

AD-765 360

**SHIPPING SURVEILLANCE DATA FOR CHURCH
GABBRO**

Eric L. Sander

Raff Associates, Incorporated

Prepared for:

Office of Naval Research

15 March 1973

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SHIPPING SURVEILLANCE DATA FOR CHURCH GABBRO

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SHIPPING SURVEILLANCE

1. Summary of Operations. The aircraft schedule was carried out in accordance with the exercise plan, by the units which were designated therein, and at the geographic locations which had been specified. The number of aircraft sorties each day is summarized as follows:

| | VP 16 | VXN 8 | NRL | TOTAL |
|------------|-------|-------|-----|-------|
| December 2 | | 1 | 1 | 2 |
| 4 | 4* | 1 | 1 | 6* |
| 5 | | 1 | 1 | 2 |
| 6 | 3 | | 1 | 4 |
| 7 | | 1 | | 1 |
| | 7* | 4 | 4 | 15* |

* Includes one aborted sortie -- engine trouble

This exercise schedule provided a built-in redundancy in shipping surveillance over most of the area of interest, with particular emphasis on December 4 and 6. As it turned out there were no apparent gaps in the area coverage of the actual operations despite modifications of the planned survey tactic in five sorties due to difficulties arising on station.

In general, the aircraft crews proved to be capable, motivated and hard working. It is believed that their navigation was excellent, facilitating a knowledge of the ships' locations. For a large fraction of the area surveyed, the use of radar navigation was possible. This more than made up for the poor functioning of the inertial navigation systems and inadequate LORAN coverage. In areas where land was more distant, however, the poor navigation performance will continue to limit the data accuracy. The crews and the PIs modified the planned surveillance tactics in some flights to overcome difficulties due to equipment failures and poor weather. All the surveillance areas were covered, but in some cases the modified

tactics could not provide the quality of data that the original tactic could have provided. Although the crews performed well, the frequency of equipment failures, particularly in the VP 16 aircraft, must be described as disappointing.

The principal technical difficulty of the shipping surveillance was that caused by false radar contacts -- the incorrect identification of clouds as ship contacts. In the exercise, this problem was caused by scattered clouds in generally clear weather areas and probably could have been minimized by reducing the radar range and flying at altitudes of 2000 feet or less, below the clouds. This would, of course, have reduced the surveyed area slightly; but the net effect would have been beneficial. Despite difficulties with equipment failures and false contacts, there are no major gaps in the intended area coverage and the data should provide adequate inputs for modelings of ambient noise.

2. Tactics Descriptions. Three basic surveillance tactics were used. The first is the Radar Only Tactic (ROT). As the aircraft flew a prescribed path, the crew recorded the range and bearing to each radar contact and the aircraft position and the local time at that moment. The APS-30 radar could provide good coverage out to about 60 n.m. and some contacts were recorded at distances greater than twice that range. This method provides only contact positions and was used only in transit to and from surveillance areas of major importance; in sorties in which environmental measurements were the primary objectives which dictated the aircraft track and on the first day when only two aircraft were used to survey the entire area. Naturally, false contacts here would create an inaccurately high ship count.

The second tactic was the Radar Survey Tactic (RST) and it is planned for use in the surveillance areas of major importance. The aircraft crew drops an SSQ 48 sonobuoy at a designated spot, returns to it using the on-top indicator, and records the local time and the range and bearing of all the radar contacts visible on the scope at the moment they pass over the sonobuoy. The aircraft then flies to another location 60 n.m. away and

repeats this procedure. The plane continues to fly back and forth between the two locations making these radar maps for a period of about four hours. Some time is reserved in the middle of this period to visually observe the radar contacts and obtain the ship's name and visual estimates of speed, course, and length. The series of positions of the radar contacts can be used to reconstruct excellent determinations of ship position, speed, and course. False contacts complicate reconstruction; but they are eliminated by reconstruction, because they do not form ship tracks.

The final method is the Visual Survey Tactic (VST). It was used when equipment failure or bad weather prevented the use of the RST. The aircraft followed a nominal ladder search pattern covering the area with a track spacings out to 30 n.m. depending on the radar or visual range available. When a contact was detected whose position was less than half the track spacing away from the intended track, the aircraft flew to it to obtain the name and visual estimates of length, speed, and course. Speed and to a lesser extent course estimates using the VST are not as good as those obtained using the RST tactic. Although false radar contacts do not contaminate VST data, time can be wasted chasing them.

3. Data. The shipping data collected for each day are presented in the following manner:

For 2, 5, and 7 December 1972, the following figures and tables are given for each plane:

1. A figure showing the approximate flight path and ROT coverage.
2. A figure showing the approximate positions of the ROT contacts.
3. A table of the latitudes, longitudes and sighting times of the ROT contacts.

Finally, a figure for the ROT contact density for each day is given. The following assumptions were made in the creation of these maps:

1. If three-fourths or more of a one degree square was within 60 n.m. of a ROT track the square was considered to have been observed by the plane.

2. The square may have been observed by the same plane at a later time or by another plane.
3. The contact density for that square is the total number of contacts observed in that square divided by the total number of observations.

For 4 and 6 December 1972, the following figures and tables are given for each plane:

1. A figure showing the approximate flight paths and RST, VST and or ROT coverage.
2. A figure showing the approximate positions of all contacts.
3. A table of the latitudes, longitudes, and sighting times of the ROT contacts (none were obtained by P3#3).

Also, a table showing the speed, course, position, and size estimates of the VST and RST contacts for all the planes on that day is given. The positions here are the dead reckoned positions for a standard time (1500 Z for the 4th, 1700 Z for the 6th). Also, estimates of the uncertainty in the RST speed and course estimates are expressed as plus or minus one standard deviation and are based on the conservative assumption that the relative positions of the multiple contacts on a single ship are known with a standard deviation of error of 4 n.m. Finally, a figure for the ROT contact density for each day is given. When this data is used in an ambient noise model for a particular hydrophone, the VST or RST data for the nearby squares should be used and these densities for the squares farther out should be used.



A. Data for 2 December 1972

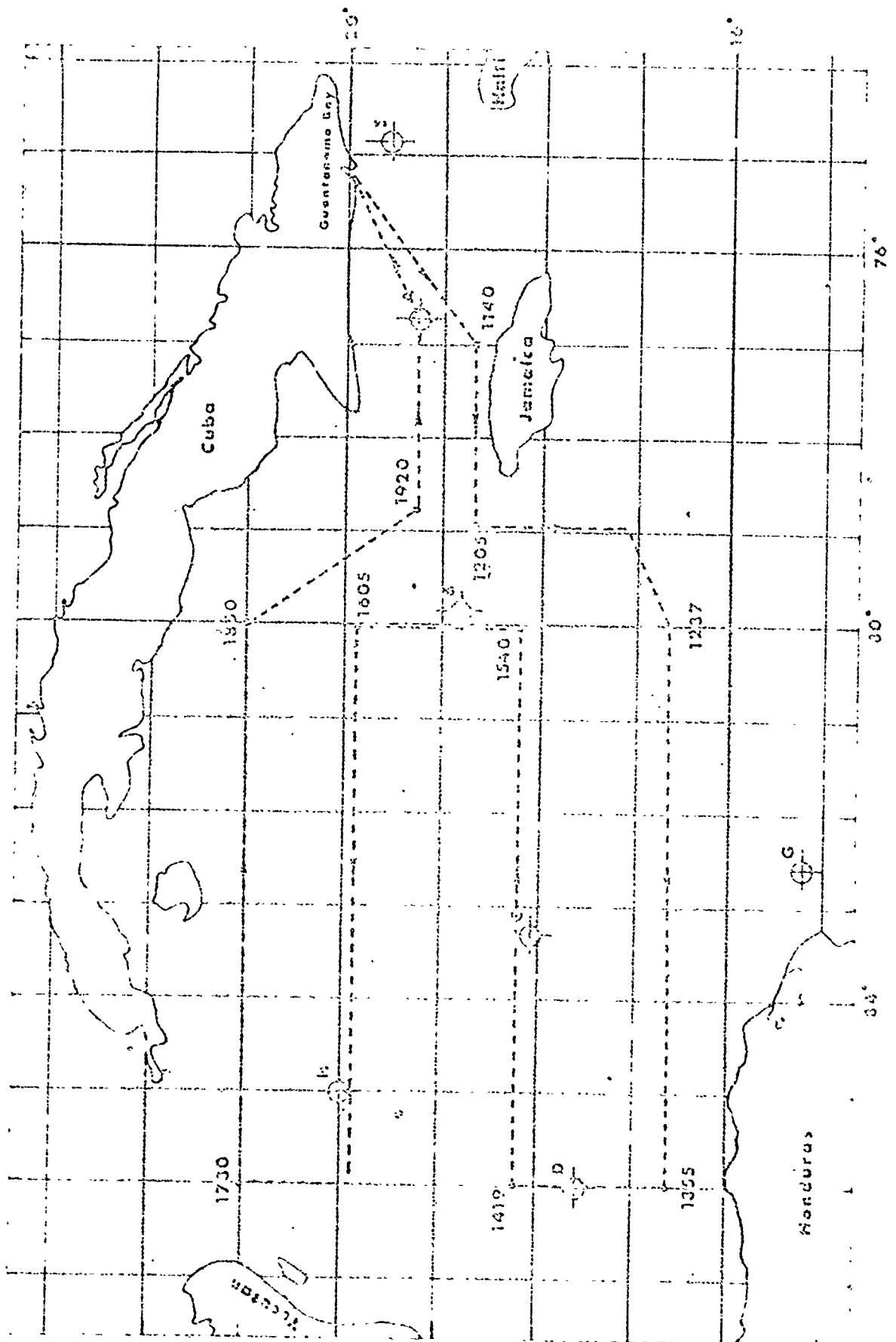


FIGURE I -- The Approximate Flight Path and ROT Area Coverage for P244 (VXN 8) on 2 December 1972. The Greenwich Mean Time (Zulu) When the Plane Reached Key Positions are Given.

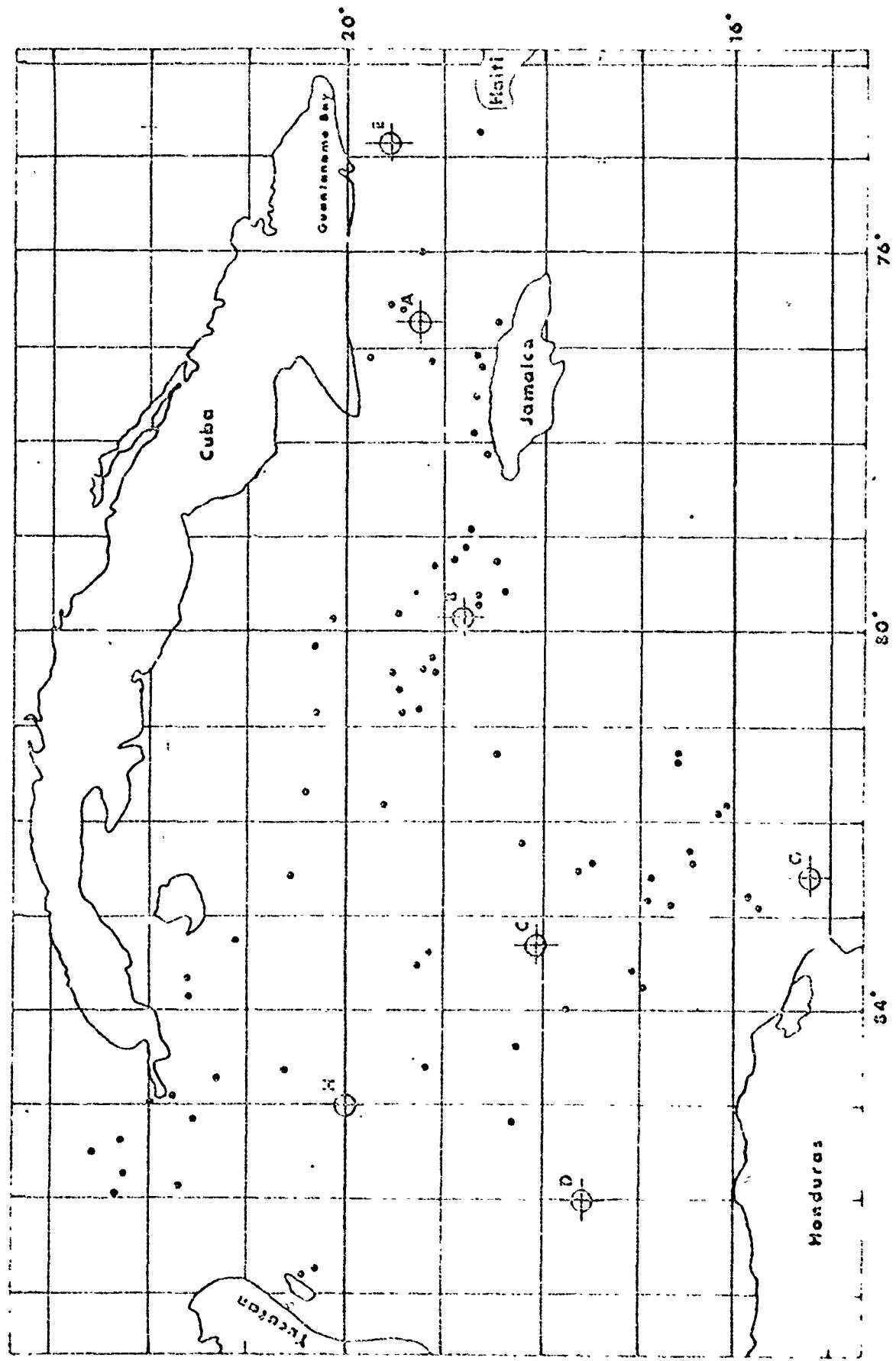


FIGURE 27 -- The approximate positions of the Radar Contacts (•) Made by
2344 (VBN 6) on 2 December 1972.

TABLE 1 - NOT CONTACTS

Plane: P3#4 (VXN 8)
Date: 2 December 1972Pilot: Lt. Lamb
PI: T. Kane

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 1 | 1732 | 2220 | 8604 |
| 2 | 1732 | 2221 | 8558 |
| 3 | 1732 | 2220 | 8539 |
| 4 | 1732 | 2233 | 8533 |
| 5 | 1732 | 2218 | 8522 |
| 6 | 1732 | 2139 | 8548 |
| 7 | 1732 | 2131 | 8508 |
| 8 | 1732 | 2156 | 8459 |
| 9 | 1732 | 2142 | 8456 |
| 10 | 1734 | 2120 | 8440 |
| 11 | 1748 | 2134 | 8349 |
| 12 | 1748 | 2107 | 8322 |
| 13 | 1748 | 2135 | 8340 |
| 14 | 1725 | 2022 | 8632 |
| 15 | 1726 | 2033 | 8643 |
| 16 | 1650 | 2040 | 8445 |
| 17 | 1630 | 2034 | 8238 |
| 18 | 1616 | 2020 | 8152 |
| 19 | 1835 | 2018 | 8012 |
| 20 | 1835 | 2027 | 8058 |
| 21 | 1607 | 2007 | 7958 |
| 22 | 1654 | 1909 | 8438 |
| 23 | 1642 | 1920 | 8339 |
| 24 | 1642 | 1917 | 8330 |
| 25 | 1613 | 1942 | 8150 |
| 26 | 1523 | 1908 | 8029 |
| 27 | 1528 | 1909 | 8021 |
| 28 | 1545 | 1903 | 8029 |

TABLE 1 - ROLL OF CONTACTS (Cont)

Plane: P3#4 (VXN 8)
Date: 2 December 1972Pilot: Lt. Lamb
PI: T. Kane

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 29 | 1552 | 1924 | 8052 |
| 30 | 1552 | 1928 | 8055 |
| 31 | 1552 | 1930 | 8027 |
| 32 | 1152 | 1935 | 8015 |
| 33 | 1907 | 1926 | 7952 |
| 34 | 1158 | 1906 | 7921 |
| 35 | 1930 | 1909 | 7703 |
| 36 | 1930 | 1945 | 7703 |
| 37 | 1935 | 1917 | 7643 |
| 38 | 1935 | 1913 | 7645 |
| 39 | 1943 | 1912 | 7600 |
| 40 | 1422 | 1817 | 8513 |
| 41 | 1438 | 1820 | 8416 |
| 42 | 1506 | 1811 | 8294 |
| 43 | 1519 | 1830 | 8117 |
| 44 | 1528 | 1850 | 7948 |
| 45 | 1539 | 1850 | 7946 |
| 46 | 1157 | 1834 | 7913 |
| 47 | 1159 | 1829 | 7941 |
| 48 | 1909 | 1857 | 7921 |
| 49 | 1915 | 1852 | 7905 |
| 50 | 1156 | 1849 | 7857 |
| 51 | 1146 | 1832 | 7803 |
| 52 | 1152 | 1841 | 7758 |
| 53 | 1147 | 1842 | 7737 |
| 54 | 1130 | 1835 | 7715 |
| 55 | 1933 | 1835 | 7704 |
| 56 | 1130 | 1827 | 7649 |

TABLE 1 - ROT CONTACTS (Cont)

Plane: P3#4 (VXN 8)
 Date: 2 December 1972

Pilot: Lt. Lamb
 PI: T. Kane

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 57 | 1956 | 1846 | 7447 |
| 58 | 1438 | 1753 | 8401 |
| 59 | 1315 | 1700 | 8339 |
| 60 | 1321 | 1702 | 8333 |
| 61 | 1504 | 1746 | 8228 |
| 62 | 1505 | 1732 | 8223 |
| 63 | 1257 | 1632 | 8221 |
| 64 | 1300 | 1656 | 8229 |
| 65 | 1300 | 1634 | 8213 |
| 66 | 1305 | 1646 | 8247 |
| 67 | 1305 | 1656 | 8241 |
| 68 | 1254 | 1602 | 8155 |
| 69 | 1254 | 1609 | 8157 |
| 70 | 1254 | 1634 | 8120 |
| 71 | 1300 | 1634 | 8120 |
| 72 | 1305 | 1556 | 8255 |
| 73 | 1312 | 1558 | 8252 |

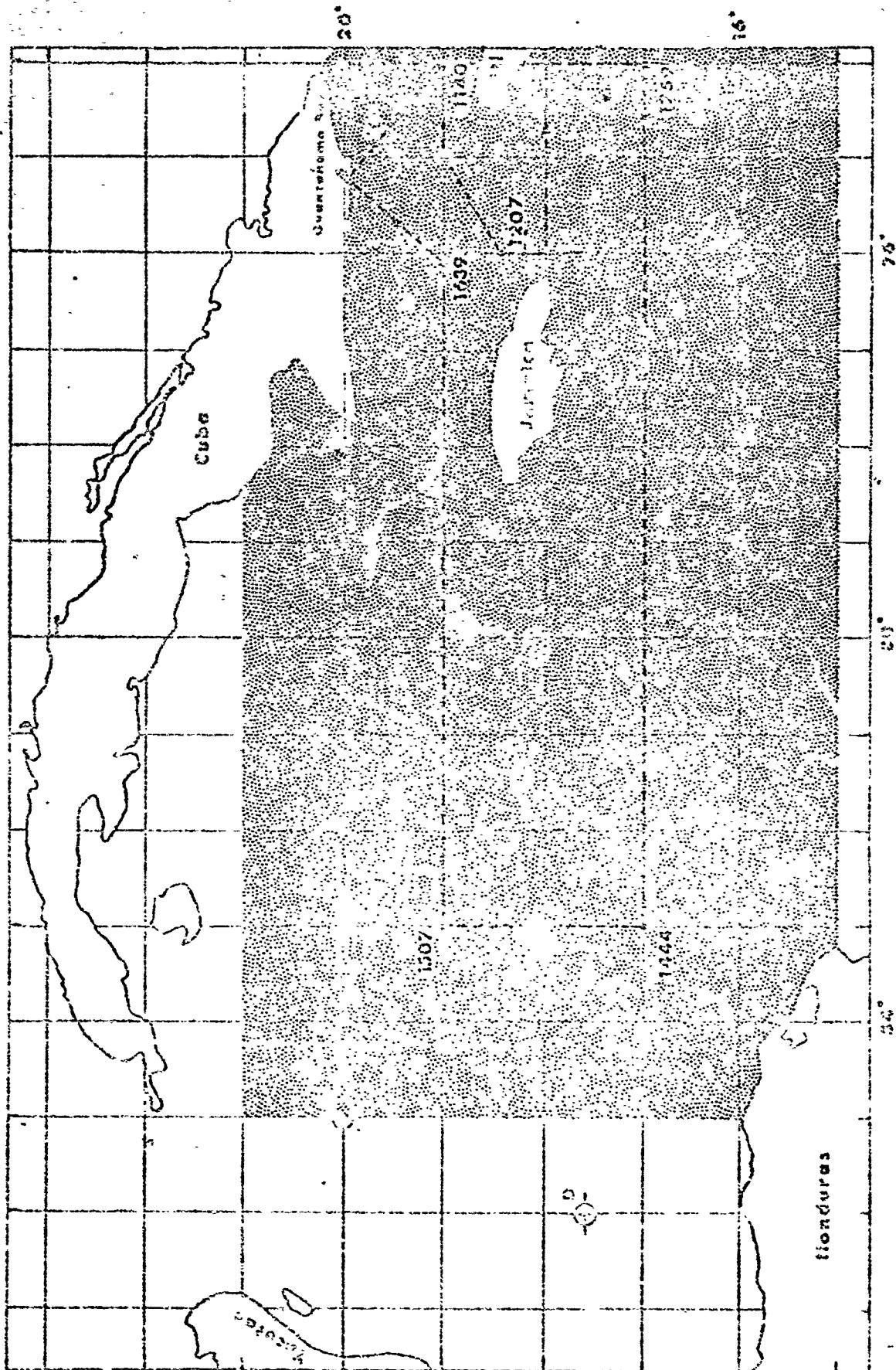


FIGURE III -- The Approximate Flight Path and RDT Coverage for P3/S (NRL) on 2 December 1972. The Greenwich Mean Time (ZULU) When the Plane Reached Key Positions are Given.

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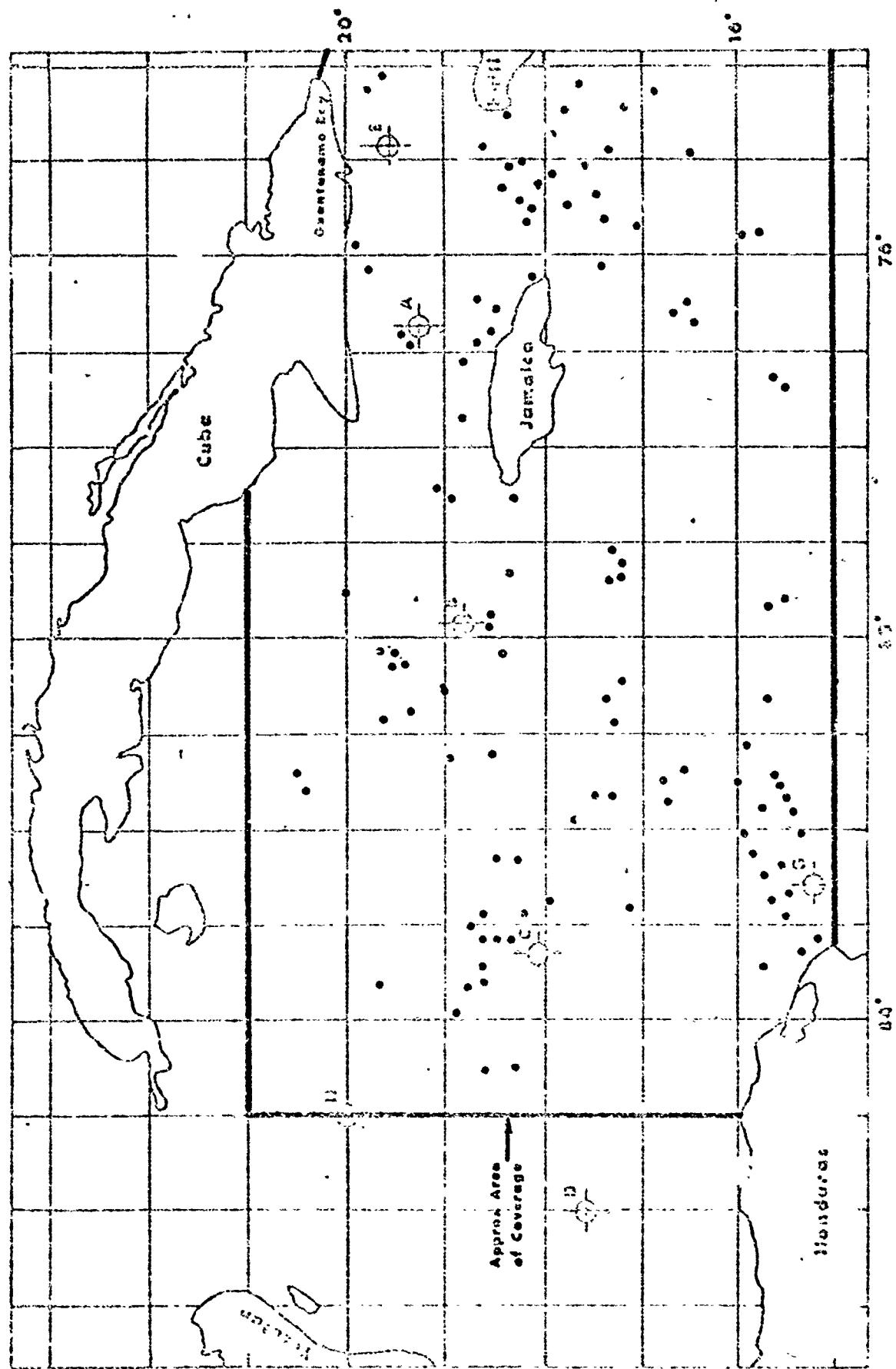


FIGURE IV -- The Approximate Positions of the Radar Contacts (•) Made by P3#5 (NRL) on 2 December 1972. No Contacts Were Made East of 74°W.

TABLE 2 -- ROT CONTACTS

Plane: P3#5 (NRL)
 Date: 2 December 1972

Pilot: LCDR Hutchins
 PI: Barrett

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 1 | 1521 | 2017 | 8131 |
| 2 | 1525 | 2019 | 8123 |
| 3 | 1543 | 2000 | 7939 |
| 4 | 1507 | 1942 | 8342 |
| 5 | 1521 | 1920 | 8047 |
| 6 | 1521 | 1930 | 8055 |
| 7 | 1526 | 1900 | 8030 |
| 8 | 1530 | 1928 | 8018 |
| 9 | 1530 | 1933 | 8015 |
| 10 | 1540 | 1935 | 8010 |
| 11 | 1541 | 1932 | 8019 |
| 12 | 1549 | 1902 | 7818 |
| 13 | 1609 | 1922 | 7651 |
| 14 | 1618 | 1924 | 7647 |
| 15 | 1623 | 1946 | 7604 |
| 16 | 1642 | 1955 | 7555 |
| 17 | 1130 | 1940 | 7419 |
| 18 | 1130 | 1930 | 7413 |
| 19 | 1448 | 1819 | 8429 |
| 20 | 1448 | 1835 | 8426 |
| 21 | 1448 | 1853 | 8358 |
| 22 | 1458 | 1822 | 8302 |
| 23 | 1458 | 1829 | 8311 |
| 24 | 1502 | 1833 | 8309 |
| 25 | 1453 | 1841 | 8307 |
| 26 | 1504 | 1845 | 8342 |
| 27 | 1504 | 1841 | 8332 |
| 28 | 1504 | 1848 | 8344 |

TABLE 2 - ROT CONTACTS (Cont)

Plane: P3#5 (NRL)

Date: 2 December 1972

Pilot: LCDR Hutchins

PI: Barrett

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 29 | 1503 | 1837 | 8259 |
| 30 | 1453 | 1810 | 8259 |
| 31 | 1453 | 1815 | 8217 |
| 32 | 1514 | 1829 | 8218 |
| 33 | 1525 | 1833 | 8117 |
| 34 | 1405 | 1856 | 8120 |
| 35 | 1541 | 1822 | 8017 |
| 36 | 1535 | 1838 | 7954 |
| 37 | 1540 | 1838 | 7951 |
| 38 | 1547 | 1821 | 7922 |
| 39 | 1549 | 1854 | 7824 |
| 40 | 1554 | 1815 | 7824 |
| 41 | 1332 | 1846 | 7742 |
| 42 | 1332 | 1845 | 7702 |
| 43 | 1332 | 1839 | 7658 |
| 44 | 1332 | 1832 | 7647 |
| 45 | 1332 | 1823 | 7638 |
| 46 | 1332 | 1337 | 7635 |
| 47 | 1251 | 1804 | 7619 |
| 48 | 1307 | 1809 | 7543 |
| 49 | 1211 | 1807 | 7531 |
| 50 | 1155 | 1818 | 7528 |
| 51 | 1223 | 1812 | 7532 |
| 52 | 1248 | 1801 | 7518 |
| 53 | 1211 | 1814 | 7504 |
| 54 | 1307 | 1813 | 7500 |
| 55 | 1149 | 1838 | 7452 |
| 56 | 1248 | 1824 | 7428 |

TABLE 2 - ROT CONTACTS (Cont)

Plane: P3F5 (NRL)
 Date: 2 December 1972

Pilot: LCDR Hutchins
 PI: Barrett

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 57 | 1443 | 1706 | 8249 |
| 58 | 1455 | 1759 | 8249 |
| 59 | 1451 | 1742 | 8155 |
| 60 | 1402 | 1730 | 8142 |
| 61 | 1411 | 1721 | 8142 |
| 62 | 1348 | 1718 | 8039 |
| 63 | 1348 | 1713 | 8035 |
| 64 | 1348 | 1717 | 8053 |
| 65 | 1347 | 1723 | 7905 |
| 66 | 1347 | 1723 | 7907 |
| 67 | 1347 | 1724 | 7912 |
| 68 | 1347 | 1726 | 7916 |
| 69 | 1308 | 1729 | 7606 |
| 70 | 1155 | 1744 | 7529 |
| 71 | 1155 | 1741 | 7512 |
| 62 | 1213 | 1726 | 7536 |
| 73 | 1248 | 1729 | 7525 |
| 74 | 1307 | 1755 | 7519 |
| 75 | 1248 | 1752 | 7537 |
| 76 | 1249 | 1758 | 7450 |
| 77 | 1211 | 1745 | 7418 |
| 78 | 1232 | 1704 | 7442 |
| 79 | 1248 | 1726 | 7459 |
| 80 | 1248 | 1709 | 7432 |
| 81 | 1240 | 1600 | 8134 |
| 82 | 1411 | 1637 | 8124 |
| 83 | 1411 | 1649 | 8131 |
| 84 | 1418 | 1645 | 8141 |

TABLE 2 - CONTACTS (Cont)

Plane: P3#5 (NRL)
 Date: 2 December 1972

Pilot: LCDR Hutchins
 PI: Barrett

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 85 | 1308 | 1642 | 7640 |
| 36 | 1308 | 16°4' | 7630 |
| 87 | 1308 | 1628 | 7640 |
| 88 | 1228 | 1641 | 7505 |
| 89 | 1228 | 1631 | 7458 |
| 90 | 1248 | 1654 | 7420 |
| 91 | 1434 | 1525 | 8323 |
| 92 | 1435 | 1518 | 8316 |
| 93 | 1435 | 1546 | 8321 |
| 94 | 1443 | 1540 | 8257 |
| 95 | 1432 | 1526 | 8204 |
| 96 | 1433 | 1531 | 8232 |
| 97 | 1418 | 1544 | 8229 |
| 98 | 1434 | 1556 | 8203 |
| 99 | 1433 | 1540 | 8242 |
| 100 | 1443 | 1538 | 8251 |
| 101 | 1443 | 1531 | 8249 |
| 102 | 1424 | 1552 | 8147 |
| 103 | 1418 | 1557 | 8107 |
| 104 | 1414 | 1547 | 8137 |
| 105 | 1432 | 1546 | 8152 |
| 106 | 1433 | 1544 | 8149 |
| 107 | 1418 | 1551 | 8131 |
| 108 | 1410 | 1500 | 8032 |
| 109 | 1417 | 1538 | 8048 |
| 110 | 1404 | 1530 | 7950 |
| 111 | 1409 | 1532 | 7956 |
| 112 | 1339 | 1541 | 7718 |

TABLE 2 - ROT CONTACTS (Cont)

Plane: P3F5 (NRL)
 Date: 2 December 1972

Pilot: LCDR Hutchins
 PI: Barrett

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 113 | 1339 | 1536 | 7720 |
| 114 | 1309 | 1559 | 7551 |
| 115 | 1312 | 1555 | 7552 |

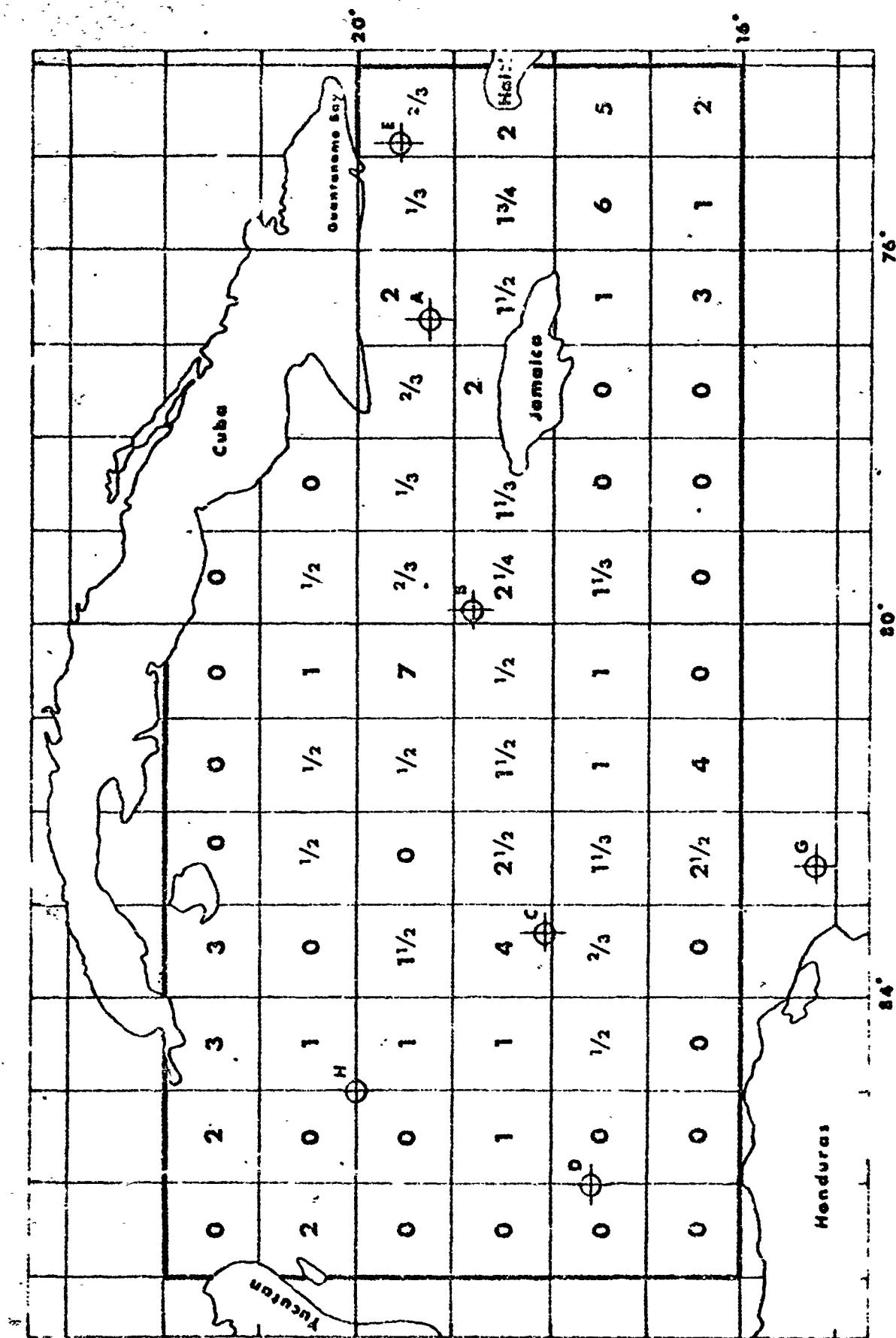


FIGURE V - The Observed Density for One Degree Squares of ROT Radar Contacts on 2 December 1972 (Average Density: 2.0 Contracts Per One Degree Square).

B. Data for 4 December 1972

TABLE 3 -- Results of RST's and VST's on 4 December 1972

| Contact | Name | 1700 Zulu Time Lat. | Time Long. | Zulu Time of Observ. | Speed | Course | Length | Comments | Plane |
|---------|------------------------|------------------------|---------------|----------------------------|--------------|---------|--------|-----------------------|-------|
| 1 | | 2048 | 8540 | 1604 | 14.3 +1.1 | 203 ± 3 | | | P3#1 |
| 2 | | 2021 | 8547 | 1544 | 14.5 +1 | 149 ± 3 | | | P3#1 |
| 3 | Xaru Pilend | 1952 | 8350 | 1556 | 14.6 +6.6 | 141 ± 5 | 613 | Merch | P3#1 |
| 4 | Honk Ksum Maru Kobe | 1907 | 9342 | 1659 | 15.0 +1.6 | 324 ± 4 | 650 | Merch | P3#1 |
| 5 | | 2027 | 8520 | 1527 | 8.5 +1 | 021 ± 5 | | | P3#1 |
| 6 | | 2051 | 3521 | 1609 | 19.8 +2.4 | 162 ± 5 | | U.S. DE | P3#1 |
| 7 | | 2024 | 3625 | 1420 | 18.4 +3.7 | 233 ± 8 | | Only two observations | P3#1 |
| 8 | | 1925 | 8559 | 1647 | 10 | 190 | | GP4 | P3#2 |
| 9 | | 1551 | 8456 | 2016 | 15 | 360 | | GP2 | P3#2 |
| 10 | | 1547 | 9339 | 2031 | 15 | 350 | | GP2 | P3#2 |
| 11 | Indus | 1926 | 8108 | 1342 | 13 | 315 | | GP4 | P3#3 |
| 12 | | 1931 | 8122 | 1343 | 14 | 300 | 271 | Tug | P3#3 |
| 13 | Baume | 1931 | 8034 | 1350 | 9 | 110 | 100 | GP4 | P3#3 |
| 14 | Fhoeleads | 1943 | 8035 | 1355 | 13.5 | 120 | 657 | GP4 | P3#3 |
| 15 | auNa | 2003 | 7945 | 1407 | 16 | 100 | 579 | GP4 | P3#3 |
| 16 | | 1920 | 7925 | 1426 | 9 | 295 | 500 | GP4 | P3#3 |

TABLE 3 -- Results of RST's and VST's on 4 December 1972 (Cont.)

| Contact | Name | 1700 Zulu Time Lat. | 1700 Zulu Time Long. | Zulu Time of Observer. | Speed | Course | Length | Comments | Plane |
|---------|-------------|------------------------|-------------------------|------------------------------|--------------|----------|--------|---------------|-------|
| 17 | Pierce | 1837 | 7931 | 1549 | 0 | | | | P3#3 |
| 18 | Monica | 1831 | 7619 | 1321 | 9.5 +3.4 | 144 ± 14 | 275 | | P3#5 |
| 19 | El Salvador | 1853 | 7655 | 1436 | 11.7 +1.1 | 073 ± 4 | 358 | | P3#5 |
| 20 | | 1944 | 7729 | 1318 | 12.0 +1.5 | 290 ± 5 | | | P3#5 |
| 21 | | 1912 | 7716 | 1409 | 20 | | | Cabin Cruiser | P3#5 |
| 22* | | 1937 | 7525 | 1430 | 22 | | | Destroyer | P3#5 |
| 23* | | 1937 | 7525 | 1430 | 10 | | | | P3#5 |

* It is believed that these are two destroyers maneuvering within 13 n.m. of this position. Only Contact 22 was sighted and no straight tracks could be obtained from the RST.

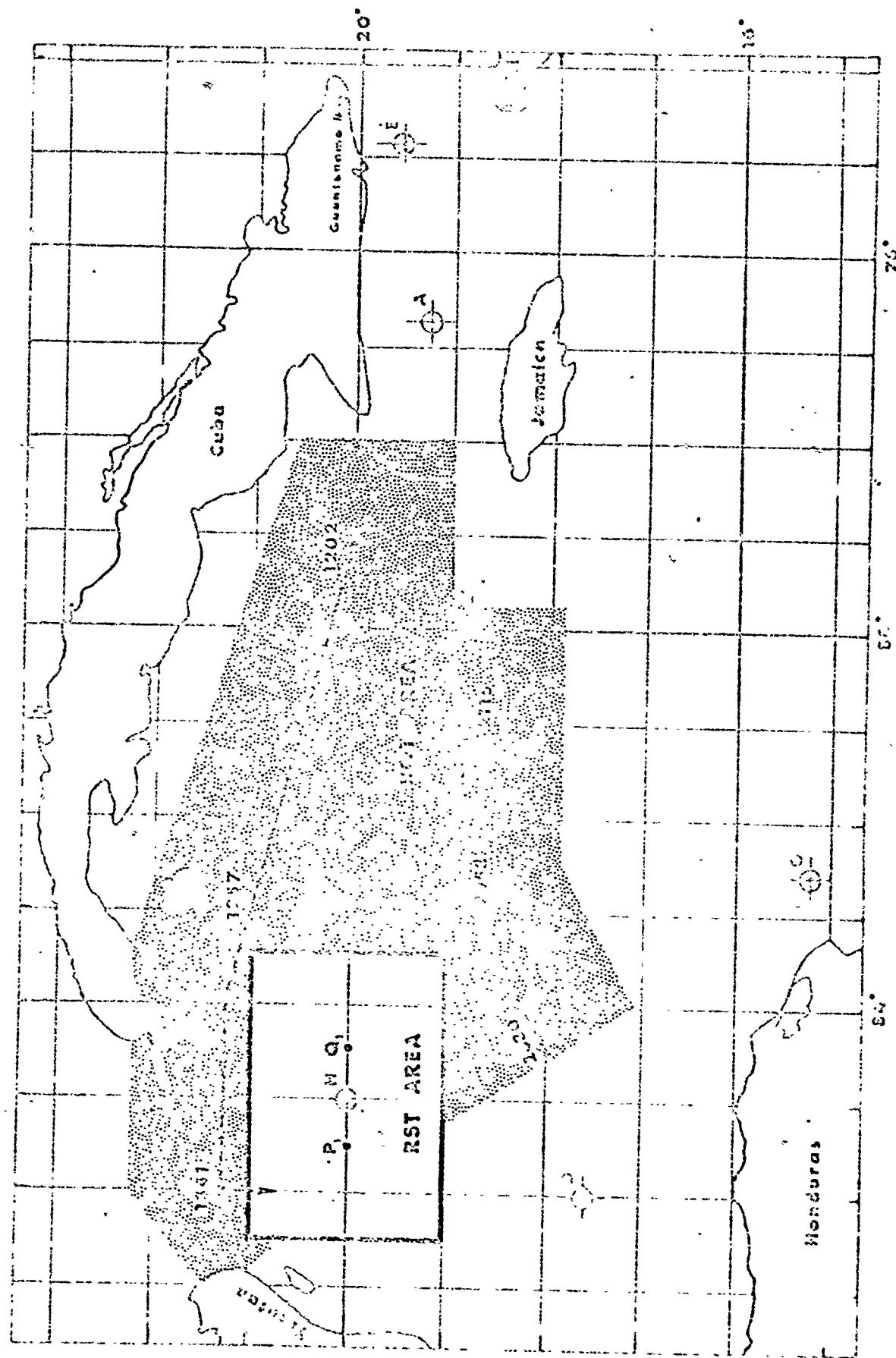


FIGURE V2 -- The Approximate Flight Path and ROT Coverage for P-3#1 (VP-16) on 4 December 1972. The Greenwich Mean Times (Zulu) for Key Positions are Given.

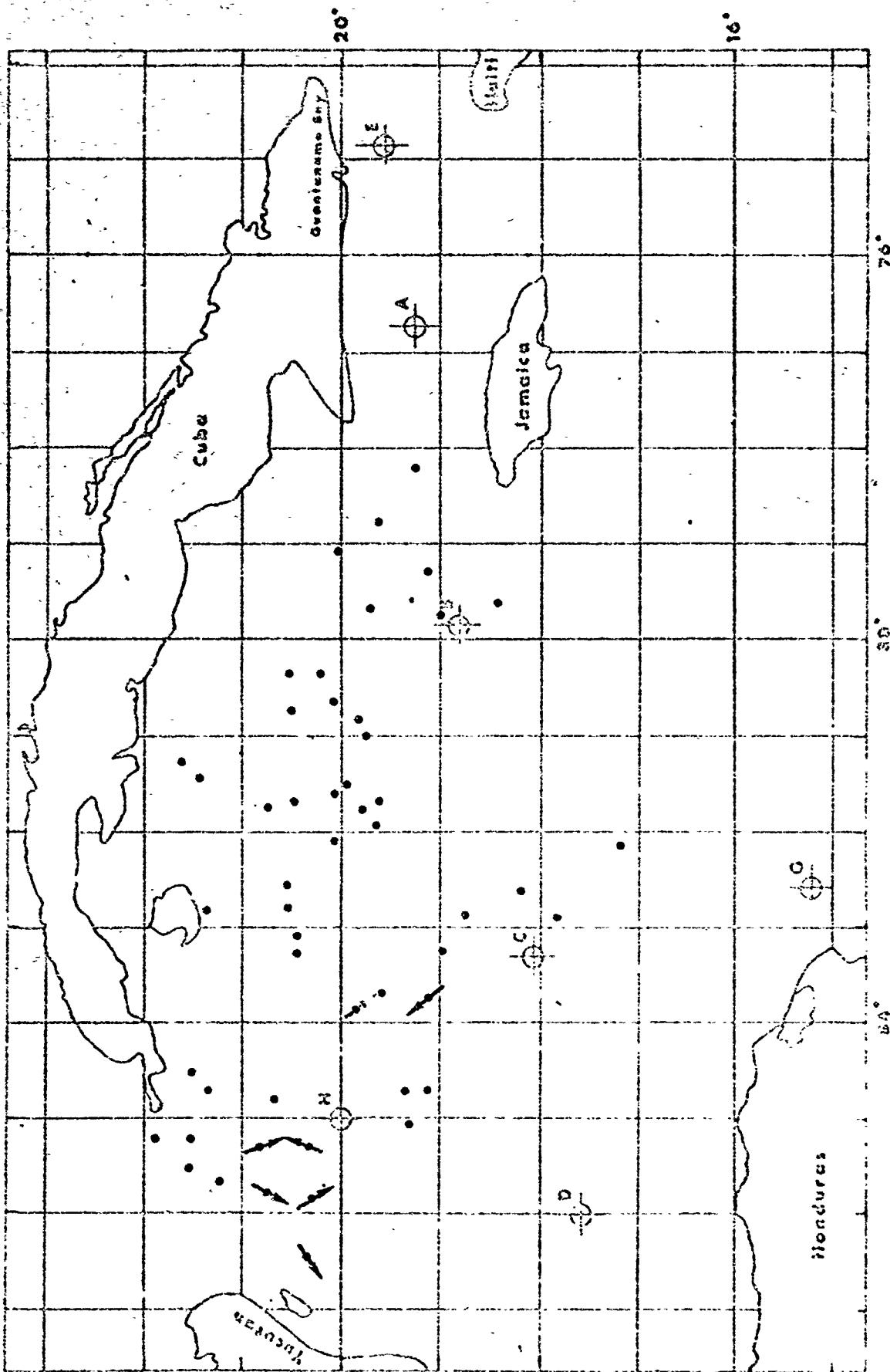


FIGURE VII -- The Approximate Positions of the Rot (•) and RST (—) 1500 Greenwich Mean Time Contacts Made by P3#1 (VP-16) on 4 December 1972.

TABLE 4 - ROT CONTACTS

Plane: P3F1 (VP-16)
 Date: 4 December 1972

Pilot: Brockley
 FI: J.I. Bowen

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 1 | 1308 | 2138 | 8508 |
| 2 | 1308 | 2119 | 8532 |
| 3 | 1308 | 2139 | 8526 |
| 4 | 1308 | 2159 | 8513 |
| 5 | 1309 | 2121 | 8443 |
| 6 | 1308 | 2132 | 8439 |
| 7 | 1255 | 2125 | 8258 |
| 8 | 1235 | 2125 | 8115 |
| 9 | 1235 | 2124 | 8133 |
| 10 | 1308 | 2045 | 8452 |
| 11 | 1256 | 2036 | 8314 |
| 12 | 1252 | 2031 | 8305 |
| 13 | 2052 | 2035 | 8244 |
| 14 | 2052 | 2034 | 8228 |
| 15 | 1235 | 2004 | 8210 |
| 16 | 1235 | 2041 | 8143 |
| 17 | 2052 | 2030 | 8138 |
| 18 | 2359 | 2001 | 8039 |
| 19 | 1218 | 2005 | 8020 |
| 20 | 1218 | 2021 | 8016 |
| 21 | 1218 | 2020 | 8041 |
| 22 | 2059 | 2000 | 7902 |
| 23 | 2030 | 1923 | 8504 |
| 24 | 2030 | 1920 | 8441 |
| 25 | 2030 | 1929 | 8444 |
| 26 | 2052 | 1936 | 8338 |
| 27 | 2052 | 1900 | 8312 |
| 28 | 2052 | 1948 | 8142 |

TABLE 4 - ROT CONTACTS (Cont)

Plane: P3#1 (VP-16)
 Date: 4 December 1972

Pilot: Brockley
 PI: J.I. Bowen

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 29 | 2052 | 1950 | 8158 |
| 30 | 1234 | 1950 | 8141 |
| 31 | 1232 | 1958 | 8130 |
| 32 | 1230 | 1949 | 8100 |
| 33 | 1230 | 1952 | 8055 |
| 34 | 2059 | 1942 | 7928 |
| 35 | 2059 | 1909 | 7921 |
| 36 | 2059 | 1913 | 7843 |
| 37 | 2059 | 1921 | 7818 |
| 38 | 2030 | 1850 | 8258 |
| 39 | 2030 | 1808 | 8239 |
| 40 | 2059 | 1859 | 7944 |
| 41 | 2059 | 1832 | 7939 |
| 42 | 2030 | 1756 | 8255 |
| 43 | 2052 | 1713 | 8204 |

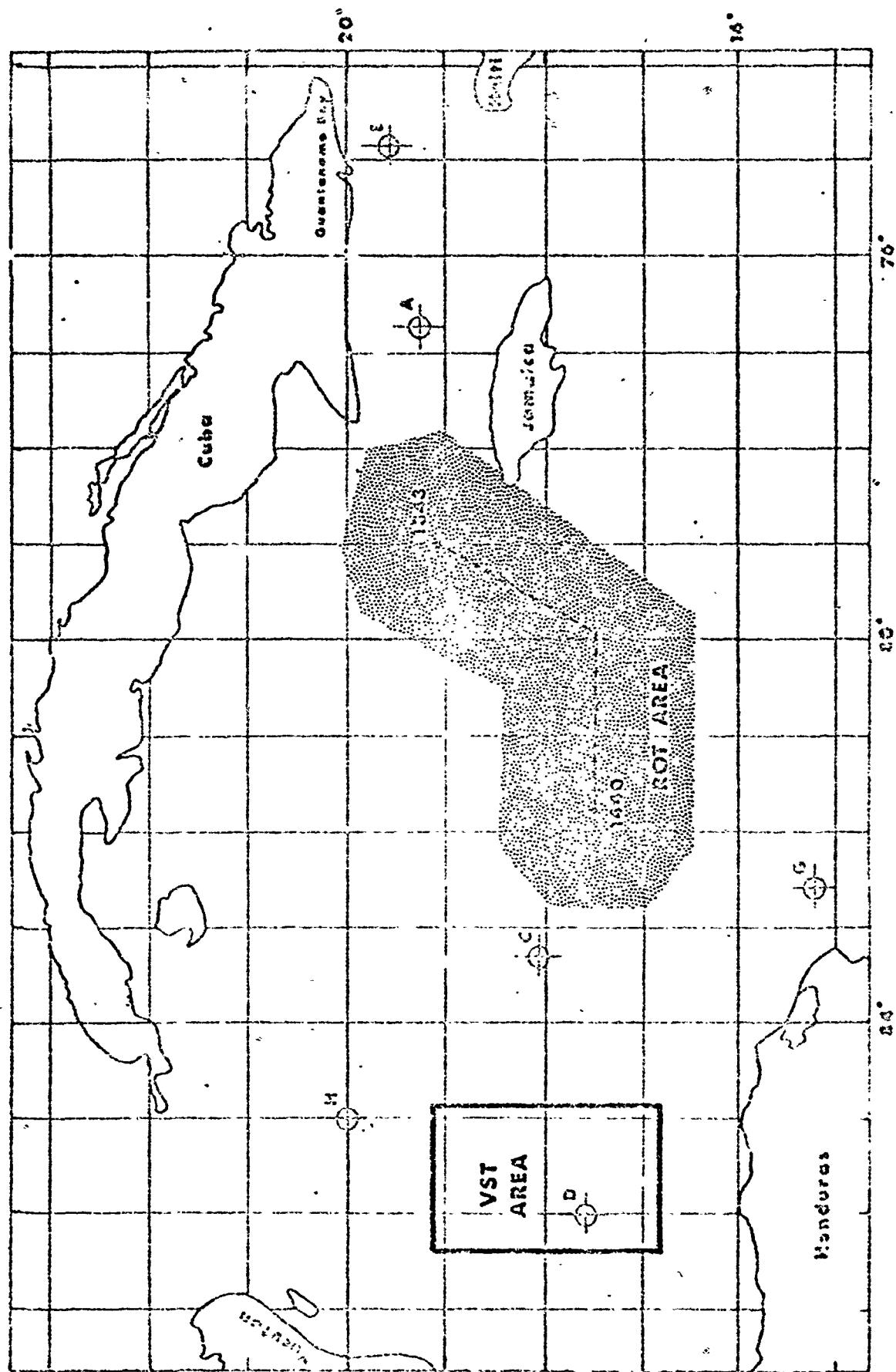


FIGURE VIII -- The Approximate Flight Path and VST and RST Coverage for P3#2 (VP-16) on 4 December 1972. The Greenwich Mean Times for Key Positions are Given.

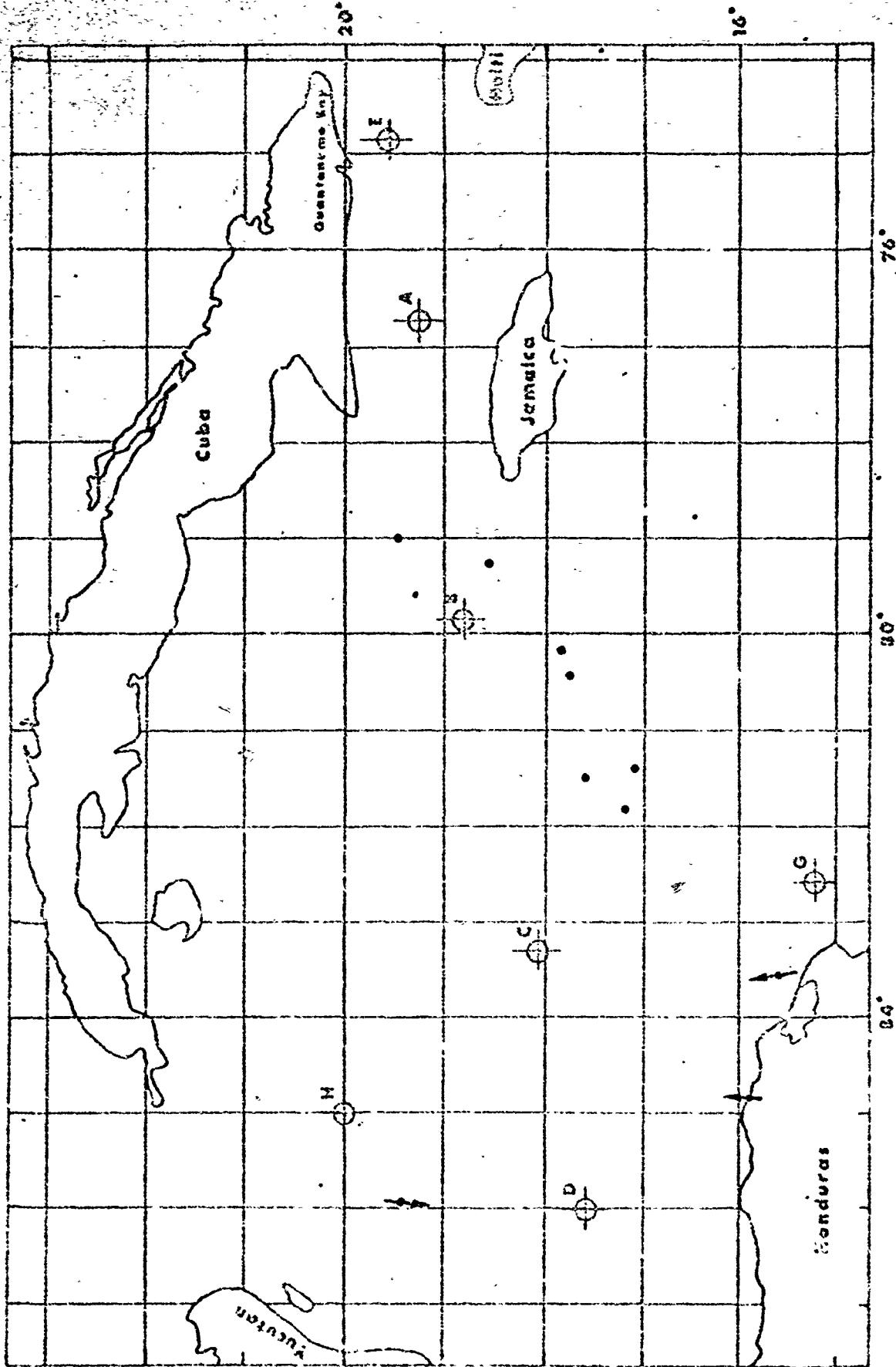


FIGURE IX — The Approximate Positions of the ROT (●) and VST (↔—1500 Greenwich Mean Time) Contacts Made by P3#2 (YP-16) on 4 December 1972.

TABLE 5 - ROT CONTACTS

Plane: P3#2 (VP-16)
 Date: 4 December 1972

Pilot: Harvey
 PI: Lackie

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 1 | 1343 | 1927 | 7900 |
| 2 | 1348 | 1837 | 7921 |
| 3 | 1429 | 1706 | 8126 |
| 4 | 1430 | 1737 | 8129 |
| 5 | 1440 | 1717 | 8152 |
| 6 | 1405 | 1753 | 8005 |
| 7 | 1407 | 1748 | 8024 |

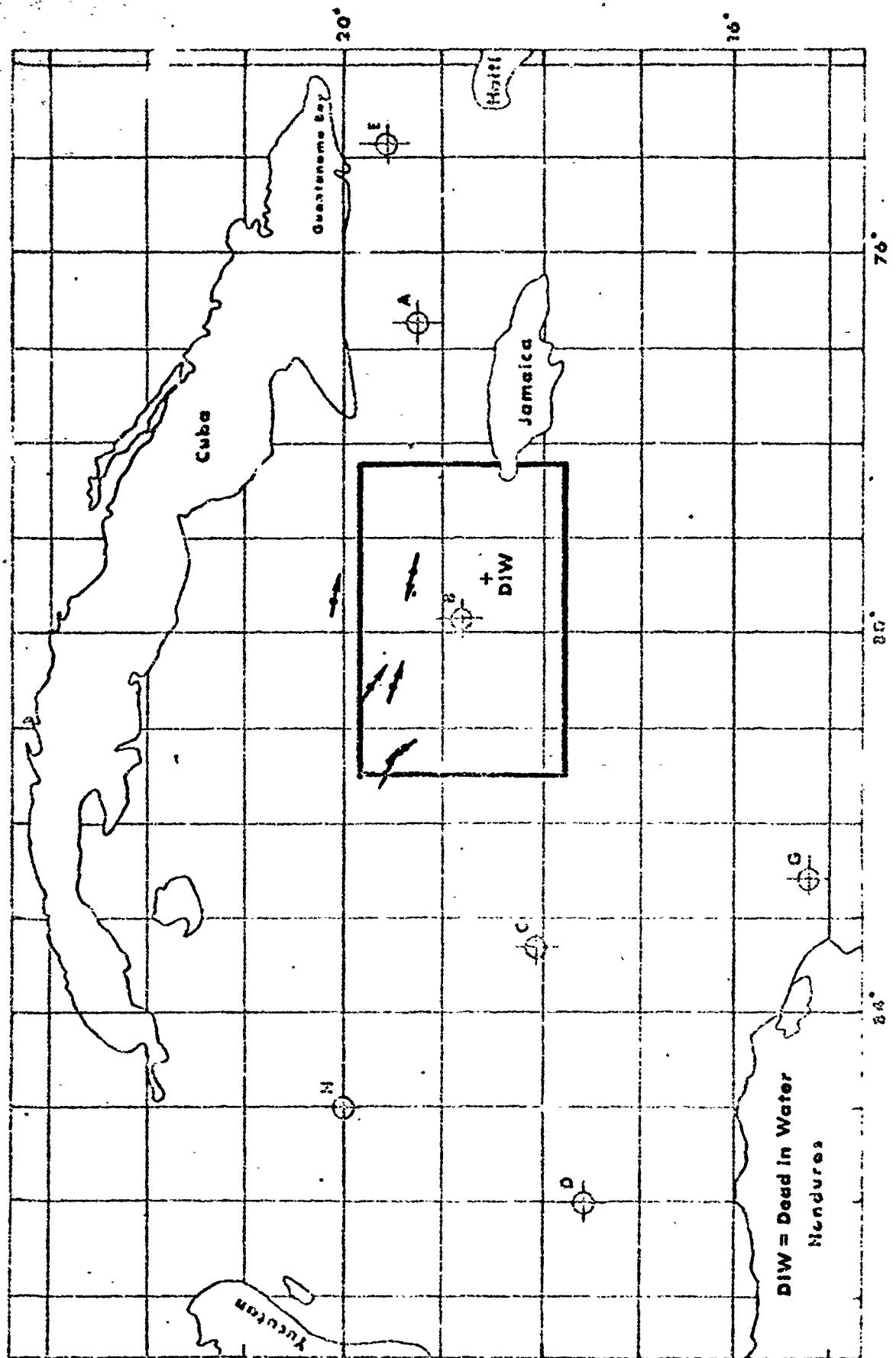


FIGURE X -- The Approximate VST Area and VSF Contact Positions Dead Reckoned to 1500 Greenwich Mean Time for P3#3 (VP-16) on 4 December 1972.

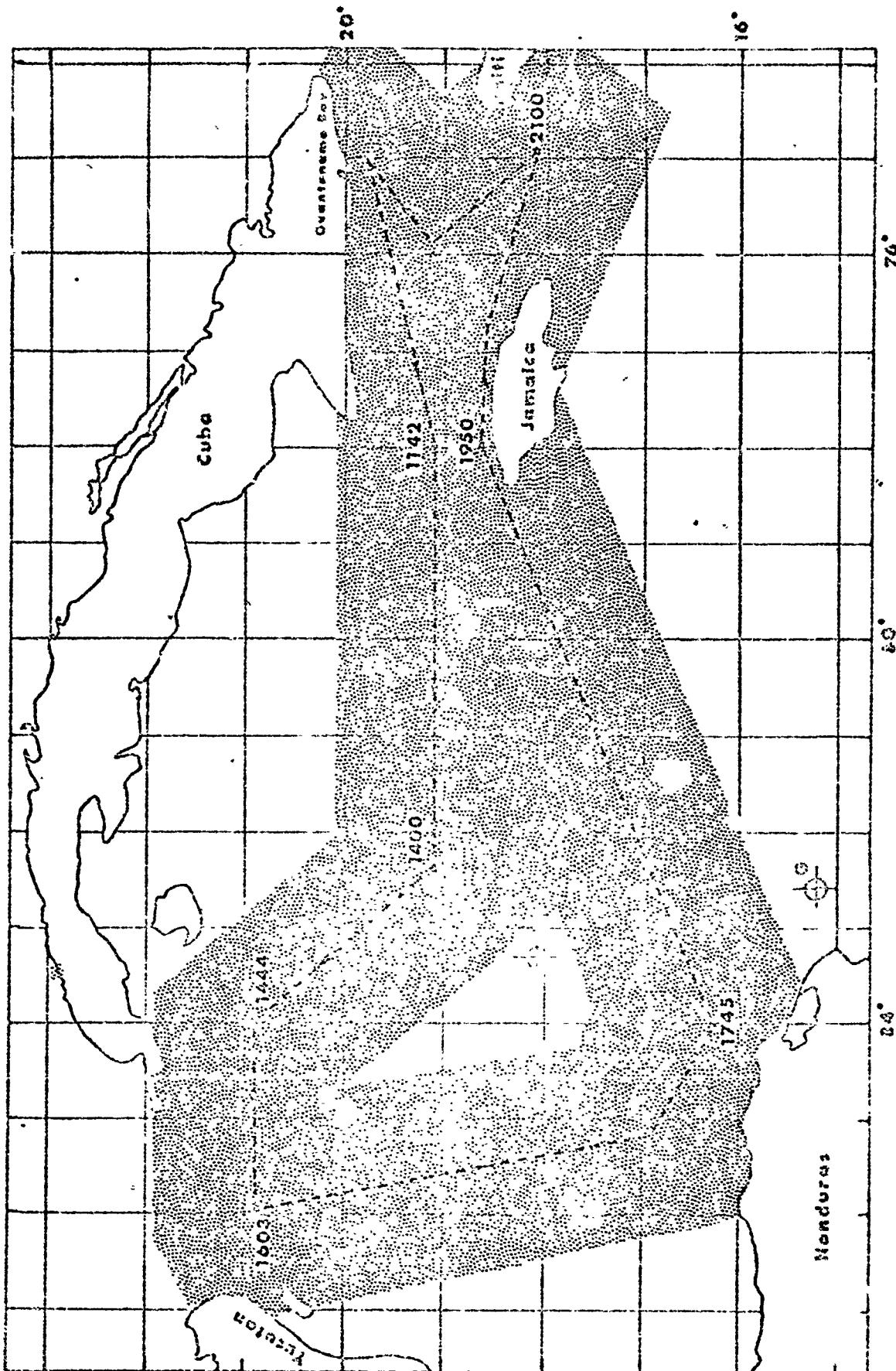


FIGURE XI -- The Approximate Flight Path and ROT Coverage Area for P3#4 (VKI 3) on 4 December 1972. The Greenwich Mean Time for key Positions are Given.

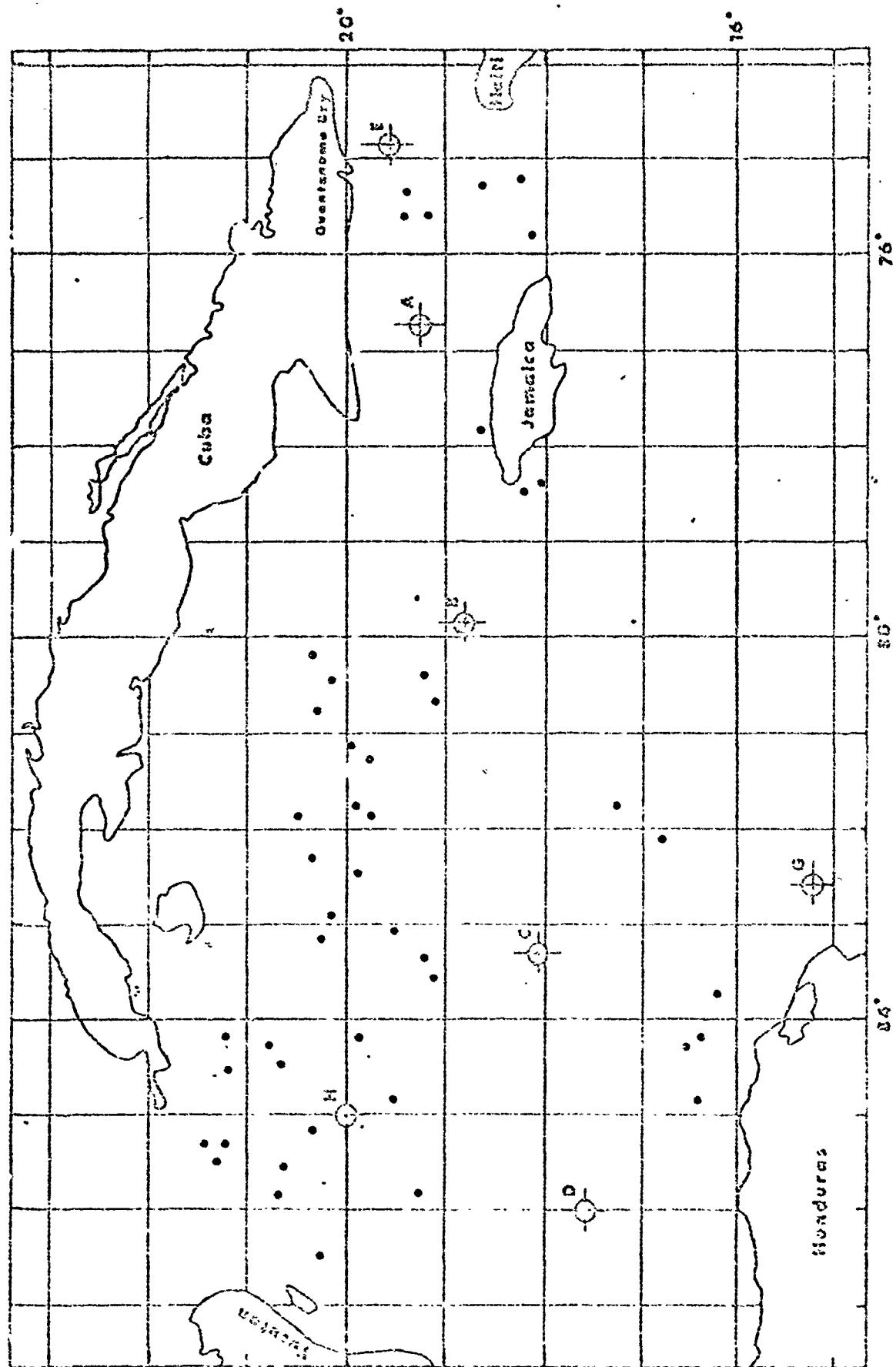


FIGURE XII -- The Approximate Positions of the Radar Contacts for
P3#4 (VXN 8) on 4 December 1972.

TABLE 6 - ROT CONTACTS

Plane: P3#4 (VXN 8)
 Date: 4 December 1972

Pilot: Lt. Lamb
 PI: R. Beckner

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 1 | 1516 | 2116 | 8524 |
| 2 | 1516 | 2127 | 8515 |
| 3 | 1517 | 2117 | 8519 |
| 4 | 1428 | 2112 | 8432 |
| 5 | 1448 | 2121 | 8406 |
| 6 | 1615 | 2014 | 8630 |
| 7 | 1517 | 2034 | 8533 |
| 8 | 1517 | 2020 | 8509 |
| 9 | 1617 | 2039 | 8554 |
| 10 | 1413 | 2044 | 8437 |
| 11 | 1413 | 2051 | 8427 |
| 12 | 1405 | 2015 | 8305 |
| 13 | 1405 | 2013 | 8257 |
| 14 | 1254 | 2023 | 8221 |
| 15 | 1254 | 2032 | 8154 |
| 16 | 1241 | 2013 | 8048 |
| 17 | 1241 | 2017 | 8026 |
| 18 | 1241 | 2006 | 8027 |
| 19 | 1628 | 1911 | 8557 |
| 20 | 1413 | 1924 | 8454 |
| 21 | 1413 | 1950 | 8409 |
| 22 | 1413 | 1904 | 8328 |
| 23 | 1412 | 1906 | 8320 |
| 24 | 1303 | 1930 | 8301 |
| 25 | 1256 | 1955 | 8228 |
| 26 | 1240 | 1945 | 8152 |
| 27 | 1254 | 1958 | 8148 |
| 28 | 1240 | 1949 | 8113 |

TABLE 6 - ROT CONTACTS (Cont)

Plane: P3#4 (AXN 8)
Date: 4 December 1972Pilot: Lt. Lamb
PI: R. Beckner

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 29 | 1241 | 1957 | 8112 |
| 30 | 1225 | 1907 | 8026 |
| 31 | 1225 | 1900 | 8038 |
| 32 | 2137 | 1921 | 7542 |
| 33 | 2137 | 1923 | 7533 |
| 34 | 2137 | 1912 | 7538 |
| 35 | 1959 | 1803 | 7822 |
| 36 | 1935 | 1810 | 7825 |
| 37 | 1947 | 1839 | 7753 |
| 38 | 2039 | 1837 | 7516 |
| 39 | 2050 | 1817 | 7512 |
| 40 | 2109 | 1808 | 7550 |
| 41 | 1854 | 1712 | 8150 |
| 42 | 1736 | 1628 | 8435 |
| 43 | 1737 | 1637 | 8411 |
| 44 | 1810 | 1620 | 8407 |
| 45 | 1747 | 1613 | 8340 |
| 46 | 1848 | 1649 | 8206 |

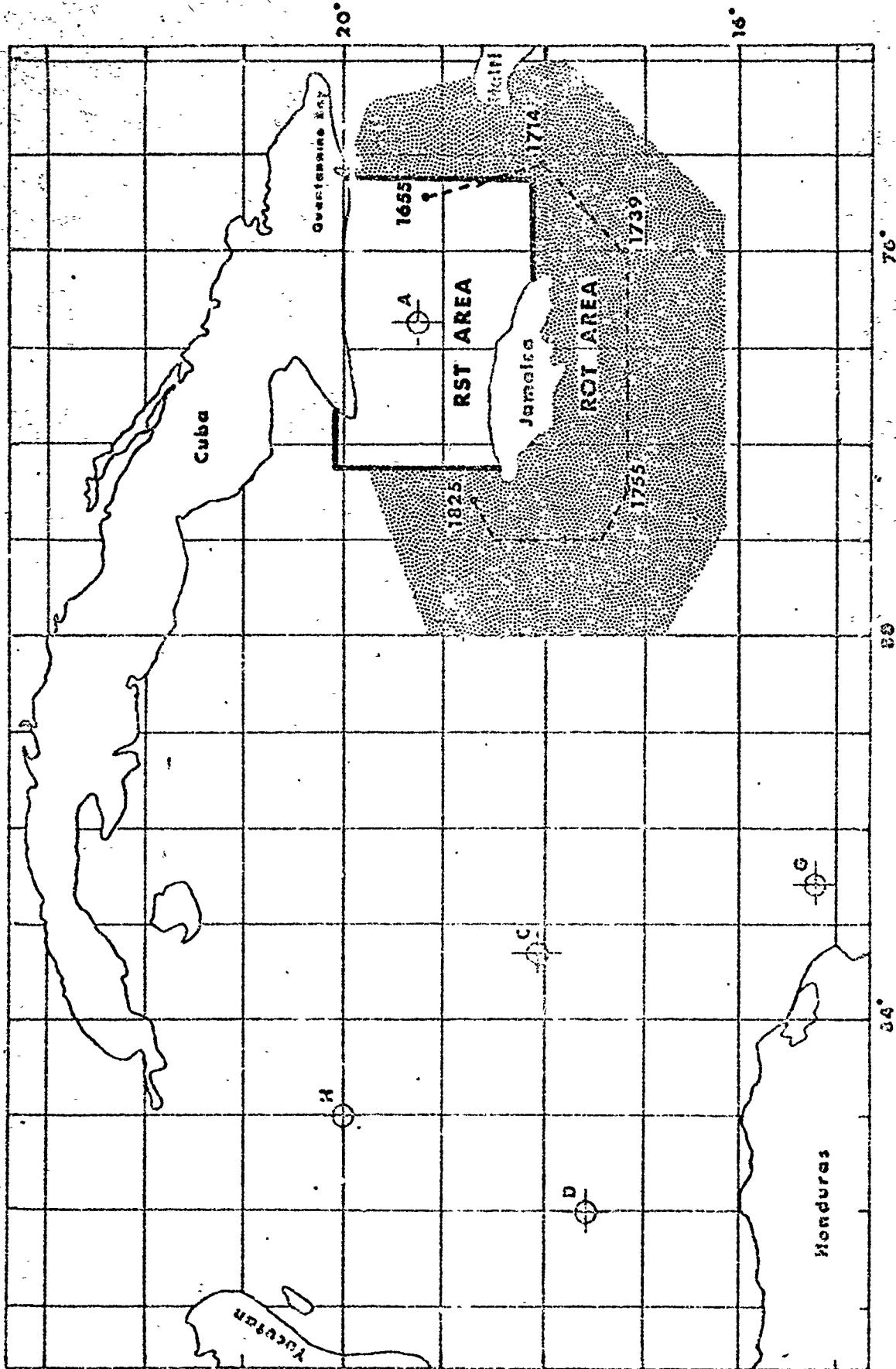


FIGURE XIII -- The Approximate Flight Path and RST and ROT Coverage for P3#5 (NRL) on 4 December 1971. The Greenwich Mean Times for Key Positions are given.

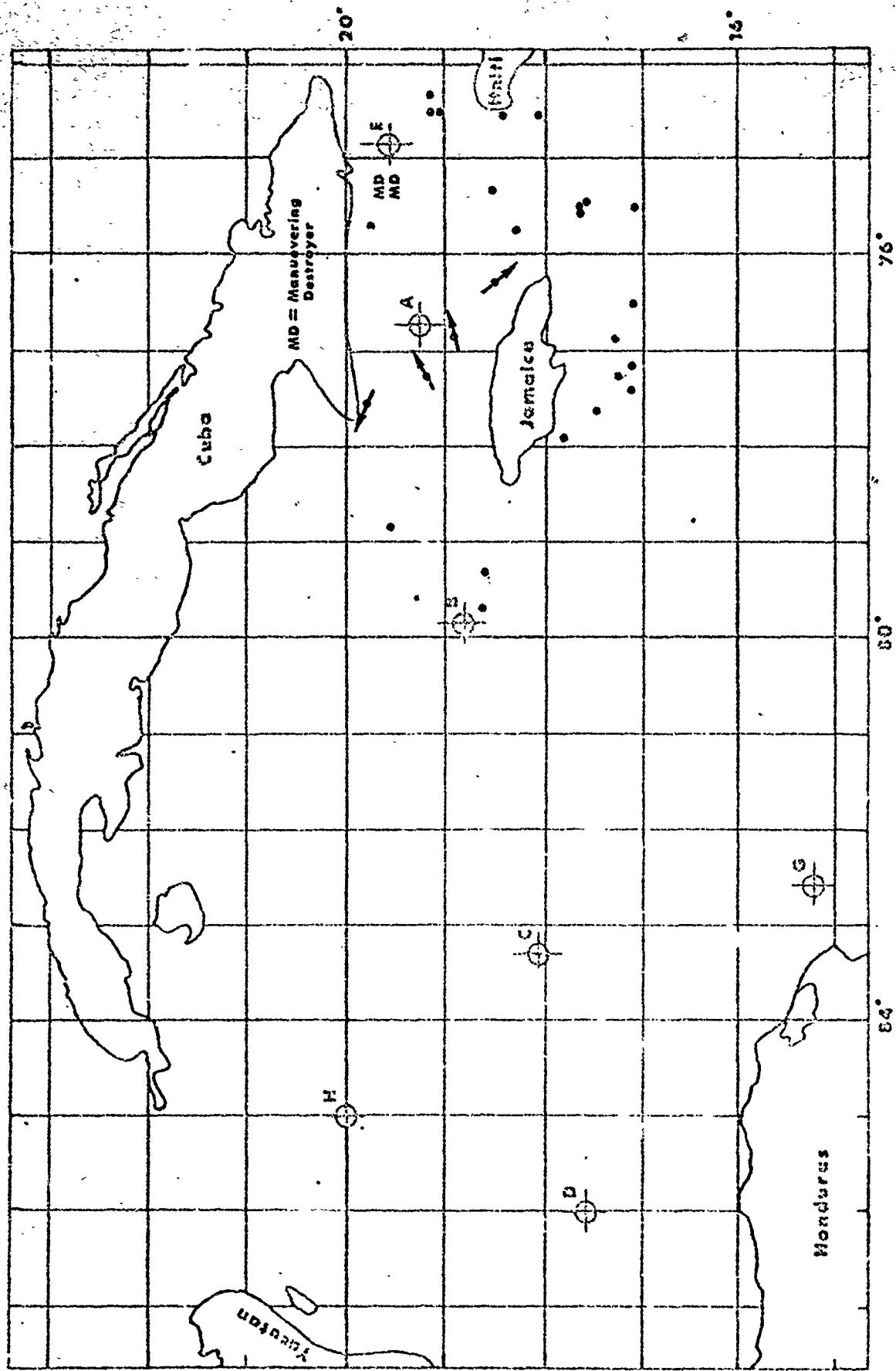


FIGURE XIV -- The Approximate Positions of ROT (●) and RST (---) 1500 Greenwich Mean Time Contacts Made by P3^W5 (NRL) on 4 December 1972.

TABLE 7 - ROT CONTACTS

Plane: P3F5 (NRL)
 Date: 4 December 1972

Pilot: Hutchin
 PI: E. Sander

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 1 | 1819 | 1927 | 7855 |
| 2 | 1655 | 1947 | 7534 |
| 3 | 1706 | 1907 | 7429 |
| 4 | 1706 | 1906 | 7415 |
| 5 | 1706 | 1901 | 7423 |
| 6 | 1816 | 1845 | 7915 |
| 7 | 1816 | 1847 | 7936 |
| 8 | 1655 | 1825 | 7514 |
| 9 | 1655 | 1814 | 7552 |
| 10 | 1706 | 1803 | 7435 |
| 11 | 1714 | 1816 | 7431 |
| 12 | 1755 | 1759 | 7757 |
| 13 | 1748 | 1729 | 7737 |
| 14 | 1739 | 1717 | 7713 |
| 15 | 1739 | 1715 | 7716 |
| 16 | 1739 | 1708 | 7703 |
| 17 | 1739 | 1716 | 7651 |
| 18 | 1732 | 1703 | 7628 |
| 19 | 1714 | 1739 | 7534 |
| 20 | 1714 | 1738 | 7532 |
| 21 | 1714 | 1736 | 7533 |
| 22 | 1723 | 1707 | 7534 |

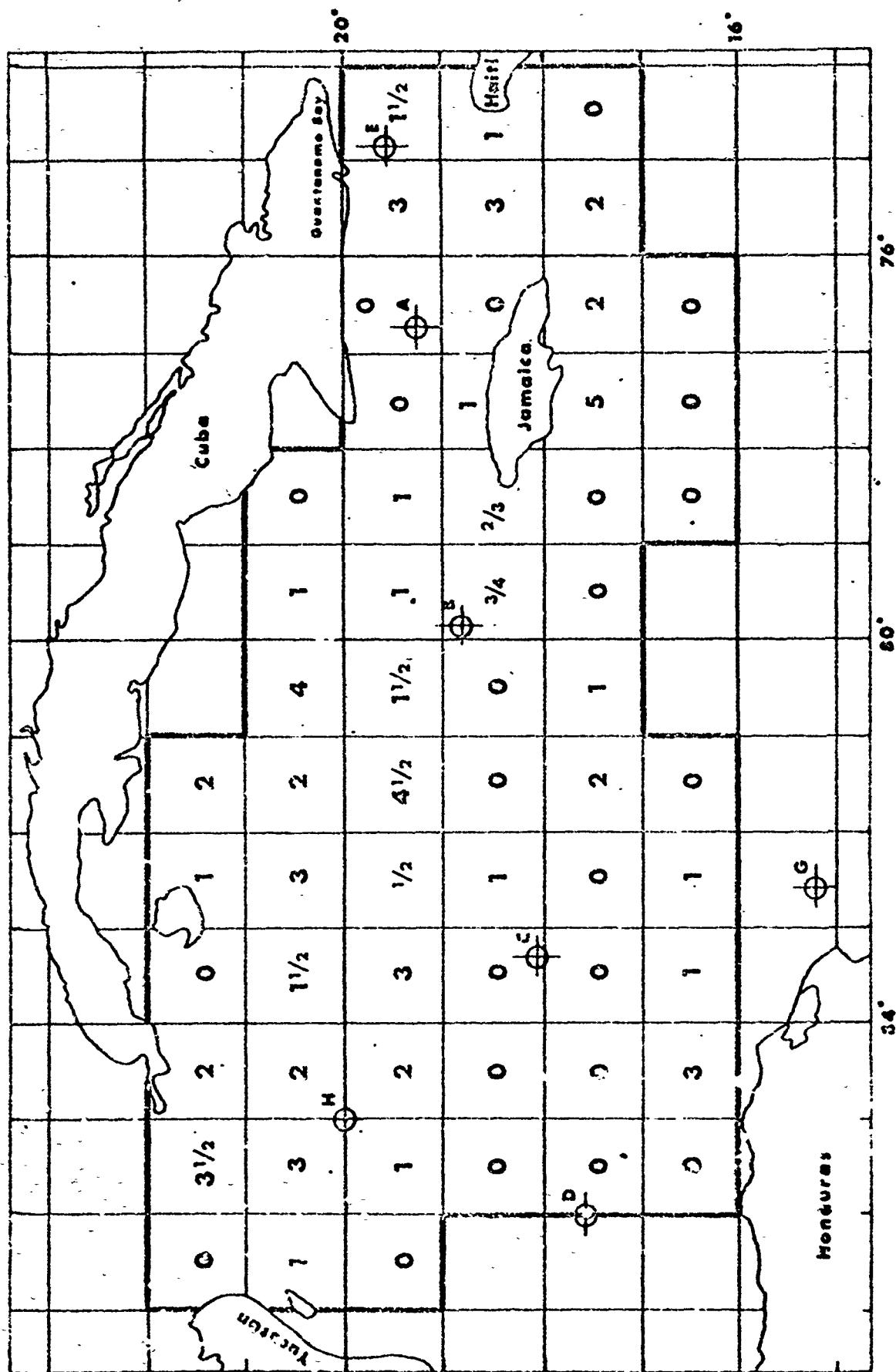


FIGURE XV -- The Observed Density for One Degree Squares of ROT Radar Contacts on 4 December 1972 (Average Density: 1.2 Contacts per One Degree Square).

C. Data for 5 December 1972

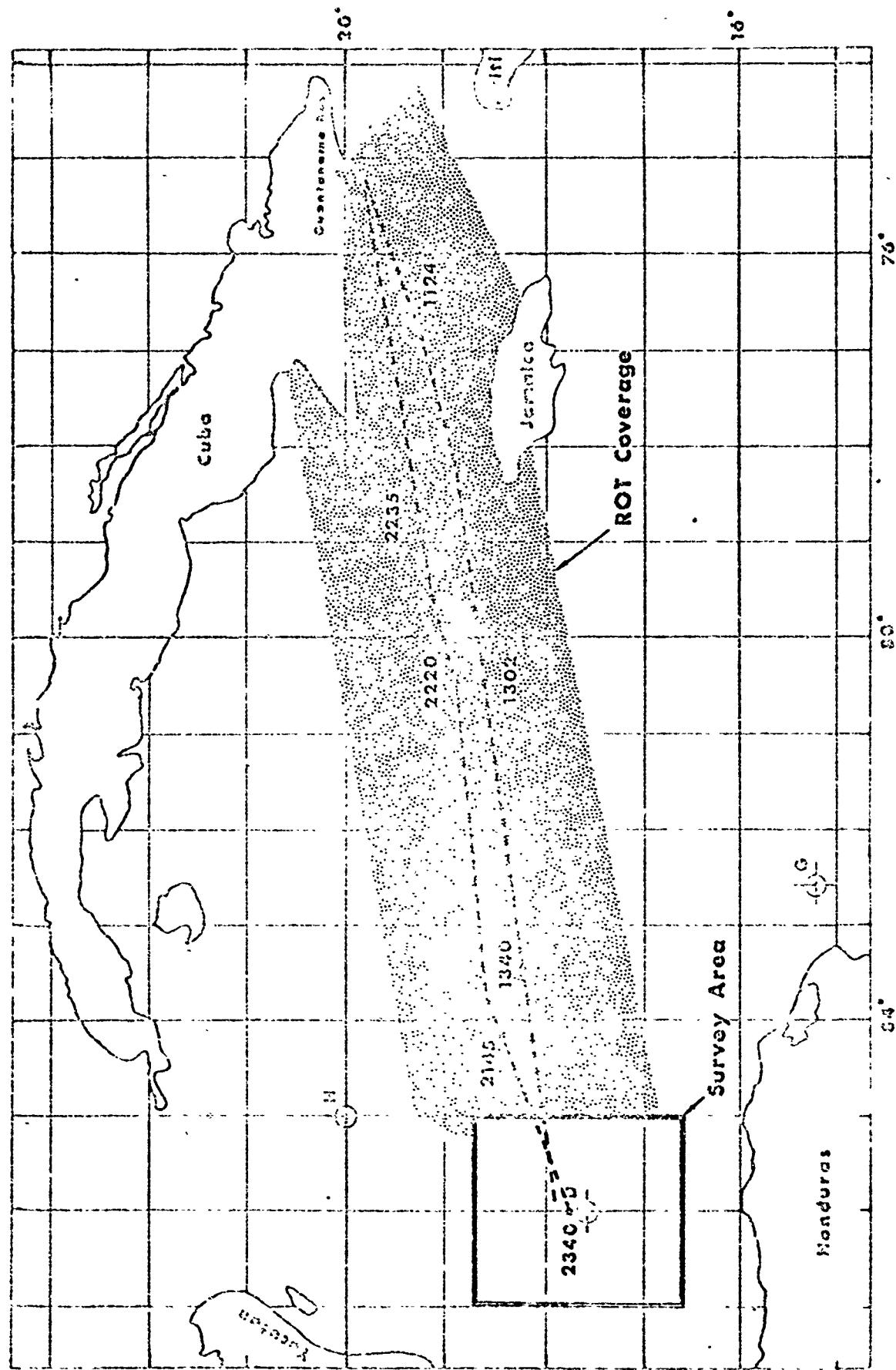


FIGURE XVI -- The Approximate Flight Path ROT Coverage and Survey Area for P244 (VX-3) on 5 December '972. The Greenwich Mean Times for Key Positions are Given.

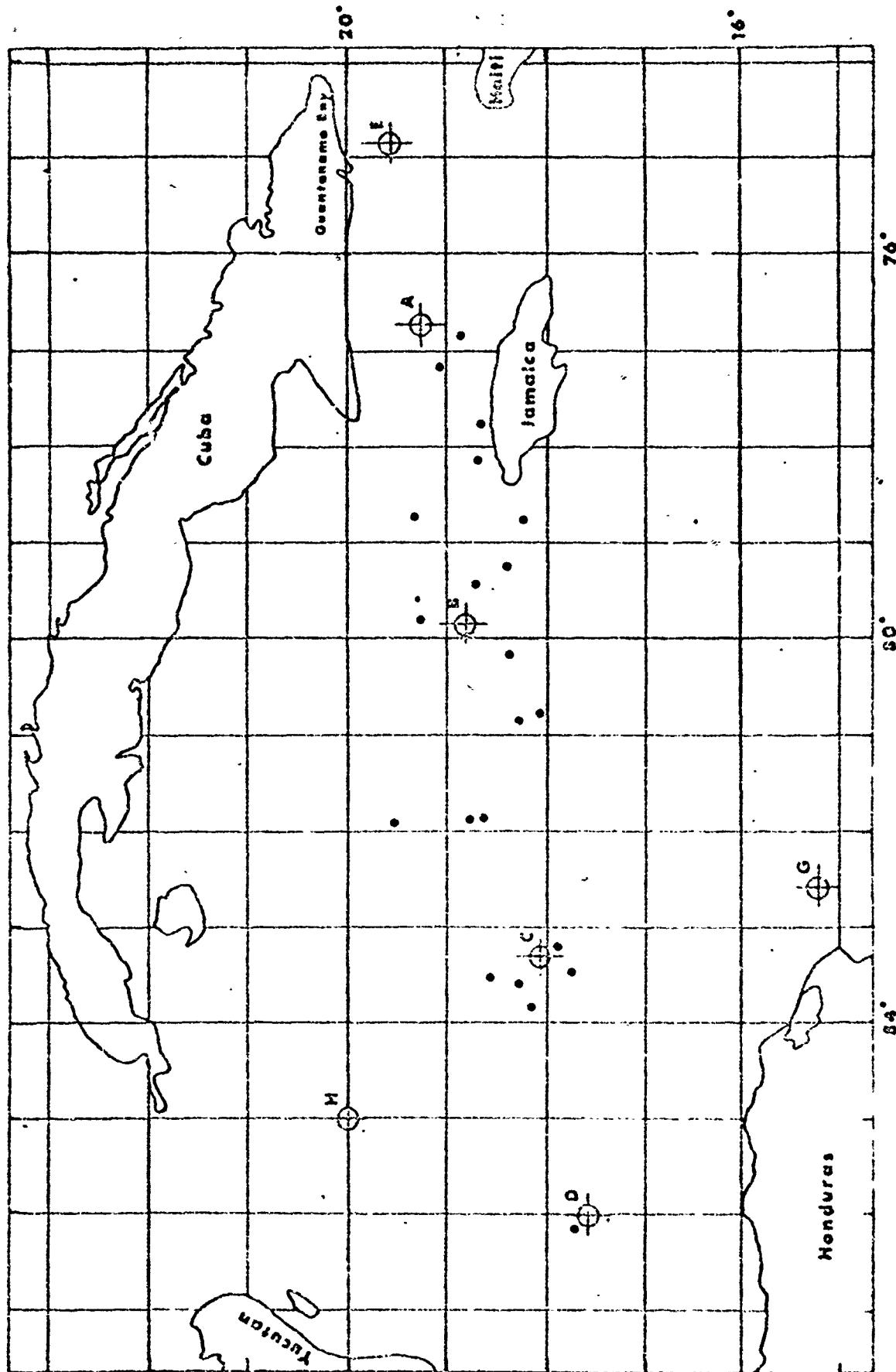


FIGURE XVII — The Approximate Positions of the Radar Contacts (•)
Made by P3#4 (VNN 8) on 5 December 1972.

TABLE 8 - ROT CONTACTS

Plane: P3#4 (VXN 8)
 Date: 5 December 1972

Pilot: Lt. Lamb
 PI: R. Beckner

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 1 | 2200 | 1928 | 8159 |
| 2 | 2220 | 1909 | 7945 |
| 3 | 1206 | 1919 | 7840 |
| 4 | 1124 | 1905 | 7718 |
| 5 | 1340 | 1803 | 8342 |
| 6 | 2145 | 1823 | 8333 |
| 7 | 2145 | 1821 | 8334 |
| 8 | 2145 | 1807 | 8314 |
| 9 | 2200 | 1845 | 8152 |
| 10 | 2211 | 1822 | 8058 |
| 11 | 1302 | 1811 | 8055 |
| 12 | 1323 | 1829 | 8008 |
| 13 | 1211 | 1846 | 7923 |
| 14 | 1210 | 1831 | 7917 |
| 15 | 1207 | 1816 | 7841 |
| 16 | 2233 | 1839 | 7807 |
| 17 | 2235 | 1826 | 7747 |
| 18 | 1137 | 1854 | 7610 |
| 19* | 1940* | 1751* | 8617* |
| 20 | 2145 | 1754 | 8314 |
| 21 | 2150 | 1744 | 8320 |

*A fishing boat.

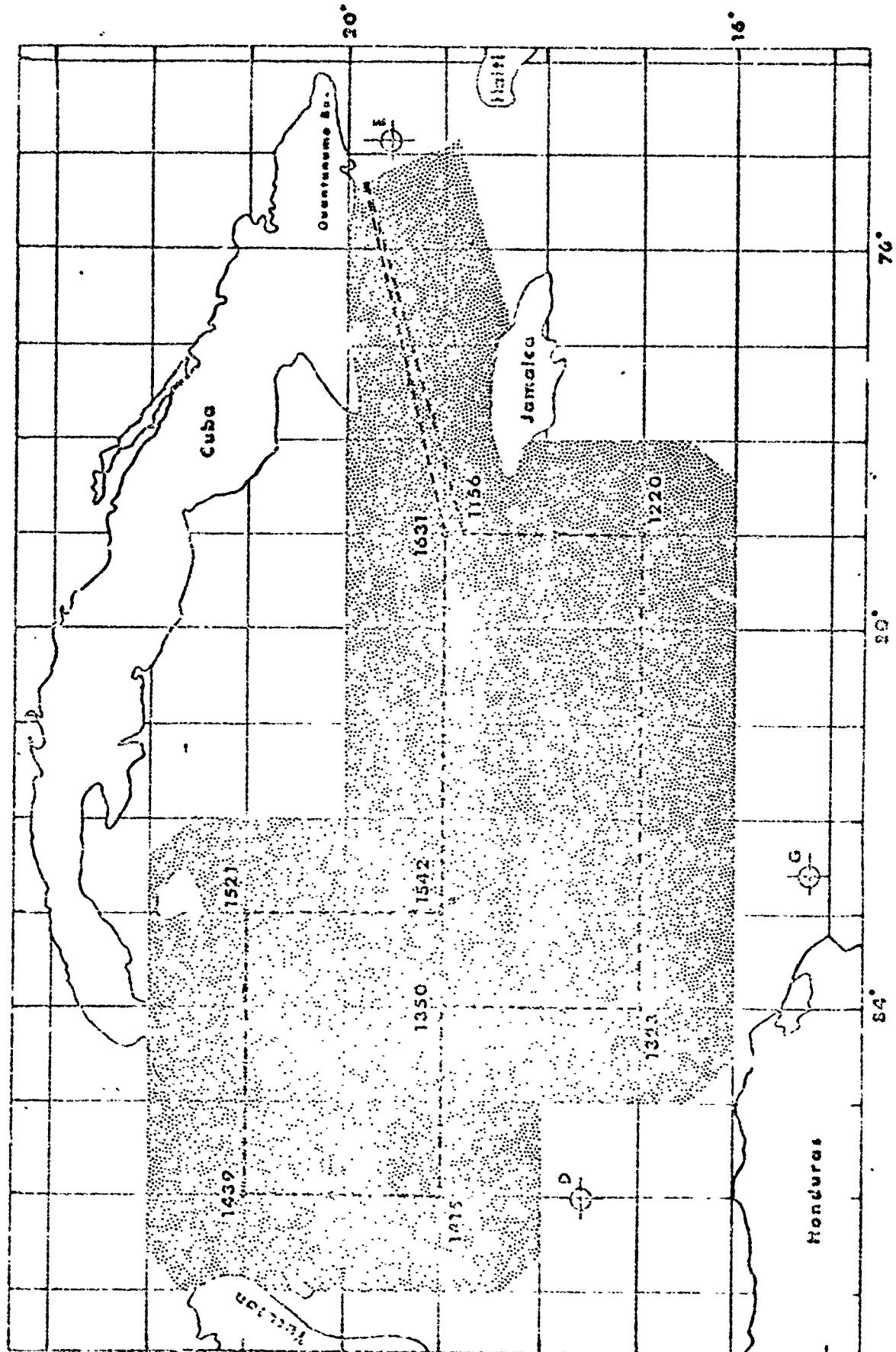


FIGURE XVIII -- The Approximate Flight Path and RT Coverage for P3#5 (NRL) on 5 December 1972. The Greenwich Mean Times for Key Positions are Given.

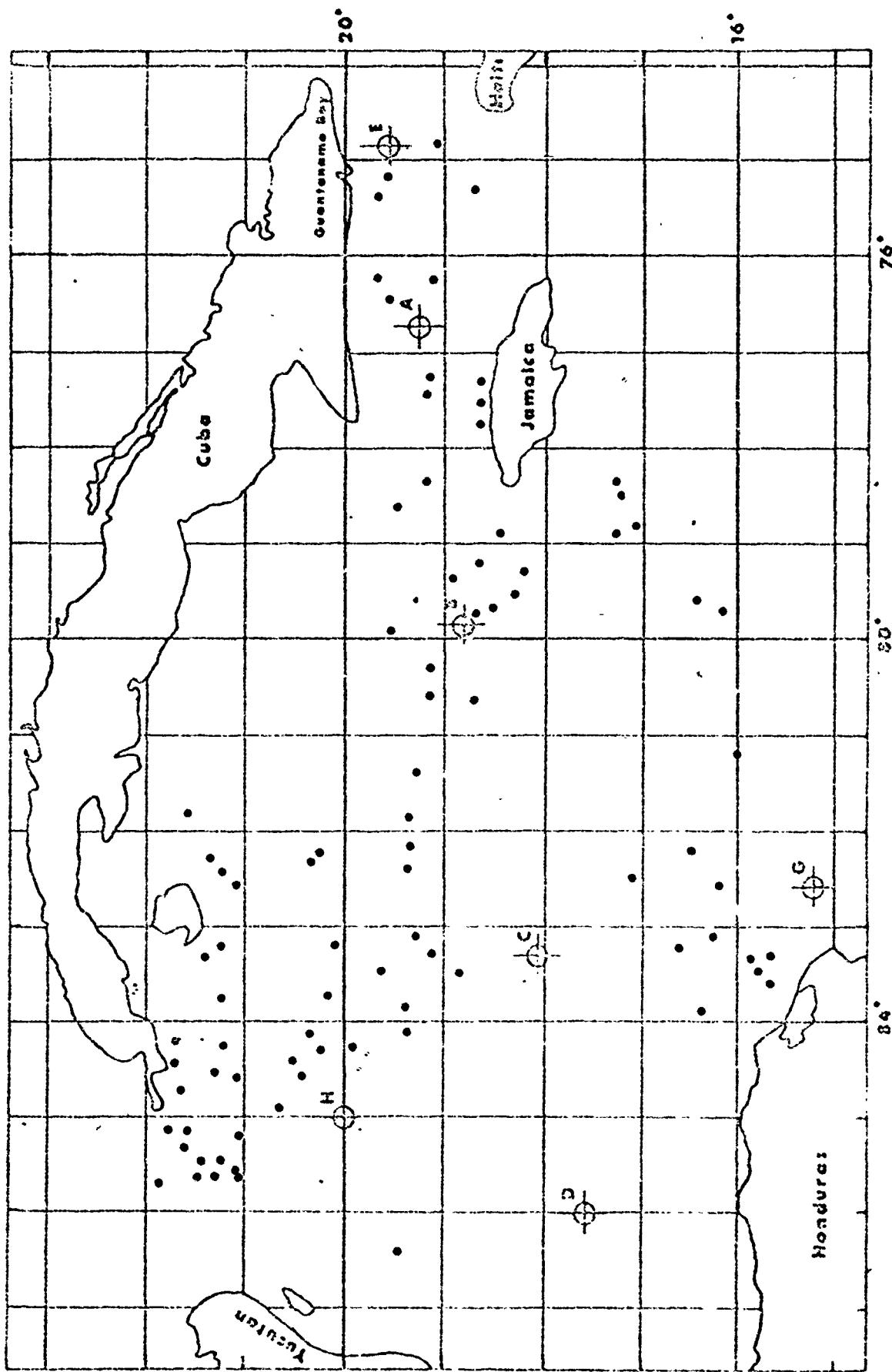


FIGURE XIX -- The Approximate Locations of the ROT Contacts Made by
P3/5 (NRL) on 5 December 1972.

TABLE 9 - ROT CONTACTS

Plane: P3#5 (NRL)
 Date: 5 December 1972

Pilot: Hutchins
 PI: E. Sander

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 1 | 1424 | 2126 | 8528 |
| 2 | 1424 | 2112 | 8527 |
| 3 | 1424 | 2102 | 8508 |
| 4 | 1433 | 2153 | 8535 |
| 5 | 1433 | 2135 | 8508 |
| 6 | 1433 | 2126 | 8533 |
| 7 | 1433 | 2115 | 8535 |
| 8 | 1444 | 2103 | 8535 |
| 9 | 1444 | 2103 | 8535 |
| 10 | 1450 | 2142 | 8509 |
| 11 | 1433 | 2135 | 8518 |
| 12 | 1433 | 2138 | 8444 |
| 13 | 1439 | 2119 | 8431 |
| 14 | 1439 | 2117 | 8423 |
| 15 | 1439 | 2104 | 8437 |
| 16 | 1452 | 2124 | 8426 |
| 17 | 1501 | 2141 | 8410 |
| 18 | 1501 | 2113 | 8351 |
| 19 | 1501 | 2110 | 8314 |
| 20 | 1510 | 2118 | 8320 |
| 21 | 1521 | 2113 | 8233 |
| 22 | 1521 | 2116 | 8230 |
| 23 | 1521 | 2119 | 8228 |
| 24 | 1521 | 2131 | 8157 |
| 25 | 1500 | 2047 | 8457 |
| 26 | 1424 | 2035 | 8433 |
| 27 | 152 | 2039 | 8425 |
| 28 | 1350 | 2016 | 8413 |

TABLE 9 - ROT CONTACTS (Cont)

Plane: P3#5 (NRL)
 Date: 5 December 1972

Pilot: Hutchins
 PI: E. Sander

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 29 | 1350 | 2028 | 8404 |
| 30 | 1350 | 2007 | 8350 |
| 31 | 1350 | 2002 | 8317 |
| 32 | 1521 | 2018 | 8229 |
| 33 | 1521 | 2010 | 8223 |
| 34 | 1408 | 1924 | 8624 |
| 35 | 1341 | 1926 | 8408 |
| 36 | 1350 | 1958 | 8412 |
| 37 | 1341 | 1929 | 8351 |
| 38 | 1341 | 1941 | 8337 |
| 39 | 1341 | 1920 | 8304 |
| 40 | 1341 | 1906 | 8320 |
| 41 | 1530 | 1929 | 8220 |
| 42 | 1530 | 1927 | 8212 |
| 43 | 1548 | 1926 | 8159 |
| 44 | 1548 | 1917 | 8130 |
| 45 | 1557 | 1902 | 8132 |
| 46 | 1611 | 1906 | 8042 |
| 47 | 1611 | 1905 | 8023 |
| 48 | 1612 | 1935 | 7959 |
| 49 | 1147 | 1927 | 7844 |
| 50 | 1138 | 1909 | 7815 |
| 51 | 1128 | 1907 | 7723 |
| 52 | 1128 | 1905 | 7710 |
| 53 | 1119 | 1937 | 7615 |
| 54 | 1119 | 1936 | 7617 |
| 55 | 1123 | 1905 | 7613 |
| 56 | 1706 | 1941 | 7519 |

TABLE 9 - ROT CONTACTS (Cont)

Plane: P3#5 (NRL)
 Date: 5 December 1972

Pilot: Hutchins
 PI: E. Sander

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 57 | 1706 | 1937 | 7505 |
| 58 | 1706 | 1946 | 7454 |
| 59 | 1530 | 1856 | 8326 |
| 60 | 1606 | 1850 | 8037 |
| 61 | 1619 | 1853 | 7954 |
| 62 | 1619 | 1847 | 7943 |
| 63 | 1147 | 1859 | 7925 |
| 64 | 1147 | 1842 | 7916 |
| 65 | 1156 | 1817 | 7930 |
| 66 | 1156 | 1831 | 7937 |
| 67 | 1156 | 1846 | 7948 |
| 68 | 1147 | 1826 | 7855 |
| 69 | 1646 | 1840 | 7751 |
| 70 | 1646 | 1837 | 7734 |
| 71 | 1655 | 1837 | 7729 |
| 72 | 1706 | 1847 | 7524 |
| 73 | 1257 | 1703 | 8229 |
| 74 | 1205 | 1718 | 7859 |
| 75 | 1205 | 1705 | 7850 |
| 76 | 1205 | 1715 | 7838 |
| 77 | 1205 | 1719 | 7831 |
| 78 | 1315 | 1839 | 8359 |
| 79 | 1306 | 1642 | 8314 |
| 80 | 1308 | 1620 | 8310 |
| 81 | 1248 | 1636 | 8205 |
| 82 | 1257 | 1619 | 8235 |
| 83 | 1238 | 1601 | 8106 |
| 84 | 1215 | 1632 | 7940 |

TABLE 9 - ROT CONTACTS (Cont)

Plane: P3#5 (NRL)
 Date: 5 December 1972

Pilot: Hutchins
 PI: E. Sander

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 85 | 1220 | 1611 | 7944 |
| 86 | 1315 | 1554 | 8334 |
| 87 | 1315 | 1552 | 8328 |
| 88 | 1315 | 1557 | 8330 |
| 89 | 1315 | 1559 | 8329 |

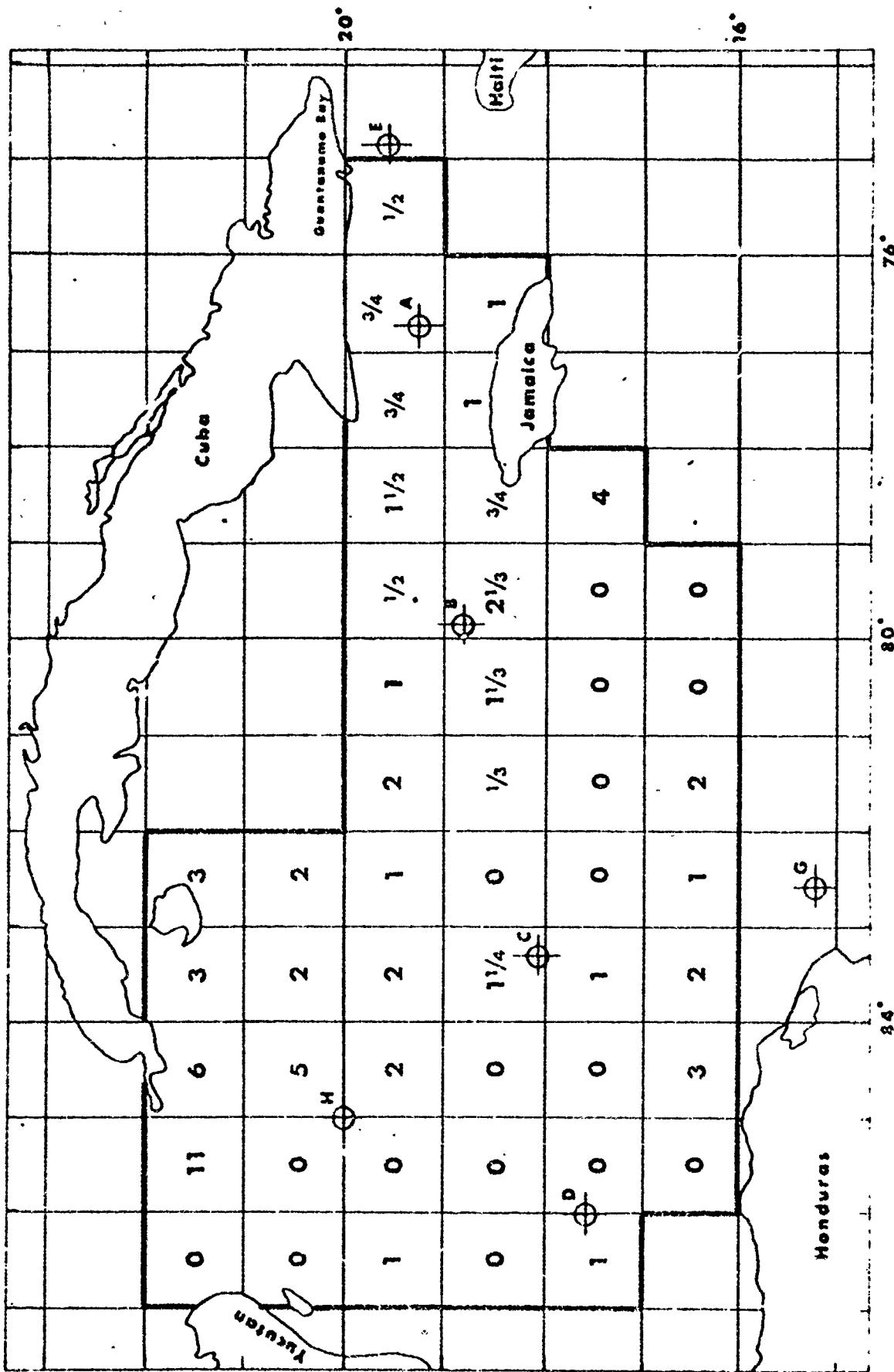


FIGURE XX -- The Observed Density for One Degree Squares of ROT Radar Contacts on 5 December 1972 (Average Density: 1.4 Contacts Per One Degree Square).

D. Data for 6 December 1972

TABLE 10 -- Results of RST's and VST's on 6 December 1972

| Contact | Name | 1700 Zulu Lat. | Time Long. | Zulu Time of Observ. | Speed | Course | Length | Comments | Plane |
|---------|-------------------|-------------------|---------------|----------------------------|-------------------|----------------------|--------|------------------------|-------|
| 1 | Inagua Beach | 2000 | 8419 | 1614 | 8 | 340 | | Fishing boat | P3#1 |
| 2 | | 2048 | 8352 | 1645 | 12 | 350 | 268 | East India Line | P3#1 |
| 3 | | 2052 | 8449 | 1702 | 8 | 350 | | Tug Pulling Barge | P3#1 |
| 4 | Sentinel | 2059 | 8622 | 1756 | 11 | 190 | 200 | Container Ship | P3#1 |
| 5 | | 2004 | 8239 | 1910 | 12-3/4 | 330 | 636 | Liberian, GP2 | P3#1 |
| 6 | Texas Trader | 2016 | 8318 | 1915 | 14-1/2 | 120 | 633 | | P3#1 |
| 7 | John D.W. Goff | 1747 | 8610 | 1519 | 9 | 020 | 300 | GP3 | P3#2 |
| 8 | Sands | 1825 | 8121 | 1629 | 5 | 245 | 209 | | P3#3 |
| 9 | North Seal | 1849 | 3109 | 1636 | 10 | 353 | | | P3#3 |
| 10 | Pierce | 1837 | 7912 | 1839 | 0 | 330 | | | P3#3 |
| 11 | Clerk- Maxwell | 1823 | 8000 | 1910 | 16 | 110 | 462 | London | P3#3 |
| 12 | | 1813 | 7818 | 1856 | 16 | 305 | 112 | Tug | P3#3 |
| 13 | | 949 | 7732 | 1346 | 17.8 ± 1.6 | 270 $\pm 4^{\circ}$ | | | P3#5 |
| 14 | Francis Marian | 1830 | 7722 | 1421 | 19.9 ± 3.8 | 275 $\pm 11^{\circ}$ | 564 | AKA 249 | P3#5 |
| 15 | Wanna Beach | 1930 | 7548 | 1321 | 11.1 ± 1.2 | 070 $\pm 6^{\circ}$ | 174 | West Indian Line Ferry | P3#5 |

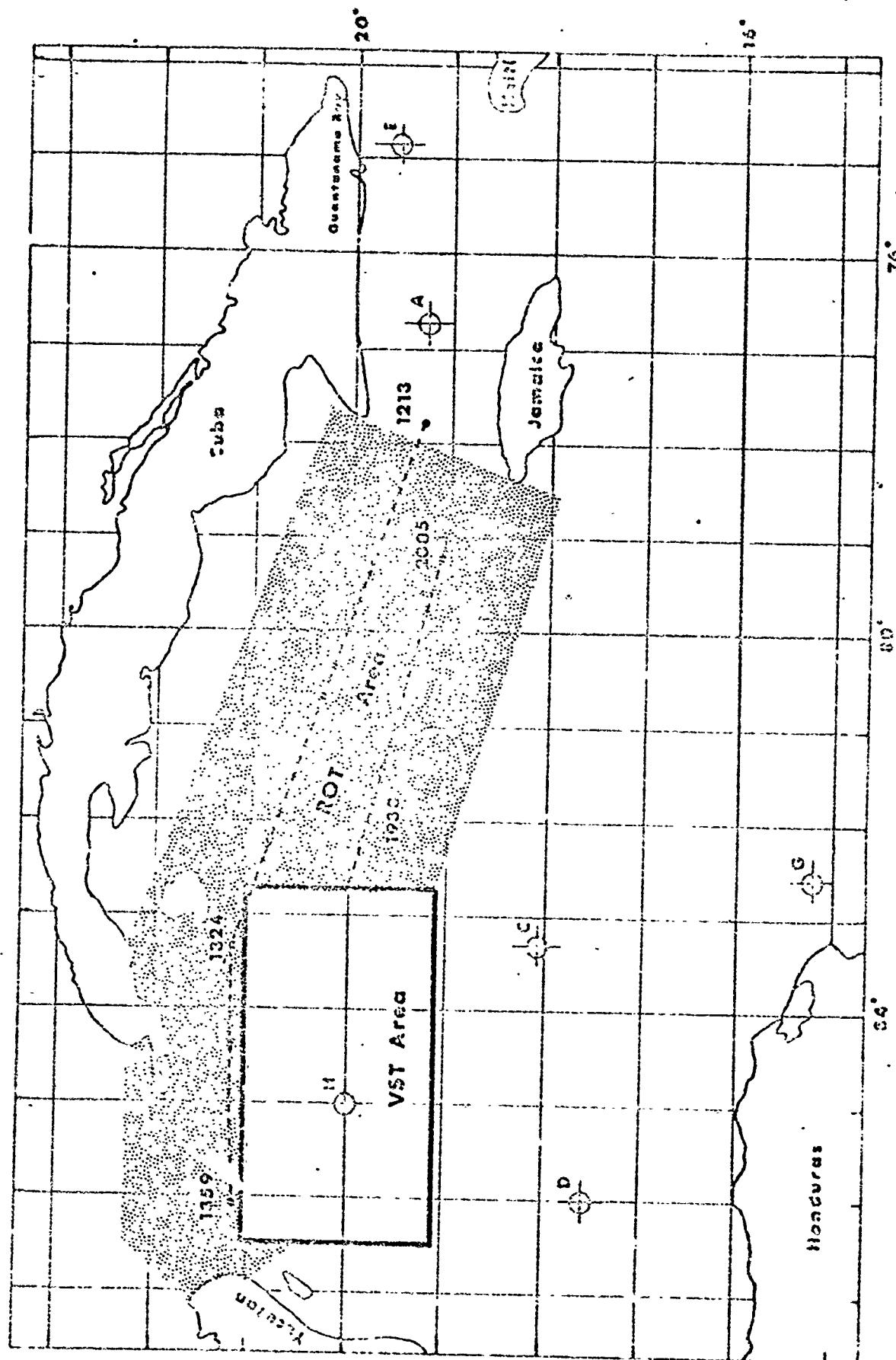


FIGURE XXI -- The Approximate Flight Path and RST and ROT Coverage for P3#1 (VP-16) on 6 December 1972. The Greenwich Mean Times for key Positions are Given.

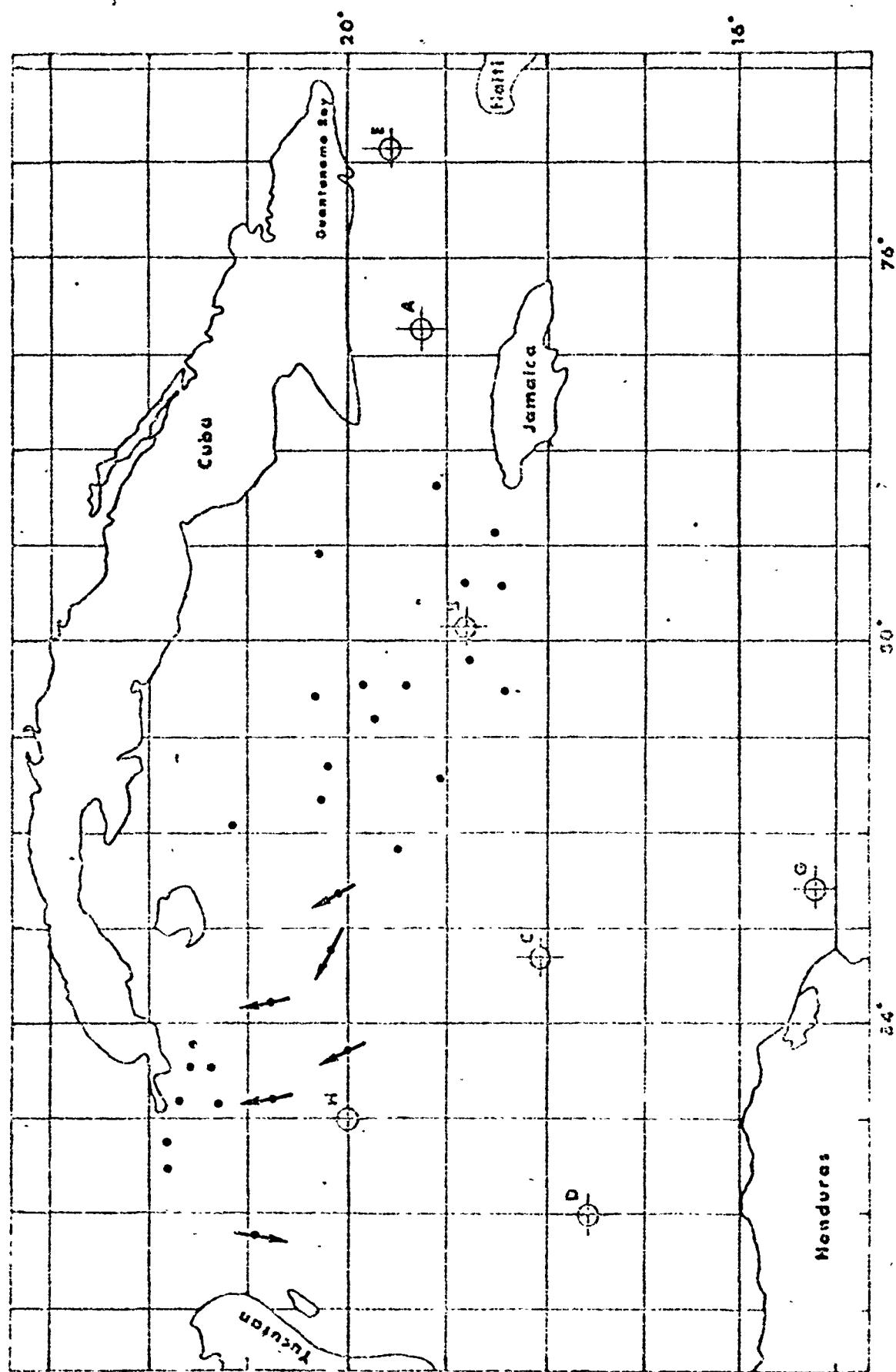


FIGURE XXII -- The Approximate Positions for the ROT Contacts (•) and VST Contacts (→—→ 1700 Greenwich Mean Time) for P3#1 on 6 December 1972.

TABLE 11 - ROT CONTACTS

Plane: P3#1 (VP 16)
 Date: 6 December 1972

Pilot: Brockley
 PI: J.I. Bowen

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 1 | 1348 | 2155 | 8525 |
| 2 | 1348 | 2155 | 8512 |
| 3 | 1325 | 2148 | 8452 |
| 4 | 1325 | 2143 | 8431 |
| 5 | 1325 | 2142 | 8431 |
| 6 | 1325 | 2135 | 8435 |
| 7 | 1325 | 2124 | 8450 |
| 8 | 1255 | 2102 | 8159 |
| 9 | 1255 | 2012 | 8133 |
| 10 | 1932 | 2011 | 8112 |
| 11 | 1932 | 2023 | 8030 |
| 12 | 1235 | 2026 | 7905 |
| 13 | 1255 | 1933 | 8204 |
| 14 | 1932 | 1900 | 8115 |
| 15 | 1235 | 1946 | 8038 |
| 16 | 1235 | 1946 | 8048 |
| 17 | 2008 | 1903 | 7821 |
| 18 | 1953 | 1840 | 8023 |
| 19 | 1235 | 1853 | 8004 |
| 20 | 1958 | 1853 | 7927 |
| 21 | 1958 | 1835 | 7921 |
| 22 | 2008 | 1843 | 7859 |

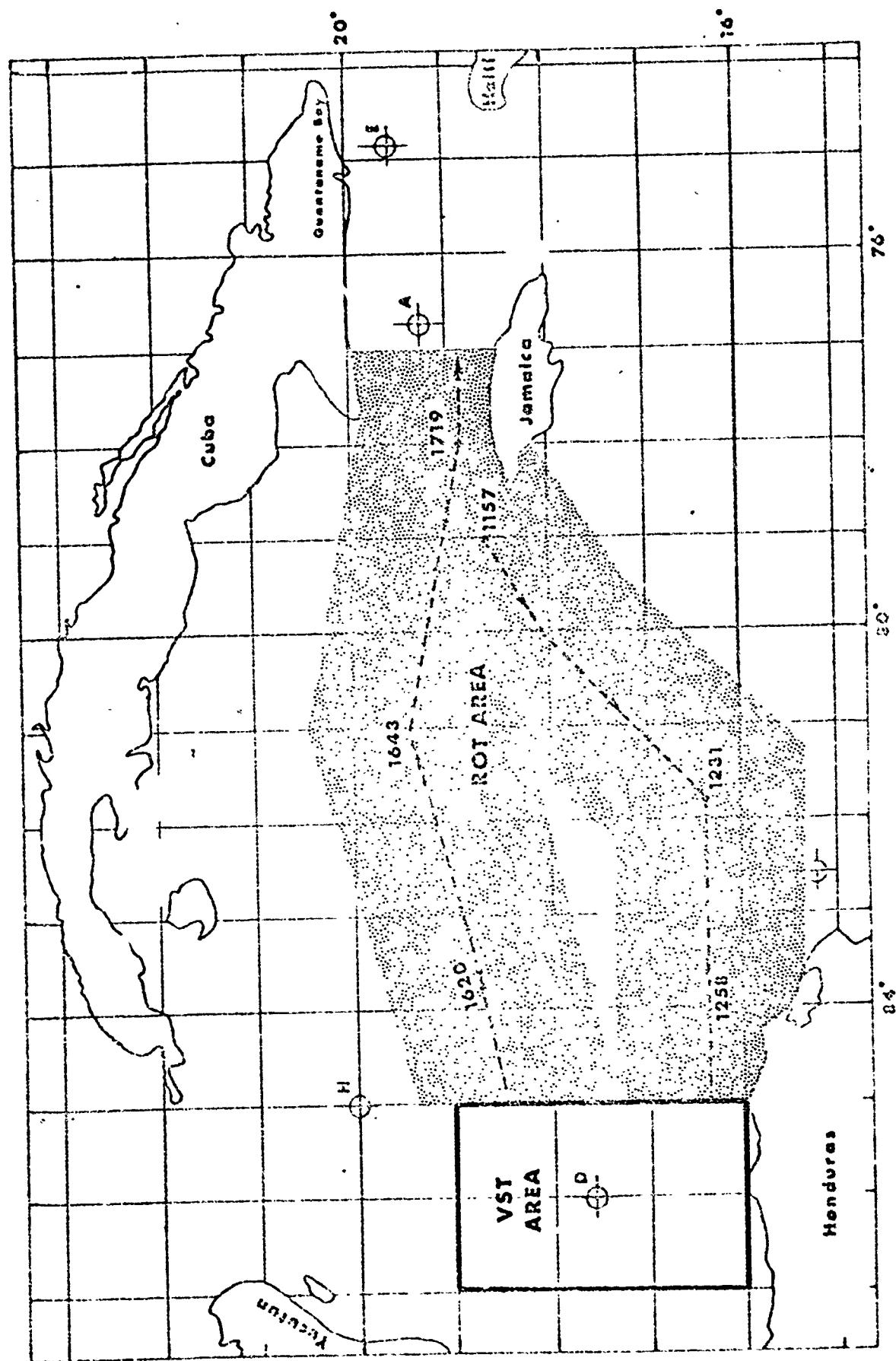


FIGURE XXIII -- The Approximate Flight Path and VST and ROT Coverage Areas for P3#2 on 6 December 1972. The Greenwich Mean Times for Key Positions are Given.

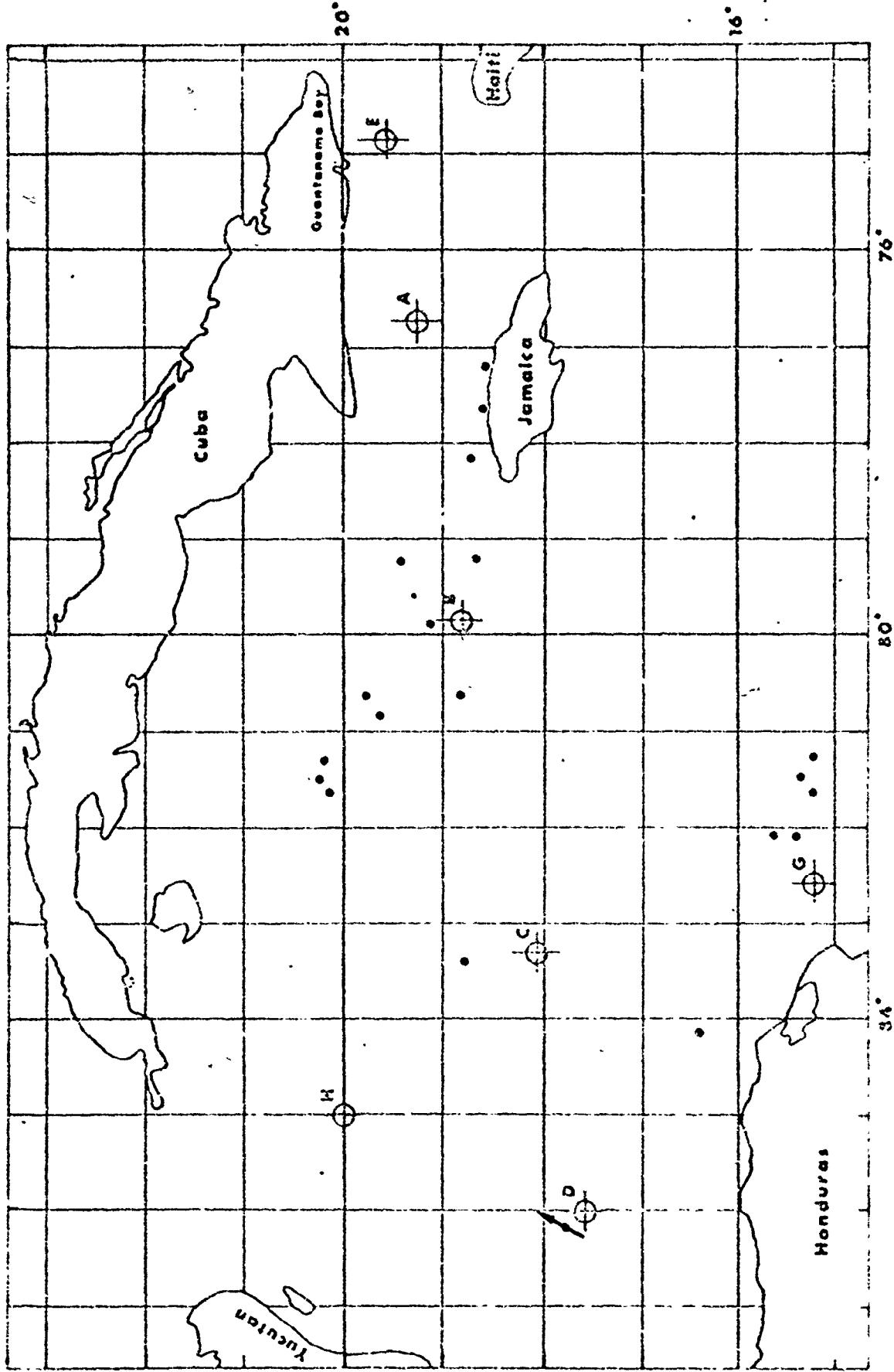


FIGURE XXIV -- The Approximate Locations for the ROT Contacts (•) and VST Contacts (—) 1700 Greenwich Mean Time) for P3#2 on 6 December 1972.

TABLE 12 - ROT CONTACTS

Plane: P3#2 (VP 16)
 Date: 6 December 1972

Pilot: Harvey
 PI: Watrous

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 1 | 1643 | 2006 | 8135 |
| 2 | 1643 | 2008 | 8132 |
| 3 | 1643 | 2008 | 8117 |
| 4 | 1643 | 1948 | 8048 |
| 5 | 1643 | 1950 | 8043 |
| 6 | 1157 | 1917 | 7913 |
| 7 | 1205 | 1901 | 7959 |
| 8 | 1620 | 1852 | 8325 |
| 9 | 1211 | 1851 | 8038 |
| 10 | 1200 | 1843 | 7914 |
| 11 | 1719 | 1844 | 7806 |
| 12 | 1719 | 1838 | 7745 |
| 13 | 1728 | 1832 | 7723 |
| 14 | 1257 | 1605 | 8418 |
| 15 | 1234 | 1545 | 8202 |
| 16 | 1234 | 1535 | 8201 |
| 17 | 1232 | 1521 | 8148 |
| 18 | 1231 | 1521 | 8136 |
| 19 | 1231 | 1525 | 8140 |

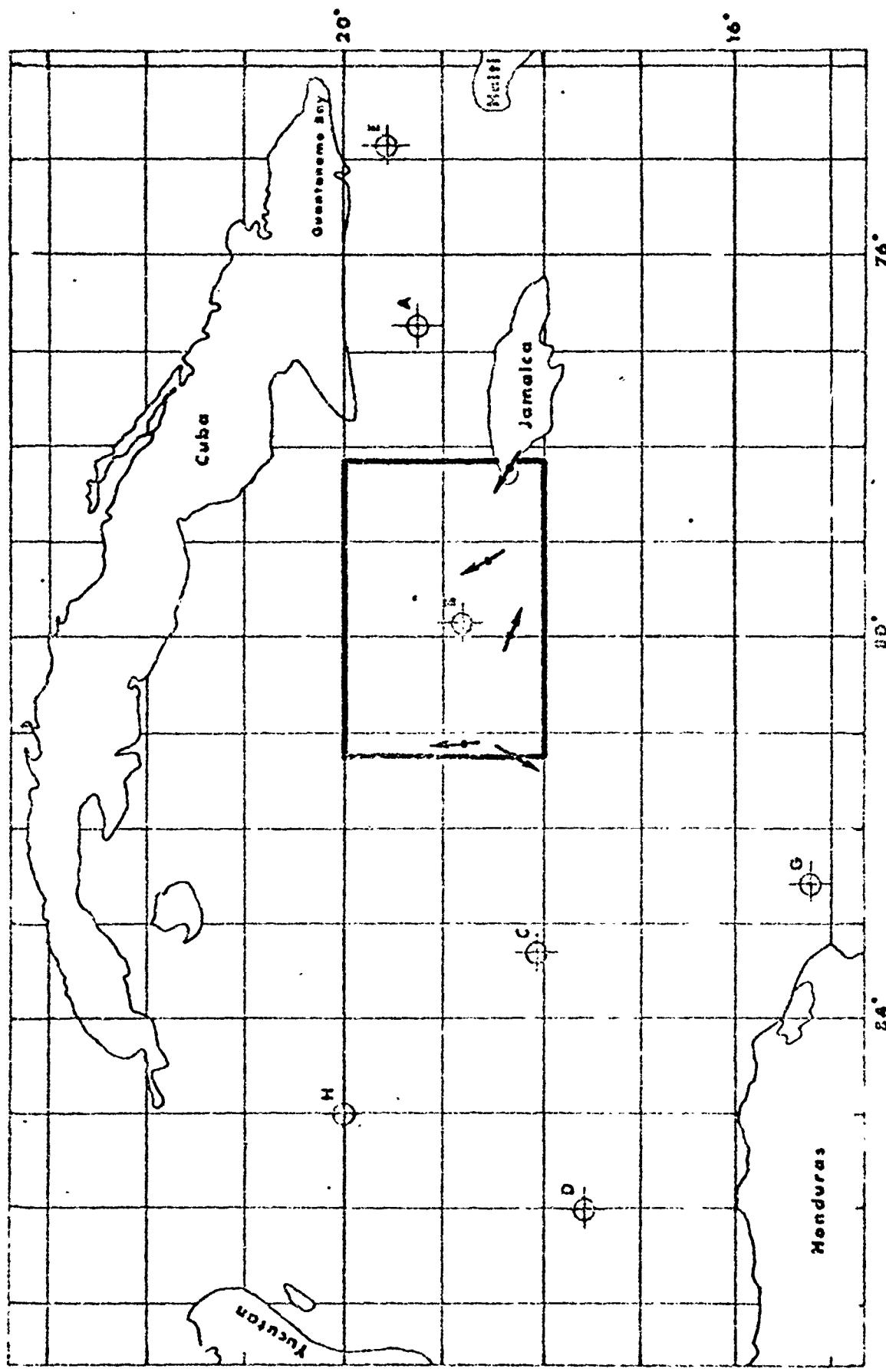


FIGURE XXV — The Approximate VST Area and VST Contact Positions Dead reckoned to 1700 Greenwich Mean Time for P3#3 on 6 December 1972.

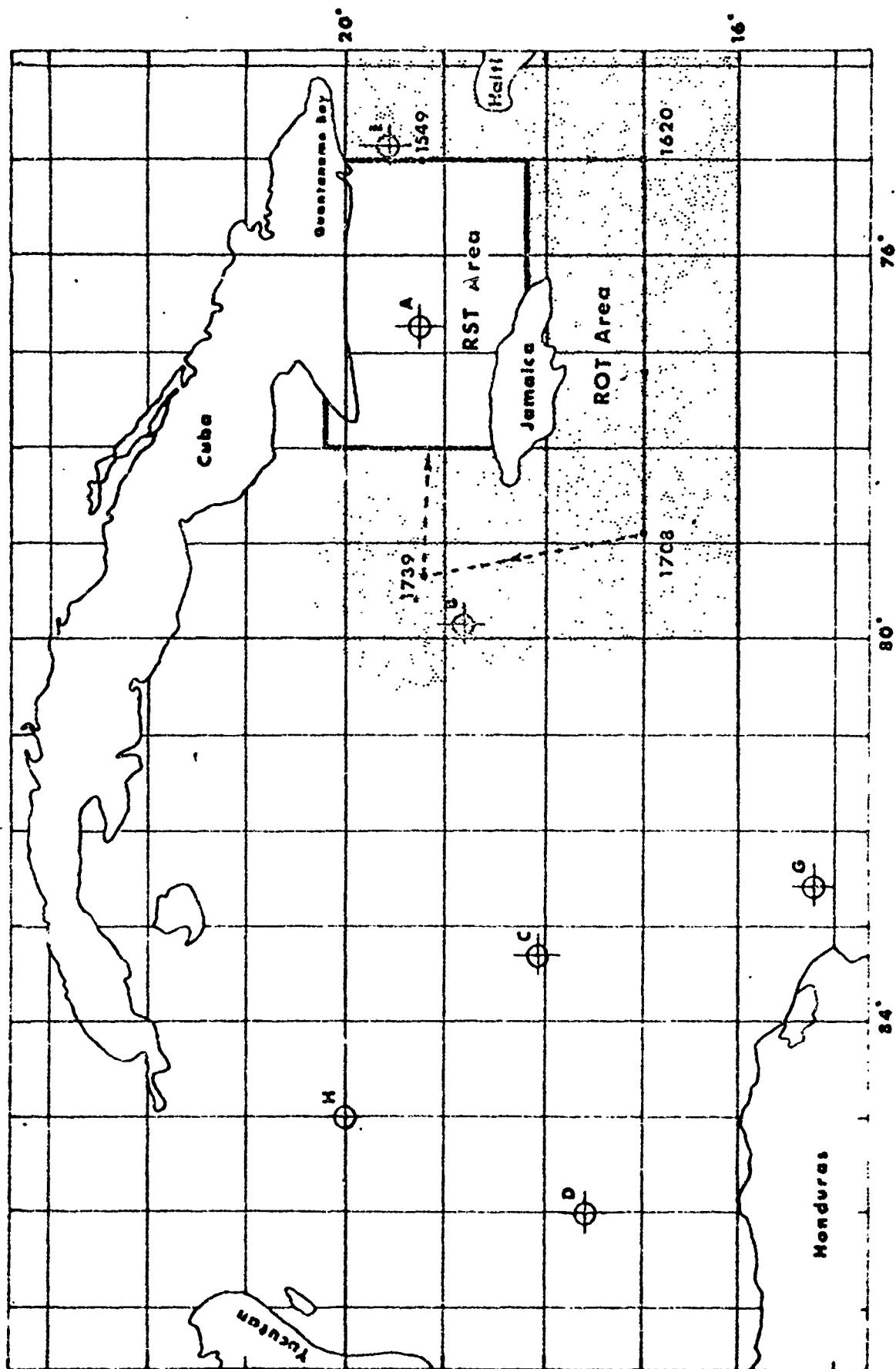


FIGURE XXVI -- The Approximate Flight Path and RST and ROT Coverage for P3#5 (NRL) on 6 December 1972. The Greenwich Mean Times at Key Positions are Given.

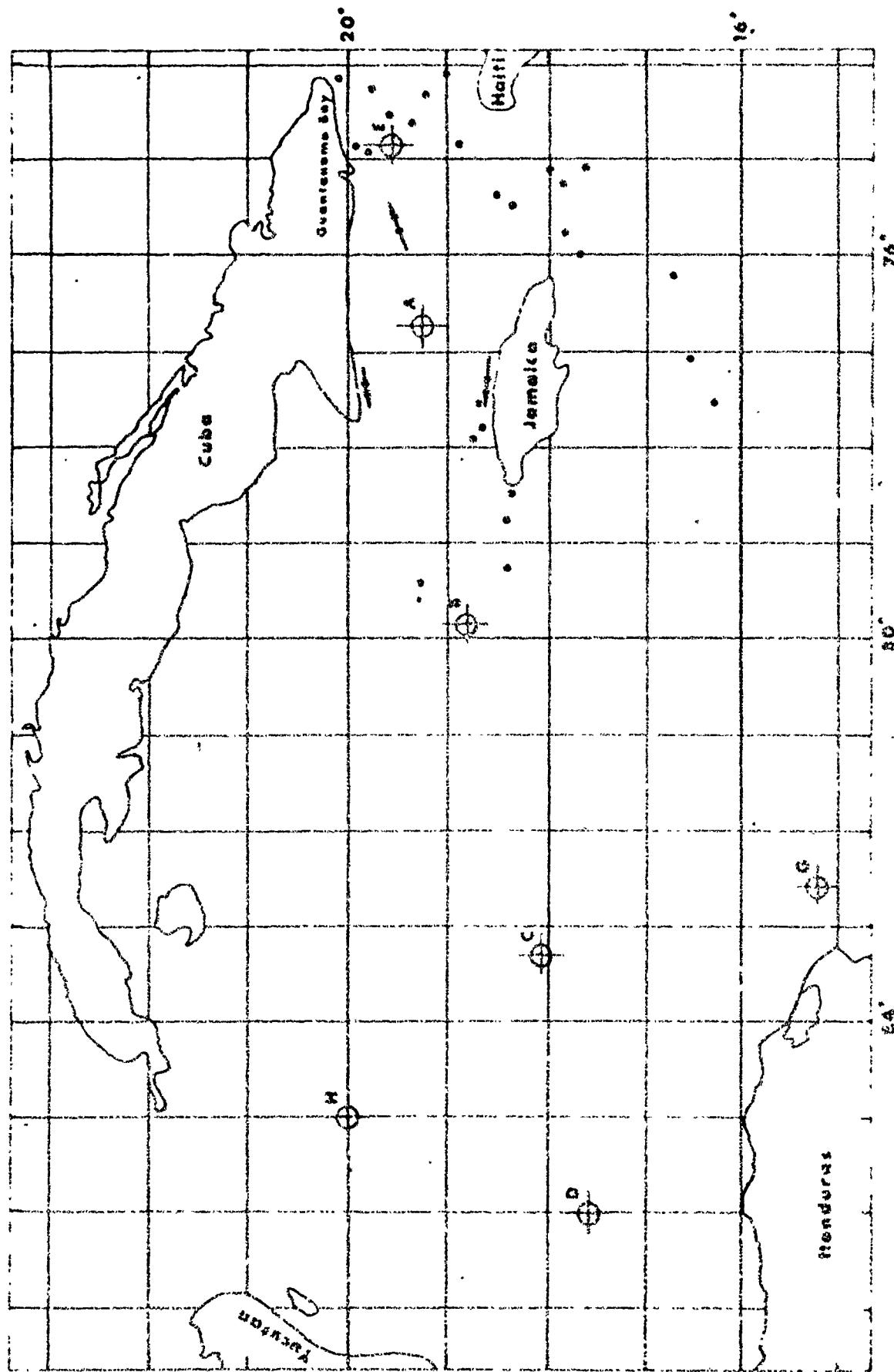


FIGURE XXVII -- The Approximate Positions for the ROT (*) and RST (—●—) Contacts for P3#5 on 6 December 1972.

TABLE 13 - ROT CONTACTS

Plane: P3#5 (NRL)
 Date: 6 December 1972

Pilot: Hutchins
 PI: Kane

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 1 | 1546 | 2006 | 7407 |
| 2 | 1730 | 1917 | 7926 |
| 3 | 1546 | 1947 | 7414 |
| 4 | 1546 | 1939 | 7432 |
| 5 | 1546 | 1922 | 7439 |
| 6 | 1546 | 1910 | 7426 |
| 7 | 1500 | 1950 | 7453 |
| 8 | 1500 | 1900 | 7414 |
| 9 | 1500 | 1944 | 7453 |
| 10 | 1720 | 1844 | 7916 |
| 11 | 1720 | 1825 | 7839 |
| 12 | 1720 | 1819 | 7823 |
| 13 | 1804 | 1840 | 7754 |
| 14 | 1804 | 1839 | 7747 |
| 15 | 1804 | 1836 | 7734 |
| 16 | 1558 | 1820 | 7522 |
| 17 | 1558 | 1822 | 7517 |
| 18 | 1558 | 1800 | 7507 |
| 19 | 1546 | 1854 | 7456 |
| 20 | 1607 | 1750 | 7601 |
| 21 | 1607 | 1758 | 7543 |
| 22 | 1607 | 1759 | 7518 |
| 23 | 1611 | 1740 | 7504 |
| 24 | 1640 | 1633 | 7703 |
| 25 | 1640 | 1625 | 7730 |
| 26 | 1629 | 1647 | 7614 |

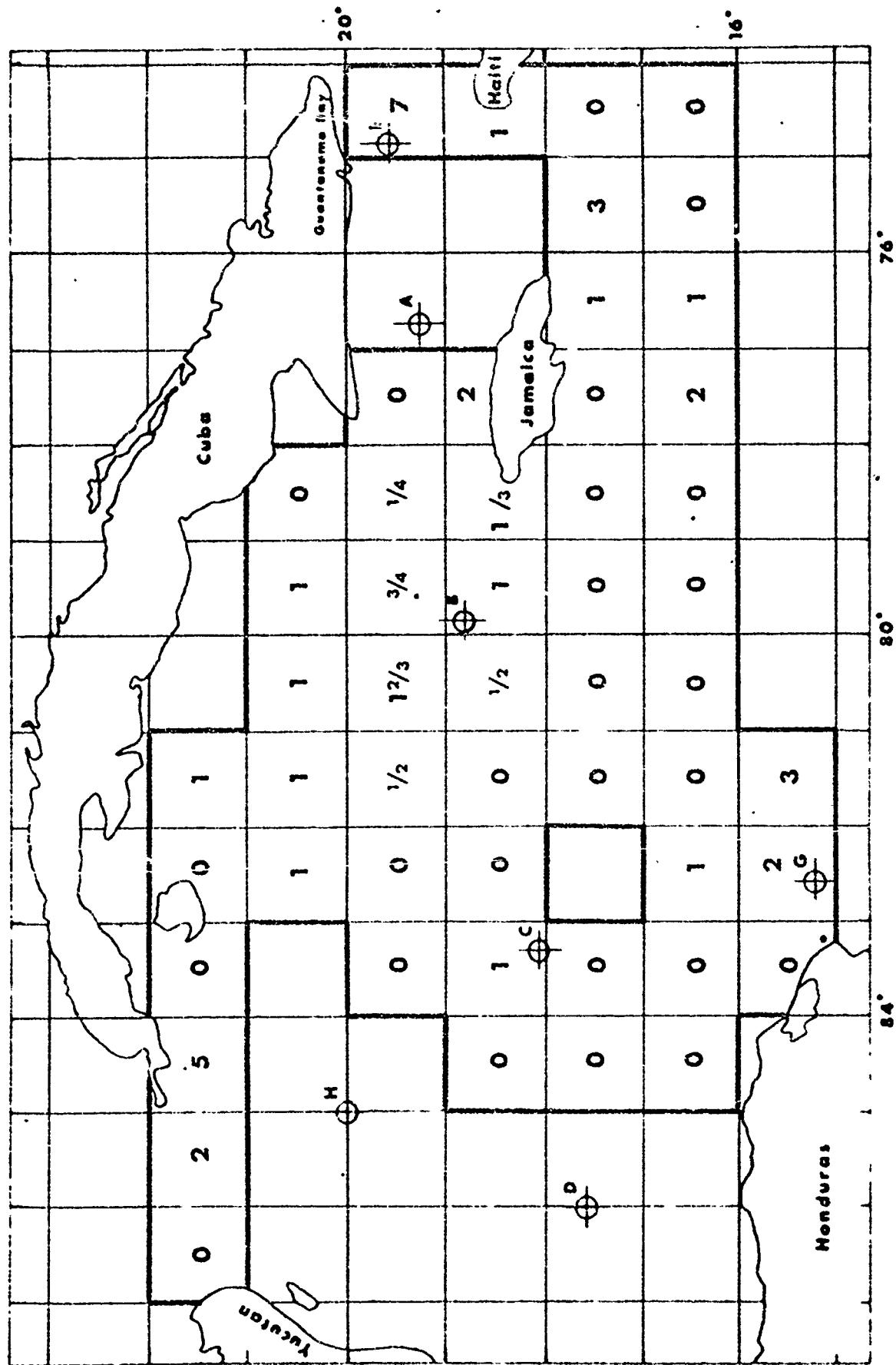


FIGURE XXVIII -- The Observed Density for One Degree Squares of ROT Radar Contacts on 6 December 1972 (Average Density: 0.8 Contacts Per One Degree Square).

E. Data for 7 December 1972

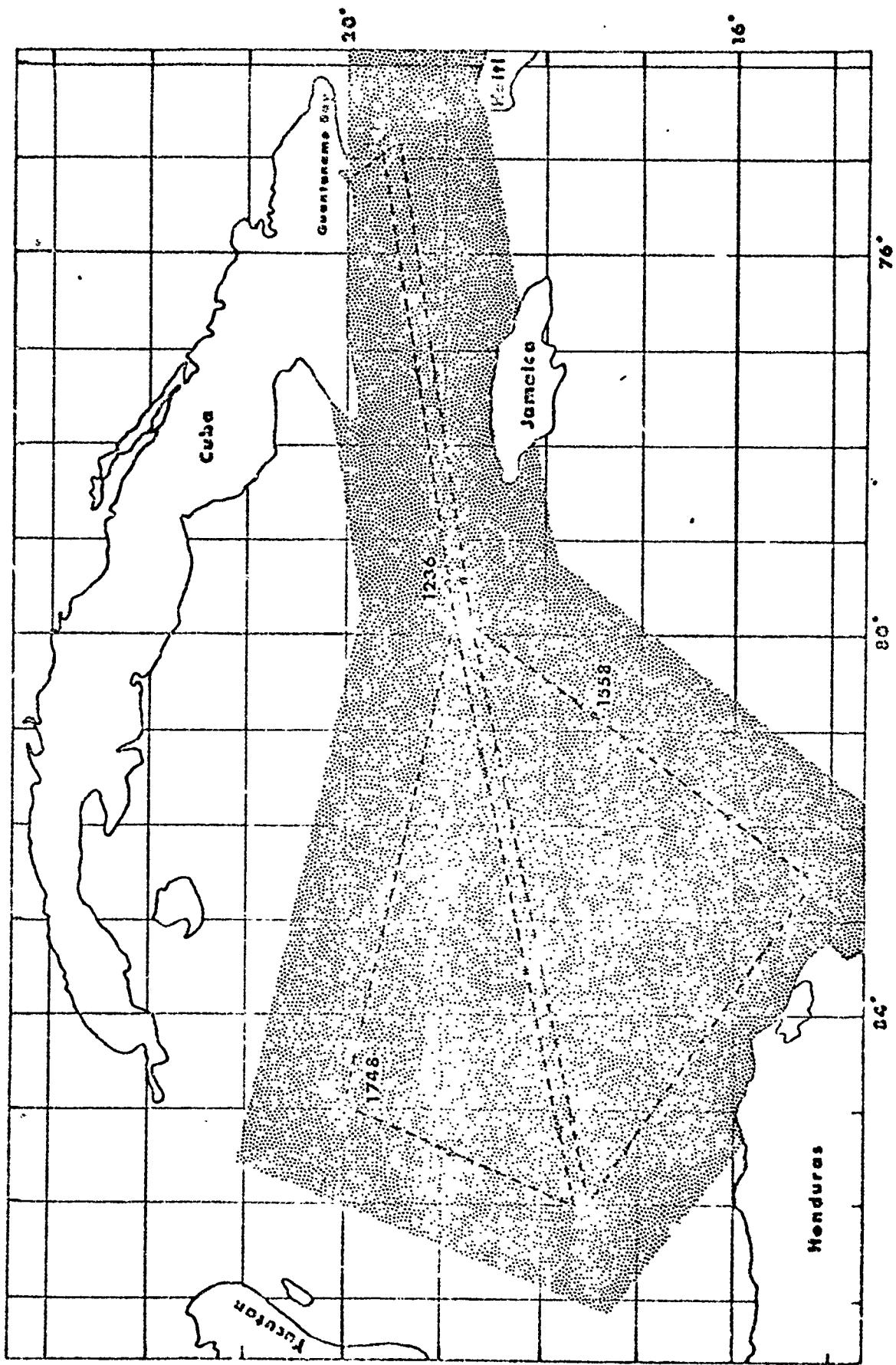


FIGURE XXIX -- The Approximate Flight Path and ROT Area Coverage for P3#4 (VXN 8) on 7 December 1972. The Greenwich Mean Time at Key Positions are Given.

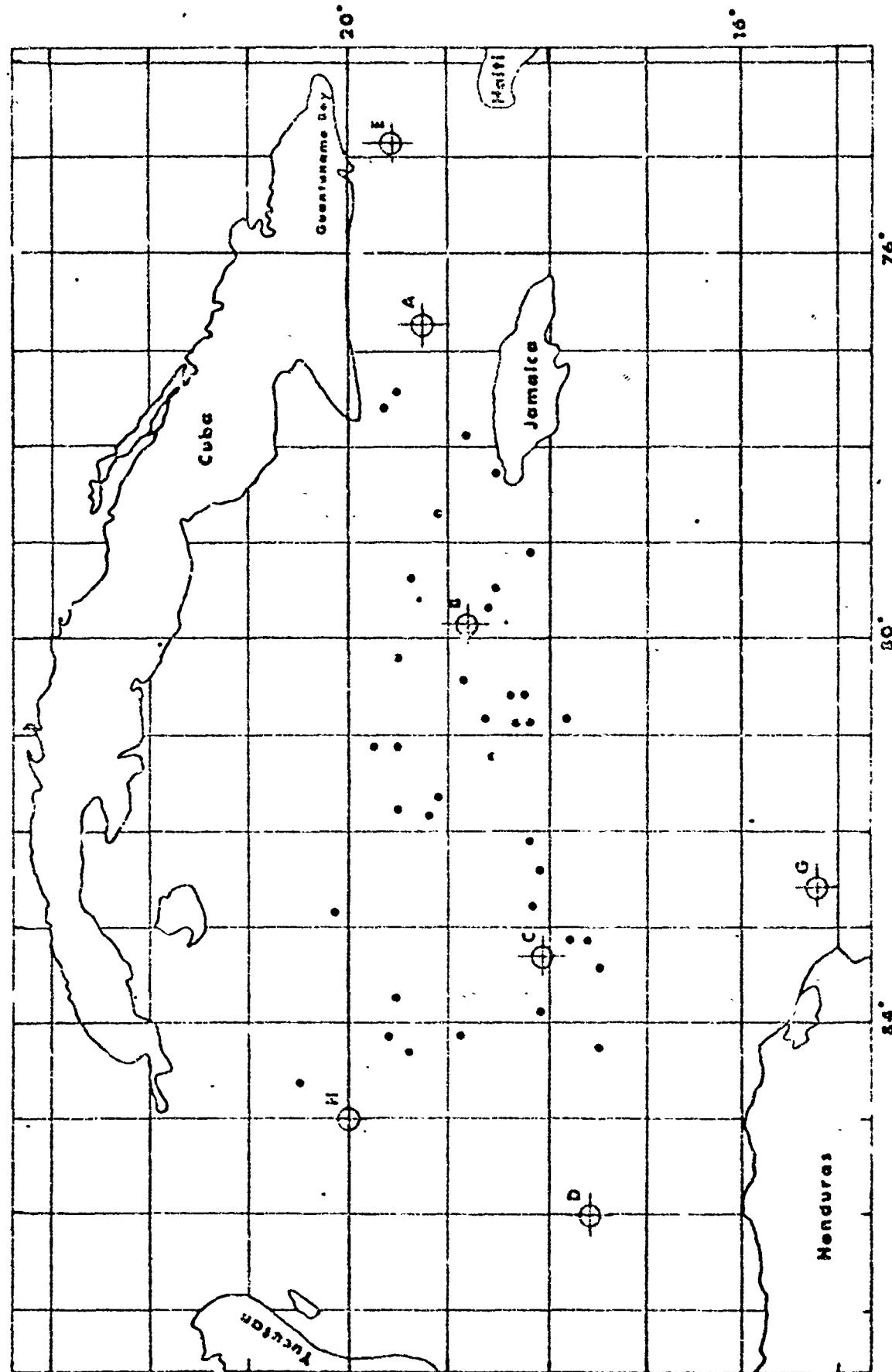


FIGURE XXX — The Approximate Positions of the Radar Contacts Made by P3W4 (YEN 8) on 7 December 1972.

TABLE 14 - ROT CONTACTS

Plane: P3#4 (VXN 8)
 Date: 7 December 1972

Pilot: Lt. Lamb
 PI: E. Sander

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 1 | 1736 | 2029 | 8441 |
| 2 | 1708 | 2002 | 8247 |
| 3 | 1716 | 1947 | 8403 |
| 4 | 1724 | 1935 | 8420 |
| 5 | 1715 | 1935 | 8339 |
| 6 | 1647 | 1927 | 8110 |
| 7 | 1647 | 1928 | 8155 |
| 8 | 1649 | 1947 | 8104 |
| 9 | 1306 | 1909 | 8155 |
| 10 | 1938 | 1904 | 8145 |
| 11 | 1959 | 1928 | 8021 |
| 12 | 2010 | 1915 | 7926 |
| 13 | 2022 | 1901 | 7846 |
| 14 | 1201 | 1926 | 7729 |
| 15 | 1202 | 1945 | 7736 |
| 16 | 2059 | 1945 | 7537 |
| 16 | 1725 | 1858 | 8412 |
| 18 | 1324 | 1806 | 8351 |
| 19 | 1311 | 1812 | 8236 |
| 20 | 1912 | 1815 | 8259 |
| 21 | 1932 | 1822 | 8207 |
| 22 | 1640 | 1845 | 8120 |
| 23 | 1236 | 1856 | 8013 |
| 24 | 1245 | 1851 | 8047 |
| 25 | 1606 | 1815 | 8030 |
| 26 | 1956 | 1822 | 8028 |
| 27 | 1613 | 1835 | 8049 |
| 28 | 1637 | 1831 | 8057 |

TABLE 14 - ROT CONTACTS (Cont)

Plane: P3#4 (VXN 8)
 Date: 7 December 1972

Pilot: Lt. Lamb
 PI: E. Sander

| Contact No. | Time (Zulu) | Latitude | Longitude |
|-------------|-------------|----------|-----------|
| 29 | 1226 | 1820 | 7909 |
| 30 | 1235 | 1841 | 7941 |
| 31 | 2007 | 1840 | 7930 |
| 32 | 1213 | 1827 | 7813 |
| 33 | 1209 | 1841 | 7758 |
| 34 | 1902 | 1732 | 8413 |
| 35 | 1325 | 1749 | 8316 |
| 36 | 1326 | 1743 | 8320 |
| 37 | 1909 | 1754 | 8312 |
| 38 | 1558 | 1757 | 8057 |

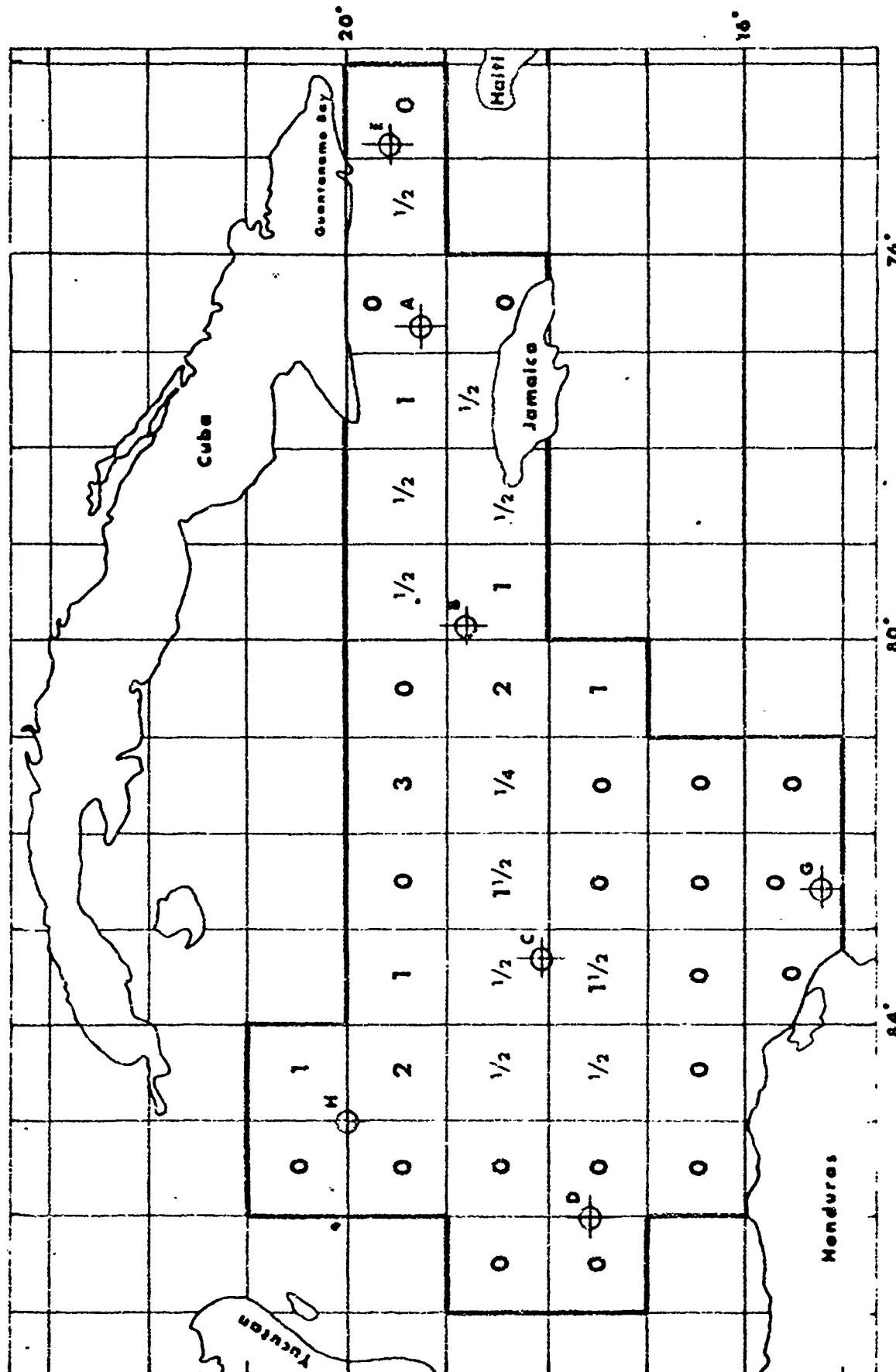


FIGURE XXXI -- The Observed Density for One Degree Squares of ROT Radar Contacts on 7 December 1972 (Average Density: 0.5 Contacts Per One Degree Square).

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