 73:45 hours as compared to last month's figure of 111:08 hours. The lowest outage figure of 22 minutes resulted from equipment adjustment at Quito on the receive paths of GJPC-3258 and GQUI-3259.

Another notable improvement in the past four months has been in the category "No Trouble Found". Through the help of the several carriers, total outage in this category has continuously declined from 81:45 hours in July to only 2:07 hours in November.

**TABLE 1**  
**NASCOM Network Teletype Circuit Reliability**

| STATION          | CIRCUIT       | JUN<br>1966 | JUL<br>1966 | AUG<br>1966 | SEP<br>1966 | OCT<br>1966 | NOV<br>1966 | SIX-MONTH<br>AVERAGE |
|------------------|---------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------------|
| Adelaide/ACSW    | AADE-561      | -           | 100         | 100         | 100         | 100         | 100         | -                    |
|                  | AADE-562      | -           | 100         | 100         | 100         | 100         | 100         | -                    |
|                  | AADE-563      | -           | 100         | 100         | 100         | 100         | 100         | -                    |
|                  | AADE-564      | -           | 100         | 100         | 100         | 100         | 100         | -                    |
|                  | AADE-565      | -           | 100         | 100         | 100         | 100         | 100         | -                    |
|                  | AADE-566      | -           | 100         | 100         | 100         | 100         | 100         | -                    |
|                  | AADE-581      | -           | 100         | 100         | 100         | 100         | 100         | -                    |
|                  | AADE-582      | -           | 100         | 100         | 100         | -           | 100         | -                    |
|                  | AADE-583      | -           | 100         | 100         | 100         | -           | 100         | -                    |
|                  | AADE-584      | -           | 100         | 100         | 100         | 100         | 100         | -                    |
| AADE-585         | -             | 100         | 100         | 100         | 100         | 100         | -           |                      |
| Ascension Island | GSEN-58877    | 95          | 93          | 94          | 93          | 85          | 89          | 92                   |
| Barstow          | GATS-3005     | 99          | 99          | 100         | 99          | 98          | 97          | 99                   |
|                  | GAVE-3001     | 98          | 99          | 100         | 100         | 99          | 98          | 99                   |
| Bermuda Island   | GBDA-58901    | 99          | 100         | 99          | 100         | 100         | 99          | 100                  |
|                  | GBDA-58902    | 99          | 100         | 99          | 100         | 99          | 97          | 99                   |
| Cambridge        | GSAG-3308     | 99          | 99          | 99          | 98          | 99          | 98          | 99                   |
| Canberra/GSFC    | ACSW-3050     | 99          | 99          | 100         | 99          | 99          | 99          | 99                   |
|                  | ACSW-3051     | 99          | 99          | 99          | 99          | 98          | 99          | 99                   |
|                  | ACSW-3052     | 100         | 99          | 99          | 99          | 99          | 99          | 99                   |
|                  | ACSW-3057     | 99          | 99          | 97          | 98          | 100         | 99          | 99                   |
|                  | ACSW-58833    | -           | -           | 98          | 100         | 99          | 99          | -                    |
|                  | ACSW-58887    | 99          | 100         | 99          | 100         | 100         | 100         | 100                  |
|                  | ACSW-58888    | 99          | 100         | 99          | 100         | 100         | 100         | 100                  |
|                  | ACSW-58913    | 99          | 100         | 99          | 100         | 100         | 100         | 100                  |
|                  | ACSW-58918    | 99          | 100         | 98          | 100         | 99          | 99          | 99                   |
|                  | Canberra/ACSW | AACT-271    | -           | 100         | 100         | 100         | 100         | 100                  |
| AACT-272         |               | -           | -           | -           | -           | 99          | 100         | -                    |
| ACNB-281         |               | -           | -           | 99          | 95          | 97          | 100         | -                    |
| ANBE-261         |               | -           | -           | 100         | 100         | 100         | 99          | -                    |
| ANBE-263         |               | -           | -           | -           | -           | -           | 100         | -                    |
| Canton Island    | PCTN-58916/14 | 100         | 100         | 99          | 98          | 97          | 99          | 99                   |
| Cape Kennedy     | GCNV-58949    | 100         | 100         | 100         | 100         | 99          | 99          | 100                  |
|                  | GCPN-58940    | 100         | 100         | 100         | 100         | 100         | 99          | 100                  |
|                  | GKAP-58938    | 100         | 100         | 100         | 100         | 99          | 99          | 100                  |
|                  | GKEN-58935    | 100         | 100         | 100         | 100         | 99          | 99          | 100                  |
|                  | GMCC-58936    | 100         | 100         | 99          | 100         | 100         | 100         | 100                  |
|                  | GMCC-58943    | 100         | 100         | 100         | 100         | 99          | 99          | 100                  |
|                  | GMCC-58944    | 100         | 100         | 99          | 100         | 99          | 99          | 100                  |
|                  | GMCC-58945    | 100         | 100         | 100         | 100         | 100         | 100         | 100                  |

TABLE 1 (Continued)

| STATION              | CIRCUIT            | JUN<br>1966 | JUL<br>1966 | AUG<br>1966 | SEP<br>1966 | OCT<br>1966 | NOV<br>1966 | SIX-MONTH<br>AVERAGE |
|----------------------|--------------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------------|
| Cape Kennedy         | GMCC-58947         | 100         | 100         | 100         | 100         | 100         | 100         | 100                  |
|                      | GMCC-58948         | 100         | 100         | 99          | 100         | 100         | 100         | 100                  |
|                      | GMIL-58950         | 100         | 100         | 100         | 100         | 99          | 99          | 100                  |
|                      | GMIL-58951         | 100         | 100         | 100         | 99          | 100         | 99          | 100                  |
|                      | GMPA-58941         | 99          | 98          | 100         | 100         | 99          | 99          | 99                   |
|                      | GPVE-58942         | 100         | 100         | 99          | 100         | 99          | 99          | 100                  |
|                      | JCAP-58937         | 100         | 100         | 100         | 100         | 100         | 100         | 100                  |
| Carnarvon/AADE       | ACRO-663           | 100         | 100         | 98          | 100         | 99          | 99          | 99                   |
|                      | ACRO-664           | 100         | 100         | 99          | 100         | 99          | 99          | 100                  |
| College              | GLGE-58931         | 99          | 100         | 100         | 99          | 99          | 99          | 99                   |
| Corpus Christi       | GTEX-58906         | 99          | 100         | 99          | 100         | 99          | 99          | 99                   |
|                      | GTEX-58907         | 99          | 100         | 99          | 100         | 100         | 99          | 100                  |
| Eglin AFB            | GEGL-58908         | 100         | 98          | 98          | 100         | 98          | 99          | 99                   |
| Fort Myers           | GYRS-3302          | 94          | 97          | 98          | 99          | 96          | 99          | 97                   |
| Gilmore Creek        | GMOR-3077          | 99          | 99          | 99          | 99          | 98          | 98          | 99                   |
|                      | GULA-58930         | 100         | 100         | 99          | 100         | 100         | 99          | 100                  |
| Goldstone            | JGLD-3002/TK-1-8   | 98          | 96          | 99          | 98          | 98          | 99          | 98                   |
|                      | JGLD-58867         | -           | -           | -           | -           | 100         | 99          | -                    |
|                      | JGLD-58868         | -           | -           | -           | -           | 100         | 99          | -                    |
| Grand Canary I./LLDN | LCYI-58905         | 99          | 99          | 98          | 99          | 97          | 99          | 99                   |
|                      | LCYI-58953         | 99          | 99          | -           | 99          | 98          | 97          | -                    |
|                      | /Madrid<br>LCYI-20 | 94          | 98          | 98          | 98          | 98          | 100         | 98                   |
| Guam                 | PGWM-58960/73      | 99          | 97          | 100         | 90          | 98          | 99          | 97                   |
|                      | PGWM-58975/91      | -           | -           | -           | -           | 97          | 99          | -                    |
| Guaymas              | GGYM-58910         | 97          | 97          | 98          | 99          | 98          | 99          | 98                   |
|                      | GGYM-58911         | 97          | 97          | 98          | 98          | 99          | 99          | 98                   |
| Houston              | HDMA-58961         | 98          | 100         | 100         | 99          | 100         | 99          | 99                   |
|                      | HDMA-58962         | 100         | 100         | 100         | 99          | 100         | 99          | 100                  |
|                      | HDMA-58963         | 100         | 100         | 100         | 99          | 100         | 99          | 100                  |
|                      | HDMA-58964         | 100         | 100         | 100         | 99          | 100         | 99          | 100                  |
|                      | HDMA-58965         | 100         | 100         | 100         | 99          | 100         | 99          | 100                  |
|                      | HDMA-58971         | 99          | 100         | 100         | 99          | 100         | 99          | 100                  |
|                      | HDMA-58972         | 99          | 100         | 100         | 99          | 100         | 99          | 100                  |
|                      | HMSC-58959         | 99          | 100         | 100         | 100         | 100         | 100         | 100                  |
|                      | HMSC-58966         | 99          | 100         | 100         | 100         | 100         | 99          | 100                  |
|                      | HMSC-58967         | 100         | 100         | 100         | 100         | 100         | 99          | 100                  |
|                      | HMSC-58968         | 100         | 100         | 100         | 100         | 100         | 99          | 100                  |
|                      | HMSC-58970         | 99          | 100         | 100         | 99          | 100         | 99          | 100                  |
|                      | HMTS-58969         | 100         | 100         | 100         | 99          | 100         | 99          | 100                  |
|                      | Huntsville         | GALA-3079   | 100         | 100         | 100         | 100         | 99          | 99                   |
| GALA-58954           |                    | 100         | 100         | 100         | 100         | 100         | 99          | 100                  |

TABLE 1 (Continued)

| STATION                             | CIRCUIT              | JUN<br>1966 | JUL<br>1966 | AUG<br>1966 | SEP<br>1966 | OCT<br>1966 | NOV<br>1966 | SIX-MONTH<br>AVERAGE |    |
|-------------------------------------|----------------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------------|----|
| Johannesburg/AADE<br>/GSFC<br>/LLDN | GBUR-688             | 77          | 89          | 85          | 85          | 93          | 94          | 87                   |    |
|                                     | GBUR-3260            | 95          | 95          | 96          | 92          | 93          | 92          | 94                   |    |
|                                     | LJOB-18              | 91          | 91          | 92          | 94          | 95          | 95          | 93                   |    |
|                                     | LJOB-24              | 91          | 91          | 92          | 94          | 95          | 95          | 93                   |    |
|                                     | LJOB-3261            | 91          | 90          | 91          | 95          | 96          | 96          | 93                   |    |
| Kano/LLDN                           | LKNO-58904           | 100         | 100         | 98          | 98          | 97          | 99          | 99                   |    |
| Kauai Island                        | PHAW-58839/12        | 100         | 99          | 100         | 99          | 99          | 99          | 99                   |    |
|                                     | PHAW-58917/15        | 99          | 99          | 99          | 99          | 99          | 99          | 99                   |    |
| Lima<br>London/GSFC                 | GAPU-58856           | 89          | 94          | 92          | 93          | 95          | 98          | 94                   |    |
|                                     | LLDN-3261            | 100         | 100         | 100         | 100         | 100         | 99          | 100                  |    |
|                                     | LLDN-3262            | 99          | 99          | 99          | 100         | 100         | 99          | 99                   |    |
|                                     | LLDN-58903           | 99          | 100         | 98          | 100         | 100         | 99          | 99                   |    |
|                                     | LLDN-58904           | 99          | 99          | 100         | 100         | 100         | 99          | 100                  |    |
|                                     | LLDN-58905           | 100         | 100         | 100         | 100         | 99          | 99          | 100                  |    |
|                                     | LLDN-58953           | 99          | 99          | 100         | 100         | 99          | 99          | 99                   |    |
|                                     | LLDN-58993           | 99          | 100         | 100         | 100         | 100         | 99          | 100                  |    |
|                                     | Madrid/GSFC<br>/LLDN | LRID-3263   | 99          | 100         | 98          | 96          | 97          | 98                   | 98 |
|                                     |                      | LRID-7      | 100         | 99          | 98          | 99          | 99          | 100                  | 99 |
| LRID-8                              |                      | 100         | 99          | 98          | 99          | 98          | 99          | 99                   |    |
| LRID-9                              |                      | 100         | 99          | 98          | 99          | 98          | 100         | 99                   |    |
| LRID-10                             |                      | 100         | 99          | 96          | 99          | 99          | 100         | 99                   |    |
| LRID-11                             |                      | 100         | 99          | 98          | 99          | 99          | 100         | 99                   |    |
| LRID-13                             |                      | 100         | 100         | 99          | 100         | 99          | 100         | 100                  |    |
| LRID-14                             |                      | 100         | 100         | 99          | 100         | 99          | 100         | 100                  |    |
| Pasadena                            | LRID-16              | 100         | 99          | 98          | 99          | 98          | 100         | 99                   |    |
|                                     | JJPL-3006            | 99          | 100         | 99          | 100         | 100         | 100         | 100                  |    |
|                                     | JJPL-3007            | 99          | 99          | 100         | 99          | 100         | 100         | 100                  |    |
|                                     | JJPL-3008            | 99          | 99          | 99          | 99          | 98          | 100         | 99                   |    |
|                                     | JJPL-3009            | 99          | 99          | 100         | 100         | 98          | 100         | 99                   |    |
|                                     | JJPL-58831           | -           | -           | -           | -           | 100         | 100         | -                    |    |
|                                     | JJPL-58858           | 99          | 99          | 100         | 100         | 100         | 100         | 100                  |    |
|                                     | JJPL-58859           | 99          | 99          | 100         | 100         | 100         | 100         | 100                  |    |
|                                     | JJPL-58860           | 99          | 99          | 100         | 100         | 100         | 100         | 100                  |    |
|                                     | JJPL-58861           | 99          | 100         | 100         | 100         | 100         | 100         | 100                  |    |
|                                     | JJPL-58862           | 99          | 100         | 100         | 100         | 100         | 100         | 100                  |    |
|                                     | JJPL-58863           | 99          | 100         | 100         | 100         | 100         | 100         | 100                  |    |
|                                     | JJPL-58921           | 99          | 100         | 100         | 100         | 100         | 100         | 100                  |    |
|                                     | JJPL-58925           | 99          | 100         | 100         | 100         | 100         | 100         | 100                  |    |
|                                     | JJPL-58926           | 99          | 100         | 100         | 100         | 100         | 100         | 100                  |    |
| JJPL-58927                          | 99                   | 100         | 100         | 100         | 100         | 100         | 100         |                      |    |
| JJPL-58928                          | 99                   | 100         | 100         | 100         | 100         | 100         | 100         |                      |    |

TABLE 1 (Continued)

| STATION                | CIRCUIT        | JUN<br>1966 | JUL<br>1966 | AUG<br>1966 | SEP<br>1966 | OCT<br>1966 | NOV<br>1966 | SIX-MONTH<br>AVERAGE |
|------------------------|----------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------------|
| Pasadena               | JJPL-58929     | 99          | 100         | 100         | 100         | 100         | 100         | 100                  |
|                        | JJPL-58983     | -           | -           | -           | -           | 100         | 100         | -                    |
|                        | JJPL-58984     | -           | -           | -           | -           | 100         | 100         | -                    |
| Point Arguello         | GCAL-58922     | 99          | 100         | 99          | 100         | 100         | 100         | 100                  |
|                        | GRGO-58920     | 99          | 100         | 100         | 100         | 100         | 100         | 100                  |
| Princeton              | GHNJ-3300      | 98          | 97          | 99          | 100         | 100         | 99          | 99                   |
| Quito                  | GJPC-3258      | 99          | 99          | 98          | 96          | 98          | 99          | 98                   |
|                        | GQUI-3259      | 99          | 99          | 98          | 97          | 98          | 99          | 98                   |
| Rosman                 | GNAT-3317      | -           | -           | -           | 97          | -           | 99          | -                    |
|                        | GROS-3307      | 99          | 99          | 99          | 97          | 99          | 99          | 99                   |
|                        | GRST-3316      | 99          | 100         | 80          | 99          | 97          | 98          | 96                   |
| St. John's<br>Santiago | GFLD-3250      | 97          | 99          | 100         | 99          | 99          | 99          | 99                   |
|                        | GAGO-3256      | 95          | 93          | 91          | 94          | 95          | 98          | 94                   |
|                        | GEDS-3255      | 93          | 90          | 89          | 91          | 95          | 98          | 93                   |
| Tananarive/LLDN        | LTAN-1         | 98          | 100         | 98          | 99          | 98          | 98          | 98                   |
| Toowoomba/ACSW         | ACBY-471       | -           | -           | -           | -           | 99          | 100         | -                    |
|                        | ACBY-472       | -           | -           | -           | -           | 99          | 100         | -                    |
| Wallops Island         | GWAB-3305      | 100         | 100         | 96          | 98          | 98          | 100         | 99                   |
|                        | GWAB-3314      | 100         | 100         | 96          | 98          | 98          | 100         | 99                   |
|                        | GWAC-3312      | 100         | 100         | 96          | 98          | 98          | 100         | 99                   |
|                        | GWAC-3313      | 100         | 100         | 96          | 98          | 98          | 100         | 99                   |
|                        | GWGE-3303      | 96          | 100         | -           | 98          | 98          | 100         | -                    |
| Washington             | NASA-HQ-3309   | 100         | 100         | 100         | 99          | 100         | 99          | 100                  |
| White Sands            | GWHS-58909     | 100         | 100         | 100         | 100         | 100         | 100         | 100                  |
| Winkfield/LLDN         | LWNK-58903     | 100         | 100         | 100         | 99          | 100         | 100         | 100                  |
| Woomera/AADE           | AOMJ-561       | -           | -           | -           | -           | -           | 100         | -                    |
|                        | AOMJ-562       | -           | -           | -           | -           | -           | 100         | -                    |
|                        | AOMJ-563       | -           | -           | -           | -           | -           | 100         | -                    |
|                        | AOMJ-564       | -           | -           | -           | -           | -           | 100         | -                    |
| SHIP STATIONS:         |                |             |             |             |             |             |             |                      |
| Coastal Sentry/Perth   | MCSQ-58832/661 | 95          | 87          | 91          | 90          | -           | 93          | -                    |
|                        | MCSQ-58833/662 | 97          | 88          | 95          | 96          | -           | 95          | -                    |
| /Guam                  | MCSQ-58988/60  | 98          | 93          | 91          | 95          | -           | 94          | -                    |
|                        | MCSQ-58989/67  | 97          | 94          | 96          | 97          | -           | 97          | -                    |
| /Japan                 | MCSQ-58988/73  | -           | -           | -           | 91          | -           | 92          | -                    |
|                        | MCSQ-58989/74  | -           | -           | -           | 95          | -           | 97          | -                    |
| Rose Knot/New York     | MRKV-58834     | 95          | 97          | 96          | 94          | -           | 91          | -                    |
|                        | MRKV-58835     | 95          | 98          | 97          | 96          | -           | 93          | -                    |
| /ETR                   | MRKV-58836     | 94          | 94          | 97          | 92          | -           | 84          | -                    |
|                        | MRKV-58837     | 94          | 95          | 97          | 94          | -           | 91          | -                    |
| Wheeling               | MWHE-58916/838 | -           | -           | 68          | 95          | -           | 98          | -                    |

TABLE 2

Teletype Circuit Lost Time by Trouble Categories (Transmit and Receive Paths Listed Separately)

| STATION        | CIRCUIT      | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL LOST TIME | SCHED OPER. HOURS | RELIA-BILITY |
|----------------|--------------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-----------------|-------------------|--------------|
| Adelaide/ACSW  | AADE-561-T   | -           | :22     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :22             | 720               | 100          |
|                | AADE-561-R   | -           | 1:30    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:30            | 720               | 100          |
|                | AADE-562-T   | -           | :22     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :22             | 720               | 100          |
|                | AADE-562-R   | -           | 1:30    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:30            | 720               | 100          |
|                | AADE-563-T   | -           | :30     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :30             | 720               | 100          |
|                | AADE-563-R   | -           | 1:38    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:38            | 720               | 100          |
|                | AADE-564-T   | -           | :22     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :22             | 720               | 100          |
|                | AADE-564-R   | -           | 1:30    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:30            | 720               | 100          |
|                | AADE-565-T   | -           | :22     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :22             | 720               | 100          |
|                | AADE-565-R   | -           | 1:30    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:30            | 720               | 100          |
|                | AADE-566-T   | -           | :22     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :22             | 720               | 100          |
|                | AADE-566-R   | -           | 1:30    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:30            | 720               | 100          |
|                | AADE-581-T   | -           | :30     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :30             | 720               | 100          |
|                | AADE-581-R   | -           | :30     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :30             | 720               | 100          |
|                | AADE-582-T   | -           | :35     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :35             | 720               | 100          |
|                | AADE-582-R   | -           | 1:15    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:15            | 720               | 100          |
|                | AADE-583-T   | -           | :30     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :30             | 720               | 100          |
|                | AADE-583-R   | -           | :48     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :48             | 720               | 100          |
|                | AADE-584-T   | -           | :22     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :22             | 720               | 100          |
|                | AADE-584-R   | -           | :27     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :27             | 720               | 100          |
| AADE-585-T     | -            | :29         | -       | -       | -         | -          | -       | -         | -              | -        | -     | :29      | 720             | 100               |              |
| AADE-585-R     | -            | :22         | -       | -       | -         | -          | -       | -         | -              | -        | -     | :22      | 720             | 100               |              |
| Ascension      | GSEN-58877-T | -           | 1:36    | 2:29    | -         | 1:06       | 1:42    | 42:42     | -              | 1:20     | :15   | 2:57     | 54:07           | 388               | 86           |
| Island         | GSEN-58877-R | -           | :39     | 2:29    | -         | 2:23       | 1:42    | 22:25     | -              | :52      | -     | 2:22     | 32:52           | 388               | 92           |
| Barstow        | GATS-3005-T  | -           | 14:12   | -       | -         | 1:15       | 3:56    | -         | -              | -        | -     | -        | 19:23           | 715               | 97           |
|                | GATS-3005-R  | -           | 13:32   | -       | -         | :50        | 3:56    | -         | -              | -        | -     | -        | 18:18           | 715               | 97           |
|                | GAVE-3001-T  | -           | 8:12    | -       | -         | :50        | 3:56    | -         | -              | -        | -     | -        | 12:58           | 716               | 98           |
|                | GAVE-3001-R  | -           | 9:28    | -       | -         | :50        | 3:56    | -         | -              | -        | -     | -        | 14:14           | 716               | 98           |
| Bermuda Island | GBDA-58901-T | -           | -       | -       | -         | 1:28       | 2:38    | -         | -              | -        | -     | -        | 4:06            | 446               | 99           |
|                | GBDA-58901-R | -           | -       | -       | -         | 4:03       | 2:38    | -         | -              | -        | -     | -        | 6:41            | 446               | 99           |
|                | GBDA-58902-T | -           | -       | -       | -         | 1:28       | 2:38    | -         | -              | -        | -     | -        | 4:06            | 446               | 99           |
|                | GBDA-58902-R | -           | 15:30   | -       | -         | 4:03       | 2:38    | -         | -              | -        | -     | -        | 22:11           | 446               | 95           |
| Cambridge      | GSAO-3308-T  | -           | 8:47    | -       | -         | -          | 4:34    | -         | -              | -        | 1:18  | -        | 14:39           | 713               | 98           |
|                | GSAO-3308-R  | -           | 5:41    | -       | -         | -          | 3:56    | -         | -              | -        | 1:18  | -        | 10:55           | 713               | 98           |
| Canberra/GSFC  | ACSW-3050-T  | -           | 3:57    | 1:45    | -         | -          | 3:56    | -         | -              | -        | -     | -        | 9:38            | 716               | 99           |
|                | ACSW-3050-R  | -           | 6:19    | 1:45    | -         | -          | 3:56    | -         | -              | -        | -     | -        | 12:00           | 716               | 98           |

TABLE 2 (Continued)

| STATION       | CIRCUIT         | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL LOST TIME | SCHED OPER. HOURS | RELIA-BILITY |     |
|---------------|-----------------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-----------------|-------------------|--------------|-----|
| Canberra/GSFC | ACSW-3051-T     | -           | 6:44    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 10:40           | 716               | 99           |     |
|               | ACSW-3051-R     | -           | 9:55    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 13:51           | 716               | 98           |     |
|               | ACSW-3052-T     | -           | 3:29    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 7:25            | 716               | 99           |     |
|               | ACSW-3052-R     | -           | 3:23    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 7:19            | 716               | 99           |     |
|               | ACSW-3057-T     | -           | 1:26    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 5:22            | 716               | 99           |     |
|               | ACSW-3057-R     | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99           |     |
|               | ACSW-58833-T    | -           | :50     | -       | -         | -          | 1:50    | -         | -              | -        | -     | -        | 2:40            | 311               | 99           |     |
|               | ACSW-58833-R    | -           | :45     | -       | -         | -          | 1:50    | -         | -              | -        | -     | -        | 2:35            | 311               | 99           |     |
|               | ACSW-58887-T    | -           | :45     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :45             | 720               | 100          |     |
|               | ACSW-58887-R    | -           | 1:04    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:04            | 720               | 100          |     |
|               | ACSW-58888-T    | -           | 1:05    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:05            | 720               | 100          |     |
|               | ACSW-58888-R    | -           | 1:20    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:20            | 720               | 100          |     |
|               | ACSW-58913-T    | -           | 3:07    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3:07            | 720               | 100          |     |
|               | ACSW-58913-R    | -           | 4:08    | -       | -         | -          | :05     | -         | -              | -        | -     | -        | 4:13            | 720               | 99           |     |
|               | ACSW-58918-T    | -           | :45     | -       | -         | -          | -       | 3:56      | -              | -        | -     | -        | 4:41            | 716               | 99           |     |
|               | ACSW-58918-R    | -           | 1:18    | -       | -         | -          | -       | 3:56      | -              | -        | -     | -        | 5:14            | 716               | 99           |     |
|               | ACSW-58932-T    | -           | 1:55    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:55            | 384               | 100          |     |
|               | ACSW-58932-R    | -           | 7:55    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 7:55            | 384               | 98           |     |
|               | ACSW-58933-T    | -           | :45     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :45             | 384               | 100          |     |
|               | ACSW-58933-R    | -           | 13:35   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 13:35           | 384               | 96           |     |
|               | ACSW-58934-T    | -           | :45     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :45             | 600               | 100          |     |
|               | ACSW-58934-R    | -           | :45     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :45             | 600               | 100          |     |
|               | ACSW-58956-T    | -           | :45     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :45             | 360               | 100          |     |
|               | ACSW-58956-R    | -           | 1:05    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:05            | 360               | 100          |     |
|               | Canberra/ACSW   | AACT-271-T  | -       | :42     | -         | -          | :25     | -         | -              | -        | -     | -        | -               | 1:07              | 718          | 100 |
|               |                 | AACT-271-R  | -       | :42     | -         | -          | :10     | -         | -              | -        | -     | -        | -               | :52               | 718          | 100 |
|               |                 | AACT-272-T  | -       | :42     | -         | -          | :10     | -         | -              | -        | -     | -        | -               | :52               | 718          | 100 |
| AACT-272-R    |                 | -           | :42     | -       | -         | :10        | -       | -         | -              | -        | -     | -        | :52             | 718               | 100          |     |
| ACNB-281-T    |                 | -           | :25     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :25             | 187               | 100          |     |
| ACNB-281-R    |                 | -           | :25     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :25             | 187               | 100          |     |
| ANBE-261-T    |                 | -           | 3:42    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3:42            | 478               | 99           |     |
| ANBE-261-R    |                 | -           | 3:42    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3:42            | 478               | 99           |     |
| Canton Island | ANBE-263-T      | -           | 2:19    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2:19            | 478               | 100          |     |
|               | ANBE-263-R      | -           | -       | -       | -         | :27        | -       | -         | -              | -        | -     | -        | :27             | 478               | 100          |     |
| Cape Kennedy  | PCTN-58916/14-T | -           | -       | -       | -         | -          | 3:12    | -         | -              | -        | -     | -        | 3:12            | 382               | 99           |     |
|               | PCTN-58916/14-R | -           | :10     | -       | -         | -          | 2:32    | 1:05      | -              | :06      | -     | -        | 3:53            | 382               | 99           |     |
| Cape Kennedy  | GCNV-58949-T    | -           | :45     | -       | -         | -          | 3:48    | -         | -              | -        | -     | -        | 4:33            | 539               | 99           |     |
|               | GCNV-58949-R    | -           | :45     | -       | -         | -          | 3:48    | -         | -              | -        | -     | -        | 4:33            | 539               | 99           |     |

TABLE 2 (Continued)

| STATION        | CIRCUIT            | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FERENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL LOST TIME | SCHED OPER. HOURS | RELIABILITY |     |
|----------------|--------------------|-------------|---------|---------|-----------|------------|---------|-----------|---------------|----------|-------|----------|-----------------|-------------------|-------------|-----|
| Cape Kennedy   | GCPN-58940-T       | -           | : 43    | -       | -         | -          | 3: 48   | -         | -             | -        | -     | -        | 4: 31           | 539               | 99          |     |
|                | GCPN-58940-R       | -           | : 43    | -       | -         | -          | 3: 48   | -         | -             | -        | -     | -        | 4: 31           | 539               | 99          |     |
|                | GKAP-58938-T       | -           | : 45    | -       | -         | -          | 3: 48   | -         | -             | -        | -     | -        | 4: 33           | 539               | 99          |     |
|                | GKAP-58938-R       | -           | : 45    | -       | -         | -          | 3: 48   | -         | -             | -        | -     | -        | 4: 33           | 539               | 99          |     |
|                | GKEN-58935-T       | -           | : 45    | -       | -         | -          | 3: 48   | -         | -             | -        | -     | -        | 4: 33           | 539               | 99          |     |
|                | GKEN-58935-R       | -           | : 45    | -       | -         | -          | 3: 48   | -         | -             | -        | -     | -        | 4: 33           | 539               | 99          |     |
|                | GMCC-58936-T       | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | : 00              | 543         | 100 |
|                | GMCC-58936-R       | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | : 00              | 543         | 100 |
|                | GMCC-58943-T       | -           | -       | : 45    | -         | -          | -       | 3: 48     | -             | -        | -     | -        | -               | 4: 33             | 539         | 99  |
|                | GMCC-58943-R       | -           | -       | : 45    | -         | -          | -       | 3: 48     | -             | -        | -     | -        | -               | 4: 33             | 539         | 99  |
|                | GMCC-58944-T       | -           | -       | : 45    | -         | -          | -       | 3: 48     | -             | -        | -     | -        | -               | 4: 33             | 539         | 99  |
|                | GMCC-58944-R       | -           | -       | : 45    | -         | -          | -       | 3: 48     | -             | -        | -     | -        | -               | 4: 33             | 539         | 99  |
|                | GMCC-58945-T       | -           | -       | : 52    | -         | -          | -       | -         | -             | -        | -     | -        | -               | : 52              | 543         | 100 |
|                | GMCC-58945-R       | -           | -       | : 45    | -         | -          | -       | -         | -             | -        | -     | -        | -               | : 45              | 543         | 100 |
|                | GMCC-58947-T       | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | : 00              | 543         | 100 |
|                | GMCC-58947-R       | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | : 00              | 543         | 100 |
|                | GMCC-58948-T       | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | : 00              | 543         | 100 |
|                | GMCC-58948-R       | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | : 00              | 543         | 100 |
|                | GMIL-58950-T       | -           | -       | -       | -         | -          | -       | 3: 48     | -             | -        | -     | -        | -               | 3: 48             | 539         | 99  |
|                | GMIL-58950-R       | -           | -       | -       | -         | -          | -       | 3: 48     | -             | -        | -     | -        | -               | 3: 48             | 539         | 99  |
|                | GMIL-58951-T       | -           | -       | -       | -         | -          | -       | 3: 48     | -             | -        | -     | -        | -               | 3: 48             | 539         | 99  |
|                | GMIL-58951-R       | -           | -       | 3: 55   | -         | -          | -       | 3: 48     | -             | -        | -     | -        | -               | 7: 43             | 539         | 99  |
|                | GMPA-58941-T       | -           | -       | : 45    | -         | -          | -       | 3: 48     | -             | -        | -     | -        | -               | 4: 33             | 539         | 99  |
|                | GMPA-58941-R       | -           | -       | : 45    | -         | -          | -       | 3: 48     | -             | -        | -     | -        | -               | 4: 33             | 539         | 99  |
|                | GPVE-58942-T       | -           | -       | -       | -         | -          | -       | 3: 48     | -             | -        | -     | -        | -               | 3: 48             | 539         | 99  |
|                | GPVE-58942-R       | -           | -       | -       | -         | -          | -       | 3: 48     | -             | -        | -     | -        | -               | 3: 48             | 539         | 99  |
|                | JCAP-58937-T       | -           | -       | : 45    | -         | -          | -       | -         | -             | -        | -     | -        | -               | : 45              | 543         | 100 |
|                | JCAP-58937-R       | -           | -       | : 45    | -         | -          | -       | -         | -             | -        | -     | -        | -               | : 45              | 543         | 100 |
|                | Carnarvon/<br>AADE | ACRO-663-T  | -       | 4: 33   | -         | -          | 2: 28   | -         | -             | -        | -     | -        | -               | 7: 01             | 515         | 99  |
|                |                    | ACRO-663-R  | -       | 3: 36   | -         | -          | -       | -         | -             | -        | -     | -        | -               | 3: 36             | 515         | 99  |
| ACRO-664-T     |                    | -           | 5: 17   | -       | -         | -          | -       | -         | -             | -        | -     | -        | 5: 17           | 515               | 99          |     |
| ACRO-664-R     |                    | -           | 3: 51   | -       | -         | -          | -       | -         | -             | -        | -     | -        | 3: 51           | 515               | 99          |     |
| College        | GLGE-58931-T       | -           | 3: 55   | -       | -         | -          | 4: 37   | -         | -             | -        | -     | -        | 8: 32           | 716               | 99          |     |
|                | GLGE-58931-R       | -           | 3: 55   | -       | -         | -          | 4: 37   | -         | -             | -        | -     | -        | 8: 32           | 716               | 99          |     |
| Corpus Christi | GTEX-58906-T       | -           | -       | -       | -         | -          | 2: 36   | -         | -             | -        | -     | -        | 2: 36           | 428               | 99          |     |
|                | GTEX-58906-R       | -           | -       | -       | -         | -          | 2: 36   | -         | -             | -        | -     | -        | 2: 36           | 428               | 99          |     |
|                | GTEX-58907-T       | -           | : 34    | -       | -         | -          | 2: 36   | -         | -             | -        | -     | -        | 3: 10           | 428               | 99          |     |
|                | GTEX-58907-R       | -           | : 19    | -       | -         | -          | 2: 36   | -         | -             | -        | -     | -        | 2: 55           | 428               | 99          |     |

TABLE 2 (Continued)

| STATION              | CIRCUIT            | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL LOST TIME | SCHED OPER. HOURS | RELIABILITY |
|----------------------|--------------------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-----------------|-------------------|-------------|
| Eglin Air Force Base | GEGL-58908-T       | -           | -       | -       | -         | -          | 2:54    | -         | -              | -        | -     | -        | 2:54            | 464               | 99          |
|                      | GEGL-58908-R       | -           | 2:40    | -       | -         | 2:05       | 2:54    | -         | -              | -        | -     | -        | 7:39            | 464               | 98          |
| Fort Myers           | GYRS-3302-T        | -           | 1:06    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 5:02            | 716               | 99          |
|                      | GYRS-3302-R        | -           | 1:28    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 5:24            | 716               | 99          |
| Gilmore Creek        | GMOR-3077-T        | -           | 11:16   | -       | -         | :02        | 3:56    | -         | -              | -        | -     | -        | 15:14           | 716               | 98          |
|                      | GMOR-3077-R        | -           | 10:03   | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 13:59           | 716               | 98          |
|                      | GULA-58930-T       | -           | 5:36    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 9:32            | 716               | 99          |
| Goldstone            | GULA-58930-R       | -           | 4:01    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 7:57            | 716               | 99          |
|                      | JGLD-3002/TK-1/8-T | -           | 9:36    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 13:32           | 716               | 98          |
|                      | JGLD-3002/TK-1/8-R | -           | 2:52    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 6:48            | 716               | 99          |
|                      | JGLD-58867-T       | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99          |
|                      | JGLD-58867-R       | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99          |
|                      | JGLD-58868-T       | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99          |
|                      | JGLD-58868-R       | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99          |
| Grand Canary I./LLDN | LCYI-58905-T       | -           | :40     | -       | -         | -          | -       | -         | -              | :30      | :46   | -        | 1:56            | 392               | 100         |
|                      | LCYI-58905-R       | -           | 3:16    | -       | -         | :03        | -       | 1:00      | 15             | 1:48     | :46   | -        | 7:08            | 392               | 98          |
|                      | LCYI-58953-T       | -           | 16:49   | -       | -         | -          | -       | 2:38      | -              | -        | :57   | -        | 20:24           | 392               | 95          |
|                      | LCYI-58953-R       | -           | :08     | -       | -         | :03        | -       | :36       | -              | 1:48     | :57   | -        | 3:32            | 392               | 99          |
|                      | LCYI-20-T          | :07         | 1:12    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:19            | 393               | 100         |
| /Madrid              | LCYI-20-R          | :01         | 7:12    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 7:13            | 393               | 100         |
|                      | PGWM-58960/73-T    | -           | :07     | -       | -         | -          | 2:08    | -         | -              | -        | -     | -        | 2:15            | 204               | 99          |
| Guam                 | PGWM-58960/73-R    | -           | :16     | -       | -         | -          | 2:08    | -         | -              | -        | -     | -        | 2:24            | 204               | 99          |
|                      | PGWM-58975/91-T    | -           | :47     | -       | -         | -          | 2:08    | -         | -              | -        | -     | -        | 2:55            | 204               | 99          |
|                      | PGWM-58975/91-R    | -           | 1:22    | -       | -         | -          | 2:08    | -         | -              | -        | -     | -        | 3:30            | 204               | 98          |
|                      | GGYM-58910-T       | -           | 2:56    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 6:52            | 716               | 99          |
| Guaymas              | GGYM-58910-R       | -           | 2:56    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 6:52            | 716               | 99          |
|                      | GGYM-58911-T       | -           | 2:20    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 6:16            | 716               | 99          |
|                      | GGYM-58911-R       | -           | 2:20    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 6:16            | 716               | 99          |
| Houston              | HDMA-58961-T       | -           | :37     | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 4:33            | 716               | 99          |
|                      | HDMA-58961-R       | -           | 1:04    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 5:00            | 716               | 99          |
|                      | HDMA-58962-T       | -           | 2:20    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 6:16            | 716               | 99          |
|                      | HDMA-58962-R       | -           | :09     | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 4:05            | 716               | 99          |
|                      | HDMA-58963-T       | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99          |
|                      | HDMA-58963-R       | -           | :29     | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 4:25            | 716               | 99          |

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TABLE 2 (Continued)

| STATION                                     | CIRCUIT         | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL LOST TIME | SCHED OPER. HOURS | RELIA-BILITY |
|---------------------------------------------|-----------------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-----------------|-------------------|--------------|
| Houston                                     | HDMA-58964-T    | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99           |
|                                             | HDMA-58964-R    | -           | :20     | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 4:16            | 716               | 99           |
|                                             | HDMA-58965-T    | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99           |
|                                             | HDMA-58965-R    | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99           |
|                                             | HDMA-58971-T    | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99           |
|                                             | HDMA-58971-R    | -           | :20     | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 4:16            | 716               | 99           |
|                                             | HDMA-58972-T    | -           | 3:53    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 7:49            | 716               | 99           |
|                                             | HDMA-58972-R    | -           | 1:15    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 5:11            | 716               | 99           |
|                                             | HMSC-58959-T    | -           | :37     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :37             | 720               | 100          |
|                                             | HMSC-58959-R    | -           | :44     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :44             | 720               | 100          |
|                                             | HMSC-58966-T    | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99           |
|                                             | HMSC-58966-R    | -           | :20     | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 4:16            | 716               | 99           |
|                                             | HMSC-58967-T    | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99           |
|                                             | HMSC-58967-R    | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99           |
|                                             | HMSC-58968-T    | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99           |
|                                             | HMSC-58968-R    | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99           |
|                                             | HMSC-58970-T    | -           | :37     | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 4:33            | 716               | 99           |
|                                             | HMSC-58970-R    | -           | 1:04    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 5:00            | 716               | 99           |
|                                             | HMTS-58969-T    | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99           |
|                                             | HMTS-58969-R    | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99           |
| Huntsville                                  | GALA-3079-T     | -           | 2:51    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 6:47            | 716               | 99           |
|                                             | GALA-3079-R     | -           | 2:51    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 6:47            | 716               | 99           |
|                                             | GALA-58954-T    | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99           |
|                                             | GALA-58954-R    | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99           |
| Johannesburg/<br>AADE<br>/GSFC<br><br>/LLDN | GBUR-668-T      | -           | 7:27    | -       | -         | -          | -       | 20:14     | 4:45           | 14:21    | -     | -        | 46:47           | 720               | 94           |
|                                             | GBUR-668-R      | -           | 4:25    | -       | -         | 3:05       | -       | 23:28     | -              | 12:16    | -     | -        | 43:14           | 720               | 94           |
|                                             | GBUR-3260-T     | -           | 4:43    | -       | -         | -          | 3:56    | 41:00     | 4:25           | 5:35     | -     | -        | 59:39           | 716               | 92           |
|                                             | GBUR-3260-R     | -           | 6:48    | -       | -         | :55        | 3:56    | 37:45     | 2:35           | 4:00     | -     | -        | 55:59           | 716               | 92           |
|                                             | LJOB-18-T       | -           | 4:37    | -       | -         | :52        | -       | 26:03     | 5:10           | :22      | -     | -        | 37:04           | 720               | 95           |
|                                             | LJOB-18-R       | -           | 6:06    | -       | -         | -          | -       | 26:39     | 3:20           | :07      | -     | -        | 36:12           | 720               | 95           |
|                                             | LJOB-24-T       | -           | 5:18    | -       | -         | :15        | -       | 26:34     | 3:40           | :22      | -     | -        | 36:09           | 720               | 95           |
|                                             | LJOB-24-R       | -           | 7:45    | -       | -         | :34        | -       | 28:38     | 1:35           | :07      | -     | -        | 38:39           | 720               | 95           |
|                                             | LJOB-3261-T     | -           | 3:54    | -       | -         | -          | -       | 24:59     | 3:25           | :22      | -     | -        | 32:40           | 720               | 95           |
|                                             | LJOB-3261-R     | -           | 3:34    | -       | -         | -          | -       | 25:40     | 1:35           | :07      | -     | -        | 30:56           | 720               | 96           |
| Kano/L'DN                                   | LKNO-58904-T    | -           | -       | -       | -         | -          | -       | 3:01      | :23            | -        | -     | :07      | 3:31            | 312               | 99           |
|                                             | LKNO-58904-R    | -           | :22     | -       | -         | -          | -       | 4:59      | -              | 2:00     | -     | :07      | 7:28            | 312               | 98           |
| Kauai Island                                | PHAW-58839/12-T | -           | 2:40    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 6:36            | 715               | 99           |
|                                             | PHAW-58839/12-R | -           | 2:25    | -       | -         | -          | 4:29    | -         | -              | -        | -     | -        | 6:54            | 715               | 99           |

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TABLE 2 (Continued)

| STATION      | CIRCUIT         | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL LOST TIME | SCHED OPER. HOURS | RELIA-BILITY |    |
|--------------|-----------------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-----------------|-------------------|--------------|----|
| Kauai Island | PHAW-58917/15-T | -           | 2:40    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 6:36            | 715               | 99           |    |
|              | PHAW-58917/15-R | -           | 2:25    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 6:21            | 715               | 99           |    |
| Lima         | GAPU-58856-T    | :20         | 1:51    | -       | -         | -          | 6:31    | 1:01      | 4:20           | -        | -     | -        | 14:03           | 716               | 98           |    |
|              | GAPU-58856-R    | -           | 2:16    | -       | -         | 1:17       | 6:31    | 3:11      | -              | 3:23     | -     | 4:54     | 21:32           | 716               | 97           |    |
| London       | LLDN-3261-T     | -           | 1:03    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 4:59            | 716               | 99           |    |
|              | LLDN-3261-R     | -           | 1:03    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 4:59            | 716               | 99           |    |
|              | LLDN-3262-T     | -           | :20     | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 4:16            | 716               | 99           |    |
|              | LLDN-3262-R     | -           | :20     | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 4:16            | 716               | 99           |    |
|              | LLDN-58903-T    | -           | :30     | -       | -         | -          | 6:11    | -         | -              | -        | -     | -        | 6:41            | 709               | 99           |    |
|              | LLDN-58903-R    | -           | :30     | -       | -         | -          | 4:46    | -         | -              | -        | -     | -        | 5:16            | 709               | 99           |    |
|              | LLDN-58904-T    | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99           |    |
|              | LLDN-58904-R    | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99           |    |
|              | LLDN-58905-T    | -           | 1:03    | :07     | -         | -          | 4:06    | -         | -              | -        | -     | -        | 5:16            | 716               | 99           |    |
|              | LLDN-58905-R    | -           | 1:03    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 4:59            | 716               | 99           |    |
|              | LLDN-58953-T    | -           | -       | -       | -         | -          | 4:36    | -         | -              | -        | -     | -        | 4:36            | 716               | 99           |    |
|              | LLDN-58953-R    | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99           |    |
|              | LLDN-58993-T    | -           | :30     | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 4:26            | 716               | 99           |    |
|              | LLDN-58993-R    | -           | :30     | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 4:26            | 716               | 99           |    |
|              | Madrid/GSFC     | LRID-3263-T | :05     | 1:36    | -         | -          | -       | 3:53      | 6:32           | :15      | 1:22  | -        | -               | 13:43             | 669          | 98 |
|              |                 | LRID-3263-R | :05     | :41     | :11       | -          | -       | 3:53      | 6:30           | :15      | 1:22  | -        | -               | 12:57             | 669          | 98 |
| Madrid/LLDN  | LRID-7-T        | :04         | 1:43    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:47            | 673               | 100          |    |
|              | LRID-7-R        | -           | 2:05    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2:05            | 673               | 100          |    |
|              | LRID-8-T        | :04         | 16:08   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 16:12           | 673               | 98           |    |
|              | LRID-8-R        | -           | 1:48    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:48            | 673               | 100          |    |
|              | LRID-9-T        | :08         | 1:17    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:25            | 673               | 100          |    |
|              | LRID-9-R        | :04         | 2:32    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2:36            | 673               | 100          |    |
|              | LRID-10-T       | :08         | 3:35    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3:43            | 673               | 99           |    |
|              | LRID-10-R       | :04         | 2:34    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2:38            | 673               | 100          |    |
|              | LRID-11-T       | :02         | 2:11    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2:13            | 673               | 100          |    |
|              | LRID-11-R       | -           | 3:00    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3:00            | 673               | 100          |    |
|              | LRID-13-T       | :02         | 7:36    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 7:30            | 673               | 99           |    |
|              | LRID-13-R       | :12         | 2:01    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2:13            | 673               | 100          |    |
|              | LRID-14-T       | -           | 3:02    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3:02            | 673               | 100          |    |
|              | LRID-14-R       | :12         | 1:34    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:46            | 673               | 100          |    |
| Pasadena     | LRID-16-T       | :08         | :33     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :46             | 673               | 100          |    |
|              | LRID-16-R       | :04         | 1:21    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:25            | 673               | 100          |    |
|              | JJPL-3006-T     | -           | :20     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :20             | 720               | 100          |    |
|              | JJPL-3006-R     | -           | :20     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :20             | 720               | 100          |    |

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TABLE 2 (Continued)

| STATION         | CIRCUIT      | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FERENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL LOST TIME | SCHED OPER. HOURS | RELIABILITY |     |
|-----------------|--------------|-------------|---------|---------|-----------|------------|---------|-----------|---------------|----------|-------|----------|-----------------|-------------------|-------------|-----|
| Pasadena        | JJPL-3007-T  | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | :00             | 720               | 100         |     |
|                 | JJPL-3007-R  | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | :00             | 720               | 100         |     |
|                 | JJPL-3008-T  | -           | 1:52    | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1:52            | 720               | 100         |     |
|                 | JJPL-3008-R  | -           | 1:52    | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1:52            | 720               | 100         |     |
|                 | JJPL-3009-T  | -           | 1:18    | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1:18            | 720               | 100         |     |
|                 | JJPL-3009-R  | -           | 1:18    | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1:18            | 720               | 100         |     |
|                 | JJPL-58831-T | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :00               | 720         | 100 |
|                 | JJPL-58831-R | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :00               | 720         | 100 |
|                 | JJPL-58858-T | -           | :10     | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :10               | 720         | 100 |
|                 | JJPL-58858-R | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :00               | 720         | 100 |
|                 | JJPL-58859-T | -           | :25     | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :25               | 720         | 100 |
|                 | JJPL-58859-R | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :00               | 720         | 100 |
|                 | JJPL-58860-T | -           | :02     | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :02               | 720         | 100 |
|                 | JJPL-58860-R | -           | :11     | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :11               | 720         | 100 |
|                 | JJPL-58861-T | -           | :31     | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :31               | 720         | 100 |
|                 | JJPL-58861-R | -           | :31     | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :31               | 720         | 100 |
|                 | JJPL-58862-T | -           | :31     | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :31               | 720         | 100 |
|                 | JJPL-58862-R | -           | :22     | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :22               | 720         | 100 |
|                 | JJPL-58863-T | -           | :02     | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :02               | 720         | 100 |
|                 | JJPL-58863-R | -           | :02     | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :02               | 720         | 100 |
|                 | JJPL-58921-T | -           | :02     | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :02               | 720         | 100 |
|                 | JJPL-58921-R | -           | :11     | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :11               | 720         | 100 |
|                 | JJPL-58925-T | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :00               | 719         | 100 |
|                 | JJPL-58925-R | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :00               | 719         | 100 |
|                 | JJPL-58926-T | -           | :02     | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :02               | 719         | 100 |
|                 | JJPL-58926-R | -           | :11     | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :11               | 719         | 100 |
|                 | JJPL-58927-T | -           | :02     | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :02               | 719         | 100 |
|                 | JJPL-58927-R | -           | :11     | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :11               | 719         | 100 |
|                 | JJPL-58928-T | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :00               | 719         | 100 |
|                 | JJPL-58928-R | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :00               | 719         | 100 |
|                 | JJPL-58929-T | -           | :02     | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :02               | 719         | 100 |
|                 | JJPL-58929-R | -           | :11     | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :11               | 719         | 100 |
|                 | JJPL-58983-T | -           | :02     | -       | -         | -          | -       | -         | -             | -        | -     | -        | -               | :02               | 720         | 100 |
| JJPL-58983-R    | -            | :11         | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | :11             | 720               | 100         |     |
| JJPL-58984-T    | -            | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | :00             | 720               | 100         |     |
| JJPL-58984-R    | -            | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | :00             | 720               | 100         |     |
| Point Argueillo | GCAL-58922-T | -           | :09     | -       | -         | -          | 1:23    | -         | -             | -        | -     | -        | 1:32            | 470               | 100         |     |
|                 | GCAL-58922-R | -           | -       | -       | -         | :20        | 1:23    | -         | -             | -        | -     | -        | 1:43            | 470               | 100         |     |

TABLE 2 (Continued)

| STATION             | CIRCUIT        | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL LOST TIME | SCHED OPER. HOURS | RELIABILITY |
|---------------------|----------------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-----------------|-------------------|-------------|
| Point Arguello      | GRGO-58920-T   | -           | -       | -       | -         | -          | 1:23    | -         | -              | -        | -     | -        | 1:23            | 470               | 100         |
|                     | GRGO-58920-R   | -           | -       | -       | -         | -          | 1:23    | -         | -              | -        | -     | -        | 1:23            | 470               | 100         |
| Princeton           | GHNJ-3300-T    | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99          |
|                     | GHNJ-3300-R    | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99          |
| Quito               | GJPC-3258-T    | -           | :20     | -       | -         | -          | 3:56    | 4:10      | :35            | -        | -     | -        | 9:01            | 712               | 99          |
|                     | GJPC-3258-R    | -           | :30     | -       | :11       | 1:46       | 3:56    | 5:18      | :35            | 2:35     | -     | -        | 14:51           | 712               | 98          |
|                     | GQUI-3259-T    | -           | :20     | -       | -         | -          | 4:01    | 4:27      | 1:20           | :15      | -     | -        | 10:23           | 712               | 99          |
|                     | GQUI-3259-R    | -           | :20     | -       | :11       | 2:01       | 3:56    | 5:10      | :59            | 2:45     | -     | -        | 15:22           | 712               | 98          |
| Rosman              | GNAT-3317-T    | -           | 1:10    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 5:06            | 716               | 99          |
|                     | GNAT-3317-R    | -           | 5:50    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 9:46            | 716               | 99          |
|                     | GROS-3307-T    | -           | 2:40    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 6:36            | 716               | 99          |
|                     | GROS-3307-R    | -           | 2:40    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 6:36            | 716               | 99          |
|                     | GRST-3316-T    | -           | 9:22    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 13:18           | 716               | 98          |
|                     | GRST-3316-R    | -           | 7:34    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 11:30           | 716               | 98          |
| St. John's          | GFLD-3250-T    | -           | 5:05    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 9:01            | 716               | 99          |
|                     | GFLD-3250-R    | -           | 4:15    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 8:11            | 716               | 99          |
| Santiago            | GAGO-3256-T    | -           | 3:53    | -       | -         | -          | 4:31    | 1:19      | -              | -        | -     | -        | 9:43            | 716               | 99          |
|                     | GAGO-3256-R    | -           | 5:00    | :04     | -         | 2:19       | 4:31    | 10:58     | :43            | 4:42     | -     | -        | 28:17           | 716               | 96          |
|                     | GEDS-3255-T    | -           | 2:53    | -       | -         | -          | 3:56    | 1:19      | :04            | -        | -     | -        | 8:12            | 716               | 99          |
|                     | GEDS-3255-R    | -           | 6:38    | :04     | -         | 2:54       | 3:56    | 13:26     | :43            | 4:27     | -     | -        | 32:08           | 716               | 96          |
| Tananarive/<br>LLDN | LTAN-1-T       | :05         | 20:14   | -       | -         | :05        | -       | 1:28      | -              | :39      | -     | :05      | 22:36           | 720               | 97          |
|                     | LTAN-1-R       | -           | 4:11    | -       | -         | :05        | -       | 2:04      | -              | :39      | -     | :05      | 7:04            | 720               | 99          |
| Toowoomba/<br>ACSW  | ACBY-471-T     | -           | 1:24    | -       | -         | :10        | -       | -         | -              | -        | -     | -        | 1:34            | 696               | 100         |
|                     | ACBY-471-R     | -           | :24     | -       | -         | :10        | -       | -         | -              | -        | -     | -        | :34             | 696               | 100         |
|                     | ACBY-472-T     | -           | :50     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :50             | 696               | 100         |
|                     | ACBY-472-R     | -           | :50     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :50             | 696               | 100         |
| Wallops Island      | GWAB-3305-T    | -           | -       | -       | -         | -          | 1:20    | -         | -              | -        | -     | -        | 1:20            | 478               | 100         |
|                     | GWAB-3314-R    | -           | -       | -       | -         | -          | 1:20    | -         | -              | -        | -     | -        | 1:20            | 478               | 100         |
|                     | GWAC-3312-R    | -           | -       | -       | -         | -          | 1:20    | -         | -              | -        | -     | -        | 1:20            | 478               | 100         |
|                     | GWAC-3313-R    | -           | -       | -       | -         | -          | 1:20    | -         | -              | -        | -     | -        | 1:20            | 478               | 100         |
|                     | GWGE-3303-T    | -           | -       | -       | -         | -          | 1:20    | -         | -              | -        | -     | -        | 1:20            | 478               | 100         |
|                     | GWGE-3303-R    | -           | -       | -       | -         | -          | 1:20    | -         | -              | -        | -     | -        | 1:20            | 478               | 100         |
| Washington          | NASA-HQ-3309-T | -           | -       | -       | -         | -          | 1:18    | -         | -              | -        | -     | -        | 1:18            | 158               | 99          |
|                     | NASA-HQ-3309-R | -           | -       | -       | -         | -          | 1:18    | -         | -              | -        | -     | -        | 1:18            | 158               | 99          |
| White Sands         | GWHS-58909-T   | -           | :20     | -       | -         | -          | 1:27    | -         | -              | -        | -     | -        | 1:47            | 368               | 100         |
|                     | GWHS-58909-R   | -           | :23     | -       | -         | -          | 1:27    | -         | -              | -        | -     | -        | 1:50            | 368               | 100         |

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TABLE 2 (Continued)

| STATION                  | CIRCUIT          | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL LOST TIME | SCHE OPER. HOURS | RELIABILITY |
|--------------------------|------------------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-----------------|------------------|-------------|
| Winkfield/LLDN           | LWNK-58903-T     | -           | : 10    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 57            | 720              | 100         |
|                          | LWNK-58903-R     | -           | : 10    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 10            | 720              | 100         |
| Woomera                  | AOMJ-561-T       | -           | 1: 28   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1: 28           | 720              | 109         |
|                          | AOMJ-561-R       | -           | : 13    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 13            | 720              | 100         |
|                          | AOMJ-562-T       | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 720              | 100         |
|                          | AOMJ-562-R       | -           | : 13    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 13            | 720              | 100         |
|                          | AOMJ-563-T       | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 720              | 100         |
|                          | AOMJ-563-R       | -           | 2: 22   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2: 22           | 720              | 100         |
|                          | AOMJ-564-T       | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 720              | 100         |
|                          | AOMJ-564-R       | -           | : 13    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 13            | 720              | 100         |
| SHIP STATIONS:           |                  |             |         |         |           |            |         |           |                |          |       |          |                 |                  |             |
| Coastal Sentry/<br>Perth | MCSQ-58832/661-T | -           | 2: 00   | -       | -         | -          | : 17    | 20: 05    | 9: 32          | : 15     | -     | : 15     | 32: 24          | 319              | 90          |
|                          | MCSQ-58832/661-R | -           | 1: 22   | -       | -         | -          | : 17    | 7: 22     | 4: 30          | -        | -     | : 15     | 13: 46          | 319              | 96          |
|                          | MCSQ-58833/662-T | -           | -       | -       | -         | -          | : 17    | 10: 20    | 7: 45          | : 21     | -     | -        | 18: 43          | 319              | 94          |
|                          | MCSQ-58833/662-R | : 07        | 1: 12   | -       | -         | -          | : 17    | 9: 35     | 4: 01          | -        | -     | -        | 15: 12          | 319              | 95          |
| /Guam                    | MCSQ-58988/60-T  | -           | -       | -       | -         | -          | : 17    | 22: 11    | 6: 26          | : 15     | -     | : 15     | 29: 24          | 319              | 97          |
|                          | MCSQ-58988/60-R  | -           | : 19    | -       | -         | : 01       | : 17    | 9: 24     | 1: 09          | : 05     | -     | : 15     | 11: 30          | 319              | 96          |
|                          | MCSQ-58989/67-T  | -           | : 15    | -       | -         | -          | : 17    | 11: 17    | 3: 03          | : 21     | -     | -        | 15: 13          | 319              | 95          |
|                          | MCSQ-58989/67-R  | -           | : 34    | -       | -         | : 01       | : 17    | 6: 34     | : 19           | : 05     | -     | -        | 7: 50           | 319              | 98          |
| /Japan                   | MCSQ-58988/73-T  | -           | 2: 53   | -       | -         | 1: 57      | : 17    | 21: 02    | 15: 22         | -        | -     | : 15     | 41: 46          | 319              | 87          |
|                          | MCSQ-58988/73-R  | -           | 1: 07   | -       | -         | : 05       | : 17    | 8: 20     | 1: 30          | : 08     | -     | : 15     | 11: 42          | 319              | 96          |
|                          | MCSQ-58989/74-T  | -           | : 15    | -       | -         | -          | : 17    | 10: 31    | 4: 40          | -        | -     | -        | 15: 43          | 319              | 95          |
|                          | MCSQ-58989/74-R  | -           | 1: 57   | -       | -         | -          | : 17    | 5: 06     | -              | : 08     | -     | -        | 7: 28           | 319              | 98          |
| Rose Knot/<br>New York   | MRKV-58834-T     | -           | : 50    | -       | -         | -          | : 07    | 10: 05    | 6: 44          | : 15     | -     | -        | 18: 01          | 244              | 93          |
|                          | MRKV-58834-R     | -           | : 28    | -       | -         | -          | : 07    | 16: 11    | 11: 29         | : 24     | -     | -        | 28: 39          | 244              | 88          |
|                          | MRKV-58835-T     | -           | -       | -       | -         | -          | : 07    | 4: 37     | 6: 19          | -        | -     | -        | 11: 03          | 244              | 95          |
|                          | MRKV-58835-R     | -           | : 28    | -       | -         | -          | : 07    | 12: 03    | 10: 52         | : 24     | -     | -        | 23: 54          | 244              | 90          |
| /ETR                     | MRKV-58836-T     | : 05        | -       | -       | -         | -          | : 07    | 4: 15     | 3: 44          | : 10     | -     | -        | 8: 21           | 244              | 97          |
|                          | MRKV-58836-R     | -           | 15: 19  | -       | -         | 1: 36      | : 07    | 48: 01    | 6: 19          | 1: 01    | -     | -        | 72: 14          | 244              | 70          |
|                          | MRKV-58837-T     | -           | -       | -       | -         | -          | : 07    | 1: 12     | 3: 19          | : 10     | -     | -        | 4: 48           | 244              | 98          |
|                          | MRKV-58837-R     | -           | -       | -       | -         | : 06       | : 07    | 34: 26    | 6: 44          | 1: 01    | -     | -        | 42: 24          | 244              | 83          |
| Wheeling                 | MVHE-58916/38-T  | -           | : 07    | -       | -         | 1: 26      | : 17    | 2: 59     | -              | : 30     | -     | : 04     | 5: 23           | 334              | 98          |
|                          | MVHE-58916/38-R  | -           | -       | -       | -         | 1: 10      | : 17    | 3: 57     | -              | -        | -     | : 10     | 5: 34           | 334              | 98          |
| TOTALS                   |                  | 2: 07       | 603: 35 | 8: 54   | : 22      | 48: 21     | 569: 51 | 705: 52   | 154: 44        | 73: 45   | 6: 17 | 12: 21   | 2, 186: 09      | 200, 748         | 99          |

TABLE 3

Teletype Circuit Interruptions by Trouble Categories and Average Durations

| STATION        | CIRCUIT      | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FERENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL INTERRUPTION | *AVG DURATION |
|----------------|--------------|-------------|---------|---------|-----------|------------|---------|-----------|---------------|----------|-------|----------|--------------------|---------------|
| Adelaide/ACSW  | AADE-561-T   | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1                  | :22           |
|                | AADE-561-R   | -           | 6       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 6                  | :15           |
|                | AADE-562-T   | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1                  | :22           |
|                | AADE-562-R   | -           | 6       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 6                  | :15           |
|                | AADE-563-T   | -           | 2       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 2                  | :15           |
|                | AADE-563-R   | -           | 7       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 7                  | :14           |
|                | AADE-564-T   | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1                  | :22           |
|                | AADE-564-R   | -           | 6       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 6                  | :15           |
|                | AADE-565-T   | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1                  | :22           |
|                | AADE-565-R   | -           | 6       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 6                  | :15           |
|                | AADE-566-T   | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1                  | :22           |
|                | AADE-566-R   | -           | 6       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 6                  | :15           |
|                | AADE-581-T   | -           | 2       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 2                  | :15           |
|                | AADE-581-R   | -           | 2       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 2                  | :15           |
|                | AADE-582-T   | -           | 3       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 3                  | :12           |
|                | AADE-582-R   | -           | 5       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 5                  | :15           |
|                | AADE-583-T   | -           | 2       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 2                  | :15           |
|                | AADE-583-R   | -           | 3       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 3                  | :16           |
|                | AADE-584-T   | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1                  | :22           |
|                | AADE-584-R   | -           | 2       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 2                  | :14           |
| AADE-585-T     | -            | 2           | -       | -       | -         | -          | -       | -         | -             | -        | -     | 2        | :15                |               |
| AADE-585-R     | -            | 1           | -       | -       | -         | -          | -       | -         | -             | -        | -     | 1        | :22                |               |
| Ascension      | GSEN-58877-T | -           | 2       | 2       | -         | 3          | 10      | 31        | -             | 4        | 1     | 4        | 57                 | :57           |
| Island         | GSEN-58877-R | -           | 2       | 2       | -         | 5          | 10      | 28        | -             | 3        | -     | 3        | 53                 | :37           |
| Barstow        | GATS-3005-T  | -           | 4       | -       | -         | 2          | 22      | -         | -             | -        | -     | -        | 28                 | :42           |
|                | GATS-3005-R  | -           | 4       | -       | -         | 1          | 22      | -         | -             | -        | -     | -        | 27                 | :41           |
|                | GAVE-3001-T  | -           | 3       | -       | -         | 1          | 22      | -         | -             | -        | -     | -        | 26                 | :30           |
|                | GAVE-3001-R  | -           | 5       | -       | -         | 1          | 22      | -         | -             | -        | -     | -        | 28                 | :31           |
| Bermuda Island | GBDA-58901-T | -           | -       | -       | -         | 1          | 12      | -         | -             | -        | -     | -        | 13                 | :19           |
|                | GBDA-58901-R | -           | -       | -       | -         | 2          | 12      | -         | -             | -        | -     | -        | 14                 | :29           |
|                | GBDA-58902-T | -           | -       | -       | -         | 1          | 12      | -         | -             | -        | -     | -        | 13                 | :19           |
|                | GBDA-58902-R | -           | 2       | -       | -         | 2          | 12      | -         | -             | -        | -     | -        | 16                 | 1:23          |
| Cambridge      | GSAO-3308-T  | -           | 6       | -       | -         | -          | 23      | -         | -             | -        | 1     | -        | 30                 | :29           |
|                | GSAO-3308-R  | -           | 6       | -       | -         | -          | 22      | -         | -             | -        | 1     | -        | 29                 | :23           |
| Canberra/GSFC  | ACSW-3050-T  | -           | 5       | 1       | -         | -          | 22      | -         | -             | -        | -     | -        | 28                 | :21           |
|                | ACSW-3050-R  | -           | 11      | 1       | -         | -          | 22      | -         | -             | -        | -     | -        | 34                 | :21           |

\*Average duration of interruptions to the nearest minute for November 1966.

TABLE 3 (Continued)

| STATION       | CIRCUIT         | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL INTER-RUPTION | *AVG DURA-TION |     |
|---------------|-----------------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|---------------------|----------------|-----|
| Canberra/GSFC | ACSW-3051-T     | -           | 11      | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 33                  | :19            |     |
|               | ACSW-3051-R     | -           | 12      | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 34                  | :24            |     |
|               | ACSW-3052-T     | -           | 4       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 26                  | :17            |     |
|               | ACSW-3052-R     | -           | 5       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 27                  | :16            |     |
|               | ACSW-3057-T     | -           | 3       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 25                  | :13            |     |
|               | ACSW-3057-R     | -           | -       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 22                  | :11            |     |
|               | ACSW-58833-T    | -           | 2       | -       | -         | -          | 6       | -         | -              | -        | -     | -        | 8                   | :20            |     |
|               | ACSW-58833-R    | -           | 1       | -       | -         | -          | 6       | -         | -              | -        | -     | -        | 7                   | :22            |     |
|               | ACSW-58887-T    | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | :45            |     |
|               | ACSW-58887-R    | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2                   | :32            |     |
|               | ACSW-58888-T    | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2                   | :33            |     |
|               | ACSW-58888-R    | -           | 3       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3                   | :27            |     |
|               | ACSW-58913-T    | -           | 7       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 7                   | :27            |     |
|               | ACSW-58913-R    | -           | 8       | -       | -         | -          | 1       | -         | -              | -        | -     | -        | 9                   | :28            |     |
|               | ACSW-58918-T    | -           | 1       | -       | -         | -          | -       | 22        | -              | -        | -     | -        | 23                  | :12            |     |
|               | ACSW-58918-R    | -           | 2       | -       | -         | -          | -       | 22        | -              | -        | -     | -        | 24                  | :13            |     |
|               | ACSW-58932-T    | -           | 3       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3                   | :38            |     |
|               | ACSW-58932-R    | -           | 4       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 4                   | 1:59           |     |
|               | ACSW-58933-T    | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | :45            |     |
|               | ACSW-58933-R    | -           | 6       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 6                   | 2:16           |     |
|               | ACSW-58934-T    | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | :45            |     |
|               | ACSW-58934-R    | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | :45            |     |
|               | ACSW-58956-T    | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | :45            |     |
|               | ACSW-58956-R    | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2                   | :33            |     |
|               | Canberra/ACSW   | AACT-271-T  | -       | 1       | -         | -          | 2       | -         | -              | -        | -     | -        | -                   | 3              | :22 |
|               |                 | AACT-271-R  | -       | 1       | -         | -          | 1       | -         | -              | -        | -     | -        | -                   | 2              | :26 |
|               |                 | AACT-272-T  | -       | 1       | -         | -          | 1       | -         | -              | -        | -     | -        | -                   | 2              | :26 |
| AACT-272-R    |                 | -           | 1       | -       | -         | 1          | -       | -         | -              | -        | -     | -        | 2                   | :26            |     |
| ACNB-281-T    |                 | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | :25            |     |
| ACNB-281-R    |                 | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | :25            |     |
| ANBE-261-T    |                 | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | 3:42           |     |
| ANBE-261-R    |                 | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | 3:42           |     |
| ANBE-263-T    |                 | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2                   | 1:10           |     |
| ANBE-263-R    |                 | -           | -       | -       | -         | 1          | -       | -         | -              | -        | -     | -        | 1                   | :27            |     |
| Canton Island | PCTN-58916/14-T | -           | -       | -       | -         | -          | 13      | -         | -              | -        | -     | -        | 13                  | :15            |     |
|               | PCTN-58916/14-R | -           | 1       | -       | -         | -          | 12      | 1         | -              | 1        | -     | -        | 15                  | :16            |     |
| Cape Kennedy  | GCVN-58949-T    | -           | 3       | -       | -         | -          | 19      | -         | -              | -        | -     | -        | 22                  | :12            |     |
|               | GCVN-58949-R    | -           | 3       | -       | -         | -          | 19      | -         | -              | -        | -     | -        | 22                  | :12            |     |

\*Average duration of interruptions to the nearest minute for November 1966.

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TABLE 3 (Continued)

| STATION        | CIRCUIT      | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FERENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL INTERRUPTION | *AVG DURATION |     |
|----------------|--------------|-------------|---------|---------|-----------|------------|---------|-----------|---------------|----------|-------|----------|--------------------|---------------|-----|
| Cape Kennedy   | GCPN-58940-T | -           | 2       | -       | -         | -          | 19      | -         | -             | -        | -     | -        | 21                 | :13           |     |
|                | GCPN-58940-R | -           | 2       | -       | -         | -          | 19      | -         | -             | -        | -     | -        | 21                 | :13           |     |
|                | GKAF-58938-T | -           | 3       | -       | -         | -          | 19      | -         | -             | -        | -     | -        | 22                 | :22           |     |
|                | GKAP-58938-R | -           | 3       | -       | -         | -          | 19      | -         | -             | -        | -     | -        | 22                 | :22           |     |
|                | GKEN-58935-T | -           | 3       | -       | -         | -          | 19      | -         | -             | -        | -     | -        | 22                 | :22           |     |
|                | GKEN-58935-R | -           | 3       | -       | -         | -          | 19      | -         | -             | -        | -     | -        | 22                 | :22           |     |
|                | GMCC-58936-T | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -                  | 0             | :00 |
|                | GMCC-58936-R | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -                  | 0             | :00 |
|                | GMCC-58943-T | -           | 3       | -       | -         | -          | 19      | -         | -             | -        | -     | -        | -                  | 22            | :22 |
|                | GMCC-58943-R | -           | 3       | -       | -         | -          | 19      | -         | -             | -        | -     | -        | -                  | 22            | :22 |
|                | GMCC-58944-T | -           | 3       | -       | -         | -          | 19      | -         | -             | -        | -     | -        | -                  | 22            | :22 |
|                | GMCC-58944-R | -           | 3       | -       | -         | -          | 19      | -         | -             | -        | -     | -        | -                  | 22            | :22 |
|                | GMCC-58945-T | -           | 4       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -                  | 4             | :13 |
|                | GMCC-58945-R | -           | 4       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -                  | 4             | :11 |
|                | GMCC-58947-T | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -                  | 0             | :00 |
|                | GMCC-58947-R | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -                  | 0             | :00 |
|                | GMCC-58948-T | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -                  | 0             | :00 |
|                | GMCC-58948-R | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | -                  | 0             | :00 |
|                | GMIL-58950-T | -           | -       | -       | -         | -          | -       | 19        | -             | -        | -     | -        | -                  | 19            | :12 |
|                | GMIL-58950-R | -           | -       | -       | -         | -          | -       | 19        | -             | -        | -     | -        | -                  | 19            | :12 |
|                | GMIL-58951-T | -           | -       | -       | -         | -          | -       | 19        | -             | -        | -     | -        | -                  | 19            | :12 |
|                | GMIL-58951-R | -           | -       | 2       | -         | -          | -       | 19        | -             | -        | -     | -        | -                  | 21            | :22 |
|                | GMPA-58941-T | -           | -       | 3       | -         | -          | -       | 19        | -             | -        | -     | -        | -                  | 22            | :22 |
|                | GMPA-58941-R | -           | -       | 3       | -         | -          | -       | 19        | -             | -        | -     | -        | -                  | 22            | :22 |
|                | GPVE-58942-T | -           | -       | -       | -         | -          | -       | 19        | -             | -        | -     | -        | -                  | 19            | :12 |
|                | GPVE-58942-R | -           | -       | -       | -         | -          | -       | 19        | -             | -        | -     | -        | -                  | 19            | :12 |
|                | JCAP-58937-T | -           | -       | 3       | -         | -          | -       | -         | -             | -        | -     | -        | -                  | 3             | :15 |
|                | JCAP-58937-R | -           | -       | 3       | -         | -          | -       | -         | -             | -        | -     | -        | -                  | 3             | :15 |
| Carnarvon/AADE | ACRO-663-T   | -           | 8       | -       | -         | 1          | -       | -         | -             | -        | -     | -        | 9                  | :47           |     |
|                | ACRO-663-R   | -           | 6       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 6                  | :36           |     |
|                | ACRO-664-T   | -           | 10      | -       | -         | -          | -       | -         | -             | -        | -     | -        | 10                 | :32           |     |
|                | ACRO-664-R   | -           | 7       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 7                  | :33           |     |
| College        | GLGE-58931-T | -           | 1       | -       | -         | -          | 23      | -         | -             | -        | -     | -        | 24                 | :21           |     |
|                | GLGE-58931-R | -           | 1       | -       | -         | -          | 23      | -         | -             | -        | -     | -        | 24                 | :21           |     |
| Corpus Christi | GTEX-58906-T | -           | -       | -       | -         | -          | 13      | -         | -             | -        | -     | -        | 13                 | :12           |     |
|                | GTEX-58906-R | -           | -       | -       | -         | -          | 13      | -         | -             | -        | -     | -        | 13                 | :12           |     |
|                | GTEX-58907-T | -           | 2       | -       | -         | -          | 13      | -         | -             | -        | -     | -        | 15                 | :13           |     |
|                | GTEX-58907-R | -           | 1       | -       | -         | -          | 13      | -         | -             | -        | -     | -        | 14                 | :13           |     |

\*Average duration of interruptions to the nearest minutes for November 1966.

TABLE 3 (Continued)

| STATION                  | CIRCUIT            | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL INTER-RUPTION | *AVG DURA-TION |
|--------------------------|--------------------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|---------------------|----------------|
| Eglin Air Force Base     | GEGL-58908-T       | -           | -       | -       | -         | -          | 17      | -         | -              | -        | -     | -        | 17                  | :10            |
|                          | GEGL-58908-R       | -           | 2       | -       | -         | 3          | 17      | -         | -              | -        | -     | -        | 22                  | :21            |
| Fort Myers               | GYRS-3302-T        | -           | 3       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 25                  | :12            |
|                          | GYRS-3302-R        | -           | 4       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 26                  | :12            |
| Gilmore Creek            | GMOR-3077-T        | -           | 11      | -       | -         | 1          | 22      | -         | -              | -        | -     | -        | 34                  | :27            |
|                          | GMOR-3077-R        | -           | 7       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 29                  | :29            |
|                          | GULA-58930-T       | -           | 4       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 26                  | :22            |
| Goldstone                | ~ULA-58930-R       | -           | 2       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 24                  | :20            |
|                          | JGLD-3002/TK-1/8-T | -           | 4       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 26                  | :31            |
|                          | JGLD-3002/TK-1/8-R | -           | 3       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 25                  | :16            |
|                          | JGLD-58867-T       | -           | -       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 22                  | :11            |
|                          | JGLD-58867-R       | -           | -       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 22                  | :11            |
|                          | JGLD-58868-T       | -           | -       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 22                  | :11            |
|                          | JGLD-58868-R       | -           | -       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 22                  | :11            |
| Grand Canary Island/LLDN | LCYI-58905-T       | -           | 3       | -       | -         | -          | -       | -         | -              | 1        | 1     | -        | 5                   | :23            |
|                          | LCYI-58905-R       | -           | 4       | -       | -         | 1          | -       | 4         | 1              | 8        | 1     | -        | 19                  | :23            |
| /Madrid                  | LCYI-58953-T       | -           | 7       | -       | -         | -          | -       | 1         | -              | -        | 1     | -        | 9                   | 2:16           |
|                          | LCYI-58953-R       | -           | 1       | -       | -         | 1          | -       | 3         | -              | 8        | 1     | -        | 14                  | :15            |
|                          | LCYI-20-T          | 2           | 3       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 5                   | :16            |
| Guam                     | LCYI-20-R          | 1           | 8       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 9                   | :48            |
|                          | PGWM-58960/73-T    | -           | 2       | -       | -         | -          | 8       | -         | -              | -        | -     | -        | 10                  | :14            |
| Guaymas                  | PGWM-58960/73-R    | -           | 3       | -       | -         | -          | 8       | -         | -              | -        | -     | -        | 11                  | :13            |
|                          | PGWM-58975/91-T    | -           | 3       | -       | -         | -          | 8       | -         | -              | -        | -     | -        | 11                  | :16            |
|                          | PGWM-58975/91-R    | -           | 4       | -       | -         | -          | 8       | -         | -              | -        | -     | -        | 12                  | :18            |
|                          | GGYM-58910-T       | -           | 7       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 29                  | :14            |
| Houston                  | GGYM-58910-R       | -           | 7       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 29                  | :14            |
|                          | GGYM-58911-T       | -           | 6       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 28                  | :13            |
|                          | GGYM-58911-R       | -           | 6       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 28                  | :13            |
|                          | HDMA-58961-T       | -           | 2       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 24                  | :11            |
|                          | HDMA-58961-R       | -           | 2       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 24                  | :13            |
|                          | HDMA-58962-T       | -           | 1       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 23                  | :16            |
|                          | HDMA-58962-R       | -           | 1       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 23                  | :11            |
|                          | HDMA-58963-T       | -           | -       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 22                  | :11            |
|                          | HDMA-58963-R       | -           | 2       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 24                  | :11            |
|                          | HDMA-58964-T       | -           | -       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 22                  | :11            |
| HDMA-58964-R             | -                  | 1           | -       | -       | -         | 22         | -       | -         | -              | -        | -     | 23       | :11                 |                |
| HDMA-58965-T             | -                  | -           | -       | -       | -         | 22         | -       | -         | -              | -        | -     | 22       | :11                 |                |
| HDMA-58965-R             | -                  | -           | -       | -       | -         | 22         | -       | -         | -              | -        | -     | 22       | :11                 |                |

\*Average duration of interruptions to the nearest minute for October 1966.

TABLE 3 (Continued)

| STATION                                 | CIRCUIT         | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL INTER-RUPTION | *AVG DURA-TION |
|-----------------------------------------|-----------------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|---------------------|----------------|
| Houston                                 | HDMA-58971-T    | -           | -       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 22                  | :11            |
|                                         | HDMA-58971-R    | -           | 1       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 23                  | :11            |
|                                         | HDMA-58972-T    | -           | 4       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 26                  | :18            |
|                                         | HDMA-58972-R    | -           | 2       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 24                  | :13            |
|                                         | HMSC-58959-T    | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2                   | :19            |
|                                         | HMSC-58959-R    | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | :44            |
|                                         | HMSC-58966-T    | -           | -       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 22                  | :11            |
|                                         | HMSC-58966-R    | -           | 1       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 23                  | :11            |
|                                         | HMSC-58967-T    | -           | -       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 22                  | :11            |
|                                         | HMSC-58967-R    | -           | -       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 22                  | :11            |
|                                         | HMSC-58968-T    | -           | -       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 22                  | :11            |
|                                         | HMSC-58968-R    | -           | -       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 22                  | :11            |
|                                         | HMSC-58970-T    | -           | 2       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 24                  | :11            |
|                                         | HMSC-58970-R    | -           | 2       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 24                  | :11            |
|                                         | HMTS-58969-T    | -           | -       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | -                   | 22             |
| HMTS-58969-R                            | -               | -           | -       | -       | -         | 22         | -       | -         | -              | -        | -     | -        | 22                  | :11            |
| Huntsville                              | GALA-3079-T     | -           | 2       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 24                  | :17            |
|                                         | GALA-3079-R     | -           | 2       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 24                  | :17            |
|                                         | GALA-58954-T    | -           | -       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 22                  | :11            |
| Johannesburg/<br>AADE<br>/GSFC<br>/LLDN | GALA-58954-R    | -           | -       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 22                  | :11            |
|                                         | GBUR-668-T      | -           | 11      | -       | -         | -          | -       | 22        | 1              | 14       | -     | -        | 48                  | :58            |
|                                         | GBUR-668-R      | -           | 8       | -       | -         | 1          | -       | 30        | -              | 51       | -     | -        | 90                  | :29            |
|                                         | GBUR-3260-T     | -           | 13      | -       | -         | -          | 22      | 59        | 3              | 24       | -     | -        | 121                 | :30            |
|                                         | GBUR-3260-R     | -           | 15      | -       | -         | 1          | 22      | 57        | 2              | 17       | -     | -        | 114                 | :29            |
|                                         | LJOB-18-T       | -           | 12      | -       | -         | 2          | -       | 51        | 7              | 2        | -     | -        | 74                  | :30            |
|                                         | LJOB-18-R       | -           | 15      | -       | -         | -          | -       | 52        | 5              | 1        | -     | -        | 73                  | :30            |
|                                         | LJOB-24-T       | -           | 13      | -       | -         | 1          | -       | 47        | 3              | 2        | -     | -        | 66                  | :33            |
|                                         | LJOB-24-R       | -           | 18      | -       | -         | 2          | -       | 49        | 1              | 1        | -     | -        | 71                  | :33            |
|                                         | LJOB-3261-T     | -           | 11      | -       | -         | -          | -       | 48        | 2              | 2        | -     | -        | 63                  | :31            |
| Kano/LLDN                               | LJOB-3261-R     | -           | 12      | -       | -         | -          | -       | 51        | 1              | 1        | -     | -        | 65                  | :29            |
|                                         | LKNO-58904-T    | -           | -       | -       | -         | -          | -       | 4         | 1              | -        | -     | 1        | 6                   | :35            |
| Kauai Island                            | LKNO-58904-R    | -           | 2       | -       | -         | -          | -       | 9         | -              | 7        | -     | 1        | 19                  | :24            |
|                                         | PHAW-58839/12-T | -           | 5       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 27                  | :15            |
|                                         | PHAW-58839/12-R | -           | 4       | -       | -         | -          | 23      | -         | -              | -        | -     | -        | 27                  | :15            |
|                                         | PHAW-58917/15-T | -           | 5       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 27                  | :15            |
| Lima                                    | PHAW-58917/15-R | -           | 4       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 26                  | :15            |
|                                         | GAPU-58856-T    | 1           | 1       | -       | -         | -          | 26      | 2         | 2              | -        | -     | -        | 32                  | :26            |
|                                         | GAPU-58856-R    | -           | 3       | -       | -         | 3          | 26      | 5         | -              | 12       | -     | 1        | 50                  | :26            |

\*Average duration of interruptions to the nearest minute for November 1966.

TABLE 3 (Continued)

| STATION   | CIRCUIT              | NO<br>TRBL<br>FND | COM<br>CAR | OPR<br>ERR | EQUIP<br>ADJ | EQUIP<br>FAIL | CP<br>FAIL | POOR<br>PROP | INTER-<br>FER-<br>ENCE | FREQ<br>CHG | MAINT | PWR<br>FAIL | TOTAL<br>INTER-<br>RUPTION | *AVG<br>DURA-<br>TION |     |
|-----------|----------------------|-------------------|------------|------------|--------------|---------------|------------|--------------|------------------------|-------------|-------|-------------|----------------------------|-----------------------|-----|
| London    | LLDN-3261-T          | -                 | 2          | -          | -            | -             | 22         | -            | -                      | -           | -     | -           | 24                         | :12                   |     |
|           | LLDN-3261-R          | -                 | 2          | -          | -            | -             | 22         | -            | -                      | -           | -     | -           | 24                         | :12                   |     |
|           | LLDN-3262-T          | -                 | 2          | -          | -            | -             | 22         | -            | -                      | -           | -     | -           | 24                         | :11                   |     |
|           | LLDN-3262-R          | -                 | 2          | -          | -            | -             | 22         | -            | -                      | -           | -     | -           | 24                         | :11                   |     |
|           | LLDN-58903-T         | -                 | 1          | -          | -            | -             | 26         | -            | -                      | -           | -     | -           | 27                         | :15                   |     |
|           | LLDN-58903-R         | -                 | 1          | -          | -            | -             | 24         | -            | -                      | -           | -     | -           | 25                         | :13                   |     |
|           | LLDN-58904-T         | -                 | -          | -          | -            | -             | 22         | -            | -                      | -           | -     | -           | 22                         | :11                   |     |
|           | LLDN-58904-R         | -                 | -          | -          | -            | -             | 22         | -            | -                      | -           | -     | -           | 22                         | :11                   |     |
|           | LLDN-58905-T         | -                 | 2          | 1          | -            | -             | 23         | -            | -                      | -           | -     | -           | 26                         | :12                   |     |
|           | LLDN-58905-R         | -                 | 2          | -          | -            | -             | 22         | -            | -                      | -           | -     | -           | 24                         | :12                   |     |
|           | LLDN-58953-T         | -                 | -          | -          | -            | -             | 24         | -            | -                      | -           | -     | -           | 24                         | :12                   |     |
|           | LLDN-58953-R         | -                 | -          | -          | -            | -             | 22         | -            | -                      | -           | -     | -           | 22                         | :11                   |     |
|           | LLDN-58993-T         | -                 | 1          | -          | -            | -             | 22         | -            | -                      | -           | -     | -           | 23                         | :12                   |     |
|           | LLDN-58993-R         | -                 | 1          | -          | -            | -             | 22         | -            | -                      | -           | -     | -           | 23                         | :12                   |     |
|           | Madrid/GSFC<br>/LLDN | LRID-3263-T       | 1          | 6          | -            | -             | -          | 21           | 6                      | 1           | 5     | -           | -                          | 40                    | :21 |
|           |                      | LRID-3263-R       | 1          | 5          | 1            | -             | -          | 21           | 6                      | 1           | 5     | -           | -                          | 40                    | :19 |
| LRID-7-T  |                      | 1                 | 9          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 10                         | :11                   |     |
| LRID-7-R  |                      | -                 | 10         | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 10                         | :13                   |     |
| LRID-8-T  |                      | 1                 | 10         | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 11                         | :28                   |     |
| LRID-8-R  |                      | -                 | 9          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 9                          | :12                   |     |
| LRID-9-T  |                      | 3                 | 8          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 11                         | :08                   |     |
| LRID-9-R  |                      | 2                 | 13         | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 15                         | :10                   |     |
| LRID-10-T |                      | 3                 | 10         | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 13                         | :17                   |     |
| LRID-10-R |                      | 2                 | 13         | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 15                         | :11                   |     |
| LRID-11-T |                      | 1                 | 6          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 7                          | :19                   |     |
| LRID-11-R |                      | -                 | 7          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 7                          | :26                   |     |
| LRID-13-T |                      | 1                 | 9          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 10                         | :46                   |     |
| LRID-13-R |                      | 1                 | 9          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 10                         | :13                   |     |
| LRID-14-T |                      | -                 | 7          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 7                          | :26                   |     |
| LRID-14-R |                      | 1                 | 5          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 6                          | :18                   |     |
| LRID-16-T |                      | 3                 | 8          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 11                         | :04                   |     |
| LRID-16-R |                      | 2                 | 8          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 10                         | :09                   |     |
| Pasadena  |                      | JJPL-3006-T       | -          | 2          | -            | -             | -          | -            | -                      | -           | -     | -           | -                          | 2                     | :10 |
|           |                      | JJPL-3006-R       | -          | 2          | -            | -             | -          | -            | -                      | -           | -     | -           | -                          | 2                     | :10 |
|           | JJPL-3007-T          | -                 | -          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 0                          | :00                   |     |
|           | JJPL-3007-R          | -                 | -          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 0                          | :00                   |     |

\*Average duration of interruptions to the nearest minute for November 1966.

TABLE 3 (Continued)

| STATION        | CIRCUIT      | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL INTER-RUPTION | *AVG DURA-TION |
|----------------|--------------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|---------------------|----------------|
| Pasadena       | JJPL-3008-T  | -           | 4       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 4                   | :28            |
|                | JJPL-3008-R  | -           | 4       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 4                   | :28            |
|                | JJPL-3009-T  | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2                   | :39            |
|                | JJPL-3009-R  | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2                   | :39            |
|                | JJPL-58831-T | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0                   | :00            |
|                | JJPL-58831-R | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0                   | :00            |
|                | JJPL-58858-T | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | :10            |
|                | JJPL-58858-R | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0                   | :00            |
|                | JJPL-58859-T | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | :25            |
|                | JJPL-58859-R | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0                   | :00            |
|                | JJPL-58860-T | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | :02            |
|                | JJPL-58860-R | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2                   | :06            |
|                | JJPL-58861-T | -           | 3       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3                   | :10            |
|                | JJPL-58861-R | -           | 3       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3                   | :10            |
|                | JJPL-58862-T | -           | 3       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3                   | :10            |
|                | JJPL-58862-R | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2                   | :11            |
|                | JJPL-58863-T | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | :02            |
|                | JJPL-58863-R | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | :02            |
|                | JJPL-58921-T | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | :02            |
|                | JJPL-58921-R | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2                   | :06            |
|                | JJPL-58925-T | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0                   | :00            |
|                | JJPL-58925-R | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0                   | :00            |
|                | JJPL-58926-T | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | :02            |
|                | JJPL-58926-R | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2                   | :06            |
|                | JJPL-58927-T | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | :02            |
|                | JJPL-58927-R | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2                   | :06            |
|                | JJPL-58928-T | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0                   | :00            |
|                | JJPL-58928-R | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0                   | :00            |
|                | JJPL-58929-T | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | :02            |
|                | JJPL-58929-R | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2                   | :06            |
|                | JJPL-58983-T | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1                   | :02            |
|                | JJPL-58983-R | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2                   | :06            |
| JJPL-58984-T   | -            | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | 0        | :00                 |                |
| JJPL-58984-R   | -            | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | 0        | :00                 |                |
| Point Arguello | GCAL-58922-T | -           | 1       | -       | -         | -          | 9       | -         | -              | -        | -     | -        | 10                  | :09            |
|                | GCAL-58922-R | -           | -       | -       | -         | 1          | 9       | -         | -              | -        | -     | -        | 10                  | :10            |

\*Average duration of interruptions to the nearest minute for November 1966.

TABLE 3 (Continued)

| STATION         | CIRCUIT        | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FERENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL INTERRUPTION | *AVG DURATION |
|-----------------|----------------|-------------|---------|---------|-----------|------------|---------|-----------|---------------|----------|-------|----------|--------------------|---------------|
| Point Arguello  | GRGO-58920-T   | -           | -       | -       | -         | -          | 9       | -         | -             | -        | -     | -        | 9                  | :09           |
|                 | GRGO-58920-R   | -           | -       | -       | -         | -          | 9       | -         | -             | -        | -     | -        | 9                  | :09           |
| Princeton       | GHNJ-3300-T    | -           | -       | -       | -         | -          | 22      | -         | -             | -        | -     | -        | 22                 | :14           |
|                 | GHNJ-3300-R    | -           | -       | -       | -         | -          | 22      | -         | -             | -        | -     | -        | 22                 | :14           |
| Quito           | GJPC-3258-T    | -           | 2       | -       | -         | -          | 22      | 3         | 1             | -        | -     | -        | 28                 | :19           |
|                 | GJPC-3258-R    | -           | 3       | -       | 1         | 3          | 22      | 9         | 1             | 10       | -     | -        | 49                 | :18           |
|                 | GQUI-3259-T    | -           | 2       | -       | -         | -          | 23      | 3         | 2             | 1        | -     | -        | 31                 | :20           |
| Rosman          | GQUI-3259-R    | -           | 2       | -       | 1         | 4          | 22      | 8         | 2             | 10       | -     | -        | 49                 | :19           |
|                 | GNAT-3317-T    | -           | 2       | -       | -         | -          | 22      | -         | -             | -        | -     | -        | 24                 | :13           |
|                 | GNAT-3317-R    | -           | 2       | -       | -         | -          | 22      | -         | -             | -        | -     | -        | 24                 | :24           |
|                 | GROS-3307-T    | -           | 1       | -       | -         | -          | 22      | -         | -             | -        | -     | -        | 23                 | :17           |
|                 | GROS-3307-R    | -           | 1       | -       | -         | -          | 22      | -         | -             | -        | -     | -        | 23                 | :17           |
|                 | GRST-3316-T    | -           | 8       | -       | -         | -          | 22      | -         | -             | -        | -     | -        | 30                 | :27           |
| St. John's      | GRST-3316-R    | -           | 6       | -       | -         | -          | 22      | -         | -             | -        | -     | -        | 28                 | :25           |
|                 | GFLD-3250-T    | -           | 4       | -       | -         | -          | 22      | -         | -             | -        | -     | -        | 26                 | :21           |
| Santiago        | GFLD-3250-R    | -           | 4       | -       | -         | -          | 22      | -         | -             | -        | -     | -        | 26                 | :19           |
|                 | GAGO-3256-T    | -           | 12      | -       | -         | -          | 23      | 3         | -             | -        | -     | -        | 38                 | :15           |
|                 | GAGO-3256-R    | -           | 14      | 1       | -         | 4          | 23      | 12        | 2             | 16       | -     | -        | 72                 | :24           |
|                 | GEDS-3255-T    | -           | 12      | -       | -         | -          | 22      | 3         | 1             | -        | -     | -        | 38                 | :13           |
| Tananarive/LLDN | GEDS-3255-R    | -           | 14      | 1       | -         | 5          | 22      | 14        | 2             | 15       | -     | -        | 73                 | :20           |
|                 | LTAN-1-T       | 1           | 6       | -       | -         | 1          | -       | 3         | -             | 2        | -     | 1        | 14                 | 1:37          |
| Toowoomba/ACSW  | LTAN-1-R       | -           | 6       | -       | -         | 1          | -       | 5         | -             | 2        | -     | 1        | 15                 | :28           |
|                 | ACBY-471-T     | -           | 4       | -       | -         | 1          | -       | -         | -             | -        | -     | -        | 5                  | :19           |
|                 | ACBY-471-R     | -           | 3       | -       | -         | 1          | -       | -         | -             | -        | -     | -        | 4                  | :09           |
|                 | ACBY-472-T     | -           | 3       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 3                  | :16           |
| Wallops Island  | ACBY-472-R     | -           | 3       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 3                  | :16           |
|                 | GWAB-3305-T    | -           | -       | -       | -         | -          | 6       | -         | -             | -        | -     | -        | 6                  | :13           |
|                 | GWAB-3314-R    | -           | -       | -       | -         | -          | 6       | -         | -             | -        | -     | -        | 6                  | :13           |
|                 | GWAC-3312-R    | -           | -       | -       | -         | -          | 6       | -         | -             | -        | -     | -        | 6                  | :13           |
|                 | GWAC-3313-R    | -           | -       | -       | -         | -          | 6       | -         | -             | -        | -     | -        | 6                  | :13           |
|                 | GWGE-3303-T    | -           | -       | -       | -         | -          | 6       | -         | -             | -        | -     | -        | 6                  | :13           |
| Washington      | GWGE-3303-R    | -           | -       | -       | -         | -          | 6       | -         | -             | -        | -     | -        | 6                  | :13           |
|                 | NASA-HQ-3309-T | -           | -       | -       | -         | -          | 5       | -         | -             | -        | -     | -        | 5                  | :16           |
| White Sands     | NASA-HQ-3309-R | -           | -       | -       | -         | -          | 5       | -         | -             | -        | -     | -        | 5                  | :16           |
|                 | GWHS-58909-T   | -           | 1       | -       | -         | -          | 9       | -         | -             | -        | -     | -        | 10                 | :11           |
|                 | GWHS-58909-R   | -           | 2       | -       | -         | -          | 9       | -         | -             | -        | -     | -        | 11                 | :10           |

\*Average duration of interruptions to the nearest minute for November 1966.

TABLE 3 (Continued)

| STATION                  | CIRCUIT          | NO<br>TRBL<br>FND | COM<br>CAR | OPR<br>ERR | EQUIP<br>ADJ | EQUIP<br>FAIL | CP<br>FAIL | POOR<br>PROP | INTER-<br>FER-<br>ENCE | FREQ<br>CHG | MAINT | PWR<br>FAIL | TOTAL<br>INTER-<br>RUPTION | *AVG<br>DURA-<br>TION |
|--------------------------|------------------|-------------------|------------|------------|--------------|---------------|------------|--------------|------------------------|-------------|-------|-------------|----------------------------|-----------------------|
| Winkfield/LLDN           | LWNK-58903-T     | -                 | 1          | -          | -            | 1             | -          | -            | -                      | -           | -     | -           | 2                          | :29                   |
|                          | LWNK-58903-R     | -                 | 1          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 1                          | :10                   |
| Woomera                  | AOMJ-561-T       | -                 | 1          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 1                          | 1:28                  |
|                          | AOMJ-561-R       | -                 | 1          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 1                          | :13                   |
|                          | AOMJ-562-T       | -                 | -          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 0                          | :00                   |
|                          | AOMJ-562-R       | -                 | 1          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 1                          | :13                   |
|                          | AOMJ-563-T       | -                 | -          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 0                          | :00                   |
|                          | AOMJ-563-R       | -                 | 4          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 4                          | :36                   |
|                          | AOMJ-564-T       | -                 | -          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 0                          | :00                   |
|                          | AOMJ-564-R       | -                 | 1          | -          | -            | -             | -          | -            | -                      | -           | -     | -           | 1                          | :13                   |
| SHIP STATIONS:           |                  |                   |            |            |              |               |            |              |                        |             |       |             |                            |                       |
| Coastal Sentry/<br>Perth | MCSQ-58832/661-T | -                 | 1          | -          | -            | -             | 8          | 20           | 12                     | 1           | -     | 1           | 43                         | :45                   |
|                          | MCSQ-58832/661-R | -                 | 2          | -          | -            | -             | 8          | 7            | 4                      | -           | -     | 1           | 22                         | :38                   |
|                          | MCSQ-58833/662-T | -                 | -          | -          | -            | -             | 8          | 9            | 5                      | 1           | -     | -           | 23                         | :49                   |
|                          | MCSQ-58833/662-R | 1                 | 1          | -          | -            | -             | 8          | 9            | 4                      | -           | -     | -           | 23                         | :40                   |
| /Guam                    | MCSQ-58988/60-T  | -                 | -          | -          | -            | -             | 8          | 25           | 11                     | 1           | -     | 1           | 46                         | :38                   |
|                          | MCSQ-58988/60-R  | -                 | 2          | -          | -            | 1             | 8          | 18           | 4                      | 1           | -     | 1           | 35                         | :20                   |
|                          | MCSQ-58989/67-T  | -                 | 1          | -          | -            | -             | 8          | 11           | 4                      | 1           | -     | -           | 25                         | :37                   |
|                          | MCSQ-58989/67-R  | -                 | 3          | -          | -            | 1             | 8          | 13           | 3                      | 1           | -     | -           | 29                         | :16                   |
| /Japan                   | MCSQ-58988/73-T  | -                 | 1          | -          | -            | 2             | 8          | 19           | 21                     | -           | -     | 1           | 52                         | :48                   |
|                          | MCSQ-58988/73-R  | -                 | 2          | -          | -            | 1             | 8          | 16           | 1                      | 2           | -     | 1           | 31                         | :23                   |
|                          | MCSQ-58989/74-T  | -                 | 1          | -          | -            | -             | 8          | 6            | 8                      | -           | -     | -           | 23                         | :41                   |
|                          | MCSQ-58989/74-R  | -                 | 4          | -          | -            | -             | 8          | 10           | -                      | 2           | -     | -           | 24                         | :19                   |
| Rose Knot/<br>New York   | MRKV-58834-T     | -                 | 1          | -          | -            | -             | 4          | 6            | 4                      | 1           | -     | -           | 16                         | 1:08                  |
|                          | MRKV-58834-R     | -                 | 1          | -          | -            | -             | 4          | 7            | 4                      | 2           | -     | -           | 18                         | 1:36                  |
|                          | MRKV-58835-T     | -                 | -          | -          | -            | -             | 4          | 4            | 2                      | -           | -     | -           | 10                         | 1:06                  |
|                          | MRKV-58835-R     | -                 | 1          | -          | -            | -             | 4          | 6            | 3                      | 2           | -     | -           | 16                         | 1:30                  |
| /ETR                     | MRKV-58836-T     | 1                 | -          | -          | -            | -             | 4          | 4            | 3                      | 1           | -     | -           | 13                         | :39                   |
|                          | MRKV-58836-R     | -                 | 1          | -          | -            | 2             | 4          | 14           | 4                      | 4           | -     | -           | 29                         | 2:29                  |
|                          | MRKV-58837-T     | -                 | -          | -          | -            | -             | 4          | 2            | 2                      | 1           | -     | -           | 9                          | :32                   |
|                          | MRKV-58837-R     | -                 | -          | -          | -            | 1             | 4          | 11           | 3                      | 4           | -     | -           | 23                         | 1:51                  |
| Wheeling                 | MWHE-58916/38-T  | -                 | 1          | -          | -            | 2             | 8          | 3            | -                      | 2           | -     | 1           | 17                         | :19                   |
|                          | MWHE-58916/38-R  | -                 | -          | -          | -            | 5             | 8          | 3            | -                      | -           | -     | 1           | 17                         | :20                   |
| TOTALS                   |                  | 30                | 955        | 10         | 2            | 80            | 3069       | 852          | 144                    | 252         | 7     | 20          | 5421                       | :24                   |

\*Average duration of interruptions to the nearest minute for November 1966.

**TABLE 4**  
**NASCOM Network Teletype Outage Time and**  
**Reliability Indexes for a Period of Six Months**

(Hours and Minutes)

| TROUBLE CATEGORIES           | JUN<br>1966     | JUL<br>1966     | AUG<br>1966     | SEP<br>1966     | OCT<br>1966     | NOV<br>1966     |
|------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| A. No Trouble Found          | 22:57           | 81:45           | 48:45           | 28:45           | 3:52            | 2:07            |
| B. Common Carrier            | 973:56          | 743:47          | 975:06          | 742:26          | 749:05          | 603:35          |
| C. Operator Error            | 9:31            | 18:46           | 15:27           | 5:54            | 21:46           | 8:54            |
| D. Equipment Adjustment      | 4:01            | 12:27           | 1:32            | 6:12            | 9:00            | :22             |
| E. Equipment Failure         | 610:39          | 181:22          | 82:34           | 86:21           | 82:33           | 48:21           |
| F. CP Failure*               | -               | -               | 551:02          | 193:19          | 368:19          | 569:51          |
| F. Wire Defect               | 1:18            | :18             | -               | -               | -               | -               |
| G. Poor Propagation          | 1,042:58        | 1,203:48        | 1,503:27        | 1,188:45        | 530:34          | 705:52          |
| I. Interference              | 63:44           | 80:42           | 74:55           | 49:22           | 72:45           | 154:44          |
| K. Frequency Change          | 73:09           | 60:19           | 82:59           | 115:14          | 111:08          | 73:45           |
| M. Maintenance               | 25:31           | 61:42           | 9:24            | 2:50            | 22:05           | 6:17            |
| P. Power Failure             | 73:12           | 140:54          | 41:42           | 51:39           | 7:46            | 12:21           |
| <b>TOTAL OUTAGE</b>          | <b>2,900:56</b> | <b>2,585:50</b> | <b>3,386:53</b> | <b>2,470:47</b> | <b>1,978:53</b> | <b>2,186:09</b> |
| <b>SCHED OPER TIME</b>       | <b>182,836</b>  | <b>200,810</b>  | <b>193,294</b>  | <b>194,361</b>  | <b>185,014</b>  | <b>200,748</b>  |
| <b>RELIABILITY (Percent)</b> | <b>98</b>       | <b>99</b>       | <b>98</b>       | <b>99</b>       | <b>99</b>       | <b>99</b>       |

\*In August Category F was changed to CP Failure.

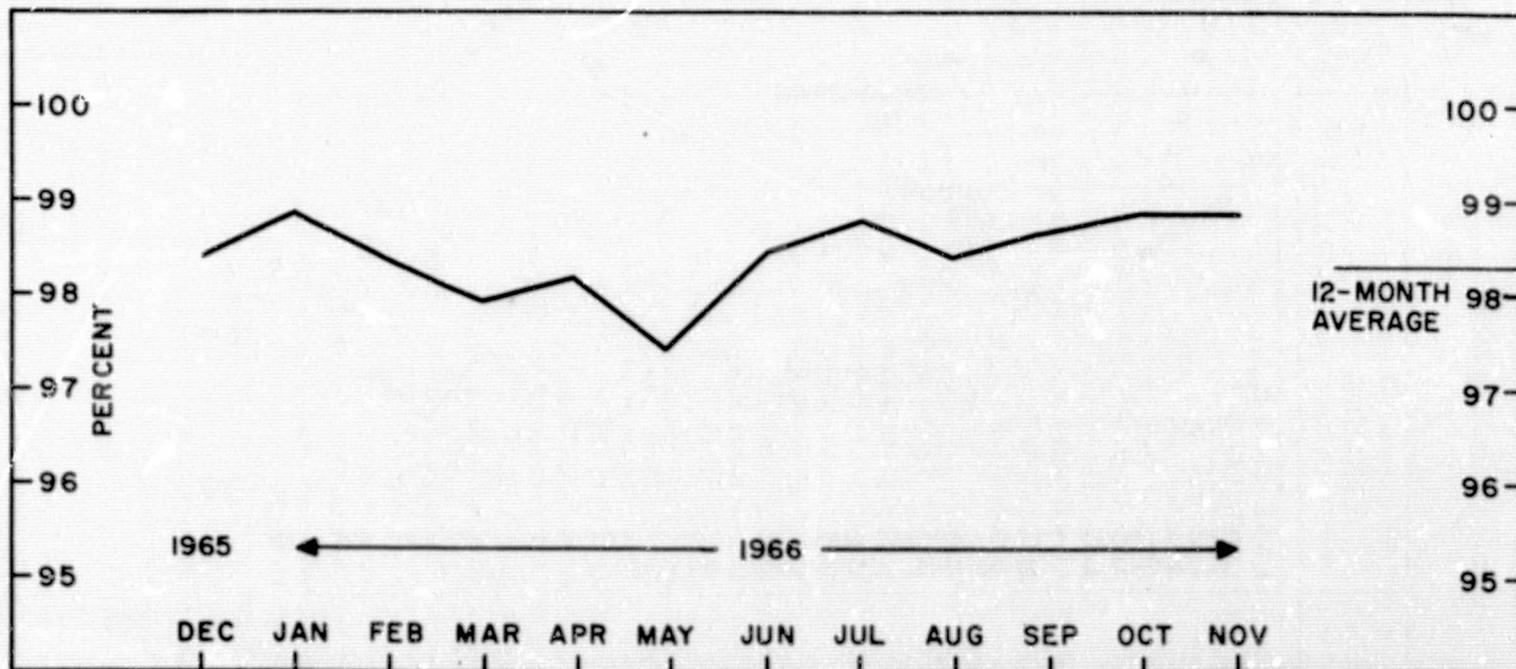


Figure 2. NASCOM Network Teletype Reliability for One Year

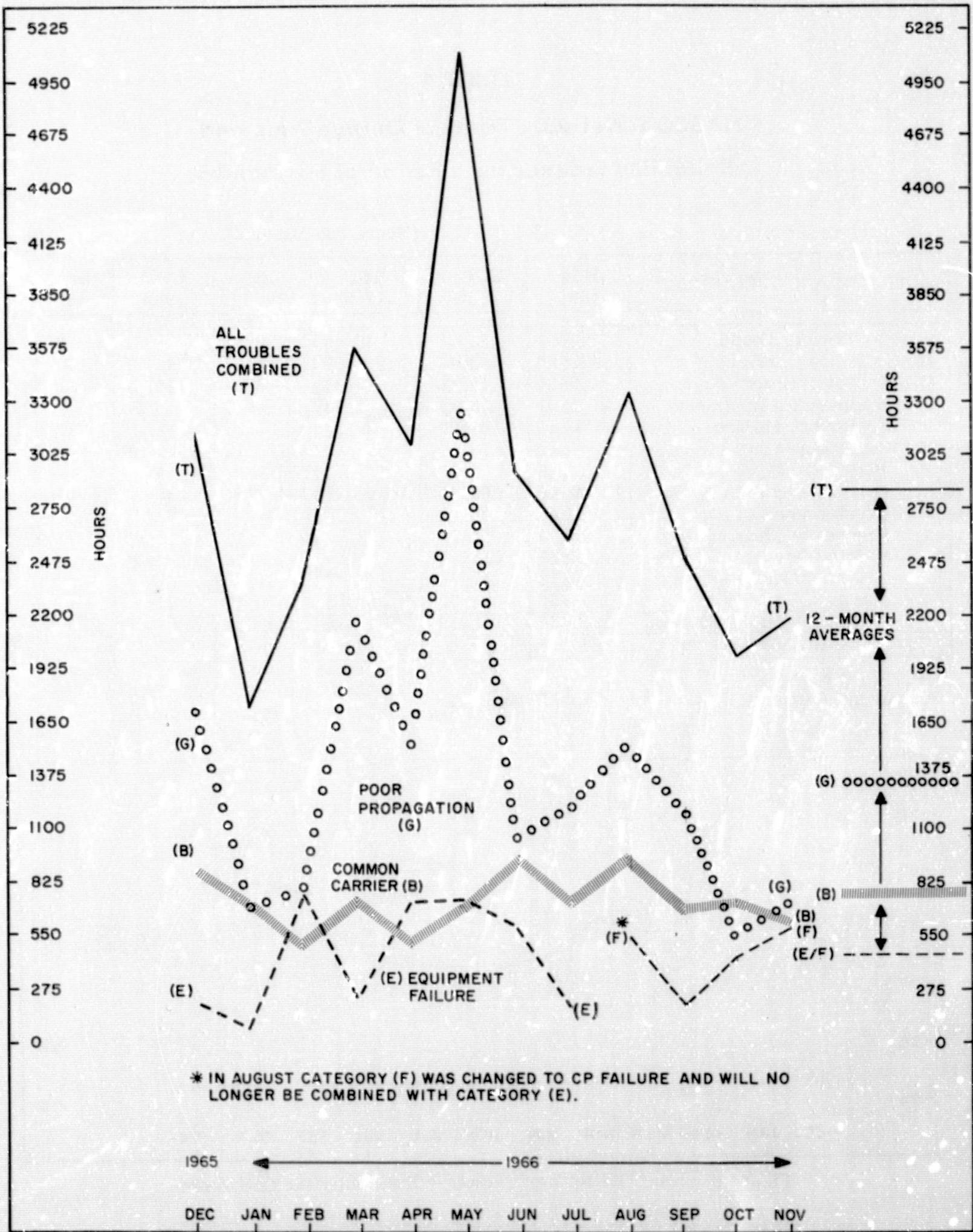


Figure 3. NASCOM Network Teletype Lost Time by Trouble Categories

## DISCUSSIONS AND ANALYSES OF PERFORMANCE OF INDIVIDUAL TELETYPE STATIONS

### General

This section of the NASCOM Network reliability report examines the performance of the teletype circuits on an individual station/circuit basis. Reliability factors affecting the performance of these individual station/circuits are analyzed in detail. The stations are listed alphabetically and each significant outage is described in the summary of the affected station. In the discussions, outage which totals less than 1:00 hour in a category, or which does not indicate a trend, may be excluded to allow emphasis of pertinent information affecting circuit reliability. Reference should be made to Tables 2 and 3 in the preceding section of the report for a complete list of outages for each station/circuit. Discussions related to stations with circuits consistently achieving low reliability are contained in the summaries, tables, and graphs in a following section. Reference should be made to that section for a more detailed analysis of factors contributing to low reliability of a specific circuit.

In order to emphasize significant factors affecting the reliability of the network, discussions are made only of outages encountered on circuits which performed below the standards which have been established for the network and published in section 2.3.2 of the NASCOM Data System Development Plan. "The present reliability requirements for the various transmission modes are as follows: a. Microwave and landlines, 99.6 percent; b. Submarine cable, 98 percent; and c. High-frequency radio, 95 percent." Circuit performance which exceeds the standards is considered satisfactory and no reference is made to those circuits in the discussions. No attempt is made to combine the standards for circuits incorporating multiple media. Thus, a circuit consisting of some landline but a predominant length of HF radio path is considered unsatisfactory when it falls below 95 percent. Also, a transoceanic cable circuit is expected to perform at 98 percent, although a large portion of the circuit may be domestic landline to the cablehead.

### Individual Station Summaries—NASCOM Network Teletype Circuits

#### BARSTOW

The reliability of the GAVE/NST-3001 circuit was 98 percent. Significant outages on both paths included one on November 10 for 4:57 hours due to a VF carrier failure and a grounded wire at the San Bernardino WUT office and, on November 12, a 2:45 hour outage due to a bad carrier channel at San Bernardino. On November 16, high distortion and a loose patch cord at San Bernardino caused a receive path outage of 1:00 hours.

#### CAMBRIDGE

The GSAO/NST-3308 circuit was 98 percent reliable. Maintenance at Cambridge resulted in two outages affecting both paths. The first, on November 12, was for 1:30 hours while the second, on November 16, was for 1:18 hours. An outage common to both paths occurred on November 25 and continued over to November 26 for a total duration of 3:45 hours due to a microwave failure at Boston. On November 18, the transmit path was out for 3:16 hours due to an unknown trouble at WUT Boston.

#### CANBERRA

The ANBE/NCT-261 circuit had transmit and receive path reliabilities of 99 percent with one outage observed during the month. On November 29 a cable break at Canberra caused both paths to fail for 3:42 hours.

#### CAPE KENNEDY

The circuits GCNV/GT-58949, GCPN/GT-58940, GKAP/GT-58938, GKEN/GT-58935, GMCC/GT-58943, GMCC/GT-58944, GMIL/GT-58950, GMPA-58941 and GPVE/GT-58942 had transmit and receive path reliabilities of 99 percent. The reliabilities of these circuits did not meet the NASCOM standard mainly because of the 3:48 hours of outage accumulated from GSFC CP interruptions on each path.

Both paths of the GMIL/GT-58951 circuit were 99 percent reliable. Two significant outages were recorded on the receive path during the month. Equipment trouble at the ATT office at Cocoa Beach caused an outage of 2:55 hours on November 10/11. High distortion on November 16 resulted in 1:00 hour of outage before being cleared by ATT Washington.

#### CARNARVON

The ACRO/NAT-663 and ACRO/NAT-664 circuits had transmit and receive path reliabilities of 99 percent. On November 3 the transmit path of the ACRO/NAT-663 circuit was out for 2:28 hours because of a faulty relay at the site. The outage was extensive because a technician had to be summoned to the site, locate the faulty relay and replace it. On November 15/16 both paths of both circuits were interrupted for 2:30 hours because of crossed wires near Gascoyne Junction, Western Australia.

#### COLLEGE

Both paths of circuit GLGE/GT-58931 had a reliability of 99 percent and were affected by one major interruption of 3:55 hours duration on November 22. This one significant outage was caused by an ATT microwave failure due to a defective rectifier and burned battery cables at Big Timber, Montana.

#### CORPUS CHRISTI

The GTEX/GT-58906 and GTEX/GT-58907 circuits were 99 percent reliable on both the transmit and receive paths. Both circuits failed to meet the NASCOM standard for reliability due to unscheduled GSFC CP outages.

#### EGLIN AIR FORCE BASE

The GEGL/GT-58908 circuit transmit path had a reliability of 99 percent and the receive path had a reliability of 98 percent. The transmit path failed to meet the NASCOM standard for reliability due to unscheduled CP outages. Two notable common carrier interruptions affected the receive path. On November 21, the receive path was out for 1:15 hours because of a faulty channel between ATT Washington, D. C. and ATT Greenbelt, Maryland. High distortion resulted in 1:25 hours of outage on the receive path on November 25.

#### FORT MYERS

The GYRS-3302 circuit was 99 percent reliable, and failed to meet the NASCOM standard for reliability due to unscheduled CP outages.

#### GILMORE CREEK

The GMOR/NST-3077 circuit reliability was 98 percent. Both paths of the circuit were affected by two major interruptions. A VF failure between Brevard and Asheville, North Carolina on November 10 resulted in 2:40 hours of outage. An outage which occurred on November 23 and continued into November 24 resulted in 5:20 hours of outage due to a faulty transformer at WUT Seattle.

The GULA-58930 circuit reliability was 99 percent. One significant interruption of 3:55 hours duration on November 22 affected both paths of the circuit. This outage was due to an ATT microwave failure caused by a defective rectifier and burned battery cables at Big Timber, Montana.

#### GOLDSTONE

The JGLD/NST-3002/TK1-8 circuit was 98 percent reliable on the transmit path and 99 percent reliable on the receive path. Two major interruptions affected the transmit path on November 19 and November 28, respectively. The first outage was caused by WUT carrier trouble between Los Angeles and Pasadena and resulted in an outage of 3:30 hours. The second major outage resulted in an interruption of 4:39 hours and was caused by high distortion between Los Angeles and JPL. The receive path was affected by one significant interruption on November 19 when an outage of 1:25 hours duration was due to WUT carrier trouble between Los Angeles and Pasadena.

The combined path reliability for circuits JGLD-58867 and JGLD-58868 did not meet the NASCOM standard due to the 3:56 hours of accumulated outage time attributable to the GSFC CP interruptions during the month.

#### GUAYMAS

The GGYM/GT-58910 and GGYM/GT-58911 circuits were 99 percent reliable on both their transmit and receive paths with no significant outages recorded during the month on either circuit. The 3:56 hours of GSFC CP outage represented 57 percent of the total outage on the GGYM/GT-58910 circuit and 63 percent of the total outage on the GGYM/GT-58911 circuit.

#### HOUSTON

The combined path reliability for circuits HDMA-58961, HDMA-58962, HDMA-58963, HDMA-58964, HDMA-58965, HDMA-58971, HDMA-58972, HMSC-58966, HMSC-58967, HMSC-58968, HMSC-58970, and HMTS-58969 did not meet the NASCOM standard due mainly to 3:56 hours of accumulated outage time attributable to the GSFC CP interruptions during the month.

#### HUNTSVILLE

The GALA/NST-3079 circuit had transmit and receive path reliabilities of 99 percent. A notable outage of 2:00 hours occurred on both paths on November 4 due to line trouble between Atlanta, Georgia and Huntsville, Alabama.

The GALA-58954 circuit was 99 percent reliable, and failed to meet the NASCOM standard due to the 3:56 hours of accumulated outage time attributable to the GSFC CP interruptions during the month.

#### LIMA

The reliability of circuit GAPI-58856 was 98 percent, an increase of three percentage points. The total outage time reported on the transmit path was 14:03 hours. Radio path anomalies were responsible for 5:21 hours of outage time on the transmit path. A total of 21:32 hours of outage time was reported on the receive path. Radio path problems contributed 6:34 hours of receive path outage time. One significant common carrier failure occurred on November 3 which affected both paths. This outage of 1:51 hours duration was the result of a faulty relay at RCA New York.

#### MADRID

Circuit LRID/TGP-8 had a transmit path reliability of 98 percent and a receive path reliability of 100 percent. Three major common carrier interruptions affected the transmit path for a total of 15:05 hours of outage time. On November 15, high distortion due to a bad channel at ETE Madrid caused 7:15 hours of outage time. Two major interruptions occurred on November 16 with the first due to high distortion at ETE Madrid resulting in 6:50 hours of outage and the second due to channel adjustment at Madrid causing an outage of 1:00 hour.

The combined path reliability for circuit LRID/TGP-10 was 99 percent. On November 11, one significant interruption occurred which resulted in a transmit path outage of 1:23 hours due to a system failure at Madrid.

Circuit LRID/TGP-13 had a transmit path reliability of 99 percent while the receive path achieved a reliability of 100 percent. The transmit path failed to meet the NASCOM standard due to the 7:36 hours of accumulated common carrier outage time. One major outage of 6:00 hours duration occurred on November 15 as the result of high distortion caused by a defective ETE channel.

#### PRINCETON

The GHNJ/NST-3300 circuit, with a reliability of 99 percent, failed to meet the NASCOM standard due to 3:56 hours of unscheduled outage time attributable to GSFC CP interruptions.

## ROSMAN

Circuit GNAT-3317 had a combined path reliability of 99 percent. Total outage on the transmit path was 5:06 hours during 24 interruptions with 3:56 hours attributable to the GSFC CP. The receive path accumulated 9:46 hours outage due to 24 interruptions. On November 10, the principal interruption on the receive path was for 5:35 hours caused by common carrier equipment trouble between Asheville and Brevard, North Carolina.

The GROS/NST-3307 circuit reliability was 99 percent. One significant interruption occurred on November 10 which affected both paths. This interruption of 2:40 hours duration was the result of a WUT VF failure between Brevard and Asheville.

The reliability for circuit GRST-3316 was 98 percent. Major outages affecting both paths of the circuit occurred on November 10 when a VF failure between Brevard and Asheville caused an outage of 2:40 hours; on November 20 when high distortion between Asheville and New York resulted in 1:50 hours of outage time, and again on November 20 when low levels between Charlotte and Asheville caused 1:45 hours of outage. An interruption occurred on November 21 when a bad line between Asheville and Brevard caused 1:16 hours on the transmit path.

## ST. JOHN'S

Circuit GFLD-3250 had a combined path reliability of 99 percent. Significant outages affected both paths of the circuit with one exception; on November 7, the transmit path only was interrupted for 1:20 hours due to an unknown carrier outage at Moncton, Canada. Outages that affected both paths occurred on November 21 when microwave troubles between Cornerbrook and Sydney, Canada caused 1:00 hour outage and on November 27 when a bad repeater between Gore and Sydney, Canada caused 2:20 hours outage.

## SANTIAGO

The reliability of circuit GAGO-3256 was 97 percent. On the transmit path, 3:53 hours of the total 9:43 hours of outage was attributable to accumulated common carrier interruption time. The receive path was interrupted for a total of 28:17 hours. Radio path problems were responsible for 58 percent of the total outage time. One significant common carrier failure occurred on November 17 and interrupted the receive path for 1:00 hour due to repeater trouble at WUT New York. Accumulated outage time attributable to the GSFC CP interruptions was responsible for 4:31 hours of outage on both paths of the circuit.

## WASHINGTON

The reliability of circuit NASA/NST-3309 was 99 percent and failed to meet the NASCOM standard due to 1:18 hours total outage attributable to GSFC CP interruptions during the month.

## WHITE SANDS

The combined path reliability for circuit GWHS-58909 did not meet the NASCOM standard due to the 1:27 hours of outage time attributable to GSFC CP interruptions during the month.

## Ship Station Summaries

### COASTAL SENTRY

The MCSQ/GT-58832/NAT-661 had a transmit path reliability of 90 percent and a receive path reliability of 96 percent. Two significant common carrier outages were observed. On November 4 the receive path of the NAT-661 segment of the circuit was out for 1:12 hours due to line trouble between Bassendean and Adelaide. A carrier failure between GSFC and San Francisco caused a transmit path outage of 2:00 hours duration on November 11. Circuit lost time due to poor propagation and interference represented 91 percent of the transmit path outage total and 86 percent of the receive path outage total.

The MCSQ/GT-58833/NAT-662 was 94 percent reliable on the transmit path and 95 percent reliable on the receive path. A line failure between Bassendean and Adelaide caused 1:12 hours of receive path outage on November 4. Poor propagation and interference caused 97 percent of the total transmit path outage time and 89 percent of the total receive path outage time.

The MCSQ/GT-58988/GT-58973 circuit was 87 percent reliable on the transmit path and 96 percent reliable on the receive path. Two significant outages were observed. The transmit path was out for 2:53 hours on November 6 due to line failure in the Yokosuka area and, on November 9, a faulty receiver aboard the ship caused a transmit path outage of 1:39 hours. Poor propagation and interference were the cause of 87 percent of outage on the transmit path and 84 percent on the receive path.

The MCSQ/GT-58988/HULC-60 had transmit and receive path reliabilities of 91 percent and 96 percent respectively. Poor propagation and interference accounted for 97 percent of the 29:24 hours total transmit path outage time and 92 percent of the 11:30 hours total receive path outage time.

The MCSQ/GT-58989/HULC-67 had transmit and receive path reliabilities of 95 percent and 98 percent respectively. Poor propagation and interference caused 94 percent of the total 15:13 hours transmit path outage and 88 percent of the total 7:50 hours receive path outage.

### ROSE KNOT

The MRKV/GT-58834 circuit had transmit and receive path reliabilities of 93 percent and 88 percent respectively. Poor propagation and interference caused 93 percent of the

18: 01 hours total outage on the transmit path and 97 percent of the receive path outage total, 28: 39 hours.

The MRKV/GT-58835 circuit had a transmit path reliability of 95 percent and a receive path reliability of 90 percent. Poor propagation and interference caused 10: 56 hours of the total 11: 03 hours outage on the transmit path and 22: 55 hours of the total 23: 54 outage on the receive path.

Circuit MRKV/GT-58836 achieved 97 percent reliability on the transmit path, but only 70 percent reliability on the receive path. Of the total receive path outage of 72: 14 hours, 55: 21 hours were caused by radio path anomalies with poor propagation accounting for 48: 01 hours. On November 9, two significant receive path outages occurred. A common carrier interruption of 15: 10 hours was due to high distortion on ETR facilities between the ship and Cape Kennedy; then the receive path remained out for an additional 1: 30 hours while antenna maintenance was performed aboard the ship.

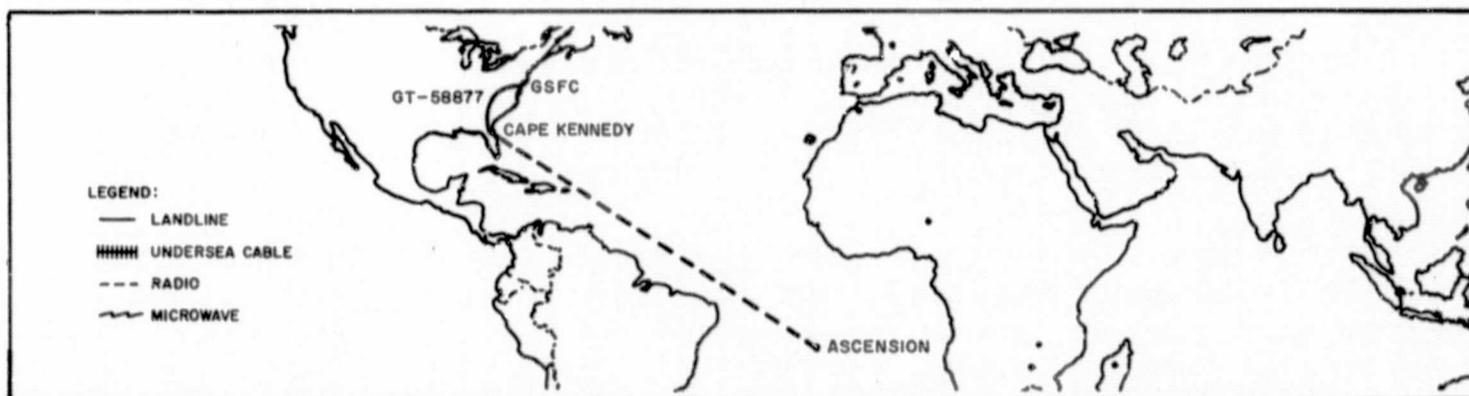
The MRKV/GT-58837 achieved transmit and receive path reliabilities of 98 and 83 percent respectively with no outages due to common carrier troubles. The low reliability of the receive path was due to 42: 11 hours total radio path outages which represent 99 percent of the total 42: 24 hours outage. Of the total 4: 48 hours outage on the transmit path, all but seven minutes was due to radio path anomalies.

A teletype circuit added and reported on is GNAT-3317 from GSFC to Rosman, North Carolina.

Deleted circuits include ACSW-58832 from GSFC to Canberra, Australia and two circuits to Cape Kennedy, GMCC-58939 and GMCC-58946.

## PERMANENT CIRCUITS WITH LOWEST RELIABILITY

### Ascension—GSEN-58877



The reliability of circuit GSEN-58877 was 89 percent, an increase of four percentage points. The transmit path reliability was 86 percent while the receive path achieved a reliability of 92 percent.

Poor propagation conditions were responsible for 75 percent of the total outage time of 86:59 hours with accumulated transmit path propagation outage time almost twice that reported on the receive path. Total circuit outage due to poor propagation was 42:42 hours on the transmit path and 22:25 hours on the receive path.

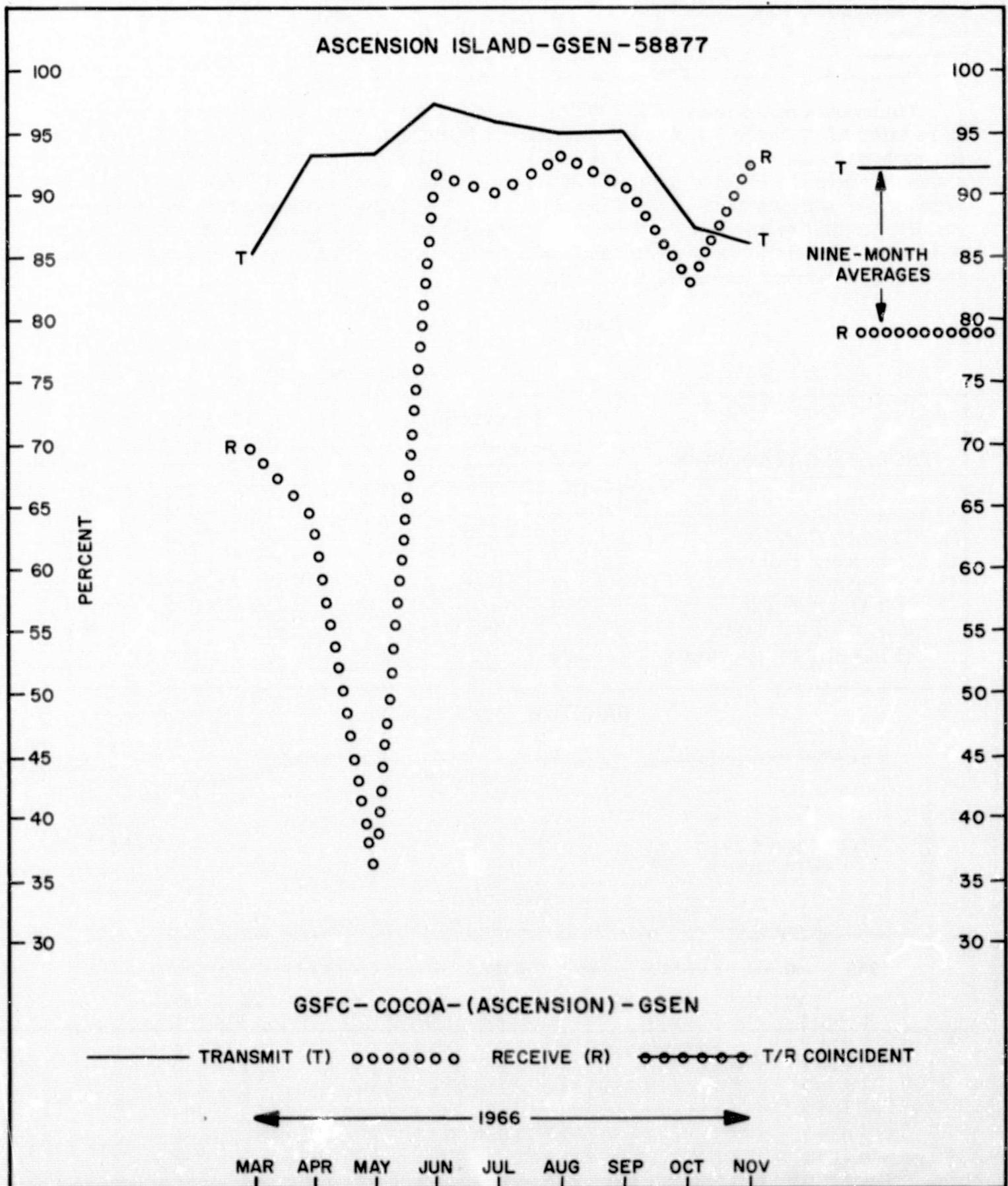
On November 21, one significant common carrier interruption, resulting in 1:16 hours of outage time on the transmit path, was caused by a bad relay at Cape Kennedy.

Both paths of the circuit were affected by one major interruption of 2:16 hours duration on November 18. This outage was due to an operator error which resulted in the selection of wrong channels between the Ascension Island site and Cape Kennedy.

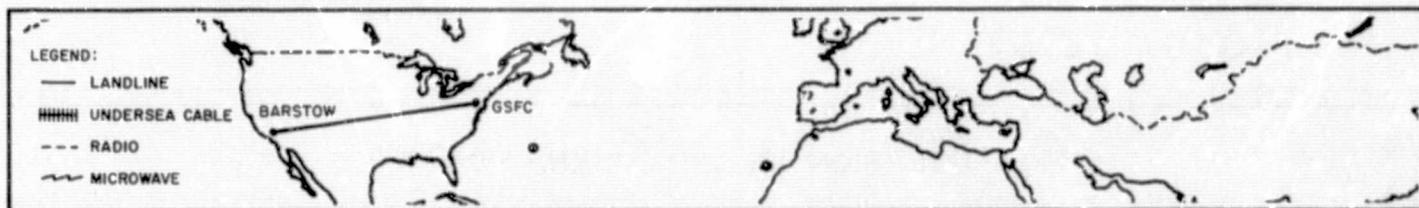
### ASCENSION ISLAND—GSEN-58877

(Hours and Minutes)

| TROUBLE CATEGORIES           | TRANSMIT<br>(from GSFC) |              |              | RECEIVE<br>(at GSFC) |              |              |
|------------------------------|-------------------------|--------------|--------------|----------------------|--------------|--------------|
|                              | SEP                     | OCT          | NOV          | SEP                  | OCT          | NOV          |
| A. No Trouble Found          | -                       | -            | -            | :28                  | :15          | -            |
| B. Common Carrier            | :13                     | 14:14        | 1:36         | 2:17                 | 12:17        | :39          |
| C. Operator Error            | -                       | -            | 2:29         | -                    | -            | 2:29         |
| E. Equipment Failure         | -                       | 3:10         | 1:06         | 2:30                 | 2:15         | 2:23         |
| F. CP Failure                | 1:14                    | :58          | 1:42         | 1:14                 | :58          | 1:42         |
| G. Poor Propagation          | 31:44                   | 30:06        | 42:42        | 55:24                | 48:22        | 22:25        |
| K. Frequency Change          | 2:00                    | :15          | 1:20         | 2:45                 | 1:15         | :52          |
| M. Maintenance               | -                       | -            | :15          | -                    | -            | -            |
| P. Power Failure             | :05                     | -            | 2:57         | :13                  | -            | 2:22         |
| <b>TOTAL OUTAGE</b>          | <b>35:16</b>            | <b>48:43</b> | <b>54:07</b> | <b>64:51</b>         | <b>65:22</b> | <b>32:52</b> |
| <b>SCHED OPER TIME</b>       | <b>711</b>              | <b>383</b>   | <b>388</b>   | <b>711</b>           | <b>383</b>   | <b>388</b>   |
| <b>RELIABILITY (Percent)</b> | <b>95</b>               | <b>87</b>    | <b>86</b>    | <b>91</b>            | <b>83</b>    | <b>92</b>    |



### Barstow-GATS-3005

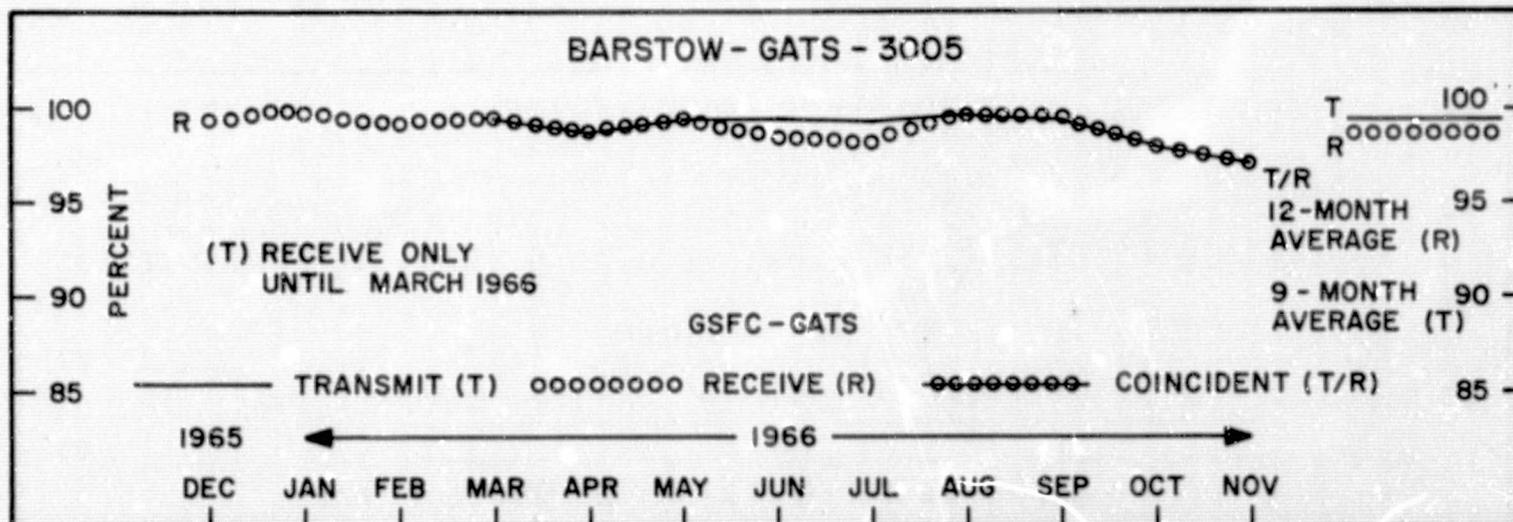


The reliability of the GATS-3005 circuit was 97 percent. Both paths of the circuit were affected by three major common carrier interruptions. On November 9, the transmit path was interrupted for 4:30 hours because of a defective tube in a WUT carrier channel, while the receive path was interrupted for 3:50 hours and was restored when a regenerator was installed at WUT Washington. A VF carrier failure and blown fuse at San Bernardino resulted in 1:12 hours of outage time on both paths of the circuit on November 10. On November 20, an 8:00 hour interruption affected both paths and was caused by a carrier failure at San Bernardino.

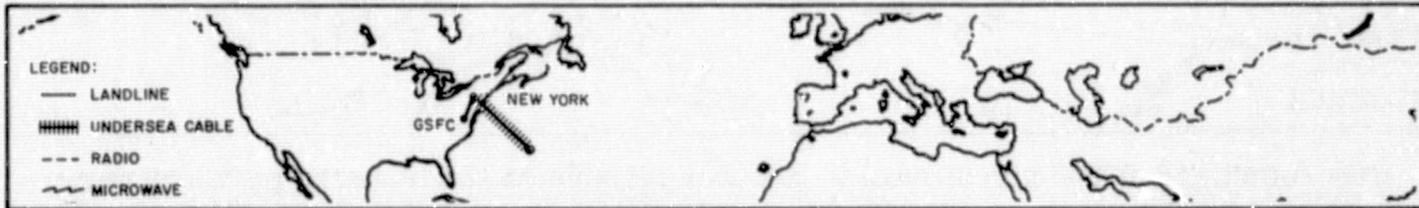
### BARSTOW-GATS-3005

(Hours and Minutes)

| TROUBLE CATEGORIES    | TRANSMIT<br>(from GSFC) |       |       | RECEIVE<br>(at GSFC) |       |       |
|-----------------------|-------------------------|-------|-------|----------------------|-------|-------|
|                       | SEP                     | OCT   | NOV   | SEP                  | OCT   | NOV   |
| B. Common Carrier     | 1:25                    | 11:57 | 14:12 | 2:20                 | 12:16 | 13:32 |
| E. Equipment Failure  | -                       | -     | 1:15  | 1:00                 | -     | :50   |
| F. CP Failure         | 1:14                    | 2:30  | 3:56  | 1:14                 | 2:30  | 3:56  |
| TOTAL OUTAGE          | 2:39                    | 14:27 | 19:23 | 4:34                 | 14:46 | 18:18 |
| SCHED OPER TIME       | 719                     | 740   | 715   | 719                  | 740   | 715   |
| RELIABILITY (Percent) | 100                     | 98    | 97    | 99                   | 98    | 97    |



## Bermuda-GBDA-58902



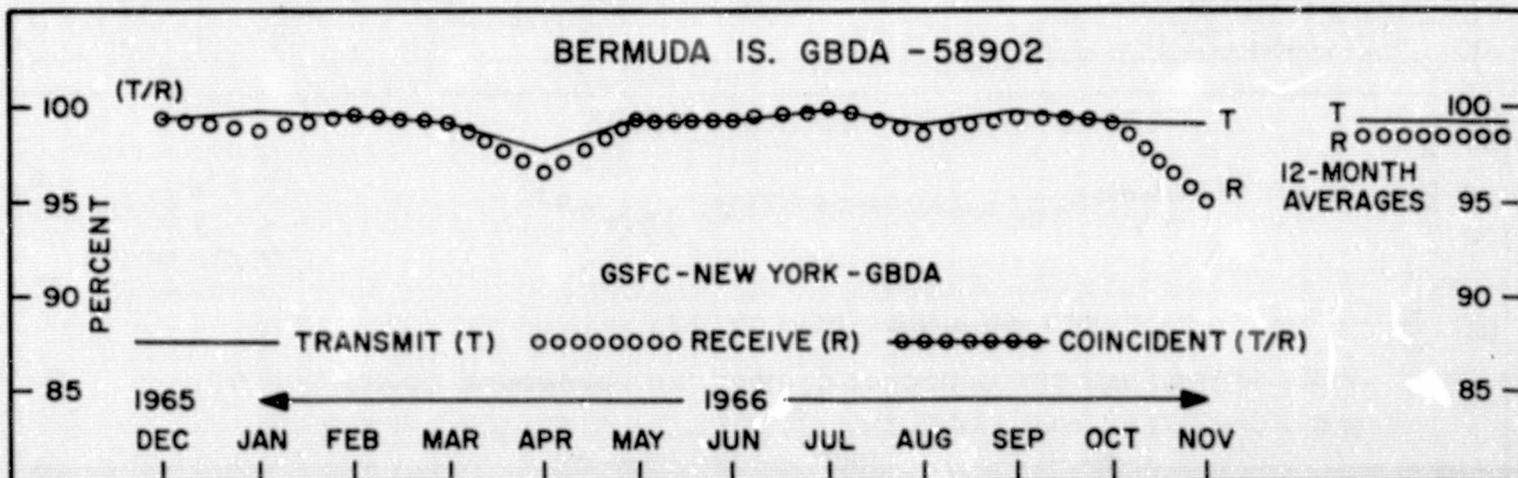
The GBDA/GT-58902 circuit reliability was 99 percent on the transmit path and only 95 percent on the receive path.

A receive path outage occurred on November 7 and extended into November 8 for a total of 15:30 hours outage due to a faulty mercury relay at Cable & Wireless Limited. A faulty audio transformer at the Bermuda site caused a 2:35 hour receive path outage on November 16, and on November 17, both paths were interrupted for 1:28 hours for the same reason.

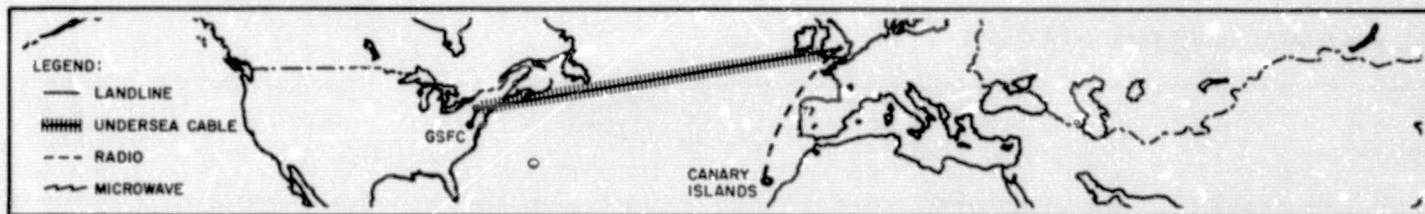
### BERMUDA-GBDA-58902

(Hours and Minutes)

| TROUBLE CATEGORIES    | TRANSMIT<br>(from GSFC) |      |      | RECEIVE<br>(at GSFC) |      |       |
|-----------------------|-------------------------|------|------|----------------------|------|-------|
|                       | SEP                     | OCT  | NOV  | SEP                  | OCT  | NOV   |
| B. Common Carrier     | -                       | :24  | -    | :31                  | :24  | 15:30 |
| E. Equipment Failure  | -                       | 1:40 | 1:28 | -                    | 1:40 | 4:03  |
| F. CP Failure         | 1:14                    | :41  | 2:38 | 1:14                 | :41  | 2:38  |
| TOTAL OUTAGE          | 1:14                    | 2:45 | 4:06 | 1:45                 | 2:45 | 22:11 |
| SCHED OPER TIME       | 446                     | 322  | 446  | 446                  | 322  | 446   |
| RELIABILITY (Percent) | 100                     | 99   | 99   | 100                  | 99   | 95    |



### Grand Canary Island—LCYI-58953

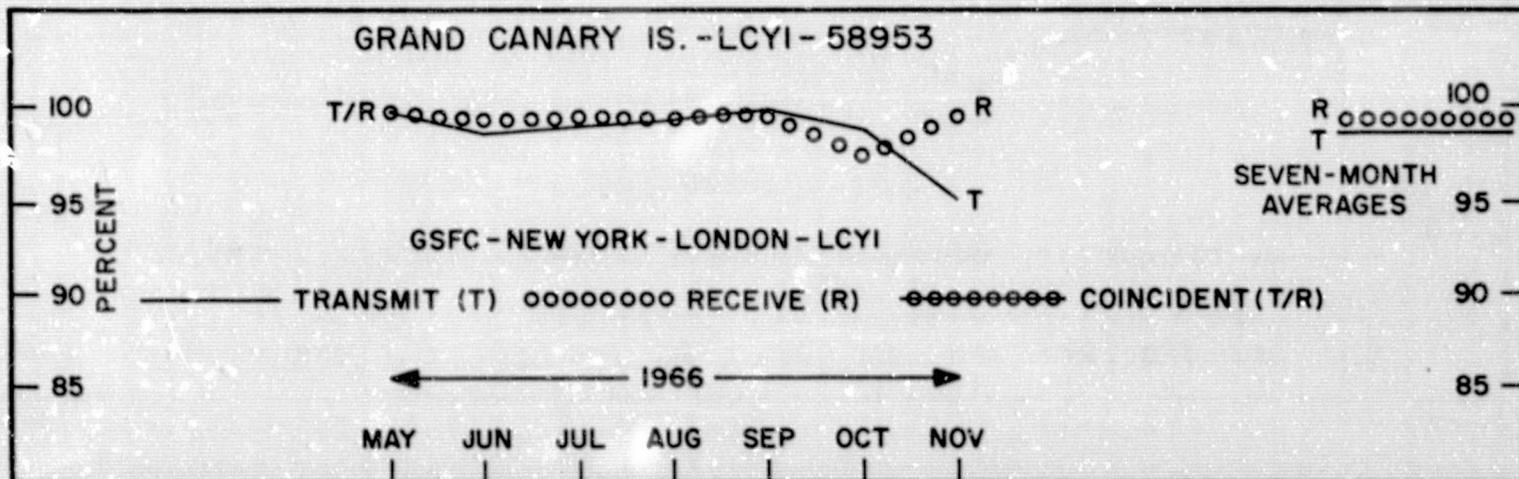


The LCYI/GT-58953 circuit was 95 percent reliable on the transmit path and 99 percent reliable on the receive path. The transmit path experienced three significant outages during the month. Faulty transmitting equipment at London caused a distorted signal to be transmitted to Grand Canary Island for a period of 1:35 hours on November 5 and a similar problem occurred on November 6, causing an outage of 2:20 hours. A faulty tone keyer at London Control caused an outage of 11:20 hours duration on November 7. The sum of these three outages caused 82 percent of the total outage time on the transmit path.

### GRAND CANARY ISLAND—LCYI-58953

(Hours and Minutes)

| TROUBLE CATEGORIES           | TRANSMIT<br>(from GSFC) |             |              | RECEIVE<br>(at GSFC) |             |             |
|------------------------------|-------------------------|-------------|--------------|----------------------|-------------|-------------|
|                              | SEP                     | OCT         | NOV          | SEP                  | OCT         | NOV         |
| B. Common Carrier            | :45                     | 2:16        | 16:49        | :51                  | :46         | :08         |
| C. Operator Error            | -                       | -           | -            | :30                  | -           | -           |
| E. Equipment Failure         | -                       | :20         | -            | -                    | -           | :03         |
| G. Poor Propagation          | :16                     | :43         | 2:38         | 1:08                 | 1:29        | :36         |
| I. Interference              | -                       | -           | -            | -                    | 4:20        | -           |
| K. Frequency Change          | -                       | -           | -            | :25                  | :20         | 1:48        |
| M. Maintenance               | -                       | -           | :57          | -                    | -           | :57         |
| P. Power Failure             | -                       | :12         | -            | -                    | :12         | -           |
| <b>TOTAL OUTAGE</b>          | <b>1:01</b>             | <b>3:31</b> | <b>20:24</b> | <b>2:54</b>          | <b>7:07</b> | <b>3:32</b> |
| <b>SCHED OPER TIME</b>       | <b>372</b>              | <b>266</b>  | <b>392</b>   | <b>372</b>           | <b>266</b>  | <b>392</b>  |
| <b>RELIABILITY (Percent)</b> | <b>100</b>              | <b>99</b>   | <b>95</b>    | <b>99</b>            | <b>97</b>   | <b>99</b>   |



## Johannesburg-GBUR-668



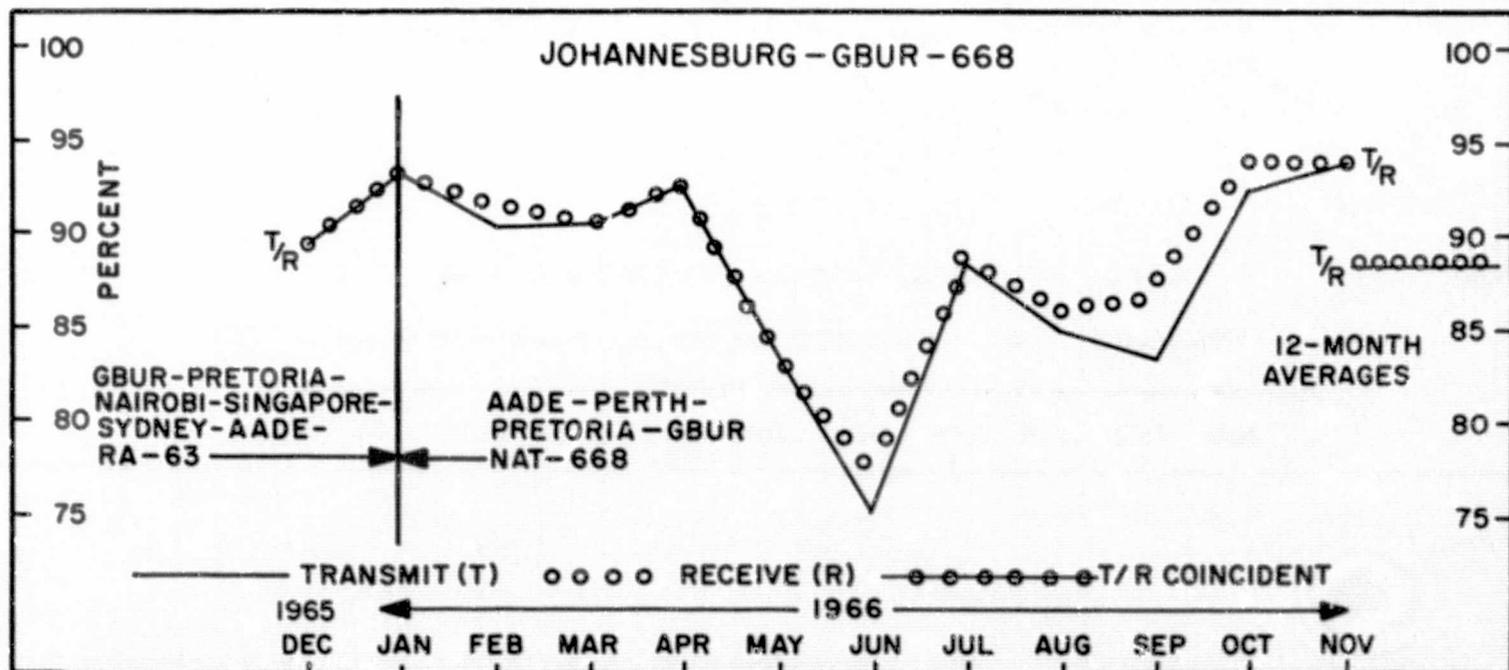
The GBUR/NAT-668 circuit was 94 percent reliable on both the transmit and receive paths.

Significant outages include that on November 14 when the transmit path was out for 1:49 hours due to a faulty relay at Pretoria and that on November 24 when a wiring error between Perth and Bassendean caused both paths to fail for 1:35 hours. Poor propagation and frequency shifts caused 83 percent of the total outage time on the receive path while outages in these categories and interference, caused 84 percent of the transmit path total outage time.

### JOHANNESBURG-GBUR-668

(Hours and Minutes)

| TROUBLE CATEGORIES           | TRANSMIT<br>(from GSFC) |              |              | RECEIVE<br>(at GSFC) |              |              |
|------------------------------|-------------------------|--------------|--------------|----------------------|--------------|--------------|
|                              | SEP                     | OCT          | NOV          | SEP                  | OCT          | NOV          |
| A. No Trouble Found          | 6:23                    | -            | -            | :18                  | -            | -            |
| B. Common Carrier            | 3:21                    | 7:05         | 7:27         | 1:51                 | 7:34         | 4:25         |
| E. Equipment Failure         | 1:25                    | -            | -            | 2:28                 | -            | 3:05         |
| G. Poor Propagation          | 86:12                   | 34:39        | 20:14        | 70:10                | 25:03        | 23:28        |
| I. Interference              | :17                     | -            | 4:45         | -                    | 3:00         | -            |
| K. Frequency Change          | 21:55                   | 15:23        | 14:21        | 18:39                | 13:33        | 12:16        |
| P. Power Failure             | :15                     | -            | -            | :15                  | -            | -            |
| <b>TOTAL OUTAGE</b>          | <b>119:48</b>           | <b>57:07</b> | <b>46:47</b> | <b>93:41</b>         | <b>49:10</b> | <b>43:14</b> |
| <b>SCHED OPER TIME</b>       | <b>720</b>              | <b>744</b>   | <b>720</b>   | <b>720</b>           | <b>744</b>   | <b>720</b>   |
| <b>RELIABILITY (Percent)</b> | <b>83</b>               | <b>92</b>    | <b>94</b>    | <b>87</b>            | <b>93</b>    | <b>94</b>    |



## Johannesburg—GBUR-3260

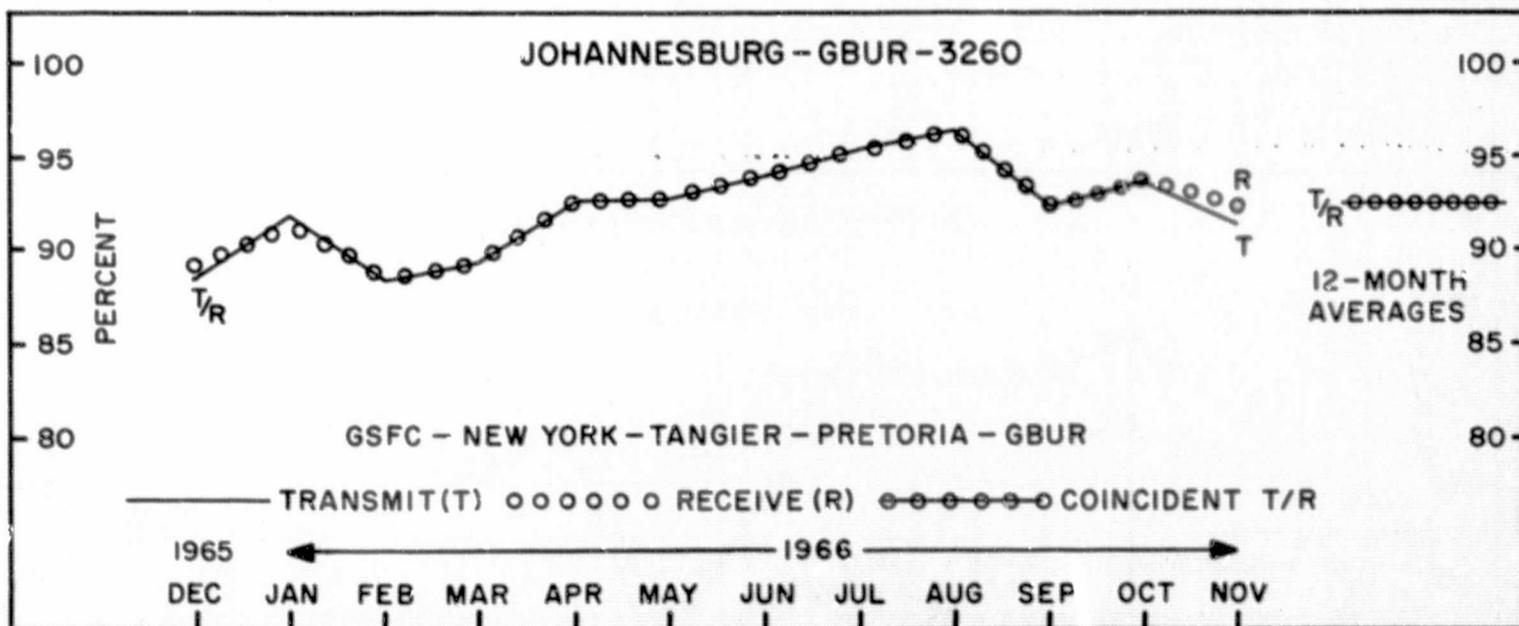
The GBUR/NST-3260 circuit transmit and receive paths were both 92 percent reliable.

One significant outage was recorded during the month when both paths were interrupted for 2:40 hours on November 14 because of a carrier failure between Philadelphia and Washington. Poor propagation, interference and frequency shifts were responsible for 85 percent of the transmit path outage total and 79 percent of the receive path outage total. Outages occurring on common carrier facilities caused eight percent of the transmit path outage total and 12 percent of the receive path total.

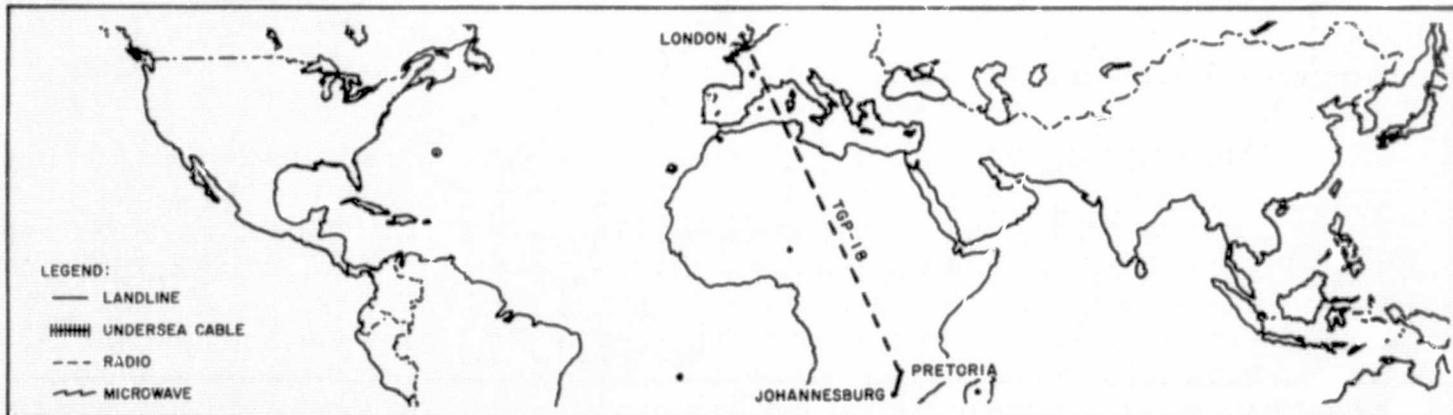
### JOHANNESBURG—GBUR-3260

(Hours and Minutes)

| TROUBLE CATEGORIES           | TRANSMIT<br>(from GSFC) |              |              | RECEIVE<br>(at GSFC) |              |              |
|------------------------------|-------------------------|--------------|--------------|----------------------|--------------|--------------|
|                              | SEP                     | OCT          | NOV          | SEP                  | OCT          | NOV          |
| A. No Trouble Found          | -                       | -            | -            | :05                  | -            | -            |
| B. Common Carrier            | 3:35                    | 10:57        | 4:43         | 9:21                 | 16:06        | 6:48         |
| E. Equipment Failure         | -                       | -            | -            | -                    | :22          | :55          |
| F. CP Failure                | 1:14                    | 2:30         | 3:56         | 1:14                 | 2:30         | 3:56         |
| G. Poor Propagation          | 46:15                   | 29:36        | 41:00        | 43:17                | 22:46        | 37:45        |
| I. Interference              | :15                     | 1:00         | 4:25         | -                    | 3:00         | 2:35         |
| K. Frequency Change          | 3:39                    | 6:49         | 5:35         | 2:54                 | 6:59         | 4:00         |
| <b>TOTAL OUTAGE</b>          | <b>54:58</b>            | <b>50:52</b> | <b>59:39</b> | <b>56:51</b>         | <b>51:43</b> | <b>55:59</b> |
| <b>SCHED OPER TIME</b>       | <b>719</b>              | <b>740</b>   | <b>716</b>   | <b>719</b>           | <b>740</b>   | <b>716</b>   |
| <b>RELIABILITY (Percent)</b> | <b>92</b>               | <b>93</b>    | <b>92</b>    | <b>92</b>            | <b>93</b>    | <b>92</b>    |



## Johannesburg—LJOB-18



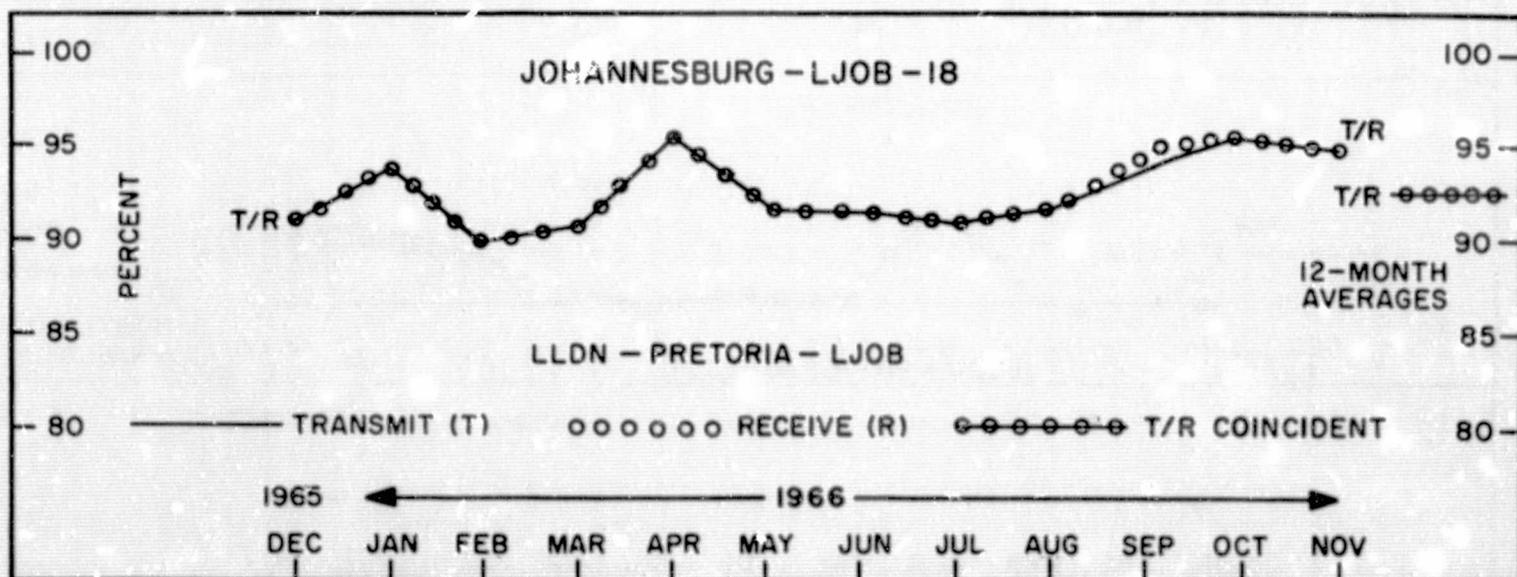
The transmit and receive paths of the LJOB/TGP-18 circuit were both 95 percent reliable.

Significant outages were recorded during the month. On November 10 both paths were interrupted for 1:15 hours due to an equipment failure at London and a faulty relay at Pretoria caused a receive path outage of 1:22 hours on November 17. Poor propagation and interference outages caused 84 percent of the total outage time on the transmit path and 83 percent of the total outage time on the receive path.

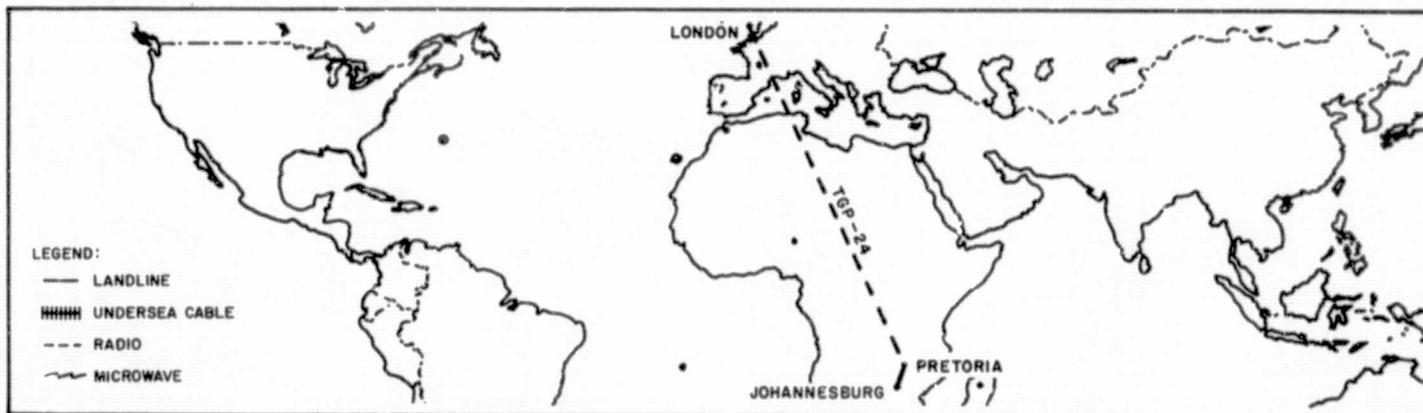
### JOHANNESBURG—LJOB-18

(Hours and Minutes)

| TROUBLE CATEGORIES    | TRANSMIT<br>(from GSFC) |       |       | RECEIVE<br>(at GSFC) |       |       |
|-----------------------|-------------------------|-------|-------|----------------------|-------|-------|
|                       | SEP                     | OCT   | NOV   | SEP                  | OCT   | NOV   |
| A. No Trouble Found   | :05                     | -     | -     | -                    | -     | -     |
| B. Common Carrier     | 3:18                    | 11:52 | 4:37  | 2:48                 | 10:18 | 6:06  |
| E. Equipment Failure  | 1:20                    | -     | :52   | :10                  | -     | -     |
| G. Poor Propagation   | 36:17                   | 20:27 | 26:03 | 35:31                | 20:07 | 26:39 |
| I. Interference       | -                       | 1:00  | 5:10  | -                    | 3:00  | 3:20  |
| K. Frequency Change   | 2:50                    | 1:10  | :22   | 2:50                 | 1:10  | :07   |
| TOTAL OUTAGE          | 43:50                   | 34:29 | 37:04 | 41:19                | 34:35 | 36:12 |
| SCHED OPER TIME       | 720                     | 744   | 720   | 720                  | 744   | 720   |
| RELIABILITY (Percent) | 94                      | 95    | 95    | 94                   | 95    | 95    |



### Johannesburg—LJOB-24



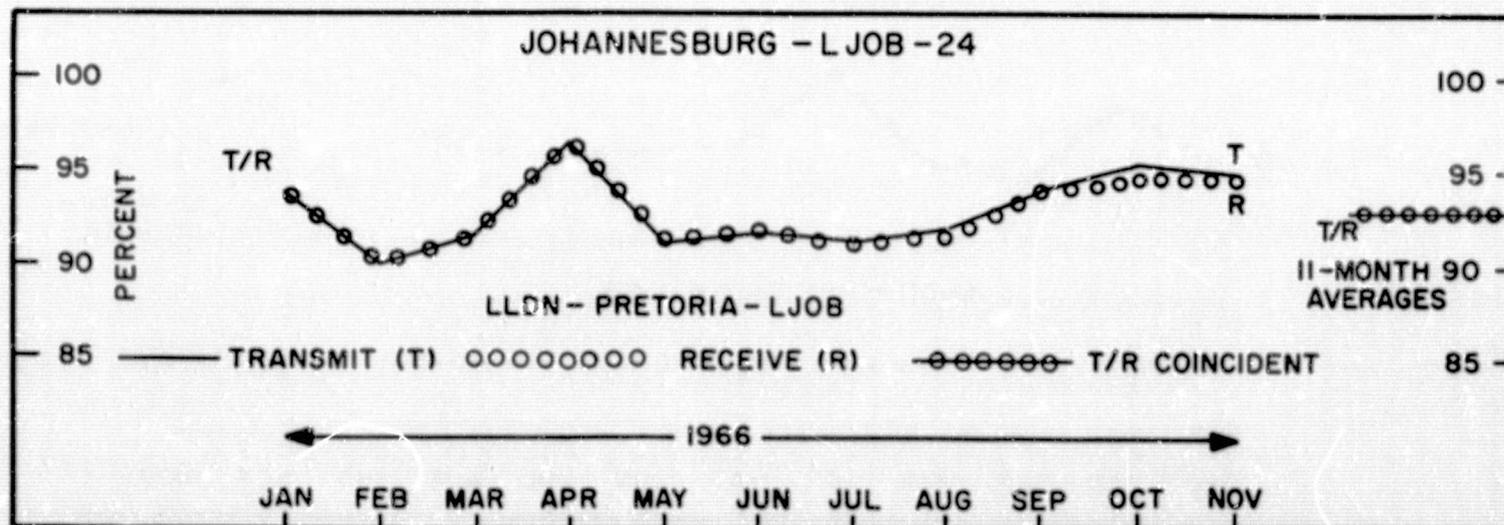
Both paths of the LJOB/TGP-24 circuit were 95 percent reliable.

Significant common carrier outages recorded during the month include that on November 9 when the receive path was out for 1:47 hours due to faulty equipment at Pretoria and that on November 10 when the transmit path was out for 1:08 hours due to an equipment failure at London. Propagation and interference outages caused 84 percent of the total transmit path outage time and 78 percent of the total receive path outage time. Outages attributed to common carrier facilities were responsible for 15 percent of the total transmit path outage time and 20 percent of the total receive path outage time.

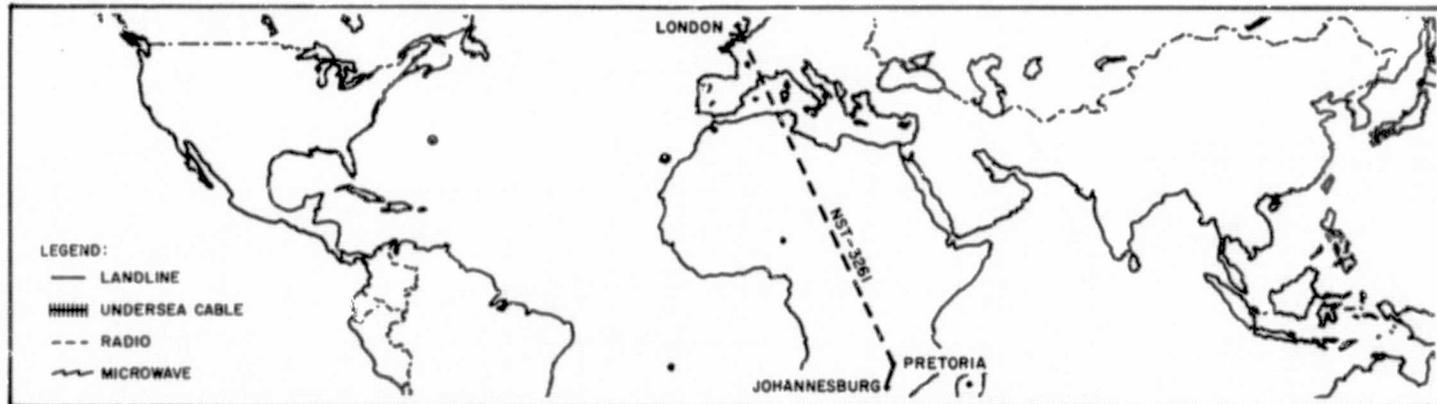
### JOHANNESBURG—LJOB-24

(Hours and Minutes)

| TROUBLE CATEGORIES           | TRANSMIT<br>(from GSFC) |              |              | RECEIVE<br>(at GSFC) |              |              |
|------------------------------|-------------------------|--------------|--------------|----------------------|--------------|--------------|
|                              | SEP                     | OCT          | NOV          | SEP                  | OCT          | NOV          |
| B. Common Carrier            | 4:52                    | 12:14        | 5:18         | 5:29                 | 13:47        | 7:45         |
| C. Operator Error            | -                       | :28          | -            | -                    | -            | -            |
| E. Equipment Failure         | :10                     | -            | :15          | :10                  | -            | :34          |
| G. Poor Propagation          | 34:25                   | 20:08        | 26:34        | 33:27                | 19:33        | 28:38        |
| I. Interference              | -                       | 1:00         | 3:40         | -                    | 3:00         | 1:35         |
| K. Frequency Change          | 3:25                    | 1:10         | :22          | 3:25                 | 1:10         | :07          |
| <b>TOTAL OUTAGE</b>          | <b>42:52</b>            | <b>35:00</b> | <b>36:09</b> | <b>42:31</b>         | <b>37:30</b> | <b>38:39</b> |
| <b>SCHED OPER TIME</b>       | <b>720</b>              | <b>744</b>   | <b>720</b>   | <b>720</b>           | <b>744</b>   | <b>720</b>   |
| <b>RELIABILITY (Percent)</b> | <b>94</b>               | <b>95</b>    | <b>95</b>    | <b>94</b>            | <b>95</b>    | <b>95</b>    |



### Johannesburg—LJOB-3261



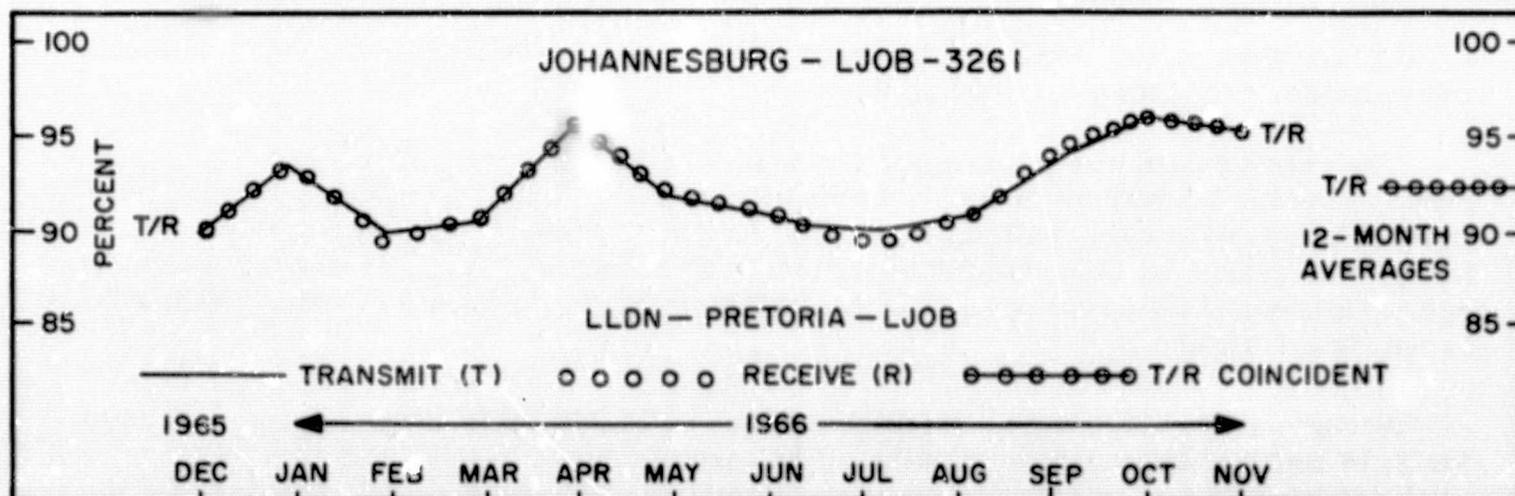
The LJOB/NST-3261 circuit had transmit and receive path reliabilities of 95 percent and 96 percent respectively.

A significant interruption occurred on November 7 when a line fault between Derdepoort and Olifantsfontein caused both paths to fail for 1:05 hours. Poor propagation, interference and frequency shifts caused 88 percent of the total outage time on each path.

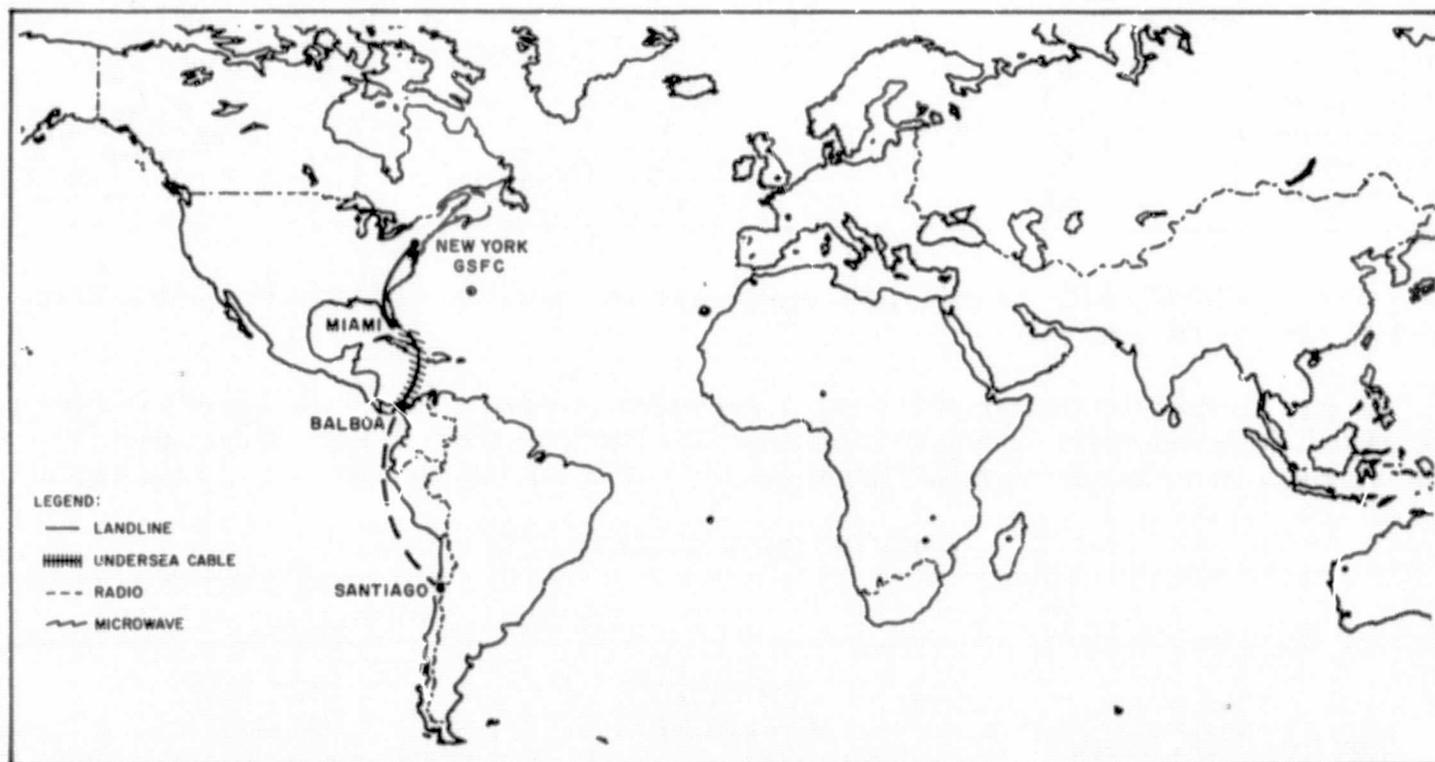
### JOHANNESBURG—LJOB-3261

(Hours and Minutes)

| TROUBLE CATEGORIES    | TRANSMIT<br>(from GSFC) |              |              | RECEIVE<br>(at GSFC) |              |              |
|-----------------------|-------------------------|--------------|--------------|----------------------|--------------|--------------|
|                       | SEP                     | OCT          | NOV          | SEP                  | OCT          | NOV          |
| B. Common Carrier     | 2:50                    | 10:53        | 3:54         | 1:48                 | 11:21        | 3:34         |
| G. Poor Propagation   | 32:26                   | 15:33        | 24:59        | 31:28                | 14:03        | 25:40        |
| I. Interference       | -                       | 1:00         | 3:25         | -                    | 3:00         | 1:35         |
| K. Frequency Change   | 2:05                    | 1:10         | :22          | 2:05                 | 1:10         | :07          |
| <b>TOTAL OUTAGE</b>   | <b>37:21</b>            | <b>28:36</b> | <b>32:40</b> | <b>35:21</b>         | <b>29:34</b> | <b>30:56</b> |
| SCHED OPER TIME       | 720                     | 744          | 720          | 720                  | 744          | 720          |
| RELIABILITY (Percent) | 95                      | 96           | 95           | 95                   | 96           | 96           |



### Santiago—GEDS-3255



Circuit GEDS-3255 achieved a reliability of 97 percent during 716 hours of scheduled operation. This represents an improvement of two percentage points compared to last month's figure.

Outage time on the transmit path totaled 8:12 hours with accumulated common carrier interruptions accounting for 2:53 hours.

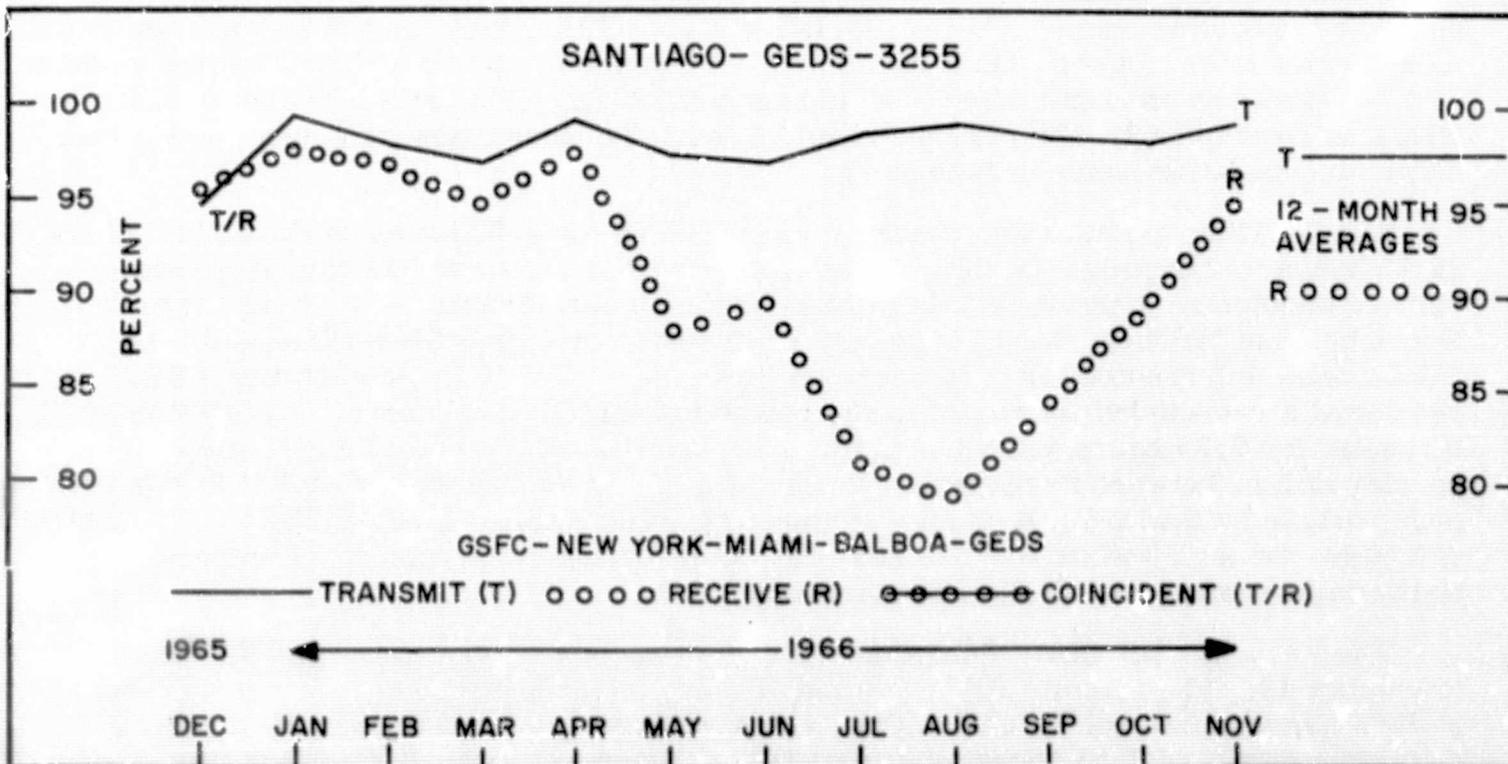
The receive path was interrupted for a total of 32:08 hours with radio path anomalies responsible for 58 percent of the outage time. Two significant common carrier interruptions affected the receive path on November 23 and November 25, respectively. The first outage was caused by demodulator adjustments at Balboa and resulted in 1:20 hours outage. The second interruption of 1:58 hours duration was the result of cable trouble between New York and Balboa.

Accumulated outage time attributable to the GSFC CP interruptions was responsible for 3:56 hours of outage on both paths of the circuit.

SANTIAGO—GEDS-3255

(Hours and Minutes)

| TROUBLE CATEGORIES           | TRANSMIT<br>(from GSFC) |               |              | RECEIVE<br>(at GSFC) |               |               |
|------------------------------|-------------------------|---------------|--------------|----------------------|---------------|---------------|
|                              | SEP                     | OCT           | NOV          | SEP                  | OCT           | NOV           |
| A. No Trouble Found          | -                       | -             | -            | : 43                 | : 19          | -             |
| B. Common Carrier            | 8: 05                   | 5: 14         | 2: 53        | 25: 22               | 3: 39         | 6: 38         |
| C. Operator Error            | -                       | -             | -            | -                    | -             | : 04          |
| E. Equipment Failure         | -                       | -             | -            | : 42                 | 8: 29         | 2: 54         |
| F. CP Failure                | 1: 14                   | 2: 30         | 3: 56        | 1: 14                | 2: 30         | 3: 56         |
| G. Poor Propagation          | 5: 58                   | 6: 45         | 1: 19        | 74: 07               | 45: 44        | 13: 26        |
| I. Interference              | -                       | -             | : 04         | 6: 46                | 6: 34         | : 43          |
| K. Frequency Change          | -                       | 2: 00         | -            | 5: 56                | 9: 26         | 4: 27         |
| P. Power Failure             | : 17                    | -             | -            | 1: 16                | : 06          | -             |
| <b>TOTAL OUTAGE</b>          | <b>15: 34</b>           | <b>16: 29</b> | <b>8: 12</b> | <b>116: 06</b>       | <b>76: 47</b> | <b>32: 08</b> |
| <b>SCHED OPER TIME</b>       | <b>719</b>              | <b>740</b>    | <b>716</b>   | <b>719</b>           | <b>740</b>    | <b>716</b>    |
| <b>RELIABILITY (Percent)</b> | <b>98</b>               | <b>98</b>     | <b>99</b>    | <b>84</b>            | <b>90</b>     | <b>96</b>     |



## SUMMARY OF NASCOM NETWORK VOICE/DATA PERFORMANCE ANALYSIS

The 195 Voice/Data circuits had 122,202 scheduled operating hours, with 1,185:35 hours total outage in 1,279 interruptions. Common carrier outages totaled 654:28 hours for 55 percent of the total lost time. Propagation interruptions increased from 115:38 hours during October to 291:51 hours in November for an increase of 152 percent. Interference interruptions increased from 1:48 hours in October to 47:11 hours in November. Outages for which no cause was found increased from 2:00 hours to 21:33 hours. Frequency change troubles also increased outage time significantly from 28:04 to 87:34 hours in November.

Major network interruptions were as follows: an intercom problem at Barstow caused GDA-58452 to be interrupted for 13:15 hours on November 2, the installation of an equalizer on GDA-58518 by RCA at San Francisco caused 18:30 hours on November 18/19, circuit NCV-202 interrupted for 7:30 hours on November 22 and 5:35 hours on November 23 due to an open circuit at Canberra, NCV-211 for 10:16 hours on November 26 caused by a cable failure at Tharwa near Canberra, a cable failure for 27:28 hours on November 21 interrupted circuit NCV-212, an unidentified common carrier interruption on Cape Kennedy circuit GDA-58578 for 6:20 hours on November 17.

Canberra circuit NCV-631 experienced three common carrier interruptions totaling 92:52 hours during the period November 21 through 26 with 58:02 hours coinciding with the scheduled operating hours. Corpus Christi circuit, GDA-58522, had two significant common carrier interruptions. On November 9, an equipment failure at GSFC caused an outage of 6:05 hours and an unidentified trouble began at 2305Z on November 28 and extended to 2030Z on December 2. This failure resulted in 23:55 hours outage which coincided with scheduled operating hours in November.

The Guaymas circuit GDA-58422 was interrupted for 5:00 hours on November 22 and 29:25 hours on November 29/30 with both interruptions due to undetermined common carrier problems. Circuit NSA-3655 had a common carrier failure of 18:12 hours on November 3 at Romney, West Virginia. The Houston circuits, GDA-58294 and GDA-58295, were interrupted for 6:36 hours on November 2/3 with Houston stating GSFC had requested a release but no record of the release at GSFC. The NASA-1 circuit was interrupted for 7:25 hours and NASA-2 for 6:28 hours on November 18 due to a common carrier failure between Derdepoort and the site. Poor propagation resulted in a 5:05 hours outage on NASA-1 and -2 on November 22. The NASA-1 also had 7:21 hours outage on November 26 while NASA-2 had 6:22 hours outage on November 24 and 6:40 hours on November 27, all due to poor propagation.

The Kauai circuit GDA-58622 experienced a common carrier failure of 13:39 hours on November 19. The circuits DP-2, -4 and -6 were interrupted for 8:15 hours on November 24 by a common carrier failure in France. A cable failure in France on November 25 caused an outage of 7:53 hours on circuit DP-6. Rosman circuit GDA-58152 was interrupted for 7:35 hours on November 17 due to an amplifier failure at Brevard, North Carolina. Circuit GFA-58460 was interrupted for 10:09 hours on November 1 by a jumper problem at Suitland and a defective heat coil at Suitland caused an outage of 9:50 hours on November 17. The Ascension circuit GP-58560 was interrupted for 10:02 hours on November 28 due to a severed cable at Ramey Air Force Base, Puerto Rico.

Alternate Voice/Data circuits added and reported on include NSA-3655 to Honolulu; NSA-3656 to London; CMV-41, LCYI/LRID and GDA-58444, PHON/PHAW.

**TABLE 5**  
**NASCOM Network Voice/Data Outage Time**  
**and Reliability Indexes for a Period of Six Months**  
 (Hours and Minutes)

| TROUBLE CATEGORIES           | JUN<br>1966    | JUL<br>1966    | AUG<br>1966      | SEP<br>1966    | OCT<br>1966    | NOV<br>1966      |
|------------------------------|----------------|----------------|------------------|----------------|----------------|------------------|
| A. No Trouble Found          | 16: 58         | 10: 19         | 11: 35           | 2: 14          | 2: 00          | 21: 33           |
| B. Common Carrier            | 338: 25        | 358: 18        | 460: 05          | 309: 37        | 409: 05        | 654: 28          |
| C. Operator Error            | 12: 51         | 18: 17         | 29: 48           | 15: 00         | 11: 31         | 14: 10           |
| D. Equipment Adjustment      | : 15           | 1: 43          | 2: 37            | : 14           | : 34           | 4: 45            |
| E. Equipment Failure         | 19: 14         | 22: 32         | 43: 46           | 53: 22         | 45: 18         | 46: 17           |
| F. CP Failure                | -              | -              | : 00             | : 00           | : 00           | : 00             |
| G. Poor Propagation          | 459: 48        | 365: 50        | 467: 41          | 260: 42        | 115: 38        | 291: 51          |
| I. Interference              | 30: 02         | 33: 15         | 16: 09           | 6: 41          | 1: 48          | 47: 11           |
| K. Frequency Change          | 79: 48         | 73: 39         | 58: 40           | 58: 43         | 59: 30         | 87: 34           |
| M. Maintenance               | 13: 05         | 15: 33         | : 00             | : 00           | : 00           | : 50             |
| P. Power Failure             | 22: 08         | 9: 51          | 1: 25            | 5: 22          | 6: 47          | 16: 56           |
| <b>TOTAL OUTAGE</b>          | <b>992: 34</b> | <b>909: 17</b> | <b>1,091: 46</b> | <b>711: 55</b> | <b>652: 11</b> | <b>1,185: 35</b> |
| <b>SCHED OPER TIME</b>       | <b>98,785</b>  | <b>104,346</b> | <b>109,968</b>   | <b>106,566</b> | <b>108,963</b> | <b>122,202</b>   |
| <b>RELIABILITY (Percent)</b> | <b>99</b>      | <b>99</b>      | <b>99</b>        | <b>99</b>      | <b>99</b>      | <b>99</b>        |

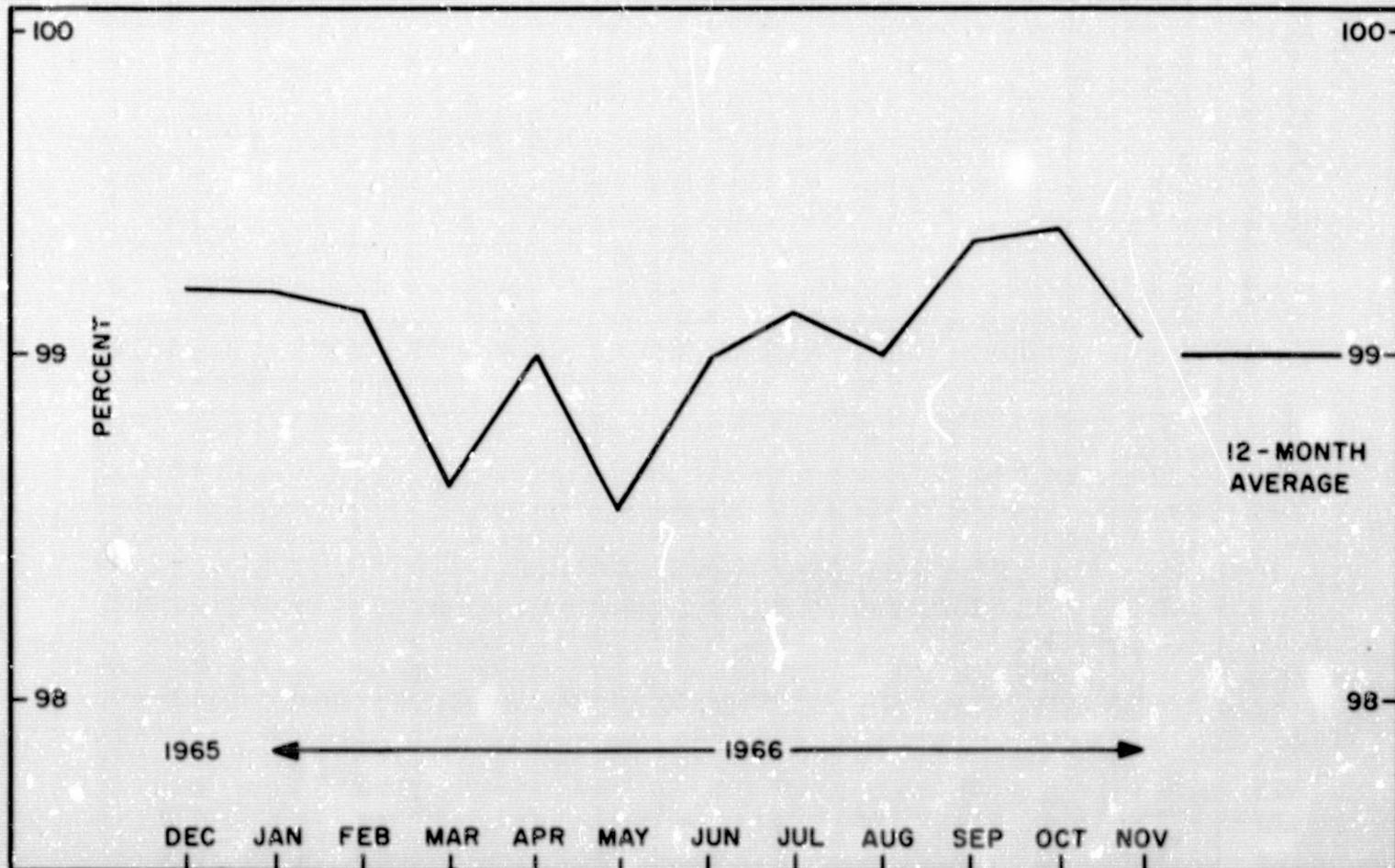


Figure 4. NASCOM Network Voice/Data Reliability for a Period of One Year

**TABLE 6**  
**Outage Time by Trouble Categories, Scheduled Operating Hours,**  
**and Reliability Indexes of Voice/Data Circuits**

| STATION                   | CIRCUIT   | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL LOST TIME | SCHED OPER. HOURS | RELIA-BILITY |
|---------------------------|-----------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-----------------|-------------------|--------------|
| VOICE/DATA                |           |             |         |         |           |            |         |           |                |          |       |          |                 |                   |              |
| Ascension Is.             | NSA-3652  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 390               | 100          |
| Barstow                   | GDA-58452 | -           | 1: 48   | -       | -         | 13: 15     | -       | -         | -              | -        | -     | -        | 15: 03          | 720               | 98           |
|                           | -58672    | -           | 5: 32   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 5: 32           | 720               | 99           |
| Bermuda Island            | GDA-58280 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 720               | 100          |
|                           | -58406    | 5: 05       | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 5: 05           | 720               | 99           |
|                           | -58407    | -           | -       | -       | -         | : 58       | -       | -         | -              | -        | -     | -        | : 58            | 720               | 100          |
|                           | -58523    | -           | 1: 26   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1: 26           | 720               | 100          |
|                           | -58528    | -           | 2: 10   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2: 10           | 720               | 100          |
|                           | -58529    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 720               | 100          |
|                           | -58530    | -           | : 50    | -       | -         | -          | -       | : 10      | -              | -        | -     | -        | 1: 00           | 720               | 100          |
| Canberra/GSFC             | GDA-58175 | -           | : 50    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 50            | 720               | 100          |
|                           | -58449    | -           | 1: 26   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1: 26           | 720               | 100          |
|                           | -58475    | -           | 1: 52   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1: 52           | 720               | 100          |
|                           | -58518    | -           | 27: 02  | -       | -         | -          | -       | -         | -              | -        | -     | -        | 27: 02          | 720               | 96           |
|                           | -58519    | -           | 2: 32   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2: 32           | 720               | 100          |
|                           | -58520    | -           | 4: 52   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 4: 52           | 720               | 99           |
|                           | -58521    | -           | 4: 00   | 1: 25   | -         | -          | -       | -         | -              | -        | -     | -        | 5: 25           | 720               | 99           |
|                           | -58546    | -           | : 58    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 58            | 720               | 100          |
|                           | -58547    | -           | 2: 08   | -       | -         | 1: 38      | -       | -         | -              | -        | -     | -        | 3: 46           | 720               | 99           |
|                           | -58548    | -           | 2: 18   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2: 18           | 720               | 100          |
|                           | -58669    | -           | 4: 13   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 4: 13           | 720               | 99           |
| Canberra/ANBE             | NCV-201   | -           | 3: 42   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3: 42           | 720               | 99           |
|                           | -202      | -           | 16: 47  | -       | -         | -          | -       | -         | -              | -        | -     | -        | 16: 47          | 720               | 98           |
|                           | -203      | -           | 3: 42   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3: 42           | 720               | 99           |
| Canberra/AACT             | NCV-211   | -           | 11: 32  | : 12    | -         | -          | -       | -         | -              | -        | -     | -        | 11: 44          | 720               | 98           |
|                           | -212      | -           | 30: 02  | -       | -         | -          | -       | -         | -              | -        | -     | -        | 30: 02          | 720               | 96           |
| Canberra/Apollo           | NCV-221   | -           | 1: 22   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1: 22           | 720               | 100          |
|                           | -222      | -           | 1: 22   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1: 22           | 720               | 100          |
| Canberra/<br>Toowoomba    | NCV-425   | -           | 12: 10  | : 37    | -         | 3: 38      | -       | -         | -              | -        | -     | -        | 16: 25          | 696               | 98           |
| Canberra via<br>Sydney    | NCV-521   | -           | 4: 27   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 4: 27           | 720               | 99           |
|                           | -522      | -           | 4: 47   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 4: 47           | 720               | 99           |
| Canberra via<br>Melbourne | NCV-531   | -           | 4: 05   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 4: 05           | 720               | 99           |
|                           | -532      | -           | : 41    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 41            | 720               | 100          |
|                           | -533      | -           | 1: 27   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1: 27           | 720               | 100          |
|                           | -534      | -           | : 41    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 41            | 720               | 100          |

TABLE 6 (Continued)

| STATION                     | CIRCUIT   | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL LOST TIME | SCHED OPER. HOURS | RELIA-BILITY |
|-----------------------------|-----------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-----------------|-------------------|--------------|
| Canton Island               | GDA-58476 | : 03        | -       | -       | -         | -          | -       | 1: 36     | -              | -        | -     | -        | 1: 39           | 385               | 100          |
| Cape Kennedy                | GDA-58283 | -           | : 12    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 12            | 543               | 100          |
|                             | -58472    | -           | 1: 40   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1: 40           | 543               | 100          |
|                             | -58473    | -           | 1: 03   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1: 03           | 543               | 100          |
|                             | -58487    | -           | 1: 23   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1: 23           | 543               | 100          |
|                             | -58488    | -           | : 11    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 11            | 543               | 100          |
|                             | -58489    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 543               | 100          |
|                             | -58578    | -           | 6: 20   | -       | 4: 17     | -          | -       | -         | -              | -        | -     | -        | 10: 37          | 543               | 98           |
|                             | -58660    | -           | 4: 55   | -       | -         | 7: 11      | -       | -         | -              | -        | -     | -        | 12: 06          | 543               | 98           |
|                             | -58661    | -           | : 32    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 32            | 543               | 100          |
|                             | -58662    | -           | 2: 10   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2: 10           | 543               | 100          |
|                             | -58663    | -           | 2: 51   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2: 51           | 543               | 99           |
|                             | -58671    | -           | 3: 00   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3: 00           | 543               | 99           |
| Carnarvon/AADE              | NAV-601   | -           | 5: 04   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 5: 04           | 515               | 99           |
|                             | -602      | -           | 1: 27   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1: 27           | 515               | 100          |
| Carnarvon/ACSW              | NCV-631   | -           | 60: 30  | : 53    | -         | -          | -       | -         | -              | -        | -     | -        | 61: 23          | 515               | 88           |
|                             | -632      | -           | 14: 02  | 1: 46   | -         | -          | -       | -         | -              | -        | -     | -        | 15: 48          | 515               | 97           |
|                             | -633      | -           | 11: 20  | 1: 46   | -         | -          | -       | -         | -              | -        | -     | -        | 13: 06          | 515               | 97           |
| Corpus Christi              | GDA-58282 | -           | : 43    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 43            | 428               | 100          |
|                             | -58403    | -           | 2: 59   | -       | -         | : 36       | -       | -         | -              | -        | -     | -        | 3: 35           | 428               | 99           |
|                             | -58522    | -           | 30: 00  | -       | -         | -          | -       | -         | -              | -        | -     | -        | 30: 00          | 428               | 93           |
|                             | -58633    | -           | : 40    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 40            | 428               | 100          |
| Fort Myers                  | GDA-58443 | -           | : 40    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 40            | 720               | 100          |
| Fort Myers/<br>Cape Kennedy | GDA-58470 | -           | 4: 48   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 4: 48           | 720               | 99           |
| Goldstone                   | GDA-58582 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 720               | 100          |
| Grand Canary I. /<br>LLDN   | CYI-1     | -           | : 25    | -       | -         | -          | -       | -         | -              | 6: 11    | -     | -        | 6: 36           | 393               | 98           |
|                             | -2        | -           | : 10    | -       | -         | : 17       | -       | : 44      | : 05           | 7: 21    | -     | -        | 8: 37           | 393               | 98           |
| Grand Canary I. /<br>LRID   | CMV-40    | -           | 10: 32  | -       | -         | 1: 18      | -       | -         | -              | -        | : 10  | -        | 12: 00          | 393               | 97           |
|                             | -41       | -           | 6: 54   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 6: 54           | 393               | 98           |
| Guam                        | GDA-58525 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 205               | 100          |
|                             | P-319     | -           | : 25    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 25            | 205               | 100          |
|                             | -320      | : 03        | 1: 54   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1: 57           | 205               | 99           |
| Guaymas                     | GDA-58422 | -           | 36: 21  | 2: 09   | -         | -          | -       | -         | -              | -        | -     | -        | 38: 30          | 720               | 95           |
|                             | -58500    | -           | : 07    | 2: 09   | -         | 1: 07      | -       | -         | -              | -        | -     | -        | 3: 23           | 720               | 100          |
|                             | -58608    | -           | 3: 22   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3: 22           | 720               | 100          |

TABLE 6 (Continued)

| STATION               | CIRCUIT   | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL LOST TIME | SCHED OPER. HOURS | RELIABILITY |
|-----------------------|-----------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-----------------|-------------------|-------------|
| Honolulu              | GDA-58423 | -           | 2:14    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2:14            | 720               | 100         |
|                       | -58544    | -           | :24     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :24             | 720               | 100         |
|                       | -58545    | -           | 1:23    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:23            | 720               | 100         |
| Houston               | NSA-3655  | -           | 28:50   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 28:50           | 720               | 96          |
|                       | GDA-58191 | -           | -       | -       | -         | 1:20       | -       | -         | -              | -        | -     | -        | 1:20            | 720               | 100         |
|                       | -58192    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100         |
|                       | -58281    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100         |
|                       | -58293    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100         |
|                       | -58294    | 6:36        | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 6:36            | 720               | 99          |
|                       | -58295    | 6:36        | :16     | -       | -         | -          | -       | -         | -              | -        | -     | -        | 6:52            | 720               | 99          |
|                       | -58425    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100         |
| Johannesburg/<br>LLDN | -58681    | -           | :11     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :11             | 720               | 100         |
|                       | NASA-1    | -           | 14:29   | -       | -         | 1:15       | -       | 87:20     | 10:16          | 30:06    | -     | -        | 143:26          | 720               | 80          |
| Kano/LLDN             | -2        | -           | 12:18   | -       | -         | :08        | -       | 72:55     | 7:13           | 29:11    | -     | -        | 121:45          | 720               | 83          |
|                       | LKNO      | 2:25        | -       | -       | :18       | 1:43       | -       | 4:59      | :18            | 1:19     | -     | :07      | 11:09           | 312               | 96          |
| Kauai                 | GDA-58284 | -           | 4:28    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 4:28            | 720               | 99          |
|                       | -58444    | -           | 1:59    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:59            | 720               | 100         |
|                       | -58477    | -           | 8:09    | -       | -         | -          | -       | -         | -              | -        | -     | 1:02     | 9:11            | 720               | 99          |
|                       | -58622    | -           | 20:01   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 20:01           | 720               | 97          |
| Lima                  | GDA-58604 | -           | 5:04    | 1:41    | -         | :41        | -       | 2:51      | 2:19           | 1:13     | -     | 5:34     | 19:23           | 720               | 97          |
|                       | London    | GDA-58288   | -       | :43     | :37       | -          | -       | -         | -              | -        | -     | -        | -               | 1:20              | 720         |
| -58433                |           | :16         | :27     | -       | -         | :34        | -       | -         | -              | -        | -     | -        | 1:17            | 720               | 100         |
| -58434                |           | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100         |
| -58499                |           | -           | 2:19    | -       | -         | 1:43       | -       | -         | -              | -        | -     | -        | 4:02            | 720               | 99          |
| -58549                |           | -           | 1:15    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:15            | 720               | 100         |
| Madrid/LLDN           | -58605    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100         |
|                       | NSA-3656  | -           | :30     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :30             | 720               | 100         |
|                       | DP-1      | :07         | 1:36    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:43            | 673               | 100         |
|                       | -2        | -           | 10:21   | :09     | -         | -          | -       | -         | -              | -        | -     | -        | 10:30           | 673               | 98          |
|                       | -3        | -           | :54     | -       | -         | -          | -       | -         | -              | -        | :10   | -        | 1:04            | 673               | 100         |
|                       | -4        | -           | 11:56   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 11:56           | 673               | 98          |
|                       | -5        | -           | 2:45    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2:45            | 673               | 100         |
| Pasadena              | -6        | -           | 20:22   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 20:22           | 673               | 97          |
|                       | GDA-58160 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100         |
|                       | -58167    | -           | 2:24    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2:24            | 720               | 100         |
|                       | -58186    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100         |

TABLE 6 (Continued)

| STATION                   | CIRCUIT   | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL LOST TIME | SCHED OPER. HOURS | RELIABILITY |
|---------------------------|-----------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-----------------|-------------------|-------------|
| Pasadena                  | GDA-58193 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100         |
|                           | -58195    | -           | 4:07    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 4:07            | 720               | 99          |
|                           | -58445    | -           | :20     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :20             | 720               | 100         |
|                           | -58490    | -           | 1:38    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:38            | 720               | 100         |
|                           | -58491    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100         |
|                           | -58492    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100         |
|                           | NSA-3653  | -           | 5:26    | -       | -         | -          | -       | -         | -              | -        | -     | :11      | 5:37            | 720               | 99          |
| -3654                     | -         | 9:19        | -       | -       | -         | -          | -       | -         | -              | -        | -     | 9:19     | 720             | 99                |             |
| Rosman                    | GDA-58152 | -           | 7:57    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 7:57            | 720               | 99          |
|                           | -58437    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100         |
|                           | -58448    | -           | :36     | -       | -         | :54        | -       | -         | -              | -        | -     | -        | 1:30            | 720               | 100         |
| -58616                    | -         | 1:49        | -       | -       | :56       | -          | -       | -         | -              | -        | -     | 2:45     | 720             | 100               |             |
| Santiago                  | GDA-58153 | -           | 3:09    | -       | -         | -          | :35     | -         | -              | :15      | :30   | -        | 4:29            | 720               | 99          |
| Tananarive/AADE<br>/Paris | NAV-611   | -           | 1:55    | :35     | -         | :20        | -       | 1:56      | -              | :15      | -     | 4:48     | 9:49            | 720               | 99          |
|                           | PARIS     | -           | 5:24    | -       | -         | :05        | -       | 19:19     | -              | 7:18     | -     | :05      | 32:11           | 720               | 96          |
| Wallops Island            | GDA-58299 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 478               | 100         |
| Woomera/AADE              | NAV-511   | -           | :20     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :20             | 720               | 100         |
|                           | -512      | -           | :29     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :29             | 720               | 100         |
|                           | -513      | -           | :10     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :10             | 720               | 100         |
| SHIP STATIONS:            |           |             |         |         |           |            |         |           |                |          |       |          |                 |                   |             |
| Coastal Sentry/<br>AADE   | NAV-606   | -           | 5:12    | -       | -         | :32        | -       | 19:56     | 7:37           | :50      | -     | 1:40     | 35:47           | 321               | 89          |
| Guam                      | TP-117    | -           | 1:01    | -       | -         | 1:12       | -       | 22:20     | 6:27           | :38      | -     | 1:35     | 33:13           | 321               | 90          |
| Japan                     | HULC-88   | -           | 1:22    | -       | -         | 2:02       | -       | 45:45     | 12:54          | :15      | -     | 1:40     | 63:58           | 321               | 80          |
| Rose Knot/ETR<br>/NY      | -         | -           | -       | -       | -         | -          | -       | 4:11      | -              | 1:06     | -     | -        | 5:17            | 246               | 98          |
|                           | GDA-58630 | -           | :16     | -       | -         | -          | -       | 1:01      | -              | :40      | -     | -        | 1:57            | 246               | 99          |
| Total Voice/Data          |           | 21:11       | 583:12  | 13:59   | 4:35      | 43:23      | -       | 285:38    | 47:09          | 86:38    | :50   | 16:42    | 1103:17         | 82,664            | 99          |
| VOICE/FACSIMILE           |           |             |         |         |           |            |         |           |                |          |       |          |                 |                   |             |
| Cape Kennedy              | GFA-58471 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 543               | 100         |
| Gilmore Creek             | GFA-58455 | -           | :38     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :38             | 720               | 100         |
|                           | -58456    | -           | 5:41    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 5:41            | 720               | 99          |
|                           | -58462    | -           | 4:29    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 4:29            | 720               | 99          |
| Hightstown                | GFA-58463 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100         |
| Pasadena                  | GFA-58194 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100         |
| Suitland                  | GFA-58459 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100         |

TABLE 6 (Continued)

| STATION               | CIRCUIT   | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL LOST TIME | SCHED OPER. HOURS | RELIA-BILITY |
|-----------------------|-----------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-----------------|-------------------|--------------|
| Suitland              | GFA-58460 | -           | 19: 59  | -       | -         | -          | -       | -         | -              | -        | -     | -        | 19: 59          | 720               | 97           |
|                       | -58461    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 720               | 100          |
| Wallops Island        | GFA-58453 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 720               | 100          |
|                       | -58454    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 720               | 100          |
| Total Voice/Facsimile |           | -           | 30: 47  | -       | -         | -          | -       | -         | -              | -        | -     | -        | 30: 47          | 7, 743            | 100          |
| VOICE ONLY            |           |             |         |         |           |            |         |           |                |          |       |          |                 |                   |              |
| Ascension Island      | GP-58560  | -           | 15: 03  | -       | -         | -          | -       | 2: 55     | -              | -        | -     | -        | 17: 58          | 390               | 95           |
| Cape Kennedy          | GP-58260  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 543               | 100          |
|                       | -58261    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 543               | 100          |
|                       | -58408    | -           | : 23    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 23            | 543               | 100          |
|                       | -58409    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 543               | 100          |
|                       | -58410    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 543               | 100          |
|                       | -58411    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 543               | 100          |
|                       | -58412    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 543               | 100          |
|                       | -58413    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 543               | 100          |
|                       | -58415    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 720               | 100          |
|                       | -58424    | -           | : 40    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 40            | 720               | 100          |
|                       | -58471    | : 19        | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 19            | 720               | 100          |
|                       | -58508    | -           | -       | -       | -         | 2: 32      | -       | -         | -              | -        | -     | -        | 2: 32           | 720               | 100          |
| Cleveland             | GP-58272  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 168               | 100          |
| College Park          | 74GL-371  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 168               | 100          |
| Eglin AFB             | GP-58402  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 464               | 100          |
| Gilmore Creek         | GP-58431  | -           | 5: 54   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 5: 54           | 720               | 99           |
|                       | -58432    | -           | 5: 54   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 5: 54           | 720               | 99           |
| Hickam                | GP-58621  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 720               | 100          |
| Hightstown            | GP-58674  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 720               | 100          |
| Houston               | GP-58262  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 720               | 100          |
|                       | -58263    | -           | 1: 00   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1: 00           | 720               | 100          |
|                       | -58264    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 720               | 100          |
|                       | -58495    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 720               | 100          |
|                       | -58496    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 720               | 100          |
|                       | -58497    | -           | : 14    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 14            | 720               | 100          |
|                       | -58507    | -           | : 10    | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 10            | 720               | 100          |
|                       | -58680    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 720               | 100          |
| Huntsville            | GP-58465  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | : 00            | 720               | 100          |

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TABLE 6 (Continued)

| STATION                        | CIRCUIT    | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL LOST TIME | SCHED OPER. HOURS | RELIA-BILITY |
|--------------------------------|------------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-----------------|-------------------|--------------|
| New York City                  | FP-28259   | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100          |
|                                | -28608     | -           | :12     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :12             | 720               | 100          |
|                                | GP-58414   | -           | 6:47    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 6:47            | 720               | 99           |
| Pasadena                       | GP-58266   | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100          |
|                                | -58267     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100          |
|                                | -58435     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100          |
|                                | -58476     | -           | :41     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :41             | 720               | 100          |
|                                | -58479     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100          |
|                                | -58505     | -           | :25     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :25             | 720               | 100          |
|                                | -58666     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100          |
|                                | -58667     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100          |
| Point Arguello                 | GP-58270   | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100          |
| Point Arguello/<br>Point Mugu  | GP-58405   | -           | 1:55    | :04     | -         | -          | -       | -         | -              | -        | -     | -        | 1:59            | 720               | 100          |
| Point Mugu                     | GP-58165   | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 720               | 100          |
| Quito                          | GP-58150   | -           | -       | :07     | :10       | -          | -       | 2:25      | -              | :45      | -     | -        | 3:27            | 720               | 100          |
| Suitland                       | 74GL-59    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 168               | 100          |
|                                | -60        | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 168               | 100          |
| Wallops Island                 | GP-58401   | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 478               | 100          |
|                                | -58427     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 478               | 100          |
| Washington                     | NASA-HQ    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 168               | 100          |
|                                | 74GL-95    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 168               | 100          |
|                                | -1596      | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 168               | 100          |
|                                | -1967      | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | :00             | 168               | 100          |
| White Sands                    | GP-58404   | -           | 1:11    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1:11            | 370               | 100          |
| Winkfield/LLDN                 | PWLR-47229 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | :10      | :10             | 720               | 100          |
| SHIP STATION:<br>Wheeling/HONO | GP-58628   | :03         | -       | -       | -         | :22        | -       | :53       | :02            | :11      | -     | :04      | 1:35            | 335               | 100          |
| Total Voice Only               |            | :22         | 40:29   | :11     | :10       | 2:54       | -       | 6:13      | :02            | :56      | -     | :14      | 51:31           | 31,795            | 100          |
| Total Network Outage: 1185:35  |            |             |         |         |           |            |         |           |                |          |       |          |                 |                   |              |
| Total Voice/Data               |            | 21:11       | 583:12  | 13:59   | 4:35      | 43:23      | -       | 285:38    | 47:09          | 86:38    | :50   | 16:42    | 1103:17         | 82,664            |              |
| Total Voice/Facsimile          |            | -           | 30:47   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 30:47           | 7,743             |              |
| Total Voice Only               |            | :22         | 40:29   | :11     | :10       | 2:54       | -       | 6:13      | :02            | :56      | -     | :14      | 51:31           | 31,795            |              |
| Outage Totals                  |            | 21:33       | 654:28  | 14:10   | 4:45      | 46:17      | -       | 291:51    | 47:11          | 87:34    | :50   | 16:56    | 1185:35         | 122,202           | 99           |

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TABLE 7

NASCOM Network Voice/Data Interruptions by Trouble Categories

| STATION                | CIRCUIT   | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FERENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL | AVG DURATION |
|------------------------|-----------|-------------|---------|---------|-----------|------------|---------|-----------|---------------|----------|-------|----------|-------|--------------|
| VOICE/DATA             |           |             |         |         |           |            |         |           |               |          |       |          |       |              |
| Ascension Island       | NSA-3652  | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 0     | :00          |
| Barstow                | GDA-58452 | -           | 3       | -       | -         | 1          | -       | -         | -             | -        | -     | -        | 4     | 3:46         |
|                        | -58672    | -           | 3       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 3     | 1:51         |
| Bermuda Island         | GDA-58280 | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 0     | :00          |
|                        | -58406    | 1           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | 5:05         |
|                        | -58407    | -           | -       | -       | -         | 1          | -       | -         | -             | -        | -     | -        | 1     | :58          |
|                        | -58523    | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | 1:26         |
|                        | -58528    | -           | 2       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 2     | 1:05         |
|                        | -58529    | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 0     | :00          |
|                        | -58530    | -           | 1       | -       | -         | -          | -       | 1         | -             | -        | -     | -        | 2     | :30          |
| Canberra/GSFC          | GDA-58175 | -           | 2       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 2     | :25          |
|                        | -58449    | -           | 3       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 3     | :29          |
|                        | -58475    | -           | 5       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 5     | :22          |
|                        | -58518    | -           | 6       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 6     | 4:30         |
|                        | -58519    | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | 2:32         |
|                        | -58520    | -           | 3       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 3     | 1:37         |
|                        | -58521    | -           | 2       | 1       | -         | -          | -       | -         | -             | -        | -     | -        | 3     | 1:48         |
|                        | -58546    | -           | 2       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 2     | :29          |
|                        | -58547    | -           | 4       | -       | -         | 1          | -       | -         | -             | -        | -     | -        | 5     | :45          |
|                        | -58548    | -           | 5       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 5     | :28          |
|                        | -58669    | -           | 5       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 5     | :51          |
| Canberra/ANBE          | NCV-201   | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | 3:42         |
|                        | -202      | -           | 3       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 3     | 5:36         |
|                        | -203      | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | 3:42         |
| Canberra/AACT          | NCV-211   | -           | 2       | 1       | -         | -          | -       | -         | -             | -        | -     | -        | 3     | 3:55         |
|                        | -212      | -           | 3       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 3     | 10:01        |
| Canberra/Apollo        | NCV-221   | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | 1:22         |
|                        | -222      | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | 1:22         |
| Canberra/Toowoomba     | NCV-425   | -           | 16      | 2       | -         | 2          | -       | -         | -             | -        | -     | -        | 20    | :49          |
| Canberra via Sydney    | NCV-521   | -           | 2       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 2     | 2:14         |
|                        | -522      | -           | 3       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 3     | 1:36         |
| Canberra via Melbourne | NCV-531   | -           | 4       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 4     | 1:01         |
|                        | -532      | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | :41          |
|                        | -533      | -           | 3       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 3     | :29          |

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TABLE 7 (Continued)

| STATION                 | CIRCUIT   | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FERENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL | AVG DURATION |
|-------------------------|-----------|-------------|---------|---------|-----------|------------|---------|-----------|---------------|----------|-------|----------|-------|--------------|
| Canberra via Melbourne  | NCV-534   | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | :41          |
| Canton Island           | GDA-58478 | 1           | -       | -       | -         | -          | -       | 1         | -             | -        | -     | -        | 2     | :50          |
| Cape Kennedy            | GDA-58283 | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | :12          |
|                         | -58472    | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | 1:40         |
|                         | -58473    | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | 1:03         |
|                         | -58487    | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | 1:23         |
|                         | -58488    | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | :11          |
|                         | -58489    | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 0     | :00          |
|                         | -58578    | -           | 1       | -       | 1         | -          | -       | -         | -             | -        | -     | -        | 2     | 5:19         |
|                         | -58660    | -           | 2       | -       | -         | 1          | -       | -         | -             | -        | -     | -        | 3     | 4:02         |
|                         | -58661    | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | :32          |
|                         | -58662    | -           | 3       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 3     | :43          |
|                         | -58663    | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | 2:51         |
|                         | -58671    | -           | 2       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 2     | 1:30         |
| Carnarvon/AADE          | NAV-601   | -           | 5       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 5     | 1:01         |
|                         | -602      | -           | 2       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 2     | :44          |
| Carnarvon/ACSW          | NCV-631   | -           | 8       | 1       | -         | -          | -       | -         | -             | -        | -     | -        | 9     | 6:49         |
|                         | -632      | -           | 6       | 2       | -         | -          | -       | -         | -             | -        | -     | -        | 8     | 1:59         |
|                         | -633      | -           | 5       | 2       | -         | -          | -       | -         | -             | -        | -     | -        | 7     | 1:52         |
| Corpus Christi          | GDA-58282 | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | :43          |
|                         | -58403    | -           | 5       | -       | -         | 1          | -       | -         | -             | -        | -     | -        | 6     | :36          |
|                         | -58522    | -           | 4       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 4     | 7:30         |
|                         | -58633    | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | :40          |
| Fort Myers              | GDA-58443 | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | :40          |
| Fort Myers/Cape Kennedy | GDA-58470 | -           | 2       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 2     | 2:24         |
| Goldstone               | GDA-58582 | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 0     | :00          |
| Grand Canary I./LLDN    | CYI-1     | -           | 1       | -       | -         | -          | -       | -         | -             | 68       | -     | -        | 69    | :06          |
|                         | -2        | -           | 1       | -       | -         | 2          | -       | 3         | 1             | 66       | -     | -        | 73    | :07          |
| Grand Canary I./LRID    | CMV-40    | -           | 16      | -       | -         | 2          | -       | -         | -             | -        | 1     | -        | 19    | :38          |
|                         | -41       | -           | 6       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 6     | 1:09         |
| Guam                    | GDA-58525 | -           | -       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 0     | :00          |
|                         | P-319     | -           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 1     | :25          |
|                         | -320      | 1           | 1       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 2     | :59          |
| Guaymas                 | GDA-58422 | -           | 7       | 2       | -         | -          | -       | -         | -             | -        | -     | -        | 9     | 4:17         |
|                         | -58500    | -           | 1       | 2       | -         | 1          | -       | -         | -             | -        | -     | -        | 4     | :51          |
|                         | -58608    | -           | 4       | -       | -         | -          | -       | -         | -             | -        | -     | -        | 4     | :51          |

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TABLE 7 (Continued)

| STATION           | CIRCUIT   | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL | AVG DURA-TION |
|-------------------|-----------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-------|---------------|
| Honolulu          | GDA-58423 | -           | 4       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 4     | :34           |
|                   | -58544    | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2     | :12           |
|                   | -58545    | -           | 5       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 5     | :17           |
| Houston           | NSA-3655  | -           | 10      | -       | -         | -          | -       | -         | -              | -        | -     | -        | 10    | 2:53          |
|                   | GDA-58191 | -           | -       | -       | -         | 1          | -       | -         | -              | -        | -     | -        | 1     | 1:20          |
|                   | -58192    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                   | -58281    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                   | -58293    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                   | -58294    | 2           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2     | 3:18          |
|                   | -58295    | 2           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3     | 2:17          |
|                   | -58425    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
| Johannesburg/LLDN | -58681    | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | :11           |
|                   | NASA-1    | -           | 19      | -       | -         | 2          | -       | 68        | 6              | 135      | -     | -        | 230   | :37           |
| Kano/LLDN         | -2        | -           | 17      | -       | -         | 1          | -       | 60        | 4              | 134      | -     | -        | 216   | :34           |
|                   | LKNO      | 1           | -       | -       | 1         | 2          | -       | 8         | 2              | 6        | -     | 1        | 21    | :32           |
| Kauai             | GDA-58284 | -           | 3       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3     | 1:29          |
|                   | -58444    | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2     | :60           |
|                   | -58477    | -           | 6       | -       | -         | -          | -       | -         | -              | -        | -     | 1        | 7     | 1:19          |
|                   | -58622    | -           | 5       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 5     | 4:00          |
| Lima              | GDA-58604 | -           | 2       | 5       | -         | 2          | 6       | 3         | 7              | -        | 2     | 27       | :43   |               |
| London            | GDA-58288 | -           | 3       | 1       | -         | -          | -       | -         | -              | -        | -     | -        | 4     | :20           |
|                   | -58433    | 1           | 1       | -       | -         | 2          | -       | -         | -              | -        | -     | -        | 4     | :19           |
|                   | -58434    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                   | -58499    | -           | 4       | -       | -         | 3          | -       | -         | -              | -        | -     | -        | 7     | :35           |
|                   | -58549    | -           | 3       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3     | :25           |
|                   | -58605    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
| Madrid/LLDN       | NSA-3656  | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | :30           |
|                   | DP-1      | 2           | 3       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 5     | :21           |
|                   | -2        | -           | 6       | 1       | -         | -          | -       | -         | -              | -        | -     | -        | 7     | 1:30          |
|                   | -3        | -           | 5       | -       | -         | -          | -       | -         | -              | -        | 1     | -        | 6     | :11           |
|                   | -4        | -           | 10      | -       | -         | -          | -       | -         | -              | -        | -     | -        | 10    | 1:12          |
|                   | -5        | -           | 8       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 8     | :21           |
| Pasadena          | -6        | -           | 13      | -       | -         | -          | -       | -         | -              | -        | -     | -        | 13    | 1:34          |
|                   | GDA-58160 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                   | -58167    | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | 2:24          |
|                   | -58186    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |

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TABLE 7 (Continued)

| STATION                                | CIRCUIT   | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL | AVG DURA-TION |
|----------------------------------------|-----------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-------|---------------|
| Pasadena                               | GDA-58193 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                                        | -58195    | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2     | 2:04          |
|                                        | -58445    | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | :20           |
|                                        | -58490    | -           | 3       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3     | :33           |
|                                        | -58491    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                                        | -58492    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                                        | NSA-3653  | -           | 3       | -       | -         | -          | -       | -         | -              | -        | -     | 1        | 4     | 1:24          |
| -3654                                  | -         | 3           | -       | -       | -         | -          | -       | -         | -              | -        | -     | 3        | 3:06  |               |
| Rosman                                 | GDA-58152 | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2     | 3:59          |
|                                        | -58437    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                                        | -58448    | -           | 1       | -       | -         | 1          | -       | -         | -              | -        | -     | -        | 2     | :45           |
|                                        | -58616    | -           | 2       | -       | -         | 1          | -       | -         | -              | -        | -     | -        | 3     | :55           |
| Santiago                               | GDA-58153 | -           | 4       | -       | -         | -          | 2       | -         | 1              | 1        | -     | 8        | :34   |               |
| Tananarive/AADE<br>/Paris              | NAV-611   | -           | 3       | 1       | -         | 1          | -       | 3         | -              | 1        | -     | 2        | 11    | :54           |
|                                        | PARIS     | -           | 13      | -       | -         | 1          | -       | 16        | -              | 22       | -     | 1        | 53    | :36           |
| Wallops Island                         | GDA-58299 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
| Woomera/AADE                           | NAV-511   | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2     | :10           |
|                                        | -512      | -           | 3       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3     | :10           |
|                                        | -513      | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | :10           |
| SHIP STATIONS:                         |           |             |         |         |           |            |         |           |                |          |       |          |       |               |
| Coastal Sentry/AADE<br>/Guam<br>/Japan | NAV-606   | -           | 2       | -       | -         | 1          | -       | 17        | 13             | 4        | -     | 1        | 38    | :57           |
|                                        | TP-117    | -           | 1       | -       | -         | 2          | -       | 20        | 9              | 3        | -     | 1        | 36    | :55           |
|                                        | HULC-88   | -           | 2       | -       | -         | 3          | -       | 33        | 16             | 1        | -     | 1        | 56    | 1:09          |
| Rose Knot/ETR<br>/New York             | GDA-58630 | -           | -       | -       | -         | -          | -       | 3         | -              | 4        | -     | -        | 7     | :45           |
| Total Voice/Data                       |           | 11          | 368     | 21      | 2         | 35         | -       | 244       | 54             | 456      | 3     | 11       | 1205  | :55           |
| VOICE/FACSIMILE                        |           |             |         |         |           |            |         |           |                |          |       |          |       |               |
| Cape Kennedy                           | GFA-58471 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
| Gilmore Creek                          | GFA-58455 | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2     | :19           |
|                                        | -58456    | -           | 6       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 6     | :57           |
|                                        | -58462    | -           | 4       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 4     | 1:07          |
| Hightstown                             | GFA-58463 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | 0        | :00   |               |
| Pasadena                               | GFA-58194 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | 0        | :00   |               |
| Suitland                               | GFA-58459 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | 0        | :00   |               |

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TABLE 7 (Continued)

| STATION               | CIRCUIT   | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL | AVG DURA-TION |
|-----------------------|-----------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-------|---------------|
| Suitland              | GFA-58460 | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2     | :10           |
|                       | -58461    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
| Wallops Island        | GFA-58453 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                       | -58454    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
| Total Voice/Facsimile |           | -           | 14      | -       | -         | -          | -       | -         | -              | -        | -     | -        | 14    | 2:12          |
| VOICE ONLY            |           |             |         |         |           |            |         |           |                |          |       |          |       |               |
| Ascension Island      | GP-58560  | -           | 5       | -       | -         | -          | -       | 2         | -              | -        | -     | -        | 7     | 2:34          |
| Cape Kennedy          | GP-58260  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                       | -58261    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                       | -58408    | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | :23           |
|                       | -58409    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                       | -58410    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                       | -58411    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                       | -58412    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                       | -58413    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                       | -58415    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                       | -58424    | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | :40           |
|                       | -58471    | 1           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | :19           |
|                       | -58508    | -           | -       | -       | -         | 1          | -       | -         | -              | -        | -     | -        | 1     | 2:32          |
| Cleveland             | GP-58272  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
| College Park          | 74GL-371  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
| Eglin AFB             | GP-58402  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
| Gilmore Creek         | GP-58431  | -           | 6       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 6     | :59           |
|                       | -58432    | -           | 6       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 6     | :59           |
| Hickam                | GP-58621  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
| Hightstown            | GP-58674  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
| Houston               | GP-58262  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                       | -58263    | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | 1:00          |
|                       | -58264    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                       | -58495    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                       | -58496    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                       | -58497    | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | :14           |
|                       | -58507    | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | :10           |
|                       | -58680    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |

TABLE 7 (Continued)

| STATION                           | CIRCUIT    | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL | AVG DURA-TION |
|-----------------------------------|------------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-------|---------------|
| Huntsville                        | GP-58465   | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
| New York City                     | FP-28259   | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                                   | -28608     | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | :12           |
|                                   | GP-58414   | -           | 3       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 3     | 2:16          |
| Pasadena                          | GP-58266   | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                                   | -58267     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                                   | -58435     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                                   | -58476     | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2     | :21           |
|                                   | -58479     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                                   | -58505     | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | :25           |
|                                   | -58666     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                                   | -58667     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
| Point Arguello                    | GP-58270   | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
| Point Arguello/Point Mugu         | GP-58405   | -           | 2       | 1       | -         | -          | -       | -         | -              | -        | -     | -        | 3     | :40           |
| Point Mugu                        | GP-58165   | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2     | :00           |
| Quito                             | GP-58150   | -           | -       | 1       | 1         | -          | -       | 5         | -              | 2        | -     | -        | 9     | :23           |
| Satiland                          | 74GL-59    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                                   | -60        | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
| Wallops Island                    | GP-58401   | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                                   | -58427     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
| Washington                        | NASA-HQ    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                                   | 74GL-95    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                                   | -1596      | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
|                                   | -1967      | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 0     | :00           |
| White Sands                       | GP-58404   | -           | 2       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 2     | :36           |
| Winkfield/LLDN                    | PWLR-47229 | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | 1        | 1     | :10           |
| SHIP STATION:                     |            |             |         |         |           |            |         |           |                |          |       |          |       |               |
| Wheeling/HONO                     | GP-58628   | 1           | -       | -       | -         | 4          | -       | 3         | 1              | 2        | -     | 1        | 12    | :08           |
| Total Voice Only                  |            | 2           | 33      | 2       | 1         | 5          | -       | 10        | 1              | 4        | -     | 2        | 60    | :52           |
| Total Network Interruptions: 1279 |            |             |         |         |           |            |         |           |                |          |       |          |       |               |
| Total Voice/Data                  |            | 11          | 368     | 21      | 2         | 35         | -       | 244       | 54             | 456      | 3     | 11       | 1205  |               |
| Total Voice/Facsimile             |            | -           | 14      | -       | -         | -          | -       | -         | -              | -        | -     | -        | 14    |               |
| Total Voice Only                  |            | 2           | 33      | 2       | 1         | 5          | -       | 10        | 1              | 4        | -     | 2        | 60    |               |
| Interruption Totals               |            | 13          | 415     | 23      | 3         | 40         | -       | 254       | 55             | 460      | 3     | 13       | 1279  | :56           |

**TABLE 8**  
**NASCOM Network Voice/Data Outage**  
**Time by Months for a Period of One Year**

| MONTH      | NUMBER OF STATIONS | NUMBER OF CIRCUITS | OUTAGE TIME (Hours and Minutes) | INTERRUPTIONS | AVERAGE DURATION OF INTERRUPTIONS |
|------------|--------------------|--------------------|---------------------------------|---------------|-----------------------------------|
| Nov (1966) | 46                 | 195                | 1, 185: 35                      | 1, 279        | : 56                              |
| Oct (1966) | 43                 | 174                | 652: 11                         | 928           | : 42                              |
| Sep (1966) | 45                 | 172                | 711: 55                         | 1, 033        | : 41                              |
| Aug (1966) | 45                 | 173                | 1, 091: 46                      | 1, 116        | : 59                              |
| Jul (1966) | 44                 | 163                | 909: 17                         | 1, 087        | : 50                              |
| Jun (1966) | 44                 | 162                | 992: 34                         | 1, 204        | : 50                              |
| May (1966) | 43                 | 153                | 1, 347: 20                      | 1, 148        | 1: 10                             |
| Apr (1966) | 39                 | 152                | 845: 28                         | 726           | 1: 10                             |
| Mar (1966) | 42                 | 139                | 1, 131: 13                      | 1, 195        | : 57                              |
| Feb (1966) | 39                 | 127                | 652: 56                         | 613           | 1: 04                             |
| Jan (1966) | 38                 | 126                | 536: 42                         | 531           | 1: 01                             |
| Dec (1965) | 42                 | 152                | 722: 56                         | 831           | : 52                              |

### DATA SOURCES

The data or information used in preparing this report has been obtained from:

Trouble Tickets (GSFC Form 22-35)

Analyses of Circuit Operations (GSFC Form 22-10)

NASA Circuit Logs (GSFC Form 22-8T)

Daily Communication Reports (DCR)

The Trouble Tickets and Daily Communication Reports provide most of the data or information used. To provide a "common denominator" for recording and interpreting trouble data, various trouble codes have been devised. These codes are used by the Facilities Control Group in writing the Trouble Tickets. The troubles are extracted and classified on the basis of these codes, permitting interruption patterns to be determined quantitatively. Code letter designations are shown in Table 5.

Whenever a discrepancy or an ambiguity appears in the Trouble Tickets or in any of the other data sources listed above, Network Review and Analysis Branch personnel then contact the site or station involved to clarify, correct, or reconcile the data. The troubles have been re-classified by the analysts in order to separate NASA troubles from common carrier troubles.

## SPECIFIC PROBLEMS

### BARSTOW

Circuit GDA-58452 decreased in reliability by one percentage point to 98 percent due primarily to two significant outages. A faulty intercom at the site on November 2 caused a 13:15 hours interruption and common carrier adjustments between Barstow and San Bernardino, California were responsible for a 1:32 hours outage on November 18.

The 99 percent reliability index of circuit GDA-58672 was caused primarily by an unknown common carrier failure of 4:41 hours on November 4.

### CANBERRA

Circuit GDA-58518 was 96 percent reliable. Significant common carrier outages occurred as follows: on November 16/17 an open circuit at Oakland, California caused 4:22 hours of downtime; on November 18/19 the circuit was interrupted for 18:30 hours and restored when RCA installed an equalizer at San Francisco; on November 22, 1:06 hours because of low levels between Canberra and San Francisco; and on November 23, for 1:51 hours due to an equalizer problem at Sydney, Australia.

Both circuits Canberra/ANBE, NCV-201 and -203 decreased in reliability by one percentage point to 99 percent. A severed cable at Mount Stromlo interrupted circuits NCV-201, -202 and -203 on November 29 for 3:42 hours. Circuit NCV-202 dropped in reliability by two percentage points to 98 percent. In addition to the outage listed above, the circuit experienced an interruption at Canberra, Australia on each day November 22 and November 23 for 7:30 hours and 5:35 hours, respectively, with both outages due to an open circuit condition. On these three circuits all lost time was due to common carrier troubles.

The Canberra/AACT circuit NCV-211 remained 98 percent reliable. A grounded amplifier at PMG Central, Canberra caused 1:16 hours of outage on November 8 and a cable failure at Tharwa on November 26 was responsible for a 10:16 hour interruption.

The reliability of circuit NCV-212 decreased by four percentage points to 96 percent. An amplifier adjustment at PMG Canberra on November 21 caused 1:18 hours of lost time. After the amplifier adjustment was made, the circuit remained out for 27:28 hours because of a cable failure between Canberra and the site. The circuit was restored on November 22. The outage of 1:16 hours on November 8 discussed under NCV-211 also affected NCV-212.

The Canberra/Toowoomba NCV-425 circuit dropped in reliability by one percentage point to 98 percent. Common carrier outages accounted for 74 percent of the 16:25 hours of total lost time. Major interruptions are as follows: a cable failure of 1:40 hours duration on November 2 and a microwave failure of 1:15 hours duration on November 10, both between Brisbane and Sydney; a microwave failure between Sydney and Lismore on November 15 caused 2:42 hours of outage and a site equipment failure caused an outage of 3:08 hours on November 19.

Both Canberra via Sydney circuits, NCV-521 and -522, were 99 percent reliable, a drop of one percent when compared to the previous month's figures. A common carrier facility outage due to an unknown cause between Canberra and Adelaide was responsible for 2:55 hours of lost time on November 26 and a common carrier failure between Sydney and Canberra caused 1:32 hours of downtime on November 29. The two outages affected both circuits.

The NCV-531 Canberra via Melbourne circuit decreased in reliability to 99 percent. An equipment failure between Adelaide and Canberra was responsible for 1:39 hours of outage on November 22 and a system failure between Adelaide and Melbourne caused a 1:30 hours outage on November 26.

#### CAPE KENNEDY

Circuit GDA-58578 dropped in reliability by two percentage points to 98 percent. An unknown common carrier failure on November 17 caused 6:20 hours of lost time and an equipment adjustment at the site (Merritt Island) resulted in 4:17 hours of outage on November 23/24.

The reliability of circuit GDA-58660 decreased by two percentage points to 98 percent. Two common carrier failures were responsible for 4:55 hours out of the 12:06 hours of total lost time. The first; a microwave failure between Charlotte, North Carolina and Waldorf, Maryland on November 5; lasted for 1:33 hours. The outage also affected GDA-58662. The second interruption was due to an undetermined common carrier failure on November 18 for 3:22 hours. An equipment failure at the site on November 23 resulted in 7:11 hours of lost time.

The reliability of the GDA-58663 circuit was 99 percent with the most significant outage occurring on November 13 for 2:51 hours due to an undetermined common carrier failure.

Circuit GDA-58671 was 99 percent reliable. A patch pulled in error at Monrovia on November 2 resulted in an outage of 2:33 hours.

#### CARNARVON

The NAV-601 circuit was 99 percent reliable with all outages recorded during the month occurring on common carrier facilities. Outages of significant duration include that on November 16 when a cable break west of Gascoyne Junction caused an outage of 1:22 hours and that on November 21 when unauthorized maintenance by PMG Carnarvon interrupted the circuit for 3:00 hours.

The NCV-631 circuit was only 88 percent reliable. The major cause of the low reliability for the month was the noisy circuit condition that commenced on November 22 and continued into November 24, when the circuit was released to PMG Canberra for maintenance work. A total of 43:15 hours outage was recorded during this period. The circuit failed again on November 25/26 due to a carrier failure between Adelaide and Melbourne, accumulating 14:47 hours outage. Circuit outage time was recorded only

during the hours that the site was scheduled for operation in the network. Two additional significant interruptions were observed; on November 16 the cable break of 1:22 hours discussed under NAV-601 and on November 30 a carrier failure between Perth and Carnarvon interrupted the circuit for 1:01 hours.

The NCV-632 and NCV-633 circuits were 97 percent reliable. Significant outages common to both circuits include that on November 2/3 when a faulty repeater between Kalgoorlie and Perth caused an interruption of 1:10 hours, on November 16 for 5:30 hours due to a cable break west of Gascoyne Junction and the 3:00 hours unauthorized maintenance on November 21 discussed under NAV-601. The NCV-632 circuit was out for 2:38 hours November 21 when a patch was removed by mistake at PMG Melbourne.

#### CORPUS CHRISTI

During the 428 hours of scheduled operating time, circuit GDA-58403 achieved a reliability index of 99 percent. Although no significant common carrier outages exceeding one hour occurred, five interruptions totaled 2:59 hours.

Circuit GDA-58522 decreased in reliability by seven percentage points to 93 percent. Significant common carrier interruptions which affected the reliability are as follows: on November 9, 6:05 hours due to an equipment failure at ATT Greenbelt and an undetermined common carrier failure over November 28/29 for 1:25 hours, November 29 for 11:30 hours and November 30 for 11:00 hours. Reequalization by ATT Washington was required to restore this circuit to specifications.

#### FORT MYERS/CAPE KENNEDY

Circuit GDA-58470 was 99 percent reliable for the month. A microwave failure on November 2 between Fort Myers and Miami, Florida caused 4:29 hours of lost time.

#### GILMORE CREEK

The reliability of circuits GFA-58456, GFA-58462, GP-58431, and GP58432 was 99 percent. All four circuits were affected by one major interruption of 3:47 hours duration on November 22. This interruption was caused by an ATT microwave failure due to a defective rectifier and burned battery cables at Big Timber, Montana.

#### GRAND CANARY ISLAND

The reliability of circuit CMV-40 decreased by one percentage point to 97 percent with four significant interruptions during the month. The first major outage of 3:10 hours occurred on November 9 due to a wideband failure at Hornachos, Spain and, on November 11, a broken wire and mispatch at Las Palmas resulted in 1:21 hours of outage. In-house checks at the Grand Canary site on November 17 caused a 1:03 hours interruption. On November 18, the circuit was out for 1:26 hours as a result of incorrect levels between Las Palmas and Madrid.

Circuit CMV-41 achieved a reliability of 98 percent primarily caused by one significant common carrier outage. This interruption, for 5:15 hours, occurred on November 13 due to a microwave failure at Las Palmas.

## GUAYMAS

Circuit GDA-58422 achieved a reliability of 95 percent, a decrease of five percentage points. Three major interruptions caused 36:31 hours of circuit outage time. An undetermined common carrier trouble interrupted the circuit for 5:00 hours on November 22. An outage which occurred at 1835Z on November 29 continued through November 30 and into December for a total of 29:25 hours during the month. The exact cause of this outage is unknown but it is attributed to common carrier maintenance at Nogales, Mexico. Due to inattention by a site operator at Guaymas, the circuit was out for 2:06 hours on November 24.

## HONOLULU

The reliability of circuit NSA-3655 was 96 percent. Six major interruptions resulted in 26:19 hours of circuit outage time. On November 3/4 a WUT system failure at Romney, West Virginia caused 18:12 hours of outage; two outages of unknown origin resulted in 3:55 hours of outage time on November 8; a system failure between Oakland and San Francisco, on November 9, caused 1:43 hours of outage; on November 27, unauthorized maintenance by RCA San Francisco interrupted service for 1:00 hour, and on November 30, an equipment problem at GSFC caused 1:29 hours of outage.

## HOUSTON

Circuits GDA-58294 and GDA-58295 each achieved a reliability of 99 percent. One major outage of 6:36 hours duration affected both circuits on November 2/3 when the common carrier at Houston had taken the circuits for maintenance without prior release from GSFC Voice Control.

## JOHANNESBURG

Circuits NASA-1 and NASA-2 achieved reliabilities of 80 percent and 83 percent respectively. For the NASA-1 circuit, it was a decrease in reliability of 12 percentage points, and for NASA-2, a decrease of 10 percentage points. Radio path anomalies were responsible for 89 percent of the total of 143:26 hours outage time on NASA-1 and for 90 percent of the 121:45 hours total outage time on NASA-2.

Both circuits encountered two major interruptions. On November 18, NASA-1 was out for 7:25 hours and NASA-2 for 6:28 hours as the result of a system failure between Derdepoort and the site. On November 28, both circuits were interrupted for 1:20 hours because of equipment maintenance at Pretoria.

## KAUAI ISLAND

The GDA-58284 circuit was 99 percent reliable with two significant interruptions reported during the month. On November 11/12, the circuit was reported by GSFC Voice Control to be highly impaired between Honolulu and Kauai Island for 2:29 hours and on November 18, a power failure at Puukapele interrupted the circuit for 1:25 hours.

The GDA-58477 circuit was 99 percent reliable. Four outages of significant duration were observed. On November 1, a loose connection at Hanapepe interrupted the circuit

for 1:16 hours. On November 18 a power failure at Puukapele caused an outage of 1:25 hours and, on November 20, an undetermined trouble between Honolulu and Kauai Island interrupted the circuit for 4:09 hours. On November 24 a power failure at the site caused an outage of 1:02 hours.

The GDA-58622 circuit was only 97 percent reliable. Three interruptions of significant duration were recorded during the month. On November 2, the circuit was out due to an unknown cause between Honolulu and Kauai for 3:43 hours and a power failure at Puukapele caused an outage of 1:25 hours on November 18. The circuit failed on November 19 for 13:39 hours without the source of the interruption being determined other than being on HAWTEL facilities.

#### LONDON

Circuit GDA-58499, with a reliability of 99 percent, was the only London circuit that did not meet the NASCOM circuit reliability standard. Accumulated minor outages totaling 4:02 hours caused the decrease in reliability. These were distributed between common carrier faults and NASA London equipment failures.

#### MADRID

Circuits DP-2 and DP-4 had a reliability of 98 percent, circuit DP-5 achieved a reliability of 99 percent and the DP-6 circuit was only 97 percent reliable.

Major interruptions which affected the Madrid circuits are as follows: DP-2 and DP-4 were interrupted for 1:05 hours on November 3 as the result of a coax failure in France; DP-4 for 1:10 hours on November 10 due to equipment troubles at Madrid; on November 24, DP-2, DP-4 and DP-6 were interrupted for 8:15 hours because of a systems failure between Perpignan and Lyon, France and DP-6 was out for 7:53 hours on November 25 as a result of cable trouble in France.

The DP-5 circuit failed to meet the NASCOM standard due to the total 2:45 hours of accumulated common carrier outage.

#### NEW YORK

The reliability of circuit GP-58414 was 99 percent. Two significant common carrier outages occurred as follows: on November 7, 2:13 hours due to a broken wire in the frame room at ATT Washington and, on November 29, 4:27 hours due to a shorted cable pair at New York City.

#### PASADENA

The GDA-58195 circuit was 99 percent reliable. On November 10 a carrier failure due to an unknown cause interrupted the circuit for 3:25 hours.

The NSA-3653 circuit had a reliability of 99 percent. Two significant outages were reported during the month. On November 21 a carrier failure due to an unknown cause interrupted the circuit for 2:14 hours. On November 25 the circuit was out for 2:40 hours due to a cable fault between Washington and Chicago.

The NSA-3654 circuit was 99 percent reliable. Three significant outages occurred during the month. On November 8 faulty equipment at ATT Greenbelt caused an outage of 4:50 hours duration. On November 21 the circuit was out for 2:14 hours due to the unknown cause discussed under NSA-3653. A carrier failure between Mount Aukum and Clarkston on November 25 caused an outage of 2:15 hours duration.

#### ROSMAN

Circuit GDA-58152 was 99 percent reliable. One significant interruption of 7:35 hours duration occurred on November 17 due to a faulty amplifier at Brevard, North Carolina.

#### SUITLAND

The reliability of circuit GFA-58460 declined by three percentage points to 97 percent with two notable outages during the month. On November 1, an outage of 10:09 hours was caused by a missing jumper wire at Suitland and an incorrect jumper connection at Greenbelt, Maryland. A faulty heat coil at Suitland caused an interruption to the circuit for 9:50 hours on November 17. In both instances, ATT personnel were not available to perform checks at Suitland until morning and this contributed to the length of the outages.

#### SHIP STATION

##### COASTAL SENTRY

The NAV-606 circuit was 89 percent reliable. Poor propagation and interference caused 77 percent of the total outage time of 35:47 hours. Two significant outages were observed during the month. On November 2, low levels on the carrier between Maylands and Bassendean in Perth, Australia caused a 5:05 hours interruption and a shipboard power failure November 9 caused an outage of 1:40 hours.

The TP-117 circuit had a reliability of 90 percent. Poor propagation and interference caused 87 percent of the total 33:13 hours circuit outage time. Two significant outages were reported during the month. On November 11, the circuit was out for a duration of 1:01 hours between the ship and Honolulu due to an unknown cause and, on November 9, a power failure aboard ship caused an outage of 1:35 hours duration.

The HULC-88 circuit was only 80 percent reliable. Poor propagation and interference were primarily responsible for the low reliability, having caused 92 percent of the total 63:58 hours outage accumulated during the month. Three significant outages were reported. The shipboard power failure, which has been mentioned under the NAV-606 and TP-117 circuits, caused an outage of 1:40 hours November 9. A receiver failure aboard ship caused an outage of 1:39 hours the same day. The third outage of 1:01 hours duration November 11 has been described in the TP-117 section of the report.

## NASCOM NETWORK DATA CIRCUITS

### General

Reliability discussions related to the voice/data circuits are contained in the summaries, tables and graphs in the preceding section. Consequently, material in this section is confined to the analyses of high-speed and wideband data circuits.

Beginning this month, one additional high-speed circuit and two additional wideband circuits will be reported in this section. These include GDA-58531 from GSFC to Canberra, GW-58760 from GSFC to Houston and N-58694 from Rosman, North Carolina to GSFC. GD-58420 and GD-58421, high-speed circuits to Cape Kennedy, were discontinued on November 23. Wideband circuit GW-58149; from GSFC to Gilmore Creek, Alaska; was discontinued in October.

### High-Speed Circuits

The NASCOM High-Speed Data circuits encountered 236 interruptions for a total outage of 150:37 hours during 35,474 hours of scheduled operation. This represents an increase of 196 interruptions and a decrease of 167:34 hours total outage compared to last month's figures. The large increase in interruptions is a result of listing the 22 GSFC-490/494 CP interruptions on the four interface circuits. The two circuits to London are NSA-3651 and GDA-58447 while the two circuits to Canberra are GDA-58504 and GDA-58531.

Two circuits failed to achieve the reliability established for their respective transmission modes by paragraph 2.3.2 of part VII of the NASCOM Data Systems Development Plan. These circuits are NSA-3651 from GSFC to London and GDA-58540 from GSFC to Wallops Island, Virginia.

#### BERMUDA

Although circuit GDA-58440 achieved a reliability equal to its established standard of 98 percent, one outage should be noted. On November 29/30 the transmit path was interrupted for 25:30 hours due to a defective loop between Cable and Wireless Limited and NASA facilities, Bermuda.

#### LONDON

Circuit NSA-3651 achieved transmit and receive path reliabilities of 92 and 96 percent respectively. Common carrier troubles accounted for 52:28 hours of the total 56:35 hours of transmit path outages and 21:09 hours of the total 26:00 hours of receive path outages. The resultant circuit reliability was 94 percent.

Three significant common carrier interruptions affecting both paths included 6:00 hours on November 28 and 2:40 hours on November 25 with both outages due to low levels. In addition, an outage of 1:12 hours occurred on November 11 caused by a WUT microwave failure at New York.

Significant interruptions on the transmit path included 13:59 hours on November 18 due to "data carrier dropping out"; 4:25 hours on November 18 due to a defective connector on multiplex equipment at WUT, New York and 4:35 hours on November 29 caused by low levels between Sydney Mines, Nova Scotia and London. Two transmit path outages of 4:05 and 7:30 hours, resulting from low levels at London on November 21, were caused by a faulty carrier loop at RCA, New York. Analysis indicates that an outage of 1:15 hours on November 19 due to low levels at London was also caused by the trouble at RCA, New York although the cause and location was originally reported as unknown. Two interruptions due to unknown carrier problems were 1:15 hours on November 1 due to high error rate at London and 1:00 hour on November 22 caused by loss of signal at London.

Significant receive path interruptions included 2:49 hours due to common carrier failure at IMCA, London on November 18; 1:45 hours on November 21 caused by faulty wiring at the patch panel at London and 1:23 hours on November 29 due to low levels from RCA, New York. Two additional common carrier outages were 1:08 hours on November 15 due to microwave failure at WUT, New York and 1:00 hour on November 7 due to carrier trouble between Portland, Maine and White Plains, New York.

#### WALLOPS ISLAND

Circuit GDA-58540 achieved a reliability of 99 percent during 170 hours of scheduled operation. The only outage occurred on the transmit path for 4:21 hours on November 30 when errors and high noise level were noted at Wallops Island. ATT reported the line between Salisbury and Pocomoke, Maryland as defective and the circuit was restored when ATT switched lines between the two points.

#### Wideband Circuits

Wideband circuits encountered 15 interruptions for a total outage of 13:08 hours during 8,629 hours of scheduled operation. This represents a decrease of five interruptions and 70:05 hours outage over last month's figures. The only circuit which failed to meet the reliability established for its transmission mode was GW-52348 to Gilmore Creek, Alaska.

#### GILMORE CREEK

The transmit path, receive path and circuit reliability of GW-52348 were coincident at 99 percent.

Of the total ten interruptions to the circuit, only one was of significant duration. A common carrier outage of 3:44 hours affected both paths on November 22 with ATT reporting the outage due to a defective rectifier and burned battery cables at Big Timber, Montana.

**TABLE 9**  
**NASCOM Network Data Circuit Outage, Scheduled Hours, and Reliability**

| STATION                      | CIRCUIT     | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL LOST TIME | SCHED OPER. HOURS | RELIA-BILITY |
|------------------------------|-------------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-----------------|-------------------|--------------|
| HIGH-SPEED CIRCUITS          |             |             |         |         |           |            |         |           |                |          |       |          |                 |                   |              |
| Bermuda                      | GDA-58440-T | -           | 25:30   | -       | -         | -          | -       | -         | -              | -        | -     | -        | 25:30           | 720               | 96           |
|                              | -58440-R    | -           | :25     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :25             | 720               | 100          |
|                              | -58441-T    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100          |
|                              | -58441-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100          |
| Bermuda/Cape Kennedy/Houston | GDA-58450-T | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 612               | 100          |
|                              | -58450-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 613               | 100          |
|                              | -58451-T    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 617               | 100          |
|                              | -58451-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 615               | 100          |
| Canberra                     | GDA-58504-T | -           | 1:33    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 5:29            | 711               | 99           |
|                              | -58504-R    | -           | 1:33    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 5:29            | 711               | 99           |
|                              | -58531-T    | -           | 5:08    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 9:04            | 715               | 99           |
|                              | -58531-R    | -           | 2:13    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 6:09            | 715               | 99           |
| Cape Kennedy                 | GD-58418-T  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100          |
|                              | -58418-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100          |
|                              | -58419-T    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100          |
|                              | -58419-R    | -           | :30     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :30             | 720               | 100          |
|                              | -58420-T    | -           | :30     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :30             | 552               | 100          |
|                              | -58420-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 552               | 100          |
|                              | -58421-T    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 552               | 100          |
|                              | -58421-R    | -           | :30     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :30             | 552               | 100          |
|                              | GDA-58538-T | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100          |
|                              | -58538-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100          |
|                              | -58543-T    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 719               | 100          |
|                              | -58543-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 719               | 100          |
|                              | -58617-T    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100          |
|                              | -58617-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100          |
| Cape Kennedy/Houston         | GD-8288-T   | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100          |
|                              | -8288-R     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100          |
|                              | -8289-T     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100          |
|                              | -8289-R     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100          |
|                              | -8290-T     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100          |
|                              | -8290-R     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100          |
|                              | -8291-T     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100          |
|                              | -8291-R     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100          |
|                              | -8292-T     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100          |
|                              | -8292-R     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100          |

TABLE 9 (Continued)

| STATION                  | CIRCUIT     | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL LOST TIME | SCHED OPER. HOURS | RELIABILITY |
|--------------------------|-------------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-----------------|-------------------|-------------|
| Cape Kennedy/<br>Houston | GD-8293-T   | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100         |
|                          | -8293-R     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100         |
|                          | -8294-T     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100         |
|                          | -8294-R     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100         |
| Gilmore Creek            | GDA-58161-T | -           | :26     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :26             | 720               | 100         |
|                          | -58161-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100         |
|                          | GD-58430-T  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 691               | 100         |
| Houston                  | -58430-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 691               | 100         |
|                          | GDA-58539-T | -           | :08     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :08             | 720               | 100         |
| London                   | -58542-T    | -           | :13     | -       | -         | -          | -       | -         | -              | -        | -     | -        | :13             | 719               | 100         |
|                          | NSA-3651-T  | -           | 52:28   | -       | -         | :11        | 3:56    | -         | -              | -        | -     | -        | 56:35           | 713               | 92          |
|                          | -3651-R     | -           | 21:09   | -       | -         | :55        | 3:56    | -         | -              | -        | -     | -        | 26:00           | 713               | 96          |
| Wallops Island           | GDA-58447-T | -           | 1:26    | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 5:22            | 716               | 99          |
|                          | -58447-R    | -           | -       | -       | -         | -          | 3:56    | -         | -              | -        | -     | -        | 3:56            | 716               | 99          |
|                          | GDA-58540-T | -           | 4:21    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 4:21            | 170               | 97          |
|                          | -58540-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 170               | 100         |
| Wallops Island           | -58541-T    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 170               | 100         |
|                          | -58541-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 170               | 100         |
| High-Speed Totals        |             | -           | 118:03  | -       | -         | 1:06       | 31:28   | -         | -              | -        | -     | -        | 150:37          | 35,474            | 100         |
| WIDEBAND CIRCUITS        |             |             |         |         |           |            |         |           |                |          |       |          |                 |                   |             |
| Cape Kennedy/<br>Houston | GW-58760-T  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100         |
|                          | -58760-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100         |
| Gilmore Creek            | GW-52348-T  | -           | 5:27    | :07     | -         | -          | -       | -         | -              | -        | -     | -        | 5:34            | 720               | 99          |
|                          | -52348-R    | -           | 4:10    | -       | -         | -          | -       | -         | -              | -        | -     | -        | 4:10            | 720               | 99          |
| Houston                  | GW-58526-T  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 715               | 100         |
|                          | -58526-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 715               | 100         |
|                          | -58527-T    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | :15      | :15             | 720               | 100         |
| Rosman                   | -58527-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | :15      | :15             | 720               | 100         |
|                          | GW-52416-RO | :05         | -       | :04     | -         | -          | -       | -         | -              | -        | -     | -        | :09             | 719               | 100         |
|                          | -58173-T    | -           | -       | -       | -         | 2:45       | -       | -         | -              | -        | -     | -        | 2:45            | 720               | 100         |
|                          | -58174-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -               | 720               | 100         |
| Wideband Totals          |             | :05         | 9:37    | :11     | -         | 2:45       | -       | -         | -              | -        | :30   | 13:08    | 8,629           | 100               |             |

**TABLE 10**  
**NASCOM Network Data Circuit Interruptions**

| STATION                      | CIRCUIT     | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL | AVG DURA-TION |
|------------------------------|-------------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-------|---------------|
| <b>HIGH-SPEED CIRCUITS</b>   |             |             |         |         |           |            |         |           |                |          |       |          |       |               |
| Bermuda                      | GDA-58440-T | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | 25:30         |
|                              | -58440-R    | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | :25           |
|                              | -58441-T    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                              | -58441-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
| Bermuda/Cape Kennedy/Houston | GDA-58450-T | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                              | -58450-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                              | -58451-T    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                              | -58451-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
| Canberra                     | GDA-58504-T | -           | 2       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 24    | :14           |
|                              | -58504-R    | -           | 2       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 24    | :14           |
|                              | -58531-T    | -           | 4       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 26    | :21           |
|                              | -58531-R    | -           | 3       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 25    | :15           |
| Cape Kennedy                 | GD-58418-T  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                              | -58418-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                              | -58419-T    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                              | -58419-R    | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | :30           |
|                              | -58420-T    | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | :30           |
|                              | -58420-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                              | -58421-T    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                              | -58421-R    | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | :30           |
|                              | GDA-58538-T | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                              | -58538-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                              | -58543-T    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                              | -58543-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
| Cape Kennedy/Houston         | -58617-T    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                              | -58617-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                              | GD-8288-T   | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                              | -8288-R     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                              | -8289-T     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                              | -8289-R     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                              | -8290-T     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                              | -8290-R     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
| -8291-T                      | -           | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     |               |
| -8291-R                      | -           | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     |               |
| -8292-T                      | -           | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     |               |
| -8292-R                      | -           | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     |               |

TABLE 10 (Continued)

| STATION              | CIRCUIT     | NO TRBL FND | COM CAR | OPR ERR | EQUIP ADJ | EQUIP FAIL | CP FAIL | POOR PROP | INTER-FER-ENCE | FREQ CHG | MAINT | PWR FAIL | TOTAL | AVG DURA-TION |
|----------------------|-------------|-------------|---------|---------|-----------|------------|---------|-----------|----------------|----------|-------|----------|-------|---------------|
| Cape Kennedy/Houston | GD-8293-T   | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                      | -8293-R     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                      | -8294-T     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                      | -8294-R     | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
| Gilmore Creek        | GDA-58161-T | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | :26           |
|                      | -58161-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                      | GD-58430-T  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                      | -58430-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
| Houston              | GDA-58539-T | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | :08           |
|                      | -58542-T    | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | :13           |
|                      | -           | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
| London               | NSA-3651-T  | -           | 22      | -       | -         | 1          | 22      | -         | -              | -        | -     | -        | 45    | 1:15          |
|                      | -3651-R     | -           | 15      | -       | -         | 1          | 22      | -         | -              | -        | -     | -        | 38    | :41           |
|                      | GDA-58447-T | -           | 1       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 23    | :14           |
|                      | -58447-R    | -           | -       | -       | -         | -          | 22      | -         | -              | -        | -     | -        | 22    | :11           |
| Wallops Island       | GDA-58540-T | -           | 1       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 1     | 4:21          |
|                      | -58540-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                      | -58541-T    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                      | -58541-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
| High-Speed Totals    |             | -           | 58      | -       | -         | 2          | 176     | -         | -              | -        | -     | -        | 236   | :38           |
| WIDEBAND CIRCUITS    |             |             |         |         |           |            |         |           |                |          |       |          |       |               |
| Cape Kennedy/Houston | GW-58760-T  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                      | -58760-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
| Gilmore Creek        | GW-52348-T  | -           | 5       | 1       | -         | -          | -       | -         | -              | -        | -     | -        | 6     | :56           |
|                      | -52348-R    | -           | 4       | -       | -         | -          | -       | -         | -              | -        | -     | -        | 4     | 1:03          |
| Houston              | GW-58526-T  | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                      | -58526-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                      | -58527-T    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | 1        | 1     | :15           |
|                      | -58527-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | 1        | 1     | :15           |
| Rosman               | GW-52416-RO | 1           | -       | 1       | -         | -          | -       | -         | -              | -        | -     | -        | 2     | :05           |
|                      | -58173-T    | -           | -       | -       | -         | 1          | -       | -         | -              | -        | -     | -        | 1     | 2:45          |
|                      | -58174-R    | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
|                      | N-58694-R   | -           | -       | -       | -         | -          | -       | -         | -              | -        | -     | -        | -     | -             |
| Wideband Totals      |             | 1           | 9       | 2       | -         | 1          | -       | -         | -              | -        | -     | 2        | 15    | :53           |

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## HF PROPAGATION CONSIDERATIONS

Radio propagation conditions during the month were generally good with the exception of slightly depressed conditions during nighttime and the night-to-day transition period from November 1 through 3 and on November 6 and 8. The former depression was due to the effects of a magnetic storm which occurred during the period October 30 through November 1, whereas the causes for the depression on November 6 and 8 are unknown.

Solar activity during the month was relatively active although major events consisted only of a flare of Importance Two\* on November 1 and 14. No short wave fadeouts were observed in conjunction with either of these Importance Two Flares. Minor events were observed continuously throughout the month.

Geomagnetic activity was generally low with the exception of November 1 when levels were of storm proportions due to recurrent-type activity which began on October 30. Activity then subsided to moderate levels on November 2 and 3. Geomagnetic activity again increased to moderate levels during the period November 28 through 30 due to the same recurrent-type activity previously described.

The mean Zurich sunspot number for November was 55.7 as may be compared to the predicted value 68.

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\*The following explanation of flares was obtained from the United States Department of Commerce publication *Ionospheric Radio Propagation*, by Kenneth Davies:

"A solar flare is a burst of 'light' occurring in the chromosphere near a sunspot. . . At present, solar patrol observations are almost continuous, and so most of the flares occurring on the solar hemisphere facing the earth are detected. Flares are frequent occurrences, particularly at the peak of the sunspot cycle.

Flares are divided into classes of importance 1-, 1, 1+, 2, 2+, 3, and 3+, according to area and brightness. The average duration of a flare increases with its importance: thus importance 1 flares last about 20 minutes, 2 flares last about 30 minutes, and 3 flares last about 60 minutes. Of course, the life of an individual flare may vary greatly from the mean value. Flares smaller than importance 1 are referred to as sub-flares.

The development of a flare is somewhat as follows: a rapid rise (flash) to peak intensity, a brief period of peak intensity, followed by a steady decline. . ."