AD-A087 243 STERLING SYSTEMS INC WASHINGTON DC F/G 17/7
ASSESSMENT OF THE CAPACITY OF THE AUTOMATED RADAR TERMINAL SYST--ETC(U)
JUN 80 W PAILEN, H C WINTERMOYER, R SITTLER DOT-FA78WAI-942
UNCLASSIFIED FAA-RD-80-51 NL

1 OF 5
AD
A087243

LEVEL

Report No. FAA-RD-80-51

# ASSESSMENT OF THE CAPACITY OF THE AUTOMATED RADAR TERMINAL SYSTEMS (ARTS IIIA) FOR THE YEARS 1980-1990

William Pailen
Hugh C. Wintermoyer
Sterling Systems, Incorporated
Robert Sittler, ARCON Corporation





JUNE 1980

FINAL REPORT

Document is available to the U.S. public through the National Technical Information Service, Springfield, Virginia 22161.

Prepared for

**U.S. DEPARTMENT OF TRANSPORTATION**
**FEDERAL AVIATION ADMINISTRATION**
**Systems Research & Development Service**
**Washington, D.C. 20590**

## NOTICE

Automated Radar Terminal Systems

**Technical Report Documentation Page**

| 1. Report No. | 2. Government Accession No. | 3. Recipient's Catalog No. |
|---|---|---|
| FAA-RD-80-51 | AD-A087 243 | |

4. Title and Subtitle
ASSESSMENT OF THE CAPACITY OF THE ARTS IIIA FOR THE YEARS 1980-1990

5. Report Date: June 1980

6. Performing Organization Code:


7. Author(s): William Pailen, Hugh C. Wintermoyer (Sterling Systems) Robert Sittler (ARCON)

8. Performing Organization Report No.:

9. Performing Organization Name and Address

Sterling Systems, Inc.
4340 Connecticut Avenue, N.W.
Washington, D.C. 20008

ARCON Corporation *
260 Bear Hill Road
Waltham, Mass. 02154


10. Work Unit No. (TRAIS):

11. Contract or Grant No.: DOT-FA78WAI-942

12. Sponsoring Agency Name and Address
U.S. Department of Transportation
Federal Aviation Administration
Systems Research and Development Service
Washington, D.C. 20590

13. Type of Report and Period Covered: Final Report October 1978 to April 1980

14. Sponsoring Agency Code: FAA/ARD-120

15. Supplementary Notes

* under subcontract to Sterling Systems, Inc.


16. Abstract

The capability of the ARTS IIIA to support future air traffic growth and functional enhancements through 1990 is examined. The approach used is to investigate a few high traffic density sites which are representative of the three current terminal system configurations: single sensor sites (Detroit); dual sensor sites (Chicago, Los Angeles); and Metroplexes (New York). Loading factors are determined for each model site. These factors include the number and type of sensors and displays, the instantaneous traffic counts, and functional capability. The loading parameters are then used as inputs to a processing model, developed in this study, in order to determine if the ARTS IIIA can provide adequate processing capacity. The loading parameters are also used to develop estimates of memory requirements. The results of the study indicate that processing capacity limitations, if not overcome, will likely constrain functional growth at Metroplex facilities but will present no problems for single and dual sensor sites. Current memory capacity limitations are shown to present significant problems for both Metroplexes and dual sensor sites.



17. Key Words
ARTS
Instantaneous Airborne Counts
Multiprocessing
Modeling

18. Distribution Statement
Document is available to the U.S. public through the National Technical Information Service, Springfield, Virginia 22161


| 19. Security Classif. (of this report) | 20. Security Classif. (of this page) | 21. No. of Pages | 22. Price |
|---|---|---|---|
| Unclassified | Unclassified | 458 | |

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized



394257

# METRIC CONVERSION FACTORS

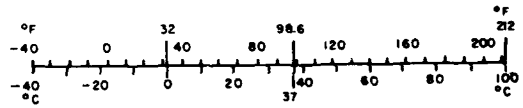
## Approximate Conversions to Metric Measures

| Symbol | When You Know | Multiply by | To Find | Symbol |
|---|---|---|---|---|
| | | **LENGTH** | | |
| in | inches | *2.5 | centimeters | cm |
| ft | feet | 30 | centimeters | cm |
| yd | yards | 0.9 | meters | m |
| mi | miles | 1.6 | kilometers | km |
| | | **AREA** | | |
| $in^2$ | square inches | 6.5 | square centimeters | $cm^2$ |
| $ft^2$ | square feet | 0.09 | square meters | $m^2$ |
| $yd^2$ | square yards | 0.8 | square meters | $m^2$ |
| $mi^2$ | square miles | 2.6 | square kilometers | $km^2$ |
| | acres | 0.4 | hectares | ha |
| | | **MASS (weight)** | | |
| oz | ounces | 28 | grams | g |
| lb | pounds | 0.45 | kilograms | kg |
| | short tons (2000 lb) | 0.9 | tonnes | t |
| | | **VOLUME** | | |
| tsp | teaspoons | 5 | milliliters | ml |
| Tbsp | tablespoons | 15 | milliliters | ml |
| fl oz | fluid ounces | 30 | milliliters | ml |
| c | cups | 0.24 | liters | l |
| pt | pints | 0.47 | liters | l |
| qt | quarts | 0.95 | liters | l |
| gal | gallons | 3.8 | liters | l |
| $ft^3$ | cubic feet | 0.03 | cubic meters | $m^3$ |
| $yd^3$ | cubic yards | 0.76 | cubic meters | $m^3$ |
| | | **TEMPERATURE (exact)** | | |
| °F | Fahrenheit temperature | 5/9 (after subtracting 32) | Celsius temperature | °C |

*1 in ≡ 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.


## Approximate Conversions from Metric Measures

| Symbol | When You Know | Multiply by | To Find | Symbol |
|---|---|---|---|---|
| | | **LENGTH** | | |
| mm | millimeters | 0.04 | inches | in |
| cm | centimeters | 0.4 | inches | in |
| m | meters | 3.3 | feet | ft |
| m | meters | 1.1 | yards | yd |
| km | kilometers | 0.6 | miles | mi |
| | | **AREA** | | |
| $cm^2$ | square centimeters | 0.16 | square inches | $in^2$ |
| $m^2$ | square meters | 1.2 | square yards | $yd^2$ |
| $km^2$ | square kilometers | 0.4 | square miles | $mi^2$ |
| ha | hectares (10,000 $m^2$) | 2.5 | acres | |
| | | **MASS (weight)** | | |
| g | grams | 0.035 | ounces | oz |
| kg | kilograms | 2.2 | pounds | lb |
| t | tonnes (1000 kg) | 1.1 | short tons | |
| | | **VOLUME** | | |
| ml | milliliters | 0.03 | fluid ounces | fl oz |
| l | liters | 2.1 | pints | pt |
| l | liters | 1.06 | quarts | qt |
| l | liters | 0.26 | gallons | gal |
| $m^3$ | cubic meters | 35 | cubic feet | $ft^3$ |
| $m^3$ | cubic meters | 1.3 | cubic yards | $yd^3$ |
| | | **TEMPERATURE (exact)** | | |
| °C | Celsius temperature | 9/5 (then add 32) | Fahrenheit temperature | °F |



## NOTE

This report is intended only to provide an approximate indication of the capability of the ARTS IIIA to support future processing and storage requirements and should not be used to determine the precise hardware configuration that should be implemented at any particular site. All processing and memory requirements estimates contained in this report are based on the New York ARTS IIIA program architecture.

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'd.)

TABLE OF CONTENTS (Cont'd.)

Hank

## 1.0 SUMMARY

The analysis approach for this study was designed to provide insight into the capability of the ARTS IIIA to support anticipated processing demands at three types of terminal facilities:

- Metroplex configuration (New York TRACON)
- High density dual sensor sites (Chicago and Los Angeles)
- High density single sensor sites (Detroit)

The future processing and storage requirements throughout the year 1990 were analyzed for the model sites shown in each category above. It is assumed that any capacity limitations evident at Chicago and Los Angeles would be similar in severity and expected time of occurrence to those that should be expected at other dual sensor sites with high traffic densities. Similarly, the analysis results for Detroit are assumed representative of those expected for single sensor sites with high traffic densities. The New York TRACON, currently in the implementation phase, is the only existing metroplex configuration. The FAA, however, is considering the use of metroplex configurations at other locations such as San Diego, Oakland and Washington, D.C. The analysis results for New York provide insight into the ability of the ARTS IIIA to support the requirements of large metroplex facilities.

The study results indicated that the processing capacity of the ARTS IIIA will be adequate for dual and single sensor sites throughout the period of the study. The processing capacity of the New York system, however, appears only marginally to meet the demands starting in 1984, with strong indications of an overload if Metering & Spacing (M&S) is installed before the Discrete Access Beacon System (DABS). The demand for storage is expected to equal or exceed system capacity at all high traffic density sites, except single sensor sites. Storage saturation is expected in 1982 at New York with the implementation of Conflict Alert. At dual sensor sites with high traffic densities, saturation is expected to occur in 1986, as M&S is introduced.

Processing and storage requirements at ARTS IIIA facilities are determined by the peak instantaneous traffic counts, system hardware configurations, and processing functions perfomed at each site. Thus, in order to estimate the current and future processing and storage requirements it was first necessary to identify the environmental and functional characteristics of the selected model sites.

Estimates of peak instantaneous traffic counts were developed by examining reported and projected airport operations at facilities within the coverage area of the ARTS surveillance systems. Busy hour instantaneous traffic estimates were developed for each model site by establishing a busy/average hour ratio of airport operations and applying it to forecasts of average hour operations for the years 1980 to 1990. Instantaneous traffic estimates were then derived from the busy hour estimates. Computation of the instantaneous traffic count was based upon estimates of the average speed, average altitude and radius of surveillance coverage for each general category of aircraft, as well as distance from the surveillance system to the airport of operation for the aircraft.

Determination of the current and future hardware configurations at the four model sites primarily involved the identification of the number and type of displays and sensors. The number of control room displays was estimated to increase in proportion to the projected growth of air traffic. Also it was assumed that remote tower cab displays will be implemented by 1984 at airports that have control towers and are within 20 nm of ARTS IIIA facilities. ARTS IIIA sensors are assumed to be ASR-8 and ATCBI-4 or 5 initially. These sensors are expected to be replaced with DABS by 1985 at Chicago, Los Angeles, and Detroit and by 1988 at New York.

The functional capabilities at each model site for 1980 are the standard ARTS IIIA/New York TRACON capabilities currently being implemented. Future functional growth is expected to include Conflict Alert (CA), Metering and Spacing (M&S), ARTS/DABS integration, ARTS/Terminal Information Processing System (TIPS) interface, Full Digital ARTS Displays (FDAD) and Tower Cab

Digital Displays (TCDD). The assumed implementation dates are:

| | | |
|---|---|---|
| CA | 1982 | |
| M&S | 1985 | |
| DABS | 1985 | (Chicago, LA, Detroit) |
| | 1988 | (NY) |
| TIPS | 1983 | |
| FDAD | 1984 | |
| TCDD | 1983 | |

Having determined the environmental and functional characteristics of each model site, processing and storage models were developed in order to determine the system requirements.

The processing model consisted of three parts: a scheduler model, task timing models, and lattice descriptions.

The scheduler model is a FORTRAN program which simulates the ARTS IIIA method of initiating processing activities. Three types of processing activities are scheduled: planned tasks, popup tasks, and overhead. Planned tasks are initiated by the scheduler according to a set of precedence relationships described in a lattice structure and according to availability of processors. Popup tasks occur asynchronously with the lattices and planned tasks and may be scheduled periodically or activitated at random intervals.

Task timing models are mathematical equations that relate system load parameters to the amount of processing time required by individual task. Models of processing times for existing planned and popup tasks and for overhead activities are based upon analysis of results of timing measurements taken at the New York TRACON and the System Simulation Facility at NAFEC. Live aircraft traffic returns constituted the system load for two of the measurements runs and simulated traffic returns were used for the remaining runs. Data collected in all runs consisted of time expended in each planned and popup task, as well as in overhead, dead time, and idle time. At the same time, counts were taken of the quantities of radar and beacon target reports, associated and unassociated tracks, display symbols of various types, and other system variables. In addition, the mean variance, maximum, and minimum time were recorded for each task in each run. The mean lattice times, and the percentages of time spent by each processor in planned tasks, popup tasks, overhead, dead time, and idle time were also recorded.

For those tasks exhibiting large mean times or large variances, attempts were made to characterize the processing times as linear functions of some of the system variables, using multiple linear regression analysis. Where linear relationships were established, they became the models for the processing times for the tasks for the year 1980. Where regression analysis failed to establish linear relationships, and where the measured mean times and variances were small, the process times were modeled by sue of the means and variances obtained from the system measurements. In some cases, however, analysis of the design of the software for a particular task led to the conclusion that the processing time depended on a parameter which did not vary during the measurement runs. In those cases, the process time models were adjusted to reflect the dependence.

The lattice model for the New York TRACON for the year 1980 is the one which existed at New York at the time of the system measurements. Lattice models for Chicago, Los Angeles and Detroit ARTS IIIA systems in 1980 are modified versions of the New York lattice.

Storage requirements estimates for 1980 for New York, Chicago, Los Angeles, and Detroit are generally based upon the storage allocation formulas used in the New York system in the fall of 1979. The 1980 storage requirement estimates are given as a range of values for each site. The range is based upon the assumed range of track capacity requirements.

For the years 1982 and later, storage, lattice, and processing time models were all modified to account for the impact of the planned implementation of advanced functions: Terminal Conflict Alert (CA), Terminal Metering and Spacing (M&S), ARTS/DABS integration, ARTS/TIPS interface, Full Digital

ARTS Display (FDAD), and Tower Cab Digital Displays (TCDD).

Changes in ARTS IIIA processing and storage utilization in the period 1980 to 1990 are expected to be influenced primarily by the implementation of new functional capabilities and system interfaces. Large increases in processor and memory utilization are required for incorporation of Conflict Alert (CA) and Metering and Spacing (M&S). The implementation of FDAD is also expected to increase processing and storage requirements. Keyboard input processing should decrease, but this will be more than offset by the substantial increase in display processing required to generate all-digital symbology. The addition of TCDDs to ARTS IIIA's will require the addition of remote display/keyboard processing tasks at facilities not already having these programs and will thus increase memory and display processing requirements. The Terminal Information Processing System is expected to require a substantial amount of memory, but will have little impact on processing. DABS implementation is assumed to eliminate the need for track corrlation processing in ARTS. Thus DABS will reduce total processing requirements but will have little impact on storage demands.

The level of traffic density at each site is a major factor in the determination of initial resource requirements, and also has a large influence on the initial impact of the implementation of advanced functions. However, growth in traffic density is not projected to be great enough at any of the sites studied to cause significant changes in the requirements for processing time or memory capacity from 1980 to 1990.

The following tables present the estimated track capacity, memory and processor requirements for each model site during a busy hour. The tables present the system requirements based on two levels of assumed traffic load. "Level C" represents the higher traffic load assumptions and "Level B" represents the lower. The current system capacity is 7 Input/Output Processors (IOPs) and 14 Memory Modules (MMs) in a failsafe configuration. In a failsoft configuration, there can be up to 8 IOPs and 15 MMs.

## TABLE 1-1 ESTIMATES OF TOTAL TRACK CAPACITY REQUIREMENTS

| | | LEVEL C | | | | LEVEL B | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Associated Tracks | Unassociated Tracks | Flight Plans | Total Track Capacity | Associated Tracks | Unassociated Tracks | Flight Plans | Total Track Capacity |
| NY | 1980 | 76 | 1491 | 76 | 1643 | 76 | 961 | 76 | 1113 |
| | 82 | 76 | 1541 | 76 | 1693 | 76 | 1000 | 76 | 1152 |
| | 84 | 80 | 1584 | 80 | 1744 | 80 | 1033 | 80 | 1193 |
| | 86 | 84 | 1615 | 84 | 1783 | 84 | 1055 | 84 | 1224 |
| | 88 | 88 | 1641 | 88 | 1817 | 88 | 1076 | 88 | 1252 |
| | 90 | 88 | 1665 | 88 | 1841 | 88 | 1098 | 88 | 1274 |
| LA | 1980 | 50 | 772 | 50 | 872 | 50 | 533 | 50 | 633 |
| | 82 | 54 | 780 | 54 | 888 | 54 | 534 | 50 | 642 |
| | 84 | 55 | 800 | 55 | 910 | 55 | 558 | 55 | 668 |
| | 86 | 56 | 813 | 56 | 925 | 56 | 567 | 56 | 679 |
| | 88 | 60 | 823 | 60 | 943 | 60 | 575 | 60 | 695 |
| | 90 | 63 | 830 | 63 | 958 | 63 | 583 | 63 | 709 |
| CHI | 1980 | 53 | 596 | 53 | 702 | 53 | 375 | 53 | 481 |
| | 82 | 55 | 617 | 55 | 727 | 55 | 390 | 55 | 500 |
| | 84 | 56 | 637 | 56 | 749 | 56 | 405 | 56 | 517 |
| | 86 | 59 | 651 | 59 | 769 | 59 | 415 | 59 | 533 |
| | 88 | 58 | 661 | 58 | 777 | 58 | 424 | 58 | 540 |
| | 90 | 59 | 670 | 59 | 788 | 59 | 431 | 59 | 549 |
| DET | 1980 | 44 | 502 | 44 | 590 | 44 | 306 | 44 | 394 |
| | 82 | 46 | 520 | 46 | 612 | 46 | 316 | 46 | 408 |
| | 84 | 47 | 541 | 47 | 635 | 47 | 331 | 47 | 425 |
| | 86 | 48 | 556 | 48 | 652 | 48 | 342 | 48 | 438 |
| | 88 | 51 | 568 | 51 | 670 | 51 | 349 | 51 | 451 |
| | 90 | 54 | 671 | 54 | 679 | 54 | 352 | 54 | 460 |

TABLE 1-2 LEVEL C STORAGE ESTIMATES

| | YEAR | BASIC PROGRAM | BASIC DATA BASE | CA | TIPS | FDAD | M&S | DADS | TOTAL | MM |
|---|---|---|---|---|---|---|---|---|---|---|
| NY | 1980 | 85,640 | 135,242 | | | | | | 220,882 | 14 |
| | 1982 | 85,640 | 139,931 | 81,141 | | | | | 306,712 | 19 |
| | 1984 | 85,640 | 144,772 | 84,865 | 24,113 | 24,299 | | | 363,689 | 23 |
| | 1986 | 85,640 | 151,292 | 87,695 | 24,533 | 24,544 | 63,440 | | 437,144 | 27 |
| | 1988 | 85,640 | 150,154 | 90,160 | 24,893 | 24,772 | 66,020 | 5,000 | 446,639 | 28 |
| | 1990 | 85,640 | 151,145 | 92,158 | 25,181 | 24,940 | 67,740 | 5,000 | 451,804 | 28 |
| LA | 1980 | 80,920 | 67,806 | | | | | | 148,726 | 10 |
| | 1982 | 80,920 | 68,975 | 32,299 | | | | | 182,194 | 12 |
| | 1984 | 82,690 | 73,430 | 33,106 | 14,405 | 13,993 | | | 217,624 | 14 |
| | 1986 | 82,690 | 72,030 | 33,799 | 14,573 | 14,091 | 49,680 | 5,000 | 271,863 | 17 |
| | 1988 | 82,690 | 74,812 | 34,460 | 14,741 | 14,225 | 51,830 | 5,000 | 277,758 | 17 |
| | 1990 | 82,690 | 75,459 | 35,050 | 14,885 | 14,309 | 53,980 | 5,000 | 281,373 | 18 |
| CHI | 1980 | 80,920 | 66,225 | | | | | | 147,145 | 9 |
| | 1982 | 80,920 | 67,525 | 25,028 | | | | | 173,473 | 11 |
| | 1984 | 82,690 | 72,626 | 25,887 | 12,461 | 12,904 | | | 206,568 | 13 |
| | 1986 | 82,690 | 71,448 | 26,595 | 12,665 | 13,023 | 50,110 | 5,000 | 261,531 | 16 |
| | 1988 | 82,690 | 71,775 | 26,975 | 12,773 | 13,086 | 49,680 | 5,000 | 261,979 | 16 |
| | 1990 | 82,690 | 72,204 | 27,400 | 12,893 | 13,156 | 50,540 | 5,000 | 263,883 | 17 |
| DET | 1980 | 80,620 | 49,530 | | | | | | 130,150 | 8 |
| | 1982 | 80,620 | 50,466 | 20,962 | | | | | 152,048 | 10 |
| | 1984 | 83,070 | 56,557 | 21,769 | 11,201 | 9,906 | | | 182,503 | 12 |
| | 1986 | 83,070 | 56,617 | 22,368 | 11,393 | 10,018 | 44,950 | 5,000 | 233,416 | 15 |
| | 1988 | 83,070 | 58,380 | 22,939 | 11,573 | 10,141 | 46,240 | 5,000 | 237,343 | 15 |
| | 1990 | 83,070 | 58,789 | 23,170 | 11,645 | 10,183 | 47,960 | 5,000 | 239,817 | 15 |

## TABLE 1-3 LEVEL 5 STORAGE ESTIMATES

| | YEAR | BASIC PROGRAM | BASIC DATA BASE | CA | TIPS | FDAD | M&S | DABS | TOTAL | MM |
|---|---|---|---|---|---|---|---|---|---|---|
| NY | 1980 | 85,648 | 118,982 | | | | | | 204,630 | 13 |
| | 1982 | 85,648 | 120,557 | 44,646 | | | | | 250,851 | 16 |
| | 1984 | 85,648 | 127,420 | 46,769 | 17,501 | 20,442 | | | 297,780 | 19 |
| | 1986 | 85,648 | 128,973 | 48,353 | 17,825 | 20,631 | 63,440 | | 364,870 | 23 |
| | 1988 | 85,648 | 127,749 | 49,785 | 18,113 | 20,817 | 66,020 | 5,000 | 373,132 | 23 |
| | 1990 | 85,648 | 128,661 | 51,119 | 18,377 | 20,971 | 67,740 | 5,000 | 377,516 | 24 |
| LA | 1980 | 80,920 | 58,553 | | | | | | 139,473 | 9 |
| | 1982 | 80,920 | 58,996 | 22,067 | | | | | 161,983 | 10 |
| | 1984 | 82,690 | 63,902 | 22,709 | 11,501 | 12,299 | | | 193,101 | 12 |
| | 1986 | 82,690 | 62,405 | 23,092 | 11,621 | 12,369 | 49,680 | 5,000 | 246,857 | 16 |
| | 1988 | 82,690 | 65,109 | 23,558 | 11,765 | 12,489 | 51,830 | 5,000 | 252,441 | 16 |
| | 1990 | 82,690 | 65,717 | 23,989 | 11,897 | 12,566 | 53,980 | 5,000 | 255,839 | 16 |
| CHI | 1980 | 80,920 | 57,541 | | | | | | 138,461 | 9 |
| | 1982 | 80,920 | 58,292 | 16,870 | | | | | 156,082 | 10 |
| | 1984 | 82,690 | 63,789 | 17,377 | 9,677 | 11,280 | | | 184,813 | 12 |
| | 1986 | 82,690 | 62,214 | 17,797 | 9,833 | 11,371 | 50,110 | 5,000 | 239,015 | 15 |
| | 1988 | 82,690 | 62,503 | 18,059 | 9,929 | 11,427 | 49,680 | 5,000 | 239,288 | 15 |
| | 1990 | 82,690 | 62,853 | 18,323 | 10,025 | 11,483 | 50,540 | 5,000 | 240,914 | 15 |
| DET | 1980 | 80,620 | 41,516 | | | | | | 122,136 | 8 |
| | 1982 | 80,620 | 42,064 | 14,401 | | | | | 137,085 | 9 |
| | 1984 | 83,070 | 48,296 | 14,855 | 8,681 | 8,436 | | | 163,338 | 10 |
| | 1986 | 83,070 | 47,944 | 15,203 | 8,825 | 8,520 | 44,950 | 5,000 | 213,512 | 14 |
| | 1988 | 83,070 | 49,521 | 15,497 | 8,945 | 8,608 | 46,240 | 5,000 | 216,881 | 14 |
| | 1990 | 83,070 | 49,921 | 15,675 | 9,017 | 8,650 | 47,960 | 5,000 | 219,293 | 14 |

TABLE 1-4

ESTIMATE OF THE NUMBER OF REQUIRED ACTIVE PROCESSORS

LEVEL C TRAFFIC

| | NY | LA | CHI | DET |
|---|---|---|---|---|
| 1980 | 7* | 3* | 3* | 3 |
| 1982 | 7 | 4 | 4 | 3 |
| 1984 | 8 | 4 | 4 | 3 |
| 1986 | 9 | 4 | 4 | 4 |
| 1988 | 8 | 4 | 4 | 4 |
| 1990 | 8 | 4 | 4 | 4 |

LEVEL B TRAFFIC

| | NY | LA | CHI | DET |
|---|---|---|---|---|
| 1980 | 7* | 3* | 3* | 2 |
| 1982 | 7* | 3* | 3* | 2 |
| 1984 | 7* | 4 | 3 | 3 |
| 1986 | 8 | 4 | 4 | 3 |
| 1988 | 7 | 4 | 4 | 3 |
| 1990 | 7 | 4 | 4 | 3 |

*These numbers represent the planned initial configurations at New York, Chicago and Los Angeles. No attempt was made to determine if fewer processors could be used in 1980. For Detroit the assumed initial configuration included one processor. Therefore, the estimated processing requirements for Detroit in 1980 represent the minimum requirements for Level B and Level C traffic assumptions.

Memory and processing estimates for all model sites are derived by use of program sizes, processing times, lattice designs and data base designs of the New York ARTS IIIA system as standards. The New York system represents a large system configuration which has been optimized for processing efficiency. Thus using the New York system as a basis for determining processing requirements results in a high degree of confidence in estimates which show that the available processing capacity will not be exceeded for single and dual sensor sites. The memory requirements for single and dual sensor sites, however, may be slightly decreased if the standard ARTS IIIA programs are assumed instead of the New York program.

Table 1-5 shows the relative impacts of adding new functions to ARTS IIIAs. The figures shown are for the New York system/Level C traffic.

TABLE 1-5 ESTIMATE NUMBER OF PROCESSORS REQUIRED FOR NEW FUNCTIONS

LEVEL C, NY TRACON

| | CA | FDAD | M&S | DABS |
|---|---|---|---|---|
| 1982 | 0.30 | | | |
| 1984 | 0.31 | 0.86 | | |
| 1986 | 0.34 | 0.87 | 0.93 | |
| 1988 | 0.37 | 0.91 | 0.94 | -0.37 |
| 1990 | 0.40 | 0.92 | 0.94 | -0.37 |

## 2.0 INTRODUCTION

### 2.1 Background and Purpose

A continuing evolutionary approach is being taken to develop and implement improvements to the National Airspace System. With this approach, changes in the basic nature of the operational system are introduced in increments over successive system generations. The third generation level of capability, including the computer-based semiautomatic radar air traffic control system of basic NAS Stage A (en route) and basic ARTS (terminal), is now in operation.

ARTS IIIA is an enhanced version of the ARTS III terminal automation system, designed to provide automated radar target detection and tracking, expanded processing and storage capacity, automated failure recovery and reconfiguration, and minimum safe altitude warning. There are, currently, ARTS IIIA systems at two TRACONS, New York and Tampa. The Tampa system has been in operational use since June, 1979. The New York system is still in the installation phase. Current FAA plans calls for the upgrade of sixty-three ARTS III TRACONS to ARTS IIIA capability.

In order to meet the anticipated traffic control demands through the year 2005 at acceptable levels of safety and without introducing intolerable delays to the system users, a substantial upgrading of the third generation air traffic control system is in process. The engineering and development work leading to timely availability of this upgraded capability is the current challenge of the development programs.

Efforts to achieve the capabilities for upgrading the system are distributed among a number of Engineering and Development (E&D) programs, including the Terminal/Tower Control Program. These programs are oriented toward the common objectives of providing system capacity to meet the expected growth of air traffic, controlling costs, and maintaining or improving the present level of safety.

Many of the E&D programs will result in systems which will either be incorporated into ARTS IIIA or will interface to it.

The purpose of this study is to examine the capability of ARTS IIIA to support increasing processing demands imposed on it by anticipated traffic growth and by the implementation of expanded functional capabilities and interfaces in the period 1980 to 1990.

## 2.2 Scope

The scope of the study includes the detailed assessment of capacity requirements versus limitations at four sites and use of the results as indicators for capacity considerations at large metroplex systems, dual sensor sites, and single sensor sites. To this end, the study approach is to develop estimations of the processing and storage capabilities of ARTS IIIA, project the system configurations and traffic loads for each terminal area, characterize the processing and storage demands imposed by current and future terminal functions, and compare the capacity at each site to the anticipated capacity requirement.

## 3.0 ANALYSIS APPROACH

### 3.1 ENVIRONMENT ANALYSIS

Estimates of processing and storage requirements depend upon the configuration of the site and upon the volume of data to be processed during a busy period. Configuration parameters which impact the system load range from the number and types of sensors to the number of processors and the number and type of displays. The volume of data to be processed during a busy period is characterized by the peak instantaneous count of target reports, associated and unassociated tracks, and sensor noise within the system.

#### 3.1.1 Site Configurations

Major external interfaces of the ARTS IIIA system are shown in Exhibit 3.1-1. A typical configuration of ARTS IIIA is shown in Exhibit 3.1-2.

##### 3.1.1.1 Sensor Systems

This study assumes air traffic to be uniformly distributed around the airport from which they operate. As a result, estimates of traffic data to be processed by ARTS IIIA are sensitive to the detection range and scan rate of the radar at each site. Assumptions of long detection ranges result in high traffic counts, while assuptions of short ranges result in low traffic counts. Likewise, high scan rates result in high traffic counts.

Radar sensor systems used at various sites throughout the terminal ATC system include ASR-4, ASR-7, and ASR-8. However, it is understood that the ASR-4 and ASR-7 sensors will be upgraded to ASR-8 capability in future years. The schedule for sensor system upgrade has not been determined. As a result, the ASR-8 has been assumed to be implemented at all sites for this study. There are two advantages of this assumption. The analysis approach is simplified through the elimination of the type of radar as a parameter. In addition, the ASR-8 exhibits higher sensitivity characteristics than the ASR-4 and ASR-7. Thus, greater confidence can be placed on any study results which shown capacity limitations are not exceeded for a given site in any particular year.

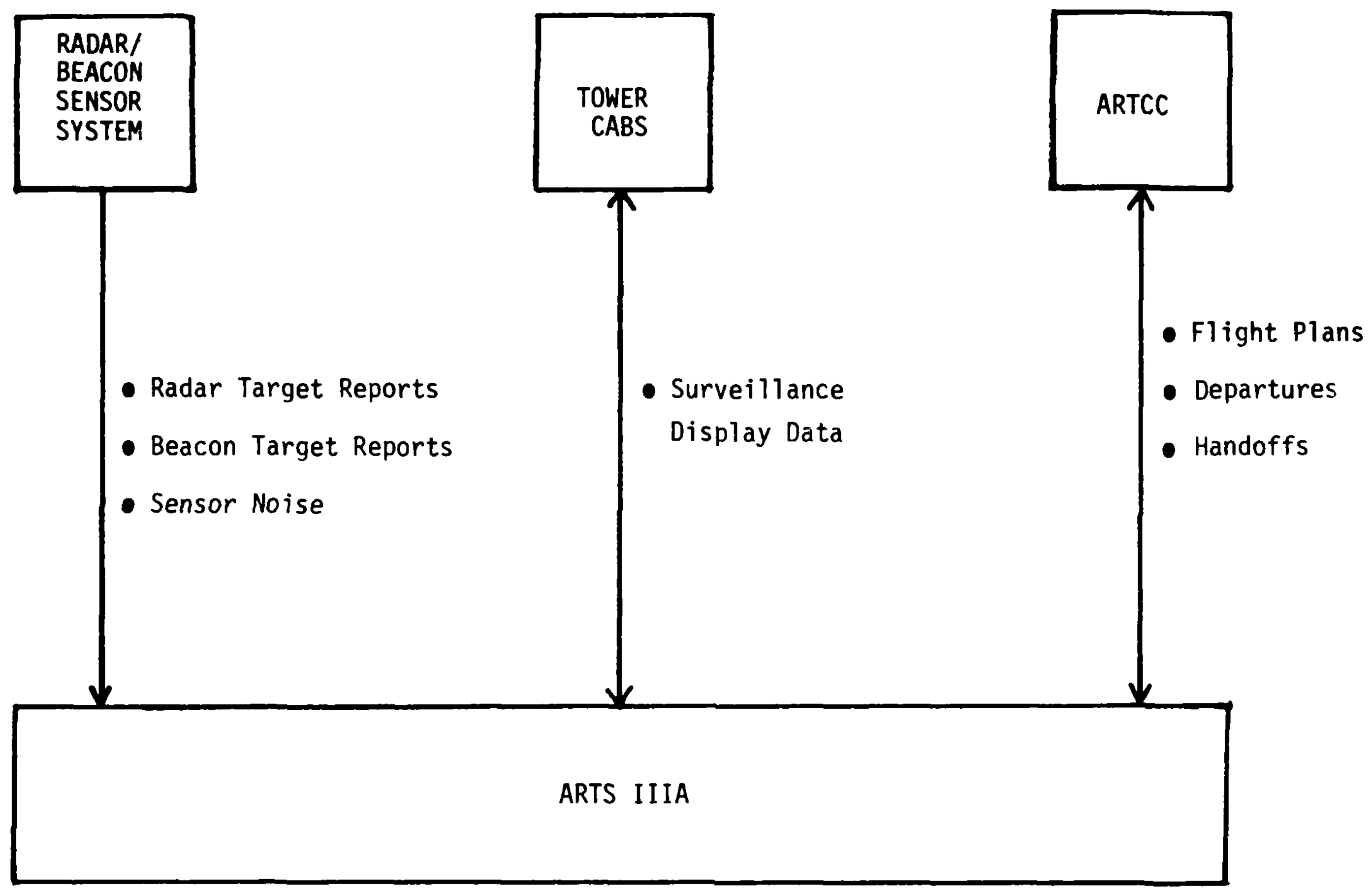



Exhibit 3.1-1 Major ARTS IIIA Interfaces

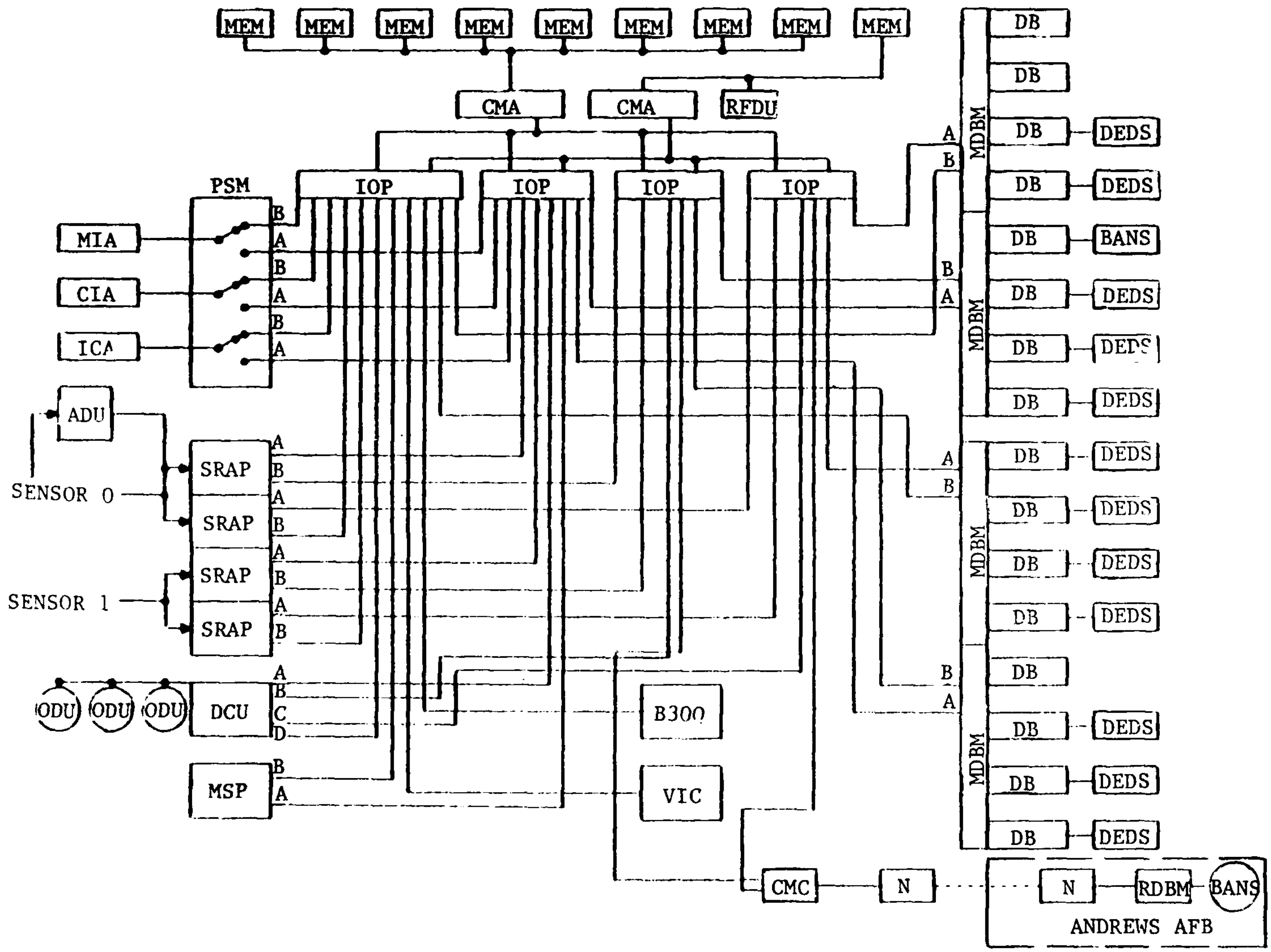



Exhibit 3.1-2 Typical ARTS IIIA System

The planned configuration for New York includes four radars:

| | Radar | Antenna | Beacon |
|---|---|---|---|
| JFK | ASR-7 | ASR-8 | BI-4 |
| EWR | ASR-7 | ASR-8 | BI-4 |
| ISP | ASR-8 | | BI-5 |
| HPN | ASR-8 | | BI-5 |

There are two radars at Chicago and Los Angeles. For Chicago they are

| | Radar | Antenna | Beacon |
|---|---|---|---|
| • ORD | ASR-7 | ASR-8 | BI-4 |
| • CHI-S | ASR-7 | ASR-8 | BI-4 |

The Los Angeles sensors are

| | Radar | Antenna | Beacon |
|---|---|---|---|
| • LAX-7 | ASR-7 | ASR-8 | BI-4 |
| • LAX-4 | ASR-4D | ASR-8 | BI-4 |

There is a single radar at Detroit:

| | Radar | Beacon |
|---|---|---|
| • DTW | ASR-8 | BI-5 |

The number and location of each radar is assumed to remain fixed throughout the period of the study.

Initially, it is assumed that the beacon sensor at each site is either the ATCBI-4 or ATCBI-5. These systems eventually will be replaced by DABS. For Chicago, Los Angeles and Detroit implementation of DABS is assumed to take place in 1986. Implementation in 1988 is assumed for New York.

It is generally expected that the maximum detection range of DABS will be approximately 100 miles, in contrast to 60 miles for the ATCBI-4 and ATCBI-5. The increased range of DABS has the potential of allowing a single DABS to replace two existing systems. However, it is not yet known how the peculiarities of terrain will influence sheilding and the ability to achieve complete area coverage with a single sensor. If a single DABS sensor is used with dual radars, there may be registration problems which make it more difficult to correlate beacon replies to radar returns at some locations.

Since the addressing of the above problems is beyond the scope of this study, the simplifying assumption was made that each existing beacon sensor will be replaced by one DABS. This led to the further assumption that there would be no requirement to track or display beacon replies at ranges greater than 60 miles.

Therefore, a DABS cutoff range of 60 miles was assumed for all sites.

It is assumed that DABS will not only transmit beacon replies to ARTS IIIA, but that the radars will also interface through the DABS processor. All radar and beacon reports are assumed to be correlated to tracks before transmission. Since ARTS IIIA is a non-correlating user of DABS data, some software modules (TCRSS and TPSEC) required for correlation of target reports to tracks can be a eliminated when DABS is implemented.

#### 3.1.1.2 Tower Cabs

The primary way in which a tower affects ARTS III capacity utilization is through the quantity and manner of interface of its displays. Initially the tower cab displays at all sites are assumed to be BANS displays. For each terminal system, the number of tower cab displays in 1980:

| | |
|---|---|
| New York | 7 |
| Chicago | 3 |
| Los Angeles | 2 |
| Detroit | 1 |

At New York, six tower cab displays interface to the TRACON processing system through RDBMs (Remote Display Buffer Memories) via a CMC (Communications Multiplexer Controller) and modems. LaGuardia Tower has its display connected through an MDBM (Multiplexed Display Buffer Memory). The Chicago, Los Angeles and Detroit BANS tower cab displays interface through MDBMs to the processors.

It is assumed that in 1984 the BANS (Brite Alpha Numeric System) displays will be replaced by TCDDs (Tower Cab Digital Displays). It is also assumed that, at that time, TCDDs will also be installed at all towers within 20 miles of the radars serving the TRACON. This method of estimating results in the following complements of remote displays in 1984.

| | |
|---|---|
| New York | 11 |
| Chicago | 5 |
| Los Angeles | 4 |
| Detroit | 5 |

No growth is assumed in the number of tower cab displays after 1984.

TCDD are assumed to require interface through an RDBM. Thus, it is assumed that RDBMs will be added to the Chicago, Los Angeles and Detroit systems in 1984. The software modules (RDOP, RTDOP and RKIP) required to interface to remote displays through RDBMs are currently included in the New York system and are assumed to remain throughout the time frame of this study. RDOP, RTDOP and RKIP are assumed not to be included in the Chicago, Los Angeles and Detroit systems until 1984.

### 3.1.1.3 Local Displays

The complements of displays for the four TRACONS for the years 1980 to 1990 are shown in Table 3.1-1. The list includes all displays for each TRACON, including displays at remote towers. It is assumed that DEDS (Data Entry and Display System) will be the display used at all sites before 1984, and that DEDS will be replaced by FDAD (Full Digital ARTS Display) in 1984.

### 3.1.1.4 ARTS IIIA Processing System

#### 3.1.1.4.1 Sensor Receiver and Processor (SRAP)

The SRAP performs radar and beacon target detection, radar clutter mapping,

TABLE 3.1-1 ESTIMATED NUMBER OF TRACON DISPLAYS (LOCAL AND REMOTE)

| | | 1980 | 1982 | 1984 | 1986 | 1988 | 1990 |
|---|---|---|---|---|---|---|---|
| New York: | JFK | 19 | 19 | 21 | 21 | 21 | 21 |
| | EWR | 15 | 15 | 16 | 16 | 17 | 17 |
| | HPN | 7 | 7 | 8 | 8 | 8 | 8 |
| | ISP | 5 | 5 | 5 | 5 | 6 | 6 |
| Chicago: | ORD | 14 | 14 | 15 | 15 | 15 | 15 |
| | CHI-S | 6 | 6 | 7 | 7 | 7 | 7 |
| Los Angeles: | LAX-4 | 8 | 8 | 9 | 9 | 11 | 11 |
| | LAX-7 | 6 | 6 | 7 | 7 | 9 | 9 |
| Detroit: | DTW | 11 | 11 | 15 | 15 | 17 | 17 |

and radar/beacon target correlation. It transmits data to the TRACON consisting of

- Radar only target reports
- Beacon only target reports
- Radar reinforced beacon target reports
- Sector marks
- Alarm messages

Two SRAPs are connected to each sensor system for redundancy.

Target reporting functions will be performed by the DABS processors when DABS is implemented. At that time, SRAPs will no longer be needed.

3.1.1.4.2 Input - Output Processor B (IOPB)

IOPs perform the basis executive control and data processing functions of the ARTS IIIA system. They are provided with addressing capability for up to 16 memory modules (16K words per memory module). Each IOP is connected through a CMA (Central Memory Access) to all memory modules.

In a fail safe configuration, ARTS IIIA systems will be configured with one to seven active on-line IOPs and one spare. The spare provides a fail safe capability by remaining on standby, fully connected into the system with power on. In this state, it can automatically be brought on line to replace a failed processor. Except for New York, ARTS IIIA facilities are not scheduled to be provided with spare IOPs.

In the analysis, it is assumed that the number of on-line processors may be expanded in any year up to a maximum of seven as required at each site to process the projected load.

3.1.1.4.3 Memory Module (MEM)

Each memory module provides storage for 16,384 thirty bit words of data and programs. A maximum of 15 modules may be included in a system configuration.

3.1.1.4.4 Central Memory Access (CMA)

The CMA is the interface module for memory modules and the RFDU (Reconfiguration and Fault Detection Unit). Memory modules and the RFDU are connected to the IOPs through CMAs. Each IOP connected to a CMA can communicate with all memories connected to the CMA. Each CMA provides interfaces for up to eight memories or up to seven memories and one RFDU. A system containing eight or more memories requires two CMAs. The maximum system configuration consists of two CMAs interfacing seven IOPs to 15 memories and one RFDU.

3.1.1.4.5 Reconfiguration and Fault Detection Unit (RFDU)

The RFDU provides for automatic or manual reconfiguration of up to eight IOPs and 15 memory modules.

3.1.1.4.6 Multiplexed Display Buffer Memory (MDBM)

An MDBM provides display refresh control, keyboard entry control and display data storage for one to four DEDS or BANS displays. Starting in 1984, it is assumed that an MDBM (or similar multiplexing device) will provide the same type of interface for FDAD. Whether the FDAD's display buffer memory is provided in the MDBM or is internal to the display has no impact on this study.

3.1.1.4.7 Remote Display Buffer Memory (RDBM)

An RDBM provides display refresh control, keyboard entry control, and data storage for a remote display. Data tranfers between RDBMs and IOPs take place through modems and a Communications Multiplexer Controller (CMC).

### 3.1.2 IAC Estimates.

#### 3.1.2.1 Introduction.

The expression "IAC" (Instantaneous Airborne Count), as used in this report, refers to the number of aircraft that are instantaneously within the coverage area of a given surveillance site. Since many of the system's processing functions are related to aircraft in the airspace under surveillance, the number of such aircraft is an essential part in making any determination of the processing demands. Further, since the specific tasks executed are contingent on available data pertaining to the aircraft being processed, it is additionally necessary that the IAC be broken down into subsets relevant to the processing required. This breakdown has been termed "IAC System Load Factors" and is presented in Table 3.1-2.

At the time of this effort, there were no previously developed IAC estimates available that specifically addressed the needs of the study; viz., what is the expected IAC and what is its expected composition during periods of high activity for each of the next ten years at each of the surveillance sites associated with the ARTS IIIA locations included in the study. Consequently, it was necessary to undertake the development of these estimates as part of the overall effort.

#### 3.1.2.2 General Approach.

In selecting a general approach, several alternatives were considered. One was to arbitrarily establish incremental levels for the IAC system load factors. This approach is useful in determining system sensitivity to various load factors and was used as part of the efforts to develop task time equations. It does not, however, address the question of what load might be expected at a given site at a given time. Another approach was to make projections from historical data based on forecast increases or decreases in annual activity. Unfortunately, historical data available relevant to IACs are sparse and incomplete and it is not known whether the data were acquired during periods of low, medium or high aerial activity.

TABLE 3.1-2

IAC SYSTEM LOAD FACTORS
(Each Surveillance Site)

TOTAL TARGET REPORTS

- Radar Only
- Beacon Only
  - Discrete
  - Non-Discrete
  - Mode C
- Radar Reinforced Beacon
  - Discrete
  - Non-Discrete
  - Mode C

ASSOCIATED TRACKS

- Radar Only
- Beacon Only
  - Discrete
  - Non-Discrete
  - Mode C
- Radar Reinforced Beacon
  - Discrete
  - Non-Discrete
  - Mode C

UNASSOCIATED TRACKS

- Radar Only
- Beacon Only
  - Discrete
  - Non-Discrete
  - Mode C
- Radar Reinforced Beacon
  - Discrete
  - Non-Discrete
  - Mode C
- Cross-Linked with Associated Track in another system

UNUSED TARGET REPORTS

- Radar
- Beacon

The approach that was adopted is aimed at deriving estimates of the IAC from terminal area forecasts of annual activity and deriving estimates of the IAC break down (i.e., IAC system load factors) through the application of reasoned assumptions. In general, the approach involves the estimation of busy hour operations from forecasts of annual activity and historical data relative to busy/average hour relationships, the estimation of instantaneous counts from busy hour estimates and a break down of these estimates into the various categories relevant to processing requirements. The approach is keyed on several basic assumptions. These are:

- The IAC is related to the number of operations at airports in the vicinity of the surveillance site of interest. In this regard, "vicinity" is considered to be within 60 nautical miles (the normal range limit of current terminal surveillance systems) and "airports" are limited to those public use or military airports having a paved runway 1,500 feet or greater in length and, as a practical matter, for which annual activity forecast and/or historical data are available.

- The higher IACs occur during good weather conditions with the peaks occurring when conditions are such as to strongly stimulate the urge to fly on the part of many private and student pilots -- probably on a weekend or holiday in the spring of the year.

- The higher activity in terms of airborne flights simultaneously receiving terminal radar services (analogous to associated tracks in the system) occurs during poor weather conditions.

- The instantaneous count of associated tracks is related to the number of instrument operations handled by the TRACON.

3.1.2.3 Annual Activity Base Numbers.

The sources of the base (annual activity) numbers used in the estimation process were:

- For Public Use Airports: FY1977 activity and FY1979-1990 forecast values from FAA's terminal area forecast data base.

- For Military Airports: The Military Air Traffic Activity Report for CY1976, published by the FAA. Forecast activity data for these airports were not available, however, general forecasts of military air traffic activity indicate it will remain relatively unchanged during the 1979-1990 period. Therefore, as was done by the FAA in their forecasts of military operations at public use airports, the values for the military airports throughout the period were assumed to remain the same.

The base numbers available for public use airports are broken down by operations category (Itinerant, Local and Instrument). Itinerant and Local are further broken down by aviation category (Air Carrier, Air Taxi and Commuter, General Aviation and Military). The reporting categories for the military services differ among the services and with those of the FAA. Total operations are reported. However, the Air Force and Navy do not break out Itinerant and Local operations and none of the services break down civil traffic into Air Carrier, Air Taxi and Commuter, and General Aviation categories. Consequently, for the military airport base numbers, where Itinerant and Local operations were not broken out, each were assumed to equal 50% of the Total operations value. Additionally, civil aircraft were assumed to all be in the General Aviation category.

Potential overflights (i.e., flights that originate and terminate at airports outside the 60 mile radius) were not considered in the estimation process for several reasons. First, a means of estimating the number of such flights simultaneously in the area was not apparent. Second, it is reasonable to believe that this number would be quite small as compared to the number of flights operating to/from airports in the vicinity. Finally, there is some compensation for this omission that results from unavoidable double-counting of some of the itinerant flights. More specifically, since the "other" airport to/from which an itinerant flight is proceeding is unknown, it is assumed that the other airport lies outside the area (i.e., it is not one of the airports whose itinerant operations forecast is also included in the IAC estimation process). Thus, for that portion of the itinerant traffic that originates at one airport in the area and terminates at another airport in the area, double-counting will result. It is reasonable to believe that this number will also be relatively small.

3.1.2.4 Methodology.

Different processes and assumptions are applied in deriving the estimated instantaneous airborne counts and the estimated instantaneous associated track counts. Following these processes, the results are merged to determine the final set of values for the IAC system load factors, i.e., number of Target Reports, Associated Tracks, Unassociated Tracks, etc..

IAC estimates were made for two different sets of assumptions related to general weather conditions (Good and Poor). Additionally, IAC estimates were made for a period of average activity and for two different assumptions concerning busy/average hour ratios during a period of high activity, the latter providing a range to the high activity estimates used in assessing the impact on processing.

The instantaneous associated track counts were estimated on the basis of poor weather conditions. During good weather conditions, the instantaneous associated track counts were assumed to approximate 75% of the poor weather values.

The processes and assumptions applied in estimating the instantaneous airborne counts, the instantaneous associated track counts, and in the merging of these estimates to derive the IAC system load factors are described in Appendix A.

3.1.2.5 Resulting Estimates.

The IAC system load factors estimated for each of the surveillance sites included in the analysis effort are contained in Appendices G - J. Estimates are provided for FY77 (based on reported annual activity data) and for FY80, FY82, FY84, FY86, FY88 and FY90 (based on forecase annual activity data).

In the breakdown of categories, the group headed "BASE" represent the estimated IAC base values and the group headed "ADJUSTED" represent the estimated target report values. The remaining nomenclatures conform to those contained in Table 3.1-2.

The columns headed A, B and C reflect the use of different busy/average hour ratio assumptions in deriving IAC base value estimates as discussed in paragraph 1.2, Appendix A. The A column reflects estimates of instantaneous counts during an average hour whereas the B and C columns reflect a low and high range of estimates of the instantaneous counts during a busy hour.

It will be noted that the entries for associated tracks and cross-linked tracks appear only under column B. This is because differing busy/average hour ratios were not used in estimating associated tracks (see paragraph 3.2, Appendix A), thus, the same values appearing under column B also apply to the A and C columns.

### 3.1.3 IAC Estimate Validation.

The IAC estimation methodology has, of necessity, been based on numerous assumptions. While conscientious efforts were made to apply sound judgements in making these assumptions, it would, of course be highly desirable to have a means of verifying the accuracy of the estimates produced by the process. However, a precise and practical method of doing this is not obvious. For one thing, the process is aimed at converting forecasts of annual activity into estimates of peak (or near peak) instantaneous counts during periods of high activity where high activity is in terms of all aircraft in the airspace of interest, not just those receiving air traffic control service. It is during such periods that the system will be taxed most severely. However, it is difficult to predict just when such conditions will occur, thus, it is extremely difficult to mount and time a special data collection effort that will assure actual IAC data is captured under these conditions. As was noted earlier in this report, field measurement data relevant to IACs are sparse and incomplete, and it is not known whether the counts are representative of low, medium or high levels that may be encountered during the course of the year.

Notwithstanding the above, some comparisons of the results produced by the methodology have been made with field data samples provided by the FAA. In making these comparisons, the objective was to determine if the estimated totals appeared reasonable bearing in mind that whether the field data represented low, medium or high values for the year was unknown. The focus was on totals (rather than composition of the totals) because these values have the greatest impact on system loading.

Data were provided by the FAA for each of the nine surveillance sites. The data for the New York surveillance systems were taken at the New York TRACON in conjunction with system integration and shakedown efforts and represent "snapshots" of the instantaneous number of active tracks in each surveillance system at different points in time. The data for the Chicago, Los Angeles and Detroit surveillance sites were derived from beacon target report data recorded at these sites over hourly periods for several different hours. These data were reduced by ARD-143 to reflect the average and peak number of beacon target reports per scan during each of the hours recorded.

The date, day of the week, time of day (local), peak count and, weather conditions of the field data samples are as shown in Table 3.1-3.

TABLE 3.1-3

PEAK TRAFFIC COUNT MEASUREMENTS FOR
NEW YORK, CHICAGO, LOS ANGELES, AND CHICAGO
(Provided by FAA)

| Site | Date | Day of Week | Time (Local) | Weather Conditions | Peak Count | |
|---|---|---|---|---|---|---|
| New York | 6-7-79 | Thur | 0845- | IFR | 407 | |
| | 6-8-79 | Fri | 0903- | Marginal VFR | 336 | |
| | 6-8-79 | Fri | 1608- | Marginal VFR | 497 | |
| | 6-10-79 | Sun | 1440 | Good VFR | 527 | Peak Total Track Counts (4 sensors) |
| | 6-28-79 | Thur | 1619 | Marginal VFR | 677 | |
| | 6-29-79 | Fri | 1614 | Marginal VFR | 710 | |
| Chicago | 8-17-79 | Fri | 1445-1545 | VFR | 296 | |
| | 8-17-79 | Fri | 1545-1645 | VFR | 253 | |
| | 8-17-79 | Fri | 1659-1759 | VFR | 288 | |
| | 8-29-79 | Wed | 1430-1530 | VFR | 243 | Peak Total Beacon Reports (2 sensors) |
| | 8-29-79 | Wed | 1530-1630 | VFR | 264 | |
| | 8-29-79 | Wed | 1630-1730 | VFR | 254 | |
| Los Angeles | 8-11-79 | Sat | 1030-1130 | VFR | 350 | |
| | 8-11-79 | Sat | 1130-1230 | VFR | 327 | |
| | 8-11-79 | Sat | 1230-1330 | VFR | 308 | |
| | 8-11-79 | Sat | 1330-1430 | VFR | 306 | |
| | 9-13-79 | Thur | 0500-0930 | VFR | 277 | |
| | 9-13-79 | Thur | 1000-1400 | VFR | 298 | |
| | 9-13-79 | Thur | 1429-1559 | VFR | 293 | |
| | 9-13-79 | Thur | 1600-1830 | VFR | 327 | |
| | 9-15-79 | Sat | 0500-0830 | VFR | 326 | |
| | 9-15-79 | Sat | 0900-1400 | VFR | 369 | |
| | 9-15-79 | Sat | 1439-1539 | VFR | 315 | |
| | 9-15-79 | Sat | 1600-1930 | VFR | 245 | |
| | 9-20-79 | Thur | 0500-1000 | VFR | 277 | Peak Total Beacon Reports (2 sensors) |
| | 9-20-79 | Thur | 1030-1430 | VFR | 306 | |
| | 9-20-79 | Thur | 1459-1559 | VFR | 354 | |
| | 9-20-79 | Thur | 1600-1830 | VFR | 332 | |
| | 9-22-79 | Sat | 0500-1000 | Marginal VFR | 301 | |
| | 9-22-79 | Sat | 1030-1430 | Marginal VFR | 346 | |
| | 9-22-79 | Sat | 1459-1559 | VFR | 316 | |
| | 9-22-79 | Sat | 1605-2005 | VFR | 276 | |
| | 9-27-79 | Thur | 0500-1000 | VFR | 306 | |
| | 9-27-79 | Thur | 1020-1430 | VFR | 351 | |
| | 9-27-79 | Thur | 1450-1550 | VFR | 356 | |
| | 9-29-79 | Sat | 0500-1000 | VFR | 365 | |
| | 9-29-79 | Sat | 1030-1500 | VFR | 298 | |
| | 9-29-79 | Sat | 1610-2140 | VFR | 238 | |
| Detroit | 10-4-79 | Thur | 0859-1029 | IFR | 76 | |
| | 10-4-79 | Thur | 1040-1140 | IFR | 59 | |
| | 10-4-79 | Thur | 1205-1435 | IFR | 70 | |
| | 10-4-79 | Thur | 1520-1750 | IFR | 97 | |
| | 10-6-79 | Sat | 0920-1150 | IFR | 66 | |
| | 10-6-79 | Sat | 1210-1440 | IFR | 51 | |
| | 10-6-79 | Sat | 1510-1640 | IFR | 55 | |
| | 10-6-79 | Sat | 1650-1750 | IFR | 49 | |

TABLE 3.1-3 (Cont'd.)

| Site | Date | Day of Week | Time (Local) | Weather Conditions | Peak Count | |
|---|---|---|---|---|---|---|
| Detroit (continued) | 1-10-80 | Thur | 1600-1700 | VFR | 92 | Peak Total Beacon Reports (1 sensor) |
| | 1-12-80 | Sat | 0900-1100 | VFR | 72 | |
| | 1-12-80 | Sat | 1200-1400 | VFR | 110 | |
| | 1-12-80 | Sat | 1430-1630 | VFR | 120 | |
| | 1-13-80 | Sun | 0900-1130 | VFR | 102 | |
| | 1-13-80 | Sun | 1200-1330 | VFR | 112 | |
| | 1-13-80 | Sun | 1400-1530 | VFR | 129 | |
| | 1-13-80 | Sun | 1600-1730 | VFR | 122 | |
| | 1-14-80 | Mon | 1130-1500 | VFR | 75 | |

Comparisons of the IAC estimates with the field data samples for each of the surveillance sites are reflected in Exhibits 3.1-3 through 3.1-11. These exhibits portray the following:

- The estimated IAC during an average hour. This corresponds to to the A (average) hour assumption concerning busy/average hour ratios. (See paragraph 1.2, Appendix A)

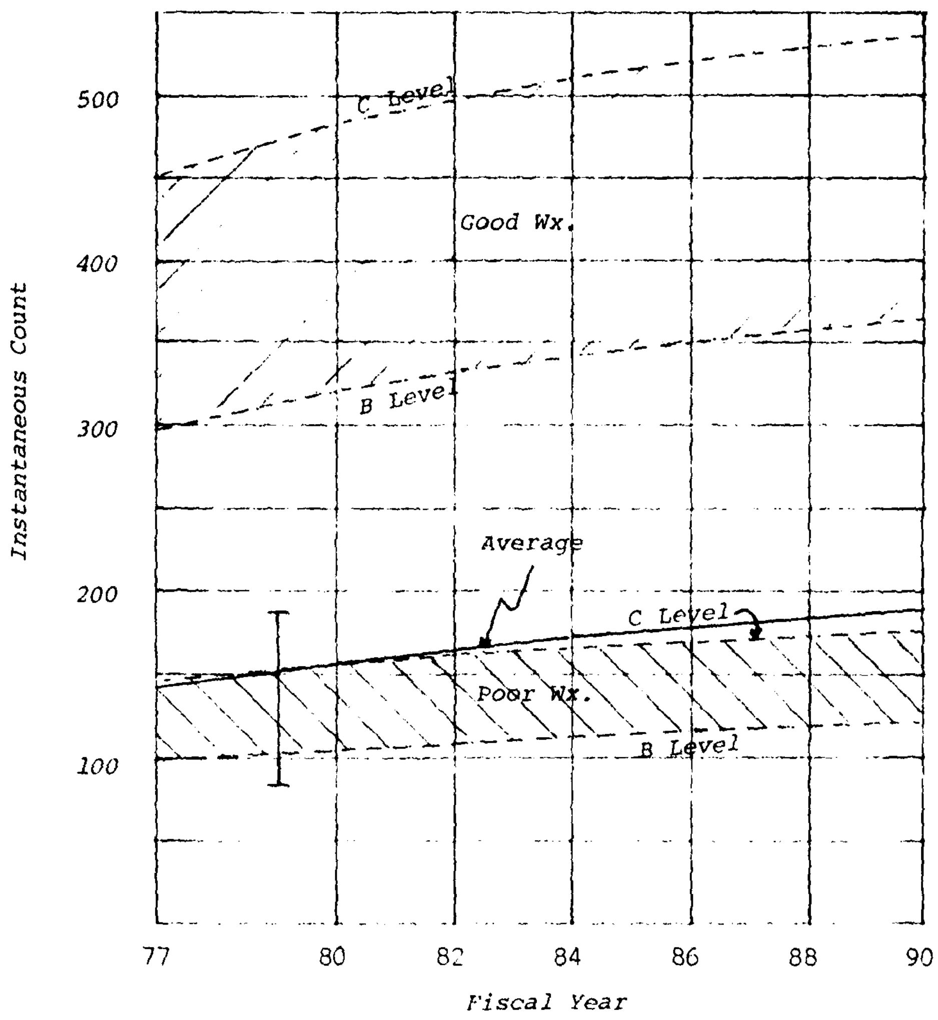
- The range of the IAC estimates for a busy hour (i.e., the B and C busy/average hour ratio assumptions) under both good and poor weather conditions.

- The range of the peak counts in the field data samples.

It should be noted that since the New York field data samples were with respect to tracks, the IAC estimates for the New York surveillance sites are also with respect to tracks. Since the data for the other sites were with respect to beacon target reports, the IAC estimates portrayed for these sites are also with respect to beacon target reports.

A review of the exhibits leads to the following observations:

- For the New York systems (JFK, EWR, HPN and ISP), the range of the field data samples brackets the estimated average IAC, with the higher counts falling somewhere between the upper poor weather estimate and the lower good weather estimate. As a matter of interest, the field data provided for New York did include some annotations regarding the general weather conditions at the time the data was taken. One sample was during IFR, one during VFR and the remaining four during marginal conditions. The high and low samples both occurred when the weather conditions were marginal.




*Range of 6 field samples*

EXHIBIT 3.1-3

Estimated Peak Instantaneous Total Tracks - JFK

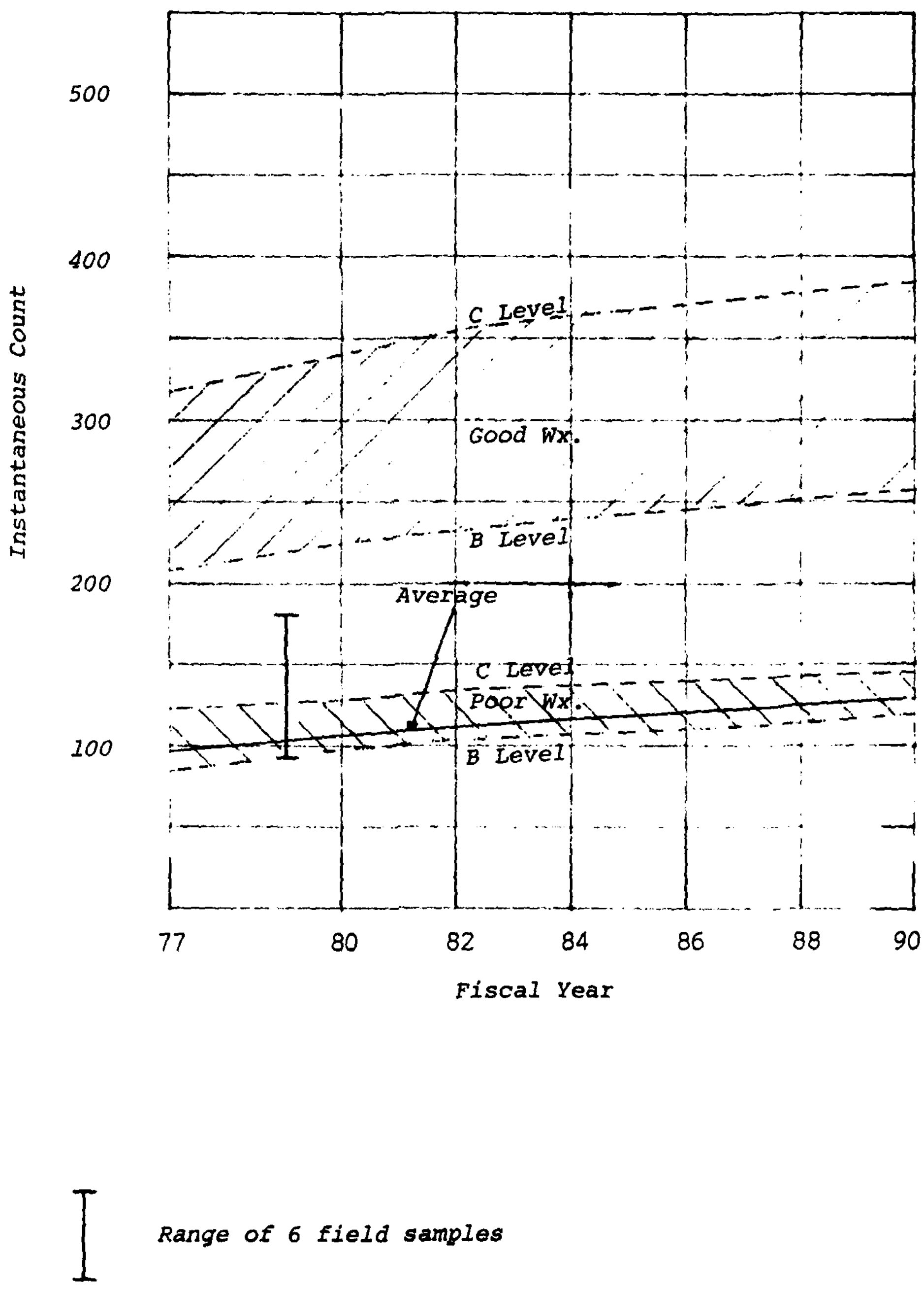
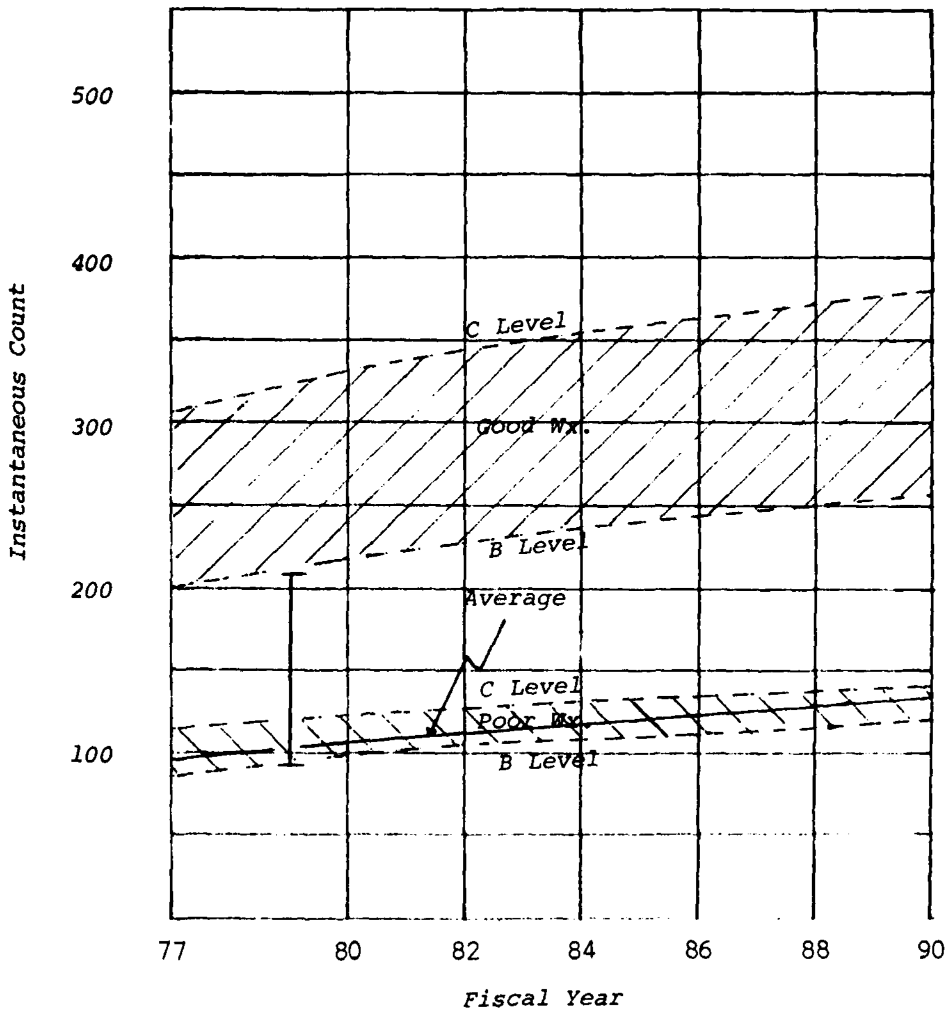



EXHIBIT 3.1-4

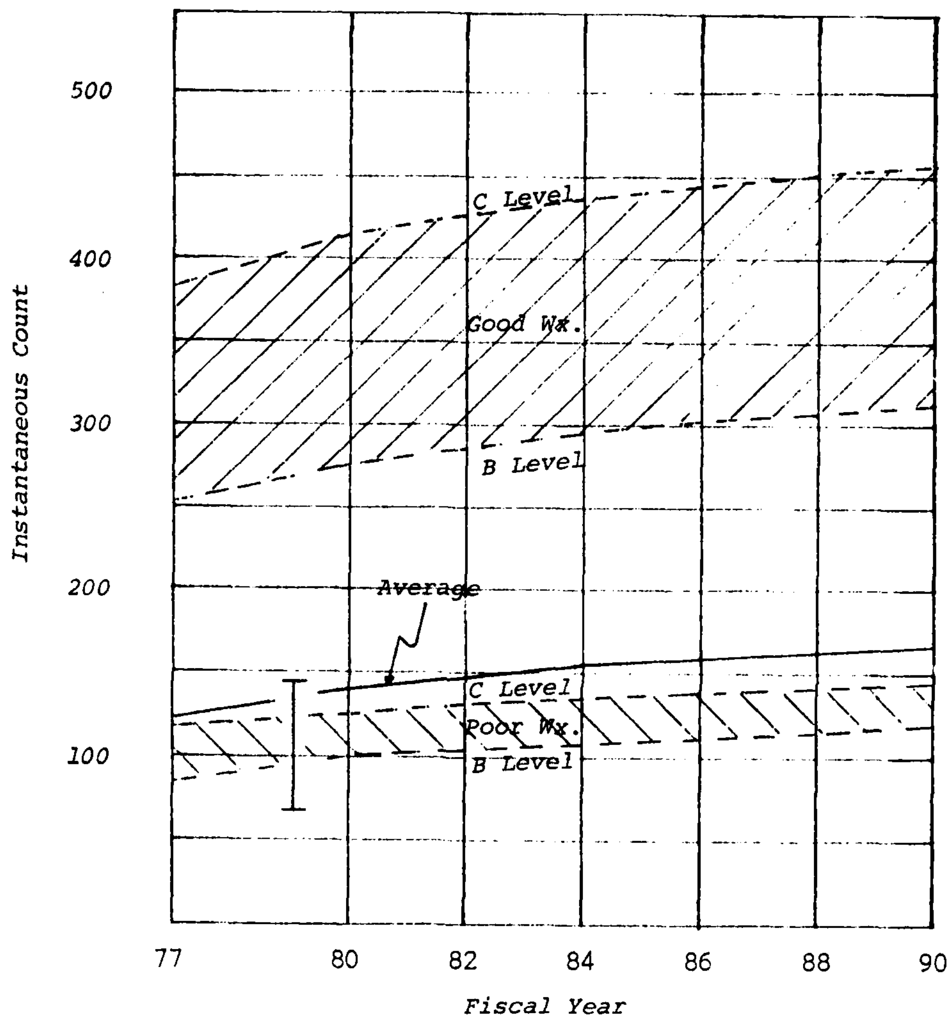
Estimated Peak Instantaneous Total Tracks - EWR




Range of 6 field samples

EXHIBIT 3.1-5

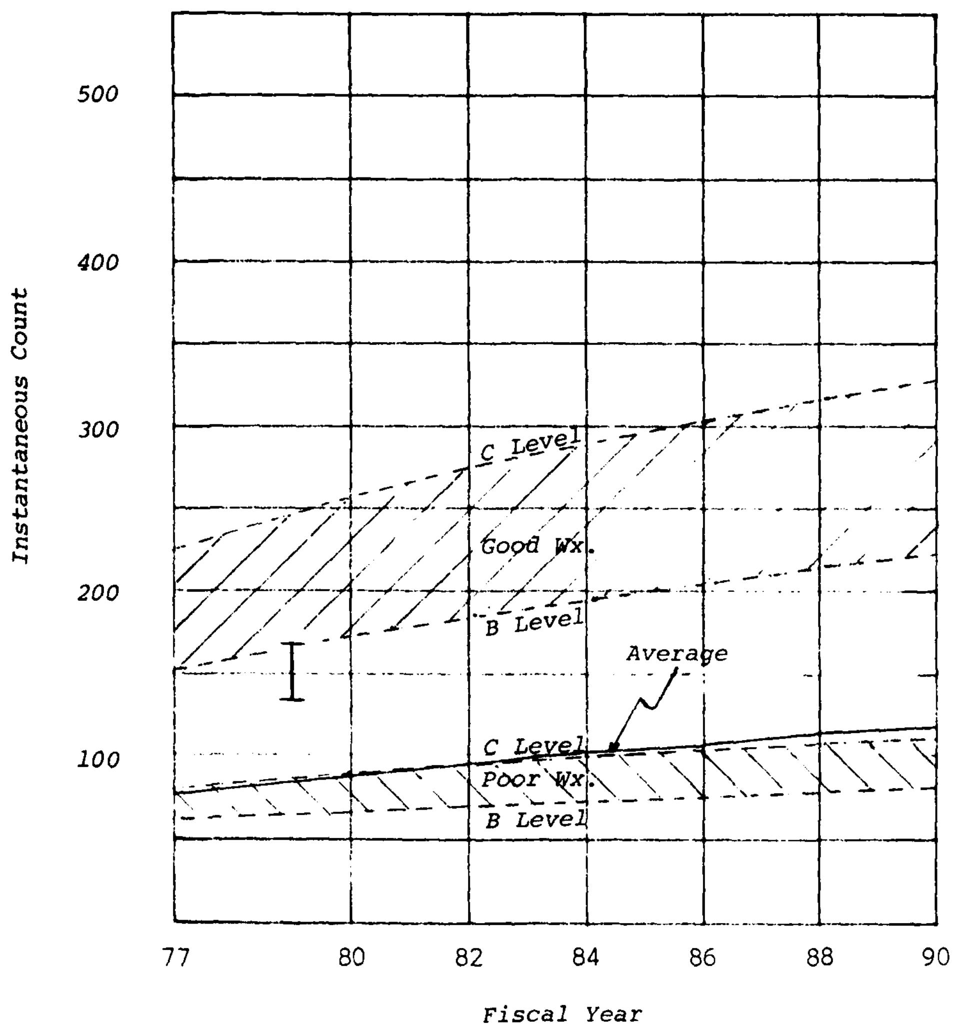
Estimated Peak Instantaneous Total Tracks - HPN




Range of 6 field samples

EXHIBIT 3.1-6

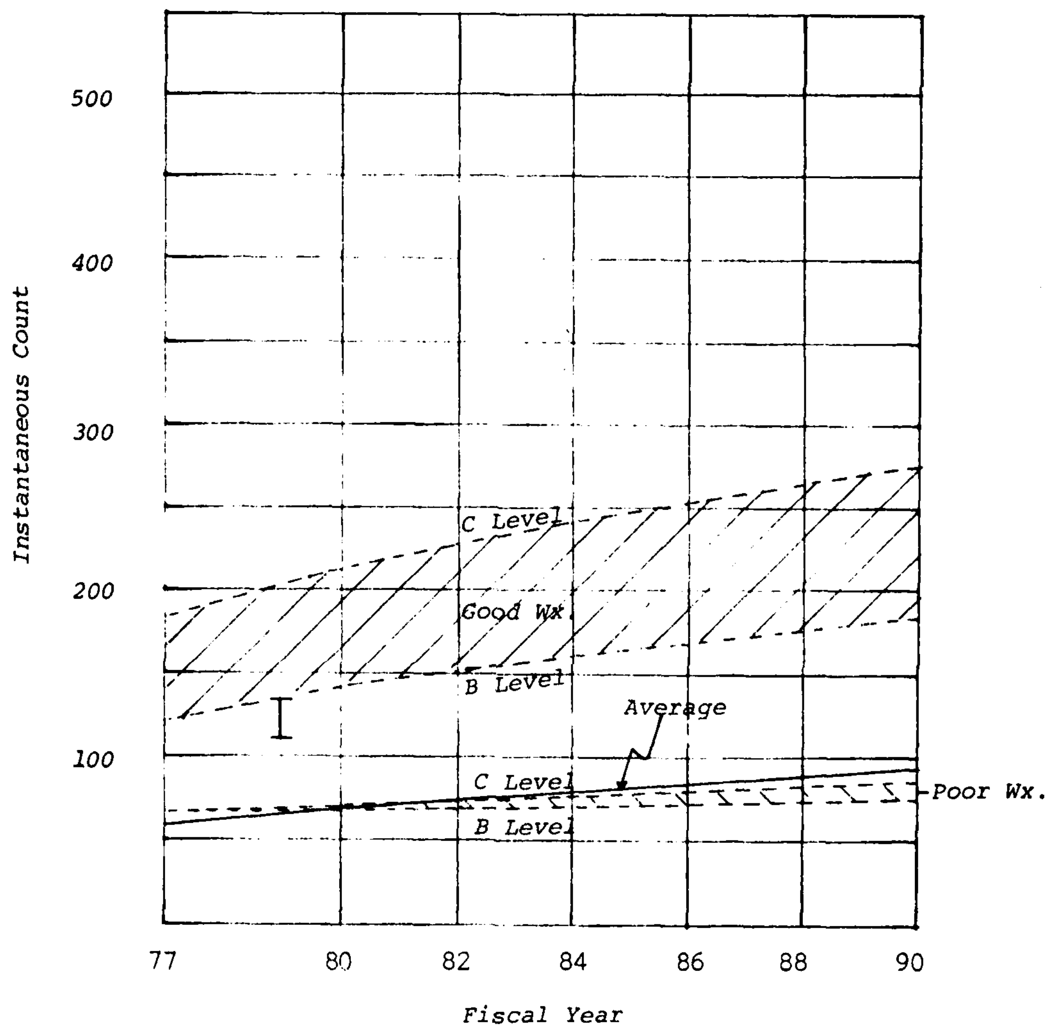
Estimated Peak Instantaneous Total Tracks - ISP




Range of 6 field samples

EXHIBIT 3.1-7

Estimated Peak Instantaneous Beacon Target Reports - ORD




Range of 6 field samples

EXHIBIT 3.1-8

Estimated Peak Instantaneous Beacon Target Reports - CHI-S

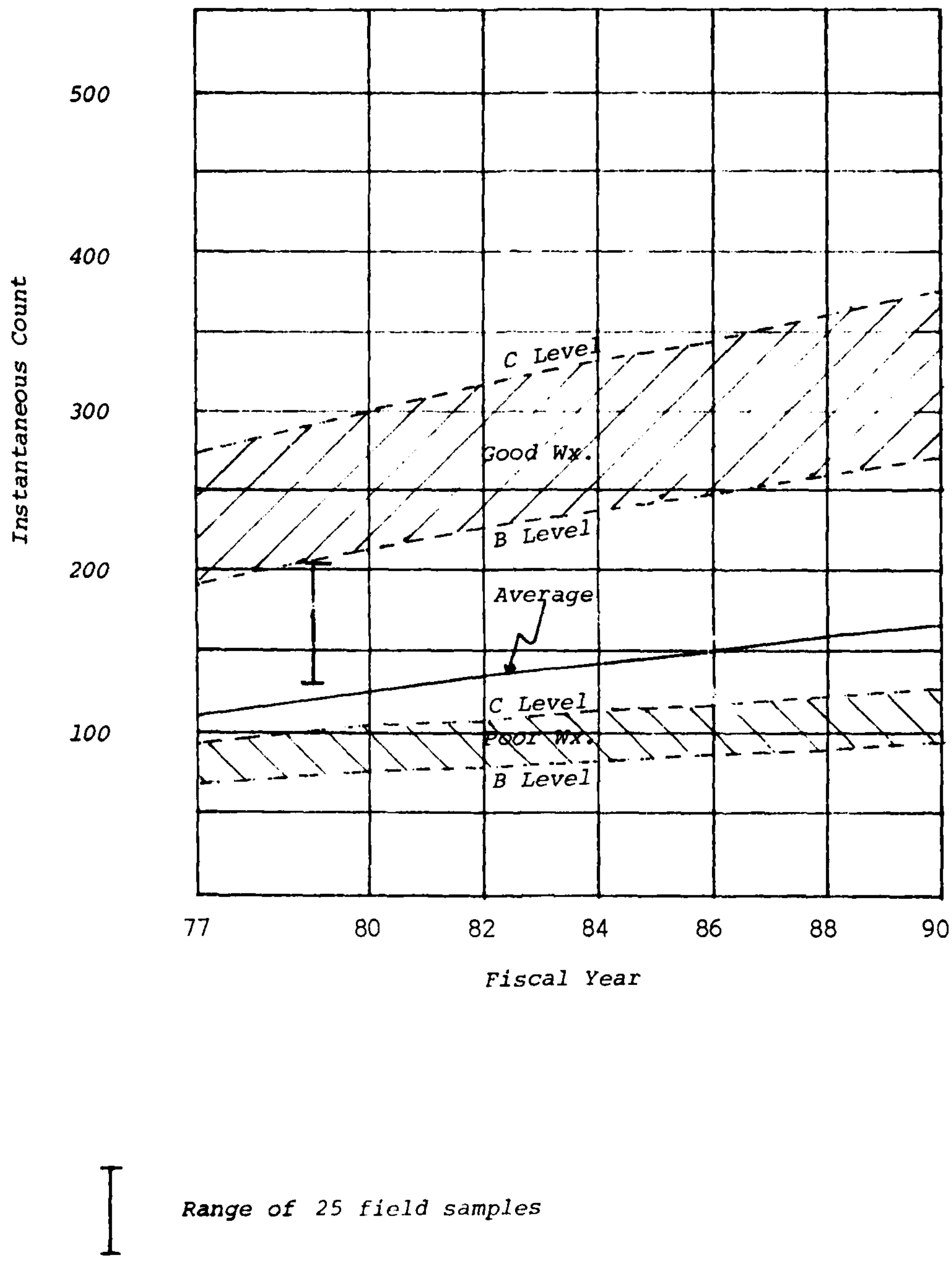
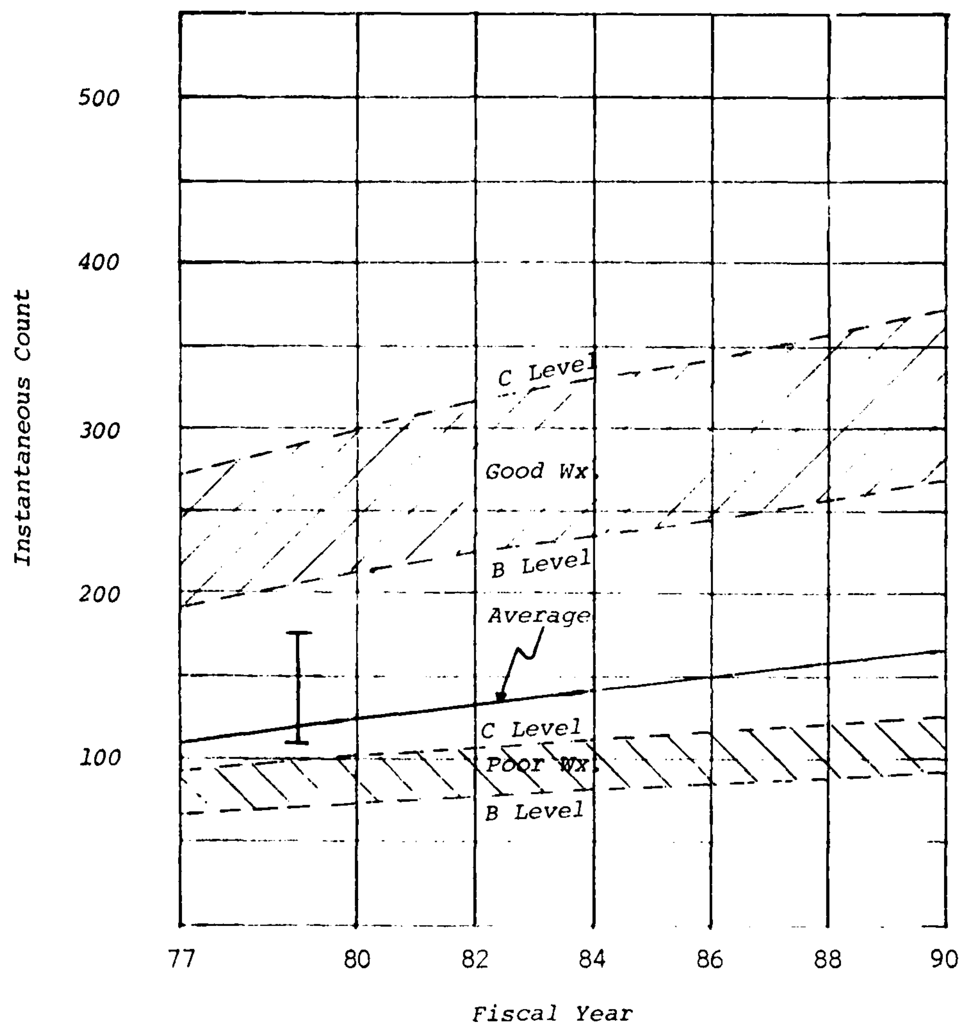



EXHIBIT 3.1-9

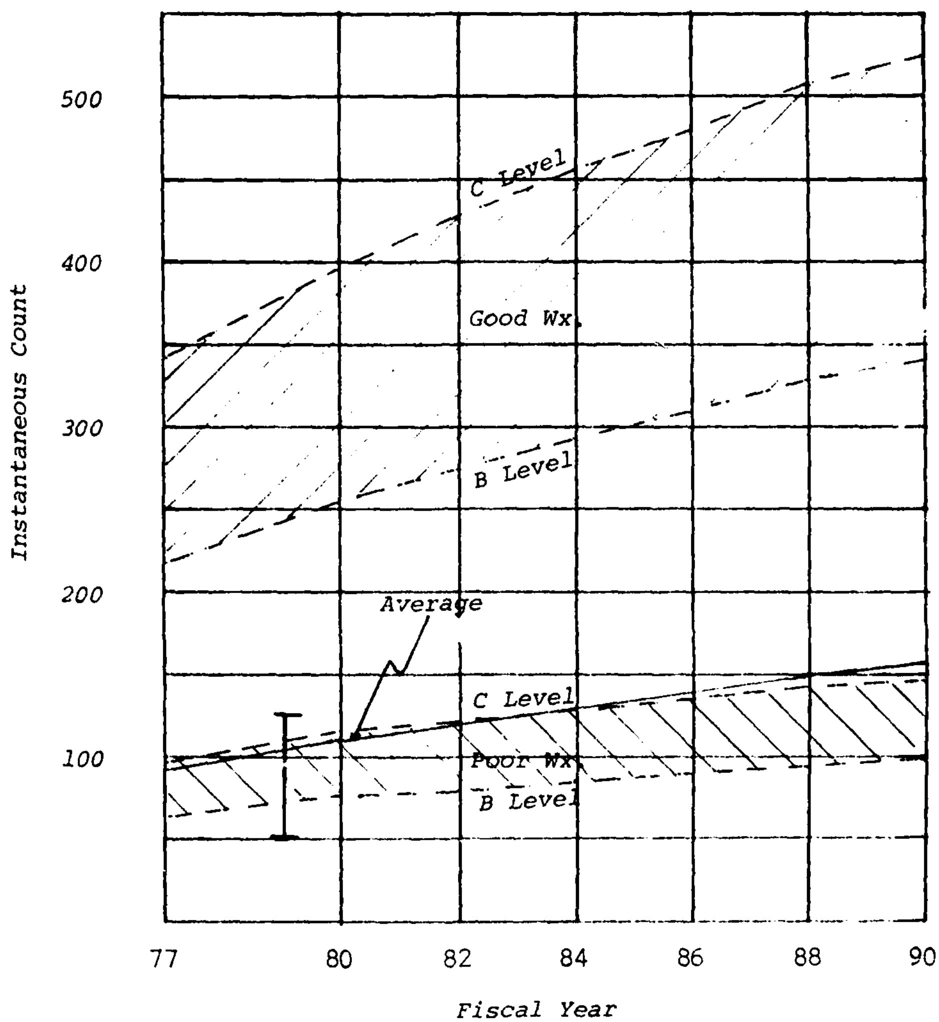
Estimated Peak Instantaneous Beacon Target Reports - LAX4




I *Range of 25 field samples*

EXHIBIT 3.1-10

Estimated Peak Instantaneous Beacon Target Reports - LAX7




*Range of 17 field samples*

EXHIBIT 3.1-11

Estimated Peak Instantaneous Beacon Target Reports - DTW

- For Chicago (ORD and CHI-S) the field data samples were all well above the estimated average IAC. The range of counts extended up to the lower of the good weather estimates.

- For Los Angeles (LAX4 and LAX7) the field counts were generally well above the estimated average IAC. The highest counts fall somewhat below the lower traffic level of the good weather estimates.

- For Detroit (DTW) the field data samples fluctuated about the estimated average IAC. About half of the 17 field samples were recorded during IFR weather conditions. For these cases, the measured counts generally agree with the poor weather estimates. The good weather samples, however, extend only somewhat above the estimated average IAC. This could be the result of underestimating the average radar shielding angle at DTW. (A $0^{0}$ shielding angle was estimated from an examination of DTW panoramics taken in 1975). The application of average shielding angles in the IAC estimation methodology has the effect of reducing the instantaneous count estimates.

Based on the above observations and considering the uncertainties as to whether the field data samples represent low, medium or high instantaneous counts for the year, there appears to be no reason to conclude that the estimated IACs are unreasonable.

## 3.2 PROCESSING REQUIREMENTS ANALYSIS

### 3.2.1 Introduction

The ARTS IIIA software functions have been described in Reference 1 as consisting of eight major areas:

- Multiprocessor Executive (MPE)
- SRAP Input Processing
- Tracking
- Display Output Processing
- Keyboard Input Processing
- Interfacility Flight Plan Processing
- MSAW
- Continuous Data Recording

The MPE provides overall control of the operational program by scheduling the processing of functional tasks. There are two types of tasks: planned tasks and popup tasks. Planned tasks are scheduled in accordance with rules of precedence of a list structure called a lattice. Popup tasks are scheduled independently of the lattice precedences for planned tasks. Popup tasks may be executed at random or periodic intervals. Random popup tasks typically are interrupt driven and are used for processing of functions with indeterminate schedules, such as output to peripherals. Periodic popups typically provide processing for external functions, such as keyboard input or SRAP input, which can be controlled by polling.

The SRAP Input processing accepts declared targets and passes them to tracking.

The tracking function performs a scan-to-scan correlation of the declared targets to provide aircraft position, ground speed and altitude for display output processing. The tracking function operates separately on the data from each sensor system. It has an automatic track start and acquisition feature for beacon and radar targets. It maintains track files on all declared tracks.

The display output function gathers data from the tracking function, keyboard input function, MSAW function, and the interfacility processing and prepares it for output to the displays through MDBMs.

The keyboard input processing function accepts data from the keyboards and performs the desired function.

Interfacility flight plan processing communicates with the ARTCC computer. This function accepts flight plan information and passes this data to the tracking and display output functions.

MSAW includes altitude tracking and general terrain and approach path warning logic.

The objective of the analysis of ARTS IIIA processing requirements is to quantify ARTS IIIA processor utilization as a function of system configuration, functional capability, lattice structure, and load factors imposed by the external environment.

The processing analysis has been separated for convenience into three areas:

- Analysis of the multiprocessor executive scheduler algorithms.
- Analysis of processing time durations for tasks running under control of the schedulers.
- Analysis of lattice structures for establishment of planned task precedences.

Scheduler algorithm models have been developed which result in the ability to predict sequences of task executions. The task sequences depend upon processing time durations for tasks running under the scheduler, and upon the priorities imposed on the tasks by the lattices in which they occur. Tasks are represented by equations for their processing times as functions of the instantaneous processing loads produced by the operating environment.

### 3.2.2 Task Models

#### 3.2.2.1 General

Task models are represented where feasible by equations of the form

$$T = K_0 + K_1F_1 + K_2F_2 + \ldots + K_nF_n$$

where: T is the processing time for the task

$F_n$ is the value of an environmental factor (e.g., number of target reports processed, or number of data blocks displayed)

$K_n$ is a constant.

In cases where the above form is not suitable, and in cases where the processing times have small means and small variances, task processing times are given as means and standard deviations.

The task equations were developed through an iterative process which included

- Analysis of ARTS IIIA design data.
- Development of a list of system load factors which have the potential of influencing task processing times.
- Development of a data extraction software package to support measurement of task processing times and potential load factors.
- Measurement of processing times and load parameters, using the New York TRACON and the ARTS IIIA system in the SSF at NAFEC.
- Analysis by linear regression of the measurement results in order to produce task equations.
- Critique of the regression results based on understanding of the system design.
- Refinement of equations for 1980 based on the critique.

- Modification of the 1980 equations to account for the impact of functions added in future years.

Data were also collected during this process to be used in characterizing processing time spent for overhead activities.

Analysis of the software design for each task module focused primarily on input and output parameters and the logical flow of the processing. Input and output parameters were analyzed in order to develop an initial list of candidate load factors for each task. Examination of the logical flow enabled judgments to be made as to which candidate factors appeared to have important influence on processing time and which did not. Evidence of major program loops and data base searches on large arrays were considered guides to judge the significance of data elements on process time. Computational details were not considered.

The result of the design analysis was a list of data elements to be counted along with task processing times while exercising the New York version of the program. Those data elements are shown in Table 3.2-1.

The list of tasks which were measured is shown in Table 3.2-2.

Three forms of output data were produced: statistical summaries of processing times; tabulations, for each lattice processed, of the quantities of data processed and of the task processing times; and histograms of the processing activities of each active processor.

For each run the statistical summary data show

- For each task
  - Number of measurements
  - Average time (mils)
  - Minimum time
  - Maximum time
  - Standard deviation
  - Variance

TABLE 3.2-1 DATA EXTRACTION PARAMETERS FOR PROCESSING LOAD MEASUREMENTS

| Task | Definition |
|---|---|
| ADB | Altitude data blocks |
| AT | Associated tracks requiring display change |
| ATB | Associated tracks with beacon codes |
| ATC | Associated tracks with mode C |
| ATD | Associated tracks with discrete beacon |
| ATH | Associated tracks in handoff |
| BOR | Beacon only reports |
| CCT | Number of changes to CTS threads |
| DTT | Deviation trial tracks |
| FD | Full data blocks requiring display change |
| LD | Limited data blocks requiring display change |
| MD | MSAW data blocks requiring display change |
| NAT | Number of assoc threads updated |
| NCS | Number of changes to sector threads |
| NDT | Number of tracks flagged for delay terminations |
| NM | Number of tracks in the MSAW tab list |
| NPC | Number of tracks in the coast/suspend list |
| NPS | Tracks in the store list |
| NT | Number of tracks, total |
| NTT | Tabular lines |
| ROR | Radar only reports |
| RRR | Radar reinforced beacon reports |
| SEC | Sector number of given sensor |
| SNS | Sensor number |
| SS | Single symbols requiring display update |
| TA | Associated tracks - total |
| TAA | Number of assoc threads added |
| TAD | Number of assoc tracks displayed |
| TAF | Number of assoc tracks requiring a FDB update |
| TL | Tabular lines requiring display update |
| TO | Number of threads added/delected |
| TSL | Number of tracks in the store list |
| TSS | Number of tracks requiring single symbol updates |
| TTT | Turning trail tracks |

TABLE 3.2-1 DATA EXTRACTION PARAMETERS FOR PROCESSING LOAD MEASUREMENTS (cont'd)

| Task | Definition |
|---|---|
| TU | Number of unassociated tracks, total |
| TUD | Unassociated tracks displayed |
| TUF | Number of unassociated tracks required FDB update |
| TUL | Unassociated linked tracks, total |
| TUU | Unassociated unlined tracks, total |
| UBR | Unused beacon reports |
| URR | Unused radar reports |
| UT | Unassociated tracks requiring display update |
| UTB | Unassociated tracks, beacon |
| UTC | Unassociated tracks, mode C |
| UTD | Unassociated tracks, discrete beacon |
| UTL | Unassociated tracks requiring LDB update |

TABLE 3.2-2 TASK DEFINITIONS FOR 1980 ARTS IIIA CONFIGURATIONS

| Task | Definition |
|---|---|
| ALTRK | Altitude tracker |
| AUT | Automatic offset of display data blocks |
| CDR | Continuous data recording |
| CDT | Console data terminal |
| CRIT | Critical data recording |
| CTIP | Console typewriter input processing |
| DOP | Display output processing |
| EDISC | Disk control |
| IFI | Interfacility input |
| IFO | Interfacility output |
| KOFA | Keyboard operational functions |
| MAT | Flight plan tab list data monitor |
| MSAW | Minimum safe altitude warning |
| MSP | Medium speed printer control |
| MTP | Magentic tape processing |
| PAUS | Track display data output control |
| PDOP | Periodic display output processing |
| PSRAP | SRAP input processing |
| RDOP | Remote display output processing |
| RKIP | Remote keyboard input processing |
| RTDOP | Remote tabular display output processing |
| SCTME | Scratch pad display monitor |
| SLINK | Inter-sensor track link |
| SWABS | Software adaption to beacon system |
| TCRSS | Track cross reference |
| TDOP | Tabular display output processing |
| TEDC | Track early discrete correlation |
| TEXEC | Tracking executive |
| TINIT | Track initialization |
| TPRED | Track prediction |
| TPSEC | Primary/secondary correlation |
| TPUR | Process unused reports |
| TROUT | Track output |
| TUDS | Sector thread update |
| TUD | Thread update |

- For each processor
  - Number of planned task measurements
  - Average, minimum, maximum, standard deviation and variance of process times (mils) for planned tasks
  - Number of popup task measurements
  - Average, minimum, maximum, standard deviation and variance of process times for popups
  - Percent of total processing time used for planned tasks popup tasks, dead time, inactive time, idle time and overhead.

Appendix K contains the statistical summaries of measurements taken at the New York TRACON and at NAFEC in the SSF.

Eight runs were taken at New York. Four methods of data input were used:

- Capacity scenario. Developed by UNIVAC, this scenario generates 500 targets, consisting of a mixture of radar and beacon targets, each moving in a small circle at 60 knots. The targets are spatially distributed more or less uniformly around the four New York sensors and have ranges great enough that there was little change in bearing from any sensor. Approximately 1200 tracks are generated from the targets, including associated and unassociated tracks.

- Modified capacity scenario. Capacity scenario modified by Sterling to cause targets to move in a constant direction ($90^o$) at a greater speed (150 knots) to force sector and track thread changes, track initiation, trial track generation, and variations in spatial distribution of tracks.

- Live data. Two samples were taken: one with all tracks unassociated, and one with some tracks manually associated.

- Sterling scenario. A scenario containing a small number of targets concentrated in a small volume of space, with some targets descending in altitude. This scenario allowed extreme variation in spatial distribution and produced a load for MSAW processing.

Table 3.2-3 lists these data sets Exhibit 3.2-1 shows the data format for measurement of processing loads and task times. Exhibit 3.2-2 illustrates the format for histograms of IOP processing.

### 3.2.2.2 Existing Functions

The statistical summaries were used to select tasks which accounted for major amounts of processing time. These tasks were subjected to analysis by linear regression in order to develop equations to represent their processing times. Tasks analysed by regression are listed in Table 3.2-4 along with the regression results.

The regression result for PAUS represents the cumulative time for seven logical copies of the task in one lattice execution. The expression 0.6 $(TAF)^2$ was ultimately eliminated from the PAUS model because no basis for it could be found in the design data and because its contribution to the total time is small. Discussions with UNIVAC personnel resulted in replacement of the constant term (45.7) with a function which is proportional to the CTS size.

The number of single symbols updated cannot be predicted directly. Estimation of the number of single symbol updates is based on the following assumptions:

- The number of single symbols updated on any display is equal to 0.25 (unassociated tracks) for the radar to which the display is associated.
- The total number of single symbols for any radar is the sum of the single symbols on all its displays.
- The number of single symbols updated during any lattice is proportional to the time duration of the previous lattice.

The equation for PAUS which results from this analysis is

$$\sum_{p=1}^{P} t(p) = 0.0381(CTS) + 0.425(t_L)(T1)$$

$$\text{where} \quad T(1) = \sum_{j=1}^{\#SNSR} \frac{1}{ts(j)} \sum_{k=1}^{32} \left[TU(j,k)\right] \left[\#Displays\ (j)\right]$$

TABLE 3.2-3 ARTS IIIA MEASUREMENT DATA TAKEN AT NY TRACON

| RUN # | DATE | SCENARIO | NOTES |
|---|---|---|---|
| 1 | 7/3/79 | Capacity | |
| 2 | 7/3/79 | Live | All Targets Unassociated |
| 3 | 7/3/79 | Live | Some Associated Targets |
| 5 | 7/4/79 | Modified Capacity | All Tracks Unassociated<br>No Keyboard Entries |
| 6 | 7/4/79 | Modified Capacity | Some Associated Tracks<br>Keyboard Entries Enabled |
| 7 | 7/5/79 | Modified Capacity | |
| 8 | 7/4/79 | Sterling Scenario | |

## EXHIBIT 3.2-1 DATA FORMAT FOR MEASUREMENT OF PROCESSING LOADS AND TASK TIMES

```
0 15 38.124
 1-2-ALTRK    3-2-ALTRK    3-1-ALTRK    3-0-ALTRK    1---ADO      2---CDRC     1---CRIT1    17---DOP     1---IFI      7---IFO
 4---KOFA     1---MAT      1-3-MSAW     4-2-MSAW     2-1-MSAW     2-0-MSAW     1---MT1      36---PAUS    20---PAUS    1---PAUS
34---PAUS1   12---PAUS1   32---PAUS2    1---PAUS2   21---PDOP    16---RDOP     5---RKIP     2---RTDOP    1---SCTME    0---SCTME
 1---SCTME    1---SLINK    1-3-SWARS    1-2-SWARS    1-1-SWARS    1-0-SWARS    2-3-TCRSS    0-2-TCRSS    3-1-TCRSS   21-0-TCRSS
 4---TDOP     3---TDOP     5---TDOP     3---TDOP1    3---TDOP1    2-3-TEDC     2-2-TEDC     5-1-TEDC     4-0-TEDC     3---TEXEC
 2-2-TINIT    4-1-TINIT    8-2-TINT1    6-0-TINT1    1-3-TPRED   14-2-TPRED    9-1-TPRED   12-1-TPRED    8-3-TPSEC   18-2-TPSEC
 1-1-TPSEC   14-0-TPSEC   41-2-TPUR    26-2-TPUR     5-1-TPUR    50-1-TPUR     2-3-TROUT    3-1-TROUT    3-2-TROUT    3-0-TROUT
16---TUP     13---TUPS
47-KIP       17-ESRAP      31-KIP
*SNS SEC TA  ATR ATP ATC ATH TU  UTR UTD UTC DTT TTT SOR ROR RRR URR UAR NT  NDT TAA TO  NCS
  0  27  0    0   0   0   0   8   8   4   5   0   0  10   2   6   0   8   0   0   0   4   0
  1   7  0    0   0   0   0   6   6   3   4   0   0   1   1   0   0   1   0   1   0   0   1
  2  25  2    2   1   1   0   7   7   4   3   0   0   5   1   4   0   3   0   0   0   0   0
  3   4  0    0   0   0   0   0   0   0   0   0   0  13   7   0   0  20   0   0   0   4   2
  2-TAD   1-TUF   14-TUU   53-SS   0-ADR   0-UTL   2-TAF   0-MD   0-NPC   0-NPS   0-NTT

0 15 38.188
 5-2-ALTRK    1---ALTRK    1---ALTRK    1---ALTRK    1---ADO      1---CDRC     1---CRIT1    14---DOP     0---IFI      7---IFO
 4---KOFA     1---MAT      2-2-MSAW     1---MSAW     1---MSAW     1---MSAW     2---MT1      10---PAUS    9---PAUS     1---PAUS
10---PAUS1    7---PAUS1   11---PAUS2    5---PAUS2    2---PDOP    15---RDOP     9---RKIP     2---RTDOP    1---SCTME    1---SCTME
 1---SCTME    2---SLINK    1-3-SWARS    1-2-SWARS    1-1-SWARS    1-0-SWARS   14-2-TCRSS    1---TCRSS    1---TCRSS    1---TCRSS
 5---TDOP     2---TDOP     4---TDOP     5---TDOP1    4---TDOP1    5-2-TEDC     1---TEDC     1---TEDC     1---TEDC     3---TEXEC
15-2-TINIT    1---TINIT    1---TINT1    1---TINT1   10-2-TPRED    1---TPRED    1---TPRED    5---TPRED   11-2-TPSEC    1---TPSEC
 1---TPSEC    1---TPSEC   24-2-TPUR     1---TPUR     1---TPUR     1---TPUR     2-2-TROUT    1---TROUT    1---TROUT    4---TROUT
14---TUP     16---TUPS
22-PSRAP      2-EDISC      43-KIP        5-EDISC       4-COT
*SNS SEC TA  ATP ATD ATC ATH TU  UTR UTD UTC DTT TTT RCR ROR RRP URR UBR NT  NDT TAA TO  NCS
  2  25  1    0   0   0   0   6   4   2   3   0   0   6   2   2   0   4   0   0   0   2   1
  0-TAD   1-TUF   4-TUU   5-SS   0-ADR   0-UTL   0-TAF   0-MD   0-NPC   0-NPS   0-NTT

0 15 38.264
 1-2-ALTRK    4-1-ALTRK    4-0-ALTRK    1---ALTRK    1---ADO      2---CDRC     2---CRIT1    11---DOP     1---IFI      8---IFO
 4---KOFA     2---MAT      1-2-MSAW     2-1-MSAW     1-0-MSAW     1---MSAW     1---MT1      28---PAUS    19---PAUS    2---PAUS
23---PAUS1   22---PAUS1   21---PAUS2    2---PAUS2    2---PDOP    17---RDOP     5---RKIP     3---RTDOP    2---SCTME    1---SCTME
```

## EXHIBIT 3.2-2 FORMAT FOR HISTOGRAMS

6/ 7/79 PAGE 1

| EVENT RESOLUTION TIME | LATENCY CYCLE | P0 | CYCLE | P1 | CYCLE | P2 | CYCLE | P3 | CYCLE | P4 | CYCLE | P5 | CYCLE | P6 | CYCLE | P7 | CYCLE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-10:39.522 | STRT LATU ? | *TUN | ? | | | | | | | | | | | | | | |
| | | TUN | ? | *TEVEC | ? | | | | | | | | | | | | |
| .523 | | ***OVHD*** | | TEVEC | ? | *ISDS | ? | *RHIP | ? | | | | | | | | |
| | | ***OVHD*** | | TEXEC | ? | ISDS | ? | RHIP | ? | | | | | | | | |
| .524 | | *CRIT1 | ? | ***OVHD*** | | ***OVHD*** | | ***OVHD*** | | | | | | | | | |
| | | CRIT1 | ? | ***OVHD*** | | ***OVHD*** | | ***OVHD*** | | | | | | | | | |
| .525 | | CRIT1 | ? | ***OVHD*** | | ***OVHD*** | | ***OVHD*** | | | | | | | | | |
| | | CRIT1 | ? | ***OVHD*** | | ***OVHD*** | | ***OVHD*** | | | | | | | | | |
| .5255 | | CRIT1 | ? | ***OVHD*** | | *TEQ | ? | ***OVHD*** | | | | | | | | | |
| | | CRIT1 | ? | ***OVHD*** | | TEQ | ? | ***OVHD*** | | | | | | | | | |
| .526 | | ***OVHD*** | | ***OVHD*** | | TEQ | ? | *RDOF | ? | | | | | | | | |
| | | ***OVHD*** | | ***OVHD*** | | TEQ | ? | RDOF | ? | | | | | | | | |
| .527 | | *TINIT | ? | ***OVHD*** | | ***OVHD*** | | ***OVHD*** | | | | | | | | | |
| | | TINIT | ? | ***OVHD*** | | ***OVHD*** | | ***OVHD*** | | | | | | | | | |
| .528 | | ***OVHD*** | | ***OVHD*** | | *TINIT | ? | *TROUT | ? | | | | | | | | |
| | | ***OVHD*** | | ***OVHD*** | | TINIT | ? | TROUT | ? | | | | | | | | |
| .529 | | *TROUT | ? | *TINIT | ? | ***OVHD*** | | ***OVHD*** | | | | | | | | | |
| | | TROUT | ? | TINIT | ? | ***OVHD*** | | ***OVHD*** | | | | | | | | | |
| .530 | | ***OVHD*** | | ***OVHD*** | | *TROUT | ? | *TINIT | ? | | | | | | | | |
| | | ***OVHD*** | | ***OVHD*** | | TROUT | ? | TINIT | ? | | | | | | | | |
| .531 | | *DOP | ? | *TROUT | ? | *MAT | ? | ***OVHD*** | | | | | | | | | |
| | | DOP | ? | ***OVHD*** | | MAT | ? | ***OVHD*** | | | | | | | | | |
| .532 | | DOP | ? | *PDOP | ? | MAT | ? | *CDPC | ? | | | | | | | | |
| | | DOP | ? | PDOP | ? | MAT | ? | CDPC | ? | | | | | | | | |
| .533 | | ***OVHD*** | | ***OVHD*** | | ***OVHD*** | | ***OVHD*** | | | | | | | | | |
| | | ***OVHD*** | | ***OVHD*** | | ***OVHD*** | | ***OVHD*** | | | | | | | | | |
| .534 | | *ADU | ? | *MTI | ? | *SLTNM | ? | *TESLC | ? | | | | | | | | |
| | | ADU | ? | MTI | ? | SLTNM | ? | TESLC | ? | | | | | | | | |
| .535 | | *TCROSS | ? | *NOFA | ? | SLTNM | ? | ***OVHD*** | | | | | | | | | |
| | | TCROSS | ? | NOFA | ? | SLTNM | ? | ***OVHD*** | | | | | | | | | |
| .536 | | ***OVHD*** | | NOFA | ? | *TEPED | ? | *TCDC | ? | | | | | | | | |
| | | ***OVHD*** | | NOFA | ? | TEPED | ? | TCDC | ? | | | | | | | | |
| .537 | | *TPUR | ? | NOFA | ? | ***OVHD*** | | *ALTRK | ? | | | | | | | | |
| | | TPUR | ? | NOFA | ? | ***OVHD*** | | ALTRK | ? | | | | | | | | |
| .538 | | *SWARS | ? | NOFA | ? | *MSAM | ? | ***OVHD*** | | | | | | | | | |
| | | SWARS | ? | NOFA | ? | MSAM | ? | ***OVHD*** | | | | | | | | | |
| .539 | | ***OVHD*** | | ***OVHD*** | | *TET | ? | *TESEE | ? | | | | | | | | |
| | | ***OVHD*** | | ***OVHD*** | | TET | ? | TESEE | ? | | | | | | | | |
| .540 | | *TCROSS | ? | *TCDC | ? | TET | ? | *TEPED | ? | | | | | | | | |
| | | TCROSS | ? | TCDC | ? | TET | ? | TEPED | ? | | | | | | | | |
| .541 | | *TDOP | ? | ***OVHD*** | | ***OVHD*** | | TEPED | ? | | | | | | | | |
| | | TDOP | ? | ***OVHD*** | | ***OVHD*** | | TEPED | ? | | | | | | | | |
| .542 | | TDOP | ? | *RTDOP | ? | *TDOP1 | ? | TPCLD | ? | | | | | | | | |
| | | TDOP | ? | RTDOP | ? | TDOP1 | ? | TPPED | ? | | | | | | | | |
| .543 | | TDOP | ? | RTDOP | ? | TDOP1 | ? | *TDOP | ? | | | | | | | | |
| | | TDOP | ? | RTDOP | ? | TDOP1 | ? | TDOP | ? | | | | | | | | |
| .544 | | *TDOP1 | ? | ***OVHD*** | | ***OVHD*** | | TDOP | ? | | | | | | | | |
| | | TDOP1 | ? | ***OVHD*** | | ***OVHD*** | | TDOP | ? | | | | | | | | |
| .545 | | TDOP1 | ? | *TDOP | ? | *TFUR | ? | TDOP | ? | | | | | | | | |
| | | TDOP1 | ? | TDOP | ? | TFUR | ? | TDOP | ? | | | | | | | | |
| .546 | | TDOP1 | ? | TDOP | ? | *ALTRK | ? | ***OVHD*** | | | | | | | | | |
| | | TDOP1 | ? | TDOP | ? | ALTRK | ? | ***OVHD*** | | | | | | | | | |

TABLE 3.2-4 REGRESSION ANALYSIS RESULTS

| | |
|---|---|
| PAUS | $t = 45.7 + 0.6(TAF)^2 + 1.7(SS)$ [total time for all copies of PAUS] |
| SLINK | $\bar{t} = 8.2 \quad \sigma = 2.7$ |
| TCRSS | $t = 3.7 + TU + 0.2(TA)^2$ |
| TEDC | $t = 1.7 + 0.55(ATD + UTD) + 0.2(TA)(TU)$ |
| TPRED | $t = 3.1 + 1.3(TA + TU)$ |
| TPSEC | $t = 7.8 + 0.5(TU) + 0.2(TA)(TU)$ |
| TPUR | $\bar{t} = 11.9 \quad \sigma = 10.9$ |
| TUDS | $\bar{t} = 7.9 \quad \sigma = 6.9$ |
| TUD | $\bar{t} = 4.5 \quad \sigma = 5.9$ |

TU = unassociated tracks
j = sensor ID
k = sector ID
$t_L$ = execution time of previous lattice
$t_S$ = sensor scan time.

No basis could be found in the system design for the term $0.2(TA)^2$ in the equation for TCRSS. This term also appears to have only a small influence on the process time for TCRSS since the number of associated tracks is normally small compared to the number of unassociated tracks. The term was, therefore, eliminated from the TCRSS equation.

The same reasoning led to the elimination of the term 0.2(TA)(TU) from the equation for TPSEC.

No correlation was found between the processing times for SLINK, TPUR, TUDS or TUD and the processing load. The mean and standard deviations were taken as the final models for SLINK and TPUR.

Discussions with UNIVAC personnel, however, led to the assumption that the times for TUDS and TUD are proportional to the CTS size. The final models for these tasks then became

For TUDS

$$t = 0.0066(CTS)$$

For TUD

$$t = 0.0038(CTS)$$

Small means and small variances were indicated by the statistical summaries for the tasks ALTRK, AUT, CDR, CRIT, DOP, MAT, MSAW, MTP, PDOP, RKIP, RTDOP, SCTME, SWABS, TEXEC, TINIT and TROUT. It was decided that tasks with short, nearly constant processing times could be adequately modeled by their mean times and standard deviations. Therefore, to save effort, no regression analysis was performed on the measurement results for these tasks.

For some of these tasks, however, analysis of the software design led to the conclusion that the processing times depended on hardware configuration parameters which did not vary during the measurement runs. In those cases, the process time models were adjusted to reflect the dependence:

- DOP $t = 1.4(\#MDBMs)$
- PDOP $t = 0.6(\#MDBMs)$
- RDOP $t = 2.4(\#RDBMs)$
- RKIP $t = 1.3(\#RDBMs)$
- RTDOP $t = 0.6(\#RDBMs)$
- TDOP $\sum_{t=1}^{I} t(i) = 2.9(\#MDBMs)$ (I = #executions/lattice)
- TEXEC $t = 0.5(\#sensors)$

There was insufficient information to develop potential load factors for the tasks IFI, IFO, KOFA, CDT, CTIP, PSRAP and MSP. These tasks, except for IFI, were then modeled by their mean times and standard deviations. IFI was estimated to have a means time of 5 mils.

The above analysis led to the processing time models for the year 1980 shown in Table 3.2-5 as processing times for each execution of the tasks.

All planned tasks are initiated in every lattice. Some of them, however, may be initiated under circumstances in which there is no load to be processed. In these circumstances, the tasks bypass their normal logical flow and exit quickly. Tasks of this type include most tracking tasks, as well as PDOP and MAT. Models for these times are shown in Table 3.2-5 under the column "Process Time (Mils) When Initiated But Not Executed".

Statistics for overhead processing are also included in Table 3.2-5. They were obtained by use of the overhead times indicated in the processor utilization histograms.

TABLE 3.2-5 PROCESSOR UTILIZATION MODELS (1980)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| ALTRK | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 2.6 \quad \sigma = 0.4$ | $\bar{t} = 1.3 \quad \sigma = .325$ |
| AUT | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.5$ | |
| CDR | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.0$ | |
| CRIT | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.0$ | |
| DOP | 1/Lattice | 1/Lattice | t = 1.4(#MDBMs) | |
| IFI | 1/Lattice | 1/Lattice | $\bar{t} = 5.0 \quad \sigma = 0.0$ | |
| IFO | 1/Lattice | 1/Lattice | $\bar{t} = 8.3 \quad \sigma = 1.6$ | |
| KOFA | 1/Lattice | 1/Lattice | $\bar{t} = 5.4 \quad \sigma = 4.3$ | |
| MAT | 1/60 Seconds | 1/Lattice | t = 0.001(CTS Capacity) ($t_{MAX} = 32$) | $\bar{t} = 1.25 \quad \sigma = 0.452$ |
| MSAW | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 1.8 \quad \sigma = 1.0$ | $\bar{t} = 1.8 \quad \sigma = 1.0$ |
| MTP | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.0$ | |
| PAUS | P/Lattice (P=#Processors) | P/Lattice | $\sum_{p=1}^{P} t(p) = 0.0381\,(CTS) + 0.425(t_L)(TI)$ <br> $TI = \sum_{j=1}^{\#Snsr} \frac{1}{\bar{t}_s(j)} \sum_{k=1}^{32} \left[TU(j,k)\right]\left[\#Displays\,(j)\right]$ <br> TU = Unassociated Tracks <br> j = Snsr ID <br> k = Sector ID <br> $t_L$ = Execution Time of Previous Lattice <br> $t_s$ = Sensor Scan Time | |

TABLE 3.2-5 PROCESSOR UTILIZATION MODELS (1980) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| PDOP | 4/Second | 1/Lattice | t = 0.6(#MDBMs) | $\bar{t}$ = 1.7 σ = 1.3 |
| RDOP | 1/Lattice at Sites with RDBMs | 1/Lattice at Sites with RDBMs | t = 2.4(#RDBMs) | |
| RKIP | 1/Lattice at Sites with RDBMs | 1/Lattice at Sites with RDBMs | t = 1.3(#RDBMs) | |
| RTDOP | 1/Lattice at Sites with RDBMs | 1/Lattice at Sites with RDBMs | t = 0.6(#RDBMs) | |
| SCTME | Detroit: 1/Lat<br>NY, CHI, LA: 3/Lat | Detroit: 1/Lat<br>NY, CHI, LA: 3/Lat | $\sum_{i=1}^{I} t(i) = 0.0011$(CTS Capacity)<br>I = #Executions/Lattice | |
| SLINK | 1/Lattice at Multisnsr Site | 1/Lattice at Multisnsr Site | $\bar{t}$ = 8.2 σ = 2.7 ($t_{MAX}$ = 80) | |
| SWABS | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t}$ = 1.0 σ = 0.0 ($t_{MAX}$ = 64) | $\bar{t}$ = 1.0 |
| TCRSS | 1/Sector/Snsr | 1/Lattice/Snsr | t = 3.7 + TU ($t_{MAX}$ = 90)<br>TU = #Unassociated Tracks in Sector Processed | $\bar{t}$ = 3.1 σ = 1.3 |
| TDOP | NY: 5/Lattice<br>CHI:3/Lattice<br>LA: 2/Lattice<br>DET:1/Lattice | NY: 5/Lattice<br>CHI:3/Lattice<br>LA: 2/Lattice<br>DET:1/Lattice | $\sum_{i=1}^{I} t(i)$ = 2.9(#MDBMs)<br>I = #Executions/Lattice | |
| TEDC | 1/Sector/Snsr | 1/Lattice/Snsr | t = 1.7 + 0.55(ATD+UTD) + 0.2(TA)(TU)<br>($t_{MAX}$ = 60)<br>ATD = #Discrete Associated Tracks<br>UTD = #Discrete Unassociated Tracks | $\bar{t}$ = 3.5 σ = 2.5 |

TABLE 3.2-5 PROCESSOR UTILIZATION MODELS (1980) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| TEXEC | 1/Lattice | 1/Lattice | $t = 0.5(\#SNSRs)$ | |
| TINIT | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 4.0$ $\sigma = 4.1$ $(t_{MAX} = 200)$ | $\bar{t} = 3.2$ $\sigma = 1.9$ |
| TPRED | 1/Sector/Snsr | 1/Lattice/Snsr | $t = 3.1 + 1.3(TA+TU)$<br>TA = #Associated Tracks in Sector Processed | $\bar{t} = 3.3$ $\sigma = 1.8$ |
| TPSEC | 1/Sector/Snsr | 1/Lattice/Snsr | $t = 7.8 + 0.5(TU)$ | $\bar{t} = 3.4$ $\sigma = 1.8$ |
| TPUR | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 11.9$ $\sigma = 10.9$ $(t_{MAX} = 90)$ | $\bar{t} = 3.2$ $\sigma = 1.9$ |
| TROUT | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 3.3$ $\sigma = 1.7$ | $\bar{t} = 2.9$ $\sigma = 1.9$ |
| TUDS | 1/Lattice | 1/Lattice | $t = 0.0066(CTS\ Capacity)$ | |
| TUD | 1/Lattice | 1/Lattice | $t = 0.0038(CTS\ Capacity)$ | |
| CDT | Prd = 1.3 Sec<br>$\sigma$ = 0.79 Sec | Random Popup | $\bar{t} = 3.6$ $\sigma = 1.7$ | |
| CTIP | Prd=0.049 Sec | Periodic Popup | $\bar{t} = 1.8$ $\sigma = 0.6$ | |
| EDISC | Prd=48.1 Mils<br>$\sigma$ = 35.8 Mils | Random Popup | $t = 0.0025(CTS\ Capacity)$ | |
| IFI | Prd=19.2 Sec<br>$\sigma$ = 4.7 Sec | Random Popup | $\bar{t} = 1.0$ $\sigma = 0.0$ | |
| KIP | Prd=64.9 Mils | Periodic Popup | $t = 0.98(\#DBMs)$ | |
| PSRAP | Prd=70.7 Mils | Periodic Popup | $\bar{t} = 19.5$ $\sigma = 8.0$ (4 Snsr Sites)<br>$\bar{t} = 9.8$ $\sigma = 5.7$ (2 Snsr Sites)<br>$\bar{t} = 4.9$ $\sigma = 4.0$ (1 Snsr Sites) | |
| MSP | Prd=48.6 Mils<br>$\sigma$ = 26.4 Mils | Random Popup | $\bar{t} = 4.0$ $\sigma = 2.6$ | |

TABLE 3.2-5 PROCESSOR UTILIZATION MODELS (1980) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| Overhead for Task Initiation | Before Each Task | | $\bar{t} = 0.33 \quad \sigma = 0.5$ | |
| Lattice | | | $t_{TIMEOUT} = \begin{cases} 130 \text{ if Prcsng on Schedule} \\ 110 \text{ if 1 Sector Late} \\ 85 \text{ if 2 Sectors Late} \\ 60 \text{ if 3 Sectors Late} \\ 35 \text{ if 4 Sectors Late} \end{cases}$ Lattice Execution Time is Compared to Timeout Value and Lattice is Terminated Only During Task PAUS. | |

Task models for future years are described in Appendix L and are discussed in Section 3.2.2.3.

There was some concern about the possibility that the task processing times may be significantly influenced by a change in the number of processors. To resolve this issue, a set of measurements was conducted at the SSF. These measurements were conducted with the following combinations of processors and displays using the modified capacity scenario:

| #IOPs | #Displays |
|---|---|
| 7 | 46 |
| 7 | 38 |
| 7 | 32 |
| 7 | 20 |
| 5 | 46 |
| 5 | 20 |

The number of processors was changed from seven to five by reconfiguring the system to place two IOPs off line.

The actual number of physically connected displays did not vary, since only a small number of displays (5) was connected. The display variation for the experiment was affected by modification of the list of logical displays in the ARTS IIIA data base, causing PAUS to process output data only for those displays on the list.

Arguments for the possibility of processing time changes resulting from variations in the number of processors are based on the proposition that contention for access to memory locations causes increases in processing times as the number of processors increases. If this proposition is true, then processing times for measurements using seven processors can be expected to be greater than for processing times with five processors, with the number of displays held constant.

Tables 3.2-6 and 3.2-7 show the mean times and standard deviations, respectively, for each task for each combination of processors and displays. Although these data do not provide a complete and accurate indication of the effects of memory contention, there appears to be no tendancy for processing times to be overwhelmingly affected by the number of processors. (Note that the model development process effectively built memory contention into the task equations, since measurements were performed on a 7 active IOPs by 14 active MMs system.)

The CDR function was modified during the measurements to allow recording of process times and other parameters related to the tests onto the system disk. The magnitude of the influence of normal CDR on the task processing times cannot be determined since modification of CDR is essential for the system measurements. However, timing measurements conducted by UNIVAC on the Tampa processing system indicate that the processing times for several important tasks may be influenced by the execution of CDR. The following data represent percent of an IOP used for processing some tasks at Tampa with four active IOPs and a 480 track scenario.

| | % of an IOP | |
|---|---|---|
| Task | Without CDR | With CDR |
| PSRAP | .68 | 3.28 |
| KIP | 14.41 | 17.00 |
| TPRED | 14.69 | 20.21 |
| ALTRKR | 4.06 | 7.55 |
| MTG | 1.86 | 5.84 |

Changes in processing times for other tasks were small - generally in the range of ± 1 percent of an IOP. The combined effect for all tasks was an increase of 10 percent of an IOP when CDR was processed.

TABLE 3.2-6 MEAN TASK PROCESSING TIMES WITH VARIATIONS IN THE NUMBER OF PROCESSORS AND DISPLAYS

| IOPs | 7 | | | | 5 | |
|---|---|---|---|---|---|---|
| Displays | 46 | 38 | 32 | 20 | 46 | 20 |
| ALTRK | 2 | 2 | 2 | 2 | 2 | 2 |
| AUT | 1 | 1 | 1 | 1 | 1 | 1 |
| CDR | 1 | 1 | 1 | 1 | 1 | 1 |
| CRIT | 3 | 3 | 3 | 2 | 3 | 2 |
| DOP | 4 | 4 | 4 | 3 | 4 | 2 |
| IFI | 1 | 1 | 1 | 1 | 1 | 1 |
| IFO | 8 | 8 | 9 | 9 | 8 | 8 |
| KOFA | 8 | 7 | 4 | 4 | 7 | 4 |
| MAT | 3 | 3 | 1 | 1 | 2 | 1 |
| MSAW | 2 | 2 | 2 | 2 | 2 | 1 |
| MTP | 1 | 1 | 1 | 1 | 1 | 1 |
| PAUS | 19 | 17 | 17 | 11 | 21 | 12 |
| PAUS 1 | 22 | 20 | 20 | 13 | 27 | 14 |
| PAUS 2 | 20 | 18 | 18 | 12 | 17 | 10 |
| PDOP | 4 | 3 | 4 | 2 | 4 | 3 |
| RDOP | 12 | 12 | 11 | 10 | 13 | 12 |
| RKIP | 4 | 4 | 4 | 4 | 4 | 3 |
| RTDOP | 4 | 5 | 5 | 4 | 4 | 4 |
| SCTME | 1 | 1 | 1 | 1 | 1 | 1 |
| SLINK | 8 | 9 | 8 | 8 | 9 | 8 |
| SWABS | 1 | 1 | 1 | 1 | 1 | 1 |
| TCRSS | 6 | 6 | 6 | 5 | 8 | 6 |
| TDOP | 7 | 8 | 8 | 7 | 7 | 7 |
| TDOP 1 | 7 | 8 | 8 | 7 | 7 | 7 |
| TEDC | 10 | 10 | 9 | 8 | 13 | 10 |
| TEXEC | 2 | 2 | 2 | 2 | 2 | 2 |
| TINIT | 4 | 4 | 4 | 3 | 4 | 3 |
| TINIT 1 | 3 | 3 | 2 | 2 | 3 | 2 |
| TPRED | 8 | 8 | 7 | 7 | 10 | 7 |
| TPSEC | 6 | 6 | 5 | 5 | 7 | 6 |
| TPUR | 2 | 2 | 2 | 2 | 3 | 2 |
| TROUT | 3 | 3 | 3 | 3 | 3 | 3 |
| TROU 1 | 2 | 2 | 2 | 2 | 3 | 2 |
| TUDS | 7 | 7 | 6 | 5 | 8 | 6 |
| TUD | 4 | 3 | 3 | 1 | 3 | 2 |
| CDT | 6 | 6 | 2 | 2 | 6 | 5 |
| CTIP | 2 | 1 | 1 | 2 | 1 | 1 |
| EDISC | 4 | 4 | 4 | 4 | 4 | 4 |
| KIP | 13 | 11 | 13 | 10 | 12 | 10 |
| MSP | 0 | 0 | 3 | 3 | 0 | 0 |
| PSRAP | 8 | 7 | 7 | 7 | 8 | 6 |

TABLE 3.2-7 STANDARD DEVIATIONS OF TASK PROCESSING TIMES WITH VARIATIONS IN THE NUMBER OF PROCESSORS AND DISPLAYS

| IOPs | 7 | | | | 5 | |
|---|---|---|---|---|---|---|
| Displays | 46 | 38 | 32 | 20 | 46 | 20 |
| ALTRK | 1 | 1 | 1 | 1 | 1 | 1 |
| AUT | 0 | 0 | 0 | 0 | 0 | 0 |
| CDR | 0 | 1 | 0 | 0 | 0 | 0 |
| CRIT | 9 | 10 | 10 | 8 | 11 | 10 |
| DOP | 1 | 1 | 2 | 2 | 1 | 0 |
| IFI | 0 | 0 | 0 | 0 | 0 | 0 |
| IFO | 2 | 2 | 2 | 1 | 2 | 2 |
| KOFA | 13 | 12 | 0 | 1 | 10 | 0 |
| MAT | 6 | 6 | 2 | 1 | 3 | 2 |
| MSAW | 1 | 1 | 1 | 1 | 1 | 1 |
| MTP | 0 | 0 | 0 | 0 | 0 | 0 |
| PAUS | 13 | 10 | 12 | 6 | 18 | 11 |
| PAUS 1 | 12 | 9 | 12 | 5 | 15 | 10 |
| PAUS 2 | 11 | 8 | 12 | 5 | 18 | 10 |
| PDOP | 4 | 3 | 4 | 2 | 4 | 2 |
| RDOP | 3 | 3 | 3 | 4 | 1 | 2 |
| RKIP | 1 | 1 | 1 | 0 | 0 | 0 |
| RTDOP | 1 | 1 | 1 | 1 | 1 | 1 |
| SCTME | 1 | 2 | 2 | 2 | 2 | 1 |
| SLINK | 4 | 5 | 3 | 4 | 5 | 4 |
| SWABS | 0 | 0 | 0 | 0 | 0 | 0 |
| TCRSS | 7 | 7 | 6 | 6 | 7 | 6 |
| TDOP | 1 | 2 | 1 | 1 | 1 | 1 |
| TDOP 1 | 1 | 2 | 1 | 1 | 1 | 1 |
| TEDC | 13 | 13 | 13 | 12 | 14 | 13 |
| TEXEC | 1 | 1 | 1 | 1 | 1 | 1 |
| TINIT | 5 | 4 | 4 | 3 | 5 | 3 |
| TINIT 1 | 3 | 3 | 3 | 3 | 4 | 3 |
| TPRED | 8 | 8 | 8 | 8 | 7 | 7 |
| TPSEC | 5 | 5 | 5 | 5 | 5 | 5 |
| TPUR | 4 | 4 | 4 | 4 | 4 | 4 |
| TROUT | 1 | 1 | 1 | 2 | 1 | 1 |
| TROU1 | 1 | 1 | 1 | 1 | 1 | 1 |
| TUDS | 6 | 6 | 5 | 5 | 6 | 5 |
| TUD | 5 | 4 | 3 | 3 | 4 | 3 |
| CDT | 1 | 1 | 0 | 0 | 1 | 1 |
| CTIP | 0 | 0 | 0 | 0 | 0 | 0 |
| EDISC | 5 | 5 | 5 | 5 | 5 | 5 |
| KIP | 2 | 2 | 3 | 2 | 1 | 1 |
| MSP | 0 | 0 | 1 | 1 | 0 | 0 |
| PSRAP | 4 | 3 | 3 | 3 | 5 | 3 |

The above results cannot be used to quantify the impact of CDR on processing times estimated in the current study. However, they do imply a possible increase in processing times of some tasks when CDR is executed.

### 3.2.2.3 Future Functions Impact

This section presents a set of assumptions which constitute the bases for estimation of the impact on ARTS IIIA processing requirements of the future implementation of the following systems:

- Terminal Conflict Alert (Stage A)
- Terminal Metering and Spacing
- ARTS/DABS integration
- ARTS/TIPS interface
- Tower Automated Ground Surveillance
- Full Digital ARTS Display
- Tower Cab Digital Display.

The sources of information on which these assumptions and estimates are based are sparse. Therefore, the estimates are very approximate and should only be interpreted as providing insight into the order of magnitude of ARTS resource requirements.

#### 3.2.2.3.1 Terminal Conflict Alert (CA)

It is assumed for this study that the CA function will be implemented at all sites in 1982 to provide service for controlled aircraft which are beacon equipped and reporting Mode C.

Various time estimates are available from studies conducted by MITRE and UNIVAC [28, 29, 30] at single and dual beacon sites. Although the quantitative results vary widely because of differing assumptions concerning aircraft densities and overhead processing, the equations used for estimation are all of the form

$$t = AN^2 + BN + C$$

where N is the number of aircraft eligible for CA processing, and A depends strongly on aircraft density. The method of estimation used in this study follows a similar approach.

As a result of discussions with UNIVAC, the CA function is assumed to be processed in the following planned tasks.

- TUDX - A single task which performs thread update. This task is parallel to TUDS and TUD in the lattice structure, is similar to themin operation and executes each lattice. Discussions with UNIVAC led to the conclusion that the timing for TUDX will likely be similar to that of TUDS. As a result, the timing model for TUDS was also adopted for TUDX.

- CA - One logical copy per sensor will provide conflict detection. All copies are successors to TEXEC, TUDS and TUDX in the planned lattice. Each copy executes once per sector for its assigned sensor. The timing model for this task is assumed, as a result of discussions with UNIVAC, to be of the form $t = AN^2 + BN$.

- CATRK - One logical copy per sensor will perform CA tracking. Each copy is a successor to one copy of the CA task. UNIVAC estimates 2 mils per track for processing time.

- CATU - A single task which acts as a data base manager. This task is executed after all copies of CA which are eligible to execute because of sector advances. UNIVAC estimates a mean processing time of 2 mils per execution.

Following the above analysis, the processing times for CA tasks are estimated to be described by

| Task | Process Time Model |
|---|---|
| TUDX | $t = 0.0066(CTS)$ |
| CA | $t(j) = 0.0015 \left[\sum_{k=1}^{32} CTA(j,k)\right]^2 + 0.084 \sum_{k=1}^{32} CTA(j,k)$ |
| | j = sensor ID |
| | k = sector ID |
| | CTA = #associated tracks of Mode C beacon equipped aircraft plus unassociated linked tracks |
| CATRK | $t(j) = 2\,[CTA(j,k)]$ |
| CATU | $\overline{t} = 2$ |

3.2.2.3.2 Terminal Metering and Spacing (M&S)

M&S was initially assumed to be a planned task which takes the following amount of process time 32 times per scan [adapted from Reference 18]

$$t = 0.11 + 1.35(N_o + N_f) + 2.7N_i$$

where $N_o$ = Number of active aircraft outside the feeder fix
$N_i$ = Number of active aircraft inside the feeder fix
$N_f$ = Number of flight plans or suspend status tracks

Subsequent discussions with UNIVAC and FAA personnel led to a revision of the M&S timing equation to

$$t = 0.11 + 2.2N_i$$

In the current study, $N_i$ is interpreted to include controlled, arriving aircraft. Controlled, arriving aircraft are estimated to constitute 75% of the associated tracks during a busy period.

M&S is modeled in this study as a periodic popup task, MSPOP, which executes 32 times during the period of one radar scan. One logical copy of MSPOP performs processing for all sensors in a multisensor system. Its processing time per execution is related to the number of associated tracks on all sensors by the following equation

$$t = 0.11 + 1.7 \sum_{j=1}^{\#SNSR} \sum_{k=1}^{32} TA(j,k)$$

where j = sensor ID

k = sector ID

An earlier attempt in this study to model the M&S function was based on the assumption that M&S might be separated into two roughly equal parts, one executed by a planned task and the other by a popup. The planned task turned out to cause the lattice processing times to be too long, however, and was abondoned.

M&S is also expected to cause a slight increase in display processing time. It is assumed that increase in PAUS processing time will occur which is proportional to the number of M&S data elements displayed, but is independent of the existing PAUS processing time. The increase in PAUS processing time is assumed equal to the amount 0.84(TA), where TA is the number of associated tracks processed.

3.2.2.3.3 ARTS/DABS Integration

ARTS/DABS integration will cause major changes to ARTS IIIA lattices. DABS will perform scan-to-scan correlation at the sensor site, thus allowing ARTS IIIA to become a noncorrelating system. In addition, unused reports will be virtually eliminated.

Thus, it is assumed that the following planned tasks can be removed from the lattice

TPUR, TCRSS, TPSEC.

TEDC is assumed to remain in the system after DABS integration to perform correlation, correction, and prediction. TPRED is assumed to remain to perform auto drop and coast.

However, all tracks will be processed by TEDC after DABS integration, whereas it currently processes discrete beacon tracks only. The processing time per track for TEDC is expected to increase by about 50% due to replacement of the TOS tracker with a TABG tracker. This new expanded version of TEDC has been renamed "DABC" to distinguish it from the current version.

#### 3.2.2.3.4 ARTS/TIPS Interface

Since TIPS will be implemented with its own processing and display, its impact on ARTS IIIA processing will be minimal. The IFI and IFO tasks are expected to expand to account for increased message traffic. After implementation of the ARTS/DABS interface, IFO and IFI are estimated to require 10 mils each per execution. A neligible increase in processing time will be caused by implementation of a new popup task to execute for approximately 20 mils only upon depression of the alternate data switch.

#### 3.2.2.3.5 Tower Automated Ground Surveillance (TAGS)

TAGS is expected to be an independent system employed in busy airports to perform ground tracking and conflict alert. Its processing and storage requirements are expected to be extremely large (on the order of M&S with added tracking). For these reasons it would seem difficult and unnecessary to merge TAGS processing into the ARTS IIIA system. Therefore, it is assumed that TAGS would employ its own processors and displays and would have negligible impact on ARTS IIIA processing.

#### 3.2.2.3.6 Full Digital ARTS Displays (FDAD)

FDAD will be very similar to a full-digital TI DEDS or TCDD with an internal RDBM operating over a parallel interface to the IOP instead of a serial interface to a CMC. Therefore adding the FDAD to ARTS IIIA is very similar to adding the RDBM/TCDD combination.

The new tasks added for the RDBM/TCDD include:

1. RKIP* - Remote Keyboard Input Processing
2. RDOP* - Remote Display Output Processing
3. MOP - Map Output Processing

4. RTDOP*- Remote Tabular Display Output Processing
5. PUTT - Process Untracked Targets

The microprocessor in the FDAD will cause keyboard input processing to be more similar to RKIP than to KIP.

Output processing for the FDAD will be more similar to DOP than to RDOP since the parallel interface of the FDAD is more similar to the parallel interface to an MDBM than it is to the serial interface to an RDBM. Therefore, the estimates for DOP and RDOP before the implementation of FDAD should remain valid.

MOP is a new task which is necessary in a system with digital displays. It outputs a new map to a display when requested by keyboard entry. Since it is executed so seldom, its effect on system timing should be negligible.

Because of the microprocesser integrated into the FDAD, tabular display processing should more resemble RTDOP than TDOP.

PUTT is a new task which displays all untracked target reports in order to simulate video. This task must execute once per sector per sensor as a post-task of TPUR. Therefore, PUTT must be added to the lattices as a post-task of TPUR. One copy of PUTT should be used for each copy of TPUR. PUTT execution time may be estimated at 1 msec per sector per sensor. It should be noted that because of this requirement, the sensor (eg., SRAP, DABS) must send all target reports to the IOP including false target reports.

PAUS will also be significantly affected by the FDAD. The track symbology required on a full-digital display is much more complicated than that on a

*These tasks are also required for the RDBM/BRITE display combination and are already present in the New York Tracon system.

time-shared display. This difference is illustrated below:

| Time-Shared Symbology | Full Digital Symbology |
| --- | --- |
| • Controller symbol displayed at current scan reported position | • Dash displayed at current scan reported position<br>• Controller symbol displayed 1/16" above the dash<br>• History trails displayed at smoothed positions of up to the last 5 scans. |

The cost of computing this more complicated symbology is estimated at 200 msec per track per display per scan. The time used by PAUS is adjusted accordingly.

There are also minor impacts on several other programs. For example, TROUT will have additional duties related to history trail updates. However, these impacts should be minor and are, therefore, ignored at this time.

3.2.2.3.7 Tower Cab Digital Display (TCDD)

TCDD is expected to be implemented at control towers within 20 miles of ARTS IIIA sensor systems. Implementation of TCDD is expected to cause the planned tasks RDOP, RTDOP and RKIP to be required. Modification of the software to provide all-digital symbology, maps, and processing of untracked targets are accounted for in the FDAD implementation impact analysis.

### 3.2.3 Scheduler Simulation

The ARTS IIIA multiprocessor executive scheduler is simulated by a stand-alone FORTRAN program (ARTSCD), which accepts operator inputs and provides printed output. The scheduler simulation produces a detailed record of the sequence and timing of all pertinent events concerning the running of tasks by an operational ARTS IIIA program. The running (and overhead) times of such tasks are simulated according to the models of the previous section. The scheduling procedures are adapted from the New York ARTS system.

The scheduler simulation outputs provide the raw data and statistics which allow evaluation of timing loads for an operational ARTS IIIA program.

Figure 3.2.3-1 shows a generalized flowchart of the simulation.

### 3.2.3.1 Simulation Concept and Outline

The scheduler simulation mimics the real-time action of an ARTS IIIA multiprocessor executive in assigning (deassigning) tasks to processors and provides a control framework for the execution of these tasks and for evaluating computer loading.

A period of real-time, typically one radar scan time, is simulated during which appropriate system states are recorded and statistics are accumulated. This period is divided by the scheduler into a number of lattice executions. A current New York type of single lattice is utilized throughout and modified appropriately for other sites and epochs. The lattice is a list of planned tasks with precedence relations that determine which tasks are eligible for execution at any time, given the set of completed tasks at that time. In addition to planned lattice tasks, popup tasks can occur, which are a separate category outside of the lattice structure and whose execution is independent of the lattice restrictions and timing.

Planned tasks are independently classified as high or low priority. The executive maintains separate queues of elegible tasks for each priority. Tasks are added to queues when all immediately preceding tasks of the lattice have been completed. A task is removed when it is assigned to a processor for execution. High priority eligible tasks are assigned in preference to low priority eligible tasks.

Popup tasks are made eligible to run according to their assigned periods in the task models. Popup tasks have assignment priority alternating with planned tasks in each processor as long as tasks are continuously assigned. If such a processor is idle for an interval, the alternating pattern is restarted with random phase.

FIGURE 3.2.3-1 ARTSCD, SCHEDULER SIMULATION GENERAL FLOW

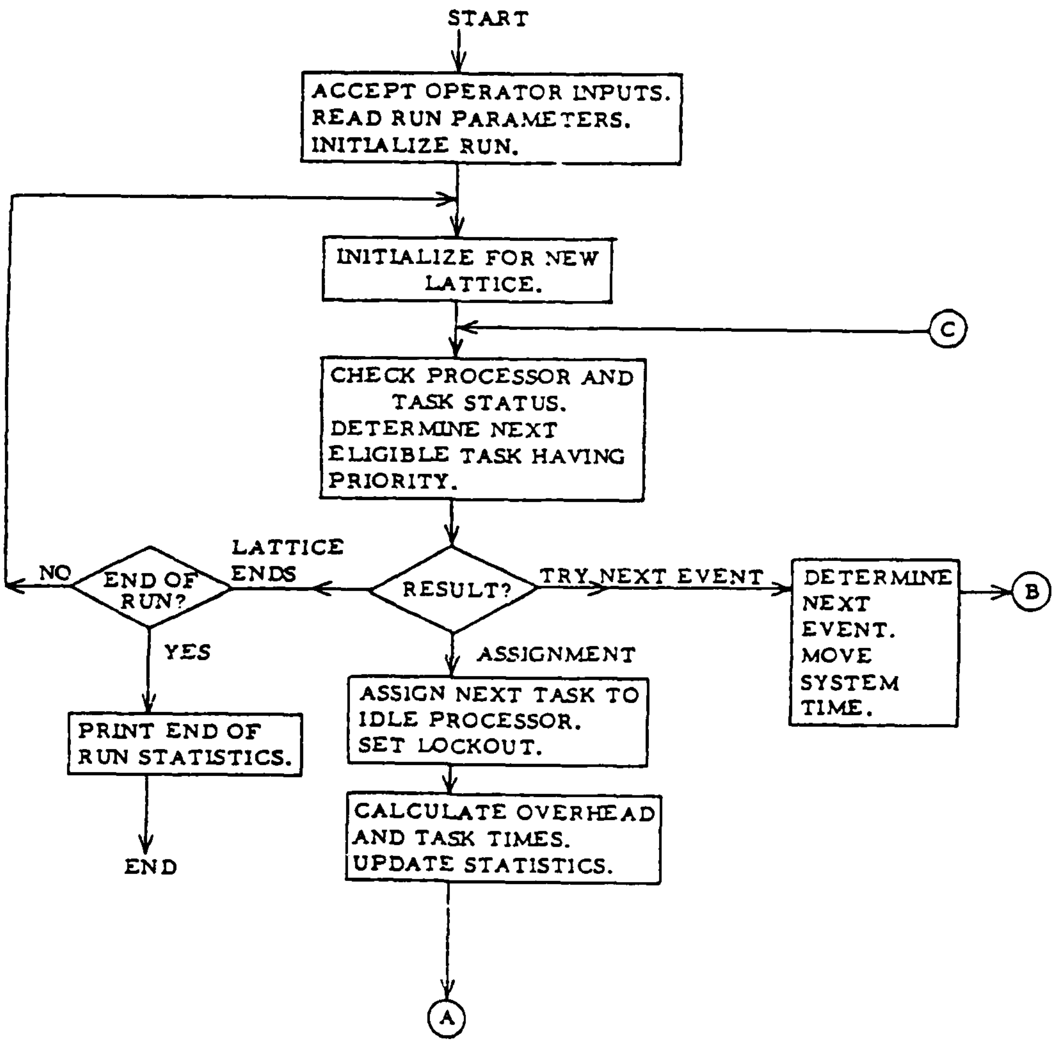
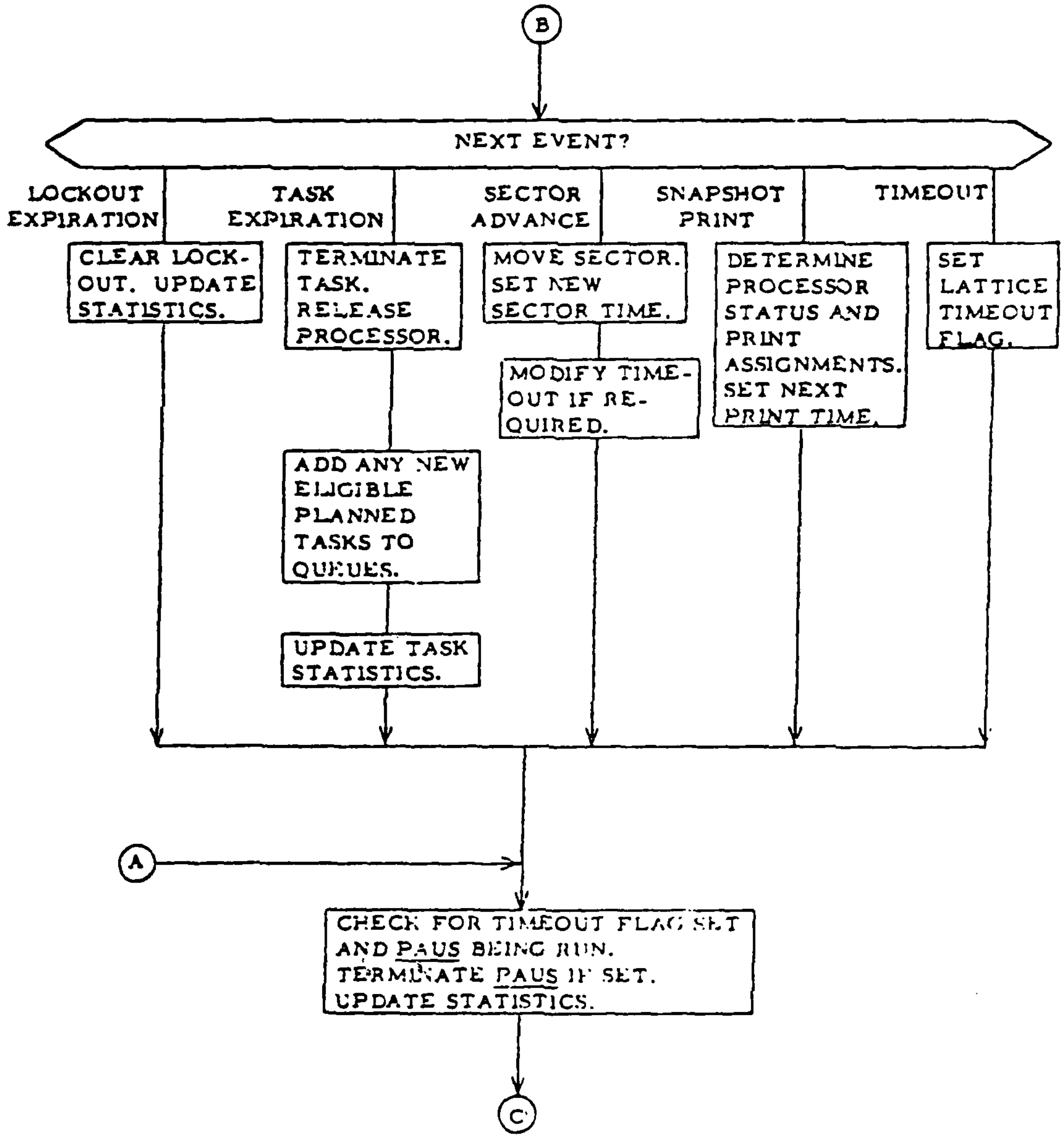


FIGURE 3.2.3-1 (Cont'd.)



When a task is assigned, the executive overhead time is calculated according to the overhead model, and the task execution time according to the task timing model. The processor is made busy with this task, but initially enters the overhead state. Task execution begins when the overhead time expires.

Some task timing models require traffic load inputs. These are determined from an aircraft track category table for each sensor which is tabulated in 32 radar sectors. The appropriate sector to be used at any time is found from a running determination of radar beam direction corrected by the sector processing lag for each task.

Some task timing models specify a total time for a set of tasks (copies) and require that each task of the set end at the same time (or nearly so). In these cases (PAUS, SCTME, TDOP), when the subsequent copies are assigned, any remaining time of the total is redistributed among all the assigned copies so that they end together. In the special case of PAUS, PAUS1 is normally forced to execute 10 mils beyond any other assigned PAUS copies. PAUS executions are terminated prematurely whenever the lattice runs too long and timeout, therefore, occurs.

The lattice terminates when all planned tasks have finished executing. A new lattice then begins immediately. Any popup tasks that have been assigned continue to execute across the lattice boundary.

The scheduler simulation is based upon an event driven logic. At each point in time the program maintains a list of next event times which are current and imminent. The earliest next event is determined, the state of the scheduler, the time and the event list are updated accordingly and the process continues. After each such event is processed, the program assigns available tasks by order of priority and lattice eligibility to idle processors according to scheduler sequencing logic and determines the overhead and running time of each new task. This defines new events for the event list.

The event list contains the following events (in the form of a time of next occurrence):

a. Executive Lockout Expiration

The scheduler model assumes that when a new task is assigned to an idle processor, the executive enters a state of lockout for a time determined from the executive overhead task model of Section 3.2.2. During lockout, no further tasks may be assigned to any idle processors. This event is created each time a new task is assigned and the lockout is cleared upon expiration.

b. Task Expiration (each active processor)

For each active processor a task expiration is calculated at the time a task is assigned by accounting for both the overhead and the task execution time determined from the timing models. When the task expiration occurs, the current task is deassigned and the processor becomes idle again.

c. Sector Advance (each sensor)

For each sensor in the system a record is kept of the next sector crossing time. When a sector crossing event occurs, the sensor state is updated and the next sector crossing time is calculated and inserted in the list. Sector crossing may modify lattice timeout time.

d. Output Print

In order to conveniently provide a simulation output option which consists of the state of each processor (tasks being run) at multiples of a uniform time interval, the simulation maintains an output event. When this event occurs (and other conditions are met) a printing of processor states occurs ("snapshot print") and the next output print time is calculated and inserted as a new event.

e. Lattice Timeout Limit

At the beginning of each lattice, the lattice timeout time is set here as 145 mils beyond the initial lattice time. Occurrence of a lattice timeout results in setting a program flag which allows any PAUS tasks to be immediately terminated short of their normal end time.

This nominal 145 mils is shortened to 125, 100, 75, 50 mils if any sector advances occur which create data backlogs of, respectively, 2, 3, 4, 5 sectors for the worst sensor.

### 3.2.3.2 Simulation Inputs

The overall simulation is controlled by means of a console dialogue, while the details of the site case parameters are specified in a data file, which is read by the program.

The console dialogue allows the operator to make the following selections:

- The site case parameter file
- Length of run
- Snapshot print interval
- The first and last lattice of the block of lattices to be outputted by the snapshot print
- The number of processors to be assumed
- Either high or low traffic
- Optional print of the site case parameter information.

The site case parameter file specifies the following information:

- The site case data file number and title.

- The number of sensors, their periods and initial beam direction. The program assumes a number of track storage slots (CTS) equal to 300 times the number of sensors.

- The following processing and display equipment complements: number of processors, number of MDBM's, number of RDBM's, number of displays associated with each sensor. The program calculates the number of DBM's as the sum of all displays minus the number of RDBM's.

- The set of tasks defined for the site case. Each task is identified by name, is assigned a priority type (high planned, low planned or popup) and a parameter type. The parameter type is followed by the coefficients of the timing model for the task and controls the interpretation of these. In addition, the parameter type defines the correspondence between the various copies of a tracking task and their associated sensors.

- The lattice structure. Lattice structure is specified as an ordered list of all the planned tasks, where each task is accompanied by an ordered list of its successor tasks.

- Traffic counts for each sensor. Both high and low counts are provided, the selection to be made at run time. For each sensor the following traffic category numbers are supplied: total associated tracks, total unassociated tracks, discrete beacon associated tracks, discrete beacon unassociated tracks, mode C beacon equipped associated tracks, mode C cross-linked tracks. These numbers are obtained from the traffic load models of this study. The sum of the last two categories constitutes the conflict alert eligible tracks.

  The program distributes these sensor track totals at random among 32 sectors in such a way that the counts are consistent (for example, the number of discrete beacon associated tracks in each sector is never greater than the total associated tracks for that sector).

In the special case of the New York validation run, the counts by sector are directly inputted in detail from the parameter file.

3.2.3.3 <u>Simulation Outputs</u>

The output of a run consists of the lattice snapshot print and the summary statistics. In addition, timeout and overload conditions are printed when they occur for any lattice. These outputs are prefaced by run parameter information.

The lattice snapshot print is an output of the state of each processor in the system at specific instants of time. These instants are integral multiples of a selected print time increment which occur during execution of a selected set of consecutive lattices.

If a processor is busy running a task, the state of the processor is denoted by printing the task name. If a processor is in executive overhead or is idle with no assigned task, while some other processor is in overhead, then those processors are considered to be in the overhead state, and **OVHD** is printed for each. If a processor is idle (and not in the overhead state) and all planned tasks for this lattice have been or are being executed, then that processor is in the inactive state and **INAC** is printed. If a processor is idle (and not in the overhead state) and is not inactive, then that processor is in the dead state and **DEAD** is printed. These rules provide an exhaustive definition of processor states.

The processor states are printed in blocks, each one lattice long. A summary of execution time, beginning and ending time is given for each lattice.

The summary statistics contain the following information accumulated for the entire run:

- The total number of lattices executed and the total run time.

- The mean and standard deviation of the lattice execution time over all lattices of the run.

- The percent average processor utilization time for each processor (and total, averaged over processors) occupied by:

  1) planned tasks, 2) popup tasks, 3) overhead state, 4) dead state, 5) inactive state.

- The mean execution time, standard deviation and number of calls for each defined system task.

Whenever timeout occurs of a given lattice, a message is printed which contains the following information: 1) the lattice number, execution time, beginning and ending time, 2) the number of sectors lag in processing and 3) the percentage completion of PAUS processing for this lattice and the total PAUS time requirement.

If the sector lag becomes 16 or greater, the run is terminated and a special termination message is printed.

### 3.2.4 Lattices

The scheduler lattices used in this study are adapted from the current New York ARTS. A single lattice is defined for each combination of site: New York, Chicago, Los Angeles, Detroit and year: 1980, 1982, 1984, 1986, 1988, 1990. The validation run is made with the NY 1980 lattice. The years beyond 1980 incorporate new functions in a hypothetical way.

In this section, the term lattice is used in a broad way to include all of the following:

- An ordered list of planned tasks defined for the system.

- The priority of each planned task, high or low.

- An ordered list of (immediate) successor tasks for each planned task.

- An ordered list of popup tasks.

This information allows the scheduler to determine the order of assignment of tasks to idle processors.

When a lattice is loaded at the start of a scheduler simulation run, the number of tasks which are predecessors to each planned task are tabulated. Those tasks having no predecessors are used to initialize the task eligibility queues at the beginning of each lattice. High priority tasks are placed on the high priority queue (FIFO) in the defined order, and low priority tasks are placed on the low priority queue. When any task complete execution, a test is made of each of its successors in the defined order. Any successor task whose predecessors have all completed execution is added to the queue corresponding to the successor task priority.

Popup tasks are scanned for eligibility in the defined order.

In order to explain the various case lattices, we refer to the representative New York lattice of 1986 in Table 3.2.4-1. This lattice can be modified by deletions or substitutions to obtain any other lattice case.

The following general remarks can be made:

- Many of the task names are identical except for a final numerical digit. This number distinguishes the several available similar copies of a task that may be individually assigned to different processors. These copies may execute simultaneously or not; but all must complete before their successors become eligible or the lattice can complete (see below for an exception).

- All lattices define seven PAUS tasks (PAUS1 to PAUS7) and three SCTME tasks (SCTME1 to SCTME3). However, the number of copies actually active in the scheduler simulation for each is limited to no more than the number of system processors. The remaining copies are inhibited and do not execute.

- The number of copies of certain track related tasks corresponds in each lattice to the number of system sensors (4 in NY, 2 in Chicago

TABLE 3.2.4-1 LATTICE STRUCTURE FOR NEW YORK 1986

| TASK/PRIORITY | | ----SUCCESSORS---- | | | | |
|---|---|---|---|---|---|---|
| TEXEC | H | | | | | |
| | | TINIT1 | TROUT1 | TINIT3 | TROUT3 | TINIT2 |
| | | TROUT2 | TINIT4 | TROUT4 | CA1 | CA2 |
| | | CA3 | CA4 | TPSEC1 | TCRSS1 | TEDC1 |
| | | TPRED1 | TPUR1 | ALTRK1 | MSAW1 | SWABS1 |
| | | TPSEC2 | TCRSS2 | TEDC2 | TPRED2 | TPUR2 |
| | | ALTRK2 | MSAW2 | SWABS2 | TPSEC3 | TCRSS3 |
| | | TEDC3 | TPRED3 | TPUR3 | ALTRK3 | MSAW3 |
| | | SWABS3 | TPSEC4 | TCRSS4 | TEDC4 | TPRED4 |
| | | TPUR4 | ALTRK4 | MSAW4 | SWABS4 | |
| TUD | H | | | | | |
| | | CRIT | IFO | AUT | SLINK | TPRED1 |
| | | TPUR1 | SWABS1 | TPRED2 | TPUR2 | SWABS2 |
| | | TPRED3 | TPUR3 | SWABS3 | TPRED4 | TPUR4 |
| | | SWABS4 | | | | |
| TUDS | H | | | | | |
| | | TINIT1 | TROUT1 | TINIT3 | TROUT3 | TINIT2 |
| | | TROUT2 | TINIT4 | TROUT4 | CA1 | CA2 |
| | | CA3 | CA4 | TPSEC1 | TCRSS1 | TEDC1 |
| | | TPRED1 | TPUR1 | ALTRK1 | MSAW1 | SWABS1 |
| | | TPSEC2 | TCRSS2 | TEDC2 | TPRED2 | TPUR2 |
| | | ALTRK2 | MSAW2 | SWABS2 | TPSEC3 | TCRSS3 |
| | | TEDC3 | TPRED3 | TPUR3 | ALTRK3 | MSAW3 |
| | | SWABS3 | TPSEC4 | TCRSS4 | TEDC4 | TPRED4 |
| | | TPUR4 | ALTRK4 | MSAW4 | SWABS4 | |
| TUDX | H | | | | | |
| | | CA1 | CA2 | CA3 | CA4 | |
| RKIP | H | | | | | |
| | | RDOP | | | | |
| RDOP | H | | | | | |
| DOP | L | | | | | |
| CDR | L | | | | | |
| RDOP | L | | | | | |
| CRIT | H | | | | | |
| | | TINIT1 | TROUT1 | TINIT3 | TROUT3 | TINIT2 |
| | | TROUT2 | TINIT4 | TROUT4 | | |
| IFO | H | | | | | |
| | | IFI | | | | |

TABLE 3.2.4-1 (Cont'd.)

| | | | | | | |
|---|---|---|---|---|---|---|
| TINIT1 | H | | | | | |
| | | MAT | | | | |
| TINIT2 | H | | | | | |
| | | MAT | | | | |
| TINIT3 | H | | | | | |
| | | MAT | | | | |
| TINIT4 | H | | | | | |
| | | MAT | | | | |
| TROUT1 | H | | | | | |
| | | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 |
| | | PAUS6 | PAUS7 | SCTME1 | SCTME2 | SCTME3 |
| TROUT2 | H | | | | | |
| | | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 |
| | | PAUS6 | PAUS7 | SCTME1 | SCTME2 | SCTME3 |
| TROUT3 | H | | | | | |
| | | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 |
| | | PAUS6 | PAUS7 | SCTME1 | SCTME2 | SCTME3 |
| TROUT4 | H | | | | | |
| | | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 |
| | | PAUS6 | PAUS7 | SCTME1 | SCTME2 | SCTME3 |
| MAT | H | | | | | |
| | | MTP | | | | |
| MTP | H | | | | | |
| | | KOFA | | | | |
| KOFA | H | | | | | |
| | | IFI | | | | |
| IFI | H | | | | | |
| | | TDOP1 | TDOP4 | RTDOP | TDOP2 | TDOP5 |
| | | TDOP3 | | | | |
| TDOP1 | H | | | | | |
| | | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 |
| | | PAUS6 | PAUS7 | SCTME1 | SCTME2 | SCTME3 |
| TDOP2 | H | | | | | |
| | | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 |
| | | PAUS6 | PAUS7 | SCTME1 | SCTME2 | SCTME3 |
| TDOP3 | H | | | | | |
| | | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 |
| | | PAUS6 | PAUS7 | SCTME1 | SCTME2 | SCTME3 |
| TDOP4 | H | | | | | |
| | | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 |
| | | PAUS6 | PAUS7 | SCTME1 | SCTME2 | SCTME3 |
| TDOP5 | H | | | | | |
| | | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 |
| | | PAUS6 | PAUS7 | SCTME1 | SCTME2 | SCTME3 |

TABLE 3.2.4-1 (Cont'd.)

| | | | | | | |
|---|---|---|---|---|---|---|
| RTDOP | H | | | | | |
| | | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 |
| | | PAUS6 | PAUS7 | SCTME1 | SCTME2 | SCTME3 |
| CA1 | L | | | | | |
| | | CATRK1 | CATU | | | |
| CATRK1 | H | | | | | |
| CA2 | L | | | | | |
| | | CATRK2 | CATU | | | |
| CATRK2 | H | | | | | |
| CA3 | L | | | | | |
| | | CATRK3 | CATU | | | |
| CATRK3 | H | | | | | |
| CA4 | L | | | | | |
| | | CATRK4 | CATU | | | |
| CATRK4 | H | | | | | |
| TPRED1 | L | | | | | |
| SWABS1 | L | | | | | |
| TPUR1 | L | | | | | |
| | | PUTT1 | | | | |
| PUTT1 | H | | | | | |
| TPRED2 | L | | | | | |
| SWABS2 | L | | | | | |
| TPUR2 | L | | | | | |
| | | PUTT2 | | | | |
| PUTT2 | H | | | | | |
| TPRED3 | L | | | | | |
| SWABS3 | L | | | | | |
| TPUR3 | L | | | | | |
| | | PUTT3 | | | | |
| PUTT3 | H | | | | | |
| TPRED4 | L | | | | | |
| SWABS4 | L | | | | | |
| TPUR4 | L | | | | | |
| | | PUTT4 | | | | |

TABLE 3.2.4-1 (Cont'd.)

| | |
|---|---|
| FUTT4 | H |
| TCRSS1 | L |
| TEDC1 | L |
| TPSEC1 | L |
| MSAW1 | L |
| ALTRK1 | L |
| TCRSS2 | L |
| TEDC2 | L |
| TPSEC2 | L |
| MSAW2 | L |
| ALTRK2 | L |
| TCRSS3 | L |
| TEDC3 | L |
| TPSEC3 | L |
| MSAW3 | L |
| ALTRK3 | L |
| TCRSS4 | L |
| TEDC4 | L |
| TPSEC4 | L |
| MSAW4 | L |
| ALTRK4 | L |
| AUT | L |
| SLINK | L |
| CATU | H |
| FAUS1 | L |
| FAUS2 | L |
| FAUS3 | L |
| FAUS4 | L |
| FAUS5 | L |
| FAUS6 | L |
| FAUS7 | L |
| SCTME1 | L |
| SCTME2 | L |
| SCTME3 | L |
| CDT | FOP |
| CTIP | FOP |
| EDISC | FOP |
| IFIP | FOP |
| KIP | FOP |
| FSRAP | FOP |
| MIP | FOP |
| MSPOP | FOP |

AD-A087 243 STERLING SYSTEMS INC WASHINGTON DC F/G 17/7
ASSESSMENT OF THE CAPACITY OF THE AUTOMATED RADAR TERMINAL SYST--ETC(U)
JUN 80 W PAILEN, H C WINTERMOYER, R SITTLER DOT-FA78WAI-942
UNCLASSIFIED FAA-RD-80-51 NL

2 OF 5
AD
A087243

and Los Angeles and 1 in Detroit). These tasks are:

| | | |
|---|---|---|
| TCRSS- | TPRED- | CA- |
| TEDC- | TPUR- | CATRK- |
| TPSEC- | SWABS- | PUTT- |
| MSAW- | TINIT- | DINIT- |
| ALTRK- | TROUT- | DABC- |

The execution of such copies is assumed to occur with data from the corresponding sensor.

- The number of TDOP- copies for each site corresponds roughly to the size of the display requirements (number of displays).

- Conflict alert system capability is introduced by adding TUDX, CA-, CATRK- and CATU tasks. TUDX is an X-thread update, CA- are the copies of conflict screening and detection, CATRK- are the corresponding copies of a special track algorithm for conflict alert and CATU is a short cleanup task. In order to force CATRK- and CATU to complete before PAUS, it is necessary to set them to high priority. TUDX and CA- are low priority.

- The metering and spacing task, MSPOP, is a popup. There is no planned metering and spacing task. Originally, it was planned to split this task into a planned and popup task on a 50-50 basis. However, it became evident that the task was so demanding of time, that any substantial allocation as a planned task would cause lattice timeouts. As it is, the MSPOP task runs nearly continuously in one or another processor for the more demanding cases. Since the popup executions can continue across lattice boundaries, this does not disrupt the lattice.

- In order to integrate DABS with ARTS, the TINIT- tasks are replaced by DINIT-, TEDC- is replaced by DABC- and the following tasks are deleted: TPUR-, TCRSS-, TPSEC-, PUTT-.

- The implementation of a full digital ARTS display requires the introduction of RTDOP, RKIP and RDOP tasks where they are not already provided (as in NY). Further, PUTT- tasks are defined as successors to the corresponding TPUR- tasks in order to process untracked targets. PUTT- tasks are given high priority to force completion before PAUS.

When DABS integration is introduced, PUTT- is deleted.

- The introduction of the advanced system enhancements above, as well as the ARTS/TIPS interface, affects the timing models for individual tasks, Section 3.2.2, but has no effect on the lattice definition beyond those mentioned above.

Starting with NY 1986 as a base, the other lattices may be obtained as follows:

New York:

| | |
|---|---|
| 1980 and Validation | Delete CA-, CATRK-, CATU, TUDX, PUTT-, MSPOP |
| 1982 | Delete PUTT-, MSPOP |
| 1984 | Delete MSPOP |
| 1986 | --- |
| 1988 and 1990 | Delete TPUR-, PUTT-, TCRSS-, TPSEC-<br>Change TINIT- to DINIT-<br>TEDC- to DABC- |

| | |
|---|---|
| Chicago: | Two copies of all track related tasks.<br>Three copies of TDOP-. |
| 1980 | Delete CA-, CATRK-, CATU, TUDX, PUTT-, MSPOP, RTDOP, RKIP, RDOP |
| 1982 | Delete PUTT-, MSPOP, RTDOP, RKIP, RDOP |
| 1984 | Delete MSPOP |
| 1986 to 1990 | Delete TPUR-, PUTT-, TCRSS-, TPSEC-<br>Change TINIT- to DINIT-<br>TEDC- to DABC- |

| | |
|---|---|
| Los Angeles: | Two copies of all track related tasks.<br>Two copies of TDOP-.<br><br>(The changes for each year are the same as for Chicago). |
| Detroit: | One copy of all track related tasks.<br>One copy of TDOP-.<br><br>(The changes for each year are the same as for Chicago). |

## 3.3 MEMORY REQUIREMENTS ANALYSIS

All program and data base modules for the ARTS IIIA system are stored on-line in fixed memory space. There is no use of dynamic memory allocation or program overlays.

As a result, storage utilization estimation for each year of the study is accomplished through simple summation of space required for all programs and tables, and addition of an amount to account for memory mapping loss.

The sources of information for space requirements for existing programs and data bases are ATC 25000 and information provided by UNIVAC describing changes to program and data base sizes as reflected in the New York System Design Data, Revision A which was developed in the fall of 1979.

Storage estimates for New York, Los Angeles, Chicago and Detroit are shown in Table 3.3-1 and 3.3-2. The estimates in Table 3.3-1 are based on level C traffic estimates, while those in Table 3.3-2 are based on level B traffic.

The storage requirements for each terminal area in the year 1980 are estimated by separately calculating the requirements for programs and data base.

For New York, the program storage requirements are taken directly from existing program sizes provided by UNIVAC (Table 3.3-3). Program storage estimates for Los Angeles, Chicago and Detroit are based on the sizes of programs existing at New York, modified to reflect some differences between the New York program and programs which may be installed elsewhere.

Data base estimates for 1980 for all sites are based on the formulas provided in ATC 25000 as modified by UNIVAC. These formulas, and the amounts of storage space allocated for each data base in the existing New York system are shown in Table 3.3-4.

As a convenience, and to simplify the computation of storage estimates, the data base estimated has been divided into two parts: variable data base storage and fixed data base storage. The variable portion of the data base includes all

## TABLE 3.3-1 LEVEL C STORAGE ESTIMATES

| | YEAR | BASIC PROGRAM | BASIC DATA BASE | CA | TIPS | FDAD | M&S | DABS | TOTAL | MM |
|---|---|---|---|---|---|---|---|---|---|---|
| NY | 1980 | 85,640 | 135,242 | | | | | | 220,882 | 14 |
| | 1982 | 85,640 | 139,931 | 81,141 | | | | | 306,712 | 19 |
| | 1984 | 85,640 | 144,772 | 84,865 | 24,113 | 24,299 | | | 363,689 | 23 |
| | 1986 | 85,640 | 151,292 | 87,695 | 24,533 | 24,544 | 63,440 | | 437,144 | 27 |
| | 1988 | 85,640 | 150,154 | 90,160 | 24,893 | 24,772 | 66,020 | 5,000 | 446,639 | 28 |
| | 1990 | 85,640 | 151,145 | 92,158 | 25,181 | 24,940 | 67,740 | 5,000 | 451,804 | 28 |
| LA | 1980 | 80,920 | 67,806 | | | | | | 148,726 | 10 |
| | 1982 | 80,920 | 68,975 | 32,299 | | | | | 182,194 | 12 |
| | 1984 | 82,690 | 73,430 | 33,106 | 14,405 | 13,993 | | | 217,624 | 14 |
| | 1986 | 82,690 | 72,030 | 33,799 | 14,573 | 14,091 | 49,680 | 5,000 | 271,863 | 17 |
| | 1988 | 82,690 | 74,812 | 34,460 | 14,741 | 14,225 | 51,830 | 5,000 | 277,758 | 17 |
| | 1990 | 82,690 | 75,459 | 35,050 | 14,885 | 14,309 | 53,980 | 5,000 | 281,373 | 18 |
| CHI | 1980 | 80,920 | 66,225 | | | | | | 147,145 | 9 |
| | 1982 | 80,920 | 67,525 | 25,028 | | | | | 173,473 | 11 |
| | 1984 | 82,690 | 72,626 | 25,887 | 12,461 | 12,904 | | | 206,568 | 13 |
| | 1986 | 82,690 | 71,448 | 26,595 | 12,665 | 13,023 | 50,110 | 5,000 | 261,531 | 16 |
| | 1988 | 82,690 | 71,775 | 26,975 | 12,773 | 13,086 | 49,680 | 5,000 | 261,979 | 16 |
| | 1990 | 82,690 | 72,204 | 27,400 | 12,893 | 13,156 | 50,540 | 5,000 | 263,883 | 17 |
| DET | 1980 | 80,620 | 49,530 | | | | | | 130,150 | 8 |
| | 1982 | 80,620 | 50,466 | 20,962 | | | | | 152,048 | 10 |
| | 1984 | 83,070 | 56,557 | 21,769 | 11,201 | 9,906 | | | 182,503 | 12 |
| | 1986 | 83,070 | 56,617 | 22,368 | 11,393 | 10,018 | 44,950 | 5,000 | 233,416 | 15 |
| | 1988 | 83,070 | 58,380 | 22,939 | 11,573 | 10,141 | 46,240 | 5,000 | 237,343 | 15 |
| | 1990 | 83,070 | 58,789 | 23,170 | 11,645 | 10,183 | 47,960 | 5,000 | 239,817 | 15 |

## TABLE 3.3-2 LEVEL B STORAGE ESTIMATES

| | YEAR | BASIC PROGRAM | BASIC DATA BASE | CA | TIPS | FDAD | M&S | DABS | TOTAL | MM |
|---|---|---|---|---|---|---|---|---|---|---|
| NY | 1980 | 85,648 | 118,982 | | | | | | 204,630 | 13 |
| | 1982 | 85,648 | 120,557 | 44,646 | | | | | 250,851 | 16 |
| | 1984 | 85,648 | 127,420 | 46,769 | 17,501 | 20,442 | | | 297,780 | 19 |
| | 1986 | 85,648 | 128,973 | 48,353 | 17,825 | 20,631 | 63,440 | | 364,870 | 23 |
| | 1988 | 85,648 | 127,749 | 49,785 | 18,113 | 20,817 | 66,020 | 5,000 | 373,132 | 23 |
| | 1990 | 85,648 | 128,661 | 51,119 | 18,377 | 20,971 | 67,740 | 5,000 | 377,516 | 24 |
| LA | 1980 | 80,920 | 58,553 | | | | | | 139,473 | 9 |
| | 1982 | 80,920 | 58,996 | 22,067 | | | | | 161,983 | 10 |
| | 1984 | 82,690 | 63,902 | 22,709 | 11,501 | 12,299 | | | 193,101 | 12 |
| | 1986 | 82,690 | 62,405 | 23,092 | 11,621 | 12,369 | 49,680 | 5,000 | 246,857 | 16 |
| | 1988 | 82,690 | 65,109 | 23,558 | 11,765 | 12,489 | 51,830 | 5,000 | 252,441 | 16 |
| | 1990 | 82,690 | 65,717 | 23,989 | 11,897 | 12,566 | 53,980 | 5,000 | 255,839 | 16 |
| CHI | 1980 | 80,920 | 57,541 | | | | | | 138,461 | 9 |
| | 1982 | 80,920 | 58,292 | 16,870 | | | | | 156,082 | 10 |
| | 1984 | 82,690 | 63,789 | 17,377 | 9,677 | 11,280 | | | 184,813 | 12 |
| | 1986 | 82,690 | 62,214 | 17,797 | 9,833 | 11,371 | 50,110 | 5,000 | 239,015 | 15 |
| | 1988 | 82,690 | 62,503 | 18,059 | 9,929 | 11,427 | 49,680 | 5,000 | 239,288 | 15 |
| | 1990 | 82,690 | 62,853 | 18,323 | 10,025 | 11,483 | 50,540 | 5,000 | 240,914 | 15 |
| DET | 1980 | 80,620 | 41,516 | | | | | | 122,136 | 8 |
| | 1982 | 80,620 | 42,064 | 14,401 | | | | | 137,085 | 9 |
| | 1984 | 83,070 | 48,296 | 14,855 | 8,681 | 8,436 | | | 163,338 | 10 |
| | 1986 | 83,070 | 47,944 | 15,203 | 8,825 | 8,520 | 44,950 | 5,000 | 213,512 | 14 |
| | 1988 | 83,070 | 49,521 | 15,497 | 8,945 | 8,608 | 46,240 | 5,000 | 216,881 | 14 |
| | 1990 | 83,070 | 49,921 | 15,675 | 9,017 | 8,650 | 47,960 | 5,000 | 219,293 | 14 |

TABLE 3.3-3 PROGRAM STORAGE (NEW YORK, 1979)

| PROGRAM | STORAGE |
|---|---|
| Executive | 18,500 |
| SRAP Processing | 1,300 |
| Keyboard Input Processing | 1,800 |
| Keyboard Op. Functions Processing | 9,200 |
| Interfacility Interrupt Processing | 600 |
| Interfacility Input Processing | 3,000 |
| Interfacility Output Processing | 500 |
| Tracking Executive | 300 |
| Tracking Cross Referencing | 500 |
| Tracking P/S Correlation | 1,800 |
| Tracking I/T Correlation | 3,000 |
| Tracking Process Unused Reports | 1,500 |
| Tracking Prediction | 600 |
| Altitude Tracking | 500 |
| Thread Update | 700 |
| MSAW Processing | 1,000 |
| Track Output | 400 |
| Periodic Display Output Processing | 800 |
| Tabular Display Output Processing | 800 |
| Display Output Control Processing | 900 |
| Automatic Offset | 600 |
| Bulk Store FP Processing | 1,100 |
| Sensor Switching (SWABS) | 500 |
| Quick Look Processing | 250 |
| Critical Data Processing | 700 |
| Monitor Tab. Coast and FPs Processing | 250 |

TABLE 3.3-3 PROGRAM STORAGE (NEW YORK, 1979) (Cont'd.)

| PROGRAM | STORAGE |
|---|---|
| CDR Extractor Control Processing | 1,000 |
| CDR Extractor Processing | 1,500 |
| Console TTY Input Processing | 600 |
| Tracking Early Discrete Correlation | 700 |
| Debug Aids | 1,000 |
| Intersubsystem Link Processing | 300 |
| RDBM Keyboard Input Processing | 850 |
| RDBM Display Output Processing | 1,600 |
| PAUS | 250 |
| Scratch Pad Time Monitor Processing | 100 |
| Reserved (NDRO, I/O, etc.) | 2,048 |
| On-Call Task Area | 8,300 |
| Common Subroutines | 10,600 |
| Memory Bank Mapping Loss | 4,200 |
| Miscellaneous | 1,500 |
| Total Program Storage | 85,648 |

TABLE 3.3-4 DATA BASE STORAGE (NEW YORK, 1979)

| TABLE NAME | FULL CAPABILITY |
|---|---|
| Central Track Store (35T + $KB_2$ * 12T, $KB_2$ = 0.125) | 43,800 |
| MDBM Buffers (1700 * MDBM) | 17,000 |
| RDBM Buffers (660 * RBDM) + 900 | 4,860 |
| Track Record Table [374(DISPL) + 2(374)(SNSR)] | 20,196 |
| TTY Messages (950 + 18 * SNSR + 8 * DISPL) | 1,390 |
| Processor Biased Temporary Store (300 * PROC) | 2,400 |
| Keyboard Input Buffers (100 * MDBM) | 1,000 |
| Dispaly Tables (26 * DISPL) | 1,196 |
| Keyboard Tables (39 * KB) | 3,549 |
| Selected Code Table | 128 |
| Airport Fix Table | 126 |
| Configuration Tables | 1,200 |
| SRAP Input Buffers (192 * SNSR) | 768 |
| Misc. SRAP Tables (110 * SNSR) | 440 |
| Track Index Table (1 + $KB_2$)T | 1,350 |
| Sector Access Store (32 * SNSR) | 128 |
| Sector Time Store (32 * SNSR) | 128 |

TABLE 3.3-4 DATA BASE STORAGE (NEW YORK, 1979) (Cont'd.)

| TABLE NAME | FULL CAPABILITY |
|---|---|
| Report Store (RPTS * 3)/2 | 1,800 |
| Sector Summary Store (32 * SNSR) | 128 |
| Report Address Table | 1,920 |
| Radar Only Target Table | 2,400 |
| Beacon Only Target Table | 744 |
| Critical Data Buffer (11DISPL + 10KB + 11TA + 942) | 11,158 |
| Continuous Data Recording Data and Buffers | 1,012 |
| MSAW Data Base (214 + 1682 * SNSR) | 6,942 |
| TCID/ECID Index Tables and IF Data (1450 + 2 * TA) | 3,050 |
| IFR/VFR Code Table | 58 |
| Miscellaneous | 3,000 |
| Total Data Base Storage | 131,871 |
| + | |
| Total Program Storage | 85,648 |
| = | |
| Total Storage | 217,519 |

storage whose estimated size depends upon the total number of tracks files, or the maximum number of associated tracks, target reports, MDBMs, RDBMs, displays, keyboards, or sensors in any user. It also includes the BOT, ROT and RAT Tables. By combining the formulas in Table 3.3-4, the size of the variable portion of the data base may be estimated by

37.625(T) + 1800(MDBM) + 660 RDBM + 419(DISPL) + 2846 (SNSR)
+ 300 (PROC) + 49(KB) + 1.5(RPTS) + 13(TA) + ROT + BOT + RAT

The fixed portion of the data base store includes those data base elements whose sizes do not vary. Examples are the selected code table, the airport fix table, and 900 words of the RDBM buffers.

Estimates of storage requirements for the basic data base (excluding enhancements) storage requirements for the years 1980 to 1990 are shown in Tables 3.3-5 through 3.3-8 for New York, Los Angeles, Chicago and Detroit. The system parameters which influence the size of the variable portion of the data base are also shown.

The parameter T includes associated and unassociated tracks obtained from good weather track estimates in Appendices G, H, I and J, and also includes estimates of the number of flight plans. The number of flight plans is estimated to be the same as the number of associated tracks, since flight plans and associated tracks are estimated to be in the system approximately the same amount of time (15 to 20 minutes).

The New York program contains one copy of each program module, except the following:

| Task | Copies | Total Storage | Storage Assumed for One Copy |
|---|---|---|---|
| PAUS | 3 | 250 | 80 |
| TDOP | 2 | 800 | 400 |
| TINIT | 2 | 3000 | 1500 |
| TROUT | 2 | 400 | 200 |

The programs at Chicago, Los Angeles and Detroit and assumed to require only one copy of each of the above tasks.

TABLE 3.3-5 BASIC* DATA BASE STORAGE ESTIMATES

NY

| LEVEL C | T | MDBM | RDBM | DISPL | SNSR | PROC | KB | RPTS | TA | ROi | BOT | RAT | VARIABLE DATA BASE STORAGE | FIXED DATA BASE STORAGE | TOTAL DATA BASE STORAGE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 1643 | 10 | 6 | 46 | 4 | 8 | 91 | 1813 | 96 | 2400 | 276 | 1920 | 129,858 | 9980 | 139,838 |
| 1982 | 1693 | 10 | 6 | 46 | 4 | 8 | 91 | 1867 | 98 | 2400 | 300 | 1920 | 129,951 | 9980 | 139,931 |
| 1984 | 1744 | 10 | 11 | 50 | 4 | 9 | 95 | 1915 | 104 | 2400 | 306 | 1920 | 134,792 | 9980 | 144,772 |
| 1986 | 1783 | 10 | 11 | 50 | 4 | 10 | 95 | 1953 | 108 | 2400 | 324 | 1920 | 141,312 | 9980 | 151,292 |
| 1988 | 1817 | 11 | 11 | 52 | 4 | 9 | 98 | 1729 | 114 | 0 | 0 | 0 | 140,165 | 9980 | 150,154 |
| 1990 | 1841 | 11 | 11 | 52 | 4 | 9 | 98 | 1753 | 118 | 0 | 0 | 0 | 141,165 | 9980 | 151,145 |
| LEVEL B | T | MDBM | RDBM | DISPL | SNSR | PROC | KB | RPTS | TA | ROT | BOT | RAT | VARIABLE DATA BASE STORAGE | FIXED DATA BASE STORAGE | TOTAL DATA BASE STORAGE |
| 1980 | 1113 | 10 | 6 | 46 | 4 | 8 | 91 | 1267 | 96 | 2400 | 180 | 1920 | 109,002 | 9980 | 118,982 |
| 1982 | 1152 | 10 | 6 | 46 | 4 | 8 | 91 | 1309 | 98 | 2400 | 198 | 1920 | 110,577 | 9980 | 120,557 |
| 1984 | 1193 | 10 | 11 | 50 | 4 | 8 | 95 | 1348 | 104 | 2400 | 210 | 1920 | 117,440 | 9980 | 127,420 |
| 1986 | 1224 | 10 | 11 | 50 | 4 | 9 | 95 | 1367 | 108 | 2400 | 216 | 1920 | 118,993 | 9980 | 128,973 |
| 1988 | 1252 | 11 | 11 | 52 | 4 | 8 | 98 | 1164 | 114 | 0 | 0 | 0 | 117,769 | 9980 | 127,749 |
| 1990 | 1274 | 11 | 11 | 52 | 4 | 8 | 98 | 1186 | 118 | 0 | 0 | 0 | 118,681 | 9980 | 128,661 |

*The basic data base storage estimates include requirements for data storage for existing functions only. The requirements for enhancements such as CA, M&S and TIPS are not included. However, storage requirements for the tracking tables ROT, BOT and RAT are eliminated when DABS is introduced.

The method of computation of the variable data base storage requirements is:

Storage = 37.625(T) + 1800(MDBM) + 660(RDBM) + 419(DISPL) + 2846(SNSR) + 300(PROC) + 49(KB) + 1.5(RPTS) + 13(TA) + ROT + BOT + RAT

## TABLE 3.3-6 BASIC* DATA BASE STORAGE ESTIMATES

LA

| LEVEL C | T | MDBM | RDBM | DISPL | SNSR | PROC | KB | RPTS | TA | ROT | BOT | RAT | VARIABLE DATA BASE STORAGE | FIXED DATA BASE STORAGE | TOTAL DATA BASE STORAGE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 872 | 4 | 0 | 14 | 2 | 3 | 29 | 846 | 65 | 1200 | 144 | 480 | 57,826 | 9980 | 67,806 |
| 1982 | 888 | 4 | 0 | 14 | 2 | 4 | 29 | 964 | 71 | 1200 | 156 | 480 | 58,995 | 9980 | 68,975 |
| 1984 | 910 | 4 | 4 | 16 | 2 | 4 | 31 | 981 | 73 | 1200 | 156 | 480 | 63,450 | 9980 | 73,430 |
| 1986 | 925 | 4 | 4 | 16 | 2 | 4 | 31 | 869 | 76 | 0 | 0 | 0 | 62,050 | 9980 | 72,030 |
| 1988 | 943 | 4 | 4 | 20 | 2 | 4 | 38 | 883 | 81 | 0 | 0 | 0 | 64,832 | 9980 | 74,812 |
| 1990 | 958 | 4 | 4 | 20 | 2 | 4 | 38 | 895 | 86 | 0 | 0 | 0 | 65,479 | 9980 | 75,459 |
| **LEVEL B** | **T** | **MDBM** | **RDBM** | **DISPL** | **SNSR** | **PROC** | **KB** | **RPTS** | **TA** | **ROT** | **BOT** | **RAT** | **VARIABLE DATA BASE STORAGE** | **FIXED DATA BASE STORAGE** | **TOTAL DATA BASE STORAGE** |
| 1980 | 633 | 4 | 0 | 14 | 2 | 3 | 29 | 700 | 65 | 1200 | 102 | 480 | 48,573 | 9980 | 58,553 |
| 1982 | 642 | 4 | 0 | 14 | 2 | 3 | 29 | 714 | 71 | 1200 | 108 | 480 | 49,016 | 9980 | 58,996 |
| 1984 | 668 | 4 | 4 | 16 | 2 | 4 | 31 | 731 | 73 | 1200 | 108 | 480 | 53,922 | 9980 | 63,902 |
| 1986 | 679 | 4 | 4 | 16 | 2 | 4 | 31 | 623 | 76 | 0 | 0 | 0 | 52,425 | 9980 | 62,405 |
| 1988 | 695 | 4 | 4 | 20 | 2 | 4 | 38 | 635 | 81 | 0 | 0 | 0 | 55,129 | 9980 | 65,109 |
| 1990 | 709 | 4 | 4 | 20 | 2 | 4 | 38 | 646 | 86 | 0 | 0 | 0 | 55,737 | 9980 | 65,717 |

*The basic data base storage estimates include requirements for data storage for existing functions only. The requirements for enhancements such as CA, M&S and TIPS are not included. However, storage requirements for the tracking tables ROT, BOT and RAT are eliminated when DABS is introduced.

The method of computation of the variable data base storage requirements is:

Storage = 37.625(T) + 1800(MDBM) + 660(RDBM) + 419(DISPL) + 2846(SNSR) + 300(PROC) + 49(KB) + 1.5(RPTS) + 13(TA) + ROT + BOT + RAT

TABLE 3.3-7 BASIC* DATA BASE STORAGE EXTIMATES

CHI

| LEVEL C | T | MDBM | RDBM | DISPL | SNSR | PROC | KB | RPTS | TA | ROT | BOT | RAT | VARIABLE DATA BASE STORAGE | FIXED DATA BASE STORAGE | TOTAL DATA BASE STORAGE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 702 | 5 | 0 | 20 | 2 | 3 | 40 | 767 | 74 | 1200 | 108 | 480 | 56,245 | 9980 | 66,225 |
| 1982 | 727 | 5 | 0 | 20 | 2 | 4 | 40 | 790 | 75 | 1200 | 120 | 480 | 57,545 | 9980 | 67,525 |
| 1984 | 749 | 5 | 5 | 22 | 2 | 4 | 42 | 815 | 74 | 1200 | 132 | 480 | 62,646 | 9980 | 72,626 |
| 1986 | 769 | 5 | 5 | 22 | 2 | 4 | 42 | 710 | 77 | 0 | 0 | 0 | 61,468 | 9980 | 71,448 |
| 1988 | 777 | 5 | 5 | 22 | 2 | 4 | 42 | 719 | 78 | 0 | 0 | 0 | 61,795 | 9980 | 71,775 |
| 1990 | 788 | 5 | 5 | 22 | 2 | 4 | 42 | 729 | 78 | 0 | 0 | 0 | 62,224 | 9980 | 72,204 |
| LEVEL B | T | MDBM | RDBM | DISPL | SNSR | PROC | KB | RPTS | TA | ROT | BOT | RAT | VARIABLE DATA BASE STORAGE | FIXED DATA BASE STORAGE | TOTAL DATA BASE STORAGE |
| 1980 | 481 | 5 | 0 | 20 | 2 | 3 | 40 | 541 | 74 | 1200 | 78 | 480 | 47,561 | 9980 | 57,541 |
| 1982 | 500 | 5 | 0 | 20 | 2 | 3 | 40 | 556 | 75 | 1200 | 78 | 480 | 48,312 | 9980 | 58,292 |
| 1984 | 517 | 5 | 5 | 22 | 2 | 4 | 42 | 575 | 74 | 1200 | 84 | 480 | 53,809 | 9980 | 63,789 |
| 1986 | 533 | 5 | 5 | 22 | 2 | 4 | 42 | 474 | 77 | 0 | 0 | 0 | 52,234 | 9980 | 62,214 |
| 1988 | 540 | 5 | 5 | 22 | 2 | 4 | 42 | 482 | 78 | 0 | 0 | 0 | 52,523 | 9980 | 62,503 |
| 1990 | 549 | 5 | 5 | 22 | 2 | 4 | 42 | 490 | 78 | 0 | 0 | 0 | 52,873 | 9980 | 62,853 |

*The basic data base storage estimates include requirements for data storage for existing functions only. The requirements for enhancements such as CA, M&S and TIPS are not included. However, storage requirements for the tracking tables ROT, BOT and RAT are eliminated when DABS is introduced.

The method of computation of the variable data base storage requirements is:

Storage = 37.625(T) + 1800(MDBM) + 660(RDBM) + 419(DISPL) + 2846(SNSR) + 300(PROC) + 49(KB) + 1.5(RPTS) + 13(TA) + ROT + BOT + RAT

## TABLE 3.3-8 BASIC* DATA BASE STORAGE ESTIMATES

DET

| LEVEL C | T | MDBM | RDBM | DISPL | SNSR | PROC | KB | RPTS | TA | ROT | BOT | RAT | VARIABLE DATA BASE STORAGE | FIXED DATA BASE STORAGE | TOTAL DATA BASE STORAGE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 590 | 3 | 0 | 11 | 1 | 3 | 23 | 608 | 57 | 600 | 96 | 120 | 39,550 | 9980 | 49,530 |
| 1982 | 612 | 3 | 0 | 11 | 1 | 3 | 23 | 633 | 62 | 600 | 102 | 120 | 40,486 | 9980 | 50,466 |
| 1984 | 635 | 3 | 5 | 15 | 1 | 3 | 27 | 656 | 63 | 600 | 108 | 120 | 46,577 | 9980 | 56,557 |
| 1986 | 652 | 3 | 5 | 15 | 1 | 4 | 27 | 604 | 65 | 0 | 0 | 0 | 46,637 | 9980 | 56,617 |
| 1988 | 670 | 3 | 5 | 17 | 1 | 4 | 31 | 613 | 68 | 0 | 0 | 0 | 48,400 | 9980 | 58,380 |
| 1990 | 679 | 3 | 5 | 17 | 1 | 4 | 31 | 625 | 72 | 0 | 0 | 0 | 48,809 | 9980 | 58,789 |
| LEVEL B | T | MDBM | RDBM | DISPL | SNSR | PROC | KB | RPTS | TA | ROT | BOT | RAT | VARIABLE DATA BASE STORAGE | FIXED DATA BASE STORAGE | TOTAL DATA BASE STORAGE |
| 1980 | 394 | 3 | 0 | 11 | 1 | 2 | 23 | 406 | 57 | 600 | 60 | 120 | 31,536 | 9980 | 41,516 |
| 1982 | 408 | 3 | 0 | 11 | 1 | 2 | 23 | 423 | 62 | 600 | 66 | 120 | 32,084 | 9980 | 42,064 |
| 1984 | 425 | 3 | 5 | 15 | 1 | 3 | 27 | 440 | 63 | 600 | 72 | 120 | 38,316 | 9980 | 48,296 |
| 1986 | 438 | 3 | 5 | 15 | 1 | 3 | 27 | 390 | 65 | 0 | 0 | 0 | 37,964 | 9980 | 47,944 |
| 1988 | 451 | 3 | 5 | 17 | 1 | 3 | 31 | 400 | 68 | 0 | 0 | 0 | 39,541 | 9980 | 49,521 |
| 1990 | 460 | 3 | 5 | 17 | 1 | 3 | 31 | 406 | 72 | 0 | 0 | 0 | 39.941 | 9980 | 49,921 |

*The basic data base storage estimates include requirements for data storage for existing functions only. The requirements for enhancements such as CA, M&S and TIPS are not included. However, storage requirements for the tracking tables ROT, BOT and RAT are eliminated when DABS is introduced.

The method of computation of the variable data base storage requirements is:

Storage = 37.625(T) + 1800(MDBM) + 660(RDBM) + 419(DISPL) + 2846(SNSR) + 300(PROC) + 49(KB) + 1.5(RPTS) + 13(TA) + ROT + BOT + RAT

The New York program also contains one copy of the following tasks:

| Task | Storage |
|---|---|
| SLINK | 300 |
| RDOP + RTDOP | 1600 |
| RKIP | 850 |

SLINK processes inter-sensor track links, and will be implemented only at multisensor sites. It is not expected to be installed at Detroit, which has a single sensor. RDOP, RKIP and RTDOP are assumed not to be implemented at Chicago, Los Angeles or Detroit until the installation of TCDD.

For years after 1980, the storage estimates include the impacts of functional enhancements.

New functions are assumed to be implemented on the following schedule

| | NY | OTHERS |
|---|---|---|
| CA | 1982 | 1982 |
| TIPS | 1983 | 1983 |
| TCDD | 1983 | 1983 |
| FDAD | 1984 | 1984 |
| M&S | 1985 | 1985 |
| DABS | 1988 | 1985 |

Storage requirement estimates for conflict Alert are shown in Tables 3.3-1 and 3.3-2. They are based on the following criteria established in reference [28]

| | |
|---|---|
| Programs | 5320 |
| Tables | $1537 + 0.02T^2 + 13.6T$ (T = Total Track Capacity) |
| Total | $6857 + 0.02T^2 + 13.6T$ |

Storage increases for TIPS are estimated by UNIVAC as follows

| | |
|---|---|
| KIP | 45 |
| SAD | 600 |
| Common Subroutine | 400 |
| IFI | 2400 |
| IFO | |
| IF Buffers, Data | 700 |
| KB & Display Data Base | 12(TA + TU) |
| Total | 4145 + 12(TA + TU) |

TIPS storage estimates are shown in Tables 3.3-1 & 3.3-2.

The impact of the implementation of TCDDs is to require allocation of memory space for RDOP, RKIP and RTDOP at Chicago, Los Angeles and Detroit. No impact on program storage requirements is assumed at New York. Data base requirements will increase in proportion to the number of displays added. The amount of data base increase is reflected in the formula for this basic variable data base estimates.

The storage impact of FDAD is estimated by UNIVAC to be

3500 + 2200(#sensors) + 7(TA + TU) + 9(#displays).

(See paragraph 3.2.2.3.6 for a discussion of the impact of introducing FDADs). Tables 3.3-1 and 3.3-2 lists storage estimates for FDAD.

M&S storage estimates are shown in Tables 3.3-1 & 3.3-2 and are based on the following model (derived from Reference 18 and discussions with UNIVAC)

| | |
|---|---|
| Programs | 17000 |
| Tables | 10000 Words for 20 Tracks |
| Total | 17000 + 500(M&S Track Capacity) |
| | = 17000 + 430(TA in Poor WX) |

This model assumes that M&S track capacity must be equal to the estimated number of associated tracks for arriving aircraft in a busy period. This number of tracks is estimated to be 86% of all associated tracks during poor weather. Associated track estimates in poor weather are shown in Table 3.3-9.

The memory requirements impact for ARTS/DABS integration is expected to be minor

TABLE 3.3-9

ESTIMATE OF ASSOCIATED TRACKS - POOR WEATHER

| | NY | LA | CHI | DET |
|---|---|---|---|---|
| 1980 | 96 | 65 | 74 | 57 |
| 1982 | 98 | 71 | 75 | 62 |
| 1984 | 104 | 73 | 74 | 63 |
| 1986 | 108 | 76 | 77 | 65 |
| 1988 | 114 | 81 | 76 | 68 |
| 1990 | 118 | 86 | 78 | 72 |

compared to the impact of CA, TIPS, FDAD and M&S. Some programs and tables will be deleted. They include

Programs

TPUR, TCRSS, TPSEC

Tables

BOT, ROT, RAT

Tables associated with TPUR

Tables assoicated with TPSEC (scoring parameters, etc.).

Overall, these programs and tables account for about 5000 words. This reduction is expected to be more than compensated for by increases in input buffer space, input processing logic and tracking tables. An increase in memory requirements of 5000 words is estimated for DABS.

## 3.4 PROCESSOR UTILIZATION MODEL VALIDATION

In order to verify the reasonableness of the processor utilization estimates, a comparison was made between simulated processing times and times measured during the processing of live data at New York. The live run used for comparison was run 2.

The lattice structure task models and hardware configuration used for the simulation were those assumed to be at New York in 1980. Traffic parameters used in the simulation consisted of a sample taken from the live run. These parameters are shown in Exhibits 3.4-1 through 3.4-4 .

The traffic sample consisted of tracks processed during one arbitrarily selected scan of the sensor in run 2. No attempt was made to determine how representative the data sample might be of conditions existing throughout the run. However, the duration of the run was short (less than one minute). It seems unlikely that a large change in the number of tracks in the system would occur in a one minute interval. However, there is a possibility that the average processing load during run 2 differed from that of the arbitrary sample.

The results of the comparison are shown in Tables 3.4-1 and 3.4-2. From these results, the following observations can be made:

- These is less than 10% difference in the average lattice times
- There is less than 10% difference in the proportion of time devoted to tasks.
- In general, the mean processing times for individual tasks are comparable to the measured times.

From these observations it may be concluded that the simulation results are reasonable.

## EXHIBIT 3.4-1

## TRAFFIC PARAMETERS USED FOR MODEL VALIDATION

## SENSOR 1

| SECTOR | TA | TU | ATU | UTU | CAT |
|---|---|---|---|---|---|
| 1 | 0 | 6 | 0 | 1 | 0 |
| 2 | 0 | 6 | 0 | 0 | 0 |
| 3 | 0 | 8 | 0 | 2 | 0 |
| 4 | 0 | 5 | 0 | 0 | 0 |
| 5 | 0 | 5 | 0 | 1 | 0 |
| 6 | 2 | 4 | 2 | 1 | 0 |
| 7 | 1 | 8 | 0 | 2 | 0 |
| 8 | 0 | 11 | 0 | 1 | 0 |
| 9 | 1 | 8 | 0 | 1 | 0 |
| 10 | 0 | 1 | 0 | 0 | 0 |
| 11 | 0 | 3 | 0 | 1 | 0 |
| 12 | 0 | 1 | 0 | 1 | 0 |
| 13 | 0 | 1 | 0 | 0 | 0 |
| 14 | 0 | 2 | 0 | 0 | 0 |
| 15 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 2 | 0 | 1 | 0 |
| 17 | 0 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 0 | 0 | 0 |
| 19 | 0 | 1 | 0 | 0 | 0 |
| 20 | 0 | 1 | 0 | 1 | 0 |
| 21 | 0 | 4 | 0 | 3 | 0 |
| 22 | 1 | 12 | 0 | 5 | 0 |
| 23 | 0 | 7 | 0 | 2 | 0 |
| 24 | 0 | 7 | 0 | 2 | 0 |
| 25 | 0 | 11 | 0 | 3 | 0 |
| 26 | 1 | 9 | 1 | 2 | 0 |
| 27 | 0 | 6 | 0 | 1 | 0 |
| 28 | 0 | 9 | 0 | 4 | 0 |
| 29 | 0 | 7 | 0 | 4 | 0 |
| 30 | 1 | 11 | 0 | 4 | 0 |
| 31 | 1 | 14 | 0 | 6 | 0 |
| 32 | 0 | 7 | 0 | 1 | 0 |
| TOT | 8 | 177 | 3 | 50 | 0 |

## EXHIBIT 3.4-2

## TRAFFIC PARAMETERS USED FOR MODEL VALIDATION

## SENSOR 2

| SECTOR | TA | TU | ATU | UTU | CAT |
|---|---|---|---|---|---|
| 1 | 0 | 4 | 0 | 2 | 0 |
| 2 | 1 | 6 | 1 | 2 | 0 |
| 3 | 0 | 12 | 0 | 2 | 0 |
| 4 | 0 | 8 | 0 | 3 | 0 |
| 5 | 2 | 8 | 1 | 1 | 0 |
| 6 | 1 | 7 | 1 | 2 | 0 |
| 7 | 1 | 7 | 1 | 2 | 0 |
| 8 | 0 | 6 | 0 | 3 | 0 |
| 9 | 0 | 5 | 0 | 2 | 0 |
| 10 | 0 | 2 | 0 | 0 | 0 |
| 11 | 0 | 3 | 0 | 3 | 0 |
| 12 | 0 | 5 | 0 | 2 | 0 |
| 13 | 0 | 2 | 0 | 1 | 0 |
| 14 | 0 | 2 | 0 | 1 | 0 |
| 15 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 0 | 0 | 0 |
| 18 | 0 | 4 | 0 | 1 | 0 |
| 19 | 0 | 3 | 0 | 2 | 0 |
| 20 | 0 | 7 | 0 | 4 | 0 |
| 21 | 0 | 10 | 0 | 4 | 0 |
| 22 | 1 | 6 | 1 | 0 | 0 |
| 23 | 1 | 6 | 1 | 4 | 0 |
| 24 | 0 | 10 | 0 | 3 | 0 |
| 25 | 1 | 9 | 1 | 2 | 0 |
| 26 | 0 | 2 | 0 | 1 | 0 |
| 27 | 0 | 6 | 0 | 1 | 0 |
| 28 | 0 | 3 | 0 | 1 | 0 |
| 29 | 1 | 2 | 1 | 0 | 0 |
| 30 | 0 | 0 | 0 | 0 | 0 |
| 31 | 0 | 3 | 0 | 0 | 0 |
| 32 | 0 | 5 | 0 | 4 | 0 |
| TOT | 9 | 153 | 8 | 53 | 0 |

<u>EXHIBIT 3.4-3</u>

<u>TRAFFIC PARAMETERS USED FOR MODEL VALIDATION</u>

<u>SENSOR 3</u>

| SECTOR | TA | TU | ATU | UTU | CAT |
|---|---|---|---|---|---|
| 1 | 0 | 8 | 0 | 1 | 0 |
| 2 | 3 | 3 | 2 | 0 | 0 |
| 3 | 0 | 4 | 0 | 0 | 0 |
| 4 | 2 | 5 | 0 | 2 | 0 |
| 5 | 1 | 4 | 1 | 1 | 0 |
| 6 | 2 | 6 | 1 | 2 | 0 |
| 7 | 2 | 5 | 0 | 0 | 0 |
| 8 | 0 | 3 | 0 | 1 | 0 |
| 9 | 1 | 2 | 0 | 0 | 0 |
| 10 | 0 | 1 | 0 | 0 | 0 |
| 11 | 2 | 2 | 1 | 0 | 0 |
| 12 | 1 | 4 | 0 | 0 | 0 |
| 13 | 0 | 1 | 0 | 0 | 0 |
| 14 | 0 | 0 | 0 | 0 | 0 |
| 15 | 1 | 0 | 1 | 0 | 0 |
| 16 | 0 | 1 | 0 | 0 | 0 |
| 17 | 0 | 0 | 0 | 0 | 0 |
| 18 | 1 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 0 | 0 | 0 |
| 20 | 2 | 3 | 0 | 0 | 0 |
| 21 | 0 | 1 | 0 | 0 | 0 |
| 22 | 1 | 3 | 1 | 0 | 0 |
| 23 | 0 | 8 | 0 | 1 | 0 |
| 24 | 1 | 6 | 0 | 3 | 0 |
| 25 | 1 | 3 | 1 | 2 | 0 |
| 26 | 2 | 7 | 1 | 4 | 0 |
| 27 | 1 | 6 | 0 | 2 | 0 |
| 28 | 0 | 6 | 0 | 0 | 0 |
| 29 | 0 | 8 | 0 | 0 | 0 |
| 30 | 2 | 8 | 1 | 1 | 0 |
| 31 | 2 | 6 | 0 | 1 | 0 |
| 32 | 3 | 4 | 0 | 1 | 0 |
| TOT | 31 | 118 | 10 | 22 | 0 |

## EXHIBIT 3.4-4

## TRAFFIC PARAMETERS USED FOR MODEL VALIDATION

## SENSOR 4

| SECTOR | TA | TU | ATU | UTD | CAT |
|---|---|---|---|---|---|
| 1 | 0 | 1 | 0 | 0 | 0 |
| 2 | 0 | 2 | 0 | 1 | 0 |
| 3 | 0 | 5 | 0 | 4 | 0 |
| 4 | 0 | 2 | 0 | 1 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 1 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 2 | 0 | 2 | 0 |
| 10 | 0 | 3 | 0 | 0 | 0 |
| 11 | 0 | 2 | 0 | 0 | 0 |
| 12 | 0 | 3 | 0 | 0 | 0 |
| 13 | 0 | 1 | 0 | 1 | 0 |
| 14 | 0 | 1 | 0 | 0 | 0 |
| 15 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 0 | 0 | 0 |
| 18 | 0 | 4 | 0 | 1 | 0 |
| 19 | 0 | 2 | 0 | 0 | 0 |
| 20 | 0 | 3 | 0 | 2 | 0 |
| 21 | 0 | 5 | 0 | 1 | 0 |
| 22 | 0 | 9 | 0 | 7 | 0 |
| 23 | 0 | 5 | 0 | 1 | 0 |
| 24 | 0 | 6 | 0 | 3 | 0 |
| 25 | 0 | 5 | 0 | 1 | 0 |
| 26 | 0 | 3 | 0 | 0 | 0 |
| 27 | 0 | 2 | 0 | 1 | 0 |
| 28 | 0 | 2 | 0 | 1 | 0 |
| 29 | 0 | 4 | 0 | 1 | 0 |
| 30 | 0 | 2 | 0 | 1 | 0 |
| 31 | 0 | 4 | 0 | 2 | 0 |
| 32 | 0 | 3 | 0 | 2 | 0 |
| TOT | 0 | 82 | 0 | 33 | 0 |

TABLE 3.4-1

COMPARISON OF PERCENT PROCESSOR UTILIZATION - RUN 2 VS SIMULATION

| | Processor Utilization (%) | |
|---|---|---|
| | Run 2 (Live) | Simulation |
| Planned tasks | 64.6 | 67.2 |
| Popup tasks | 13.1 | 15.2 |
| Overhead | 11.6 | 10.1 |
| Dead | 1.9 | 0.8 |
| Inactive | 9.0 | 6.8 |

TABLE 3.4-2 COMPARISON OF MEAN LATTICE AND TASK TIMES - RUN 2 VS SIMULATION

| | | MEAN TIMES(MILS) | |
|---|---|---|---|
| | | Run 2 (Live) | Simulation |
| | LATTICE | 87.3 | 80.3 |
| Planned Tasks | ALTRK | 2 | 2.7 |
| | AUT | 1 | 0.9 |
| | CDR | 1 | 1 |
| | CRIT | 1 | 1 |
| | DOP | 13 | 14 |
| | IFI | 1 | 5 |
| | IFO | 7 | 8.1 |
| | KOFA | 4 | 5.6 |
| | MAT | 1 | 1.3 |
| | MSAW | 1 | 1.7 |
| | MTP | 1 | 1 |
| | PAUS | 15.1 | 13.4 |
| | PDOP | 6 | 3 |
| | RDOP | 14 | 14.4 |
| | RKIP | 7 | 7.8 |
| | RTDOP | 2 | 3.6 |
| | SCTME | 1 | 0.4 |
| | SLINK | 1 | 8.2 |
| | SWABS | 1 | 1 |
| | TCRSS | 8 | 5.6 |
| | TDOP | 3 | 5.8 |
| | TEDC | 3 | 3.2 |
| | TEXEC | 2 | 2 |
| | TINIT | 2.5 | 3.5 |
| | TPRED | 6 | 6.3 |
| | TPSEC | 7 | 6.9 |
| | TPUR | 14 | 7.4 |
| | TROUT | 2.5 | 3.0 |
| | TUDS | 9 | 7.9 |
| | TUD | 7 | 4.6 |
| Popup Tasks | CDT | 2 | 4.9 |
| | CTIP | 1 | 1.8 |
| | EDISC | 3 | 3 |
| | IFI | 1 | 0 |
| | KIP | 39 | 39.2 |
| | PSRAP | 20 | 20.7 |
| | MSP | 4 | 3.3 |

## 4.0 ANALYSIS RESULTS

### 4.1 Processing Capacity

For each of the four TRACONS, processor utilization estimates were obtained by simulation, using the ARTS IIIA scheduler simulation program with appropriate inputs to describe the site configuration, busy hour instantaneous traffic, lattice configuration, and task processing time equation. Simulations were conducted for New York, Chicago, Los Angeles and Detroit for the years 1980, 1982, 1984, 1986, 1988 and 1990. The initial number of processors assumed at each site in 1980 was:

| Tracon | Total IOPs | Redundant IOPs | Active IOPs |
|---|---|---|---|
| New York | 8 | 1 | 7 |
| Chicago | 3 | 0 | 3 |
| Los Angeles | 3 | 0 | 3 |
| Detroit | 1 | 0 | 1 |

Where the simulation results indicated that the capacity of the assumed number of active processors was exceeded for a given year, the number of processors was increased until there was adequate capacity or until a maximum of seven processors was used.

The most common indication of a capacity deficit was incomplete processing of the display task PAUS. The system scheduling logic is designed to cause PAUS processing to be curtailed in any lattice in which the lattice processing time excceds a threshold. When this happens, the unprocessed PAUS data are held for processing during the next lattice. If a large number of lattices is unable to complete processing of PAUS, then some display data will never be output to the displays.

The scheduling logic designed to overcome this kind of difficulty is based on the theory that sector processing will lag behind the sensor antenna position in an overload condition. This logic causes target reports to be erased from memory for the next sector to be processed when sector processing lags the antenna position by five or more sectors. This is done to cause the processing time for the next sector to be short, due to a lack of reports to be correlated. If sector processing lags by 10 or more sectors, no tracking tasks are processed for those sectors in excess of 10.

However, the simulation results indicate that the processing of sectors rarely falls behind the antenna position with anticipated loads. In only one case, (Detroit in 1980 with level C traffic and one active processor) did a lag appear. In this case, processing was nine sectors late at the end of one radar scan. When the number of processors was increased, and when level B traffic was assumed, processing did not lag.

In the usual overload case, processing of PAUS data is not completed, but sector processing remains synchronized with the antenna. This is interpreted to mean that track processing continues normally, but that some tracks may not be displayed in a heavy overload condition.

Simulation results for processor utilization at New York are summarized in Exhibit 4-1 for level C and level B traffic assumptions. Seven active processors were assumed for each year for both traffic levels. The results indicate that seven processors will be adequate until 1984 if level C traffic is assumed. Starting in 1984, one additional processor is required for all years except 1986. In 1986, the results indicated a need for two additional processors with level C traffic. When level B traffic is assumed at New York, seven processors appear to provide adequate capacity, except in 1986, when eight active processors are required.

Estimation of the number of additional processors required when a seven processor configuration is overloaded is accomplished by examination of the PAUS processing results. In Tables 4-1 through 4-5, estimates are derived for the total additional time per scan which would be required if all PAUS processing was completed. The estimates are:

# EXHIBIT 4-1

## PROCESSOR UTILIZATION SIMULATION RESULTS

### NEW YORK

### LEVEL C TRAFFIC

| | 1980 | 1982 | 1984 | 1986 | 1988 | 1990 |
|---|---|---|---|---|---|---|
| Number of Processors | 7 | 7 | 7 | 7 | 7 | 7 |
| Lattices Executed | 43 | 37 | 34 | 34 | 34 | 34 |
| Lattice Duration: Mean | 116.2 | 133.8 | 146.8 | 147.4 | 148.2 | 147.6 |
| | 5.4 | 7.3 | 1.7 | 1.0 | 3.0 | 4.6 |
| % Process Time: Planned Tasks | 74.1 | 75.7 | 85.8 | 73.0 | 73.6 | 73.6 |
| Popup Tasks | 14.8 | 15.3 | 8.0 | 21.5 | 21.6 | 21.7 |
| Overhd. | 6.6 | 6.0 | 6.0 | 5.4 | 4.8 | 4.6 |
| Dead | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Inact. | 4.2 | 3.0 | 0.2 | 0.0 | 0.0 | 0.0 |
| Total Process Time for Tasks | 30984 | 31535 | 32781 | 33145 | 35579 | 33477 |
| Lattice Timeouts | 0 | 3 | 33 | 34 | 33 | 33 |
| Additional Process Time Required Per Scan* | | | 1625 | 6341 | 2857 | 3258 |
| Time Available Per Processor | | | 4915 | 4915 | 4915 | 4915 |
| Additional Processors Required | 0 | 0 | 1 | 2 | 1 | 1 |
| New Functions | | CA | TIPS FDAD TCDD | M&S | DABS | |

## EXHIBIT 4-1

PROCESSOR UTILIZATION SIMULATION RESULTS (Cont'd.)

NEW YORK

LEVEL B TRAFFIC

| | | 1980 | 1982 | 1984 | 1986 | 1988 | 1990 |
|---|---|---|---|---|---|---|---|
| Number of Processors | | 7 | 7 | 7 | 7 | 7 | 7 |
| Lattices Executed | | 54 | 47 | 42 | 34 | 41 | 40 |
| Lattice Duration: | Mean | 91.9 | 105.6 | 119.6 | 145.4 | 121.7 | 125.6 |
| | σ | 5.4 | 5.2 | 6.6 | 3.5 | 5.8 | 6.6 |
| % Process Time: | Planned Tasks | 70.1 | 71.8 | 79.4 | 72.9 | 70.5 | 70.5 |
| | Popup Tasks | 15.2 | 15.2 | 8.4 | 21.2 | 20.9 | 21.4 |
| | Overhd. | 8.6 | 8.0 | 7.6 | 5.5 | 5.9 | 5.7 |
| | Dead | 0.6 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| | Inact. | 5.5 | 4.9 | 4.5 | 0.5 | 2.7 | 2.4 |
| Total Process Time for Tasks | | 29628 | 30226 | 30802 | 32563 | 31924 | 32319 |
| Lattice Timeouts | | 0 | 0 | 0 | 29 | 0 | 0 |
| Additional Process Time Required Per Scan* | | | | | 344** | | |
| Time Available Per Processor | | | | | 4915 | | |
| Additional Processors Required | | 0 | 0 | 0 | 1** | 0 | 0 |
| New Functions | | | CA | TIPS<br>FDAD<br>TCDD | M&S | DABS | |

* This represents the estimated minimum additional processing capacity required. Capacity requirements may increase due to the use of additional processors.
**Processor capacity is marginally exceeded in simulation results for Level B Traffic in 1986.

TABLE 4-1

ESTIMATE OF PROCESSING TIME REQUIREMENTS IN EXCESS OF TIME AVAILABLE

NY 1984 LEVEL C TRAFFIC

| LATTICE | PAUS TIME REQUIRED | % PAUS COMPLETE | PAUS TIME COMPLETED | REMAINDER |
|---|---|---|---|---|
| 1 | | | | |
| 2 | 413.1 | 99.7 | 411.1 | 2.0 |
| 3 | 420.4 | 65.3 | 274.5 | 145.9 |
| 4 | 424.0 | 80.2 | 340.0 | 84.0 |
| 5 | 423.4 | 84.2 | 356.5 | 66.9 |
| 6 | 424.7 | 91.9 | 390.3 | 34.4 |
| 7 | 425.2 | 91.7 | 389.9 | 35.3 |
| 8 | 422.4 | 81.8 | 345.5 | 76.9 |
| 9 | 423.2 | 92.9 | 393.2 | 30.0 |
| 10 | 430.3 | 95.4 | 410.5 | 19.8 |
| 11 | 422.0 | 85.5 | 360.8 | 61.2 |
| 12 | 425.4 | 97.9 | 416.5 | 8.9 |
| 13 | 428.2 | 97.1 | 415.8 | 12.4 |
| 14 | 426.3 | 90.8 | 387.1 | 39.2 |
| 15 | 423.0 | 81.5 | 344.7 | 78.3 |
| 16 | 430.0 | 87.5 | 376.3 | 53.7 |
| 17 | 426.6 | 93.8 | 400.2 | 26.4 |
| 18 | 425.7 | 99.8 | 424.8 | 0.9 |
| 19 | 420.4 | 70.1 | 294.7 | 125.7 |
| 20 | 422.7 | 81.9 | 346.2 | 76.5 |
| 21 | 423.6 | 94.0 | 398.2 | 25.4 |
| 22 | 430.0 | 61.6 | 264.9 | 165.1 |
| 23 | 424.4 | 98.3 | 417.2 | 7.2 |
| 24 | 420.4 | 91.6 | 385.1 | 35.3 |
| 25 | 426.4 | 94.1 | 401.2 | 25.2 |
| 26 | 425.6 | 95.5 | 406.4 | 19.2 |
| 27 | 442.0 | 88.8 | 392.5 | 49.5 |
| 28 | 426.2 | 86.0 | 366.5 | 59.7 |
| 29 | 426.1 | 75.9 | 323.4 | 102.7 |
| 30 | 423.9 | 98.2 | 416.3 | 7.6 |
| 31 | 424.2 | 88.8 | 376.7 | 47.5 |
| 32 | 426.3 | 97.9 | 417.3 | 9.0 |
| 33 | 426.0 | 80.3 | 342.1 | 83.9 |
| 34 | 427.0 | 97.7 | 417.2 | 9.8 |
| | | | | 1625.5 Total Time for Unprocessed PAUS |

TABLE 4-2

ESTIMATE OF PROCESSING TIME REQUIREMENTS IN EXCESS OF TIME AVAILABLE

NY 1986 LEVEL C TRAFFIC

| LATTICE | PAUS TIME REQUIRED | % PAUS COMPLETE | PAUS TIME COMPLETED | REMAINDER |
|---|---|---|---|---|
| 1 | 311.0 | 79.8 | 248.2 | 62.8 |
| 2 | 433.1 | 56.6 | 245.1 | 188.0 |
| 3 | 434.3 | 46.6 | 202.4 | 231.9 |
| 4 | 437.2 | 59.1 | 258.4 | 178.8 |
| 5 | 438.2 | 51.0 | 248.8 | 188.4 |
| 6 | 432.9 | 54.0 | 233.8 | 199.1 |
| 7 | 436.6 | 60.1 | 262.4 | 174.2 |
| 8 | 438.5 | 57.4 | 251.7 | 186.8 |
| 9 | 435.3 | 75.3 | 327.8 | 107.5 |
| 10 | 435.5 | 46.3 | 201.6 | 233.9 |
| 11 | 436.2 | 52.3 | 228.1 | 208.1 |
| 12 | 441.9 | 45.0 | 198.9 | 243.0 |
| 13 | 432.8 | 72.8 | 315.1 | 117.7 |
| 14 | 434.1 | 44.1 | 191.4 | 242.7 |
| 15 | 435.1 | 62.6 | 272.4 | 162.7 |
| 16 | 437.8 | 51.0 | 223.3 | 214.5 |
| 17 | 433.0 | 45.9 | 198.7 | 234.3 |
| 18 | 436.6 | 51.1 | 223.1 | 213.5 |
| 19 | 441.8 | 60.5 | 267.3 | 174.5 |
| 20 | 441.6 | 84.2 | 371.8 | 69.8 |
| 21 | 437.9 | 47.4 | 207.6 | 230.3 |
| 22 | 434.1 | 61.5 | 267.0 | 167.1 |
| 23 | 435.3 | 61.4 | 267.3 | 168.0 |
| 24 | 438.5 | 62.9 | 275.8 | 162.7 |
| 25 | 441.2 | 59.7 | 263.4 | 177.8 |
| 26 | 439.6 | 75.7 | 332.8 | 106.8 |
| 27 | 439.5 | 55.7 | 244.8 | 194.7 |
| 28 | 435.3 | 44.7 | 194.6 | 240.7 |
| 29 | 438.0 | 49.4 | 216.4 | 221.6 |
| 30 | 434.0 | 34.8 | 151.0 | 283.0 |
| 31 | 435.3 | 57.9 | 252.0 | 183.3 |
| 32 | 438.8 | 63.5 | 278.6 | 160.2 |
| 33 | 435.3 | 63.0 | 274.2 | 161.1 |
| 34 | 432.9 | 41.8 | 181.0 | 251.9 |
| | | | | 6341.4 |

TABLE 4-3

ESTIMATE OF PROCESSING TIME REQUIREMENTS
IN EXCESS OF TIME AVAILABLE

NY 1988 LEVEL C TRAFFIC

PAUS PROCESSING

| LATTICE | PAUS TIME REQUIRED | % PAUS COMPLETE | PAUS TIME COMPLETED | REMAINDER |
|---|---|---|---|---|
| 1 | | | | |
| 2 | 418.0 | 98.5 | 411.7 | 6.3 |
| 3 | 451.6 | 82.9 | 374.4 | 77.2 |
| 4 | 460.2 | 72.9 | 335.5 | 124.7 |
| 5 | 461.4 | 88.9 | 410.2 | 51.2 |
| 6 | 463.8 | 79.4 | 368.3 | 95.5 |
| 7 | 457.3 | 69.4 | 317.4 | 139.9 |
| 8 | 464.2 | 74.1 | 344.0 | 120.2 |
| 9 | 457.3 | 89.8 | 410.7 | 46.6 |
| 10 | 462.7 | 85.0 | 393.3 | 69.4 |
| 11 | 462.9 | 90.1 | 417.1 | 45.8 |
| 12 | 465.6 | 79.4 | 369.7 | 95.9 |
| 13 | 465.0 | 86.3 | 401.3 | 63.7 |
| 14 | 470.1 | 86.1 | 404.8 | 65.3 |
| 15 | 460.1 | 84.5 | 388.8 | 71.3 |
| 16 | 460.0 | 68.7 | 316.0 | 144.0 |
| 17 | 471.7 | 74.7 | 352.4 | 119.3 |
| 18 | 461.7 | 81.8 | 377.7 | 84.0 |
| 19 | 455.4 | 83.8 | 381.6 | 73.8 |
| 20 | 462.8 | 77.6 | 359.1 | 103.7 |
| 21 | 462.2 | 73.0 | 337.4 | 124.8 |
| 22 | 462.4 | 92.3 | 426.8 | 35.6 |
| 23 | 464.2 | 88.4 | 410.4 | 53.8 |
| 24 | 459.1 | 90.3 | 414.6 | 44.5 |
| 25 | 465.8 | 84.4 | 393.1 | 72.7 |
| 26 | 458.4 | 73.6 | 337.4 | 121.0 |
| 27 | 456.4 | 75.8 | 346.0 | 110.4 |
| 28 | 464.1 | 67.9 | 315.1 | 149.0 |
| 29 | 456.2 | 82.1 | 374.5 | 81.7 |
| 30 | 459.4 | 76.4 | 351.0 | 108.4 |
| 31 | 461.8 | 79.2 | 365.7 | 96.1 |
| 32 | 457.4 | 77.4 | 354.0 | 103.4 |
| 33 | 464.0 | 81.9 | 380.0 | 84.0 |
| 34 | 458.4 | 83.8 | 384.1 | 74.3 |
| | 1424.3 | | | 2857.5 |

TABLE 4-4

ESTIMATE OF PROCESSING TIME REQUIREMENTS IN EXCESS OF TIME AVAILABLE

*NY 1990 LEVEL C TRAFFIC*

| LATTICE | PAUS TIME REQUIRED | % PAUS COMPLETE | PAUS TIME COMPLETED | REMAINDER |
|---|---|---|---|---|
| 1 | | | | |
| 2 | 396.1 | 97.9 | 387.8 | 8.3 |
| 3 | 459.6 | 79.1 | 363.5 | 96.1 |
| 4 | 460.8 | 79.4 | 365.9 | 94.9 |
| 5 | 458.7 | 73.7 | 338.1 | 120.6 |
| 6 | 472.9 | 74.2 | 350.9 | 122.0 |
| 7 | 465.3 | 70.6 | 328.5 | 136.8 |
| 8 | 461.4 | 69.9 | 322.5 | 138.9 |
| 9 | 465.4 | 78.6 | 365.8 | 99.6 |
| 10 | 464.7 | 93.4 | 434.0 | 30.7 |
| 11 | 480.3 | 75.4 | 362.1 | 118.2 |
| 12 | 464.5 | 79.4 | 368.8 | 95.7 |
| 13 | 483.7 | 71.7 | 346.8 | 136.9 |
| 14 | 469.2 | 79.6 | 373.5 | 95.7 |
| 15 | 465.4 | 78.5 | 365.3 | 100.1 |
| 16 | 467.1 | 73.0 | 341.0 | 126.1 |
| 17 | 462.2 | 68.1 | 314.8 | 147.4 |
| 18 | 477.3 | 72.5 | 346.0 | 131.3 |
| 19 | 460.9 | 98.8 | 455.4 | 5.5 |
| 20 | 456.7 | 82.2 | 375.4 | 81.3 |
| 21 | 464.1 | 76.6 | 355.5 | 108.6 |
| 22 | 467.8 | 69.2 | 323.7 | 144.1 |
| 23 | 465.1 | 73.2 | 340.5 | 124.6 |
| 24 | 462.6 | 89.3 | 413.1 | 49.5 |
| 25 | 463.5 | 75.7 | 350.9 | 112.6 |
| 26 | 464.6 | 88.0 | 408.8 | 55.8 |
| 27 | 468.7 | 79.0 | 370.3 | 98.4 |
| 28 | 467.5 | 79.8 | 373.1 | 94.4 |
| 29 | 464.8 | 67.0 | 311.4 | 153.4 |
| 30 | 466.6 | 80.7 | 376.5 | 90.1 |
| 31 | 468.0 | 79.7 | 373.0 | 95.0 |
| 32 | 469.1 | 67.7 | 317.1 | 152.0 |
| 33 | 463.7 | 88.4 | 409.9 | 53.8 |
| 34 | 462.2 | 89.3 | 412.7 | 49.5 |
| | | | | 3257.9 |

TABLE 4-5
ESTIMATE OF PROCESSING TIME REQUIREMENTS
IN EXCESS OF TIME AVAILABLE

NY 1986 LEVEL B TRAFFIC

| LATTICE | PAUS TIME REQUIRED | % PAUS COMPLETE | PAUS TIME COMPLETED | REMAINDER | SUB. CUM. |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| 3 | 278.4 | 96.5 | 268.7 | 9.7 | |
| 4 | | | | | |
| 5 | 296.1 | 90.1 | 266.8 | 29.3 | |
| 6 | 303.0 | 98.5 | 298.5 | 4.5 | |
| 7 | 296.1 | 99.2 | 293.7 | 2.4 | |
| 8 | 296.1 | 83.8 | 248.1 | 48.0 | |
| 9 | 301.2 | 99.4 | 299.4 | 1.8 | |
| 10 | 296.1 | 98.2 | 290.8 | 5.3 | |
| 11 | 296.1 | 92.8 | 274.8 | 21.3 | |
| 12 | 298.2 | 97.4 | 290.4 | 7.8 | |
| | | | | | 120.4 |
| 13 | | | | | |
| 14 | 295.8 | 98.2 | 290.5 | 5.3 | |
| 15 | 296.1 | 97.3 | 288.1 | 8.0 | |
| 16 | 296.2 | 82.1 | 243.2 | 53.0 | |
| 17 | 299.9 | 97.4 | 292.1 | 7.8 | |
| 18 | 299.6 | 96.8 | 290.0 | 9.6 | |
| 19 | 301.1 | 97.6 | 293.9 | 7.2 | |
| 20 | 298.9 | 98.1 | 293.2 | 5.7 | |
| 21 | 296.1 | 99.0 | 293.1 | 3.0 | |
| 22 | 296.1 | 99.0 | 293.1 | 3.0 | |
| 23 | 296.1 | 97.1 | 287.5 | 8.6 | |
| | | | | | 111.2 |
| 24 | | | | | |
| 25 | 288.6 | 95.8 | 276.5 | 12.1 | |
| 26 | 298.2 | 96.9 | 289.0 | 9.2 | |
| 27 | 306.2 | 99.4 | 304.4 | 1.8 | |
| 28 | 296.1 | 96.7 | 286.3 | 9.8 | |
| 29 | 302.7 | 88.1 | 266.7 | 36.0 | |
| 30 | 298.6 | 97.8 | 292.0 | 6.6 | |
| 31 | 296.1 | 97.2 | 287.8 | 8.3 | |
| 32 | 300.2 | 90.2 | 270.8 | 29.4 | |
| 33 | 303.8 | 98.4 | 298.9 | 4.9 | |
| 34 | 296.1 | 98.4 | 296.1 | 4.7 | |
| | | | | | 113.0 |

# EXHIBIT 4-2

## PROCESSOR UTILIZATION SIMULATION RESULTS

## CHICAGO

## LEVEL C TRAFFIC

| No. of Processors | | 1980 | 1982 | 1984 | 1986 | 1988 | 1990 |
|---|---|---|---|---|---|---|---|
| 4 | Lattices Executed | | 55 | 45 | 43 | 42 | 42 |
| | Lattice Duration: Mean | | 90.9 | 109.3 | 115.6 | 118.9 | 117.6 |
| | σ | | 8.4 | 7.8 | 8.3 | 8.8 | 8.4 |
| | % Process Time: Plnd. Tasks | | 72.4 | 80.5 | 67.9 | 68.1 | 68.7 |
| | Popup Tasks | | 15.2 | 8.7 | 24.8 | 24.7 | 24.3 |
| | Overhd. | | 7.6 | 7.0 | 5.3 | 5.5 | 5.2 |
| | Dead | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Inact. | | 4.7 | 3.8 | 2.0 | 1.7 | 1.7 |
| | Total Process Time for Tasks | | 17517 | 17547 | 18424 | 18540 | 18381 |
| | Lattice Timeouts | | 0 | 0 | 0 | 0 | 0 |
| 3 | Lattices Executed | 40 | 36 | | | | |
| | Lattice Duration: Mean | 125.2 | 137.4 | | | | |
| | σ | 10.0 | 10.2 | | | | |
| | % Process Time: Plnd. Tasks | 73.6 | 74.2 | | | | |
| | Popup Tasks | 19.7 | 19.3 | | | | |
| | Overhd. | 5.5 | 6.1 | | | | |
| | Dead | 0.0 | 0.0 | | | | |
| | Inact. | 1.2 | 0.4 | | | | |
| | Total Process Time for Tasks | 14013 | 13873 | | | | |
| | Lattice Timeouts | 2 | 10 | | | | |
| | New Functions | | CA | TIPS<br>FDAD<br>TCDD | M&S<br>DABS | | |

## EXHIBIT 4-2 (Cont'd.)

### PROCESSOR UTILIZATION SIMULATION RESULTS (Cont'd.)

### CHICAGO

### LEVEL B TRAFFIC

| No. of Processors | | 1980 | 1982 | 1984 | 1986 | 1988 | 1990 |
|---|---|---|---|---|---|---|---|
| 4 | Lattices Executed | | | | 54 | 53 | 51 |
| | Lattice Duration: Mean | | | | 92.0 | 93.9 | 96.8 |
| | σ | | | | 7.2 | 7.4 | 7.6 |
| | % Process Time: Plnd. Tasks | | | | 65.6 | 65.4 | 65.2 |
| | Popup Tasks | | | | 24.4 | 24.5 | 25.3 |
| | Overhd. | | | | 6.5 | 6.7 | 6.4 |
| | Dead | | | | 0.0 | 0.0 | 0.0 |
| | Inact. | | | | 3.5 | 3.4 | 3.1 |
| | Total Process Time for Tasks | | | | 19874 | 19905 | 19739 |
| | Lattice Timeouts | | | | 0 | 0 | 0 |
| 3 | Lattices Executed | 48 | 42 | 38 | 34 | | |
| | Lattice Duration: Mean | 103.9 | 118.0 | 130.4 | 145.9 | | |
| | σ | 10.7 | 9.0 | 8.1 | 7.2 | | |
| | % Process Time: Plnd. Tasks | 70.9 | 71.4 | 79.8 | 61.9 | | |
| | Popup Tasks | 19.3 | 19.6 | 11.4 | 32.8 | | |
| | Overhd. | 7.0 | 6.6 | 6.8 | 5.3 | | |
| | Dead | 0.0 | 0.0 | 0.0 | 0.0 | | |
| | Inact. | 2.8 | 2.4 | 2.0 | 0.1 | | |
| | Total Process Time for Tasks | 13497 | 13530 | 13561 | 14092 | | |
| | Lattice Timeouts | 0 | 0 | 2 | 28 | | |
| | New Functions | | CA | TIPS FDAD TCDD | M&S DABS | | |

# EXHIBIT 4-3

## PROCESSOR UTILIZATION SIMULATION RESULTS

## LOS ANGELES

## LEVEL C TRAFFIC

| No. of Processors | | | 1980 | 1982 | 1984 | 1986 | 1988 | 1990 |
|---|---|---|---|---|---|---|---|---|
| 4 | Lattice Executed | | | 57 | 48 | 46 | 39 | 38 |
| | Lattice Duration: | Mean | | 87.2 | 103.7 | 107.0 | 127.3 | 132.2 |
| | | σ | | 7.4 | 9.5 | 7.8 | 10.0 | 10.2 |
| | % Process Time: | Plnd. Tasks | | 74.2 | 80.3 | 68.3 | 68.9 | 68.4 |
| | | Popup Tasks | | 12.4 | 8.4 | 23.5 | 25.1 | 25.8 |
| | | Overhd. | | 7.7 | 7.2 | 5.7 | 4.7 | 4.6 |
| | | Dead | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | | Inact. | | 5.7 | 4.1 | 2.6 | 1.3 | 1.2 |
| | Total Process Time for Tasks | | | 17216 | 17659 | 18075 | 18665 | 18922 |
| | Lattice Timeouts | | | 0 | 0 | 0 | 0 | 0 |
| 3 | Lattice Executed | | 42 | 37 | | | | |
| | Lattice Duration: | Mean | 119.5 | 135.5 | | | | |
| | | σ | 13.6 | 9.1 | | | | |
| | % Process Time: | Plnd. Tasks | 75.7 | 76.1 | | | | |
| | | Popup Tasks | 16.6 | 16.8 | | | | |
| | | Overhd. | 5.6 | 6.0 | | | | |
| | | Dead | 0.0 | 0.0 | | | | |
| | | Inact. | 2.1 | 2.1 | | | | |
| | Total Process Time for Tasks | | 13099 | 13970 | | | | |
| | Lattice Timeouts | | 0 | 7 | | | | |
| | New Functions | | | CA | TIPS<br>FDAD<br>TCDD | M&S<br>DABS | | |

## EXHIBIT 4-3 (Cont'd.)

### PROCESSOR UTILIZATION SIMULATION RESULTS (Cont'd.)

### LOS ANGELES

### LEVEL B TRAFFIC

| No. of Processors | | | 1980 | 1982 | 1984 | 1986 | 1988 | 1990 |
|---|---|---|---|---|---|---|---|---|
| 4 | Lattice Executed | | | | 56 | 55 | 49 | 48 |
| | Lattice Duration: | Mean | | | 88.3 | 90.3 | 101.2 | 104.0 |
| | | σ | | | 7.8 | 8.1 | 7.8 | 8.4 |
| | % Process Time: | Plnd. Tasks | | | 77.6 | 66.3 | 66.1 | 66.0 |
| | | Popup Tasks | | | 7.9 | 23.3 | 25.3 | 25.7 |
| | | Overhd. | | | 8.5 | 6.8 | 5.9 | 5.9 |
| | | Dead | | | 0.0 | 0.0 | 0.1 | 0.0 |
| | | Inact. | | | 5.9 | 3.6 | 2.7 | 2.5 |
| | Total Process Time for Tasks | | | | 19017 | 17792 | 18133 | 18311 |
| | Lattice Timeouts | | | | 0 | 0 | 0 | 0 |
| 3 | Lattice Executed | | 49 | 43 | 36 | | | |
| | Lattice Duration: | Mean | 103.3 | 115.9 | 136.7 | | | |
| | | σ | 9.4 | 9.1 | 9.3 | | | |
| | % Process Time: | Plnd. Tasks | 73.9 | 74.1 | 80.8 | | | |
| | | Popup Tasks | 16.9 | 16.7 | 11.6 | | | |
| | | Overhd. | 6.9 | 6.8 | 6.1 | | | |
| | | Dead | 0.0 | 0.0 | 0.0 | | | |
| | | Inact. | 2.3 | 2.4 | 1.5 | | | |
| | Total Process Time for Tasks | | 13527 | 13522 | 13638 | | | |
| | Lattice Timeouts | | 0 | 0 | 10 | | | |
| | New Functions | | | CA | TIPS<br>FDAD<br>TCDD | M&S<br>DABS | | |

# EXHIBIT 4-4

## PROCESSOR UTILIZATION SIMULATION RESULTS

### DETROIT

### LEVEL C TRAFFIC

| No. of Processors | | 1980 | 1982 | 1984 | 1986 | 1988 | 1990 |
|---|---|---|---|---|---|---|---|
| 4 | Lattices Executed | | | | 63 | 57 | 55 |
| | Lattice Duration: Mean | | | | 78.3 | 87.0 | 89.6 |
| | σ | | | | 6.1 | 7.0 | 8.6 |
| | % Process Time: Plnd. Tasks | | | | 69.4 | 70.8 | 70.0 |
| | Popup Tasks | | | | 19.7 | 19.7 | 20.9 |
| | Overhd. | | | | 6.3 | 5.7 | 5.3 |
| | Dead | | | | 0.7 | 0.6 | 0.8 |
| | Inact. | | | | 3.9 | 3.2 | 3.1 |
| | Total Process Time for Tasks | | | | 17572 | 17943 | 17913 |
| | Lattice Timeouts | | | | 0 | 0 | 0 |
| 3 | Lattices Executed | 78 | 69 | 44 | 36 | | |
| | Lattice Duration: Mean | 63.6 | 71.2 | 113.7 | 138.9 | | |
| | σ | 10.7 | 12.5 | 13.7 | 13.4 | | |
| | % Process Time: Plnd. Tasks | 71.6 | 73.6 | 84.0 | 70.3 | | |
| | Popup Tasks | 12.9 | 12.8 | 7.7 | 24.9 | | |
| | Overhd. | 8.3 | 8.0 | 5.8 | 4.4 | | |
| | Dead | 1.8 | 0.3 | 0.0 | 0.0 | | |
| | Inact. | 5.4 | 5.2 | 2.4 | 0.4 | | |
| | Total Process Time for Tasks | 12573 | 12743 | 13768 | 14282 | | |
| | Lattice Timeouts | 0 | 0 | 0 | 21 | | |
| 2 | Lattices Executed | 40 | | | | | |
| | Lattice Duration: Mean | 123.9 | | | | | |
| | σ | 18.0 | | | | | |
| | % Process Time: Plnd. Tasks | 76.6 | | | | | |
| | Popup Tasks | 17.5 | | | | | |
| | Overhd. | 5.5 | | | | | |
| | Dead | 0.0 | | | | | |
| | Inact. | 0.3 | | | | | |
| | Total Process Time for Tasks | 9325 | | | | | |
| | Lattice Timeouts | 7 | | | | | |
| 1 | Lattices Executed | 23* | | | | | |
| | Lattice Duration: Mean | 213.3 | | | | | |
| | σ | 24.0 | | | | | |
| | % Process Time: Plnd. Tasks | 60.0 | | | | | |
| | Popup Tasks | 33.4 | | | | | |
| | Overhd. | 6.6 | | | | | |
| | Dead | 0.0 | | | | | |
| | Inact. | 0.0 | | | | | |
| | Total Process Time for Tasks | 4689 | | | | | |
| | Lattice Timeouts | 23 | | | | | |
| | New Functions | | CA | TIPS<br>FDAD<br>TCDD | M&S<br>DABS | | |

*Processing was 9 sectors behind real time at the end of one scan period.

## EXHIBIT 4-4 (Cont'd.)

### PROCESSOR UTILIZATION SIMULATION RESULTS

### DETROIT

### LEVEL B TRAFFIC

| No. of Processors | | 1980 | 1982 | 1984 | 1986 | 1988 | 1990 |
|---|---|---|---|---|---|---|---|
| 4 | Lattices Executed | | | | | | |
| | Lattice Duration: Mean | | | | | | |
| | σ | | | | | | |
| | % Process Time: Plnd. Tasks | | | | | | |
| | Popup Tasks | | | | | | |
| | Overhd. | | | | | | |
| | Dead | | | | | | |
| | Inact. | | | | | | |
| | Total Process Time for Tasks | | | | | | |
| | Lattice Timeouts | | | | | | |
| 3 | Lattices Executed | | | 60 | 51 | 45 | 44 |
| | Lattice Duration: Mean | | | 83.2 | 97.0 | 109.3 | 112.9 |
| | σ | | | 9.7 | 11.6 | 12.7 | 13.5 |
| | % Process Time: Plnd. Tasks | | | 79.8 | 65.9 | 66.3 | 65.0 |
| | Popup Tasks | | | 7.6 | 25.3 | 26.9 | 28.1 |
| | Overhd. | | | 7.5 | 5.9 | 5.0 | 5.1 |
| | Dead | | | 0.2 | 0.5 | 0.2 | 0.4 |
| | Inact. | | | 4.9 | 2.4 | 1.6 | 1.3 |
| | Total Process Time for Tasks | | | 14093 | 13531 | 13757 | 13873 |
| | Lattice Timeouts | | | 0 | 0 | 0 | 0 |
| 2 | Lattices Executed | 56 | 48 | 35 | | | |
| | Lattice Duration: Mean | 88.6 | 104.1 | 144.5 | | | |
| | σ | 14.6 | 16.5 | 7.3 | | | |
| | % Process Time: Plnd. Tasks | 73.5 | 73.3 | 82.4 | | | |
| | Popup Tasks | 17.5 | 18.2 | 11.7 | | | |
| | Overhd. | 7.1 | 7.0 | 5.9 | | | |
| | Dead | 0.0 | 0.0 | 0.0 | | | |
| | Inact. | 1.8 | 1.6 | 0.0 | | | |
| | Total Process Time for Tasks | 9026 | 9145 | 8506 | | | |
| | Lattice Timeouts | 0 | 0 | 29 | | | |
| 1 | Lattices Executed | 26 | | | | | |
| | Lattice Duration: Mean | 194.7 | | | | | |
| | σ | 20.8 | | | | | |
| | % Process Time: Plnd. Tasks | 57.3 | | | | | |
| | Popup Tasks | 35.6 | | | | | |
| | Overhd. | 7.1 | | | | | |
| | Dead | 0.0 | | | | | |
| | Inact. | 0.0 | | | | | |
| | Total Process Time for Tasks | 4663 | | | | | |
| | Lattice Timeouts | 26 | | | | | |
| | New Functions | | CA | TIPS FDAD TCDD | M&S DABS | | |

| | Year | Additional Time |
|---|---|---|
| Level C traffic | 1984 | 1600 mils |
| | 1986 | 6300 |
| | 1988 | 2900 |
| | 1990 | 3300 |
| Level B traffic | 1986 | 300 |

It should be noted that the actual increased amount of processing time consumed by additional processors should exceed the amount required for PAUS processing. The reason is that additional processors will require overhead processing time and may enable the execution of additional tasks in a free running lattice design.

However, comparing the additional processing time required for PAUS to 4915 mils, which is the time available for one processor for one scan, the following additional active processors are required for New York.

| | Year | Additional IOPs |
|---|---|---|
| Level C traffic | 1984 | 1 |
| | 1986 | 2 |
| | 1988 | 1 |
| | 1990 | 1 |
| Level B traffic | 1986 | 1 |

Exhibits 4-2 through 4-4 summarize the processor utilization results for Chicago, Los Angeles and Detroit. The results indicate that four active processors is the maximum number expected to be required at any of these tracons.

Estimates of the total number of active processors required for New York, Chicago, Los Angeles and Detroit are given in Table 4-6.

## 4.2 Storage Capacity

The analysis results indicate that the demand for storage will equal or exceed

TABLE 4-6
ESTIMATE OF THE NUMBER OF REQUIRED ACTIVE PROCESSORS

LEVEL C TRAFFIC

| | NY | LA | CHI | DET |
|---|---|---|---|---|
| 1980 | 7* | 3* | 3* | 3 |
| 1982 | 7 | 4 | 4 | 3 |
| 1984 | 8 | 4 | 4 | 3 |
| 1986 | 9 | 4 | 4 | 4 |
| 1988 | 8 | 4 | 4 | 4 |
| 1990 | 8 | 4 | 4 | 4 |

LEVEL B TRAFFIC

| | NY | LA | CHI | DET |
|---|---|---|---|---|
| 1980 | 7* | 3* | 3* | 2 |
| 1982 | 7* | 3* | 3* | 2 |
| 1984 | 7* | 4 | 3 | 3 |
| 1986 | 8 | 4 | 4 | 3 |
| 1988 | 7 | 4 | 4 | 3 |
| 1990 | 7 | 4 | 4 | 3 |

*These numbers represent the planned initial configurations at New York, Chicago and Los Angeles. No attempt was made to determine if fewer processors could be used in 1980. For Detroit the assumed initial configuration included one processor. Therefore, the estimated processing requirements for Detroit in 1980 represent the minimum requirements for Level B and Level C traffic assumptions.

system capacity at all high traffic density sites, except single sensor sites. Exhibits 4-5 through 4-8 are charts of the storage requirement estimates for New York, Chicago, Los Angeles and Detroit. They indicate memory capacity will be exceeded in the following years:

| Tracon | Year Marginally Exceeded | Year Firmly Exceeded |
|---|---|---|
| New York | | 1982 |
| Chicago | 1986 | |
| Los Angeles | | 1986 |
| Detroit | 14 to 15 memory modules estimated in 1986. Capacity not exceeded. | |

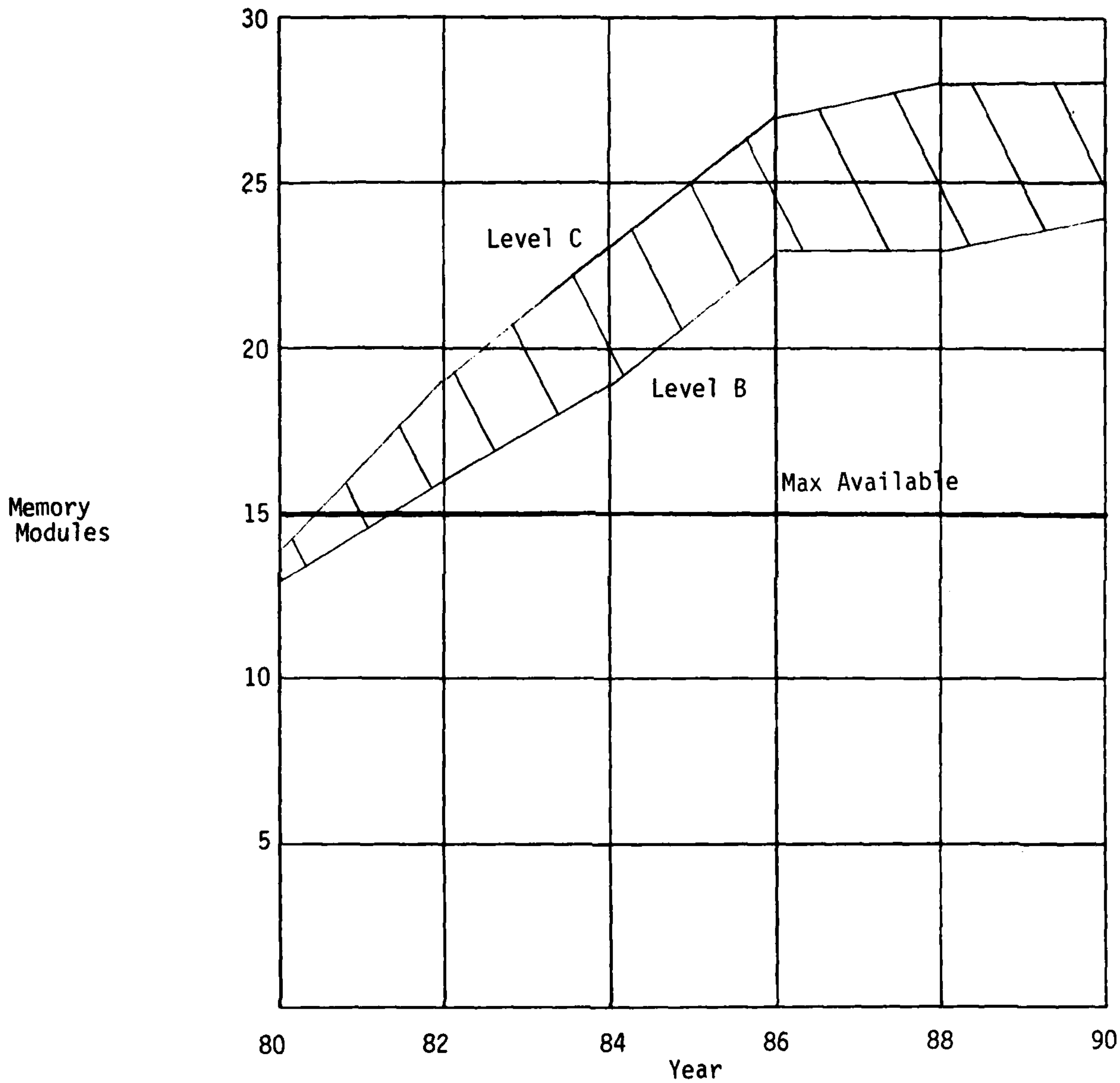



EXHIBIT 4-5

ESTIMATED NUMBER OF MEMORY MODULES - NEW YORK

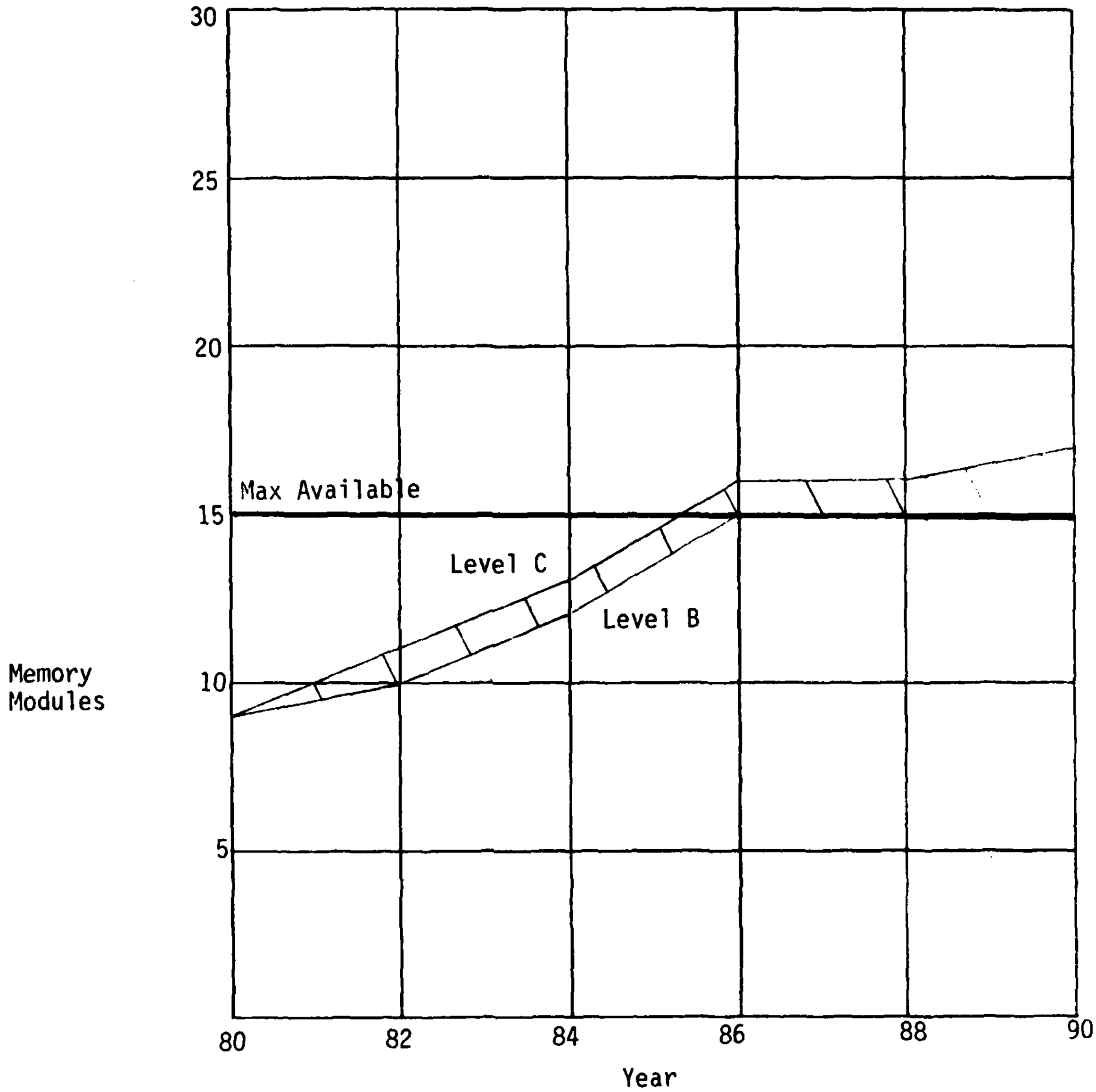



EXHIBIT 4-6

ESTIMATED NUMBER OF MEMORY MODULES - CHICAGO

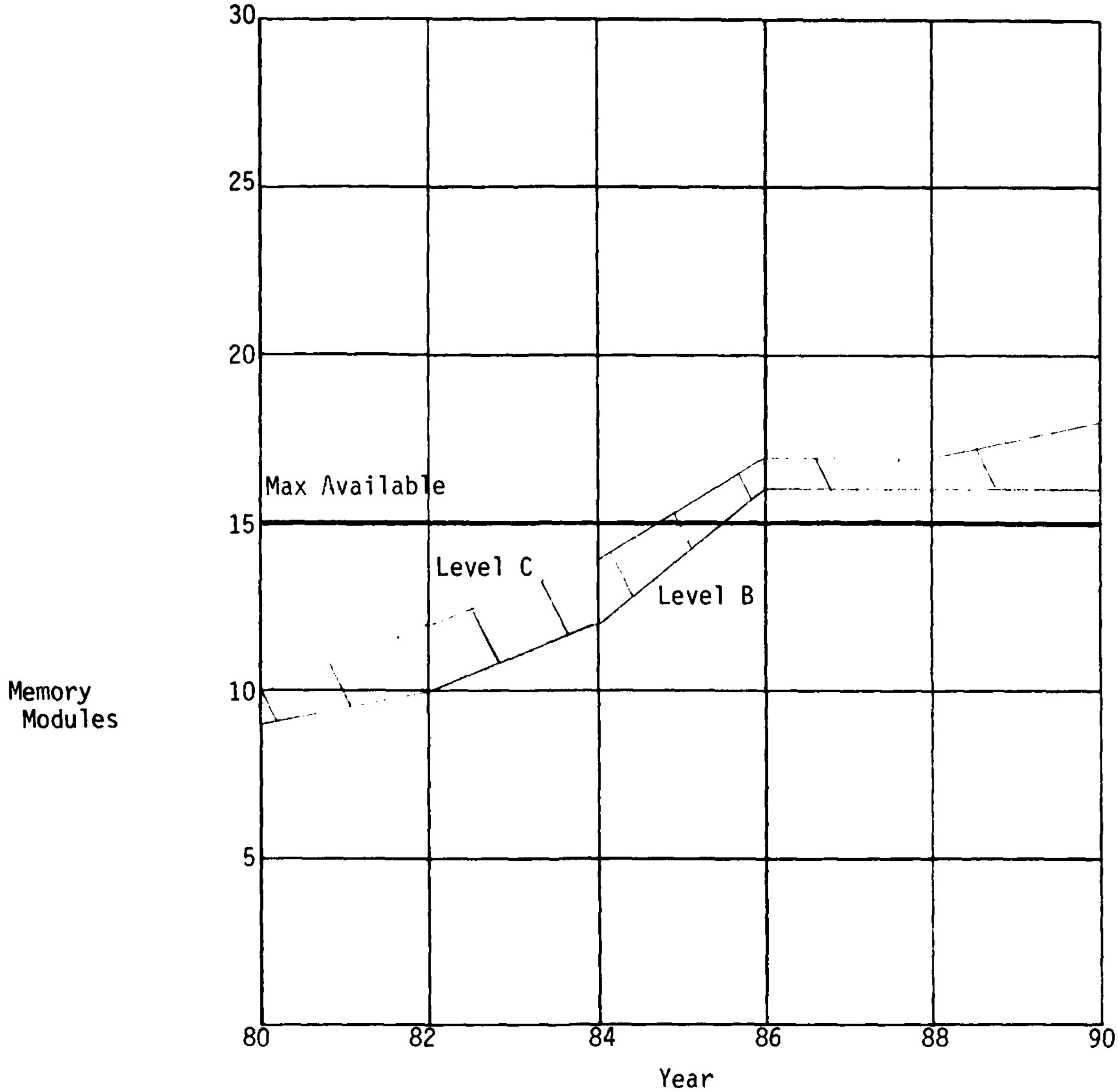



EXHIBIT 4-7

ESTIMATED NUMBER OF MEMORY MODULES - LOS ANGELES

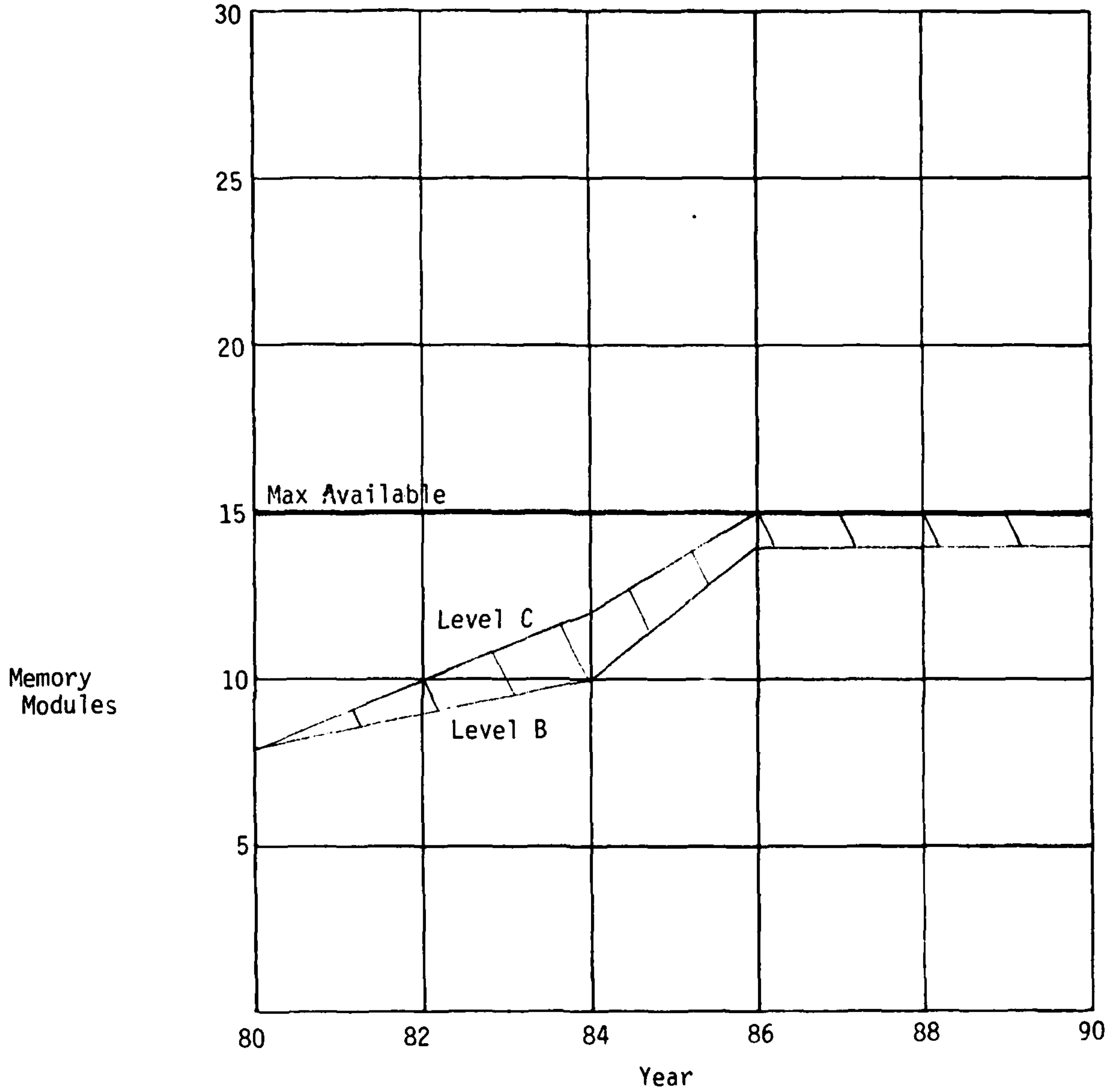



EXHIBIT 4-8

ESTIMATED NUMBER OF MEMORY MODULES - DETROIT

## 4.3 PROCESSING CAPACITY SENSITIVITY ANALYSIS RESULTS

The processing capacity requirements estimates resulting from the above analysis are based on the assuptions that

- The instantaneous traffic load during a busy hour will be within the range of the level B and level C estimates of this study
- CA, FDAD, M&S and DABS will be implemented within the time frame of the study
- The New York TRACON will automatically acquire tracks on radar and beacon targets

The sensitivity of the processing requirements to variations in traffic load from level B to level C may be seen by examination of Table 4-6.

- At New York in the years 1984 through 1990, the number of processors required for level C traffic is one greater than the number required for level B traffic.
- The number of processors required at Los Angeles and Chicago is sensitive to the traffic assumptions only in one year, 1982. In 1982, level C traffic estimates result in a requirement of four processors at Los Angeles and Chicago, while only three processors are required for level B traffic. However, four processors are required after 1982 regardless of whether the traffic is level C or level B.
- The variation in traffic estimates results in a variation of one processor at Detroit for all years except 1984. The number of processors at Detroit in 1984 is insensitive to the difference between level B and level C traffic.

Since the processing requirements at New York are expected to equal or exceed available capacity, an analysis was performed to determine the sensitivity of the capacity requirements to the implementation of future functional enhancements.

Future functions which are expected to have significant impacts on processing time are CA, FDAD, M&S and DABS. Exhibit 4-9 shows the estimated number of processors required for new functions in the years 1982 to 1990. The bases for the estimates are given in Exhibits 4-10 through 4-13.

The New York TRACON processing and memory requirements estimates were based on the assumption that New York would be implemented as a track-all system. If the New York system does not automatically acquire tracks on radar only targets, the processing and memory requirements can be expected to decrease slightly. Estimates for the amount of processing capacity attributable to tracking all targets instead of only beacon equipped targets is shown in Exhibit 4-14 (Level C traffic is assumed). The reduction in memory requirements would be approximately 37.625(R), where R is the number of radar only targets. For 1980, Level C traffic, the reduction in memory requirements would then be 37.625(451) = 16,969 words, or about 1 MM.

EXHIBIT 4-9 ESTIMATED NUMBER OF PROCESSORS REQUIRED FOR NEW FUNCTIONS

LEVEL C, NEW YORK

| | CA | FDAD | M&S | DABS |
|---|---|---|---|---|
| 1982 | 0.30 | | | |
| 1984 | 0.31 | 0.86 | | |
| 1986 | 0.34 | 0.87 | 0.93 | |
| 1988 | 0.37 | 0.91 | 0.94 | -0.37 |
| 1990 | 0.40 | 0.92 | 0.94 | -0.37 |

EXHIBIT 4-10 ESTIMATE OF PROCESSING REQUIREMENT IMPACT DUE TO CONFLICT ALERT

LEVEL C, NEW YORK

| | Mean Time in Mils | | | | | | |
|---|---|---|---|---|---|---|---|
| YEAR | $T_{TUDX}$ | $T_{CA}$ | $T_{CATRK}$ | $T_{CATU}$ | $T_{CONFLICT\ ALERT}$* | $T_{LATTICE}$ | #PROCESSORS** |
| 1982 | 7.9 | 20.7 | 10.0 | 2.0 | 40.6 | 133.8 | 0.30 |
| 1984 | 7.9 | 24.6 | 10.7 | 2.0 | 45.2 | 146.8 | 0.31 |
| 1986 | 7.9 | 28.4 | 11.9 | 2.0 | 50.2 | 147.4 | 0.34 |
| 1988 | 7.9 | 31.8 | 13.0 | 2.0 | 54.7 | 148.2 | 0.37 |
| 1990 | 7.9 | 35.0 | 13.7 | 2.0 | 58.6 | 147.6 | 0.40 |

* Computed by summing processing times for TUDX, CA, CATRK and CATU

**Total mean time for Conflict Alert tasks divided mean lattice time

EXHIBIT 4-11 ESTIMATE OF PROCESSING REQUIREMENT IMPACT DUE TO FDAD

LEVEL C, NEW YORK

| | Mean Time in Mils | | | | |
|---|---|---|---|---|---|
| YEAR | $T_{PUTT}$ | $T_{PAUS}$ | $T_{FDAD}$* | $T_{LATTICE}$ | #PROCESSORS** |
| 1982 | | | | | |
| 1984 | 4 | 421.6 | 125.9 | 146.8 | 0.86 |
| 1986 | 4 | 432.2 | 127.7 | 147.4 | 0.87 |
| 1988 | 4 | 456.1 | 135.3 | 148.2 | 0.91 |
| 1990 | 4 | 459.7 | 136.5 | 147.6 | 0.92 |

* Computed by summing the contributions due to PUTT and the increase in PAUS caused by FDAD. The total time for PAUS is

$$T_{PAUS} = 45.7 + 0.625\Sigma$$ ($\Sigma$ is a function of the number of tracks and displays)

Without FDAD, the time for PAUS would be

$$T'_{PAUS} = 45.7 + 0.425\Sigma$$

The impact due to FDAD is, therefore

$$T_{PAUS} - T'_{PAUS} = 0.2\Sigma$$

Since

$$\Sigma = (T_{PAUS} - 45.7)/0.625$$

It follows that

$$T_{PAUS} - T'_{PAUS} = 0.32(T_{PAUS} - 45.7)$$

And

$$T_{FDAD} = 0.32(T_{PAUS} - 45.7) + T_{PUTT}$$

**Mean process time attributable to FDAD divided by mean lattice time

EXHIBIT 4-12 ESTIMATE OF PROCESSING REQUIREMENT IMPACT DUE TO M&S

LEVEL C, NEW YORK

| | MS | | $\Sigma$(TA) | LATTICES | | $T_{M\&S}$* (Mils) | $T_{SCAN}$** (Mils) | #PROCESSORS*** |
|---|---|---|---|---|---|---|---|---|
| | Mean Time (Mils) | #Executions Per Scan | | Mean Time (Mils) | #Executions Per Scan | | | |
| 1982 | | | | | | | | |
| 1984 | | | | | | | | |
| 1986 | 142.9 | 32 | 84 | 147.4 | 34 | 4643.4 | 5011.6 | 0.93 |
| 1988 | 149.7 | 31 | 88 | 148.2 | 34 | 4714.6 | 5038.8 | 0.94 |
| 1990 | 149.7 | 31 | 88 | 147.6 | 34 | 4714.6 | 5018.4 | 0.94 |

* Expected processing time per scan due to M&S, computed by summation of the time for execution of the MS popup task and the increase in PAUS processing time for display of M&S data:

Time for MS task = (Mean time for MS) x (#Executions per scan)

Increased time for PAUS = $0.84\,\Sigma$(TA)

**Total time for one scan = (Mean lattice time) x (#Lattices per scan)

***$T_{M\&S}$ divided by $T_{SCAN}$

## EXHIBIT 4-13 ESTIMATE OF PROCESSING REQUIREMENT IMPACT DUE TO DABS

### LEVEL C, NEW YORK

| | $\Sigma$(TA) | $\Sigma$(TU) | $\Sigma$(TA)(TU) | $\Sigma$(ATD) | $\Sigma$(UTD) | $T_{DABS}$* (Mils) | $T_{SCAN}$ (Mils) | #PROCESSORS |
|---|---|---|---|---|---|---|---|---|
| 1988 | 88 | 1641 | 1213 | 78 | 241 | -1849 | 5038.8 | -0.37 |
| 1990 | 88 | 1665 | 1207 | 82 | 257 | -1856 | 5018.4 | -0.37 |

* Computed by taking the time for DABS minus the time saved by removing TEDC, TPUR, TCRSS and TPSEC

Processing time for DABC: 2.55 + 0.83 (TA + TU) + 0.3 (TA)(TU)

Processing time decrease for:
- TEDC - (1.7 + 0.55 (ATD + UTD) + 0.2 (TA)(TU)
- TPUR - 11.9
- TCRSS - (3.7 + TU)
- TPSEC - (7.8 + 0.5 (TU))

Total time change per lattice: $0.83\,(TA) - 0.67\,(TU) + 0.1\,(TA)(TU) - 0.55\,(ATD + UTD) - 22.6$

* Total time change per scan $0.83\,\Sigma(TA) - 0.67\,\Sigma(TU) + 0.1\,\Sigma(TA)(TU) - 0.55\Sigma(ATD + UTD) - 22.6L$

where $\Sigma$ is the sum over all lattices in a scan

L is the number of lattices in a scan

L = 34 for New York in 1988 and 1990

EXHIBIT 4-14

CHANGE IN ESTIMATED NUMBER OF PROCESSORS IN 1980 DUE TO AUTOMATED INTIATION OF TRACKS ONLY ON BEACON EQUIPPED AIRCRAFT

LEVEL C, NEW YORK

| TA | ATB | TU | UTB | ATD | L | UTD | Σ(TA)(TU)* | $\Delta T_{1980}$(Mils) | #PROCESSORS |
|---|---|---|---|---|---|---|---|---|---|
| 76 | 70 | 1491 | 1033 | 58 | 43 | 189 | 1213 | 4500 | 0.27 |

*Estimated sum of products of TA and TU, where the products are taken for each sector of each sensor.

$$T_{PAUS} = 0.0381(CTS)(\#Lattices) + 0.425\sum_j \sum_k \left[TU(j,k)\right]\left[\#Displays(j)\right]$$

$$\sim .0381(CTS)(\#Lattices) + 4.9\sum_j \sum_k (TU)$$

$$T_{TCRSS} = 3.7(\#Lattices)(\#Sensors) + \sum_j \sum_k (TU)$$

$$T_{TEDC} = 1.7(\#Lattices)(\#Sensors) + 0.55\sum_j \sum_k (ATD + UTD) + 0.2\sum_j \sum_k (TA)(TU)$$

$$T_{TPRED} = 3.1(\#Lattices)(\#Sensors) + 1.3\sum_j \sum_k (TA + TU)$$

$$T_{TPSEC} = 7.8(\#Lattices)(\#Sensors) + 0.53\sum_j \sum_k (TU)$$

## EXHIBIT 4-14

## CHANGE IN ESTIMATED NUMBER OF PROCESSORS IN 1980 AND 1990 DUE TO AUTOMATED INTIATION OF TRACKS ONLY ON BEACON EQUIPPED AIRCRAFT (cont'd)

## LEVEL C, NEW YORK

$$T_{Track\ all} = \left[0.0381(TA + TU) + 16.3(\#Sensors)\right](\#Lattices) + 7.7\sum_j \sum_k (TU)$$
$$+ 1.3\sum_j \sum_k (TA) + 0.2\sum_j \sum_k (TA)(TU) + 0.55\sum_j \sum_k (ATD + UTD)$$

$$T_{Beacon\ only} = \left[0.0381(ATB + UTB) + 16.3(\#Sensors)\right](\#Lattices) + 7.7\sum_j \sum_k (ATD + UTD)$$
$$+ 1.3\sum_j \sum_k (ATB) + 0.2\sum_j \sum_k (ATB)(UTB) + 0.55\sum_j \sum_k (ATD + UTD)$$

$$\Delta T_{1980} = T_{Track\ all} - T_{Beacon\ only}$$
$$\leq 0.0381(\Delta TA + \Delta TU)(\#Lattices) + 7.7(\Delta TU) + 1.3(\Delta TA)$$
$$+ 0.2\sum_j \sum_k (TA)(TU)$$

where $\Delta TA = \sum_j \sum_k (TA) - \sum_j \sum_k (ATB)$

$\Delta TU = \sum_j \sum_k (TU) - \sum_j \sum_k (UTB)$

$j$ = sensor, $k$ = sector

## 5.0 CONCLUSIONS

Resource requirement estimates for Chicago and Los Angeles are representative of requirements for dual sensor sites with high traffic densities. Requirements for Detroit are representative of single sensor sites with high traffic densities.

### 5.1 Processing Capacity

TRACONS with single sensor systems or dual sensor systems are expected to require a maximum of four active processors. This is well below the maximum ARTS IIIA configuration of seven active IOPs (assuming one spare processor).

The processing capacity required at New York during a busy period in 1986 is expected to be 8 to 9 active processors, exceeding the available capacity by 1 or 2 processors.

In the years 1984, 1988 and 1990, the processing capacity required at New York is expected to be 7 to 8 active processors, exceeding available capacity by 0 to 1 processor.

In 1980 and 1982 the processing capacity required at New York is expected to be 7 active processors.

### 5.2 Memory Capacity

Memory requirements are expected to exceed available memory capacity by 1982 at New York and by 1986 at high traffic density dual sensor sites. Available memory appears to be adequate for the requirements at single sensor sites through 1990. Use of standard ARTS IIIA programs at dual and single sensor sites, instead of the New York ARTS IIIA programs which have been optimized for processing efficiency, potentially will cause some reduction in memory requirements at these sites.

## 6.0 RECOMMENDATIONS

Normal development cycles for major air traffic control automation systems can be as long as seven to ten years. The problems of storage saturation at all major sites and processing capacity saturation at New York need to be addressed in much shorter time frames.

As a result, viable options for near term ARTS IIIA capacity increases should be examined. This approach is not necessarily an alternative to the development of a replacement system, but should be considered independently of plans for ARTS IIIA replacement.

In addition to development of approaches for increasing ARTS IIIA capacity, methods of minimizing demand for resources should be investigated. One potential means of reducing the peak demand for processor capacity at New York is to install DABS prior to the installation of M&S.

# APPENDICES

# APPENDIX A

## PROCESSES AND ASSUMPTIONS APPLIED IN DERIVING IAC SYSTEM LOAD FACTORS

## 1 IAC (Good Weather Estimates)

### 1.1 Determination of Airports in the Vicinity of the Surveillance Sites

The determination of airports in the vicinity of the surveillance sites was accomplished in several steps. Sectional Aeronautical Charts were scrutinized to identify airports within, or close to within, a 60 mile radius of any of the surveillance sites of interest. The coordinates of these airports were then determined from the Airport/Facility Directory (or DOD Flight Information Publication Supplements for military airports). Having this data and the coordinates of the surveillance sites (obtained from the Controller Chart Supplement, Section 9, Air Route and Airport Surveillance Radar Facilities), the distance from the surveillance site to each of the pertinent airports was then computed and recorded.

For those airports within 60 miles of the radar sites, a search was made of the FAA's terminal area forecast data (Military Air Traffic Activity Report in the case of military airports) to determine if forecast (or activity) data were available. Where this was the case, the appropriate annual numbers for each operation and aviation category were extracted for the fiscal years 1977, 1980, 1982, 1984, 1986, 1988 and 1990. These, along with the identification of the airport and its distance from the pertinent surveillance site, were then input as part of the data base used for IAC estimation.

### 1.2 Estimation of Busy Hour Flights.

The objective of this step is to estimate the number of flights (in each of the operations and aviation categories) operating to/from each of the airports in the vicinity of the surveillance site during the course of a busy hour. These data are subsequently used in estimating the IAC during a period of high activity.

The average hour values can be determined quite simply by dividing the number of hours in a year into the annual value. However, estimation of the values during a period of high activity requires the use of busy/average hour ratios. For this purpose, busy/average hour relationships as a function of the total annual operations of an airport were developed from busy hour and annual activity data reported in FY69, FY72, FY73 and FY76 for airports where the control towers (source of the counts) were in operation 24 hours daily. This relationship, as depicted in Exhibit A-1 is represented by the equation

$$\text{Busy/Average Hour Ratio} = 8.72e^{-.0035x} + 1$$

where $x$ = total annual operations (in thousands)

(Note: Derivation of the equation is described in Appendix B)

It is pertinent to note that the above equation relates to the busy/average hour relationship at an airport, not an area. Thus, if one were to use this ratio, per se, to estimate the number of flights in an area during a period of high activity, it would be tantamount to assuming that all of the airports in the area experience their busy hour at the same time. This seems most unlikely. On the other hand, if one were to use the average hour value for each airport to determine the number of operations in the area during a high activity period, it would be tantamount to assuming that for each operation above the average at one or more of the airports, there is a corresponding number of operations below the average at the remaining airports. While perhaps somewhat more plausible than assuming all the airports experience their busy hour at the same time, it is still considered quite unlikely that this would represent the situation during the area's busy hour. It is more reasonable to believe that the appropriate value lies somewhere in between, probably biased more toward the average than toward the busy/average hour ratio of the individual airports. Accordingly, three sets of values are derived as estimates of the hourly number of operations at the airports in the area which are subsequently used in estimating the IACs. The first is simply the average and is carried through the remaining IAC computations merely as an item of interest that may be

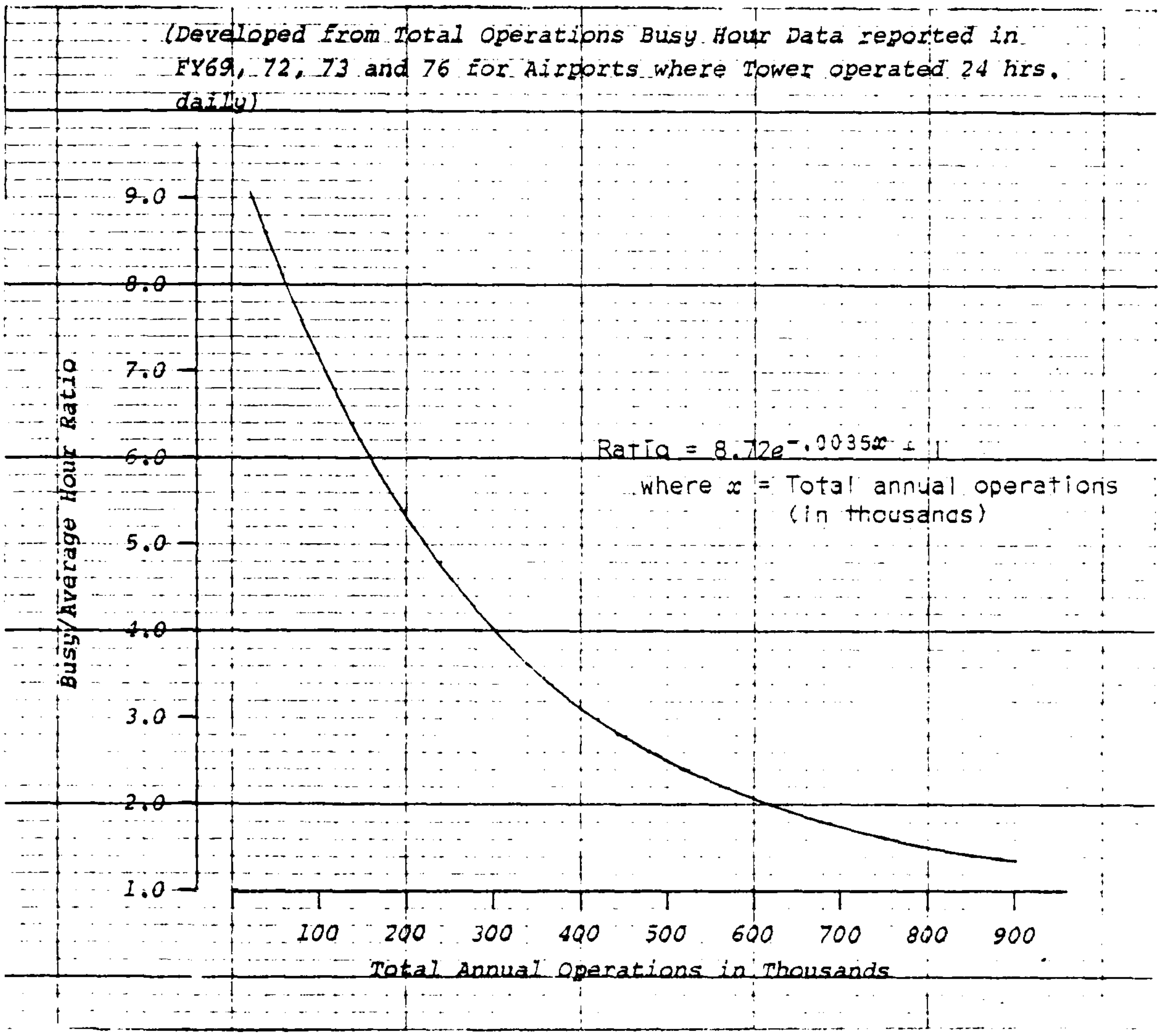



EXHIBIT A-1

Busy/Average Hour Relationship
as a Function of Total Annual Operations

used as a point of reference. It is not particularly germane to a determination of whether the system's capacity is adequate to handle expected future load conditions. The remaining two are used to represent a low and high range of estimates.

In line with the foregoing, the busy/average hour ratios applied in determining each airport's contribution to the area busy hour were:

A (Average Hour) Ratio = 1

B (Busy Hour) $\text{Ratio} = .25(\text{Busy/Average Hr. Ratio}_a - 1) + 1$

C (Busy Hour) $\text{Ratio} = .5(\text{Busy/Average Hr. Ratio}_a - 1) + 1$

where a = Busy/Average Hr. Ratio for the airport.

The number of flights of each operations category (Itinerant and Local) and of each aviation category, i.e., AC (Air Carrier), AT (Air Taxi and Commuter), GA (General Aviation) and MA (Military Aircraft), are computed for each airport as described below using each of the ratios (A, B and C) previously described. The results represent the estimated number of flights in each category operating to/from that airport during the area's busy hour.

- <u>Itinerant Flights</u>: (Separate computations are made for AC, AT, GA and MA)

$$\frac{\text{Forecast Annual Itinerant Operations}}{8760^*} \cdot \text{Ratio}$$

(*3760 = Number of hours in a year)

- <u>Local Flights</u>: (Separate computations are made for GA and MA)

$$\frac{.5(\text{Forecast Annual Local Operations})^*}{8760} \cdot \text{Ratio}$$

(*Local operations include both the departure and arrival of flights whose departure and arrival are at the same airport; hence, local flights are only 50% of local operations.)

### 1.3 Estimation of IAC Base Values (Tentative).

The objective of this step is to convert the estimates of the number of flights operating to/from airports in the area during a busy hour to estimates of the number of flights simultaneously within the coverage area of the particular surveillance system. Fundamentally, this is a function of the time each flight spends in the coverage area which, in turn, is a function of the average speed and distance flown in the coverage area. Since these are unknown, it is necessary to estimate the required values for each aviation and operation category and, as relates to surveillance coverage, for each surveillance site.

The basic assumption is that all flights operating to/from an airport during the hour (with exception of part of the local flights discussed later), are uniformly distributed throughout the area surrounding the airport. The average speed and altitude for each aviation category are weighted averages resulting from general characteristics and performance assumptions presented in Appendix C. The radius of surveillance coverage is based on the detectability and shielding angle assumptions presented in Appendix D. The resulting values used in the computation are contained in Table A-1.

It should be noted that separate computations are required for the radar and beacon systems as well as for each operation and aviation category for each airport.

#### 1.3.1 Itinerant Flights.

There are three different cases pertaining to the location of the airport with respect to the area of surveillance coverage that determine the specific computation used. These cases and the appropriate computations are as follow:

TABLE A-1

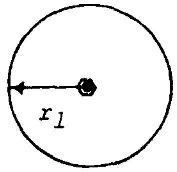
Estimated Speed, Altitude and Radius of Surveillance Coverage by Operation and Aviation Category

| | | ----Itinerant---- | | | | Gp. 1 Local | | ----Itinerant---- | | | | Gp. 1 Local | | Gp. 2 Local |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AC | AT | GA | MA | GA | MA | AC | AT | GA | MA | GA | MA | |
| Av. Speed | | 280 | 175 | 110 | 280 | 110 | 280 | 280 | 175 | 110 | 280 | 110 | 280 | N/A |
| Av. Altitude (x 100) | | 85 | 40 | 25 | 85 | 25 | 85 | 85 | 40 | 25 | 85 | 25 | 85 | 10 |
| | | Radius of Surveillance Coverage | | | | | | | | | | | | |
| TRACON | Surv. Site | Radar | | | | | | Beacon | | | | | | Radar & Beacon |
| N9Ø | JFK | 60 | 50 | 37 | 60 | 37 | 60 | 60 | 50 | 37 | 60 | 37 | 60 | 18.9 |
| | EWR | 60 | 40 | 28 | 60 | 28 | 60 | 60 | 40 | 28 | 60 | 28 | 60 | 13.0 |
| | HPN | 60 | 44 | 31 | 60 | 31 | 60 | 60 | 44 | 31 | 60 | 31 | 60 | 14.8 |
| | ISP | 60 | 52 | 38 | 60 | 38 | 60 | 60 | 52 | 38 | 60 | 38 | 60 | 19.8 |
| ORD | ORD | 60 | 54 | 40 | 60 | 40 | 60 | 60 | 54 | 40 | 60 | 40 | 60 | 21.5 |
| | CHI-S | 60 | 54 | 40 | 60 | 40 | 60 | 60 | 54 | 40 | 60 | 40 | 60 | 21.5 |
| LAX | $LAX_4$ | 59 | 36 | 26 | 59 | 26 | 59 | 59 | 36 | 26 | 59 | 26 | 59 | 15.9 |
| | $LAX_7$ | 59 | 36 | 26 | 59 | 26 | 59 | 59 | 36 | 26 | 59 | 26 | 59 | 15.9 |
| DTW | DTW | 60 | 57 | 51 | 60 | 51 | 60 | 60 | 60 | 58 | 60 | 58 | 60 | 38.5 |

• Surveillance Site $r_1$ = radius of surveillance coverage

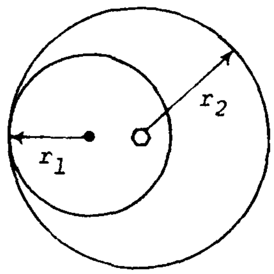
o Airport $r_2 = r_1$ + distance from surveillance site to airport.

Case 1: Surveillance site located on the airport.



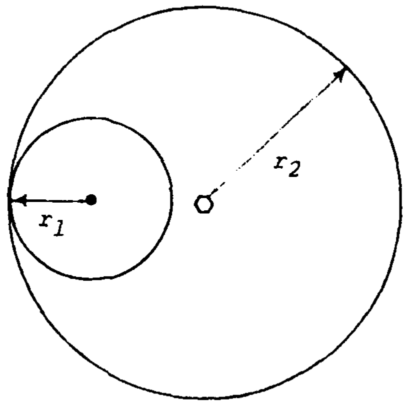

$$N = \frac{r_1 + 10}{Av.\ Speed} \cdot Busy\ Hour\ Flights$$

Case 2: Distance from surveillance site to airport $\leq r_1$.




$$N = \frac{r_2 + 10}{Av.\ Speed} \cdot Busy\ Hour\ Flights \cdot \frac{\pi r_1^2}{\pi r_2^2}$$

Case 3: Distance from surveillance site to airport $> r_1$.




$$N = \frac{r_2}{Av.\ Speed} \cdot Busy\ Hour\ Flights \cdot \frac{\pi r_1^2}{\pi r_2^2}$$

### 1.3.2 Local Flights

Local flights include two generally different groups of flight activity.

Group 1 is comprised of aircraft on sight-seeing flights or operating to, from or within local practice areas. Group 2 is comprised of aircraft remaining in close proximity to the airport (10 mile radius) and executing touch-and-go landings or full stop landings followed by taxi back and take-off.

It is assumed that 50% of the local flights, whether GA or MA, are in Group 1 and the remaining 50% are in Group 2. Separate computations are performed for the different aviation categories. Additionally, the method of computation differs according to Group.

Group 1:

For Group 1 (i.e., 50% of Busy Hour Local Flights), the computation is identical to the computation for itinerant flights except the results are multiplied by two. This is because the aircraft are assumed to be going both out from and back to the airport during the busy hour, while an itinerant flight travels in one direction only. As a result, Group 1 flights travel twice the distance that itinerant aircraft travel within radar coverage.

Group 2:

For Group 2 (i.e., the remaining 50% of Busy Hour Local Flights), speed is not a factor since the flights are assumed to be equally distributed within a circle having a 10 mile radius from the airport. It is further assumed that the flights in this group are airborne 75% of the busy hour and on the airport surface the remaining 25% and that, while airborne, their average altitude is 1,000 feet.

Obviously, if the 10 mile radius circle around the airport falls totally outside the radius of surveillance coverage for 1,000 feet, none of the aircraft in this group would be in the coverage area. Conversely, if the 10 mile radius circle around the airport falls totally within the radius of surveillance coverage at 1,000 feet, all of the airborne aircraft in this group are considered to be within the coverage area. Where the two circles partially overlap, the number of airborne aircraft in this group in the surveillance coverage area is proportionate to the area of the overlap region to the area of the 10 mile radius circle.

From the foregoing, it is evident that the ratio of the area of the overlap region to the area of the 10 mile radius circle around the airport (CR) is a function of two values, viz., the distance (d) from the surveillance site to the airport and the radius of surveillance coverage (ROSC) at the average altitude assumed for the flights. It may be recalled that the distance (d) was previously determined for each airport in the area and stored in the data base. The values of ROSC pertinent to this computation are given for each surveillance site under the column labelled Gp. 2 Local, Radar & Beacon, in Table A-1.

The computation for the Group 2 Local Flights is as follows:

$$N = .5(\text{Busy Hour Flights}) \cdot .75 \cdot CR$$

For $d \leq (ROSC - 10)$, $CR = 1$

For $d \geq (ROSC + 10)$, $CR = 0$

Where $(ROSC - 10) < d < (ROSC + 10)$, CR is determined as follows:

$$CR = \frac{1}{100\pi}\left[10^2\left(\frac{\pi\angle B}{180} - \sin\angle B\cos\angle B\right) + ROSC^2\left(\frac{\pi\angle A}{180} - \sin\angle A\cos\angle A\right)\right]$$

$$\text{where } \angle A = \text{arc cos}\left(\frac{d^2 + ROSC^2 - 10^2}{2 \cdot ROSC \cdot d}\right)$$

$$\text{and } \angle B = \text{arc cos}\left(\frac{d^2 + 10^2 - ROSC^2}{2 \cdot 10 \cdot d}\right)$$

(Note: Derivation of this equation is described in Appendix E)

### 1.3.3 Fluctuation in IAC During the Hour

After summing the individual airport values pertinent to a particular surveillance system, the end result of the processes described thus far is the estimated average number of aircraft in each aviation category that are instantaneously within the coverage of that system during a busy hour for each of the ratio values assumed (i.e., A, B and C). Since the number would obviously fluctuate above and below the average during the course of the hour and the peak values are the ones of interest, a peaking factor of 1.2 (i.e. 1.2 • Average IAC during Busy Hour) is applied. The value of 1.2 was based on past observations of peak to average instantaneous tracks during busy hour operations at the New York CIFRR. The reasonableness of this value was further substantiated by average and peak beacon target report counts made for Chicago and Los Angeles in the fall of 1979 by ARD-143.

### 1.3.4 Distribution by Radar Only, Beacon Only and Radar Reinforced Beacon.

The purpose of this step is to break down the tentative IAC base values into categories relevant to processing requirements -- i.e., radar only, beacon only and radar reinforced beacon with the beacon categories further broken down as to discrete or non-discrete code and automatic altitude reporting (Mode C) capability. The term "base values" is used to denote the estimated number of targets in each category if the probability of detection were 100% and there were no false targets. The "tentative" qualification is applied since it is possible that some adjustments may be required when the IAC estimates are merged with the instantaneous associated track estimates to complete the system load factor estimates.

At this point in the process, the number of aircraft in each operation and aviation category has been summed for all the airports and the peaking factor has been applied. Converting this set of numbers into categories such as radar only, beacon only, etc., requires the application of assumptions regarding beacon equippage and code assignments as well as the consideration of any differences in the radius of surveillance coverage of the radar system as compared to the collocated beacon system.

The beacon assumptions made for the good weather conditions are reflected in Table A-2. The radius of surveillance coverage for each of the radar and co-located beacon sites for each of the operation and aviation categories is contained in Table A-1.

## TABLE A-2

### *BEACON ASSUMPTIONS*

*(During Good Weather Conditions)*

| | FY-77 | FY-80 | FY-82 | FY-84 | FY-86 | FY-88 | FY-90 |
|---|---|---|---|---|---|---|---|
| AIR CARRIER | | | | | | | |
| Beacon Equipped | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Mode C | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Discrete Code | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| AIR TAXI & COMMUTER | | | | | | | |
| Beacon Equipped | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Mode C | 95 | 97 | 98 | 99 | 100 | 100 | 100 |
| Discrete Code | 50 | 54 | 58 | 62 | 66 | 72 | 75 |
| MILITARY AIRCRAFT | | | | | | | |
| Beacon Equipped | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Mode C | 95 | 97 | 98 | 99 | 100 | 100 | 100 |
| Discrete Code | | | | | | | |
| Itinerant | 60 | 65 | 70 | 75 | 80 | 85 | 90 |
| Local | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GENERAL AVIATION | | | | | | | |
| Beacon Equipped | 65 | 68 | 71 | 73 | 75 | 78 | 80 |
| Mode C | 15 | 21 | 25 | 28 | 32 | 36 | 40 |
| Discrete Code | | | | | | | |
| Itinerant | 5 | 5 | 6 | 7 | 8 | 9 | 10 |
| Local | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Values in the table represent the percent of the total aircraft estimated to be within the beacon surveillance area.*

*Discrete Code is the estimated percent that will be responding with a discrete code, not the percent with discrete code capability .*

The distribution is determined by applying the following computations to the numbers for each operations and aviation category (using the appropriate values from the beacon assumption table) and summing the results.

*RIAC = Number in radar coverage area as determined from previous computations.*

*BIAC = Number in beacon coverage area as determined from previous computations.*

| | |
|---|---|
| *Radar Only* | *= RIAC(1 - Percent Beacon Equipped)* |
| *Beacon Only* | *= Percent Beacon Equipped(BIAC - RIAC)* |
| *Discrete* | *= Percent Discrete Code(BIAC - RIAC)* |
| *Non-Discrete* | *= Beacon Only - Discrete* |
| *Mode C* | *= Percent Mode C(BIAC - RIAC)* |
| *Radar Reinforced Beacon* | *= Percent Beacon Equipped • RIAC* |
| *Discrete* | *= Percent Discrete • RIAC* |
| *Non-Discrete* | *= Radar Reinforced Beacon - Discrete* |
| *Mode C* | *= Percent Mode C • RIAC* |

### 1.4 Estimation of Target Reports (Tentative).

Conversion of the IAC base values to estimates of the number of target reports in each of the radar only, beacon only, etc. categories is based on probability of detection and false target assumptions. The values assumed for this purpose are contained in Table A-3.

The "tentative" qualification also applies here since any change in the IAC base values that may occur in the system load factors finalization process requires recomputation of the target report estimates.

In application of the probability of detection (or conversely, the probability of missed detection) to the radar reinforced beacon base values,

## TABLE A-3

*PROBABILITY OF DETECTION AND FALSE TARGET ASSUMPTIONS*

| | |
|---|---|
| *Radar* | |
| *Probability of Detection* | *.96* |
| *False Targets* | |
| *Good Wx Conditions* | *50/scan* |
| *Poor Wx Conditions* | *100/scan* |
| *Beacon* | |
| *Probability of Detection* | *.96** |
| *False Targets* | *.0417 x No. of targets detected *** |

* *Assumes 4% loss of targets due to antenna shielding in turns and multi-path cancellation effects.*

** *Number of false targets due to reflections, side-lobes, etc., is assumed to approximately equal number of missed detections.*

it is assumed that the radar and beacon misses do not occur at the same time for the same aircraft. Thus, for each assumed beacon miss of an aircraft initially in the radar reinforced beacon category, the number in that category is reduced by one but the number in the radar only category is increased by one. Similarly, for each assumed radar miss of an aircraft initially in the radar reinforced beacon category, that category is also reduced by one but the number in the beacon only category is increased by one.

The assumed number of radar false targets are added to the radar only category while the number of beacon false targets resulting from the beacon false target probability assumption are added to the beacon only category. The false target report values (radar and beacon) also constitute the estimated values for the "Unused Target Reports" category of the IAC System Load Factors.

While the above manipulations appear relatively straight forward, the process is somewhat complicated by the requirement to maintain a breakdown of the beacon counts into the discrete, non-discrete and Mode C subcategories. The equations used in the process are set forth in Table A-4.

2 IAC (Poor Weather Estimates).

The methodology and computations used in deriving the IAC estimates for poor weather conditions are identical to those used in deriving the IAC (Good Weather Estimates). With several exceptions, the assumptions made are also identical. These exceptions are as follow:

- There are no Local Operations under these conditions.

- The number of GA Itinerant Operations is reduced to 40% of the good weather values. The number of AC, AT and MA Itinerant Operations are assumed to remain unaffected, i.e., remain the same as the good weather values.

## TABLE A-4

### ADJUSTMENT OF BASE VALUES TO ACCOUNT FOR PROBABILITY OF DETECTION AND FALSE TARGETS

*- Legend -*

| | |
|---|---|
| RO | = Radar Only |
| BO | = Beacon Only |
| RRB | = Radar Reinforced Beacon |
| Subscript "b" | = Base value (i.e., estimated number of targets if the probability of detection were 100% and there were no false targets) |
| Subscript "a" | = Adjusted value based on probability of detection and false target assumptions |
| Prefix "d" | = Discrete code |
| Prefix "n" | = Non discrete code |
| Prefix "c" | = Mode C |
| RPD | = Radar probability of detection (parameter; assumed value = .96) |
| BPD | = Beacon probability of detection (parameter; assumed value = .96) |
| BFTP | = Beacon false target probability (parameter; assumed value = .0417) |
| BFT | = Beacon false targets. $BFT = BFTP(BPD(RRB_b + BO_b))$ |
| RFT | = Radar false targets (parameter; assumed value for "good" weather = 50; assumed value for "bad" weather = 100) |

*- Equations -*

$$\text{Total Target Reports}_a = RO_a + BO_a + RRB_a$$

$$RO_a = RPD \cdot RO_b + (RRB_b - RRB_b \cdot BPD) + RFT$$

$$BO_a = dBO_a + nBO_a$$

$$dBO_a = (1 + BFTP) \cdot ((dBO_b \cdot BPD) + (dRRB_b - dRRB_b \cdot RPD)) + BFTP(dRRB_b - dRRB_b((1 - RPD) + (1 - BPD)))$$

$$nBO_a = (1 + BFTP) \cdot ((nBO_b \cdot BPD) + (nRRB_b - nRRB_b \cdot RPD)) + BFTP(nRRB_b - nRRB_b((1 - RPD) + (1 - BPD)))$$

$$cBO_a = (1 - BFTP) \cdot ((cBO_b \cdot BPD) + (cRRB_b - cRRB_b \cdot RPD)) + BFTP(nRRB_b - nRRB_b((1 - RPD) + (1 - BPD)))$$

TABLE A-4 (Cont'd.)

*Adjustment of Base Values to Account for Probability of Detection and False Targets (Continued)*

$RRB_a = dRRB_a + nRRB_a$

$dRRB_a = dRRB_b - dRRB_b((1 - RPD) + (1 - BPD))$

$nRRB_a = nRRB_b - nRRB_b((1 - RPD) + (1 - BPD))$

$cRRB_a = cRRB_b - cRRB_b((1 - RPD) + (1 - BPD))$

- The number of radar false targets per scan is estimated tc be 100 (instead of 50 as estimated in the good weather case).

- The assumptions regarding beacon equippage and code assignments differ from the good weather assumptions. The beacon assumptions applied in the poor weather estimates are presented in Table A-5.

## 3 Estimation of Instantaneous Associated Tracks.

### 3.1 Annual Activity Base Numbers.

The method of estimating the instantaneous number of associated tracks at an ARTS IIIA TRACON differs in a number of respects from that used in estimating the IAC counts. This is due, in part, to the nature of the problem and the nature of the annual forecast data available. In this regard, it is pertinent to remember that in the ARTS IIIA system, associated tracks are analogous to airborne aircraft receiving radar services from the TRACON (or any of its associated towers that are tied in to the system), whereas the IAC counts are estimates of the number of aircraft in the surveillance coverage area, not just those being handled by the facility. Consequently, it is more appropriate to use the forecasts of annual instrument operations for these estimates than to use total operations (Itinerant and Local) as was done for the IAC estimates. There are, however, several aspects of the annual instrument operations forecasts that make them unsuitable to serve as the annual base numbers without first applying certain interpretations and/or assumptions. The basic problems posed by the data available and the approach taken are outlined below.

Forecast instrument operations are presented in the annual forecast data base for each airport that had an FAA operated tower in service during the year preceding the year in which the forecast data base was established. They are presented whether or not the tower has approach control authority. These forecasts represent projections from the annual activity reported by the facilities during the previous year. Forecasts are not provided for airports

## TABLE A-5

*BEACON ASSUMPTIONS*

*(During Poor Weather Conditions)*

| | FY-77 | FY-80 | FY-82 | FY-84 | FY-86 | FY-88 | FY-90 |
|---|---|---|---|---|---|---|---|
| **AIR CARRIER** | | | | | | | |
| Beacon Equipped | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Mode C | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Discrete Code | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| **AIR TAXI & COMMUTER** | | | | | | | |
| Beacon Equipped | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Mode C | 95 | 97 | 98 | 99 | 100 | 100 | 100 |
| Discrete Code | 85 | 87 | 88 | 89 | 90 | 90 | 90 |
| **MILITARY AIRCRAFT** | | | | | | | |
| Beacon Equipped | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Mode C | 95 | 97 | 98 | 99 | 100 | 100 | 100 |
| Discrete Code | 95 | 97 | 98 | 99 | 100 | 100 | 100 |
| **GENERAL AVIATION** | | | | | | | |
| Beacon Equipped | 76 | 80 | 82 | 84 | 86 | 88 | 90 |
| Mode C | 25 | 31 | 35 | 38 | 42 | 46 | 50 |
| Discrete Code | 42 | 45 | 46 | 47 | 48 | 49 | 50 |

*Values in the table represent the percent of the total aircraft estimated to be within the beacon surveillance area.*

*Discrete Code is the estimated percent that will be responding with a discrete code, not the percent with discrete code capability.*

without control towers. As a consequence, an airport related approach is not feasible. Data are not available for each of the airports involved and, for the towered airports, double counting would result from flights counted by the towers not having approach control authority as well as the one that does. Accordingly, the approach taken uses the total annual instrument operations forecast for the terminal facility having approach control jurisdiction for the area. For New York, because of the impending changeover from the New York CIFRR to the New York TRACON and associated changes in the area of jurisdiction, the annual instrument operations data for N9Ø were used for FY-77. For subsequent years, the forecast data for N9Ø and HPN were combined.

The forecasts of instrument operations are not broken down as to aviation category (i.e., AC, AT, GA and MA); however, breakdowns of this nature are reflected in annual activity reports. Therefore, to provide a breakdown to facilitate estimating average times in associated track status on the basis of general performance characteristics, the following assumptions were made:

- The annual instrument operations by MA will remain the same as the value reported for FY-77.

- The annual instrument operations by AC will increase/decrease with respect to the FY-77 reported value by an amount proportionate to changes in the AC itinerant operations forecast.

- The remainder of the total forecast operations represents the annual instrument operations by AT and GA. A further break out of these two groups was not undertaken since the data available does not lend itself to such a breakout and, in the case of instrument operations, GA is assumed to be made up predominantly of light twin-engine aircraft similar in performance to AT, thus, the breakout is not essential in the estimating process.

### 3.2 Estimation of Busy Hour Associated Tracks.

Following the same approach used in the IAC estimation process (see paragraph 1.2), busy/average hour relationships as a function of total annual instrument operations were developed from busy hour and annual instrument operations activity data reported in FY69, FY72, FY73 and FY76 by approach control facilities having 300,000 or more annual instrument operations. The results of this effort are depicted in Exhibit A-2 and are represented by the equation,

$$\text{Busy/Average Hour Ratio} = 2.51e^{-.001x} + 1$$

where $x$ = annual instrument operations (in thousands)

Unlike the IAC busy hour estimates, the question of different airports experiencing their busy hour at different times does not arise in this case since the ratio derived is from the forecast annual value for one facility, not a combination from different forecast annual values for a number of airports. Consequently, the instantaneous associated track estimates (for the poor weather conditions ) are based on the above busy/average hour ratio equation, i.e., different (A, B and C) ratios, as pursued in the IAC estimates, are not applied in this case. The instantaneous associated track estimates for good weather conditions are derived simply from the assumption that they are equal to 75% of the poor weather values. This is based on the notion that in good weather conditions, the delay experienced by individual aircraft will be less and thus their time in associated track status will be less.

The composition of busy hour instrument operations by AC, MA and (AT + GA) is computed as follows:

$$N = \frac{\text{Annual Value (AC, MA or AT + GA)}}{8760} \cdot \text{Busy/Average Hour Ratio}$$

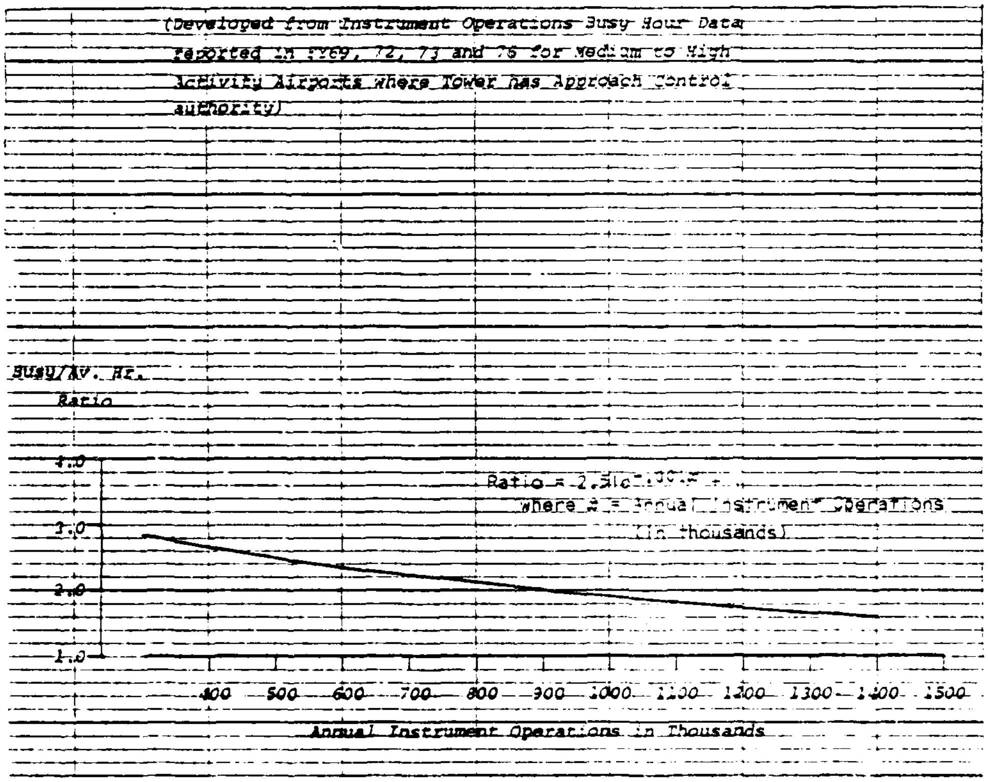



EXHIBIT A-2

Busy/Average Hour Relationship
as a Function of Annual Instrument Operations

### 3.3 Estimation of Instantaneous Associated Tracks in the System.

The conversion of busy hour estimates to estimates of the instantaneous number of associated tracks in the system is based on estimates of the average time each flight is in associated track status. This, in turn, requires estimates of the distance flown and flight profiles (i.e., speed and altitude) relative to the different aviation categories as well as the adoption of assumptions regarding radar coverage and arrival/departure ratios. The estimates/assumptions made for this purpose were as follow:

- AC and MA have the same general performance characteristics and will average the same time in associated track status.
- AT and GA involved in instrument operations have the same general performance characteristics and will average the same time in associated track status.
- The average path length for arrivals in associated track status during the busy hour is 67.5 miles.*
- The average path length for departures in associated track status during the busy hour is 33.75 miles.*
- The ratio of arrivals to departures during the busy hour is 3:1.
- The average time overflights are in associated track status is equal to the weighted arrival/departure average.
- Radar coverage is not a factor (i.e., procedures for handling instrument operations in a radar control environment are generally designed to retain controlled aircraft in surveillance coverage to the maximum extent practical).

The estimated time in associated track status based on the above assumptions and estimated speeds for the different categories are as follow:*

| | Arrivals | Departures | Weighted Average |
|---|---|---|---|
| AC & MA | 19:18 | 9:43 | 16:54 |
| AT & GA | 23:54 | 11:53 | 20:54 |

where time is expressed in minutes and seconds.

(* The hypothetical geometry and flight profiles assumed in deriving the estimates are presented in Appendix F.)

Based on the foregoing, computation of the average associated track count during the busy hour is accomplished as follows:

N = .2817(Busy Hr AC + MA) + .3483(Busy Hr AT + GA)

where .2817 and .3483 represent the average hours (in decimal) that each of the different categories is in associated track status.

Since the above results represent the average instantaneous associated track count during a busy hour and the count will obviously fluctuate above and below the average during the course of the hour, a peaking factor of 1.2 is subsequently applied to estimate the peak instantaneous associated track count during a busy hour. The factor of 1.2 is based on past observations of peak to average instantaneous tracks during busy hour operations at the New York CIFRR.

### 3.4 Beacon Assumptions Pertaining to Associated Tracks.

Inasmuch as associated tracks represent controlled flights, it is reasonable to assume that the vast majority are associated with beacon equipped aircraft. The specific assumptions made in determining the distribution of associated tracks by the Radar Only and Beacon categories were as indicated in the following table:

- Percent of Total Associated Tracks -

| | FY77 | FY80 | FY82 | FY84 | FY86 | FY88 | FY90 |
|---|---|---|---|---|---|---|---|
| Beacon Equipped | 95 | 96 | 97 | 98 | 99 | 99 | 99 |
| Discrete Code | 75 | 80 | 83 | 86 | 89 | 92 | 95 |
| Mode C | 75 | 80 | 83 | 86 | 89 | 92 | 95 |
| Radar Only | 5 | 4 | 3 | 2 | 1 | 1 | 1 |

### 3.5 Distribution of Associated Tracks by Surveillance Site.

Estimates of the instantaneous associated track counts made thus far in the process relate to the overall system. However, with the ARTS IIIA system, associated tracks are correlated in the radar system corresponding to the one used for display by the controller position having control jurisdiction over the flight. Therefore, for the locations where surveillance data is provided from more than one surveillance site, it is necessary to estimate the distribution between the various sites. In practice, it is probable that the distributions are related to the configurations and operating practices applied at the particular facility. For purposes of estimating, it is assumed that there is some general relationship between the airports having the bulk of the activity and the surveillance sites closest to those airports. The assumed distributions for the facilities in this study were as follow:

New York : JFK (35%); EWR (35%); HPN (15%); ISP (15%)

Chicago : ORD (70%); CHI-S (30%)

Los Angeles : $LAX_4$ (55%); $LAX_7$ (45%)

### 3.6 Unassociated/Associated Track Cross-Linking.

In ARTS IIIA, unassociated tracks in one surveillance system that correspond to associated tracks in another surveillance system (i.e., are deduced to be the same aircraft) are cross-linked for purposes of changing the display symbology that would otherwise be presented for the unassociated track. The occurrance of this condition is a function of the overlap in coverage of the particular surveillance sites in areas where tracks are in an associated track status. The general assumptions made relevant to estimating the number of unassociated tracks that are cross-linked with associated tracks are as follow:

- The average range of an associated track on an arrival when it first becomes an associated track is 45 miles from the surveillance site with which it is associated.

- The average range of an associated track on departures when it is handed off and the track becomes an unassociated track is 25 miles from the surveillance site with which it was associated.

- The altitude of the associated arrival/departure flight is such that detection by the other surveillance system/s is not line-of-sight limited.

The foregoing assumptions imply that the number of associated tracks in surveillance system "A" that would be cross-linked with unassociated tracks in surveillance system "B" is a function of the percent the surveillance site A's area covering associated tracks is overlapped by surveillance site B's coverage. For example, surveillance site A's associated track area for departures is a circle having a radius of 25 miles. Surveillance site B's assumed coverage is a circle having a 60 mile radius. For arrivals, surveillance site A's associated track area is a circle having a radius of 45 miles while surveillance site B's assumed coverage area remains a circle having a 60 mile radius. The number of unassociated tracks of surveillance site B that are cross-linked with associated tracks of surveillance site A is equal to the percent of surveillance site A's associated tracks on departures that lie within the area where the 25 mile radius and 60 mile radius circles overlap plus the percent of surveillance site A's associated tracks on arrivals that lie within the area where the 45 mile radius and 60 mile radius circles overlap. In line with the earlier arrival/departure ratio symbology that would otherwise be presented for the unassociated track. The occurrance of this condition is a function of the overlap in coverage of the particular surveillance sites in areas where tracks are in an associated track status. The general assumptions made relevant to estimating the number of unassociated tracks that are cross-linked with associated tracks are as follow:

- The average range of an associated track on an arrival when it first becomes an associated track is 45 miles from the surveillance site with which it is associated.

- The average range of an associated track on departures when it is handed off and the track becomes an unassociated track is 25 miles from the surveillance site with which it was associated.

- The altitude of the associated arrival/departure flight is such that detection by the other surveillance system/s is not line-of-sight limited.

The foregoing assumptions imply that the number of associated tracks in surveillance system "A" that would be cross-linked with unassociated tracks in surveillance system "B" is a function of the percent the surveillance site A's area covering associated tracks is overlapped by surveillance site B's coverage. For example, surveillance site A's associated track area for departures is a circle having a radius of 25 miles. Surveillance site B's assumed coverage is a circle having a 60 mile radius. For arrivals, surveillance site A's associated track area is a circle having a radius of 45 miles while surveillance site B's assumed coverage area remains a circle having a 60 mile radius. The number of unassociated tracks of surveillance site B that are cross-linked with associated tracks of surveillance site A is equal to the percent of surveillance site A's associated tracks on departures that lie within the area where the 25 mile radius and 60 mile radius circles overlap plus the percent of surveillance site A's associated tracks on arrivals that lie within the area where the 45 mile radius and 60 mile radius circles overlap. In line with the earlier arrival/departure ratio assumption, associated tracks on departures are assumed to be 25% of the total associated tracks and associated tracks on arrivals are assumed to be 75% of the total associated tracks. The ratio of the overlap area to the 25 and 45 mile radius circles around surveillance site A is, of course, dependant on the distance (d) between the two surveillance sites.

Where there is more than one "other" surveillance system, as is the case with New York, separate computations are made for each of the other systems and the results are summed to determine the number of unassociated tracks that are cross-linked with associated tracks in another system.

The computations used to determine the number of unassociated tracks that are cross-linked are as follow:

$$N = po_d(.25(\text{Total Associated Tracks in other system})) + po_a(.75(\text{Total Associated Tracks in other system}))$$

*where:*

$po_d$ = *percent 25 mile radius circle around surveillance site A is overlapped by 60 mile radius circle around surveillance site B.*

$po_a$ = *percent 45 mile radius circle around surveillance site A is overlapped by 60 mile radius circle around surveillance site B.*

The equation used to determine CR in the computation of Group 2, Local Flights (see paragraph 1.3.2) is also used to determine $po_d$ and $po_a$ by substituting values in the equation as follows:

*where:* d = *distance between surveillance sites.*

ROSC = *radius of surveillance coverage for site B* = 60

atr = *associated track radius. For* $po_d$, atr = 25; *for* $po_a$, atr = 45.

*then:*

*For* $d \leq (ROSC - atr)$, $po = 1$

*For* $d \geq (ROSC + atr)$, $po = 0$

*Where* $(ROSC - atr) < d < (ROSC + atr)$, *po is determined as follows:*

$$po = \frac{1}{100\pi}\left[atr^2\left(\frac{\pi \angle B}{180} - \sin\angle B \cos\angle B\right) + ROSC^2\left(\frac{\pi \angle A}{180} - \sin\angle A \cos\angle A\right)\right]$$

$$\text{where } \angle A = \arccos\left(\frac{d^2 + ROSC^2 - atr^2}{2 \cdot ROSC \cdot d}\right)$$

$$\text{and } \angle B = \arccos\left(\frac{d^2 + atr^2 - ROSC^2}{2 \cdot atr \cdot d}\right)$$

4 Merging and Finalizing the Estimates of IAC System Load Factors.

Application of the preceding processes produce tentative values for all of the IAC system load factors except the Radar Only, Beacon Only and Radar Reinforced Beacon values for Unassociated Tracks. The purpose of his step is to derive these values and to finalize the tentative IAC base values and the tentative target report values.

In the ARTS IIIA system, the system attempts to automatically initiate and maintain tracks on all aircraft operating within the coverage area of the surveillance systems providing it inputs. Tracks for which the controlling position has been determined (either from flight plan data or keyboard inputs) are termed associated tracks. As previously noted, these tracks equate to airborne aircraft receiving terminal radar services from the facility served by the system. All other tracks are termed unassociated tracks. On the premise that the system does not generally track noise (false targets) and is capable of coasting tracks through momentary target loss situations, the determination of unassociated tracks would appear to be simply a matter of subtracting the associated track values from the IAC base values. This would indeed be the case if it were not for two complicating factors. One is that the application of probability of detection assumptions in converting IAC base values to target report values resulted in some redistribution between the Radar Only, Beacon Only and Radar Reinforced Beacon categories. The other is that the IAC base values and the associated track values were independantly derived and use different assumptions regarding beacon equippage and code assignments. It is therefore possible in merging the data to encounter situations where the number of unassociated tracks in a particular category is a negative value. When this occurs, it is necessary to modify the tentative IAC base values (as well as the tentative target report values) to rectify the condition.

The equations used to determine tentative values for the unassociated track breakdown are contained in Table A-6. If no negative values are produced, then these values along with the tentative IAC base and tentative target report values represent the final set of values. If, on the other hand, one or more negative numbers are produced, adjustments are made to the tentative IAC base and tentative target report values with the amount of adjustment determined by the absolute value of the negative number. These modified values then represent the final set of values for the IAC system load factors.

## TABLE A-6

### *DETERMINATION OF UNASSOCIATED TRACK VALUES FROM BASE VALUES AND ASSOCIATED TRACK VALUES*

*- Legend -*

| | | |
|---|---|---|
| RO | = | Radar Only |
| BO | = | Beacon Only |
| RRB | = | Radar Reinforced Beacon |
| Subscript "b" | = | Base value (i.e., estimated number of targets if the probability of detection were 100% and there were no false targets) |
| Subscript "at" | = | Associated tracks |
| Subscript "ut" | = | Unassociated tracks |
| Prefix "d" | = | Discrete code |
| Prefix "n" | = | Non discrete code |
| Prefix "c" | = | Mode C |
| RPD | = | Radar probability of detection (parameter; assumed value = .96) |
| BPD | = | Beacon probability of detection (parameter; assumed value = .96) |

*- Equations -*

$$Total_{ut} = RO_{ut} + BO_{ut} + RRB_{ut}$$

$$RO_{ut} = RO_b + RRB_b(1 - BPD) - RO_{at}$$

$$BO_{ut} = dBO_{ut} + nBO_{ut}$$

$$dBO_{ut} = dBO_b + dRRB_b(1 - RPD) - dBO_{at}$$

$$nBO_{ut} = nBO_b + nRRB_b(1 - RPD) - nBO_{at}$$

$$cBO_{ut} = cBO_b + cRRB_b(1 - RPD) - cBO_{at}$$

$$RRB_{ut} = dRRB_{ut} + nRRB_{ut}$$

$$dRRB_{ut} = dRRB_b - dRRB_b((1 - RPD) + (1 - BPD)) - dRRB_{at}$$

$$nRRB_{ut} = nRRB_b - nRRB_b((1 - RPD) + (1 - BPD)) - nRRB_{at}$$

$$cRRB_{ut} = cRRB_b - cRRB_b((1 - RPD) + (1 - BPD)) - cRRB_{at}$$

# APPENDIX B

BUSY/AVERAGE HOUR RATIOS VS. TOTAL ANNUAL OPERATIONS

*BUSY HOUR/AVERAGE HOUR RATIOS VS. TOTAL ANNUAL OPERATIONS*

*(For Airports with 24 Hr/Day Tower Operations)*

*An analytical expression for the Busy Hour/Average Hour Ratio ($y$) as a function of the total annual operations ($\div$ 1,000, $= x$) was derived from the following assumptions:*

(1) *As the total annual operations for any airport becomes large, increases in traffic loads are spread out over more hours of the day. Any given airport system will operate at maximum load only by spreading out the traffic load evenly over all 24 hours of the day, with a resulting $y = 1$. On the other hand, airports with very low traffic loads will presumably not be operating at maximum capability. For reasons of convenience, peak loads can be expected to occur in such systems, producing a $y > 1$.*

*Assumption: For small $x$, $y > 1$; but $y$ asymptotically approaches 1 for large values of $x$.*

(2) *As a preliminary approach to this problem, airports were placed in groups corresponding to specific ranges of $x$, and the average $y$ was calculated for each group. When ($\bar{y}$, $x$ midpoint of range) points were compared, they did indicate a monotonically decreasing function. This function dropped more slowly than $x^{-1}$, and therefore more slowly than $x^{-n}$, for any integral $n$. An exponential fit was then attempted for $(y - 1)$, since $e^{-mx}$ will approach zero asymtotically for large $x$, and since the initial slope of the dropoff can be adjusted by adjusting the value of $m$. The fit looked good.*

*Assumption: $y = ce^{-mx} + 1$, when $c$ and $m$ are constants*

*In order to evaluate the constants $c$ and $m$, and to obtain some statistical verification of these assumptions, it was noted that, if they were true, one could write*

$$y - 1 = ce^{-mx}.$$

Then, by taking the natural logarithms of both sides, one obtains

$$\ln(y - 1) = \ln c - mx.$$

Since this expression is linear in $x$, standard linear regression analyses were performed on the transformed sample points $[\ln(y - 1), x]$.

Data points were available for four separate years; 1969, 1972, 1973 and 1976. Regressions were performed separately for each particular year, and for all the years taken together in one combined sample. The results of these regressions are as follow:

| Year | Number of Airports | c | ln c | m | Correlation Coefficient |
|---|---|---|---|---|---|
| 1969 | 204 | 8.37 | 2.12 | -.0031 | -.59 |
| 1972 | 212 | 9.07 | 2.20 | -.0036 | -.61 |
| 1973 | 209 | 9.34 | 2.23 | -.0038 | -.67 |
| 1976 | 200 | 8.10 | 2.09 | -.0034 | -.61 |
| Combined | 825 | 8.72 | 2.17 | -.0035 | -.62 |

Note that the calculated values hold relatively constant from year to year, and that the correlation coefficient holds steady at the high value of approximately -0.6. It is therefore reasoned that the result obtained from the combined sample points provides a valid tool for estimating busy hour operations at an airport given a forecast of total annual operations for that airport. In other words, that

$$y = 8.72e^{-.0035x} + 1$$

# APPENDIX C

## PERFORMANCE ASSUMPTIONS FOR AIRCRAFT CATEGORIES

## PERFORMANCE ASSUMPTIONS FOR AIRCRAFT CATEGORIES

*Aircraft proceed directly to/from the airport except that an additional 10 miles is flown in the vicinity of the airport while maneuvering to land or immediately after takeoff.*

*GA consists predominantly of aircraft with characteristics similar to Cessna 150's and 172's.*

*AT consists predominantly of light twins with characteristics similar to Cessna 310's and Beechcraft 99's.*

*AC consists predominantly of aircraft with characteristics similar to Boeing 727's.*

*MA consists predominantly of aircraft with characteristics similar to air carriers.*

*The airport elevation is 0 feet MSL.*

*The assumed performance of each aviation category related to flight path distance from the runway is as follows:*

*Flight Path Distance 0 5 10 20 40 70*

| | | | | | |
|---|---|---|---|---|---|
| ***GA*** | | | | | |
| Av. Alt (MSL) | 500' | 1,000' | 1,000' | 3,000' | 3,000' |
| Av. IAS | 85 | 100 | 100 | 110 | 110 |
| Av. TAS | 86 | 101 | 101 | 115 | 115 |
| Time to Fly | 3:29 | 2:58 | 5:56 | 10:26 | 15:39 |
| ***AT*** | | | | | |
| Av. Alt (MSL) | 500' | 1,000' | 1,000' | 4,000' | 8,000' |
| Av. IAS | 95 | 110 | 150 | 190 | 190 |
| Av. TAS | 96 | 112 | 152 | 202 | 214 |
| Time to Fly | 3:08 | 2:41 | 3:57 | 5:56 | 8:24 |
| ***AC & MA*** | | | | | |
| Av. Alt (MSL) | 500' | 1,000' | 2,000' | 9,000' | 20,000' |
| Av. IAS | 135 | 180 | 210 | 230 | 350 |
| Av. TAS | 136 | 183 | 216 | 263 | 479 |
| Time to Fly | 2:12 | 1:38 | 2:47 | 4:34 | 3:45 |

AD-A087 243 STERLING SYSTEMS INC WASHINGTON DC F/G 17/7
ASSESSMENT OF THE CAPACITY OF THE AUTOMATED RADAR TERMINAL SYST--ETC(U)
JUN 80 W PAILEN, H C WINTERMOYER, R SITTLER DOT-FA78WAI-942
UNCLASSIFIED FAA-RD-80-51 NL

3 OF 5
AD
A087243

# APPENDIX D

## SURVEILLANCE DETECTABILITY AND SHIELDING ASSUMPTIONS

## RADAR DETECTABILITY ASSUMPTIONS

*Estimates of radar cross section and radar range based on information contained in "Excerpts from PRIMARY/SECONDARY TERMINAL RADAR SITING HANDBOOK, July 20, 1976, Order 6310.6"*

| Aviation Category | Average Altitude | Radar Cross Section* Sq. Meters | dB, ret to 2.2 $m^2$ | (Unshielded) Radar Range (ASR-8**) | Beacon Range (ATCBI-4) |
|---|---|---|---|---|---|
| ITINERANT | | | | | |
| GA | 2500 | 2.8 | +1 | 51 | 58 (LOS) |
| AT | 4000 | 3.5 | +2 | 57 | 60 |
| AC & MA | 8500 | 12 | +7.5 | 60 | 60 |
| GROUP 2 LOCALS | | | | | |
| GA | 1000 | 2.8 | +1 | 38.5 (LOS) | 38.5 (LOS) |
| MA | 1000 | 12 | +7.5 | 38.5 (LOS) | 38.5 (LOS) |

* Values for types of aircraft of interest are not given in the cited Handbook. Estimated values relate to given values as follow:

Sq. Meters 2.8 Equal to F4 and F86. Greater than T33 and F84 (2.2) and less than F100 (3.5) and DC-3 (11).

3.5 Equal to F100. Greater than T33, F84, F4 and F86 and less than F106 (4.4) and DC-3.

12 Not equal to any given value. Greater than DC-3 and less than B707 (13.8) and DC-8 (17.4).

** Assumes ASR-8 operating with linear polarization.

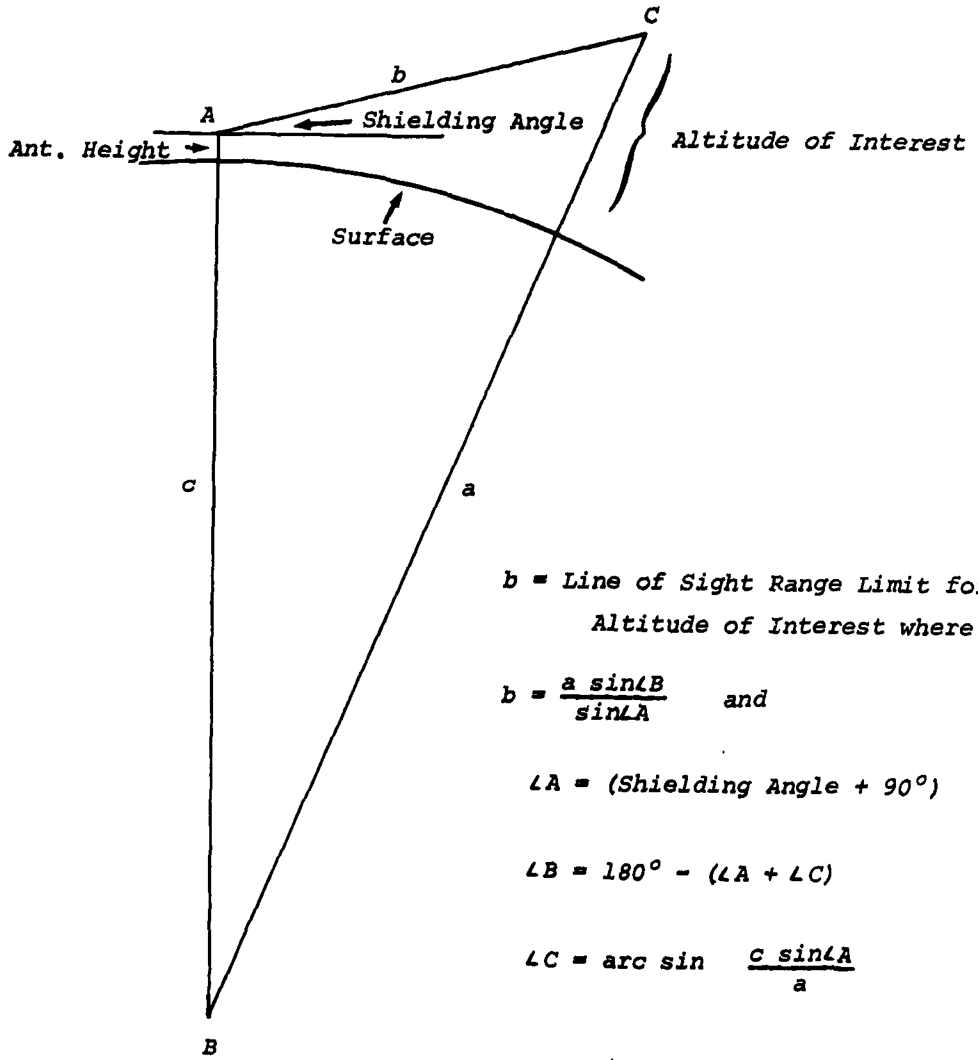
(LOS) = Line of sight limitation due to earth curvature effect based on the following assumptions:

Antenna height = 21 feet (17 foot pedestal + 1/2 eight foot sail)

Aircraft height = Average altitude.

Mean earth radius = 3,440.07 International Nautical Miles

International Nautical Mile = 6076.11549 feet.




$b$ = Line of Sight Range Limit for Altitude of Interest where

$$b = \frac{a \sin\angle B}{\sin\angle A} \quad \text{and}$$

$$\angle A = (\text{Shielding Angle} + 90^\circ)$$

$$\angle B = 180^\circ - (\angle A + \angle C)$$

$$\angle C = \arc \sin \frac{c \sin\angle A}{a}$$

$a$ = (mean earth radius + alt. of interest)

$c$ = (mean earth radius + antenna height)

Computation of Radius of Surveillance Coverage at Altitudes of Interest

## RADIUS OF SURVEILLANCE COVERAGE

***(With Shielding Assumptions Applied)***

| TRACON | Surv. Site | Shielding ∠ | RADAR --Itinerant--- AC | AT | GA | MA | RADAR Gp. 1 Local GA | MA | BEACON --Itinerant--- AC | AT | GA | MA | BEACON Gp. 1 Local GA | MA | Radar & Beacon Gp. 2 Local |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Av. Alt. (x 100) | | | 85 | 40 | 25 | 85 | 25 | 85 | 85 | 40 | 25 | 85 | 25 | 85 | 10 |
| N9Ø | JFK | .33 | 60 | 50 | 37 | 60 | 37 | 60 | 60 | 50 | 37 | 60 | 37 | 60 | 18.9 |
| | EWR | .6 | 60 | 40 | 28 | 60 | 28 | 60 | 60 | 40 | 28 | 60 | 28 | 60 | 13.0 |
| | HPN | .5 | 60 | 44 | 31 | 60 | 31 | 60 | 60 | 44 | 31 | 60 | 31 | 60 | 14.8 |
| | ISP | .3 | 60 | 52 | 38 | 60 | 38 | 60 | 60 | 52 | 38 | 60 | 38 | 60 | 19.9 |
| ORD | ORD | .25 | 60 | 54 | 40 | 60 | 40 | 60 | 60 | 54 | 40 | 60 | 40 | 60 | 21.5 |
| | CHI-S | .25 | 60 | 54 | 40 | 60 | 40 | 60 | 60 | 54 | 40 | 60 | 40 | 60 | 21.5 |
| LAX | $LAX_4$ | * | 59 | 36 | 26 | 59 | 26 | 59 | 59 | 36 | 26 | 59 | 26 | 59 | 15.9 |
| | $LAX_7$ | * | 59 | 36 | 26 | 59 | 26 | 59 | 59 | 36 | 26 | 59 | 26 | 59 | 15.9 |
| DTW | DTW | None | 60 | 57 | 51 | 60 | 51 | 60 | 60 | 60 | 58 | 60 | 58 | 60 | 38.5 |

* LAX Shielding Angle = $1^{o}$ (all ranges). Average Altitude increased 930' (the average elevation of airports in data base).

## APPENDIX E

CALCULATION OF THE RATIO OF THE OVERLAP OF TWO OVERLAPPING CIRCLES TO THE AREA OF THE SMALLER CIRCLE

## CALCULATION OF THE RATIO OF THE OVERLAP AREA OF TWO OVERLAPPING CIRCLES TO THE AREA OF THE SMALLER CIRCLE

*This problem arises in estimating the percentage of Group 2 local flights operating in the immediate vicinity of an airport that fall within the radius of surveillance coverage (ROSC) of a particular surveillance site. It also arises in estimating the percentage of associated tracks in one surveillance system that are cross-linked with unassociated tracks in another surveillance system.*

*In the case of the Group 2 local flights, the smaller circle is called the airport circle and has a radius of 10 miles. The radius of the larger circle (ROSC) varies depending on shielding angle assumptions related to the specific surveillance site. The value of "d" is equal to the distance between the particular surveillance site and the particular airport.*

*In the cross-link case, the smaller circle represents the associated track area. The radius of the associated track area (atr) is either 25 miles or 45 miles depending on whether the associated tracks are on departures or arrivals. The larger circle, ROSC, represents the radius of surveillance coverage of the surveillance system with the unassociated tracks. It is assumed to be 60 miles. The value of "d", in this case, is equal to the distance between the two surveillance sites.*

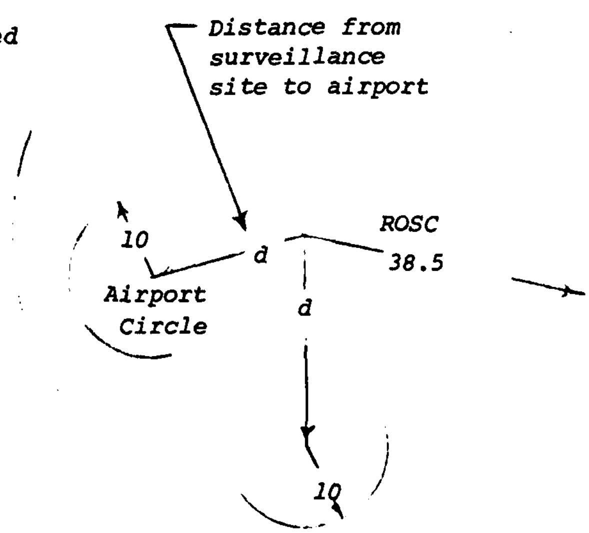
*For purposes of illustration, the examples that follow are based on the case of Group 2 local flights with ROSC having an assumed value of 38.5 miles. The same equations are applied to the other cases by substituting the appropriate values.*

*Case I: The airport circle is contained entirely within ROSC. The area of overlap is the area of the airport circle, divided by the area of the airport circle which produces*

$$\boxed{CR = 1}$$

*Case I occurs when*

$$\boxed{d \leq (38.5 - 10)}$$

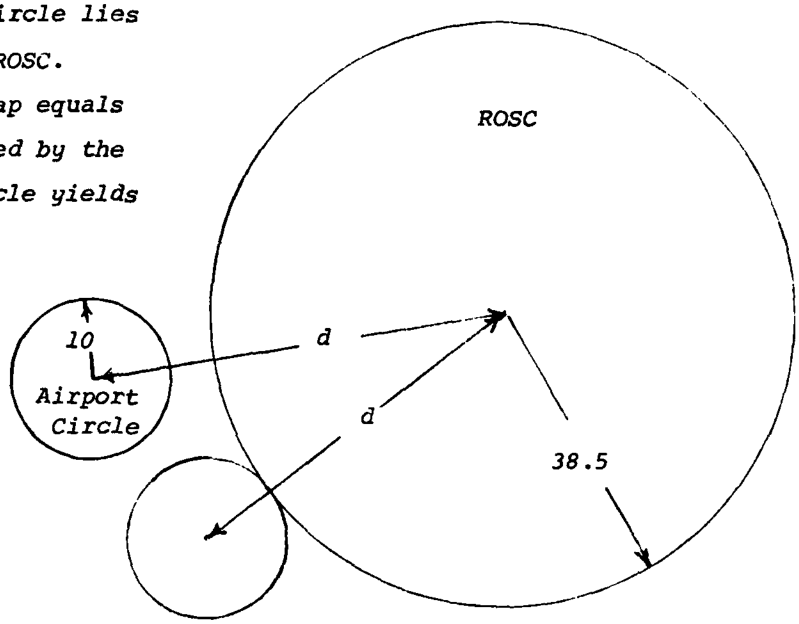


*Case II: The airport circle lies completely outside the ROSC. Here, the area of overlap equals zero, which, when divided by the area of the airport circle yields*

$$\boxed{CR = 0}$$

*Case II occurs when*

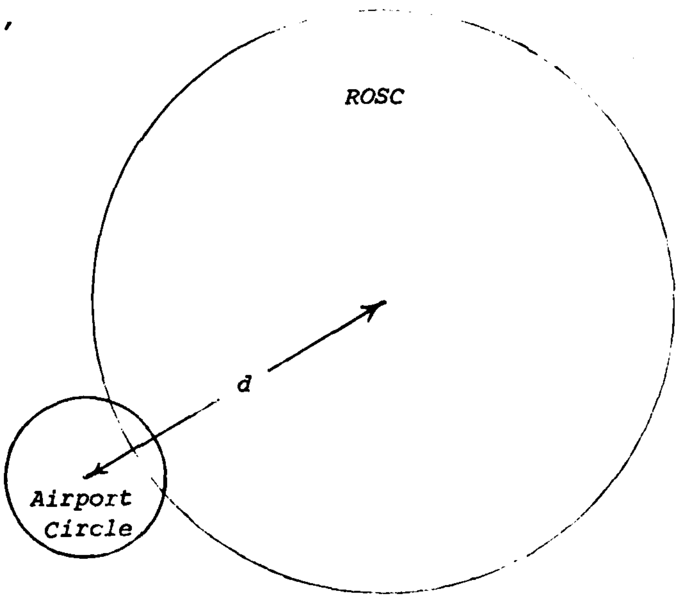
$$\boxed{d \geq (38.5 + 10)}$$



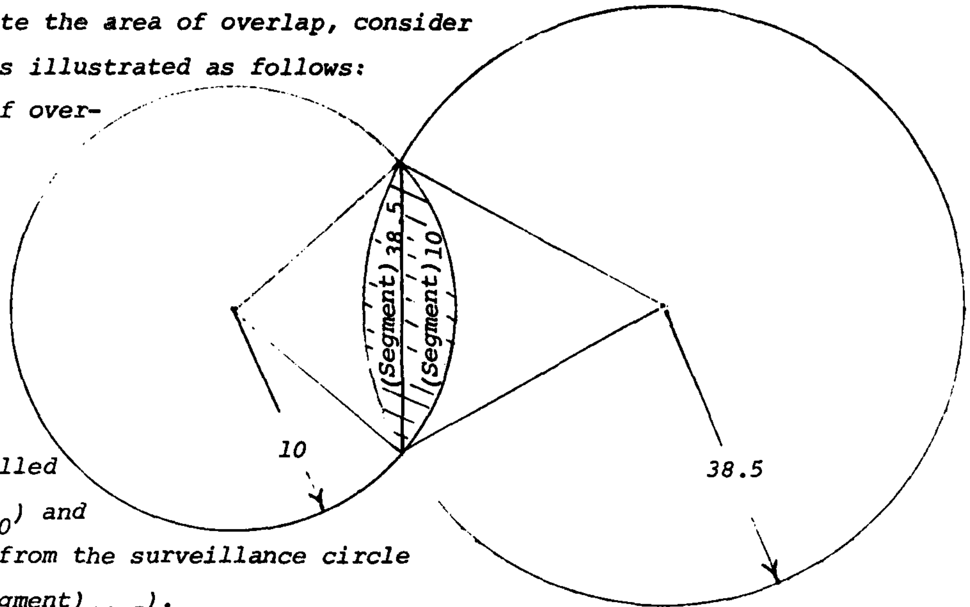

*Case III: The airport circle lies neither totally within nor totally outside ROSC.*

*Case III occurs when* $\boxed{28.5 \leq d \leq 48.5}$

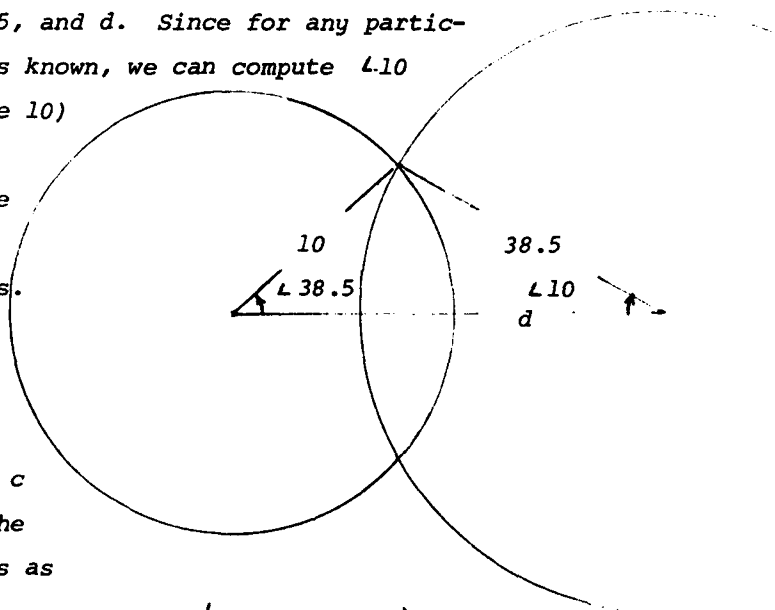
*The area of overlap will range all the way from zero (at d = 48.5), producing a CR = 0, up to the area of the airport circle (at d = 28.5), producing a CR = 1.*



*To calculate the area of overlap, consider the circles illustrated as follows: The area of overlap can be seen to equal the sum of a segment from the airport circle (called $(Segment)_{10}$) and a segment from the surveillance circle (called $(Segment)_{38.5}$).*




*Considering the two circles again, we find a triangle of sides 10, 38.5, and d. Since for any particular case d is known, we can compute ∠10 (opposite side 10) and ∠38.5 (opposite side 38.5) by the Law of Cosines.*




*In a triangle with sides a, b, c, the ∠C opposite side c is given by the Law of Cosines as*

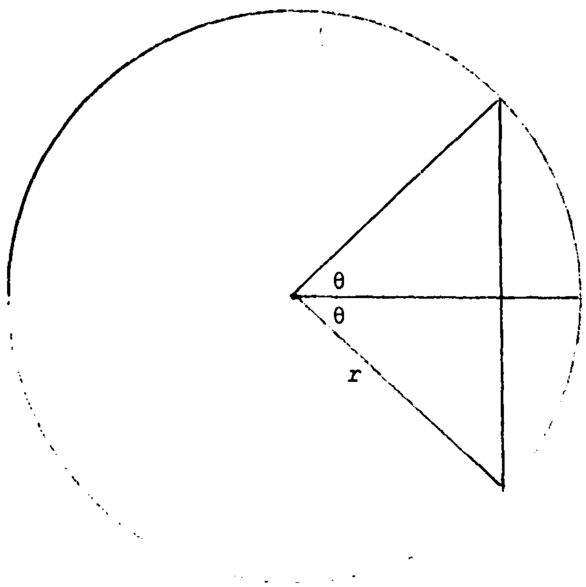
$$\angle C = \text{arc cos}\left(\frac{a^2 + b^2 - c^2}{2ab}\right)$$

*In our own particular case,*

$$\angle 10 = \text{arc cos}\left(\frac{d^2 + 38.5^2 - 10^2}{2 \cdot 38.5 \cdot d}\right) \quad \text{and}$$

$$\angle 38.5 = \text{arc cos}\left(\frac{d^2 + 10^2 - 38.5^2}{2 \cdot 10 \cdot d}\right)$$

Now, how do we find the area of a segment? The general case is illustrated below:




The segment area can be found by subtracting the triangular area from the area of the sector.

The area of the sector will be equal to

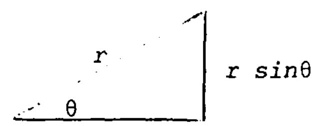
$$\pi r^2 \cdot \frac{2\theta}{360^\circ}, \text{ since } \frac{2\theta}{360^\circ}$$

represents the proportion of the circle's area which is subtended by the sector.

The triangular area can be found by examining the smaller triangles, one of which is illustrated below:

The height of the triangle = $r \sin\theta$

The base of the triangle = $r \cos\theta$




So, the area of one of the smaller triangles will be

$$\frac{r \sin\theta \cdot r \cos\theta}{2}$$

And, since there are two of them, the total triangular area will be

$$r^2 \sin\theta\cos\theta.$$

Finally, we can carry out the subtraction and write the segment area as

$$\pi r^2 \cdot \frac{2\theta}{360^\circ} - r^2 \sin\theta\cos\theta = r^2 \left(\frac{\pi\theta}{180^\circ} - \sin\theta\cos\theta\right).$$

Returning to our specific problem, we can then write the area of overlap as equal to the sum of the segment areas as follows:

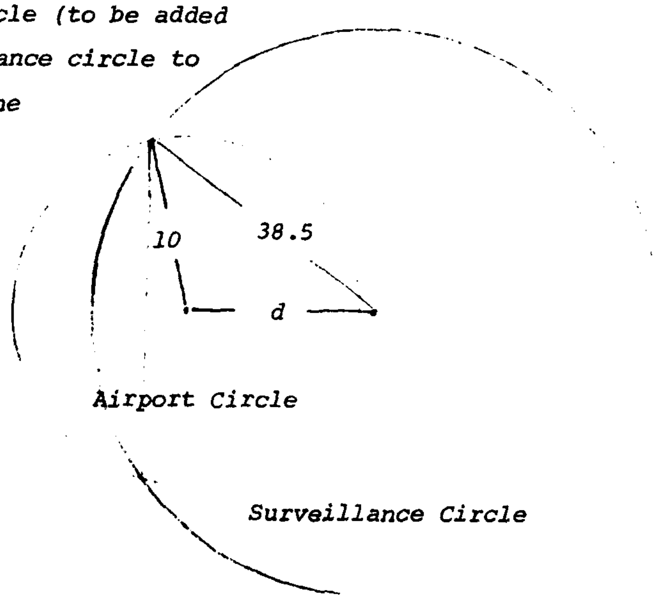
$$10^2 \left(\frac{\pi\angle 38.5}{180} - \sin\angle 38.5\cos\angle 38.5\right) + 38.5^2 \left(\frac{\pi\angle 10}{180} - \sin\angle 10\cos\angle 10\right)$$

Which, when divided by the area of the airport circle, yields the coverage ratio.

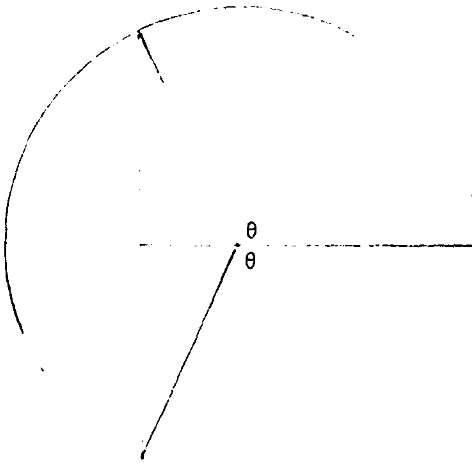
Determination of the coverage ratio (CR) may then be stated as

$$CR = \frac{1}{100\pi}\left[10^2\left(\frac{\pi\angle 38.5}{180} - \sin\angle 38.5\cos\angle 38.5\right) + 38.5^2\left(\frac{\pi\angle 10}{180} - \sin\angle 10\cos\angle 10\right)\right]$$

Note -- when the intersection is as illustrated here, 38.5 is obtuse and the segment from the airport circle (to be added to the segment from the surveillance circle to obtain the area of overlap) is the <u>larger</u> segment of the airport circle.




The derived formula, however, still holds under these conditions as illustrated below.




The area of the largest sector is given by $\frac{2\theta}{360} \cdot r^2$, as before.

The triangular area must be <u>added</u> to area of the sector to obtain the area of the larger segment.

So we have

$$\text{Segment area} = \frac{2\theta}{360} \cdot r^2 + \sin(180 - \theta)\cos(180 - \theta) \cdot r^2$$

But -- $\sin(180 - \theta) = \sin\theta$, $\cos(180 - \theta) = -\cos\theta$,

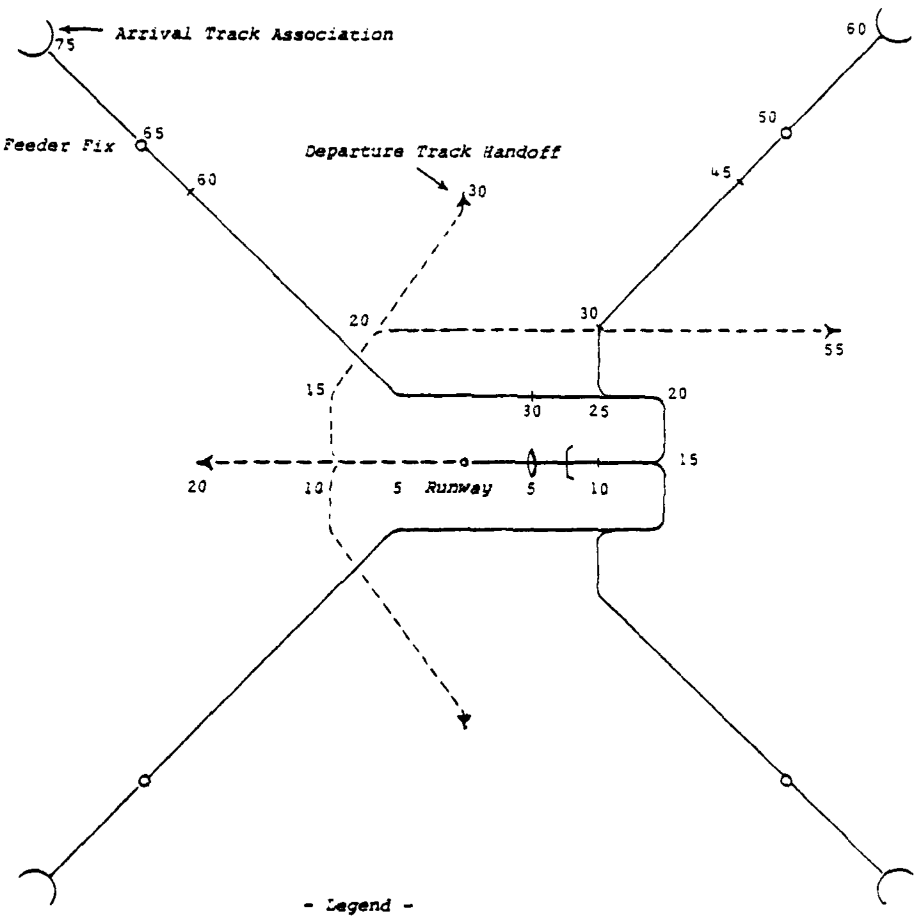
So we have

$$\text{Segment area} = r^2\left(\frac{\theta\pi}{180} - \sin\theta\cos\theta\right)$$, and the formula still holds.

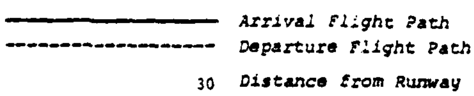
# APPENDIX F

## HYPOTHETICAL GEOMETRY AND FLIGHT PROFILES ASSUMED IN ESTIMATING AVERAGE LIFE OF ASSOCIATED TRACKS

HYPOTHETICAL GEOMETRY ASSUMED IN ESTIMATING AVERAGE LIFE OF ASSOCIATED TRACKS




- Legend -



## FLIGHT PROFILES ASSUMED IN ESTIMATING AVERAGE LIFE OF ASSOCIATED TRACKS

### AC and MA Arrivals

| Flt Path Distance from Runway | 50% of Arrivals | | | | 50% of Arrivals | | | |
|---|---|---|---|---|---|---|---|---|
| | Average | | | | Average | | | |
| | Alt | IAS | TAS | TTF | Alt | IAS | TAS | TTF |
| 0 | | | | | | | | |
| | 5 | 135 | 136 | 2:12 | 5 | 135 | 136 | 2:12 |
| 5 | | | | | | | | |
| | 10 | 156 | 158 | 1:54 | 10 | 156 | 158 | 1:54 |
| 10 | | | | | | | | |
| | 15 | 160 | 164 | 1:50 | 15 | 160 | 164 | 1:50 |
| 15 | | | | | | | | |
| | 20 | 177 | 183 | 1:39 | 20 | 177 | 183 | 1:39 |
| 20 | | | | | | | | |
| | 25 | 180 | 187 | 1:36 | 25 | 180 | 187 | 1:36 |
| 25 | | | | | | | | |
| | 30 | 203 | 212 | 1:25 | 30 | 203 | 212 | 1:25 |
| 30 | | | | | | | | |
| 35 | | | | | | | | |
| | | | | | 55 | 210 | 228 | 3:57 |
| 40 | | | | | | | | |
| 45 | 116 | 210 | 249 | 7:13 | | | | |
| | | | | | 75 | 225 | 252 | 1:12 |
| 50 | | | | | | | | |
| 55 | | | | | 95 | 250 | 289 | 2:05 |
| 60 | | | | | | | | |
| | 148 | 227 | 284 | 1:03 | | | | |
| 65 | | | | | | | | |
| 70 | 150 | 250 | 315 | 1:54 | | | | |
| 75 | | | | | | | | |
| | TOTAL TTF: | | | 20:46 | | | | 17:50 |

Average Associated Track Life (AC and MA Arrivals) = 19:18

## FLIGHT PROFILES ASSUMED IN ESTIMATING AVERAGE LIFE OF ASSOCIATED TRACKS

### AT and GA Arrivals

| Flt Path Distance from Runway | 50% of Arrivals | | | | 50% of Arrivals | | | |
|---|---|---|---|---|---|---|---|---|
| | Average | | | | Average | | | |
| | Alt | IAS | TAS | TTF | Alt | IAS | TAS | TTF |
| 0 | | | | | | | | |
| | 5 | 95 | 96 | 3:08 | 5 | 95 | 96 | 3:08 |
| 5 | | | | | | | | |
| | 10 | 117 | 119 | 2:31 | 10 | 117 | 119 | 2:31 |
| 10 | | | | | | | | |
| | 10 | 120 | 122 | 2:28 | 10 | 120 | 122 | 2:28 |
| 15 | | | | | | | | |
| | 10 | 159 | 161 | 1:52 | 10 | 159 | 161 | 1:52 |
| 20 | | | | | | | | |
| | 15 | 180 | 184 | 1:38 | 15 | 180 | 184 | 1:38 |
| 25 | | | | | | | | |
| | 20 | 189 | 195 | 1:32 | 20 | 189 | 195 | 1:32 |
| 30 | | | | | | | | |
| 35 | | | | | | | | |
| 40 | | | | | 50 | 190 | 205 | 5:52 |
| 45 | | | | | | | | |
| | 60 | 190 | 208 | 10:06 | | | | |
| 50 | | | | | | | | |
| 55 | | | | | | | | |
| | | | | | 80 | 190 | 214 | 2:48 |
| 60 | | | | | | | | |
| 65 | | | | | | | | |
| 70 | 100 | 190 | 221 | 2:43 | | | | |
| 75 | | | | | | | | |
| TOTAL TTF: | | | | 25:58 | | | | 21:49 |

*Average Associated Track Life (AT and GA Arrivals) = 23:54*

## FLIGHT PROFILES ASSUMED IN ESTIMATING AVERAGE LIFE OF ASSOCIATED TRACKS

### AC and MA Departures

| Flt Path Distance from Runway | 25% of Departures | | | | 50% of Departures | | | | 25% of Departures | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ------Average------ | | | | ------Average------ | | | | ------Average------ | | | |
| | Alt | IAS | TAS | TTF | Alt | IAS | TAS | TTF | Alt | IAS | TAS | TTF |
| 0 | | | | | | | | | | | | |
| | 10 | 160 | 162 | 1:51 | 10 | 160 | 162 | 1:51 | 10 | 160 | 162 | 1:51 |
| 5 | | | | | | | | | | | | |
| | 20 | 185 | 191 | 1:34 | 20 | 185 | 191 | 1:34 | 20 | 185 | 191 | 1:34 |
| 10 | | | | | | | | | | | | |
| | 30 | 210 | 220 | 1:22 | 30 | 210 | 220 | 1:22 | 30 | 210 | 220 | 1:22 |
| 15 | | | | | | | | | | | | |
| | 30 | 210 | 220 | 1:22 | 30 | 210 | 220 | 1:22 | 30 | 210 | 220 | 1:22 |
| 20 | | | | | | | | | | | | |
| 25 | | | | | 40 | 210 | 223 | 2:42 | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| | | | | | | | | | 80 | 210 | 237 | 8:52 |
| 40 | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | |
| 50 | | | | | | | | | | | | |
| 55 | | | | | | | | | | | | |
| TOTAL TTF: | | | | 6:09 | | | | 8:51 | | | | 15:01 |

Average Associated Track Life (AC & MA Departures) = 9:43

## FLIGHT PROFILES ASSUMED IN ESTIMATING AVERAGE LIFE OF ASSOCIATED TRACKS

### AT and GA Departures

| Flt Path Distance from Runway | 25% of Departures — Average | | | | 50% of Departures — Average | | | | 25% of Departures — Average | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Alt | IAS | TAS | TTF | Alt | IAS | TAS | TTF | Alt | IAS | TAS | TTF |
| 0 | | | | | | | | | | | | |
| | 5 | 110 | 111 | 2:42 | 5 | 110 | 111 | 2:42 | 5 | 110 | 111 | 2:42 |
| 5 | | | | | | | | | | | | |
| | 15 | 150 | 153 | 1:58 | 15 | 150 | 153 | 1:58 | 15 | 150 | 153 | 1:58 |
| 10 | | | | | | | | | | | | |
| | 25 | 175 | 182 | 1:39 | 25 | 175 | 182 | 1:39 | 25 | 175 | 182 | 1:39 |
| 15 | | | | | | | | | | | | |
| | 30 | 190 | 199 | 1:30 | 30 | 190 | 199 | 1:30 | 30 | 190 | 199 | 1:30 |
| 20 | | | | | | | | | | | | |
| 25 | | | | | 40 | 190 | 202 | 2:59 | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| | | | | | | | | | 50 | 190 | 205 | 10:16 |
| 40 | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | |
| 50 | | | | | | | | | | | | |
| 55 | | | | | | | | | | | | |
| TOTAL TTF: | | | | 7:49 | | | | 10:48 | | | | 18:05 |

Average Associated Track Life (AT & GA Departures) = 11:53

# APPENDIX G

## IAC SYSTEM LOAD FACTORS FOR THE NEW YORK TRACON SURVEILLANCE SITES

SYSTEM LOAD VALUES
FOR
NEW YORK JFK
1977

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 143.06 | 296.62 | 450.19 | 91.04 | 98.52 | 146.67 |
| RADAR ONLY | 39.56 | 84.34 | 129.12 | 5.19 | 11.03 | 16.87 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 103.51 | 212.29 | 321.07 | 75.85 | 87.50 | 129.81 |
| DISCRETE | 44.91 | 50.27 | 73.05 | 59.88 | 69.80 | 102.81 |
| NON DISCRETE | 58.59 | 162.01 | 248.01 | 15.97 | 17.70 | 27.00 |
| MODE C | 44.91 | 90.80 | 135.08 | 59.88 | 59.88 | 92.68 |
| **ADJUSTED** | | | | | | |
| TOTAL | 195.22 | 351.30 | 508.38 | 180.78 | 201.50 | 250.42 |
| RADAR ONLY | 92.00 | 139.00 | 187.00 | 107.00 | 114.00 | 121.00 |
| BEACON ONLY | 8.00 | 17.00 | 26.00 | 4.00 | 7.00 | 10.00 |
| DISCRETE | 2.00 | 4.00 | 6.00 | 3.00 | 6.00 | 8.00 |
| NON DISCRETE | 6.00 | 13.00 | 20.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 4.00 | 7.00 | 11.00 | 3.00 | 5.00 | 7.00 |
| RADAR REINFORCED BEACON | 95.22 | 195.30 | 295.38 | 69.78 | 80.50 | 119.42 |
| DISCRETE | 41.32 | 46.25 | 67.21 | 55.09 | 64.21 | 94.58 |
| NON DISCRETE | 53.91 | 149.05 | 228.17 | 14.69 | 16.28 | 24.84 |
| MODE C | 41.32 | 83.53 | 124.27 | 55.09 | 55.09 | 85.26 |
| **ASSOCIATED TRACKS** | | | | | | |
| TOTAL | | 21 | | | 28 | |
| RADAR ONLY | | 2 | | | 2 | |
| BEACON ONLY | | 1 | | | 2 | |
| DISCRETE | | 1 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 18 | | | 24 | |
| DISCRETE | | 14 | | | 19 | |
| NON DISCRETE | | 4 | | | 5 | |
| MODE C | | 16 | | | 21 | |
| **UNASSOCIATED TRACKS** | | | | | | |
| TOTAL | 122 | 275 | 429 | 53 | 71 | 119 |
| RADAR ONLY | 42 | 91 | 140 | 6 | 13 | 20 |
| BEACON ONLY | 3 | 7 | 12 | 1 | 2 | 3 |
| DISCRETE | 1 | 1 | 2 | 0 | 1 | 2 |
| NON DISCRETE | 2 | 6 | 10 | 1 | 1 | 1 |
| MODE C | 1 | 3 | 4 | 1 | 1 | 3 |
| RADAR REINFORCED BEACON | 77 | 177 | 277 | 46 | 56 | 96 |
| DISCRETE | 27 | 32 | 53 | 36 | 45 | 76 |
| NON DISCRETE | 50 | 145 | 224 | 10 | 11 | 20 |
| MODE C | 25 | 68 | 108 | 34 | 34 | 64 |
| CROSS-LINKED | | 38 | | | 49 | |
| UNUSED TARGET REPORTS | 54 | 58 | 63 | 103 | 104 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 8 | 13 | 3 | 4 | 5 |

SYSTEM LOAD VALUES
FOR
NEW YORK JFK
1980

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 157.17 | 319.58 | 482.00 | 95.41 | 104.44 | 155.76 |
| RADAR ONLY | 40.95 | 84.55 | 128.16 | 5.04 | 10.42 | 15.81 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 116.22 | 235.03 | 353.84 | 90.38 | 94.02 | 139.95 |
| DISCRETE | 56.48 | 56.48 | 75.08 | 75.31 | 75.31 | 109.56 |
| NON DISCRETE | 59.74 | 178.55 | 278.76 | 15.06 | 18.70 | 30.39 |
| MODE C | 56.48 | 110.23 | 164.66 | 75.31 | 75.31 | 100.42 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 209.93 | 376.23 | 540.54 | 194.15 | 208.50 | 260.75 |
| RADAR ONLY | 94.00 | 141.00 | 187.00 | 107.00 | 114.00 | 121.00 |
| BEACON ONLY | 9.00 | 19.00 | 28.00 | 4.00 | 8.00 | 11.00 |
| DISCRETE | 2.00 | 4.00 | 6.00 | 3.00 | 6.00 | 9.00 |
| NON DISCRETE | 7.00 | 15.00 | 22.00 | 1.00 | 2.00 | 2.00 |
| MODE C | 4.00 | 9.00 | 13.00 | 3.00 | 5.00 | 8.00 |
| RADAR REINFORCED BEACON | 106.93 | 216.23 | 325.54 | 83.15 | 86.50 | 128.75 |
| DISCRETE | 51.97 | 51.97 | 69.08 | 69.29 | 69.29 | 100.79 |
| NON DISCRETE | 54.96 | 164.26 | 256.46 | 13.86 | 17.21 | 27.96 |
| MODE C | 51.97 | 101.41 | 151.49 | 69.29 | 69.29 | 92.39 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 26 | | | 34 | |
| RADAR ONLY | | 2 | | | 3 | |
| BEACON ONLY | | 2 | | | 2 | |
| DISCRETE | | 2 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 22 | | | 29 | |
| DISCRETE | | 18 | | | 24 | |
| NON DISCRETE | | 4 | | | 5 | |
| MODE C | | 20 | | | 26 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 131 | 293 | 455 | 62 | 70 | 121 |
| RADAR ONLY | 44 | 92 | 140 | 6 | 11 | 18 |
| BEACON ONLY | 2 | 7 | 12 | 2 | 2 | 3 |
| DISCRETE | 0 | 0 | 1 | 1 | 1 | 2 |
| NON DISCRETE | 2 | 7 | 11 | 1 | 1 | 1 |
| MODE C | 1 | 3 | 6 | 2 | 2 | 3 |
| RADAR REINFORCED BEACON | 85 | 194 | 303 | 54 | 57 | 100 |
| DISCRETE | 34 | 34 | 51 | 45 | 45 | 77 |
| NON DISCRETE | 51 | 160 | 252 | 9 | 12 | 23 |
| MODE C | 32 | 81 | 131 | 43 | 43 | 66 |
| CROSS-LINKED | | 47 | | | 58 | |

| | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| UNUSED TARGET REPORTS | 55 | 59 | 64 | 104 | 104 | 106 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 5 | 9 | 14 | 4 | 4 | 6 |

SYSTEM LOAD VALUES
FOR
NEW YORK JFK
1982

| ASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| OTAL | 164.81 | 330.79 | 496.77 | 130.54 | 108.48 | 161.55 |
| ADAR ONLY | 39.16 | 79.50 | 119.84 | 4.85 | 9.87 | 14.90 |
| EACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ADAR REINFORCED BEACON | 125.65 | 251.29 | 376.92 | 95.69 | 98.61 | 146.66 |
| DISCRETE | 61.41 | 61.41 | 80.09 | 81.88 | 81.88 | 114.18 |
| NON DISCRETE | 64.24 | 189.88 | 296.83 | 13.81 | 16.73 | 32.48 |
| MODE C | 61.41 | 124.74 | 186.16 | 81.88 | 81.88 | 107.19 |

| DJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| OTAL | 218.60 | 387.19 | 556.77 | 199.04 | 211.72 | 266.93 |
| ADAR ONLY | 93.00 | 136.00 | 180.00 | 107.00 | 113.00 | 120.00 |
| EACON ONLY | 10.00 | 20.00 | 30.00 | 4.00 | 8.00 | 12.00 |
| DISCRETE | 2.00 | 4.00 | 6.00 | 3.00 | 6.00 | 9.00 |
| NON DISCRETE | 8.00 | 16.00 | 24.00 | 1.00 | 2.00 | 3.00 |
| MODE C | 5.00 | 10.00 | 15.00 | 3.00 | 6.00 | 9.00 |
| ADAR REINFORCED BEACON | 115.60 | 231.19 | 346.77 | 88.04 | 90.72 | 134.93 |
| DISCRETE | 56.50 | 56.50 | 73.69 | 75.33 | 75.33 | 105.05 |
| NON DISCRETE | 59.10 | 174.69 | 273.08 | 12.71 | 15.39 | 29.88 |
| MODE C | 56.50 | 114.76 | 171.27 | 75.33 | 75.33 | 98.62 |

| SSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| OTAL | | 27 | | | 34 | |
| ADAR ONLY | | 2 | | | 2 | |
| EACON ONLY | | 2 | | | 2 | |
| DISCRETE | | 2 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| ADAR REINFORCED BEACON | | 23 | | | 30 | |
| DISCRETE | | 20 | | | 26 | |
| NON DISCRETE | | 3 | | | 4 | |
| MODE C | | 21 | | | 29 | |

| NASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| OTAL | 137 | 304 | 470 | 67 | 74 | 128 |
| ADAR ONLY | 42 | 88 | 133 | 7 | 12 | 19 |
| EACON ONLY | 3 | 8 | 13 | 2 | 2 | 4 |
| DISCRETE | 0 | 0 | 1 | 1 | 1 | 3 |
| NON DISCRETE | 3 | 8 | 12 | 1 | 1 | 1 |
| MODE C | 1 | 4 | 6 | 2 | 2 | 3 |
| ADAR REINFORCED BEACON | 92 | 208 | 324 | 58 | 60 | 105 |
| DISCRETE | 36 | 36 | 54 | 49 | 49 | 79 |
| NON DISCRETE | 56 | 172 | 270 | 9 | 11 | 26 |
| MODE C | 35 | 94 | 150 | 46 | 46 | 70 |
| ROSS-LINKED | | 46 | | | 60 | |

| | A | B | C | A | B | C |
|---|---|---|---|---|---|---|
| NUSED TARGET REPORTS | 55 | 60 | 65 | 104 | 104 | 106 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 5 | 10 | 15 | 4 | 4 | 6 |

## SYSTEM LOAD VALUES
## FOR
## NEW YORK JFK
## 1984

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 172.43 | 341.16 | 509.90 | 104.05 | 111.61 | 165.83 |
| RADAR ONLY | 38.38 | 76.54 | 114.69 | 4.54 | 9.10 | 13.66 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 134.05 | 264.63 | 395.21 | 99.51 | 102.51 | 152.17 |
| DISCRETE | 65.49 | 65.49 | 85.04 | 87.32 | 87.32 | 118.04 |
| NON DISCRETE | 68.56 | 199.14 | 310.17 | 12.18 | 15.19 | 34.13 |
| MODE C | 69.97 | 136.84 | 203.71 | 87.32 | 87.32 | 112.60 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 226.32 | 398.46 | 571.59 | 201.55 | 215.31 | 271.00 |
| RADAR ONLY | 92.00 | 134.00 | 176.00 | 106.00 | 113.00 | 119.00 |
| BEACON ONLY | 11.00 | 21.00 | 32.00 | 4.00 | 8.00 | 12.00 |
| DISCRETE | 2.00 | 5.00 | 7.00 | 3.00 | 6.00 | 9.00 |
| NON DISCRETE | 9.00 | 16.00 | 25.00 | 1.00 | 2.00 | 3.00 |
| MODE C | 6.00 | 11.00 | 16.00 | 3.00 | 6.00 | 9.00 |
| RADAR REINFORCED BEACON | 123.32 | 243.46 | 363.59 | 91.55 | 94.31 | 140.00 |
| DISCRETE | 60.25 | 60.25 | 78.24 | 80.34 | 80.34 | 108.60 |
| NON DISCRETE | 63.07 | 183.21 | 285.35 | 11.21 | 13.97 | 31.40 |
| MODE C | 64.37 | 125.89 | 187.41 | 80.34 | 80.34 | 103.59 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 28 | | | 36 | |
| RADAR ONLY | | 2 | | | 2 | |
| BEACON ONLY | | 2 | | | 2 | |
| DISCRETE | | 2 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 24 | | | 32 | |
| DISCRETE | | 21 | | | 28 | |
| NON DISCRETE | | 3 | | | 4 | |
| MODE C | | 23 | | | 31 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 145 | 313 | 481 | 67 | 75 | 130 |
| RADAR ONLY | 42 | 85 | 129 | 7 | 11 | 18 |
| BEACON ONLY | 4 | 9 | 13 | 1 | 2 | 4 |
| DISCRETE | 1 | 1 | 1 | 1 | 1 | 3 |
| NON DISCRETE | 3 | 8 | 12 | 0 | 1 | 1 |
| MODE C | 2 | 4 | 7 | 2 | 2 | 4 |
| RADAR REINFORCED BEACON | 99 | 219 | 339 | 59 | 62 | 108 |
| DISCRETE | 39 | 39 | 57 | 52 | 52 | 81 |
| NON DISCRETE | 60 | 180 | 282 | 7 | 10 | 27 |
| MODE C | 41 | 103 | 164 | 49 | 49 | 73 |
| CROSS-LINKED | | 49 | | | 64 | |
| UNUSED TARGET REPORTS | 55 | 61 | 66 | 104 | 104 | 106 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 5 | 11 | 16 | 4 | 4 | 6 |

## SYSTEM LOAD VALUES
## FOR
## NEW YORK JFK
## 1986

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 178.32 | 349.17 | 520.03 | 108.39 | 113.74 | 168.67 |
| RADAR ONLY | 36.96 | 72.76 | 108.57 | 4.15 | 8.20 | 12.25 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 141.36 | 276.41 | 411.47 | 103.94 | 105.54 | 156.42 |
| DISCRETE | 70.08 | 70.08 | 89.30 | 93.44 | 93.44 | 120.84 |
| NON DISCRETE | 71.28 | 206.33 | 322.17 | 10.50 | 12.10 | 35.58 |
| MODE C | 77.79 | 151.26 | 224.73 | 93.44 | 93.44 | 117.92 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 232.05 | 407.30 | 582.55 | 205.63 | 217.10 | 274.91 |
| RADAR ONLY | 91.00 | 131.00 | 171.00 | 106.00 | 112.00 | 118.00 |
| BEACON ONLY | 11.00 | 22.00 | 33.00 | 4.00 | 8.00 | 13.00 |
| DISCRETE | 3.00 | 5.00 | 7.00 | 3.00 | 7.00 | 10.00 |
| NON DISCRETE | 8.00 | 17.00 | 26.00 | 1.00 | 1.00 | 3.00 |
| MODE C | 6.00 | 12.00 | 18.00 | 3.00 | 6.00 | 9.00 |
| RADAR REINFORCED BEACON | 130.05 | 254.30 | 378.55 | 95.63 | 97.10 | 143.91 |
| DISCRETE | 64.48 | 64.48 | 82.16 | 85.97 | 85.97 | 111.18 |
| NON DISCRETE | 65.57 | 189.82 | 296.39 | 9.66 | 11.13 | 32.73 |
| MODE C | 71.57 | 139.16 | 206.76 | 85.97 | 85.97 | 108.48 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 29 | | | 38 | |
| RADAR ONLY | | 1 | | | 2 | |
| BEACON ONLY | | 2 | | | 3 | |
| DISCRETE | | 2 | | | 3 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 26 | | | 33 | |
| DISCRETE | | 23 | | | 30 | |
| NON DISCRETE | | 3 | | | 3 | |
| MODE C | | 25 | | | 33 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 150 | 320 | 491 | 70 | 75 | 131 |
| RADAR ONLY | 42 | 83 | 124 | 6 | 10 | 17 |
| BEACON ONLY | 4 | 9 | 15 | 1 | 1 | 3 |
| DISCRETE | 1 | 1 | 2 | 1 | 1 | 2 |
| NON DISCRETE | 3 | 8 | 13 | 0 | 0 | 1 |
| MODE C | 2 | 5 | 8 | 3 | 3 | 4 |
| RADAR REINFORCED BEACON | 104 | 229 | 352 | 63 | 64 | 111 |
| DISCRETE | 41 | 41 | 59 | 56 | 56 | 81 |
| NON DISCRETE | 63 | 187 | 293 | 7 | 8 | 30 |
| MODE C | 47 | 114 | 182 | 53 | 53 | 75 |
| CROSS-LINKED | | 52 | | | 66 | |
| UNUSED TARGET REPORTS | 56 | 61 | 66 | 104 | 104 | 106 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 6 | 11 | 16 | 4 | 4 | 6 |

SYSTEM LOAD VALUES
FOR
NEW YORK JFK
1989

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 183.87 | 356.32 | 528.78 | 112.90 | 116.13 | 171.78 |
| RADAR ONLY | 33.65 | 65.47 | 97.28 | 3.70 | 7.24 | 10.77 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 150.21 | 290.86 | 431.50 | 109.19 | 108.90 | 161.01 |
| DISCRETE | 76.10 | 76.10 | 94.19 | 101.47 | 101.47 | 123.53 |
| NON DISCRETE | 74.11 | 214.76 | 337.31 | 7.72 | 7.43 | 37.48 |
| MODE C | 85.97 | 165.88 | 245.79 | 101.47 | 101.47 | 123.32 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 238.20 | 414.59 | 592.98 | 211.46 | 220.19 | 278.13 |
| RADAR ONLY | 88.00 | 124.00 | 161.00 | 106.00 | 111.00 | 117.00 |
| BEACON ONLY | 12.00 | 23.00 | 35.00 | 5.00 | 9.00 | 13.00 |
| DISCRETE | 3.00 | 5.00 | 8.00 | 4.00 | 7.00 | 10.00 |
| NON DISCRETE | 9.00 | 18.00 | 27.00 | 1.00 | 2.00 | 3.00 |
| MODE C | 7.00 | 13.00 | 20.00 | 4.00 | 7.00 | 10.00 |
| RADAR REINFORCED BEACON | 138.20 | 267.59 | 396.98 | 100.46 | 100.19 | 148.13 |
| DISCRETE | 70.02 | 70.02 | 86.66 | 93.35 | 93.35 | 113.65 |
| NON DISCRETE | 68.18 | 197.57 | 310.32 | 7.10 | 6.83 | 34.48 |
| MODE C | 79.09 | 152.61 | 226.12 | 93.35 | 93.35 | 113.46 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 30 | | | 40 | |
| RADAR ONLY | | 1 | | | 2 | |
| BEACON ONLY | | 2 | | | 3 | |
| DISCRETE | | 2 | | | 3 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 27 | | | 35 | |
| DISCRETE | | 25 | | | 33 | |
| NON DISCRETE | | 2 | | | 2 | |
| MODE C | | 27 | | | 36 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 154 | 327 | 499 | 72 | 76 | 131 |
| RADAR ONLY | 39 | 76 | 114 | 6 | 10 | 15 |
| BEACON ONLY | 4 | 10 | 15 | 1 | 1 | 3 |
| DISCRETE | 1 | 1 | 2 | 1 | 1 | 2 |
| NON DISCRETE | 3 | 9 | 13 | 0 | 0 | 1 |
| MODE C | 2 | 6 | 9 | 3 | 3 | 4 |
| RADAR REINFORCED BEACON | 111 | 241 | 370 | 65 | 65 | 113 |
| DISCRETE | 45 | 45 | 62 | 60 | 60 | 81 |
| NON DISCRETE | 66 | 196 | 308 | 5 | 5 | 32 |
| MODE C | 52 | 126 | 199 | 57 | 57 | 77 |
| CROSS-LINKED | | 54 | | | 70 | |

| | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| UNUSED TARGET REPORTS | 56 | 62 | 67 | 104 | 104 | 106 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 6 | 12 | 17 | 4 | 4 | 6 |

SYSTEM LOAD VALUES

FOR

NEW YORK JFK

1990

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 189.06 | 362.80 | 536.54 | 117.86 | 120.86 | 175.03 |
| RADAR ONLY | 31.54 | 60.68 | 89.82 | 3.22 | 6.21 | 9.21 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 157.52 | 302.12 | 446.72 | 114.64 | 114.64 | 165.82 |
| DISCRETE | 82.51 | 82.51 | 98.59 | 110.01 | 110.01 | 126.32 |
| NON DISCRETE | 75.02 | 219.61 | 348.12 | 4.63 | 4.63 | 39.50 |
| MODE C | 94.45 | 180.76 | 267.08 | 110.01 | 110.01 | 128.98 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 244.92 | 421.95 | 600.98 | 215.47 | 224.47 | 280.56 |
| RADAR ONLY | 87.00 | 120.00 | 154.00 | 105.00 | 110.00 | 115.00 |
| BEACON ONLY | 13.00 | 24.00 | 36.00 | 5.00 | 9.00 | 13.00 |
| DISCRETE | 3.00 | 5.00 | 8.00 | 4.00 | 7.00 | 10.00 |
| NON DISCRETE | 10.00 | 19.00 | 28.00 | 1.00 | 2.00 | 3.00 |
| MODE C | 8.00 | 14.00 | 21.00 | 4.00 | 7.00 | 10.00 |
| RADAR REINFORCED BEACON | 144.92 | 277.95 | 410.98 | 105.47 | 105.47 | 152.56 |
| DISCRETE | 75.91 | 75.91 | 90.71 | 101.21 | 101.21 | 116.22 |
| NON DISCRETE | 69.01 | 202.04 | 320.27 | 4.26 | 4.26 | 36.34 |
| MODE C | 86.90 | 166.30 | 245.71 | 101.21 | 101.21 | 118.66 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 31 | | | 41 | |
| RADAR ONLY | | 1 | | | 2 | |
| BEACON ONLY | | 2 | | | 3 | |
| DISCRETE | | 2 | | | 3 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 2 | |
| RADAR REINFORCED BEACON | | 28 | | | 36 | |
| DISCRETE | | 27 | | | 35 | |
| NON DISCRETE | | 1 | | | 1 | |
| MODE C | | 29 | | | 39 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 158 | 332 | 506 | 76 | 79 | 134 |
| RADAR ONLY | 37 | 72 | 107 | 6 | 9 | 14 |
| BEACON ONLY | 4 | 10 | 16 | 1 | 1 | 4 |
| DISCRETE | 1 | 1 | 2 | 1 | 1 | 2 |
| NON DISCRETE | 3 | 9 | 14 | 0 | 0 | 2 |
| MODE C | 3 | 6 | 10 | 2 | 2 | 3 |
| RADAR REINFORCED BEACON | 117 | 250 | 383 | 69 | 69 | 116 |
| DISCRETE | 49 | 49 | 64 | 66 | 66 | 81 |
| NON DISCRETE | 68 | 201 | 319 | 3 | 3 | 35 |
| MODE C | 58 | 137 | 217 | 62 | 62 | 80 |
| CROSS-LINKED | | 54 | | | 72 | |
| UNUSED TARGET REPORTS | 56 | 62 | 68 | 105 | 105 | 107 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 6 | 12 | 18 | 5 | 5 | 7 |

SYSTEM LOAD VALUES
FOR
NEW YORK EWR
1977

| BASE | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 97.35 | 206.99 | 316.60 | 79.46 | 83.61 | 121.84 |
| RADAR ONLY | 24.38 | 54.05 | 83.72 | 3.61 | 7.76 | 11.91 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 72.97 | 152.93 | 232.89 | 75.85 | 75.85 | 109.93 |
| DISCRETE | 44.91 | 44.91 | 67.01 | 59.88 | 59.88 | 90.30 |
| NON DISCRETE | 28.06 | 108.02 | 165.88 | 15.97 | 15.97 | 19.62 |
| MODE C | 44.91 | 74.74 | 111.80 | 59.88 | 59.88 | 83.38 |

| ADJUSTED | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 149.13 | 260.69 | 373.26 | 177.78 | 185.78 | 226.13 |
| RADAR ONLY | 76.00 | 108.00 | 140.00 | 105.00 | 110.00 | 116.00 |
| BEACON ONLY | 6.00 | 12.00 | 19.00 | 3.00 | 6.00 | 9.00 |
| DISCRETE | 2.00 | 4.00 | 5.00 | 3.00 | 5.00 | 7.00 |
| NON DISCRETE | 4.00 | 8.00 | 14.00 | 0.00 | 1.00 | 2.00 |
| MODE C | 3.00 | 6.00 | 9.00 | 2.00 | 5.00 | 7.00 |
| RADAR REINFORCED BEACON | 67.13 | 140.69 | 214.26 | 69.78 | 69.78 | 101.13 |
| DISCRETE | 41.32 | 41.32 | 61.65 | 55.09 | 55.09 | 83.08 |
| NON DISCRETE | 25.81 | 99.38 | 152.61 | 14.69 | 14.69 | 18.05 |
| MODE C | 41.32 | 68.77 | 102.85 | 55.09 | 55.09 | 76.71 |

| ASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | | 21 | | | 28 | |
| RADAR ONLY | | 2 | | | 2 | |
| BEACON ONLY | | 1 | | | 2 | |
| DISCRETE | | 1 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 18 | | | 24 | |
| DISCRETE | | 14 | | | 19 | |
| NON DISCRETE | | 4 | | | 5 | |
| MODE C | | 16 | | | 21 | |

| UNASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 76 | 185 | 297 | 52 | 56 | 94 |
| RADAR ONLY | 25 | 58 | 91 | 5 | 9 | 14 |
| BEACON ONLY | 2 | 5 | 9 | 1 | 1 | 3 |
| DISCRETE | 1 | 1 | 2 | 0 | 0 | 2 |
| NON DISCRETE | 1 | 4 | 7 | 1 | 1 | 1 |
| MODE C | 1 | 2 | 3 | 1 | 1 | 2 |
| RADAR REINFORCED BEACON | 49 | 122 | 197 | 46 | 46 | 77 |
| DISCRETE | 27 | 27 | 48 | 36 | 36 | 64 |
| NON DISCRETE | 22 | 95 | 149 | 10 | 10 | 13 |
| MODE C | 25 | 53 | 87 | 34 | 34 | 56 |
| CROSS-LINKED | | 36 | | | 45 | |
| UNUSED TARGET REPORTS | 53 | 56 | 59 | 103 | 103 | 104 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 3 | 6 | 9 | 3 | 3 | 4 |

SYSTEM LOAD VALUES
FOR
NEW YORK EWR
1980

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 106.28 | 223.55 | 340.82 | 93.81 | 97.60 | 128.97 |
| RADAR ONLY | 25.18 | 54.47 | 83.76 | 3.43 | 7.22 | 11.01 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 81.10 | 169.08 | 257.06 | 90.38 | 90.38 | 117.96 |
| DISCRETE | 56.48 | 56.48 | 69.51 | 75.31 | 75.31 | 96.15 |
| NON DISCRETE | 24.62 | 112.60 | 187.55 | 15.06 | 15.06 | 21.81 |
| MODE C | 56.48 | 88.45 | 133.07 | 75.31 | 75.31 | 90.17 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 157.61 | 278.55 | 398.49 | 191.15 | 199.15 | 232.52 |
| RADAR ONLY | 77.00 | 109.00 | 141.00 | 105.00 | 110.00 | 115.00 |
| BEACON ONLY | 6.00 | 14.00 | 21.00 | 3.00 | 6.00 | 9.00 |
| DISCRETE | 2.00 | 4.00 | 6.00 | 3.00 | 5.00 | 8.00 |
| NON DISCRETE | 4.00 | 10.00 | 15.00 | 0.00 | 1.00 | 1.00 |
| MODE C | 4.00 | 7.00 | 11.00 | 3.00 | 5.00 | 7.00 |
| RADAR REINFORCED BEACON | 74.61 | 155.55 | 236.49 | 83.15 | 83.15 | 108.52 |
| DISCRETE | 51.97 | 51.97 | 63.95 | 69.29 | 69.29 | 88.46 |
| NON DISCRETE | 22.65 | 103.59 | 172.55 | 13.86 | 13.86 | 20.06 |
| MODE C | 51.97 | 81.37 | 122.43 | 69.29 | 69.29 | 82.96 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 26 | | | 34 | |
| RADAR ONLY | | 2 | | | 3 | |
| BEACON ONLY | | 2 | | | 2 | |
| DISCRETE | | 2 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 22 | | | 29 | |
| DISCRETE | | 18 | | | 24 | |
| NON DISCRETE | | 4 | | | 5 | |
| MODE C | | 20 | | | 26 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 80 | 198 | 316 | 60 | 64 | 95 |
| RADAR ONLY | 26 | 59 | 92 | 4 | 8 | 13 |
| BEACON ONLY | 1 | 5 | 9 | 2 | 2 | 3 |
| DISCRETE | 0 | 0 | 1 | 1 | 1 | 2 |
| NON DISCRETE | 1 | 5 | 8 | 1 | 1 | 1 |
| MODE C | 1 | 3 | 4 | 2 | 2 | 3 |
| RADAR REINFORCED BEACON | 53 | 134 | 215 | 54 | 54 | 79 |
| DISCRETE | 34 | 34 | 46 | 45 | 45 | 64 |
| NON DISCRETE | 19 | 100 | 169 | 9 | 9 | 15 |
| MODE C | 32 | 61 | 102 | 43 | 43 | 57 |
| CROSS-LINKED | | 43 | | | 54 | |
| UNUSED TARGET REPORTS | 53 | 57 | 60 | 104 | 104 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 3 | 7 | 10 | 4 | 4 | 5 |

SYSTEM LOAD VALUES
FOR
NEW YORK EWR
1982

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 111.35 | 232.03 | 352.70 | 98.97 | 102.50 | 133.50 |
| RADAR ONLY | 24.09 | 51.42 | 78.75 | 3.28 | 6.81 | 10.34 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 87.26 | 180.61 | 273.95 | 95.69 | 95.69 | 123.16 |
| DISCRETE | 61.41 | 61.41 | 73.79 | 81.88 | 81.88 | 99.99 |
| NON DISCRETE | 25.85 | 119.19 | 200.16 | 13.81 | 13.81 | 23.17 |
| MODE C | 61.41 | 98.50 | 148.36 | 81.88 | 81.88 | 95.58 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 164.28 | 287.16 | 411.04 | 196.04 | 205.04 | 238.31 |
| RADAR ONLY | 77.00 | 107.00 | 137.00 | 105.00 | 110.00 | 115.00 |
| BEACON ONLY | 7.00 | 14.00 | 22.00 | 3.00 | 7.00 | 10.00 |
| DISCRETE | 2.00 | 4.00 | 6.00 | 3.00 | 5.00 | 8.00 |
| NON DISCRETE | 5.00 | 10.00 | 16.00 | 0.00 | 2.00 | 2.00 |
| MODE C | 4.00 | 8.00 | 12.00 | 3.00 | 5.00 | 8.00 |
| RADAR REINFORCED BEACON | 80.28 | 166.16 | 252.04 | 88.04 | 88.04 | 113.31 |
| DISCRETE | 56.50 | 56.50 | 67.88 | 75.33 | 75.33 | 91.99 |
| NON DISCRETE | 23.78 | 109.66 | 184.15 | 12.71 | 12.71 | 21.32 |
| MODE C | 56.50 | 90.71 | 136.49 | 75.33 | 75.33 | 87.94 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 27 | | | 34 | |
| RADAR ONLY | | 2 | | | 2 | |
| BEACON ONLY | | 2 | | | 2 | |
| DISCRETE | | 2 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 23 | | | 30 | |
| DISCRETE | | 20 | | | 26 | |
| NON DISCRETE | | 3 | | | 4 | |
| MODE C | | 21 | | | 29 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 84 | 205 | 326 | 65 | 69 | 99 |
| RADAR ONLY | 26 | 57 | 88 | 5 | 9 | 13 |
| BEACON ONLY | 1 | 5 | 9 | 2 | 2 | 3 |
| DISCRETE | 0 | 0 | 1 | 1 | 1 | 2 |
| NON DISCRETE | 1 | 5 | 8 | 1 | 1 | 1 |
| MODE C | 1 | 3 | 5 | 2 | 2 | 3 |
| RADAR REINFORCED BEACON | 57 | 143 | 229 | 58 | 58 | 83 |
| DISCRETE | 36 | 35 | 48 | 49 | 49 | 66 |
| NON DISCRETE | 21 | 107 | 181 | 9 | 9 | 17 |
| MODE C | 35 | 70 | 115 | 46 | 46 | 59 |
| CROSS-LINKED | | 43 | | | 56 | |
| UNUSED TARGET REPORTS | 53 | 57 | 61 | 104 | 104 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 3 | 7 | 11 | 4 | 4 | 5 |

SYSTEM LOAD VALUES
FOR
NEW YORK EWR
1984

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 116.29 | 239.43 | 362.57 | 102.57 | 105.77 | 136.96 |
| RADAR ONLY | 23.60 | 49.56 | 75.52 | 3.06 | 6.26 | 9.46 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 92.69 | 189.87 | 287.05 | 99.51 | 99.51 | 127.50 |
| DISCRETE | 65.49 | 55.49 | 78.01 | 87.32 | 87.32 | 103.26 |
| NON DISCRETE | 27.20 | 124.38 | 209.04 | 12.18 | 12.18 | 24.24 |
| MODE C | 65.49 | 107.04 | 160.83 | 87.32 | 87.32 | 99.99 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 168.28 | 294.68 | 421.08 | 199.55 | 207.55 | 241.30 |
| RADAR ONLY | 76.00 | 105.00 | 134.00 | 105.00 | 109.00 | 114.00 |
| BEACON ONLY | 7.00 | 15.00 | 23.00 | 3.00 | 7.00 | 10.00 |
| DISCRETE | 2.00 | 4.00 | 6.00 | 3.00 | 6.00 | 8.00 |
| NON DISCRETE | 5.00 | 11.00 | 17.00 | 0.00 | 1.00 | 2.00 |
| MODE C | 4.00 | 9.00 | 13.00 | 3.00 | 5.00 | 8.00 |
| RADAR REINFORCED BEACON | 85.28 | 174.68 | 264.08 | 91.55 | 91.55 | 117.30 |
| DISCRETE | 60.25 | 60.25 | 71.77 | 80.34 | 80.34 | 95.00 |
| NON DISCRETE | 25.02 | 114.43 | 192.32 | 11.21 | 11.21 | 22.30 |
| MODE C | 60.25 | 98.48 | 147.97 | 80.34 | 80.34 | 91.99 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 28 | | | 36 | |
| RADAR ONLY | | 2 | | | 2 | |
| BEACON ONLY | | 2 | | | 2 | |
| DISCRETE | | 2 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 24 | | | 32 | |
| DISCRETE | | 21 | | | 28 | |
| NON DISCRETE | | 3 | | | 4 | |
| MODE C | | 23 | | | 31 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 88 | 211 | 334 | 65 | 68 | 101 |
| RADAR ONLY | 25 | 55 | 85 | 5 | 8 | 13 |
| BEACON ONLY | 2 | 6 | 9 | 1 | 1 | 3 |
| DISCRETE | 1 | 1 | 1 | 1 | 1 | 2 |
| NON DISCRETE | 1 | 5 | 8 | 0 | 0 | 1 |
| MODE C | 2 | 3 | 5 | 2 | 2 | 3 |
| RADAR REINFORCED BEACON | 61 | 150 | 240 | 59 | 59 | 85 |
| DISCRETE | 39 | 39 | 51 | 52 | 52 | 67 |
| NON DISCRETE | 22 | 111 | 189 | 7 | 7 | 18 |
| MODE C | 37 | 75 | 125 | 49 | 49 | 61 |
| CROSS-LINKED | | 45 | | | 59 | |
| UNUSED TARGET REPORTS | 54 | 58 | 61 | 104 | 104 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 8 | 11 | 4 | 4 | 5 |

SYSTEM LOAD VALUES
FOR
NEW YORK EWR
1986

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 120.29 | 245.29 | 370.29 | 105.74 | 109.58 | 139.25 |
| RADAR ONLY | 22.76 | 47.20 | 71.65 | 2.79 | 5.63 | 8.48 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 97.53 | 198.09 | 298.65 | 103.94 | 103.94 | 130.78 |
| DISCRETE | 70.08 | 70.08 | 81.64 | 93.44 | 93.44 | 105.61 |
| NON DISCRETE | 27.45 | 128.01 | 217.00 | 10.50 | 10.50 | 25.16 |
| MODE C | 70.08 | 116.90 | 175.42 | 93.44 | 93.44 | 104.13 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 173.73 | 301.24 | 429.75 | 203.63 | 211.63 | 243.31 |
| RADAR ONLY | 76.00 | 103.00 | 131.00 | 104.00 | 109.00 | 113.00 |
| BEACON ONLY | 8.00 | 16.00 | 24.00 | 4.00 | 7.00 | 10.00 |
| DISCRETE | 2.00 | 4.00 | 7.00 | 3.00 | 6.00 | 8.00 |
| NON DISCRETE | 6.00 | 12.00 | 17.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 5.00 | 9.00 | 14.00 | 3.00 | 6.00 | 8.00 |
| RADAR REINFORCED BEACON | 89.73 | 182.24 | 274.75 | 95.63 | 95.63 | 120.31 |
| DISCRETE | 64.48 | 64.48 | 75.11 | 85.97 | 85.97 | 97.16 |
| NON DISCRETE | 25.25 | 117.77 | 199.64 | 9.66 | 9.66 | 23.15 |
| MODE C | 64.48 | 107.55 | 161.38 | 85.97 | 85.97 | 95.20 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 29 | | | 38 | |
| RADAR ONLY | | 1 | | | 2 | |
| BEACON ONLY | | 2 | | | 3 | |
| DISCRETE | | 2 | | | 3 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 26 | | | 33 | |
| DISCRETE | | 23 | | | 30 | |
| NON DISCRETE | | 3 | | | 3 | |
| MODE C | | 25 | | | 33 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 91 | 216 | 342 | 69 | 72 | 101 |
| RADAR ONLY | 26 | 54 | 83 | 5 | 8 | 12 |
| BEACON ONLY | 2 | 6 | 10 | 1 | 1 | 2 |
| DISCRETE | 1 | 1 | 1 | 1 | 1 | 1 |
| NON DISCRETE | 1 | 5 | 9 | 0 | 0 | 1 |
| MODE C | 2 | 4 | 6 | 3 | 3 | 3 |
| RADAR REINFORCED BEACON | 63 | 156 | 249 | 63 | 63 | 87 |
| DISCRETE | 41 | 41 | 52 | 56 | 56 | 67 |
| NON DISCRETE | 22 | 115 | 197 | 7 | 7 | 20 |
| MODE C | 39 | 83 | 136 | 53 | 53 | 63 |
| CROSS-LINKED | | 48 | | | 61 | |
| UNUSED TARGET REPORTS | 54 | 58 | 62 | 104 | 104 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 8 | 12 | 4 | 4 | 5 |

## SYSTEM LOAD VALUES
## FOR
## NEW YORK EWR
## 1988

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 124.19 | 250.57 | 376.95 | 111.69 | 114.17 | 141.80 |
| RADAR ONLY | 20.77 | 42.54 | 64.31 | 2.50 | 4.98 | 7.45 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 103.43 | 208.03 | 312.64 | 109.19 | 109.19 | 134.34 |
| DISCRETE | 76.10 | 76.10 | 85.82 | 101.47 | 101.47 | 101.47 |
| NON DISCRETE | 27.32 | 131.93 | 226.82 | 7.72 | 7.72 | 32.87 |
| MODE C | 76.10 | 126.83 | 189.87 | 101.47 | 101.47 | 101.47 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 177.15 | 307.39 | 436.63 | 208.46 | 215.46 | 247.60 |
| RADAR ONLY | 74.00 | 99.00 | 124.00 | 104.00 | 108.00 | 113.00 |
| BEACON ONLY | 8.00 | 17.00 | 25.00 | 4.00 | 7.00 | 11.00 |
| DISCRETE | 2.00 | 5.00 | 7.00 | 3.00 | 6.00 | 9.00 |
| NON DISCRETE | 6.00 | 12.00 | 18.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 5.00 | 10.00 | 15.00 | 3.00 | 6.00 | 9.00 |
| RADAR REINFORCED BEACON | 95.15 | 191.39 | 287.63 | 100.46 | 100.46 | 123.60 |
| DISCRETE | 70.02 | 70.02 | 78.95 | 93.35 | 93.35 | 93.35 |
| NON DISCRETE | 25.14 | 121.38 | 208.68 | 7.10 | 7.10 | 30.24 |
| MODE C | 70.02 | 116.68 | 174.68 | 93.35 | 93.35 | 93.35 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 30 | | | 40 | |
| RADAR ONLY | | 1 | | | 2 | |
| BEACON ONLY | | 2 | | | 3 | |
| DISCRETE | | 2 | | | 3 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 27 | | | 35 | |
| DISCRETE | | 25 | | | 33 | |
| NON DISCRETE | | 2 | | | 2 | |
| MODE C | | 27 | | | 36 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 94 | 220 | 347 | 71 | 73 | 101 |
| RADAR ONLY | 24 | 50 | 76 | 5 | 7 | 11 |
| BEACON ONLY | 2 | 6 | 10 | 1 | 1 | 2 |
| DISCRETE | 1 | 1 | 1 | 1 | 1 | 1 |
| NON DISCRETE | 1 | 5 | 9 | 0 | 0 | 1 |
| MODE C | 2 | 4 | 7 | 3 | 3 | 3 |
| RADAR REINFORCED BEACON | 68 | 164 | 261 | 65 | 65 | 88 |
| DISCRETE | 45 | 45 | 54 | 60 | 60 | 60 |
| NON DISCRETE | 23 | 119 | 207 | 5 | 5 | 28 |
| MODE C | 43 | 90 | 148 | 57 | 57 | 57 |
| CROSS-LINKED | | 50 | | | 65 | |
| UNUSED TARGET REPORTS | 54 | 58 | 63 | 104 | 104 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 8 | 13 | 4 | 4 | 5 |

SYSTEM LOAD VALUES
FOR
NEW YORK EWR
1990

| ISE | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| OTAL | 128.06 | 255.58 | 383.11 | 116.82 | 118.92 | 144.54 |
| ADAR ONLY | 19.52 | 39.51 | 59.49 | 2.17 | 4.28 | 6.38 |
| EACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ADAR REINFORCED BEACON | 108.54 | 216.08 | 323.61 | 114.64 | 114.64 | 138.16 |
| DISCRETE | 82.51 | 82.51 | 89.57 | 110.01 | 110.01 | 110.01 |
| NON DISCRETE | 26.03 | 133.57 | 234.05 | 4.63 | 4.63 | 28.15 |
| MODE C | 82.51 | 137.06 | 204.63 | 110.01 | 110.01 | 110.01 |

| DJUSTED | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| OTAL | 181.86 | 312.79 | 443.73 | 213.47 | 220.47 | 250.11 |
| ADAR ONLY | 73.00 | 97.00 | 120.00 | 104.00 | 108.00 | 112.00 |
| EACON ONLY | 9.00 | 17.00 | 26.00 | 4.00 | 7.00 | 11.00 |
| DISCRETE | 3.00 | 5.00 | 7.00 | 3.00 | 6.00 | 9.00 |
| NON DISCRETE | 6.00 | 12.00 | 19.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 5.00 | 11.00 | 16.00 | 3.00 | 6.00 | 9.00 |
| ADAR REINFORCED BEACON | 99.86 | 198.79 | 297.73 | 105.47 | 105.47 | 127.11 |
| DISCRETE | 75.91 | 75.91 | 82.40 | 101.21 | 101.21 | 101.21 |
| NON DISCRETE | 23.95 | 122.88 | 215.32 | 4.26 | 4.26 | 25.90 |
| MODE C | 75.91 | 126.10 | 188.26 | 101.21 | 101.21 | 101.21 |

| SOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| OTAL | | 31 | | | 41 | |
| ADAR ONLY | | 1 | | | 2 | |
| EACON ONLY | | 2 | | | 3 | |
| DISCRETE | | 2 | | | 3 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 2 | |
| ADAR REINFORCED BEACON | | 28 | | | 36 | |
| DISCRETE | | 27 | | | 35 | |
| NON DISCRETE | | 1 | | | 1 | |
| MODE C | | 29 | | | 39 | |

| NASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| OTAL | 97 | 224 | 351 | 75 | 77 | 103 |
| ADAR ONLY | 23 | 47 | 71 | 5 | 7 | 10 |
| EACON ONLY | 2 | 6 | 11 | 1 | 1 | 2 |
| DISCRETE | 1 | 1 | 2 | 1 | 1 | 1 |
| NON DISCRETE | 1 | 5 | 9 | 0 | 0 | 1 |
| MODE C | 2 | 4 | 7 | 2 | 2 | 2 |
| ADAR REINFORCED BEACON | 72 | 171 | 269 | 69 | 69 | 91 |
| DISCRETE | 49 | 49 | 55 | 66 | 66 | 66 |
| NON DISCRETE | 23 | 122 | 214 | 3 | 3 | 25 |
| MODE C | 47 | 97 | 159 | 62 | 62 | 62 |
| OSS-LINKED | | 50 | | | 67 | |
| NUSED TARGET REPORTS | 54 | 59 | 63 | 105 | 105 | 106 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 9 | 13 | 5 | 5 | 6 |

SYSTEM LOAD VALUES
FOR
NEW YORK HPN
1977

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 95.81 | 200.77 | 305.74 | 79.96 | 84.60 | 114.25 |
| RADAR ONLY | 25.65 | 55.86 | 86.07 | 4.10 | 8.75 | 13.39 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 70.15 | 144.91 | 219.67 | 75.85 | 75.85 | 100.86 |
| DISCRETE | 44.91 | 44.91 | 56.41 | 59.88 | 59.88 | 79.40 |
| NON DISCRETE | 25.24 | 100.00 | 163.26 | 15.97 | 15.97 | 21.46 |
| MODE C | 44.91 | 64.44 | 95.71 | 59.88 | 59.88 | 71.48 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 147.54 | 254.32 | 361.10 | 177.78 | 185.78 | 217.80 |
| RADAR ONLY | 77.00 | 109.00 | 141.00 | 105.00 | 111.00 | 117.00 |
| BEACON ONLY | 6.00 | 12.00 | 18.00 | 3.00 | 5.00 | 8.00 |
| DISCRETE | 2.00 | 3.00 | 5.00 | 2.00 | 4.00 | 6.00 |
| NON DISCRETE | 4.00 | 9.00 | 13.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 3.00 | 5.00 | 8.00 | 2.00 | 4.00 | 6.00 |
| RADAR REINFORCED BEACON | 64.54 | 133.32 | 202.10 | 69.78 | 69.78 | 92.80 |
| DISCRETE | 41.32 | 41.32 | 51.90 | 55.09 | 55.09 | 73.05 |
| NON DISCRETE | 23.22 | 92.00 | 150.20 | 14.69 | 14.69 | 19.75 |
| MODE C | 41.32 | 59.29 | 88.06 | 55.09 | 55.09 | 65.76 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 10 | | | 12 | |
| RADAR ONLY | | 1 | | | 1 | |
| BEACON ONLY | | 1 | | | 1 | |
| DISCRETE | | 1 | | | 1 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 0 | | | 0 | |
| RADAR REINFORCED BEACON | | 8 | | | 10 | |
| DISCRETE | | 6 | | | 8 | |
| NON DISCRETE | | 2 | | | 2 | |
| MODE C | | 7 | | | 9 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 85 | 191 | 296 | 68 | 73 | 102 |
| RADAR ONLY | 27 | 61 | 94 | 6 | 11 | 16 |
| BEACON ONLY | 2 | 5 | 8 | 2 | 2 | 3 |
| DISCRETE | 1 | 1 | 1 | 1 | 1 | 2 |
| NON DISCRETE | 1 | 4 | 7 | 1 | 1 | 1 |
| MODE C | 2 | 3 | 4 | 2 | 2 | 3 |
| RADAR REINFORCED BEACON | 56 | 125 | 194 | 60 | 60 | 83 |
| DISCRETE | 35 | 35 | 46 | 47 | 47 | 65 |
| NON DISCRETE | 21 | 90 | 148 | 13 | 13 | 18 |
| MODE C | 34 | 52 | 81 | 46 | 46 | 57 |
| CROSS-LINKED | | 46 | | | 60 | |

| | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| UNUSED TARGET REPORTS | 53 | 56 | 59 | 103 | 103 | 104 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 3 | 6 | 9 | 3 | 3 | 4 |

SYSTEM LOAD VALUES
FOR
NEW YORK HPN
1980

| BASE | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 106.07 | 218.49 | 330.92 | 94.37 | 98.64 | 122.24 |
| RADAR ONLY | 26.85 | 56.61 | 86.38 | 4.00 | 8.26 | 12.53 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 79.22 | 161.88 | 244.53 | 90.38 | 90.38 | 109.72 |
| DISCRETE | 56.48 | 56.48 | 56.48 | 75.31 | 75.31 | 85.48 |
| NON DISCRETE | 22.74 | 105.39 | 188.05 | 15.06 | 15.06 | 24.24 |
| MODE C | 56.48 | 78.30 | 117.02 | 75.31 | 75.31 | 75.31 |

| ADJUSTED | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 157.89 | 272.93 | 387.97 | 191.15 | 200.15 | 225.94 |
| RADAR ONLY | 79.00 | 111.00 | 143.00 | 105.00 | 111.00 | 116.00 |
| BEACON ONLY | 6.00 | 13.00 | 20.00 | 3.00 | 6.00 | 9.00 |
| DISCRETE | 2.00 | 3.00 | 5.00 | 2.00 | 5.00 | 7.00 |
| NON DISCRETE | 4.00 | 10.00 | 15.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 3.00 | 5.00 | 9.00 | 2.00 | 4.00 | 6.00 |
| RADAR REINFORCED BEACON | 72.89 | 148.93 | 224.97 | 83.15 | 83.15 | 100.94 |
| DISCRETE | 51.97 | 51.97 | 51.97 | 69.29 | 69.29 | 78.64 |
| NON DISCRETE | 20.92 | 96.96 | 173.00 | 13.86 | 13.86 | 22.30 |
| MODE C | 51.97 | 72.04 | 107.65 | 69.29 | 69.29 | 69.29 |

| ASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | | 12 | | | 14 | |
| RADAR ONLY | | 1 | | | 1 | |
| BEACON ONLY | | 1 | | | 1 | |
| DISCRETE | | 1 | | | 1 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 0 | | | 0 | |
| RADAR REINFORCED BEACON | | 10 | | | 12 | |
| DISCRETE | | 8 | | | 10 | |
| NON DISCRETE | | 2 | | | 2 | |
| MODE C | | 8 | | | 11 | |

| UNASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 94 | 206 | 319 | 81 | 85 | 108 |
| RADAR ONLY | 29 | 62 | 95 | 7 | 11 | 16 |
| BEACON ONLY | 2 | 5 | 9 | 3 | 3 | 3 |
| DISCRETE | 1 | 1 | 1 | 2 | 2 | 2 |
| NON DISCRETE | 1 | 4 | 8 | 1 | 1 | 1 |
| MODE C | 2 | 3 | 5 | 3 | 3 | 3 |
| RADAR REINFORCED BEACON | 63 | 139 | 215 | 71 | 71 | 89 |
| DISCRETE | 44 | 44 | 44 | 59 | 59 | 69 |
| NON DISCRETE | 19 | 95 | 171 | 12 | 12 | 20 |
| MODE C | 44 | 64 | 100 | 58 | 58 | 58 |
| CROSS-LINKED | | 57 | | | 73 | |
| UNUSED TARGET REPORTS | 53 | 56 | 60 | 104 | 104 | 104 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 3 | 6 | 10 | 4 | 4 | 4 |

SYSTEM LOAD VALUES
FOR
NEW YORK HPN
1982

| BASE | GOOD WEATHER A | B | C | BAD WEATHER A | B | C |
|---|---|---|---|---|---|---|
| TOTAL | 112.32 | 228.26 | 344.20 | 99.57 | 103.56 | 127.33 |
| RADAR ONLY | 26.00 | 53.81 | 81.62 | 3.87 | 7.87 | 11.86 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 86.32 | 174.46 | 262.59 | 95.69 | 95.69 | 115.47 |
| DISCRETE | 61.41 | 61.41 | 61.41 | 81.88 | 81.88 | 89.45 |
| NON DISCRETE | 24.91 | 113.04 | 201.17 | 13.81 | 13.81 | 25.02 |
| MODE C | 61.41 | 88.80 | 132.67 | 81.88 | 81.88 | 81.88 |

| ADJUSTED | GOOD WEATHER A | B | C | BAD WEATHER A | B | C |
|---|---|---|---|---|---|---|
| TOTAL | 164.42 | 283.50 | 401.58 | 196.04 | 205.04 | 231.23 |
| RADAR ONLY | 78.00 | 109.00 | 139.00 | 105.00 | 111.00 | 116.00 |
| BEACON ONLY | 7.00 | 14.00 | 21.00 | 3.00 | 6.00 | 9.00 |
| DISCRETE | 2.00 | 3.00 | 5.00 | 3.00 | 5.00 | 7.00 |
| NON DISCRETE | 5.00 | 11.00 | 16.00 | 0.00 | 1.00 | 2.00 |
| MODE C | 4.00 | 7.00 | 11.00 | 2.00 | 5.00 | 7.00 |
| RADAR REINFORCED BEACON | 79.42 | 160.50 | 241.58 | 88.04 | 88.04 | 106.23 |
| DISCRETE | 56.50 | 56.50 | 56.50 | 75.33 | 75.33 | 82.30 |
| NON DISCRETE | 22.92 | 104.00 | 185.08 | 12.71 | 12.71 | 23.93 |
| MODE C | 56.50 | 81.70 | 122.05 | 75.33 | 75.33 | 75.33 |

| ASSOCIATED TRACKS | GOOD WEATHER A | B | C | BAD WEATHER A | B | C |
|---|---|---|---|---|---|---|
| TOTAL | | 11 | | | 15 | |
| RADAR ONLY | | 1 | | | 1 | |
| BEACON ONLY | | 1 | | | 1 | |
| DISCRETE | | 1 | | | 1 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 0 | | | 1 | |
| RADAR REINFORCED BEACON | | 9 | | | 13 | |
| DISCRETE | | 8 | | | 11 | |
| NON DISCRETE | | 1 | | | 2 | |
| MODE C | | 9 | | | 12 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | B | C | BAD WEATHER A | B | C |
|---|---|---|---|---|---|---|
| TOTAL | 100 | 217 | 332 | 85 | 89 | 112 |
| RADAR ONLY | 29 | 60 | 91 | 7 | 11 | 15 |
| BEACON ONLY | 2 | 6 | 9 | 3 | 3 | 4 |
| DISCRETE | 1 | 1 | 1 | 2 | 2 | 3 |
| NON DISCRETE | 1 | 5 | 8 | 1 | 1 | 1 |
| MODE C | 2 | 4 | 5 | 2 | 2 | 2 |
| RADAR REINFORCED BEACON | 70 | 151 | 232 | 75 | 75 | 93 |
| DISCRETE | 48 | 48 | 48 | 64 | 64 | 71 |
| NON DISCRETE | 22 | 103 | 184 | 11 | 11 | 22 |
| MODE C | 47 | 73 | 113 | 63 | 63 | 63 |
| CROSS-LINKED | | 58 | | | 74 | |
| UNUSED TARGET REPORTS | 53 | 57 | 61 | 104 | 104 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 3 | 7 | 11 | 4 | 4 | 5 |

SYSTEM LOAD VALUES
FOR
NEW YORK HPN
1984

| BASE | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 118.25 | 236.80 | 355.35 | 103.16 | 106.79 | 131.45 |
| RADAR ONLY | 25.66 | 52.10 | 78.53 | 3.66 | 7.29 | 10.92 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 92.59 | 184.70 | 276.82 | 99.51 | 99.51 | 120.53 |
| DISCRETE | 65.49 | 65.49 | 65.49 | 87.32 | 87.32 | 87.32 |
| NON DISCRETE | 27.10 | 119.21 | 211.33 | 12.18 | 12.18 | 33.21 |
| MODE C | 65.49 | 97.72 | 145.71 | 87.32 | 87.32 | 87.32 |

| ADJUSTED | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 170.19 | 291.93 | 412.67 | 199.55 | 208.55 | 235.89 |
| RADAR ONLY | 78.00 | 107.00 | 136.00 | 105.00 | 110.00 | 115.00 |
| BEACON ONLY | 7.00 | 15.00 | 22.00 | 3.00 | 7.00 | 10.00 |
| DISCRETE | 2.00 | 4.00 | 5.00 | 3.00 | 5.00 | 7.00 |
| NON DISCRETE | 5.00 | 11.00 | 17.00 | 0.00 | 2.00 | 3.00 |
| MODE C | 4.00 | 8.00 | 12.00 | 3.00 | 5.00 | 7.00 |
| RADAR REINFORCED BEACON | 85.19 | 169.93 | 254.67 | 91.55 | 91.55 | 110.89 |
| DISCRETE | 60.25 | 60.25 | 60.25 | 80.34 | 80.34 | 80.34 |
| NON DISCRETE | 24.93 | 109.68 | 194.42 | 11.21 | 11.21 | 30.56 |
| MODE C | 60.25 | 89.90 | 134.05 | 80.34 | 80.34 | 80.34 |

| ASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | | 12 | | | 16 | |
| RADAR ONLY | | 1 | | | 1 | |
| BEACON ONLY | | 1 | | | 1 | |
| DISCRETE | | 1 | | | 1 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 0 | | | 1 | |
| RADAR REINFORCED BEACON | | 10 | | | 14 | |
| DISCRETE | | 9 | | | 12 | |
| NON DISCRETE | | 1 | | | 2 | |
| MODE C | | 10 | | | 13 | |

| UNASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 106 | 225 | 343 | 86 | 89 | 115 |
| RADAR ONLY | 28 | 58 | 89 | 7 | 10 | 15 |
| BEACON ONLY | 3 | 7 | 10 | 2 | 2 | 3 |
| DISCRETE | 2 | 2 | 2 | 2 | 2 | 2 |
| NON DISCRETE | 1 | 5 | 8 | 0 | 0 | 1 |
| MODE C | 3 | 4 | 6 | 2 | 2 | 2 |
| RADAR REINFORCED BEACON | 75 | 160 | 244 | 77 | 77 | 97 |
| DISCRETE | 51 | 51 | 51 | 68 | 68 | 68 |
| NON DISCRETE | 24 | 109 | 193 | 9 | 9 | 29 |
| MODE C | 53 | 80 | 124 | 67 | 67 | 67 |
| CROSS-LINKED | | 60 | | | 78 | |
| UNUSED TARGET REPORTS | 54 | 57 | 61 | 104 | 104 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 7 | 11 | 4 | 4 | 5 |

## SYSTEM LOAD VALUES FOR NEW YORK HPN 1986

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 123.14 | 243.53 | 363.92 | 107.31 | 110.55 | 134.15 |
| RADAR ONLY | 24.93 | 49.81 | 74.69 | 3.37 | 6.60 | 9.84 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 98.22 | 193.72 | 289.22 | 103.94 | 103.94 | 124.32 |
| DISCRETE | 70.08 | 70.08 | 70.08 | 93.44 | 93.44 | 93.44 |
| NON DISCRETE | 28.13 | 123.64 | 219.14 | 10.50 | 10.50 | 30.88 |
| MODE C | 70.08 | 108.04 | 160.75 | 93.44 | 93.44 | 93.44 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 175.36 | 300.22 | 422.08 | 204.63 | 212.63 | 238.38 |
| RADAR ONLY | 78.00 | 106.00 | 133.00 | 105.00 | 110.00 | 114.00 |
| BEACON ONLY | 8.00 | 16.00 | 23.00 | 4.00 | 7.00 | 10.00 |
| DISCRETE | 2.00 | 4.00 | 6.00 | 3.00 | 5.00 | 3.00 |
| NON DISCRETE | 6.00 | 12.00 | 17.00 | 1.00 | 2.00 | 2.00 |
| MODE C | 4.00 | 9.00 | 13.00 | 3.00 | 5.00 | 7.00 |
| RADAR REINFORCED BEACON | 90.36 | 178.22 | 266.08 | 95.63 | 95.63 | 114.39 |
| DISCRETE | 64.48 | 64.48 | 64.48 | 85.97 | 85.97 | 85.97 |
| NON DISCRETE | 25.88 | 113.74 | 201.61 | 9.66 | 9.66 | 29.41 |
| MODE C | 64.48 | 99.40 | 147.89 | 85.97 | 85.97 | 85.97 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 13 | | | 16 | |
| RADAR ONLY | | 1 | | | 1 | |
| BEACON ONLY | | 1 | | | 1 | |
| DISCRETE | | 1 | | | 1 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 0 | | | 1 | |
| RADAR REINFORCED BEACON | | 11 | | | 14 | |
| DISCRETE | | 10 | | | 13 | |
| NON DISCRETE | | 1 | | | 1 | |
| MODE C | | 11 | | | 14 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 110 | 231 | 351 | 92 | 95 | 119 |
| RADAR ONLY | 28 | 57 | 85 | 7 | 10 | 14 |
| BEACON ONLY | 3 | 7 | 11 | 3 | 3 | 4 |
| DISCRETE | 2 | 2 | 2 | 3 | 3 | 3 |
| NON DISCRETE | 1 | 5 | 9 | 0 | 0 | 1 |
| MODE C | 3 | 4 | 6 | 3 | 3 | 3 |
| RADAR REINFORCED BEACON | 79 | 167 | 255 | 92 | 82 | 100 |
| DISCRETE | 54 | 54 | 54 | 73 | 73 | 73 |
| NON DISCRETE | 25 | 113 | 201 | 9 | 9 | 27 |
| MODE C | 53 | 88 | 137 | 72 | 72 | [illegible] |
| CROSS-LINKED | | 63 | | | 82 | |
| UNUSED TARGET REPORTS | 54 | 58 | 62 | 104 | 104 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 8 | 12 | 4 | 4 | 5 |

## SYSTEM LOAD VALUES
## FOR
## NEW YORK HPN
## 1988

| BASE | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 128.12 | 250.09 | 372.07 | 112.23 | 115.05 | 137.10 |
| RADAR ONLY | 22.94 | 45.15 | 67.35 | 3.03 | 5.86 | 8.69 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 105.18 | 204.95 | 304.71 | 109.19 | 109.19 | 128.42 |
| DISCRETE | 76.10 | 76.10 | 76.10 | 101.47 | 101.47 | 101.47 |
| NON DISCRETE | 29.07 | 128.84 | 228.61 | 7.72 | 7.72 | 26.94 |
| MODE C | 76.10 | 118.75 | 176.14 | 101.47 | 101.47 | 101.47 |

| ADJUSTED | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 180.76 | 306.55 | 431.34 | 209.46 | 216.46 | 241.14 |
| RADAR ONLY | 76.00 | 102.00 | 127.00 | 105.00 | 109.00 | 113.00 |
| BEACON ONLY | 8.00 | 16.00 | 24.00 | 4.00 | 7.00 | 10.00 |
| DISCRETE | 2.00 | 4.00 | 6.00 | 3.00 | 5.00 | 8.00 |
| NON DISCRETE | 6.00 | 12.00 | 18.00 | 1.00 | 2.00 | 2.00 |
| MODE C | 5.00 | 10.00 | 14.00 | 3.00 | 5.00 | 8.00 |
| RADAR REINFORCED BEACON | 96.76 | 188.55 | 280.34 | 100.46 | 100.46 | 118.14 |
| DISCRETE | 70.02 | 70.02 | 70.02 | 93.35 | 93.35 | 93.35 |
| NON DISCRETE | 26.75 | 118.54 | 210.32 | 7.10 | 7.10 | 24.79 |
| MODE C | 70.02 | 109.25 | 162.04 | 93.35 | 93.35 | 93.35 |

| ASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | | 14 | | | 17 | |
| RADAR ONLY | | 1 | | | 1 | |
| BEACON ONLY | | 1 | | | 1 | |
| DISCRETE | | 1 | | | 1 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 0 | | | 1 | |
| RADAR REINFORCED BEACON | | 12 | | | 15 | |
| DISCRETE | | 11 | | | 14 | |
| NON DISCRETE | | 1 | | | 1 | |
| MODE C | | 11 | | | 15 | |

| UNASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 114 | 236 | 358 | 94 | 97 | 120 |
| RADAR ONLY | 26 | 52 | 79 | 6 | 9 | 13 |
| BEACON ONLY | 3 | 7 | 11 | 3 | 3 | 4 |
| DISCRETE | 2 | 2 | 2 | 3 | 3 | 3 |
| NON DISCRETE | 1 | 5 | 9 | 0 | 0 | 1 |
| MODE C | 3 | 5 | 7 | 3 | 3 | 3 |
| RADAR REINFORCED BEACON | 85 | 177 | 268 | 85 | 85 | 103 |
| DISCRETE | 59 | 59 | 59 | 79 | 79 | 79 |
| NON DISCRETE | 26 | 118 | 209 | 6 | 6 | 24 |
| MODE C | 59 | 98 | 151 | 78 | 78 | 78 |
| CROSS-LINKED | | 66 | | | 86 | |
| UNUSED TARGET REPORTS | 54 | 58 | 62 | 104 | 104 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 8 | 12 | 4 | 4 | 5 |

SYSTEM LOAD VALUES
FOR
NEW YORK HPN
1990

| BASE | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 132.75 | 256.00 | 379.24 | 117.30 | 119.71 | 140.12 |
| RADAR ONLY | 21.70 | 42.11 | 62.52 | 2.66 | 5.06 | 7.47 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 111.06 | 213.89 | 316.71 | 114.64 | 114.64 | 132.65 |
| DISCRETE | 82.51 | 82.51 | 82.51 | 110.01 | 110.01 | 110.01 |
| NON DISCRETE | 28.55 | 131.38 | 234.20 | 4.63 | 4.63 | 22.64 |
| MODE C | 82.51 | 129.56 | 191.66 | 110.01 | 110.01 | 110.01 |
| ADJUSTED | GOOD WEATHER | | | BAD WEATHER | | |
| | A | B | C | A | B | C |
| TOTAL | 186.18 | 312.78 | 439.37 | 213.47 | 220.47 | 245.04 |
| RADAR ONLY | 75.00 | 99.00 | 123.00 | 104.00 | 108.00 | 112.00 |
| BEACON ONLY | 9.00 | 17.00 | 25.00 | 4.00 | 7.00 | 11.00 |
| DISCRETE | 2.00 | 4.00 | 6.00 | 3.00 | 5.00 | 8.00 |
| NON DISCRETE | 7.00 | 13.00 | 19.00 | 1.00 | 2.00 | 3.00 |
| MODE C | 5.00 | 10.00 | 15.00 | 3.00 | 6.00 | 8.00 |
| RADAR REINFORCED BEACON | 102.18 | 196.78 | 291.37 | 105.47 | 105.47 | 122.04 |
| DISCRETE | 75.91 | 75.91 | 75.91 | 101.21 | 101.21 | 101.21 |
| NON DISCRETE | 26.27 | 120.87 | 215.47 | 4.26 | 4.26 | 20.83 |
| MODE C | 75.91 | 119.29 | 176.33 | 101.21 | 101.21 | 101.21 |
| ASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
| | A | B | C | A | B | C |
| TOTAL | | 13 | | | 18 | |
| RADAR ONLY | | 1 | | | 1 | |
| BEACON ONLY | | 1 | | | 1 | |
| DISCRETE | | 1 | | | 1 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 0 | | | 1 | |
| RADAR REINFORCED BEACON | | 11 | | | 16 | |
| DISCRETE | | 11 | | | 15 | |
| NON DISCRETE | | 0 | | | 1 | |
| MODE C | | 12 | | | 17 | |
| UNASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
| | A | B | C | A | B | C |
| TOTAL | 119 | 243 | 365 | 98 | 101 | 122 |
| RADAR ONLY | 25 | 50 | 74 | 6 | 9 | 12 |
| BEACON ONLY | 3 | 7 | 11 | 3 | 3 | 4 |
| DISCRETE | 2 | 2 | 2 | 3 | 3 | 3 |
| NON DISCRETE | 1 | 5 | 9 | 0 | 0 | 1 |
| MODE C | 3 | 5 | 8 | 3 | 3 | 3 |
| RADAR REINFORCED BEACON | 91 | 186 | 280 | 89 | 89 | 106 |
| DISCRETE | 65 | 65 | 65 | 86 | 86 | 86 |
| NON DISCRETE | 26 | 121 | 215 | 3 | 3 | 20 |
| MODE C | 64 | 107 | 164 | 84 | 84 | 84 |
| CROSS-LINKED | | 67 | | | 89 | |
| UNUSED TARGET REPORTS | 54 | 59 | 63 | 105 | 105 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 9 | 13 | 5 | 5 | 5 |

## SYSTEM LOAD VALUES FOR NEW YORK ISP 1977

| BASE | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 123.46 | 252.69 | 381.92 | 80.69 | 85.93 | 117.33 |
| RADAR ONLY | 35.91 | 74.89 | 113.87 | 4.84 | 10.08 | 15.32 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 87.55 | 177.80 | 268.05 | 75.85 | 75.85 | 102.01 |
| DISCRETE | 44.91 | 44.91 | 52.08 | 59.88 | 59.88 | 77.67 |
| NON DISCRETE | 42.64 | 132.89 | 215.97 | 15.97 | 15.97 | 24.34 |
| MODE C | 44.91 | 70.07 | 104.25 | 59.88 | 59.88 | 68.49 |
| **ADJUSTED** | **GOOD WEATHER** | | | **BAD WEATHER** | | |
| | A | B | C | A | B | C |
| TOTAL | 175.55 | 306.58 | 437.60 | 178.78 | 186.78 | 220.85 |
| RADAR ONLY | 88.00 | 129.00 | 170.00 | 106.00 | 112.00 | 119.00 |
| BEACON ONLY | 7.00 | 14.00 | 21.00 | 3.00 | 5.00 | 8.00 |
| DISCRETE | 2.00 | 3.00 | 4.00 | 2.00 | 4.00 | 6.00 |
| NON DISCRETE | 5.00 | 11.00 | 17.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 3.00 | 6.00 | 8.00 | 2.00 | 4.00 | 5.00 |
| RADAR REINFORCED BEACON | 80.55 | 163.58 | 246.60 | 69.78 | 69.78 | 93.85 |
| DISCRETE | 41.32 | 41.32 | 47.92 | 55.09 | 55.09 | 71.46 |
| NON DISCRETE | 39.23 | 122.26 | 198.69 | 14.69 | 14.69 | 22.39 |
| MODE C | 41.32 | 64.47 | 95.91 | 55.09 | 55.09 | 63.01 |
| **ASSOCIATED TRACKS** | **GOOD WEATHER** | | | **BAD WEATHER** | | |
| | A | B | C | A | B | C |
| TOTAL | | 10 | | | 12 | |
| RADAR ONLY | | 1 | | | 1 | |
| BEACON ONLY | | 1 | | | 1 | |
| DISCRETE | | 1 | | | 1 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 0 | | | 0 | |
| RADAR REINFORCED BEACON | | 8 | | | 10 | |
| DISCRETE | | 6 | | | 8 | |
| NON DISCRETE | | 2 | | | 2 | |
| MODE C | | 7 | | | 9 | |
| **UNASSOCIATED TRACKS** | **GOOD WEATHER** | | | **BAD WEATHER** | | |
| | A | B | C | A | B | C |
| TOTAL | 113 | 242 | 373 | 69 | 74 | 104 |
| RADAR ONLY | 38 | 81 | 124 | 7 | 12 | 18 |
| BEACON ONLY | 3 | 6 | 10 | 2 | 2 | 3 |
| DISCRETE | 1 | 1 | 1 | 1 | 1 | 2 |
| NON DISCRETE | 2 | 5 | 9 | 1 | 1 | 1 |
| MODE C | 2 | 3 | 4 | 2 | 2 | 3 |
| RADAR REINFORCED BEACON | 72 | 155 | 239 | 60 | 60 | 83 |
| DISCRETE | 35 | 35 | 42 | 47 | 47 | 63 |
| NON DISCRETE | 37 | 120 | 197 | 13 | 13 | 20 |
| MODE C | 34 | 57 | 89 | 46 | 46 | 54 |
| CROSS-LINKED | | 39 | | | 51 | |
| UNUSED TARGET REPORTS | 54 | 57 | 61 | 103 | 103 | 104 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 7 | 11 | 3 | 3 | 4 |

SYSTEM LOAD VALUES
FOR
NEW YORK ISP
1980

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 139.63 | 276.23 | 412.84 | 95.15 | 99.93 | 126.43 |
| RADAR ONLY | 38.03 | 75.84 | 113.65 | 4.78 | 9.56 | 14.33 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 101.59 | 200.39 | 299.19 | 90.38 | 90.38 | 112.09 |
| DISCRETE | 56.48 | 56.48 | 56.48 | 75.31 | 75.31 | 84.50 |
| NON DISCRETE | 45.11 | 143.91 | 242.71 | 15.06 | 15.06 | 27.59 |
| MODE C | 56.48 | 88.53 | 131.55 | 75.31 | 75.31 | 75.31 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 192.47 | 331.36 | 470.26 | 192.15 | 201.15 | 230.12 |
| RADAR ONLY | 91.00 | 131.00 | 171.00 | 106.00 | 112.00 | 118.00 |
| BEACON ONLY | 8.00 | 16.00 | 24.00 | 3.00 | 6.00 | 9.00 |
| DISCRETE | 2.00 | 3.00 | 4.00 | 2.00 | 5.00 | 7.00 |
| NON DISCRETE | 6.00 | 13.00 | 20.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 4.00 | 7.00 | 11.00 | 2.00 | 4.00 | 6.00 |
| RADAR REINFORCED BEACON | 93.47 | 184.36 | 275.26 | 83.15 | 83.15 | 103.12 |
| DISCRETE | 51.97 | 51.97 | 51.97 | 69.29 | 69.29 | 77.74 |
| NON DISCRETE | 41.50 | 132.40 | 223.29 | 13.86 | 13.86 | 25.38 |
| MODE C | 51.97 | 91.44 | 121.03 | 69.29 | 69.29 | 69.29 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 12 | | | 14 | |
| RADAR ONLY | | 1 | | | 1 | |
| BEACON ONLY | | 1 | | | 1 | |
| DISCRETE | | 1 | | | 1 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 0 | | | 0 | |
| RADAR REINFORCED BEACON | | 10 | | | 12 | |
| DISCRETE | | 8 | | | 10 | |
| NON DISCRETE | | 2 | | | 2 | |
| MODE C | | 8 | | | 11 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 128 | 264 | 401 | 81 | 86 | 112 |
| RADAR ONLY | 41 | 83 | 125 | 7 | 12 | 18 |
| BEACON ONLY | 3 | 7 | 11 | 3 | 3 | 3 |
| DISCRETE | 1 | 1 | 1 | 2 | 2 | 2 |
| NON DISCRETE | 2 | 6 | 10 | 1 | 1 | 1 |
| MODE C | 2 | 4 | 5 | 3 | 3 | 3 |
| RADAR REINFORCED BEACON | 84 | 174 | 265 | 71 | 71 | 91 |
| DISCRETE | 44 | 44 | 44 | 59 | 59 | 68 |
| NON DISCRETE | 40 | 130 | 221 | 12 | 12 | 23 |
| MODE C | 44 | 73 | 113 | 58 | 58 | 58 |
| CROSS-LINKED | | 48 | | | 62 | |
| UNUSED TARGET REPORTS | 54 | 58 | 62 | 104 | 104 | 104 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 8 | 12 | 4 | 4 | 4 |

SYSTEM LOAD VALUES
FOR
NEW YORK ISR
1982

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 147.25 | 286.38 | 425.50 | 100.30 | 104.74 | 131.89 |
| RADAR ONLY | 36.49 | 71.26 | 106.04 | 4.61 | 9.05 | 13.49 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 110.77 | 215.12 | 319.47 | 95.69 | 95.69 | 118.41 |
| DISCRETE | 61.41 | 61.41 | 61.41 | 81.88 | 81.88 | 88.86 |
| NON DISCRETE | 49.35 | 153.71 | 258.06 | 13.81 | 13.81 | 29.55 |
| MODE C | 61.41 | 101.74 | 150.75 | 81.88 | 81.88 | 81.88 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 199.91 | 341.91 | 484.91 | 197.04 | 206.04 | 235.94 |
| RADAR ONLY | 89.00 | 127.00 | 165.00 | 106.00 | 112.00 | 118.00 |
| BEACON ONLY | 9.00 | 17.00 | 26.00 | 3.00 | 6.00 | 9.00 |
| DISCRETE | 2.00 | 3.00 | 5.00 | 3.00 | 5.00 | 7.00 |
| NON DISCRETE | 7.00 | 14.00 | 21.00 | 0.00 | 1.00 | 2.00 |
| MODE C | 4.00 | 8.00 | 12.00 | 2.00 | 4.00 | 7.00 |
| RADAR REINFORCED BEACON | 101.91 | 197.91 | 293.91 | 88.04 | 88.04 | 108.94 |
| DISCRETE | 56.50 | 56.50 | 56.50 | 75.33 | 75.33 | 81.75 |
| NON DISCRETE | 45.41 | 141.41 | 237.41 | 12.71 | 12.71 | 27.18 |
| MODE C | 56.50 | 93.60 | 138.69 | 75.33 | 75.33 | 75.33 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 11 | | | 15 | |
| RADAR ONLY | | 1 | | | 1 | |
| BEACON ONLY | | 1 | | | 1 | |
| DISCRETE | | 1 | | | 1 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 0 | | | 1 | |
| RADAR REINFORCED BEACON | | 9 | | | 13 | |
| DISCRETE | | 8 | | | 11 | |
| NON DISCRETE | | 1 | | | 2 | |
| MODE C | | 9 | | | 12 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 135 | 274 | 413 | 85 | 90 | 117 |
| RADAR ONLY | 40 | 79 | 118 | 7 | 12 | 17 |
| BEACON ONLY | 3 | 7 | 11 | 3 | 3 | 4 |
| DISCRETE | 1 | 1 | 1 | 2 | 2 | 3 |
| NON DISCRETE | 2 | 6 | 10 | 1 | 1 | 1 |
| MODE C | 2 | 4 | 6 | 2 | 2 | 2 |
| RADAR REINFORCED BEACON | 92 | 188 | 284 | 75 | 75 | 96 |
| DISCRETE | 48 | 48 | 48 | 64 | 64 | 71 |
| NON DISCRETE | 44 | 140 | 236 | 11 | 11 | 25 |
| MODE C | 47 | 85 | 130 | 63 | 63 | 63 |
| CROSS-LINKED | | 49 | | | 63 | |
| UNUSED TARGET REPORTS | 54 | 59 | 63 | 104 | 104 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 9 | 13 | 4 | 4 | 5 |

SYSTEM LOAD VALUES
FOR
NEW YORK ISP
1984

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 154.51 | 295.76 | 437.01 | 103.83 | 107.84 | 136.12 |
| RADAR ONLY | 35.75 | 68.52 | 101.30 | 4.33 | 8.33 | 12.34 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 118.76 | 227.23 | 335.71 | 99.51 | 99.51 | 123.78 |
| DISCRETE | 65.49 | 65.49 | 65.49 | 87.32 | 87.32 | 87.32 |
| NON DISCRETE | 53.27 | 161.74 | 270.22 | 12.18 | 12.18 | 36.45 |
| MODE C | 65.49 | 112.84 | 166.60 | 87.32 | 87.32 | 87.32 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 208.26 | 352.05 | 496.85 | 201.55 | 209.55 | 240.87 |
| RADAR ONLY | 89.00 | 125.00 | 161.00 | 106.00 | 111.00 | 117.00 |
| BEACON ONLY | 10.00 | 18.00 | 27.00 | 4.00 | 7.00 | 10.00 |
| DISCRETE | 2.00 | 3.00 | 5.00 | 3.00 | 5.00 | 7.00 |
| NON DISCRETE | 8.00 | 15.00 | 22.00 | 1.00 | 2.00 | 3.00 |
| MODE C | 5.00 | 9.00 | 13.00 | 3.00 | 5.00 | 7.00 |
| RADAR REINFORCED BEACON | 109.26 | 209.05 | 308.85 | 91.55 | 91.55 | 113.87 |
| DISCRETE | 60.25 | 60.25 | 60.25 | 80.34 | 80.34 | 80.34 |
| NON DISCRETE | 49.00 | 148.30 | 248.60 | 11.21 | 11.21 | 33.54 |
| MODE C | 60.25 | 103.81 | 153.27 | 80.34 | 80.34 | 80.34 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 12 | | | 16 | |
| RADAR ONLY | | 1 | | | 1 | |
| BEACON ONLY | | 1 | | | 1 | |
| DISCRETE | | 1 | | | 1 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 0 | | | 1 | |
| RADAR REINFORCED BEACON | | 10 | | | 14 | |
| DISCRETE | | 9 | | | 12 | |
| NON DISCRETE | | 1 | | | 2 | |
| MODE C | | 10 | | | 13 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 142 | 284 | 426 | 86 | 90 | 119 |
| RADAR ONLY | 39 | 77 | 114 | 7 | 11 | 16 |
| BEACON ONLY | 4 | 8 | 13 | 2 | 2 | 3 |
| DISCRETE | 2 | 2 | 2 | 2 | 2 | 2 |
| NON DISCRETE | 2 | 6 | 11 | 0 | 0 | 1 |
| MODE C | 3 | 5 | 7 | 2 | 2 | 2 |
| RADAR REINFORCED BEACON | 99 | 199 | 299 | 77 | 77 | 100 |
| DISCRETE | 51 | 51 | 51 | 68 | 68 | 68 |
| NON DISCRETE | 48 | 148 | 248 | 9 | 9 | 32 |
| MODE C | 50 | 94 | 143 | 67 | 67 | 67 |
| CROSS-LINKED | | 51 | | | 67 | |
| UNUSED TARGET REPORTS | 55 | 59 | 63 | 104 | 104 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 5 | 9 | 13 | 4 | 4 | 5 |

## SYSTEM LOAD VALUES FOR NEW YORK ISO 1986

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 159.29 | 301.85 | 444.41 | 107.87 | 111.42 | 138.65 |
| RADAR ONLY | 34.22 | 64.81 | 95.41 | 3.93 | 7.47 | 11.02 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 125.07 | 237.03 | 349.00 | 103.94 | 103.94 | 127.63 |
| DISCRETE | 70.08 | 70.08 | 70.08 | 93.44 | 93.44 | 93.44 |
| NON DISCRETE | 54.99 | 166.95 | 278.91 | 10.50 | 10.50 | 34.19 |
| MODE C | 70.08 | 125.56 | 184.89 | 93.44 | 93.44 | 93.44 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 213.06 | 359.07 | 505.08 | 205.63 | 213.63 | 243.42 |
| RADAR ONLY | 88.00 | 122.00 | 156.00 | 106.00 | 111.00 | 116.00 |
| BEACON ONLY | 10.00 | 19.00 | 28.00 | 4.00 | 7.00 | 10.00 |
| DISCRETE | 2.00 | 4.00 | 5.00 | 3.00 | 5.00 | 8.00 |
| NON DISCRETE | 8.00 | 15.00 | 23.00 | 1.00 | 2.00 | 2.00 |
| MODE C | 5.00 | 10.00 | 15.00 | 3.00 | 5.00 | 7.00 |
| RADAR REINFORCED BEACON | 115.06 | 218.07 | 321.08 | 95.63 | 95.63 | 117.42 |
| DISCRETE | 64.48 | 64.48 | 64.48 | 95.97 | 85.97 | 65.97 |
| NON DISCRETE | 50.59 | 153.59 | 256.60 | 9.66 | 9.66 | 31.46 |
| MODE C | 64.48 | 115.51 | 170.10 | 85.97 | 85.97 | 85.97 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 13 | | | 16 | |
| RADAR ONLY | | 1 | | | 1 | |
| BEACON ONLY | | 1 | | | 1 | |
| DISCRETE | | 1 | | | 1 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 0 | | | 1 | |
| RADAR REINFORCED BEACON | | 11 | | | 14 | |
| DISCRETE | | 10 | | | 13 | |
| NON DISCRETE | | 1 | | | 1 | |
| MODE C | | 11 | | | 14 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 146 | 289 | 431 | 92 | 96 | 122 |
| RADAR ONLY | 38 | 73 | 108 | 7 | 11 | 15 |
| BEACON ONLY | 4 | 9 | 13 | 3 | 3 | 4 |
| DISCRETE | 2 | 2 | 2 | 3 | 3 | 3 |
| NON DISCRETE | 2 | 7 | 11 | 0 | 0 | 1 |
| MODE C | 3 | 5 | 7 | 3 | 3 | 3 |
| RADAR REINFORCED BEACON | 104 | 207 | 310 | 82 | 82 | 103 |
| DISCRETE | 54 | 54 | 54 | 73 | 73 | 73 |
| NON DISCRETE | 50 | 153 | 256 | 9 | 9 | 30 |
| MODE C | 53 | 105 | 159 | 72 | 72 | 72 |
| CROSS-LINKED | | 54 | | | 70 | |
| UNUSED TARGET REPORTS | 55 | 59 | 64 | 104 | 104 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 5 | 9 | 14 | 4 | 4 | 5 |

SYSTEM LOAD VALUES
FOR
NEW YORK ISP
1988

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 143.44 | 307.06 | 450.69 | 112.58 | 115.75 | 141.68 |
| RADAR ONLY | 30.89 | 57.95 | 85.00 | 3.48 | 6.55 | 9.62 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 132.54 | 249.11 | 365.68 | 109.19 | 109.19 | 132.06 |
| DISCRETE | 76.10 | 76.10 | 76.10 | 101.47 | 101.47 | 101.47 |
| NON DISCRETE | 56.44 | 173.01 | 289.58 | 7.72 | 7.72 | 30.59 |
| MODE C | 76.10 | 138.49 | 203.40 | 101.47 | 101.47 | 101.47 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 217.94 | 365.18 | 511.43 | 209.46 | 217.46 | 247.49 |
| RADAR ONLY | 85.00 | 116.00 | 146.00 | 105.00 | 110.00 | 115.00 |
| BEACON ONLY | 11.00 | 20.00 | 29.00 | 4.00 | 7.00 | 11.00 |
| DISCRETE | 2.00 | 4.00 | 6.00 | 3.00 | 5.00 | 8.00 |
| NON DISCRETE | 9.00 | 16.00 | 23.00 | 1.00 | 2.00 | 3.00 |
| MODE C | 6.00 | 11.00 | 16.00 | 3.00 | 5.00 | 9.00 |
| RADAR REINFORCED BEACON | 121.94 | 229.18 | 336.43 | 100.46 | 100.46 | 121.49 |
| DISCRETE | 70.02 | 70.02 | 70.02 | 93.35 | 93.35 | 93.35 |
| NON DISCRETE | 51.92 | 159.17 | 266.41 | 7.10 | 7.10 | 28.14 |
| MODE C | 70.02 | 127.41 | 187.13 | 93.35 | 93.35 | 93.35 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 14 | | | 17 | |
| RADAR ONLY | | 1 | | | 1 | |
| BEACON ONLY | | 1 | | | 1 | |
| DISCRETE | | 1 | | | 1 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 0 | | | 1 | |
| RADAR REINFORCED BEACON | | 12 | | | 15 | |
| DISCRETE | | 11 | | | 14 | |
| NON DISCRETE | | 1 | | | 1 | |
| MODE C | | 11 | | | 15 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 149 | 293 | 437 | 95 | 98 | 124 |
| RADAR ONLY | 35 | 67 | 99 | 7 | 10 | 14 |
| BEACON ONLY | 4 | 9 | 14 | 3 | 3 | 4 |
| DISCRETE | 2 | 2 | 2 | 3 | 3 | 3 |
| NON DISCRETE | 2 | 7 | 12 | 0 | 0 | 1 |
| MODE C | 3 | 6 | 8 | 3 | 3 | 3 |
| RADAR REINFORCED BEACON | 110 | 217 | 324 | 95 | 85 | 106 |
| DISCRETE | 59 | 59 | 59 | 79 | 79 | 79 |
| NON DISCRETE | 51 | 158 | 265 | 6 | 6 | 27 |
| MODE C | 59 | 116 | 176 | 78 | 78 | 79 |
| CROSS-LINKED | | 56 | | | 73 | |
| UNUSED TARGET REPORTS | 55 | 60 | 65 | 104 | 104 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 5 | 10 | 15 | 4 | 4 | 5 |

SYSTEM LOAD VALUES
FOR
NEW YORK ISP
1990

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 167.17 | 311.63 | 456.09 | 117.64 | 120.23 | 144.60 |
| RADAR ONLY | 28.72 | 53.41 | 78.10 | 3.00 | 5.59 | 8.19 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 138.46 | 259.23 | 377.99 | 114.64 | 114.64 | 136.42 |
| DISCRETE | 82.51 | 82.51 | 82.51 | 110.01 | 110.01 | 110.01 |
| NON DISCRETE | 55.95 | 175.72 | 295.49 | 4.63 | 4.63 | 26.41 |
| MODE C | 82.51 | 151.42 | 221.80 | 110.01 | 110.01 | 110.01 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 221.38 | 370.57 | 517.76 | 214.47 | 221.47 | 249.50 |
| RADAR ONLY | 83.00 | 112.00 | 140.00 | 105.00 | 109.00 | 113.00 |
| BEACON ONLY | 11.00 | 21.00 | 30.00 | 4.00 | 7.00 | 11.00 |
| DISCRETE | 2.00 | 4.00 | 6.00 | 3.00 | 6.00 | 8.00 |
| NON DISCRETE | 9.00 | 17.00 | 24.00 | 1.00 | 1.00 | 3.00 |
| MODE C | 6.00 | 12.00 | 18.00 | 3.00 | 6.00 | 8.00 |
| RADAR REINFORCED BEACON | 127.38 | 237.57 | 347.76 | 105.47 | 105.47 | 125.50 |
| DISCRETE | 75.91 | 75.91 | 75.91 | 101.21 | 101.21 | 101.21 |
| NON DISCRETE | 51.48 | 161.66 | 271.85 | 4.26 | 4.26 | 24.29 |
| MODE C | 75.91 | 139.30 | 204.06 | 101.21 | 101.21 | 101.21 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 13 | | | 18 | |
| RADAR ONLY | | 1 | | | 1 | |
| BEACON ONLY | | 1 | | | 1 | |
| DISCRETE | | 1 | | | 1 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 0 | | | 1 | |
| RADAR REINFORCED BEACON | | 11 | | | 16 | |
| DISCRETE | | 11 | | | 15 | |
| NON DISCRETE | | 0 | | | 1 | |
| MODE C | | 12 | | | 17 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 153 | 299 | 443 | 99 | 101 | 126 |
| RADAR ONLY | 33 | 63 | 92 | 7 | 9 | 13 |
| BEACON ONLY | 4 | 9 | 14 | 3 | 3 | 4 |
| DISCRETE | 2 | 2 | 2 | 3 | 3 | 3 |
| NON DISCRETE | 2 | 7 | 12 | 0 | 0 | 1 |
| MODE C | 3 | 6 | 9 | 3 | 3 | 3 |
| RADAR REINFORCED BEACON | 116 | 227 | 337 | 89 | 89 | 109 |
| DISCRETE | 65 | 65 | 65 | 86 | 86 | 86 |
| NON DISCRETE | 51 | 162 | 272 | 3 | 3 | 23 |
| MODE C | 64 | 127 | 192 | 84 | 84 | 84 |
| CROSS-LINKED | | 57 | | | 76 | |
| UNUSED TARGET REPORTS | 56 | 60 | 65 | 105 | 105 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 6 | 10 | 15 | 5 | 5 | 5 |

## APPENDIX H

IAC SYSTEM LOAD FACTORS FOR THE
CHICAGO TRACON SURVEILLANCE SITES

SYSTEM LOAD VALUES
FOR
CHICAGO CHI-S
1977

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 80.28 | 172.80 | 265.32 | 69.39 | 73.12 | 76.84 |
| RADAR ONLY | 21.40 | 51.88 | 82.36 | 2.81 | 6.54 | 10.26 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 58.88 | 120.92 | 182.96 | 66.58 | 66.58 | 66.58 |
| DISCRETE | 39.42 | 39.42 | 39.42 | 52.56 | 52.56 | 52.56 |
| NON DISCRETE | 19.46 | 81.50 | 143.54 | 14.02 | 14.02 | 14.02 |
| MODE C | 39.42 | 46.43 | 64.78 | 52.56 | 52.56 | 52.56 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 132.17 | 226.25 | 319.32 | 167.26 | 173.26 | 178.26 |
| RADAR ONLY | 73.00 | 105.00 | 136.00 | 104.00 | 108.00 | 112.00 |
| BEACON ONLY | 5.00 | 10.00 | 15.00 | 2.00 | 4.00 | 5.00 |
| DISCRETE | 1.00 | 2.00 | 2.00 | 2.00 | 3.00 | 4.00 |
| NON DISCRETE | 4.00 | 8.00 | 13.00 | 0.00 | 1.00 | 1.00 |
| MODE C | 2.00 | 4.00 | 5.00 | 2.00 | 2.00 | 3.00 |
| RADAR REINFORCED BEACON | 54.17 | 111.25 | 168.32 | 61.26 | 61.26 | 61.26 |
| DISCRETE | 36.27 | 36.27 | 36.27 | 48.36 | 48.36 | 48.36 |
| NON DISCRETE | 17.90 | 74.98 | 132.05 | 12.90 | 12.90 | 12.90 |
| MODE C | 36.27 | 42.71 | 59.60 | 48.36 | 48.36 | 48.36 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 16 | | | 22 | |
| RADAR ONLY | | 1 | | | 2 | |
| BEACON ONLY | | 1 | | | 1 | |
| DISCRETE | | 1 | | | 1 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 0 | | | 1 | |
| RADAR REINFORCED BEACON | | 14 | | | 19 | |
| DISCRETE | | 11 | | | 15 | |
| NON DISCRETE | | 3 | | | 4 | |
| MODE C | | 12 | | | 16 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 65 | 157 | 250 | 47 | 51 | 55 |
| RADAR ONLY | 23 | 56 | 89 | 3 | 7 | 11 |
| BEACON ONLY | 2 | 4 | 7 | 2 | 2 | 2 |
| DISCRETE | 1 | 1 | 1 | 1 | 1 | 1 |
| NON DISCRETE | 1 | 3 | 6 | 1 | 1 | 1 |
| MODE C | 2 | 2 | 3 | 1 | 1 | 1 |
| RADAR REINFORCED BEACON | 40 | 97 | 154 | 42 | 42 | 42 |
| DISCRETE | 25 | 25 | 25 | 33 | 33 | 33 |
| NON DISCRETE | 15 | 72 | 129 | 9 | 9 | 9 |
| MODE C | 24 | 31 | 48 | 32 | 32 | 32 |
| CROSS-LINKED | | 36 | | | 48 | |
| UNUSED TARGET REPORTS | 52 | 55 | 57 | 103 | 103 | 103 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 2 | 5 | 7 | 3 | 3 | 3 |

## SYSTEM LOAD VALUES
## FOR
## CHICAGO CHI-S
## 1980

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 91.63 | 193.41 | 295.19 | 70.94 | 74.25 | 79.33 |
| RADAR ONLY | 22.44 | 52.90 | 83.36 | 2.66 | 5.97 | 9.28 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 69.19 | 140.51 | 211.83 | 68.28 | 68.28 | 70.06 |
| DISCRETE | 42.67 | 42.67 | 42.67 | 56.90 | 56.90 | 56.90 |
| NON DISCRETE | 26.51 | 97.83 | 169.15 | 11.38 | 11.38 | 13.16 |
| MODE C | 42.67 | 62.55 | 89.04 | 56.90 | 56.90 | 56.90 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 143.65 | 246.27 | 349.88 | 169.82 | 174.82 | 182.45 |
| RADAR ONLY | 74.00 | 106.00 | 138.00 | 104.00 | 108.00 | 112.00 |
| BEACON ONLY | 6.00 | 11.00 | 17.00 | 3.00 | 4.00 | 6.00 |
| DISCRETE | 2.00 | 2.00 | 3.00 | 2.00 | 3.00 | 4.00 |
| NON DISCRETE | 4.00 | 9.00 | 14.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 3.00 | 5.00 | 7.00 | 2.00 | 3.00 | 4.00 |
| RADAR REINFORCED BEACON | 63.65 | 129.27 | 194.88 | 62.82 | 62.82 | 64.45 |
| DISCRETE | 39.26 | 39.26 | 39.26 | 52.35 | 52.35 | 52.35 |
| NON DISCRETE | 24.39 | 90.01 | 155.62 | 10.47 | 10.47 | 12.10 |
| MODE C | 39.26 | 57.55 | 81.92 | 52.35 | 52.35 | 52.35 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 16 | | | 22 | |
| RADAR ONLY | | 1 | | | 2 | |
| BEACON ONLY | | 1 | | | 1 | |
| DISCRETE | | 1 | | | 1 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 14 | | | 19 | |
| DISCRETE | | 12 | | | 16 | |
| NON DISCRETE | | 2 | | | 3 | |
| MODE C | | 13 | | | 17 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 75 | 178 | 280 | 47 | 51 | 57 |
| RADAR ONLY | 24 | 58 | 91 | 3 | 7 | 10 |
| BEACON ONLY | 2 | 5 | 8 | 1 | 1 | 2 |
| DISCRETE | 1 | 1 | 1 | 1 | 1 | 1 |
| NON DISCRETE | 1 | 4 | 7 | 0 | 0 | 1 |
| MODE C | 1 | 2 | 3 | 1 | 1 | 1 |
| RADAR REINFORCED BEACON | 49 | 115 | 181 | 43 | 43 | 45 |
| DISCRETE | 27 | 27 | 27 | 36 | 36 | 36 |
| NON DISCRETE | 22 | 88 | 154 | 7 | 7 | 9 |
| MODE C | 26 | 45 | 69 | 35 | 35 | 35 |
| CROSS-LINKED | | 35 | | | 49 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| UNUSED TARGET REPORTS | 53 | 56 | 58 | 103 | 103 | 103 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 3 | 6 | 8 | 3 | 3 | 3 |

# SYSTEM LOAD VALUES FOR CHICAGO CHI-S 1982

| | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| **BASE** | | | | | | |
| TOTAL | 96.10 | 201.23 | 306.35 | 72.53 | 75.59 | 82.04 |
| RADAR ONLY | 21.49 | 49.99 | 78.50 | 2.53 | 5.59 | 8.65 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 74.61 | 151.23 | 227.85 | 70.00 | 70.00 | 73.39 |
| DISCRETE | 44.92 | 44.92 | 44.92 | 59.89 | 59.89 | 59.89 |
| NON DISCRETE | 29.69 | 106.31 | 182.93 | 10.10 | 10.10 | 13.50 |
| MODE C | 44.92 | 71.75 | 103.10 | 59.89 | 59.89 | 59.89 |
| **ADJUSTED** | | | | | | |
| TOTAL | 148.64 | 255.13 | 361.63 | 171.40 | 175.40 | 184.52 |
| RADAR ONLY | 74.00 | 104.00 | 134.00 | 104.00 | 107.00 | 111.00 |
| BEACON ONLY | 6.00 | 12.00 | 18.00 | 3.00 | 4.00 | 6.00 |
| DISCRETE | 2.00 | 2.00 | 3.00 | 2.00 | 3.00 | 4.00 |
| NON DISCRETE | 4.00 | 10.00 | 15.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 3.00 | 6.00 | 8.00 | 2.00 | 3.00 | 4.00 |
| RADAR REINFORCED BEACON | 68.64 | 139.13 | 209.63 | 64.40 | 64.40 | 67.52 |
| DISCRETE | 41.33 | 41.33 | 41.33 | 55.10 | 55.10 | 55.10 |
| NON DISCRETE | 27.31 | 97.81 | 168.30 | 9.29 | 9.29 | 12.42 |
| MODE C | 41.33 | 66.01 | 94.85 | 55.10 | 55.10 | 55.10 |
| **ASSOCIATED TRACKS** | | | | | | |
| TOTAL | | 16 | | | 22 | |
| RADAR ONLY | | 1 | | | 1 | |
| BEACON ONLY | | 1 | | | 1 | |
| DISCRETE | | 1 | | | 1 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 14 | | | 20 | |
| DISCRETE | | 12 | | | 17 | |
| NON DISCRETE | | 2 | | | 3 | |
| MODE C | | 13 | | | 18 | |
| **UNASSOCIATED TRACKS** | | | | | | |
| TOTAL | 79 | 185 | 290 | 49 | 52 | 60 |
| RADAR ONLY | 23 | 55 | 87 | 4 | 7 | 11 |
| BEACON ONLY | 2 | 5 | 8 | 1 | 1 | 2 |
| DISCRETE | 1 | 1 | 1 | 1 | 1 | 1 |
| NON DISCRETE | 1 | 4 | 7 | 0 | 0 | 1 |
| MODE C | 1 | 2 | 3 | 1 | 1 | 1 |
| RADAR REINFORCED BEACON | 54 | 125 | 195 | 44 | 44 | 47 |
| DISCRETE | 29 | 29 | 29 | 38 | 38 | 38 |
| NON DISCRETE | 25 | 96 | 166 | 6 | 6 | 9 |
| MODE C | 28 | 53 | 82 | 37 | 37 | 37 |
| CROSS-LINKED | | 37 | | | 50 | |
| **UNUSED TARGET REPORTS** | 53 | 56 | 59 | 103 | 103 | 103 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 3 | 6 | 9 | 3 | 3 | 3 |

# SYSTEM LOAD VALUES
# FOR
# CHICAGO CHI-S
# 1984

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 100.52 | 208.43 | 316.35 | 74.11 | 76.87 | 84.62 |
| RADAR ONLY | 21.03 | 48.23 | 75.43 | 2.36 | 5.12 | 7.88 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 79.49 | 160.20 | 240.92 | 71.75 | 71.75 | 76.74 |
| DISCRETE | 47.22 | 47.22 | 47.22 | 62.96 | 62.96 | 62.96 |
| NON DISCRETE | 32.27 | 112.98 | 193.69 | 8.79 | 8.79 | 13.77 |
| MODE C | 47.22 | 79.73 | 115.07 | 62.96 | 62.96 | 62.96 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 152.13 | 263.39 | 372.64 | 173.01 | 177.01 | 187.60 |
| RADAR ONLY | 73.00 | 103.00 | 132.00 | 104.00 | 107.00 | 111.00 |
| BEACON ONLY | 6.00 | 13.00 | 19.00 | 3.00 | 4.00 | 6.00 |
| DISCRETE | 2.00 | 2.00 | 3.00 | 2.00 | 3.00 | 5.00 |
| NON DISCRETE | 4.00 | 11.00 | 16.00 | 1.00 | 1.00 | 1.00 |
| MODE C | 4.00 | 6.00 | 9.00 | 2.00 | 3.00 | 4.00 |
| RADAR REINFORCED BEACON | 73.13 | 147.39 | 221.64 | 66.01 | 66.01 | 70.60 |
| DISCRETE | 43.44 | 43.44 | 43.44 | 57.93 | 57.93 | 57.93 |
| NON DISCRETE | 29.69 | 103.94 | 178.20 | 8.09 | 8.08 | 12.67 |
| MODE C | 43.44 | 73.35 | 105.87 | 57.93 | 57.93 | 57.93 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 17 | | | 21 | |
| RADAR ONLY | | 1 | | | 1 | |
| BEACON ONLY | | 1 | | | 1 | |
| DISCRETE | | 1 | | | 1 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 15 | | | 19 | |
| DISCRETE | | 13 | | | 17 | |
| NON DISCRETE | | 2 | | | 2 | |
| MODE C | | 14 | | | 19 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 83 | 192 | 299 | 53 | 56 | 55 |
| RADAR ONLY | 23 | 54 | 84 | 4 | 7 | 10 |
| BEACON ONLY | 2 | 6 | 9 | 2 | 2 | 3 |
| DISCRETE | 1 | 1 | 1 | 2 | 2 | 2 |
| NON DISCRETE | 1 | 5 | 8 | 0 | 0 | 1 |
| MODE C | 1 | 2 | 4 | 2 | 2 | 2 |
| RADAR REINFORCED BEACON | 58 | 132 | 206 | 47 | 47 | 52 |
| DISCRETE | 30 | 30 | 30 | 41 | 41 | 41 |
| NON DISCRETE | 28 | 102 | 176 | 6 | 6 | 11 |
| MODE C | 29 | 59 | 92 | 39 | 39 | 39 |
| CROSS-LINKED | | 37 | | | 50 | |
| UNUSED TARGET REPORTS | 53 | 56 | 60 | 103 | 103 | 103 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 3 | 6 | 10 | 3 | 3 | 3 |

SYSTEM LOAD VALUES
FOR
CHICAGO CHI-S
1986

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 104.31 | 214.03 | 323.74 | 75.57 | 78.00 | 86.68 |
| RADAR ONLY | 20.25 | 45.83 | 71.40 | 2.15 | 4.59 | 7.02 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 84.07 | 168.20 | 252.34 | 73.42 | 73.42 | 79.67 |
| DISCRETE | 49.50 | 49.50 | 49.50 | 66.00 | 66.00 | 66.00 |
| NON DISCRETE | 34.56 | 118.70 | 202.83 | 7.42 | 7.42 | 13.66 |
| MODE C | 49.50 | 89.38 | 129.52 | 56.00 | 66.00 | 66.00 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 157.34 | 268.74 | 381.15 | 174.54 | 179.54 | 189.29 |
| RADAR ONLY | 73.00 | 101.00 | 129.00 | 104.00 | 107.00 | 110.00 |
| BEACON ONLY | 7.00 | 13.00 | 20.00 | 3.00 | 5.00 | 6.00 |
| DISCRETE | 2.00 | 3.00 | 3.00 | 2.00 | 4.00 | 5.00 |
| NON DISCRETE | 5.00 | 10.00 | 17.00 | 1.00 | 1.00 | 1.00 |
| MODE C | 4.00 | 7.00 | 10.00 | 2.00 | 3.00 | 5.00 |
| RADAR REINFORCED BEACON | 77.34 | 154.74 | 232.15 | 67.54 | 67.54 | 73.29 |
| DISCRETE | 45.54 | 45.54 | 45.54 | 60.72 | 60.72 | 60.72 |
| NON DISCRETE | 31.80 | 109.20 | 186.61 | 6.82 | 6.82 | 12.57 |
| MODE C | 45.54 | 32.23 | 119.16 | 60.72 | 60.72 | 60.72 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 18 | | | 23 | |
| RADAR ONLY | | 1 | | | 1 | |
| BEACON ONLY | | 1 | | | 2 | |
| DISCRETE | | 1 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 16 | | | 20 | |
| DISCRETE | | 14 | | | 18 | |
| NON DISCRETE | | 2 | | | 2 | |
| MODE C | | 15 | | | 20 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 87 | 197 | 306 | 53 | 56 | 65 |
| RADAR ONLY | 23 | 52 | 80 | 4 | 7 | 9 |
| BEACON ONLY | 2 | 6 | 9 | 1 | 1 | 2 |
| DISCRETE | 1 | 1 | 1 | 1 | 1 | 1 |
| NON DISCRETE | 1 | 5 | 8 | 0 | 0 | 1 |
| MODE C | 1 | 3 | 4 | 2 | 2 | 2 |
| RADAR REINFORCED BEACON | 62 | 139 | 217 | 48 | 48 | 54 |
| DISCRETE | 32 | 32 | 32 | 43 | 42 | 43 |
| NON DISCRETE | 30 | 107 | 185 | 5 | 5 | 11 |
| MODE C | 31 | 67 | 104 | 41 | 41 | 41 |
| CROSS-LINKED | | 39 | | | 51 | |
| UNUSED TARGET REPORTS | 53 | 57 | 60 | 103 | 103 | 103 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 3 | 7 | 10 | 3 | 3 | 3 |

SYSTEM LOAD VALUES
FOR
CHICAGO CHI-S
1989

| BASE | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 107.55 | 218.24 | 328.92 | 76.12 | 78.20 | 88.61 |
| RADAR ONLY | 18.36 | 41.03 | 63.70 | 1.91 | 4.00 | 6.09 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 89.19 | 177.21 | 265.22 | 74.20 | 74.20 | 82.52 |
| DISCRETE | 51.72 | 51.72 | 51.72 | 68.96 | 68.96 | 68.96 |
| NON DISCRETE | 37.48 | 125.49 | 213.51 | 5.25 | 5.25 | 13.57 |
| MODE C | 51.72 | 98.88 | 143.62 | 68.96 | 68.96 | 68.96 |

| ADJUSTED | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 160.06 | 273.03 | 387.01 | 174.27 | 179.27 | 191.92 |
| RADAR ONLY | 71.00 | 96.00 | 122.00 | 103.00 | 106.00 | 109.00 |
| BEACON ONLY | 7.00 | 14.00 | 21.00 | 3.00 | 5.00 | 7.00 |
| DISCRETE | 2.00 | 3.00 | 4.00 | 2.00 | 4.00 | 5.00 |
| NON DISCRETE | 5.00 | 11.00 | 17.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 4.00 | 8.00 | 11.00 | 2.00 | 4.00 | 5.00 |
| RADAR REINFORCED BEACON | 82.06 | 163.03 | 244.01 | 68.27 | 68.27 | 75.92 |
| DISCRETE | 47.58 | 47.58 | 47.58 | 63.44 | 63.44 | 63.44 |
| NON DISCRETE | 34.48 | 115.45 | 196.43 | 4.83 | 4.83 | 12.48 |
| MODE C | 47.58 | 90.97 | 132.13 | 63.44 | 63.44 | 63.44 |

| ASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | | 17 | | | 23 | |
| RADAR ONLY | | 1 | | | 1 | |
| BEACON ONLY | | 1 | | | 2 | |
| DISCRETE | | 1 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 15 | | | 20 | |
| DISCRETE | | 14 | | | 19 | |
| NON DISCRETE | | 1 | | | 1 | |
| MODE C | | 15 | | | 21 | |

| UNASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 90 | 201 | 312 | 53 | 55 | 65 |
| RADAR ONLY | 21 | 47 | 73 | 4 | 6 | 9 |
| BEACON ONLY | 2 | 6 | 10 | 1 | 1 | 2 |
| DISCRETE | 1 | 1 | 1 | 1 | 1 | 1 |
| NON DISCRETE | 1 | 5 | 9 | 0 | 0 | 1 |
| MODE C | 1 | 3 | 5 | 2 | 2 | 2 |
| RADAR REINFORCED BEACON | 67 | 148 | 229 | 48 | 48 | 55 |
| DISCRETE | 34 | 34 | 34 | 44 | 44 | 44 |
| NON DISCRETE | 33 | 114 | 195 | 4 | 4 | 11 |
| MODE C | 32 | 75 | 116 | 42 | 42 | 42 |
| CROSS-LINKED | | 39 | | | 50 | |
| UNUSED TARGET REPORTS | 54 | 57 | 61 | 103 | 103 | 103 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 7 | 11 | 3 | 3 | 3 |

## SYSTEM LOAD VALUES FOR CHICAGO CHI-S 1990

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 110.72 | 221.86 | 333.00 | 76.57 | 78.32 | 90.68 |
| RADAR ONLY | 17.14 | 37.82 | 58.49 | 1.66 | 3.41 | 5.16 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 93.58 | 184.05 | 274.51 | 74.91 | 74.91 | 85.52 |
| DISCRETE | 53.91 | 53.91 | 53.91 | 71.88 | 71.88 | 71.88 |
| NON DISCRETE | 39.67 | 130.14 | 220.60 | 3.03 | 3.03 | 13.64 |
| MODE C | 59.30 | 108.41 | 157.53 | 71.88 | 71.88 | 71.88 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 163.09 | 278.32 | 391.55 | 174.91 | 179.91 | 193.68 |
| RADAR ONLY | 70.00 | 94.00 | 117.00 | 103.00 | 106.00 | 108.00 |
| BEACON ONLY | 7.00 | 15.00 | 22.00 | 3.00 | 5.00 | 7.00 |
| DISCRETE | 2.00 | 3.00 | 4.00 | 3.00 | 4.00 | 5.00 |
| NON DISCRETE | 5.00 | 12.00 | 18.00 | 0.00 | 1.00 | 2.00 |
| MODE C | 5.00 | 9.00 | 13.00 | 3.00 | 4.00 | 5.00 |
| RADAR REINFORCED BEACON | 86.09 | 169.32 | 252.55 | 68.91 | 68.91 | 78.68 |
| DISCRETE | 49.60 | 49.60 | 49.60 | 66.13 | 66.13 | 66.13 |
| NON DISCRETE | 36.49 | 119.72 | 202.96 | 2.78 | 2.78 | 12.55 |
| MODE C | 54.55 | 99.74 | 144.93 | 66.13 | 66.13 | 66.13 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 18 | | | 24 | |
| RADAR ONLY | | 1 | | | 1 | |
| BEACON ONLY | | 1 | | | 2 | |
| DISCRETE | | 1 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 16 | | | 21 | |
| DISCRETE | | 15 | | | 20 | |
| NON DISCRETE | | 1 | | | 1 | |
| MODE C | | 16 | | | 22 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 93 | 204 | 315 | 53 | 54 | 68 |
| RADAR ONLY | 20 | 44 | 68 | 4 | 5 | 8 |
| BEACON ONLY | 3 | 6 | 10 | 1 | 1 | 2 |
| DISCRETE | 1 | 1 | 1 | 1 | 1 | 1 |
| NON DISCRETE | 2 | 5 | 9 | 0 | 0 | 1 |
| MODE C | 1 | 3 | 5 | 2 | 2 | 2 |
| RADAR REINFORCED BEACON | 70 | 154 | 237 | 48 | 48 | 58 |
| DISCRETE | 35 | 35 | 35 | 46 | 46 | 46 |
| NON DISCRETE | 35 | 119 | 202 | 2 | 2 | 12 |
| MODE C | 39 | 84 | 129 | 44 | 44 | 44 |
| CROSS-LINKED | | 39 | | | 51 | |
| UNUSED TARGET REPORTS | 54 | 57 | 61 | 103 | 103 | 103 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 7 | 11 | 3 | 3 | 3 |

SYSTEM LOAD VALUES
FOR
CHICAGO OHARE
1977

| BASE | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 103.10 | 212.38 | 321.66 | 69.79 | 74.29 | 92.35 |
| RADAR ONLY | 26.23 | 61.48 | 96.72 | 3.41 | 7.71 | 12.01 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 76.87 | 150.91 | 224.94 | 66.58 | 66.58 | 80.34 |
| DISCRETE | 39.42 | 39.42 | 43.07 | 52.56 | 52.56 | 61.80 |
| NON DISCRETE | 37.45 | 111.48 | 181.87 | 14.02 | 14.02 | 18.54 |
| MODE C | 39.42 | 62.56 | 86.05 | 52.56 | 52.56 | 52.56 |

| ADJUSTED | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 154.72 | 265.83 | 376.94 | 169.26 | 176.26 | 194.91 |
| RADAR ONLY | 78.00 | 115.00 | 152.00 | 105.00 | 110.00 | 115.00 |
| BEACON ONLY | 6.00 | 12.00 | 18.00 | 3.00 | 5.00 | 6.00 |
| DISCRETE | 2.00 | 3.00 | 3.00 | 3.00 | 4.00 | 5.00 |
| NON DISCRETE | 4.00 | 9.00 | 15.00 | 0.00 | 1.00 | 1.00 |
| MODE C | 3.00 | 5.00 | 7.00 | 2.00 | 3.00 | 4.00 |
| RADAR REINFORCED BEACON | 70.72 | 138.83 | 206.94 | 61.26 | 61.26 | 73.91 |
| DISCRETE | 36.27 | 36.27 | 39.62 | 48.36 | 48.36 | 56.85 |
| NON DISCRETE | 34.46 | 102.56 | 167.32 | 12.90 | 12.90 | 17.06 |
| MODE C | 36.27 | 57.56 | 79.16 | 48.36 | 48.36 | 48.36 |

| ASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | | 38 | | | 51 | |
| RADAR ONLY | | 3 | | | 4 | |
| BEACON ONLY | | 3 | | | 4 | |
| DISCRETE | | 2 | | | 3 | |
| NON DISCRETE | | 1 | | | 1 | |
| MODE C | | 1 | | | 2 | |
| RADAR REINFORCED BEACON | | 32 | | | 43 | |
| DISCRETE | | 25 | | | 34 | |
| NON DISCRETE | | 7 | | | 9 | |
| MODE C | | 28 | | | 37 | |

| UNASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 64 | 175 | 284 | 20 | 24 | 42 |
| RADAR ONLY | 26 | 65 | 103 | 2 | 6 | 11 |
| BEACON ONLY | 0 | 3 | 6 | 0 | 0 | 0 |
| DISCRETE | 0 | 0 | 0 | 0 | 0 | 0 |
| NON DISCRETE | 0 | 3 | 6 | 0 | 0 | 0 |
| MODE C | 1 | 2 | 2 | 0 | 0 | 0 |
| RADAR REINFORCED BEACON | 38 | 107 | 175 | 18 | 18 | 31 |
| DISCRETE | 11 | 11 | 15 | 14 | 14 | 23 |
| NON DISCRETE | 27 | 96 | 160 | 4 | 4 | 8 |
| MODE C | 8 | 30 | 51 | 11 | 11 | 11 |
| CROSS-LINKED | | 15 | | | 21 | |
| UNUSED TARGET REPORTS | 53 | 56 | 59 | 103 | 103 | 103 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 3 | 6 | 9 | 3 | 3 | 3 |

SYSTEM LOAD VALUES
FOR
CHICAGO OHARE
1980

| BASE | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 115.41 | 234.02 | 352.63 | 71.42 | 75.24 | 101.84 |
| RADAR ONLY | 27.00 | 61.32 | 96.65 | 3.14 | 6.96 | 10.78 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 88.41 | 172.20 | 255.99 | 68.28 | 68.28 | 91.06 |
| DISCRETE | 42.67 | 42.67 | 48.57 | 56.90 | 56.90 | 70.58 |
| NON DISCRETE | 45.73 | 129.52 | 207.42 | 11.38 | 11.38 | 20.48 |
| MODE C | 48.51 | 91.03 | 113.55 | 56.90 | 56.90 | 64.23 |
| **ADJUSTED** | **GOOD WEATHER** | | | **BAD WEATHER** | | |
| | A | B | C | A | B | C |
| TOTAL | 167.33 | 288.42 | 408.51 | 170.82 | 176.82 | 204.77 |
| RADAR ONLY | 79.00 | 116.00 | 153.00 | 105.00 | 109.00 | 114.00 |
| BEACON ONLY | 7.00 | 14.00 | 20.00 | 3.00 | 5.00 | 7.00 |
| DISCRETE | 2.00 | 3.00 | 4.00 | 3.00 | 4.00 | 6.00 |
| NON DISCRETE | 5.00 | 11.00 | 16.00 | 0.00 | 1.00 | 1.00 |
| MODE C | 4.00 | 6.00 | 9.00 | 3.00 | 4.00 | 5.00 |
| RADAR REINFORCED BEACON | 81.33 | 158.42 | 235.51 | 62.82 | 62.82 | 83.77 |
| DISCRETE | 39.26 | 39.26 | 44.68 | 52.35 | 52.35 | 64.93 |
| NON DISCRETE | 42.07 | 119.16 | 190.83 | 10.47 | 10.47 | 18.84 |
| MODE C | 44.63 | 74.55 | 104.46 | 52.35 | 52.35 | 59.09 |
| **ASSOCIATED TRACKS** | **GOOD WEATHER** | | | **BAD WEATHER** | | |
| | A | B | C | A | B | C |
| TOTAL | | 37 | | | 52 | |
| RADAR ONLY | | 3 | | | 4 | |
| BEACON ONLY | | 2 | | | 4 | |
| DISCRETE | | 2 | | | 3 | |
| NON DISCRETE | | 0 | | | 1 | |
| MODE C | | 1 | | | 2 | |
| RADAR REINFORCED BEACON | | 32 | | | 44 | |
| DISCRETE | | 27 | | | 37 | |
| NON DISCRETE | | 5 | | | 7 | |
| MODE C | | 30 | | | 40 | |
| **UNASSOCIATED TRACKS** | **GOOD WEATHER** | | | **BAD WEATHER** | | |
| | A | B | C | A | B | C |
| TOTAL | 79 | 197 | 316 | 20 | 24 | 50 |
| RADAR ONLY | 28 | 66 | 104 | 2 | 6 | 10 |
| BEACON ONLY | 2 | 5 | 8 | 0 | 0 | 0 |
| DISCRETE | 0 | 0 | 0 | 0 | 0 | 0 |
| NON DISCRETE | 2 | 5 | 8 | 0 | 0 | 0 |
| MODE C | 1 | 2 | 4 | 0 | 0 | 1 |
| RADAR REINFORCED BEACON | 49 | 126 | 204 | 18 | 18 | 40 |
| DISCRETE | 12 | 12 | 18 | 15 | 15 | 28 |
| NON DISCRETE | 37 | 114 | 186 | 3 | 3 | 12 |
| MODE C | 15 | 45 | 74 | 12 | 12 | 19 |
| CROSS-LINKED | | 15 | | | 21 | |
| UNUSED TARGET REPORTS | 54 | 57 | 60 | 103 | 103 | 104 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 7 | 10 | 3 | 3 | 4 |

SYSTEM LOAD VALUES
FOR
CHICAGO OHARE
1982

| BASE | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 120.67 | 242.96 | 365.25 | 72.99 | 76.30 | 105.21 |
| RADAR ONLY | 25.83 | 58.37 | 90.91 | 2.99 | 6.54 | 10.09 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 94.85 | 184.59 | 274.34 | 70.00 | 69.76 | 95.12 |
| DISCRETE | 44.92 | 44.92 | 51.75 | 59.89 | 59.89 | 73.39 |
| NON DISCRETE | 49.93 | 139.68 | 222.59 | 10.10 | 9.87 | 21.73 |
| MODE C | 53.72 | 91.76 | 129.80 | 59.89 | 59.89 | 68.50 |
| **ADJUSTED** | **GOOD WEATHER** | | | **BAD WEATHER** | | |
| | A | B | C | A | B | C |
| TOTAL | 174.26 | 297.83 | 422.39 | 173.40 | 179.18 | 208.51 |
| RADAR ONLY | 79.00 | 113.00 | 148.00 | 105.00 | 109.00 | 113.00 |
| BEACON ONLY | 8.00 | 15.00 | 22.00 | 4.00 | 6.00 | 8.00 |
| DISCRETE | 2.00 | 3.00 | 4.00 | 3.00 | 4.00 | 6.00 |
| NON DISCRETE | 6.00 | 12.00 | 18.00 | 1.00 | 2.00 | 2.00 |
| MODE C | 4.00 | 7.00 | 10.00 | 3.00 | 4.00 | 5.00 |
| RADAR REINFORCED BEACON | 87.26 | 169.83 | 252.39 | 64.40 | 64.18 | 87.51 |
| DISCRETE | 41.33 | 41.33 | 47.61 | 55.10 | 55.10 | 67.52 |
| NON DISCRETE | 45.93 | 128.50 | 204.78 | 9.29 | 9.08 | 19.99 |
| MODE C | 49.42 | 84.42 | 119.42 | 55.10 | 55.10 | 63.02 |
| **ASSOCIATED TRACKS** | **GOOD WEATHER** | | | **BAD WEATHER** | | |
| | A | B | C | A | B | C |
| TOTAL | | 39 | | | 53 | |
| RADAR ONLY | | 3 | | | 3 | |
| BEACON ONLY | | 2 | | | 4 | |
| DISCRETE | | 2 | | | 3 | |
| NON DISCRETE | | 0 | | | 1 | |
| MODE C | | 1 | | | 2 | |
| RADAR REINFORCED BEACON | | 34 | | | 46 | |
| DISCRETE | | 29 | | | 39 | |
| NON DISCRETE | | 5 | | | 7 | |
| MODE C | | 31 | | | 42 | |
| **UNASSOCIATED TRACKS** | **GOOD WEATHER** | | | **BAD WEATHER** | | |
| | A | B | C | A | B | C |
| TOTAL | 82 | 205 | 327 | 21 | 24 | 53 |
| RADAR ONLY | 27 | 63 | 99 | 3 | 6 | 11 |
| BEACON ONLY | 2 | 6 | 9 | 0 | 0 | 0 |
| DISCRETE | 0 | 0 | 0 | 0 | 0 | 0 |
| NON DISCRETE | 2 | 6 | 9 | 0 | 0 | 0 |
| MODE C | 1 | 3 | 4 | 0 | 0 | 1 |
| RADAR REINFORCED BEACON | 53 | 135 | 219 | 18 | 18 | 42 |
| DISCRETE | 12 | 12 | 19 | 16 | 16 | 29 |
| NON DISCRETE | 41 | 124 | 200 | 2 | 2 | 13 |
| MODE C | 18 | 53 | 88 | 13 | 13 | 21 |
| CROSS-LINKED | | 15 | | | 21 | |
| UNUSED TARGET REPORTS | 54 | 57 | 61 | 103 | 103 | 104 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 7 | 11 | 3 | 3 | 4 |

SYSTEM LOAD VALUES
FOR
CHICAGO OHARE
1984

| BASE | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 125.84 | 251.05 | 376.27 | 74.54 | 78.69 | 108.37 |
| RADAR ONLY | 25.23 | 56.20 | 87.17 | 2.79 | 5.99 | 9.20 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 100.61 | 194.85 | 289.09 | 71.75 | 72.70 | 99.18 |
| DISCRETE | 47.22 | 47.22 | 55.27 | 62.96 | 62.96 | 76.36 |
| NON DISCRETE | 53.39 | 147.63 | 233.82 | 8.79 | 9.73 | 22.81 |
| MODE C | 58.48 | 101.05 | 143.62 | 62.96 | 62.96 | 72.59 |

| ADJUSTED | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 178.56 | 307.26 | 433.97 | 175.01 | 181.88 | 212.24 |
| RADAR ONLY | 78.00 | 112.00 | 145.00 | 105.00 | 109.00 | 113.00 |
| BEACON ONLY | 8.00 | 16.00 | 23.00 | 4.00 | 6.00 | 8.00 |
| DISCRETE | 3.00 | 3.00 | 4.00 | 3.00 | 5.00 | 6.00 |
| NON DISCRETE | 5.00 | 13.00 | 19.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 5.00 | 8.00 | 11.00 | 3.00 | 4.00 | 6.00 |
| RADAR REINFORCED BEACON | 92.56 | 179.26 | 265.97 | 66.01 | 66.88 | 91.24 |
| DISCRETE | 43.44 | 43.44 | 50.85 | 57.93 | 57.93 | 70.25 |
| NON DISCRETE | 49.12 | 135.82 | 215.12 | 8.08 | 8.96 | 20.99 |
| MODE C | 53.81 | 92.97 | 132.13 | 57.93 | 57.93 | 66.78 |

| ASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | | 39 | | | 53 | |
| RADAR ONLY | | 2 | | | 3 | |
| BEACON ONLY | | 3 | | | 3 | |
| DISCRETE | | 3 | | | 3 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 2 | |
| RADAR REINFORCED BEACON | | 34 | | | 47 | |
| DISCRETE | | 30 | | | 41 | |
| NON DISCRETE | | 4 | | | 6 | |
| MODE C | | 33 | | | 44 | |

| UNASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 87 | 213 | 338 | 22 | 26 | 55 |
| RADAR ONLY | 27 | 62 | 97 | 3 | 6 | 10 |
| BEACON ONLY | 2 | 6 | 9 | 0 | 0 | 1 |
| DISCRETE | 0 | 0 | 0 | 0 | 0 | 0 |
| NON DISCRETE | 2 | 6 | 9 | 0 | 0 | 1 |
| MODE C | 1 | 3 | 5 | 1 | 1 | 1 |
| RADAR REINFORCED BEACON | 58 | 145 | 232 | 19 | 20 | 44 |
| DISCRETE | 13 | 13 | 21 | 17 | 17 | 29 |
| NON DISCRETE | 45 | 132 | 211 | 2 | 3 | 15 |
| MODE C | 21 | 60 | 99 | 14 | 14 | 23 |
| CROSS-LINKED | | 16 | | | 20 | |
| UNUSED TARGET REPORTS | 54 | 58 | 62 | 103 | 103 | 104 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 8 | 12 | 3 | 3 | 4 |

SYSTEM LOAD VALUES
FOR
CHICAGO OHARE
1986

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 130.19 | 257.28 | 384.37 | 75.97 | 60.65 | 110.81 |
| RADAR ONLY | 24.26 | 53.36 | 82.45 | 2.55 | 5.38 | 8.21 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 105.93 | 203.92 | 301.92 | 73.42 | 75.27 | 102.59 |
| DISCRETE | 49.50 | 49.50 | 58.65 | 66.00 | 66.00 | 78.86 |
| NON DISCRETE | 56.43 | 154.42 | 243.27 | 7.42 | 9.27 | 23.74 |
| MODE C | 64.20 | 112.15 | 160.10 | 66.00 | 66.00 | 76.79 |
| **ADJUSTED** | **GOOD WEATHER A** | **B** | **C** | **BAD WEATHER A** | **B** | **C** |
| TOTAL | 183.46 | 312.61 | 442.77 | 175.54 | 183.25 | 214.39 |
| RADAR ONLY | 78.00 | 109.00 | 141.00 | 104.00 | 108.00 | 112.00 |
| BEACON ONLY | 8.00 | 16.00 | 24.00 | 4.00 | 6.00 | 8.00 |
| DISCRETE | 3.00 | 4.00 | 5.00 | 3.00 | 5.00 | 6.00 |
| NON DISCRETE | 5.00 | 12.00 | 19.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 5.00 | 9.00 | 13.00 | 3.00 | 5.00 | 6.00 |
| RADAR REINFORCED BEACON | 97.46 | 187.61 | 277.77 | 67.54 | 69.25 | 94.39 |
| DISCRETE | 45.54 | 45.54 | 53.96 | 60.72 | 60.72 | 72.55 |
| NON DISCRETE | 51.91 | 142.07 | 223.81 | 6.82 | 8.53 | 21.84 |
| MODE C | 59.06 | 103.18 | 147.29 | 60.72 | 60.72 | 70.64 |
| **ASSOCIATED TRACKS** | **GOOD WEATHER A** | **B** | **C** | **BAD WEATHER A** | **B** | **C** |
| TOTAL | | 41 | | | 54 | |
| RADAR ONLY | | 2 | | | 2 | |
| BEACON ONLY | | 3 | | | 4 | |
| DISCRETE | | 3 | | | 4 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 2 | |
| RADAR REINFORCED BEACON | | 36 | | | 48 | |
| DISCRETE | | 32 | | | 43 | |
| NON DISCRETE | | 4 | | | 5 | |
| MODE C | | 35 | | | 46 | |
| **UNASSOCIATED TRACKS** | **GOOD WEATHER A** | **B** | **C** | **BAD WEATHER A** | **B** | **C** |
| TOTAL | 90 | 218 | 345 | 23 | 28 | 58 |
| RADAR ONLY | 26 | 60 | 93 | 3 | 6 | 10 |
| BEACON ONLY | 2 | 6 | 10 | 0 | 0 | 1 |
| DISCRETE | 0 | 0 | 0 | 0 | 0 | 0 |
| NON DISCRETE | 2 | 6 | 10 | 0 | 0 | 1 |
| MODE C | 2 | 3 | 5 | 1 | 1 | 1 |
| RADAR REINFORCED BEACON | 62 | 152 | 242 | 20 | 22 | 47 |
| DISCRETE | 14 | 14 | 22 | 18 | 18 | 30 |
| NON DISCRETE | 48 | 138 | 220 | 2 | 4 | 17 |
| MODE C | 24 | 68 | 112 | 15 | 15 | 25 |
| CROSS-LINKED | | 17 | | | 22 | |
| UNUSED TARGET REPORTS | 54 | 58 | 62 | 103 | 103 | 104 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 8 | 12 | 3 | 3 | 4 |

SYSTEM LOAD VALUES
FOR
CHICAGO OHARE
1988

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 133.99 | 262.12 | 390.25 | 75.47 | 82.55 | 113.06 |
| RADAR ONLY | 22.00 | 47.78 | 73.57 | 2.27 | 4.70 | 7.14 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 111.99 | 214.34 | 316.69 | 74.20 | 77.84 | 105.92 |
| DISCRETE | 51.72 | 51.72 | 62.49 | 68.96 | 68.96 | 81.20 |
| NON DISCRETE | 60.28 | 162.62 | 254.19 | 5.25 | 8.89 | 24.72 |
| MODE C | 69.99 | 123.12 | 176.24 | 68.96 | 68.96 | 80.92 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 188.03 | 318.19 | 449.35 | 176.27 | 185.61 | 216.45 |
| RADAR ONLY | 76.00 | 104.00 | 133.00 | 104.00 | 108.00 | 111.00 |
| BEACON ONLY | 9.00 | 17.00 | 25.00 | 4.00 | 6.00 | 8.00 |
| DISCRETE | 3.00 | 4.00 | 5.00 | 3.00 | 5.00 | 6.00 |
| NON DISCRETE | 6.00 | 13.00 | 20.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 6.00 | 10.00 | 14.00 | 3.00 | 5.00 | 6.00 |
| RADAR REINFORCED BEACON | 103.03 | 197.19 | 291.35 | 68.27 | 71.61 | 97.45 |
| DISCRETE | 47.58 | 47.58 | 57.49 | 63.44 | 63.44 | 74.70 |
| NON DISCRETE | 55.45 | 149.61 | 233.86 | 4.83 | 8.18 | 22.74 |
| MODE C | 64.39 | 113.27 | 162.14 | 63.44 | 63.44 | 74.45 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 41 | | | 53 | |
| RADAR ONLY | | 2 | | | 2 | |
| BEACON ONLY | | 3 | | | 4 | |
| DISCRETE | | 3 | | | 4 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 2 | |
| RADAR REINFORCED BEACON | | 36 | | | 47 | |
| DISCRETE | | 33 | | | 44 | |
| NON DISCRETE | | 3 | | | 3 | |
| MODE C | | 36 | | | 48 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 93 | 223 | 349 | 24 | 30 | 61 |
| RADAR ONLY | 24 | 54 | 84 | 3 | 6 | 9 |
| BEACON ONLY | 2 | 7 | 10 | 0 | 0 | 1 |
| DISCRETE | 0 | 0 | 0 | 0 | 0 | 0 |
| NON DISCRETE | 2 | 7 | 10 | 0 | 0 | 1 |
| MODE C | 2 | 4 | 6 | 1 | 1 | 1 |
| RADAR REINFORCED BEACON | 67 | 162 | 255 | 21 | 24 | 51 |
| DISCRETE | 15 | 15 | 24 | 19 | 19 | 31 |
| NON DISCRETE | 52 | 147 | 231 | 2 | 5 | 20 |
| MODE C | 28 | 77 | 126 | 15 | 15 | 26 |
| CROSS-LINKED | | 16 | | | 22 | |
| UNUSED TARGET REPORTS | 54 | 59 | 63 | 103 | 103 | 104 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 9 | 13 | 3 | 3 | 4 |

SYSTEM LOAD VALUES
FOR
CHICAGO OHARE
1990

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 137.87 | 266.82 | 395.77 | 76.87 | 84.74 | 115.66 |
| RADAR ONLY | 20.58 | 44.15 | 67.72 | 1.97 | 4.02 | 6.07 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 117.29 | 222.67 | 328.05 | 74.91 | 80.71 | 109.58 |
| DISCRETE | 53.91 | 53.91 | 66.09 | 71.88 | 71.88 | 83.74 |
| NON DISCRETE | 63.38 | 168.76 | 261.96 | 3.03 | 8.83 | 25.84 |
| MODE C | 76.14 | 134.37 | 192.60 | 71.88 | 71.88 | 85.29 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 190.91 | 323.86 | 455.80 | 176.91 | 187.26 | 219.82 |
| RADAR ONLY | 74.00 | 101.00 | 128.00 | 104.00 | 107.00 | 110.00 |
| BEACON ONLY | 9.00 | 18.00 | 26.00 | 4.00 | 6.00 | 9.00 |
| DISCRETE | 3.00 | 4.00 | 5.00 | 3.00 | 5.00 | 7.00 |
| NON DISCRETE | 6.00 | 14.00 | 21.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 6.00 | 11.00 | 15.00 | 4.00 | 5.00 | 7.00 |
| RADAR REINFORCED BEACON | 107.91 | 204.86 | 301.80 | 58.91 | 74.26 | 100.82 |
| DISCRETE | 49.60 | 49.60 | 60.80 | 66.13 | 66.13 | 77.04 |
| NON DISCRETE | 58.31 | 155.26 | 241.00 | 2.78 | 8.13 | 23.78 |
| MODE C | 70.05 | 123.62 | 177.19 | 66.13 | 66.13 | 78.46 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 41 | | | 54 | |
| RADAR ONLY | | 2 | | | 2 | |
| BEACON ONLY | | 3 | | | 4 | |
| DISCRETE | | 3 | | | 4 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 2 | | | 2 | |
| RADAR REINFORCED BEACON | | 36 | | | 48 | |
| DISCRETE | | 35 | | | 46 | |
| NON DISCRETE | | 1 | | | 2 | |
| MODE C | | 38 | | | 50 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 98 | 227 | 355 | 24 | 31 | 62 |
| RADAR ONLY | 23 | 51 | 79 | 3 | 5 | 8 |
| BEACON ONLY | 3 | 7 | 10 | 0 | 0 | 1 |
| DISCRETE | 0 | 0 | 0 | 0 | 0 | 0 |
| NON DISCRETE | 3 | 7 | 10 | 0 | 0 | 1 |
| MODE C | 1 | 3 | 6 | 1 | 1 | 1 |
| RADAR REINFORCED BEACON | 72 | 169 | 266 | 21 | 26 | 53 |
| DISCRETE | 15 | 15 | 26 | 20 | 20 | 31 |
| NON DISCRETE | 57 | 154 | 240 | 1 | 6 | 22 |
| MODE C | 32 | 96 | 139 | 16 | 16 | 28 |
| CROSS-LINKED | | 17 | | | 23 | |

| UNUSED TARGET REPORTS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| UNUSED TARGET REPORTS | 55 | 59 | 63 | 103 | 103 | 104 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 5 | 9 | 13 | 3 | 3 | 4 |

# APPENDIX I

IAC SYSTEM LOAD FACTORS FOR THE
LOS ANGELES TRACON SURVEILLANCE SITES

SYSTEM LOAD VALUES
FOR
LOS ANGELES LAX4
1977

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 155.62 | 271.26 | 386.91 | 60.45 | 76.19 | 106.87 |
| RADAR ONLY | 46.03 | 80.39 | 114.76 | 5.65 | 9.68 | 13.70 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 109.60 | 190.87 | 272.15 | 54.79 | 66.52 | 93.17 |
| DISCRETE | 32.44 | 34.10 | 46.83 | 43.26 | 51.24 | 71.49 |
| NON DISCRETE | 77.15 | 156.77 | 225.31 | 11.54 | 15.27 | 21.67 |
| MODE C | 43.35 | 74.99 | 106.62 | 43.26 | 43.26 | 62.93 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 208.83 | 325.60 | 443.37 | 160.41 | 178.19 | 209.71 |
| RADAR ONLY | 99.00 | 135.00 | 171.00 | 107.00 | 112.00 | 117.00 |
| BEACON ONLY | 9.00 | 15.00 | 22.00 | 3.00 | 5.00 | 7.00 |
| DISCRETE | 2.00 | 3.00 | 4.00 | 2.00 | 4.00 | 6.00 |
| NON DISCRETE | 7.00 | 12.00 | 18.00 | 1.00 | 1.00 | 1.00 |
| MODE C | 3.00 | 6.00 | 9.00 | 2.00 | 4.00 | 5.00 |
| RADAR REINFORCED BEACON | 100.83 | 175.60 | 250.37 | 50.41 | 61.19 | 65.71 |
| DISCRETE | 29.85 | 31.38 | 43.09 | 39.80 | 47.14 | 65.77 |
| NON DISCRETE | 70.98 | 144.23 | 207.29 | 10.61 | 14.05 | 19.94 |
| MODE C | 39.69 | 68.99 | 96.09 | 39.80 | 39.60 | 57.90 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 23 | | | 33 | |
| RADAR ONLY | | 2 | | | 3 | |
| BEACON ONLY | | 1 | | | 2 | |
| DISCRETE | | 1 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 20 | | | 28 | |
| DISCRETE | | 15 | | | 22 | |
| NON DISCRETE | | 4 | | | 6 | |
| MODE C | | 18 | | | 24 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 132 | 247 | 344 | 28 | 43 | 74 |
| RADAR ONLY | 48 | 86 | 124 | 5 | 9 | 14 |
| BEACON ONLY | 3 | 6 | 10 | 0 | 1 | 2 |
| DISCRETE | 0 | 0 | 1 | 0 | 0 | 1 |
| NON DISCRETE | 3 | 4 | 6 | 0 | 1 | 1 |
| MODE C | 1 | 2 | 3 | 1 | 1 | 2 |
| RADAR REINFORCED BEACON | 81 | 155 | 230 | 23 | 33 | 58 |
| DISCRETE | 14 | 15 | 27 | 18 | 25 | [illegible] |
| NON DISCRETE | 67 | 140 | 203 | 5 | 8 | [illegible] |
| MODE C | 22 | 51 | 80 | 16 | 16 | 34 |
| CROSS-LINKED | | 23 | | | 27 | |

| | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| UNUSED TARGET REPORTS | 54 | 58 | 61 | 102 | 103 | 104 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 8 | 11 | 2 | 3 | 4 |

SYSTEM LOAD VALUES
FOR
LOS ANGELES LAX4
1980

| BASE | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 170.70 | 291.14 | 411.37 | 67.20 | 82.55 | 114.64 |
| RADAR ONLY | 46.10 | 78.70 | 111.30 | 5.19 | 8.62 | 12.04 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 124.61 | 212.34 | 300.07 | 62.01 | 73.94 | 102.61 |
| DISCRETE | 38.75 | 38.75 | 51.78 | 51.67 | 57.35 | 79.40 |
| NON DISCRETE | 85.85 | 173.59 | 248.29 | 10.33 | 16.58 | 23.21 |
| MODE C | 56.57 | 96.08 | 135.58 | 51.67 | 51.67 | 72.37 |

| ADJUSTED | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 223.64 | 346.35 | 469.06 | 168.05 | 185.02 | 218.40 |
| RADAR ONLY | 99.00 | 134.00 | 169.00 | 107.00 | 111.00 | 116.00 |
| BEACON ONLY | 10.00 | 17.00 | 24.00 | 4.00 | 6.00 | 8.00 |
| DISCRETE | 2.00 | 3.00 | 4.00 | 3.00 | 5.00 | 6.00 |
| NON DISCRETE | 8.00 | 14.00 | 20.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 5.00 | 8.00 | 11.00 | 3.00 | 4.00 | 5.00 |
| RADAR REINFORCED BEACON | 114.64 | 195.35 | 276.06 | 57.05 | 68.02 | 94.40 |
| DISCRETE | 35.65 | 35.65 | 47.64 | 47.54 | 52.77 | 73.05 |
| NON DISCRETE | 79.59 | 159.70 | 228.42 | 9.51 | 15.26 | 21.35 |
| MODE C | 52.05 | 88.39 | 124.73 | 47.54 | 47.54 | 66.58 |

| ASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | | 28 | | | 36 | |
| RADAR ONLY | | 2 | | | 3 | |
| BEACON ONLY | | 2 | | | 2 | |
| DISCRETE | | 2 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 24 | | | 31 | |
| DISCRETE | | 20 | | | 26 | |
| NON DISCRETE | | 4 | | | 5 | |
| MODE C | | 21 | | | 28 | |

| UNASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 143 | 264 | 283 | 32 | 47 | 78 |
| RADAR ONLY | 49 | 85 | 121 | 5 | 9 | 13 |
| BEACON ONLY | 3 | 7 | 10 | 0 | 1 | 2 |
| DISCRETE | 0 | 0 | 0 | 0 | 0 | 1 |
| NON DISCRETE | 3 | 7 | 10 | 0 | 1 | 1 |
| MODE C | 1 | 3 | 4 | 1 | 1 | 2 |
| RADAR REINFORCED BEACON | 91 | 172 | 252 | 27 | 37 | 63 |
| DISCRETE | 16 | 16 | 28 | 22 | 27 | 47 |
| NON DISCRETE | 75 | 156 | 224 | 5 | 10 | 16 |
| MODE C | 31 | 67 | 104 | 20 | 26 | 39 |
| CROSS-LINKED | | 22 | | | 29 | |
| UNUSED TARGET REPORTS | 55 | 59 | 62 | 102 | 103 | 104 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 5 | 9 | 12 | 2 | 3 | 4 |

SYSTEM LOAD VALUES
FOR
LOS ANGELES LAX4
1982

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 177.02 | 298.70 | 420.39 | 71.34 | 85.68 | 118.73 |
| RADAR ONLY | 43.24 | 73.06 | 102.69 | 4.91 | 8.05 | 11.19 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 133.79 | 225.64 | 317.49 | 66.44 | 77.83 | 107.54 |
| DISCRETE | 42.64 | 42.64 | 56.24 | 56.85 | 60.27 | 83.11 |
| NON DISCRETE | 91.15 | 183.00 | 261.26 | 9.59 | 17.56 | 24.43 |
| MODE C | 64.97 | 109.22 | 153.59 | 56.85 | 56.85 | 77.80 |
| **ADJUSTED** | | | | | | |
| TOTAL | 231.08 | 354.59 | 478.09 | 172.12 | 188.60 | 222.94 |
| RADAR ONLY | 97.00 | 129.00 | 161.00 | 107.00 | 111.00 | 115.00 |
| BEACON ONLY | 11.00 | 18.00 | 25.00 | 4.00 | 6.00 | 9.00 |
| DISCRETE | 2.00 | 3.00 | 5.00 | 3.00 | 5.00 | 7.00 |
| NON DISCRETE | 9.00 | 15.00 | 20.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 5.00 | 9.00 | 12.00 | 3.00 | 5.00 | 6.00 |
| RADAR REINFORCED BEACON | 123.08 | 207.59 | 292.09 | 61.12 | 71.60 | 98.94 |
| DISCRETE | 39.23 | 39.23 | 51.74 | 52.30 | 55.45 | 76.46 |
| NON DISCRETE | 83.86 | 168.36 | 240.35 | 8.32 | 16.15 | 22.48 |
| MODE C | 59.77 | 100.54 | 141.30 | 52.30 | 52.30 | 71.58 |
| **ASSOCIATED TRACKS** | | | | | | |
| TOTAL | | 30 | | | 39 | |
| RADAR ONLY | | 2 | | | 3 | |
| BEACON ONLY | | 2 | | | 2 | |
| DISCRETE | | 2 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 26 | | | 34 | |
| DISCRETE | | 22 | | | 29 | |
| NON DISCRETE | | 4 | | | 5 | |
| MODE C | | 23 | | | 31 | |
| **UNASSOCIATED TRACKS** | | | | | | |
| TOTAL | 148 | 268 | 390 | 32 | 46 | 78 |
| RADAR ONLY | 47 | 80 | 114 | 5 | 8 | 12 |
| BEACON ONLY | 4 | 7 | 10 | 0 | 1 | 2 |
| DISCRETE | 0 | 0 | 0 | 0 | 0 | 1 |
| NON DISCRETE | 4 | 7 | 10 | 0 | 1 | 1 |
| MODE C | 2 | 3 | 5 | 1 | 1 | 2 |
| RADAR REINFORCED BEACON | 97 | 181 | 266 | 27 | 37 | 64 |
| DISCRETE | 17 | 17 | 30 | 23 | 26 | 47 |
| NON DISCRETE | 80 | 164 | 236 | 4 | 11 | 17 |
| MODE C | 37 | 73 | 118 | 21 | 21 | 41 |
| CROSS-LINKED | | 24 | | | 32 | |
| **UNUSED TARGET REPORTS** | 55 | 59 | 63 | 103 | 103 | 104 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 5 | 9 | 13 | 3 | 3 | 4 |

SYSTEM LOAD VALUES
FOR
LOS ANGELES LAX4
1984

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 183.72 | 306.25 | 428.78 | 74.23 | 89.46 | 123.01 |
| RADAR ONLY | 41.64 | 69.53 | 97.42 | 4.57 | 7.41 | 10.24 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 142.09 | 236.72 | 331.36 | 69.65 | 82.05 | 112.77 |
| DISCRETE | 45.84 | 45.84 | 61.16 | 61.12 | 61.12 | 87.13 |
| NON DISCRETE | 96.23 | 190.87 | 270.20 | 8.53 | 20.93 | 25.63 |
| MODE C | 72.55 | 120.59 | 168.63 | 61.12 | 61.12 | 93.06 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 237.71 | 362.78 | 486.85 | 174.08 | 192.49 | 226.75 |
| RADAR ONLY | 96.00 | 126.00 | 157.00 | 106.00 | 110.00 | 114.00 |
| BEACON ONLY | 11.00 | 19.00 | 27.00 | 4.00 | 7.00 | 9.00 |
| DISCRETE | 2.00 | 4.00 | 5.00 | 3.00 | 5.00 | 7.00 |
| NON DISCRETE | 9.00 | 15.00 | 22.00 | 1.00 | 2.00 | 2.00 |
| MODE C | 6.00 | 10.00 | 13.00 | 3.00 | 5.00 | 7.00 |
| RADAR REINFORCED BEACON | 130.71 | 217.78 | 304.85 | 64.08 | 75.49 | 103.75 |
| DISCRETE | 42.18 | 42.18 | 56.27 | 56.23 | 56.23 | 80.16 |
| NON DISCRETE | 88.54 | 175.60 | 248.58 | 7.85 | 19.26 | 23.58 |
| MODE C | 66.75 | 110.94 | 155.14 | 56.23 | 56.23 | 76.41 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 30 | | | 40 | |
| RADAR ONLY | | 2 | | | 2 | |
| BEACON ONLY | | 2 | | | 3 | |
| DISCRETE | | 2 | | | 3 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 26 | | | 35 | |
| DISCRETE | | 23 | | | 31 | |
| NON DISCRETE | | 3 | | | 4 | |
| MODE C | | 25 | | | 34 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 154 | 277 | 399 | 34 | 50 | 83 |
| RADAR ONLY | 45 | 77 | 109 | 5 | 9 | 13 |
| BEACON ONLY | 4 | 8 | 11 | 0 | 1 | 1 |
| DISCRETE | 0 | 0 | 0 | 0 | 0 | 0 |
| NON DISCRETE | 4 | 8 | 11 | 0 | 1 | 1 |
| MODE C | 2 | 4 | 6 | 1 | 1 | 2 |
| RADAR REINFORCED BEACON | 105 | 192 | 279 | 29 | 40 | 69 |
| DISCRETE | 19 | 19 | 33 | 25 | 25 | 49 |
| NON DISCRETE | 86 | 173 | 246 | 4 | 15 | 20 |
| MODE C | 42 | 86 | 130 | 22 | 22 | 42 |
| CROSS-LINKED | | 25 | | | 33 | |
| UNUSED TARGET REPORTS | 56 | 59 | 63 | 103 | 103 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 6 | 9 | 13 | 3 | 3 | 5 |

SYSTEM LOAD VALUES
FOR
LOS ANGELES LAX4
1986

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 189.47 | 312.53 | 435.59 | 77.41 | 92.12 | 126.10 |
| RADAR ONLY | 39.71 | 65.59 | 91.48 | 4.15 | 6.65 | 9.14 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 149.76 | 246.94 | 344.11 | 73.26 | 85.47 | 116.96 |
| DISCRETE | 49.40 | 49.40 | 65.57 | 65.86 | 65.86 | 90.33 |
| NON DISCRETE | 100.37 | 197.54 | 278.54 | 7.40 | 19.61 | 26.63 |
| MODE C | 81.47 | 134.12 | 186.76 | 65.86 | 65.86 | 88.22 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 243.79 | 370.18 | 496.56 | 177.40 | 195.64 | 229.60 |
| RADAR ONLY | 94.00 | 122.00 | 152.00 | 106.00 | 110.00 | 113.00 |
| BEACON ONLY | 12.00 | 20.00 | 28.00 | 4.00 | 7.00 | 9.00 |
| DISCRETE | 2.00 | 4.00 | 5.00 | 3.00 | 5.00 | 7.00 |
| NON DISCRETE | 10.00 | 16.00 | 23.00 | 1.00 | 2.00 | 2.00 |
| MODE C | 7.00 | 11.00 | 15.00 | 3.00 | 5.00 | 7.00 |
| RADAR REINFORCED BEACON | 137.78 | 227.18 | 316.58 | 67.40 | 78.64 | 107.60 |
| DISCRETE | 45.44 | 45.44 | 60.33 | 60.59 | 60.59 | 63.10 |
| NON DISCRETE | 92.34 | 181.74 | 256.26 | 6.81 | 18.04 | 24.50 |
| MODE C | 74.95 | 123.39 | 171.82 | 60.59 | 60.59 | 81.16 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 31 | | | 42 | |
| RADAR ONLY | | 1 | | | 2 | |
| BEACON ONLY | | 2 | | | 3 | |
| DISCRETE | | 2 | | | 3 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 29 | | | 37 | |
| DISCRETE | | 25 | | | 33 | |
| NON DISCRETE | | 3 | | | 4 | |
| MODE C | | 27 | | | 36 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 158 | 281 | 404 | 36 | 51 | 84 |
| RADAR ONLY | 45 | 74 | 104 | 5 | 6 | 12 |
| BEACON ONLY | 4 | 8 | 12 | 0 | 1 | 2 |
| DISCRETE | 0 | 0 | 1 | 0 | 0 | 1 |
| NON DISCRETE | 4 | 8 | 11 | 0 | 1 | 1 |
| MODE C | 2 | 4 | 6 | 2 | 2 | 3 |
| RADAR REINFORCED BEACON | 109 | 199 | 288 | 31 | 42 | 70 |
| DISCRETE | 20 | 20 | 35 | 29 | 28 | 50 |
| NON DISCRETE | 89 | 179 | 253 | 2 | 14 | 20 |
| MODE C | 48 | 96 | 145 | 25 | 21 | 45 |
| CROSS-LINKED | | 25 | | | 34 | |
| UNUSED TARGET REPORTS | 56 | 60 | 64 | 103 | 102 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 6 | 10 | 14 | 3 | 2 | 5 |

SYSTEM LOAD VALUES
FOR
LOS ANGELES LAX4
1988

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 194.47 | 318.09 | 441.70 | 81.34 | 94.56 | 129.11 |
| RADAR ONLY | 35.82 | 58.62 | 81.41 | 3.66 | 5.81 | 7.95 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 158.64 | 259.47 | 360.29 | 77.68 | 86.75 | 121.16 |
| DISCRETE | 54.14 | 54.14 | 70.61 | 72.19 | 72.19 | 93.33 |
| NON DISCRETE | 104.50 | 205.33 | 289.68 | 5.49 | 16.57 | 27.83 |
| MODE C | 90.25 | 147.56 | 204.86 | 72.19 | 72.19 | 93.34 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 249.95 | 376.71 | 503.47 | 182.46 | 197.65 | 233.47 |
| RADAR ONLY | 91.00 | 117.00 | 143.00 | 106.00 | 109.00 | 112.00 |
| BEACON ONLY | 13.00 | 21.00 | 29.00 | 5.00 | 7.00 | 10.00 |
| DISCRETE | 3.00 | 4.00 | 6.00 | 3.00 | 5.00 | 7.00 |
| NON DISCRETE | 10.00 | 17.00 | 23.00 | 2.00 | 2.00 | 3.00 |
| MODE C | 7.00 | 12.00 | 16.00 | 3.00 | 5.00 | 7.00 |
| RADAR REINFORCED BEACON | 145.95 | 238.71 | 331.47 | 71.46 | 81.65 | 111.47 |
| DISCRETE | 49.81 | 49.81 | 64.96 | 66.41 | 66.41 | 85.67 |
| NON DISCRETE | 96.14 | 188.90 | 266.50 | 5.05 | 15.24 | 25.60 |
| MODE C | 83.03 | 135.75 | 188.47 | 66.41 | 66.41 | 85.67 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 33 | | | 45 | |
| RADAR ONLY | | 2 | | | 2 | |
| BEACON ONLY | | 2 | | | 3 | |
| DISCRETE | | 2 | | | 3 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 2 | |
| RADAR REINFORCED BEACON | | 29 | | | 40 | |
| DISCRETE | | 27 | | | 37 | |
| NON DISCRETE | | 2 | | | 3 | |
| MODE C | | 30 | | | 40 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 161 | 285 | 410 | 36 | 49 | 85 |
| RADAR ONLY | 40 | 67 | 94 | 5 | 7 | 11 |
| BEACON ONLY | 4 | 9 | 13 | 0 | 1 | 2 |
| DISCRETE | 0 | 0 | 1 | 0 | 0 | 1 |
| NON DISCRETE | 4 | 9 | 12 | 0 | 1 | 1 |
| MODE C | 3 | 5 | 7 | 1 | 1 | 2 |
| RADAR REINFORCED BEACON | 117 | 210 | 303 | 31 | 41 | 72 |
| DISCRETE | 23 | 23 | 38 | 29 | 29 | 49 |
| NON DISCRETE | 94 | 187 | 265 | 2 | 12 | 23 |
| MODE C | 53 | 106 | 159 | 26 | 26 | 46 |
| CROSS-LINKED | | 27 | | | 36 | |
| UNUSED TARGET REPORTS | 55 | 60 | 64 | 103 | 104 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 5 | 10 | 14 | 3 | 4 | 5 |

SYSTEM LOAD VALUES
FOR
LOS ANGELES LAX4
1990

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 200.09 | 324.43 | 448.76 | 85.18 | 98.16 | 133.75 |
| RADAR ONLY | 33.33 | 54.00 | 74.67 | 3.14 | 4.93 | 6.71 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 166.76 | 270.43 | 374.10 | 82.04 | 93.25 | 127.04 |
| DISCRETE | 59.04 | 59.04 | 76.85 | 78.72 | 78.72 | 97.98 |
| NON DISCRETE | 107.72 | 211.39 | 297.25 | 3.31 | 14.53 | 29.06 |
| MODE C | 100.10 | 162.43 | 224.75 | 78.72 | 78.72 | 100.19 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 255.42 | 393.79 | 511.17 | 185.48 | 200.79 | 238.88 |
| RADAR ONLY | 89.00 | 113.00 | 137.00 | 105.00 | 108.00 | 112.00 |
| BEACON ONLY | 13.00 | 22.00 | 30.00 | 5.00 | 7.00 | 10.00 |
| DISCRETE | 3.00 | 5.00 | 6.00 | 4.00 | 6.00 | 8.00 |
| NON DISCRETE | 10.00 | 17.00 | 24.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 8.00 | 13.00 | 18.00 | 4.00 | 6.00 | 8.00 |
| RADAR REINFORCED BEACON | 153.42 | 248.79 | 344.17 | 75.48 | 85.79 | 116.88 |
| DISCRETE | 54.32 | 54.32 | 70.70 | 72.43 | 72.43 | 90.14 |
| NON DISCRETE | 99.10 | 194.47 | 273.47 | 3.05 | 13.37 | 26.73 |
| MODE C | 92.09 | 149.43 | 206.78 | 72.43 | 72.43 | 92.17 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 35 | | | 47 | |
| RADAR ONLY | | 2 | | | 2 | |
| BEACON ONLY | | 2 | | | 2 | |
| DISCRETE | | 2 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 2 | |
| RADAR REINFORCED BEACON | | 31 | | | 42 | |
| DISCRETE | | 30 | | | 40 | |
| NON DISCRETE | | 1 | | | 2 | |
| MODE C | | 32 | | | 43 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 164 | 288 | 414 | 27 | 51 | 87 |
| RADAR ONLY | 38 | 63 | 68 | 4 | 7 | 10 |
| BEACON ONLY | 4 | 9 | 13 | 0 | 1 | 2 |
| DISCRETE | 0 | 0 | 1 | 0 | [illegible] | 1 |
| NON DISCRETE | 4 | 8 | 12 | 0 | 1 | 1 |
| MODE C | 3 | 5 | 9 | 1 | 1 | 2 |
| RADAR REINFORCED BEACON | 122 | 217 | 313 | 33 | 43 | 75 |
| DISCRETE | 24 | 24 | 41 | 32 | 32 | 50 |
| NON DISCRETE | 98 | 193 | 272 | 1 | 11 | 25 |
| MODE C | 60 | 117 | 175 | 29 | 29 | 49 |
| CROSS-LINKED | | 29 | | | 39 | |
| UNUSED TARGET REPORTS | 57 | 61 | 65 | 103 | 104 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 7 | 11 | 15 | 3 | 4 | 5 |

SYSTEM LOAD VALUES
FOR
LOS ANGELES LAX7
1977

| BASE | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 156.40 | 271.46 | 386.52 | 60.41 | 75.89 | 106.39 |
| RADAR ONLY | 46.29 | 80.45 | 114.62 | 5.62 | 9.60 | 13.59 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 110.11 | 191.01 | 271.90 | 54.79 | 66.29 | 92.80 |
| DISCRETE | 32.44 | 34.07 | 46.77 | 43.26 | 51.12 | 71.29 |
| NON DISCRETE | 77.67 | 156.93 | 225.13 | 11.54 | 15.17 | 21.51 |
| MODE C | 43.50 | 75.04 | 106.57 | 43.26 | 43.26 | 62.81 |

| ADJUSTED | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 209.31 | 325.73 | 443.15 | 160.41 | 177.99 | 209.37 |
| RADAR ONLY | 99.00 | 135.00 | 171.00 | 107.00 | 112.00 | 117.00 |
| BEACON ONLY | 9.00 | 15.00 | 22.00 | 3.00 | 5.00 | 7.00 |
| DISCRETE | 2.00 | 3.00 | 4.00 | 2.00 | 4.00 | 6.00 |
| NON DISCRETE | 7.00 | 12.00 | 18.00 | 1.00 | 1.00 | 1.00 |
| MODE C | 3.00 | 6.00 | 9.00 | 2.00 | 4.00 | 5.00 |
| RADAR REINFORCED BEACON | 101.31 | 175.73 | 250.15 | 50.41 | 60.99 | 85.37 |
| DISCRETE | 29.85 | 31.35 | 43.03 | 39.80 | 47.03 | 65.59 |
| NON DISCRETE | 71.46 | 144.38 | 207.12 | 10.61 | 13.95 | 19.79 |
| MODE C | 40.02 | 69.03 | 98.05 | 39.80 | 39.80 | 57.78 |

| ASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | | 20 | | | 27 | |
| RADAR ONLY | | 2 | | | 2 | |
| BEACON ONLY | | 1 | | | 2 | |
| DISCRETE | | 1 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 17 | | | 23 | |
| DISCRETE | | 13 | | | 18 | |
| NON DISCRETE | | 4 | | | 5 | |
| MODE C | | 15 | | | 19 | |

| UNASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 136 | 250 | 366 | 34 | 49 | 80 |
| RADAR ONLY | 49 | 86 | 123 | 6 | 10 | 15 |
| BEACON ONLY | 3 | 5 | 10 | 0 | 1 | 2 |
| DISCRETE | 0 | 0 | 1 | 0 | 0 | 1 |
| NON DISCRETE | 3 | 5 | 9 | 0 | 1 | 1 |
| MODE C | 1 | 2 | 3 | 1 | 1 | 2 |
| RADAR REINFORCED BEACON | 84 | 158 | 233 | 28 | 38 | 63 |
| DISCRETE | 17 | 18 | 30 | 22 | 29 | 48 |
| NON DISCRETE | 67 | 140 | 203 | 6 | 9 | 15 |
| MODE C | 25 | 54 | 62 | 21 | 21 | 39 |
| CROSS-LINKED | | 23 | | | 33 | |
| UNUSED TARGET REPORTS | 54 | 58 | 61 | 102 | 103 | 104 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 8 | 11 | 2 | 3 | 4 |

SYSTEM LOAD VALUES
FOR
LOS ANGELES LAX7
1980

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 171.18 | 290.51 | 409.83 | 67.16 | 82.20 | 114.09 |
| RADAR ONLY | 46.24 | 78.53 | 110.81 | 5.16 | 6.55 | 11.93 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 124.94 | 211.98 | 295.02 | 52.01 | 73.65 | 102.16 |
| DISCRETE | 38.75 | 38.75 | 51.68 | 51.57 | 57.19 | 79.14 |
| NON DISCRETE | 86.18 | 173.23 | 247.34 | 10.33 | 16.46 | 23.02 |
| MODE C | 56.69 | 95.97 | 135.25 | 51.57 | 51.67 | 72.18 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 223.94 | 346.02 | 467.10 | 168.05 | 184.76 | 217.99 |
| RADAR ONLY | 99.00 | 134.00 | 168.00 | 107.00 | 111.00 | 116.00 |
| BEACON ONLY | 10.00 | 17.00 | 24.00 | 4.00 | 6.00 | 8.00 |
| DISCRETE | 2.00 | 3.00 | 4.00 | 3.00 | 5.00 | 6.00 |
| NON DISCRETE | 8.00 | 14.00 | 20.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 5.00 | 8.00 | 11.00 | 3.00 | 4.00 | 6.00 |
| RADAR REINFORCED BEACON | 114.94 | 195.02 | 275.10 | 57.05 | 67.76 | 93.99 |
| DISCRETE | 35.65 | 35.65 | 47.55 | 47.54 | 52.62 | 72.81 |
| NON DISCRETE | 79.29 | 159.37 | 227.55 | 9.51 | 15.15 | 21.18 |
| MODE C | 52.16 | 88.29 | 124.43 | 47.54 | 47.54 | 56.41 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 22 | | | 29 | |
| RADAR ONLY | | 2 | | | 2 | |
| BEACON ONLY | | 1 | | | 2 | |
| DISCRETE | | 1 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 19 | | | 25 | |
| DISCRETE | | 16 | | | 21 | |
| NON DISCRETE | | 3 | | | 4 | |
| MODE C | | 17 | | | 23 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 149 | 269 | 389 | 39 | 53 | 85 |
| RADAR ONLY | 49 | 85 | 121 | 6 | 9 | 14 |
| BEACON ONLY | 4 | 8 | 11 | 0 | 1 | 2 |
| DISCRETE | 1 | 1 | 1 | 0 | 0 | 1 |
| NON DISCRETE | 3 | 7 | 10 | 0 | 1 | 1 |
| MODE C | 1 | 3 | 4 | 1 | 1 | 2 |
| RADAR REINFORCED BEACON | 96 | 176 | 257 | 33 | 43 | 69 |
| DISCRETE | 20 | 20 | 32 | 27 | 32 | 52 |
| NON DISCRETE | 76 | 156 | 225 | 6 | 11 | 17 |
| MODE C | 35 | 71 | 127 | 25 | 25 | 43 |
| CROSS-LINKED | | 28 | | | 36 | |
| UNUSED TARGET REPORTS | 55 | 58 | 67 | 102 | 103 | 104 |
| RADAR | 50 | 50 | 55 | 100 | 100 | 100 |
| BEACON | 5 | 8 | 12 | 2 | 3 | 4 |

SYSTEM LOAD VALUES
FOR
LOS ANGELES LAX7
1982

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 177.38 | 297.95 | 418.51 | 71.31 | 85.56 | 118.15 |
| RADAR ONLY | 43.34 | 72.84 | 102.35 | 4.87 | 7.98 | 11.09 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 134.05 | 225.10 | 316.16 | 66.44 | 77.52 | 107.06 |
| DISCRETE | 42.64 | 42.64 | 56.11 | 56.85 | 56.85 | 82.82 |
| NON DISCRETE | 91.41 | 182.47 | 260.05 | 9.59 | 20.67 | 24.24 |
| MODE C | 65.07 | 109.09 | 153.11 | 56.85 | 56.85 | 77.58 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 231.32 | 354.10 | 476.87 | 172.12 | 188.32 | 222.50 |
| RADAR ONLY | 97.00 | 129.00 | 161.00 | 107.00 | 111.00 | 115.00 |
| BEACON ONLY | 11.00 | 18.00 | 25.00 | 4.00 | 6.00 | 9.00 |
| DISCRETE | 2.00 | 3.00 | 4.00 | 3.00 | 5.00 | 7.00 |
| NON DISCRETE | 9.00 | 15.00 | 21.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 5.00 | 9.00 | 12.00 | 3.00 | 5.00 | 6.00 |
| RADAR REINFORCED BEACON | 123.32 | 207.10 | 290.87 | 61.12 | 71.32 | 98.50 |
| DISCRETE | 39.23 | 39.23 | 51.62 | 52.30 | 52.30 | 76.19 |
| NON DISCRETE | 84.10 | 167.87 | 239.24 | 8.32 | 19.02 | 22.30 |
| MODE C | 59.87 | 100.36 | 140.86 | 52.30 | 52.30 | 71.37 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 24 | | | 32 | |
| RADAR ONLY | | 2 | | | 2 | |
| BEACON ONLY | | 1 | | | 2 | |
| DISCRETE | | 1 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 21 | | | 28 | |
| DISCRETE | | 18 | | | 24 | |
| NON DISCRETE | | 3 | | | 4 | |
| MODE C | | 19 | | | 26 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 154 | 274 | 394 | 39 | 53 | 85 |
| RADAR ONLY | 47 | 80 | 113 | 6 | 9 | 13 |
| BEACON ONLY | 5 | 8 | 11 | 0 | 1 | 2 |
| DISCRETE | 1 | 1 | 1 | 0 | 0 | 1 |
| NON DISCRETE | 4 | 7 | 10 | 0 | 1 | 1 |
| MODE C | 2 | 3 | 5 | 1 | 1 | 2 |
| RADAR REINFORCED BEACON | 102 | 186 | 270 | 33 | 43 | 70 |
| DISCRETE | 21 | 21 | 34 | 28 | 28 | 52 |
| NON DISCRETE | 81 | 165 | 236 | 5 | 15 | 18 |
| MODE C | 41 | 81 | 122 | 26 | 26 | 45 |
| CROSS-LINKED | | 30 | | | 39 | |

| | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| UNUSED TARGET REPORTS | 55 | 59 | 63 | 103 | 103 | 104 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 5 | 9 | 13 | 3 | 3 | 4 |

SYSTEM LOAD VALUES
FOR
LOS ANGELES LAX7
1984

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 183.98 | 305.31 | 426.64 | 74.19 | 89.06 | 122.40 |
| RADAR ONLY | 41.71 | 69.28 | 96.85 | 4.54 | 7.34 | 10.15 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 142.27 | 236.03 | 329.79 | 69.65 | 81.72 | 112.25 |
| DISCRETE | 45.84 | 45.84 | 61.00 | 61.12 | 61.12 | 86.82 |
| NON DISCRETE | 96.43 | 190.19 | 268.79 | 8.53 | 20.59 | 25.43 |
| MODE C | 72.63 | 120.32 | 168.01 | 61.12 | 61.12 | 82.80 |
| **ADJUSTED** | **GOOD WEATHER A** | **B** | **C** | **BAD WEATHER A** | **B** | **C** |
| TOTAL | 237.89 | 362.15 | 485.41 | 174.08 | 192.18 | 226.27 |
| RADAR ONLY | 96.00 | 126.00 | 156.00 | 106.00 | 110.00 | 114.00 |
| BEACON ONLY | 11.00 | 19.00 | 26.00 | 4.00 | 7.00 | 9.00 |
| DISCRETE | 2.00 | 4.00 | 5.00 | 3.00 | 5.00 | 7.00 |
| NON DISCRETE | 9.00 | 15.00 | 21.00 | 1.00 | 2.00 | 2.00 |
| MODE C | 6.00 | 10.00 | 13.00 | 3.00 | 5.00 | 7.00 |
| RADAR REINFORCED BEACON | 130.89 | 217.15 | 303.41 | 64.08 | 75.18 | 103.27 |
| DISCRETE | 42.18 | 42.18 | 56.12 | 56.23 | 56.23 | 79.87 |
| NON DISCRETE | 88.72 | 174.97 | 247.28 | 7.85 | 18.94 | 23.40 |
| MODE C | 66.82 | 110.70 | 154.57 | 56.23 | 56.23 | 76.17 |
| **ASSOCIATED TRACKS** | **GOOD WEATHER A** | **B** | **C** | **BAD WEATHER A** | **B** | **C** |
| TOTAL | | 25 | | | 33 | |
| RADAR ONLY | | 1 | | | 2 | |
| BEACON ONLY | | 2 | | | 2 | |
| DISCRETE | | 2 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 22 | | | 29 | |
| DISCRETE | | 19 | | | 25 | |
| NON DISCRETE | | 3 | | | 4 | |
| MODE C | | 21 | | | 28 | |
| **UNASSOCIATED TRACKS** | **GOOD WEATHER A** | **B** | **C** | **BAD WEATHER A** | **B** | **C** |
| TOTAL | 159 | 281 | 401 | 40 | 56 | 89 |
| RADAR ONLY | 46 | 78 | 109 | 5 | 9 | 13 |
| BEACON ONLY | 4 | 8 | 11 | 0 | 1 | 2 |
| DISCRETE | 0 | 0 | 0 | 0 | 0 | 1 |
| NON DISCRETE | 4 | 8 | 11 | 0 | 1 | 1 |
| MODE C | 2 | 4 | 6 | 1 | 1 | 2 |
| RADAR REINFORCED BEACON | 109 | 195 | 281 | 35 | 46 | 74 |
| DISCRETE | 23 | 23 | 37 | 31 | 31 | 55 |
| NON DISCRETE | 66 | 172 | 244 | 4 | 15 | 19 |
| MODE C | 45 | 99 | 134 | 29 | 28 | 48 |
| CROSS-LINKED | | 30 | | | 40 | |
| UNUSED TARGET REPORTS | 56 | 59 | 63 | 103 | 103 | 104 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 6 | 9 | 13 | 3 | 3 | 4 |

SYSTEM LOAD VALUES
FOR
LOS ANGELES LAX7
1986

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 189.66 | 311.46 | 433.26 | 77.38 | 91.70 | 125.47 |
| RADAR ONLY | 39.75 | 65.33 | 90.90 | 4.12 | 6.59 | 9.06 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 149.91 | 246.13 | 342.36 | 73.26 | 85.11 | 116.40 |
| DISCRETE | 49.40 | 49.40 | 65.39 | 65.86 | 65.86 | 89.99 |
| NON DISCRETE | 100.51 | 196.74 | 276.96 | 7.40 | 19.25 | 26.41 |
| MODE C | 81.53 | 133.76 | 186.00 | 65.86 | 65.66 | 87.92 |
| **ADJUSTED** | **GOOD WEATHER A** | **B** | **C** | **BAD WEATHER A** | **B** | **C** |
| TOTAL | 243.92 | 369.44 | 492.97 | 177.40 | 195.30 | 229.09 |
| RADAR ONLY | 94.00 | 123.00 | 151.00 | 106.00 | 110.00 | 113.00 |
| BEACON ONLY | 12.00 | 20.00 | 27.00 | 4.00 | 7.00 | 9.00 |
| DISCRETE | 2.00 | 4.00 | 5.00 | 3.00 | 5.00 | 7.00 |
| NON DISCRETE | 10.00 | 16.00 | 22.00 | 1.00 | 2.00 | 2.00 |
| MODE C | 7.00 | 11.00 | 15.00 | 3.00 | 5.00 | 7.00 |
| RADAR REINFORCED BEACON | 137.92 | 226.44 | 314.97 | 67.40 | 78.30 | 107.09 |
| DISCRETE | 45.44 | 45.44 | 60.16 | 60.59 | 60.59 | 82.79 |
| NON DISCRETE | 92.47 | 181.00 | 254.81 | 6.81 | 17.71 | 24.30 |
| MODE C | 75.01 | 123.06 | 171.12 | 60.59 | 60.59 | 80.89 |
| **ASSOCIATED TRACKS** | **GOOD WEATHER A** | **B** | **C** | **BAD WEATHER A** | **B** | **C** |
| TOTAL | | 25 | | | 34 | |
| RADAR ONLY | | 1 | | | 2 | |
| BEACON ONLY | | 2 | | | 2 | |
| DISCRETE | | 2 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 22 | | | 30 | |
| DISCRETE | | 20 | | | 27 | |
| NON DISCRETE | | 2 | | | 3 | |
| MODE C | | 22 | | | 30 | |
| **UNASSOCIATED TRACKS** | **GOOD WEATHER A** | **B** | **C** | **BAD WEATHER A** | **B** | **C** |
| TOTAL | 164 | 286 | 409 | 44 | 59 | 92 |
| RADAR ONLY | 45 | 74 | 104 | 5 | 8 | 12 |
| BEACON ONLY | 4 | 8 | 12 | 1 | 2 | 3 |
| DISCRETE | 0 | 0 | 1 | 1 | 1 | 2 |
| NON DISCRETE | 4 | 8 | 11 | 0 | 1 | 1 |
| MODE C | 2 | 4 | 6 | 2 | 2 | 3 |
| RADAR REINFORCED BEACON | 115 | 204 | 293 | 38 | 49 | 77 |
| DISCRETE | 25 | 25 | 40 | 34 | 34 | 56 |
| NON DISCRETE | 90 | 179 | 253 | 4 | 15 | 21 |
| MODE C | 53 | 101 | 149 | 31 | 31 | 5[illegible] |
| CROSS-LINKED | | 31 | | | 42 | |
| UNUSED TARGET REPORTS | 56 | 60 | 64 | 103 | 103 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 6 | 10 | 14 | 3 | 3 | 5 |

SYSTEM LOAD VALUES
FOR
LOS ANGELES LAY7
1988

| BASE | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 194.62 | 316.93 | 439.24 | 81.32 | 94.13 | 128.46 |
| RADAR ONLY | 35.86 | 58.37 | 80.88 | 3.64 | 5.76 | 7.88 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 158.76 | 258.56 | 358.25 | 77.68 | 88.37 | 120.58 |
| DISCRETE | 54.14 | 54.14 | 70.41 | 72.19 | 72.19 | 92.98 |
| NON DISCRETE | 104.62 | 204.42 | 287.55 | 5.49 | 16.18 | 27.60 |
| MODE C | 90.31 | 147.13 | 203.95 | 72.19 | 72.19 | 93.01 |

| ADJUSTED | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 250.66 | 374.88 | 500.69 | 181.46 | 197.30 | 232.93 |
| RADAR ONLY | 91.00 | 116.00 | 142.00 | 106.00 | 109.00 | 112.00 |
| BEACON ONLY | 13.00 | 21.00 | 29.00 | 4.00 | 7.00 | 10.00 |
| DISCRETE | 3.00 | 4.00 | 6.00 | 3.00 | 5.00 | 7.00 |
| NON DISCRETE | 10.00 | 17.00 | 23.00 | 1.00 | 2.00 | 3.00 |
| MODE C | 7.00 | 12.00 | 16.00 | 3.00 | 5.00 | 7.00 |
| RADAR REINFORCED BEACON | 146.66 | 237.88 | 329.69 | 71.46 | 81.30 | 110.93 |
| DISCRETE | 49.81 | 49.81 | 64.78 | 66.41 | 66.41 | 85.54 |
| NON DISCRETE | 96.25 | 188.07 | 264.91 | 5.05 | 14.89 | 25.39 |
| MODE C | 83.08 | 135.36 | 187.64 | 66.41 | 66.41 | 85.57 |

| ASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | | 27 | | | 36 | |
| RADAR ONLY | | 1 | | | 2 | |
| BEACON ONLY | | 2 | | | 2 | |
| DISCRETE | | 2 | | | 2 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 24 | | | 32 | |
| DISCRETE | | 22 | | | 30 | |
| NON DISCRETE | | 2 | | | 2 | |
| MODE C | | 24 | | | 32 | |

| UNASSOCIATED TRACKS | GOOD WEATHER | | | BAD WEATHER | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| TOTAL | 167 | 290 | 413 | 45 | 56 | 93 |
| RADAR ONLY | 41 | 68 | 54 | 5 | 7 | 11 |
| BEACON ONLY | 4 | 8 | 13 | 1 | 2 | 3 |
| DISCRETE | 0 | 0 | 1 | 1 | 1 | 2 |
| NON DISCRETE | 4 | 8 | 12 | 0 | 1 | 1 |
| MODE C | 3 | 5 | 7 | 2 | 2 | 3 |
| RADAR REINFORCED BEACON | 122 | 214 | 306 | 39 | 49 | 79 |
| DISCRETE | 28 | 28 | 43 | 36 | 36 | 56 |
| NON DISCRETE | 94 | 186 | 263 | 3 | 13 | 23 |
| MODE C | 59 | 111 | 164 | 34 | 34 | 54 |
| CROSS-LINKED | | 33 | | | 45 | |
| UNUSED TARGET REPORTS | 55 | 60 | 64 | 103 | 104 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 5 | 10 | 14 | 3 | 4 | 5 |

SYSTEM LOAD VALUES
FOR
LOS ANGELES LAX7
1990

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 200.21 | 323.21 | 446.21 | 95.16 | 97.71 | 133.06 |
| RADAR ONLY | 33.35 | 53.76 | 74.17 | 3.12 | 4.89 | 6.65 |
| BEACON ONLY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NON DISCRETE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MODE C | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RADAR REINFORCED BEACON | 166.65 | 269.45 | 372.04 | 92.04 | 92.83 | 126.40 |
| DISCRETE | 59.04 | 59.04 | 76.60 | 78.72 | 78.72 | 97.58 |
| NON DISCRETE | 107.81 | 210.40 | 295.44 | 3.31 | 14.10 | 28.82 |
| MODE C | 100.14 | 161.92 | 223.70 | 78.72 | 78.72 | 99.79 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 255.50 | 381.89 | 508.28 | 185.48 | 200.40 | 237.29 |
| RADAR ONLY | 89.00 | 112.00 | 136.00 | 105.00 | 108.00 | 111.00 |
| BEACON ONLY | 13.00 | 22.00 | 30.00 | 5.00 | 7.00 | 10.00 |
| DISCRETE | 3.00 | 5.00 | 6.00 | 4.00 | 6.00 | 8.00 |
| NON DISCRETE | 10.00 | 17.00 | 24.00 | 1.00 | 1.00 | 2.00 |
| MODE C | 8.00 | 13.00 | 18.00 | 4.00 | 6.00 | 8.00 |
| RADAR REINFORCED BEACON | 153.50 | 247.89 | 342.28 | 75.48 | 85.40 | 116.29 |
| DISCRETE | 54.32 | 54.32 | 70.47 | 72.43 | 72.43 | 89.77 |
| NON DISCRETE | 99.18 | 193.57 | 271.81 | 3.05 | 12.98 | 26.52 |
| MODE C | 97.12 | 148.76 | 255.84 | 72.43 | 72.43 | 91.81 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 28 | | | 39 | |
| RADAR ONLY | | 1 | | | 2 | |
| BEACON ONLY | | 2 | | | 3 | |
| DISCRETE | | 2 | | | 3 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 1 | | | 1 | |
| RADAR REINFORCED BEACON | | 25 | | | 34 | |
| DISCRETE | | 24 | | | 33 | |
| NON DISCRETE | | 1 | | | 1 | |
| MODE C | | 27 | | | 35 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 171 | 295 | 416 | 45 | 59 | 95 |
| RADAR ONLY | 39 | 64 | 68 | 4 | 7 | 10 |
| BEACON ONLY | 4 | 8 | 13 | 0 | 1 | 2 |
| DISCRETE | 0 | 0 | 1 | 0 | 0 | 1 |
| NON DISCRETE | 4 | 8 | 12 | 0 | 1 | 1 |
| MODE C | 3 | 5 | 8 | 2 | 2 | 3 |
| RADAR REINFORCED BEACON | 128 | 223 | 317 | 41 | 51 | 83 |
| DISCRETE | 30 | 30 | 46 | 39 | 39 | 57 |
| NON DISCRETE | 98 | 193 | 271 | 2 | 12 | 26 |
| MODE C | 55 | 127 | 179 | 37 | 37 | 57 |
| CROSS-LINKED | | 35 | | | 47 | |
| UNUSED TARGET REPORTS | 57 | 61 | 65 | 103 | 104 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | [illegible] |
| BEACON | 7 | 11 | 15 | 3 | 4 | [illegible] |

# APPENDIX J

## IAC SYSTEM LOAD FACTORS FOR THE DETROIT TRACON SURVEILLANCE SITE

SYSTEM LOAD VALUES
FOR
DETROIT METRO WAYNE
1977

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 131.44 | 309.44 | 487.45 | 54.76 | 74.19 | 114.85 |
| RADAR ONLY | 38.65 | 92.16 | 145.66 | 4.86 | 11.20 | 17.53 |
| BEACON ONLY | 10.77 | 25.61 | 40.45 | 3.04 | 7.03 | 11.03 |
| DISCRETE | .59 | 1.36 | 2.12 | 1.76 | 4.06 | 6.37 |
| NON DISCRETE | 10.18 | 24.25 | 38.32 | 1.28 | 2.97 | 4.66 |
| MODE C | 2.68 | 6.34 | 9.99 | 1.17 | 2.68 | 4.20 |
| RADAR REINFORCED BEACON | 82.02 | 191.68 | 301.34 | 46.86 | 55.96 | 86.29 |
| DISCRETE | 27.74 | 27.74 | 32.75 | 36.99 | 38.70 | 59.32 |
| NON DISCRETE | 54.27 | 163.94 | 268.60 | 9.86 | 17.26 | 26.97 |
| MODE C | 29.92 | 59.56 | 92.53 | 40.25 | 40.25 | 48.33 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 182.45 | 363.34 | 544.24 | 154.11 | 176.48 | 217.39 |
| RADAR ONLY | 90.00 | 146.00 | 202.00 | 106.00 | 113.00 | 120.00 |
| BEACON ONLY | 17.00 | 41.00 | 65.00 | 5.00 | 12.00 | 18.00 |
| DISCRETE | 1.00 | 3.00 | 5.00 | 3.00 | 7.00 | 11.00 |
| NON DISCRETE | 16.00 | 38.00 | 60.00 | 2.00 | 5.00 | 7.00 |
| MODE C | 5.00 | 11.00 | 17.00 | 2.00 | 5.00 | 8.00 |
| RADAR REINFORCED BEACON | 75.45 | 176.34 | 277.24 | 43.11 | 51.48 | 79.39 |
| DISCRETE | 25.52 | 25.52 | 30.13 | 34.03 | 35.60 | 54.58 |
| NON DISCRETE | 49.93 | 150.82 | 247.11 | 9.08 | 15.88 | 24.81 |
| MODE C | 27.52 | 54.79 | 85.13 | 37.03 | 37.03 | 44.46 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 39 | | | 51 | |
| RADAR ONLY | | 3 | | | 4 | |
| BEACON ONLY | | 3 | | | 4 | |
| DISCRETE | | 2 | | | 3 | |
| NON DISCRETE | | 1 | | | 1 | |
| MODE C | | 1 | | | 2 | |
| RADAR REINFORCED BEACON | | 33 | | | 43 | |
| DISCRETE | | 26 | | | 34 | |
| NON DISCRETE | | 7 | | | 9 | |
| MODE C | | 28 | | | 37 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 93 | 271 | 448 | 4 | 24 | 65 |
| RADAR ONLY | 39 | 97 | 155 | 3 | 9 | 17 |
| BEACON ONLY | 11 | 30 | 49 | 1 | 6 | 11 |
| DISCRETE | 0 | 0 | 1 | 0 | 3 | 6 |
| NON DISCRETE | 11 | 30 | 48 | 1 | 3 | 5 |
| MODE C | 3 | 8 | 13 | 1 | 2 | 4 |
| RADAR REINFORCED BEACON | 43 | 144 | 244 | 0 | 9 | 37 |
| DISCRETE | 0 | 0 | 4 | 0 | 2 | 21 |
| NON DISCRETE | 43 | 144 | 240 | 0 | 7 | 16 |
| MODE C | 0 | 27 | 57 | 0 | 0 | 7 |
| CROSS-LINKED | | 0 | | | 0 | |
| UNUSED TARGET REPORTS | 54 | 59 | 64 | 102 | 103 | 104 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 9 | 14 | 2 | 3 | 4 |

SYSTEM LOAD VALUES
FOR
DETROIT METRO WAYNE
1980

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 150.10 | 345.98 | 541.86 | 61.26 | 85.65 | 131.20 |
| RADAR ONLY | 39.40 | 92.55 | 145.70 | 4.44 | 10.05 | 15.65 |
| BEACON ONLY | 12.65 | 29.43 | 46.20 | 3.59 | 8.12 | 12.65 |
| DISCRETE | .71 | 1.58 | 2.44 | 2.14 | 4.81 | 7.49 |
| NON DISCRETE | 11.94 | 27.85 | 43.76 | 1.45 | 3.31 | 5.16 |
| MODE C | 4.16 | 9.62 | 15.07 | 1.62 | 3.61 | 5.61 |
| RADAR REINFORCED BEACON | 98.05 | 224.00 | 349.95 | 53.23 | 67.49 | 102.90 |
| DISCRETE | 33.27 | 33.27 | 39.84 | 44.36 | 48.18 | 72.92 |
| NON DISCRETE | 64.78 | 190.73 | 310.11 | 8.87 | 19.30 | 29.98 |
| MODE C | 39.94 | 87.60 | 135.25 | 47.62 | 47.62 | 63.86 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 202.21 | 401.08 | 599.96 | 160.97 | 168.09 | 234.67 |
| RADAR ONLY | 92.00 | 148.00 | 204.00 | 106.00 | 112.00 | 119.00 |
| BEACON ONLY | 20.00 | 47.00 | 74.00 | 6.00 | 14.00 | 21.00 |
| DISCRETE | 2.00 | 4.00 | 6.00 | 4.00 | 9.00 | 13.00 |
| NON DISCRETE | 18.00 | 43.00 | 68.00 | 2.00 | 5.00 | 8.00 |
| MODE C | 7.00 | 17.00 | 26.00 | 3.00 | 7.00 | 11.00 |
| RADAR REINFORCED BEACON | 90.21 | 206.08 | 321.96 | 48.97 | 62.09 | 94.67 |
| DISCRETE | 30.61 | 30.61 | 36.65 | 40.81 | 44.33 | 67.09 |
| NON DISCRETE | 59.60 | 175.47 | 285.30 | 8.16 | 17.76 | 27.58 |
| MODE C | 36.75 | 80.59 | 124.43 | 43.81 | 43.81 | 58.75 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 44 | | | 57 | |
| RADAR ONLY | | 3 | | | 4 | |
| BEACON ONLY | | 4 | | | 4 | |
| DISCRETE | | 3 | | | 3 | |
| NON DISCRETE | | 1 | | | 1 | |
| MODE C | | 1 | | | 2 | |
| RADAR REINFORCED BEACON | | 37 | | | 49 | |
| DISCRETE | | 31 | | | 41 | |
| NON DISCRETE | | 6 | | | 8 | |
| MODE C | | 33 | | | 44 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 108 | 302 | 498 | 5 | 29 | 74 |
| RADAR ONLY | 40 | 99 | 157 | 3 | 9 | 16 |
| BEACON ONLY | 14 | 34 | 56 | 2 | 7 | 12 |
| DISCRETE | 0 | 0 | 1 | 1 | 4 | 7 |
| NON DISCRETE | 14 | 34 | 55 | 1 | 3 | 5 |
| MODE C | 5 | 12 | 19 | 2 | 4 | 6 |
| RADAR REINFORCED BEACON | 54 | 169 | 285 | 0 | 13 | 46 |
| DISCRETE | 0 | 0 | 6 | 0 | 3 | 26 |
| NON DISCRETE | 54 | 169 | 279 | 0 | 10 | 20 |
| MODE C | 4 | 48 | 91 | 0 | 0 | 15 |
| CROSS-LINKED | | 0 | | | 0 | |
| UNUSED TARGET REPORTS | 54 | 60 | 66 | 102 | 103 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 4 | 10 | 16 | 2 | 3 | 5 |

## SYSTEM LOAD VALUES
## FOR
## DETROIT METRO WAYNE
## 1982

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 157.28 | 361.35 | 565.43 | 65.10 | 38.59 | 135.81 |
| RADAR ONLY | 37.45 | 87.44 | 137.42 | 4.18 | 9.41 | 14.63 |
| BEACON ONLY | 13.92 | 32.33 | 50.73 | 3.92 | 8.84 | 13.75 |
| DISCRETE | .91 | 2.01 | 3.12 | 2.35 | 5.27 | 8.20 |
| NON DISCRETE | 13.02 | 30.31 | 47.61 | 1.57 | 3.56 | 5.55 |
| MODE C | 5.20 | 12.01 | 18.81 | 1.94 | 4.32 | 6.71 |
| RADAR REINFORCED BEACON | 105.91 | 241.59 | 377.27 | 57.00 | 70.35 | 107.43 |
| DISCRETE | 36.58 | 36.58 | 43.10 | 48.77 | 48.77 | 75.36 |
| NON DISCRETE | 69.33 | 205.01 | 334.17 | 8.23 | 21.57 | 32.07 |
| MODE C | 46.35 | 102.59 | 158.82 | 53.12 | 53.12 | 68.76 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 209.43 | 418.26 | 625.09 | 164.44 | 190.72 | 238.84 |
| RADAR ONLY | 90.00 | 144.00 | 197.00 | 105.00 | 112.00 | 118.00 |
| BEACON ONLY | 22.00 | 52.00 | 81.00 | 7.00 | 14.00 | 22.00 |
| DISCRETE | 2.00 | 4.00 | 7.00 | 4.00 | 9.00 | 14.00 |
| NON DISCRETE | 20.00 | 48.00 | 74.00 | 3.00 | 5.00 | 8.00 |
| MODE C | 9.00 | 20.00 | 32.00 | 4.00 | 8.00 | 12.00 |
| RADAR REINFORCED BEACON | 97.43 | 222.26 | 347.09 | 52.44 | 64.72 | 98.84 |
| DISCRETE | 33.65 | 33.65 | 39.65 | 44.87 | 44.87 | 69.33 |
| NON DISCRETE | 63.78 | 188.61 | 307.44 | 7.57 | 19.85 | 29.50 |
| MODE C | 42.64 | 94.38 | 146.12 | 48.87 | 48.87 | 63.26 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 46 | | | 62 | |
| RADAR ONLY | | 3 | | | 4 | |
| BEACON ONLY | | 3 | | | 5 | |
| DISCRETE | | 3 | | | 4 | |
| NON DISCRETE | | 0 | | | 1 | |
| MODE C | | 1 | | | 2 | |
| RADAR REINFORCED BEACON | | 40 | | | 53 | |
| DISCRETE | | 34 | | | 45 | |
| NON DISCRETE | | 6 | | | 8 | |
| MODE C | | 37 | | | 49 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 113 | 316 | 520 | 3 | 26 | 74 |
| RADAR ONLY | 39 | 94 | 150 | 2 | 8 | 15 |
| BEACON ONLY | 16 | 39 | 63 | 1 | 6 | 13 |
| DISCRETE | 0 | 0 | 2 | 0 | 3 | 7 |
| NON DISCRETE | 16 | 39 | 61 | 1 | 3 | 6 |
| MODE C | 6 | 15 | 24 | 2 | 4 | 7 |
| RADAR REINFORCED BEACON | 58 | 183 | 307 | 0 | 12 | 46 |
| DISCRETE | 0 | 0 | 6 | 0 | 0 | 24 |
| NON DISCRETE | 58 | 183 | 301 | 0 | 12 | 22 |
| MODE C | 6 | 57 | 109 | 0 | 0 | 14 |
| CROSS-LINKED | | 0 | | | 0 | |
| UNUSED TARGET REPORTS | 55 | 61 | 67 | 102 | 103 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 5 | 11 | 17 | 2 | 3 | 5 |

# SYSTEM LOAD VALUES
## FOR
## DETROIT METRO WAYNE
## 1984

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 166.59 | 377.45 | 588.21 | 67.60 | 93.48 | 142.60 |
| RADAR ONLY | 36.65 | 84.47 | 132.28 | 3.90 | 8.65 | 13.39 |
| BEACON ONLY | 15.11 | 34.60 | 54.09 | 4.26 | 9.47 | 14.67 |
| DISCRETE | 1.12 | 2.44 | 3.77 | 2.57 | 5.67 | 8.78 |
| NON DISCRETE | 13.99 | 32.15 | 50.32 | 1.69 | 3.79 | 5.89 |
| MODE C | 6.13 | 13.96 | 21.80 | 2.23 | 4.90 | 7.57 |
| RADAR REINFORCED BEACON | 114.82 | 258.38 | 401.94 | 59.44 | 75.37 | 114.54 |
| DISCRETE | 39.12 | 39.12 | 48.69 | 52.16 | 52.16 | 80.63 |
| NON DISCRETE | 75.70 | 219.26 | 353.25 | 7.28 | 23.21 | 33.91 |
| MODE C | 53.65 | 117.42 | 181.20 | 56.51 | 56.51 | 75.78 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 219.64 | 433.71 | 648.78 | 166.68 | 195.34 | 246.38 |
| RADAR ONLY | 90.00 | 141.00 | 193.00 | 105.00 | 111.00 | 117.00 |
| BEACON ONLY | 24.00 | 55.00 | 86.00 | 7.00 | 15.00 | 24.00 |
| DISCRETE | 2.00 | 5.00 | 8.00 | 5.00 | 10.00 | 15.00 |
| NON DISCRETE | 22.00 | 50.00 | 78.00 | 2.00 | 5.00 | 9.00 |
| MODE C | 10.00 | 23.00 | 36.00 | 4.00 | 9.00 | 14.00 |
| RADAR REINFORCED BEACON | 105.64 | 237.71 | 369.78 | 54.68 | 69.34 | 105.38 |
| DISCRETE | 35.99 | 35.99 | 44.79 | 47.99 | 47.99 | 74.18 |
| NON DISCRETE | 69.65 | 201.72 | 324.99 | 6.70 | 21.35 | 31.19 |
| MODE C | 49.36 | 108.03 | 166.70 | 51.99 | 51.99 | 69.72 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 47 | | | 63 | |
| RADAR ONLY | | 3 | | | 3 | |
| BEACON ONLY | | 3 | | | 5 | |
| DISCRETE | | 3 | | | 4 | |
| NON DISCRETE | | 0 | | | 1 | |
| MODE C | | 2 | | | 2 | |
| RADAR REINFORCED BEACON | | 41 | | | 55 | |
| DISCRETE | | 36 | | | 48 | |
| NON DISCRETE | | 5 | | | 7 | |
| MODE C | | 39 | | | 52 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 120 | 331 | 541 | 5 | 31 | 79 |
| RADAR ONLY | 38 | 92 | 145 | 3 | 9 | 15 |
| BEACON ONLY | 17 | 42 | 67 | 2 | 8 | 14 |
| DISCRETE | 0 | 1 | 3 | 1 | 4 | 8 |
| NON DISCRETE | 17 | 41 | 64 | 1 | 4 | 6 |
| MODE C | 6 | 17 | 27 | 2 | 5 | 9 |
| RADAR REINFORCED BEACON | 65 | 197 | 329 | 0 | 14 | 50 |
| DISCRETE | 0 | 0 | 9 | 0 | 0 | 26 |
| NON DISCRETE | 65 | 197 | 320 | 0 | 14 | 24 |
| MODE C | 10 | 69 | 128 | 0 | 0 | 18 |
| CROSS-LINKED | | 0 | | | 0 | |

| UNUSED TARGET REPORTS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 55 | 62 | 68 | 103 | 103 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 5 | 12 | 18 | 3 | 3 | 5 |

## SYSTEM LOAD VALUES
## FOR
## DETROIT METRO WAYNE
## 1986

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 174.40 | 389.55 | 604.70 | 70.40 | 97.07 | 147.31 |
| RADAR ONLY | 35.33 | 80.31 | 125.29 | 3.55 | 7.74 | 11.94 |
| BEACON ONLY | 16.17 | 36.51 | 56.84 | 4.56 | 9.97 | 15.38 |
| DISCRETE | 1.32 | 2.85 | 4.38 | 2.76 | 5.99 | 9.23 |
| NON DISCRETE | 14.85 | 33.65 | 52.45 | 1.81 | 3.98 | 6.15 |
| MODE C | 7.25 | 16.29 | 25.33 | 2.54 | 5.51 | 8.48 |
| RADAR REINFORCED BEACON | 122.90 | 272.73 | 422.57 | 62.28 | 79.36 | 119.99 |
| DISCRETE | 41.99 | 41.99 | 53.80 | 55.99 | 55.99 | 84.68 |
| NON DISCRETE | 80.90 | 230.74 | 368.77 | 6.29 | 23.37 | 35.31 |
| MODE C | 62.13 | 134.60 | 207.08 | 60.34 | 60.34 | 82.48 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 228.06 | 446.92 | 666.77 | 170.30 | 200.01 | 251.39 |
| RADAR ONLY | 89.00 | 138.00 | 187.00 | 105.00 | 111.00 | 116.00 |
| BEACON ONLY | 26.00 | 58.00 | 91.00 | 8.00 | 16.00 | 25.00 |
| DISCRETE | 3.00 | 6.00 | 9.00 | 5.00 | 11.00 | 16.00 |
| NON DISCRETE | 23.00 | 52.00 | 82.00 | 3.00 | 5.00 | 9.00 |
| MODE C | 12.00 | 27.00 | 42.00 | 5.00 | 10.00 | 15.00 |
| RADAR REINFORCED BEACON | 113.06 | 250.92 | 388.77 | 57.30 | 73.01 | 110.39 |
| DISCRETE | 38.63 | 38.63 | 49.49 | 51.51 | 51.51 | 77.91 |
| NON DISCRETE | 74.43 | 212.28 | 339.27 | 5.79 | 21.50 | 32.48 |
| MODE C | 57.16 | 123.83 | 190.51 | 55.51 | 55.51 | 75.88 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 48 | | | 65 | |
| RADAR ONLY | | 2 | | | 3 | |
| BEACON ONLY | | 3 | | | 4 | |
| DISCRETE | | 3 | | | 4 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 2 | | | 2 | |
| RADAR REINFORCED BEACON | | 43 | | | 58 | |
| DISCRETE | | 39 | | | 52 | |
| NON DISCRETE | | 4 | | | 6 | |
| MODE C | | 42 | | | 56 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 126 | 342 | 556 | 6 | 32 | 83 |
| RADAR ONLY | 38 | 89 | 140 | 3 | 8 | 14 |
| BEACON ONLY | 18 | 45 | 71 | 3 | 9 | 17 |
| DISCRETE | 0 | 2 | 4 | 1 | 4 | 9 |
| NON DISCRETE | 18 | 43 | 67 | 2 | 5 | 8 |
| MODE C | 8 | 20 | 32 | 3 | 6 | 10 |
| RADAR REINFORCED BEACON | 70 | 208 | 345 | 0 | 15 | 52 |
| DISCRETE | 0 | 0 | 10 | 0 | 0 | 26 |
| NON DISCRETE | 70 | 208 | 335 | 0 | 15 | 26 |
| MODE C | 15 | 82 | 149 | 0 | 0 | 20 |
| CROSS-LINKED | | 0 | | | 0 | |
| UNUSED TARGET REPORTS | 56 | 62 | 69 | 103 | 104 | 105 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 6 | 12 | 19 | 3 | 4 | 5 |

## SYSTEM LOAD VALUES
## FOR
## DETROIT METRO WAYNE
## 1988

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 181.97 | 400.45 | 618.94 | 73.53 | 100.72 | 152.00 |
| RADAR ONLY | 32.19 | 72.15 | 112.11 | 3.17 | 6.79 | 10.41 |
| BEACON ONLY | 17.45 | 38.82 | 60.19 | 4.88 | 10.49 | 16.11 |
| DISCRETE | 1.56 | 3.31 | 5.07 | 2.95 | 6.31 | 9.67 |
| NON DISCRETE | 15.88 | 35.50 | 55.12 | 1.93 | 4.18 | 6.44 |
| MODE C | 8.42 | 18.65 | 28.88 | 2.87 | 6.13 | 9.39 |
| RADAR REINFORCED BEACON | 132.33 | 289.48 | 446.64 | 65.48 | 83.44 | 125.48 |
| DISCRETE | 45.64 | 45.64 | 59.81 | 60.85 | 60.85 | 88.49 |
| NON DISCRETE | 86.69 | 243.84 | 386.83 | 4.63 | 22.59 | 36.99 |
| MODE C | 70.87 | 151.74 | 232.61 | 66.29 | 66.29 | 89.03 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 235.74 | 459.32 | 681.91 | 173.24 | 203.77 | 256.44 |
| RADAR ONLY | 86.00 | 131.00 | 175.00 | 105.00 | 110.00 | 115.00 |
| BEACON ONLY | 28.00 | 62.00 | 96.00 | 8.00 | 17.00 | 26.00 |
| DISCRETE | 3.00 | 7.00 | 10.00 | 5.00 | 11.00 | 17.00 |
| NON DISCRETE | 25.00 | 55.00 | 86.00 | 3.00 | 6.00 | 9.00 |
| MODE C | 14.00 | 31.00 | 47.00 | 5.00 | 11.00 | 17.00 |
| RADAR REINFORCED BEACON | 121.74 | 266.32 | 410.91 | 60.24 | 76.77 | 115.44 |
| DISCRETE | 41.99 | 41.99 | 55.03 | 55.98 | 55.98 | 81.41 |
| NON DISCRETE | 79.75 | 224.34 | 355.88 | 4.26 | 20.78 | 34.03 |
| MODE C | 65.20 | 139.60 | 214.00 | 60.98 | 60.98 | 81.91 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 51 | | | 68 | |
| RADAR ONLY | | 2 | | | 3 | |
| BEACON ONLY | | 4 | | | 5 | |
| DISCRETE | | 4 | | | 5 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 2 | | | 2 | |
| RADAR REINFORCED BEACON | | 45 | | | 60 | |
| DISCRETE | | 42 | | | 56 | |
| NON DISCRETE | | 3 | | | 4 | |
| MODE C | | 46 | | | 61 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 131 | 349 | 568 | 5 | 33 | 83 |
| RADAR ONLY | 35 | 82 | 128 | 3 | 7 | 12 |
| BEACON ONLY | 19 | 46 | 74 | 2 | 9 | 16 |
| DISCRETE | 0 | 1 | 3 | 0 | 4 | 8 |
| NON DISCRETE | 19 | 45 | 71 | 2 | 5 | 8 |
| MODE C | 9 | 23 | 36 | 4 | 7 | 11 |
| RADAR REINFORCED BEACON | 77 | 221 | 366 | 0 | 17 | 55 |
| DISCRETE | 0 | 0 | 13 | 0 | 0 | 25 |
| NON DISCRETE | 77 | 221 | 353 | 0 | 17 | 30 |
| MODE C | 19 | 94 | 168 | 0 | 0 | 21 |
| CROSS-LINKED | | 0 | | | 0 | |
| UNUSED TARGET REPORTS | 56 | 63 | 70 | 103 | 104 | 106 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 6 | 13 | 20 | 3 | 4 | 6 |

## SYSTEM LOAD VALUES
## FOR
## DETROIT METRO WAYNE
## 1990

| BASE | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 186.00 | 405.47 | 624.93 | 76.46 | 103.40 | 155.72 |
| RADAR ONLY | 29.67 | 65.83 | 101.99 | 2.64 | 5.62 | 8.60 |
| BEACON ONLY | 17.98 | 39.76 | 61.54 | 4.98 | 10.67 | 16.35 |
| DISCRETE | 1.74 | 3.68 | 5.63 | 3.03 | 6.45 | 9.87 |
| NON DISCRETE | 16.24 | 36.08 | 55.91 | 1.95 | 4.21 | 6.47 |
| MODE C | 9.37 | 20.64 | 31.92 | 3.11 | 6.60 | 10.10 |
| RADAR REINFORCED BEACON | 138.35 | 299.88 | 461.41 | 68.84 | 87.12 | 130.78 |
| DISCRETE | 49.54 | 49.54 | 66.07 | 66.05 | 66.05 | 92.87 |
| NON DISCRETE | 88.81 | 250.34 | 395.34 | 2.78 | 21.06 | 37.91 |
| MODE C | 79.01 | 168.22 | 257.43 | 71.49 | 71.49 | 96.39 |

| ADJUSTED | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 240.28 | 464.89 | 688.50 | 175.33 | 207.15 | 260.32 |
| RADAR ONLY | 84.00 | 125.00 | 166.00 | 104.00 | 109.00 | 113.00 |
| BEACON ONLY | 29.00 | 64.00 | 98.00 | 8.00 | 18.00 | 27.00 |
| DISCRETE | 4.00 | 7.00 | 11.00 | 6.00 | 11.00 | 17.00 |
| NON DISCRETE | 25.00 | 57.00 | 87.00 | 2.00 | 7.00 | 10.00 |
| MODE C | 16.00 | 34.00 | 53.00 | 6.00 | 12.00 | 18.00 |
| RADAR REINFORCED BEACON | 127.28 | 275.89 | 424.50 | 63.33 | 80.15 | 120.32 |
| DISCRETE | 45.58 | 45.58 | 60.78 | 60.77 | 60.77 | 85.44 |
| NON DISCRETE | 81.70 | 230.31 | 363.72 | 2.56 | 19.38 | 34.88 |
| MODE C | 72.69 | 154.76 | 236.84 | 65.77 | 65.77 | 88.68 |

| ASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | | 54 | | | 72 | |
| RADAR ONLY | | 2 | | | 3 | |
| BEACON ONLY | | 4 | | | 5 | |
| DISCRETE | | 4 | | | 5 | |
| NON DISCRETE | | 0 | | | 0 | |
| MODE C | | 2 | | | 3 | |
| RADAR REINFORCED BEACON | | 48 | | | 64 | |
| DISCRETE | | 46 | | | 61 | |
| NON DISCRETE | | 2 | | | 3 | |
| MODE C | | 50 | | | 66 | |

| UNASSOCIATED TRACKS | GOOD WEATHER A | GOOD WEATHER B | GOOD WEATHER C | BAD WEATHER A | BAD WEATHER B | BAD WEATHER C |
|---|---|---|---|---|---|---|
| TOTAL | 133 | 352 | 571 | 5 | 31 | 84 |
| RADAR ONLY | 33 | 76 | 118 | 2 | 6 | 11 |
| BEACON ONLY | 20 | 48 | 76 | 3 | 9 | 17 |
| DISCRETE | 0 | 2 | 4 | 1 | 4 | 9 |
| NON DISCRETE | 20 | 46 | 72 | 2 | 5 | 8 |
| MODE C | 11 | 25 | 40 | 3 | 6 | 11 |
| RADAR REINFORCED BEACON | 80 | 228 | 377 | 0 | 16 | 56 |
| DISCRETE | 0 | 0 | 15 | 0 | 0 | 24 |
| NON DISCRETE | 80 | 228 | 362 | 0 | 16 | 32 |
| MODE C | 23 | 105 | 187 | 0 | 0 | 23 |
| CROSS-LINKED | | 0 | | | 0 | |
| UNUSED TARGET REPORTS | 56 | 64 | 71 | 103 | 104 | 106 |
| RADAR | 50 | 50 | 50 | 100 | 100 | 100 |
| BEACON | 6 | 14 | 21 | 3 | 4 | 6 |

# APPENDIX K

## RESULTS OF MEASUREMENTS OF PROCESSING TIMES AT THE NEW YORK TRACON AND THE SYSTEM SIMULATION FACILITY

NOTE: Results of the following test runs are included in this Appendix:

NY
SSF

ARTS IIIA MEASUREMENT DATA TAKEN
AT NY TRACON

| RUN # | DATE | SCENARIO | NOTES |
|---|---|---|---|
| 1 | 7/3/79 | Capacity | |
| 2 | 7/3/79 | Live | All Targets Unassociated |
| 3 | 7/3/79 | Live | Some Associated Targets |
| 5 | 7/4/79 | Modified Capacity | All Tracks Unassociated No Keyboard Entries |
| 6 | 7/4/79 | Modified Capacity | Some Associated Tracks Keyboard Entries Enabled |
| 7 | 7/5/79 | Modified Capacity | |
| 8 | 7/4/79 | Sterling Scenario | |

## ARTS IIIA MEASUREMENT DATA TAKEN AT SSF

| RUN # | DATE | SCENARIO | NOTES |
|---|---|---|---|
| 9 | 9/4/79 | Modified Capacity | 7 Processors, 46 Displays |
| 10 | 9/4/79 | Modified Capacity | 7 Processors, 38 Displays |
| 11 | 9/4/79 | Modified Capacity | 7 Processors, 32 Displays |
| 12 | 9/4/79 | Modified Capacity | 7 Processors, 20 Displays |
| 13 | 9/4/79 | Modified Capacity | 5 Processors, 46 Displays |
| 14 | 9/4/79 | Modified Capacity | 5 Processors, 20 Displays |

- RUN 1 -

TASK TIMING STATISTICS

| PLANNED TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 1516 | 3 | 0 | 10 | 1 | 3 |
| AOB | 380 | 1 | 0 | 6 | 0 | 0 |
| CDRC | 380 | 1 | 1 | 5 | 0 | 0 |
| CRIT1 | 380 | 3 | 0 | 93 | 12 | 164 |
| DOP | 380 | 15 | 8 | 25 | 2 | 4 |
| IFI | 379 | 1 | 0 | 9 | 0 | 0 |
| IFO | 380 | 10 | 6 | 18 | 1 | 2 |
| KOFA | 379 | 4 | 3 | 11 | 1 | 1 |
| MAT | 379 | 1 | 0 | 7 | 1 | 1 |
| MSAW | 1516 | 2 | 1 | 9 | 1 | 1 |
| MT1 | 379 | 1 | 0 | 9 | 0 | 0 |
| PAUS | 1137 | 27 | 0 | 65 | 15 | 225 |
| PAUS1 | 758 | 33 | 6 | 63 | 11 | 132 |
| PAUS2 | 758 | 29 | 1 | 65 | 12 | 146 |
| PDOP | 379 | 14 | 0 | 49 | 16 | 280 |
| RDOP | 379 | 16 | 12 | 24 | 1 | 3 |
| RKIP | 380 | 8 | 5 | 15 | 1 | 3 |
| RTDOP | 379 | 5 | 4 | 9 | 1 | 1 |
| SCTME | 1137 | 2 | 0 | 32 | 2 | 6 |
| SLINK | 379 | 10 | 5 | 22 | 2 | 7 |
| SWABS | 1516 | 1 | 0 | 5 | 0 | 0 |
| TCRSS | 1516 | 9 | 0 | 39 | 7 | 49 |
| TDOP | 1137 | 8 | 5 | 15 | 1 | 2 |
| TDOP1 | 758 | 8 | 6 | 15 | 1 | 1 |
| TEDC | 1516 | 15 | 0 | 64 | 13 | 190 |
| TEXEC | 380 | 2 | 1 | 11 | 1 | 1 |
| TINIT | 760 | 4 | 0 | 25 | 4 | 16 |
| TINT1 | 759 | 3 | 1 | 24 | 3 | 9 |
| TPRED | 1516 | 12 | 0 | 35 | 7 | 63 |
| TPSEC | 1516 | 8 | 0 | 32 | 5 | 31 |
| TPUR | 1516 | 5 | 0 | 57 | 8 | 66 |
| TROUT | 759 | 4 | 1 | 13 | 1 | 3 |
| TROU1 | 759 | 3 | 0 | 12 | 1 | 3 |
| TUDS | 380 | 6 | 1 | 22 | 6 | 40 |
| TUD | 380 | 1 | 1 | 7 | 1 | 1 |

- RUN 1 -

**PROCESSOR UTILIZATION FOR PLANNED TASK**

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 4107 | 8 | 0 | 85 | 10 | 111 |
| 1 | 3488 | 9 | 0 | 93 | 11 | 132 |
| 2 | 4122 | 8 | 0 | 65 | 10 | 106 |
| 3 | 4012 | 8 | 0 | 84 | 10 | 111 |
| 4 | 3853 | 8 | 0 | 85 | 10 | 112 |
| 5 | 3825 | 8 | 0 | 85 | 10 | 115 |
| 6 | 3895 | 8 | 0 | 83 | 10 | 111 |
| TOTAL | 27302 | 8 | | | | |

- RUN 1 -

## TASK TIMING STATISTICS

| POPUP TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| CDT | 72 | 4 | 2 | 11 | 1 | 3 |
| CTIP | 83 | 2 | 1 | 4 | 0 | 0 |
| EDISC | 1703 | 4 | 1 | 94 | 6 | 37 |
| IFI | 3 | 1 | 1 | 1 | 0 | 0 |
| KIP | 635 | 38 | 29 | 59 | 5 | 29 |
| PSRAP | 585 | 9 | 1 | 24 | 4 | 17 |

## PROCESSOR UTILIZATION FOR POPUP TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 488 | 11 | 1 | 82 | 13 | 194 |
| 1 | 412 | 14 | 0 | 94 | 16 | 263 |
| 2 | 468 | 11 | 1 | 82 | 13 | 177 |
| 3 | 432 | 12 | 1 | 86 | 13 | 189 |
| 4 | 434 | 12 | 0 | 51 | 13 | 194 |
| 5 | 425 | 12 | 0 | 87 | 15 | 235 |
| 6 | 422 | 11 | 0 | 84 | 13 | 186 |
| TOTAL | 3081 | 12 | | | | |

- RUN 1 -

**PERCENT OF PROCESSING TIME DISTRIBUTION**

| PROCESSOR | PLANNED | POPUP | DEAD | INACTIVE | IDLE | OVERHEAD |
|---|---|---|---|---|---|---|
| 0 | 74.855 | 12.599 | .998 | 3.451 | .000 | 8.091 |
| 1 | 74.816 | 13.250 | .642 | 3.597 | .000 | 7.687 |
| 2 | 74.650 | 12.419 | .890 | 3.384 | .000 | 8.648 |
| 3 | 75.191 | 11.927 | 1.048 | 3.494 | .000 | 8.332 |
| 4 | 75.167 | 12.464 | .791 | 3.656 | .000 | 7.914 |
| 5 | 75.076 | 12.308 | .798 | 3.748 | .000 | 8.064 |
| 6 | 76.722 | 10.943 | .921 | 3.445 | .000 | 7.960 |

Average Lattice Time = 112.3

$\sigma$ = 20.7

- RUN 2 -

TASK TIMING STATISTICS

| PLANNED TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 2625 | 2 | 0 | 12 | 1 | 2 |
| AOØ | 656 | 1 | 0 | 8 | 0 | 0 |
| CDRC | 657 | 1 | 1 | 5 | 0 | 0 |
| CRIT1 | 657 | 1 | 0 | 6 | 0 | 0 |
| DOP | 657 | 13 | 5 | 23 | 2 | 5 |
| IFI | 656 | 1 | 0 | 8 | 0 | 0 |
| IFO | 656 | 7 | 1 | 16 | 1 | 1 |
| KOFA | 656 | 4 | 3 | 10 | 1 | 1 |
| MAT | 656 | 1 | 0 | 8 | 0 | 0 |
| MSAW | 2624 | 1 | 0 | 10 | 0 | 0 |
| MTI | 656 | 1 | 0 | 7 | 0 | 0 |
| PAUS | 1968 | 14 | 0 | 51 | 10 | 117 |
| PAUS1 | 1312 | 18 | 1 | 49 | 8 | 77 |
| PAUS2 | 1312 | 14 | 0 | 47 | 9 | 90 |
| PDOP | 657 | 6 | 0 | 31 | 7 | 62 |
| RDOP | 657 | 14 | 3 | 22 | 4 | 19 |
| RKIP | 657 | 7 | 3 | 17 | 1 | 3 |
| RTDOP | 656 | 2 | 1 | 9 | 1 | 1 |
| SCTME | 1968 | 1 | 0 | 18 | 1 | 1 |
| SLINK | 656 | 1 | 1 | 9 | 1 | 1 |
| SWABS | 2624 | 1 | 0 | 6 | 0 | 0 |
| TCRSS | 2624 | 8 | 0 | 58 | 9 | 84 |
| TDOP | 1968 | 3 | 1 | 11 | 1 | 1 |
| TDOP1 | 1312 | 3 | 2 | 7 | 0 | 0 |
| TEDC | 2625 | 3 | 0 | 30 | 3 | 15 |
| TEXEC | 657 | 2 | 1 | 12 | 1 | 1 |
| TINIT | 1313 | 3 | 0 | 23 | 2 | 8 |
| TINT1 | 1312 | 2 | 1 | 25 | 2 | 5 |
| TPRED | 2624 | 6 | 0 | 36 | 5 | 35 |
| TPSEC | 2624 | 7 | 0 | 44 | 7 | 58 |
| TPUR | 2624 | 14 | 0 | 115 | 20 | 417 |
| TROUT | 1312 | 3 | 0 | 10 | 1 | 2 |
| TROU1 | 1312 | 2 | 0 | 11 | 1 | 2 |
| TUDS | 657 | 9 | 1 | 24 | 6 | 44 |
| TUD | 657 | 7 | 1 | 25 | 7 | 51 |

- RUN 2 -

PROCESSOR UTILIZATION FOR PLANNED TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 6932 | 5 | 0 | 100 | 8 | 64 |
| 1 | 6138 | 6 | 0 | 103 | 8 | 74 |
| 2 | 6919 | 5 | 0 | 103 | 8 | 66 |
| 3 | 6996 | 5 | 0 | 104 | 8 | 69 |
| 4 | 6562 | 6 | 0 | 111 | 8 | 79 |
| 5 | 7029 | 5 | 0 | 115 | 7 | 63 |
| 6 | 66[illegible]8 | 6 | 0 | 111 | 8 | 77 |
| TOTAL | 47244 | 6 | | | | |

- RUN 2 -

TASK TIMING STATISTICS

| POPUP TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| CDT | 21 | 2 | 1 | 4 | 1 | 1 |
| CTIP | 112 | 1 | 1 | 3 | 0 | 0 |
| EDISC | 602 | 3 | 1 | 8 | 1 | 1 |
| IFI | 3 | 1 | 1 | 1 | 0 | 0 |
| KIP | 876 | 39 | 31 | 61 | 4 | 24 |
| MSP | 18 | 4 | 1 | 10 | 2 | 7 |
| PSRAP | 798 | 20 | 7 | 43 | 7 | 50 |

PROCESSOR UTILIZATION FOR POPUP TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 445 | 21 | 1 | 48 | 14 | 223 |
| 1 | 332 | 25 | 1 | 61 | 18 | 328 |
| 2 | 371 | 21 | 0 | 48 | 15 | 227 |
| 3 | 328 | 21 | 0 | 53 | 15 | 231 |
| 4 | 324 | 21 | 1 | 53 | 15 | 241 |
| 5 | 302 | 21 | 0 | 51 | 15 | 233 |
| 6 | 328 | 22 | 0 | 53 | 15 | 243 |
| TOTAL | 2430 | 22 | | | | |

- RUN 2 -

**PERCENT OF PROCESSING TIME DISTRIBUTION**

| PROCESSOR | PLANNED | POPUP | DEAD | INACTIVE | IDLE | OVERHEAD |
|---|---|---|---|---|---|---|
| 0 | 61.580 | 16.492 | 2.037 | 8.701 | .000 | 11.185 |
| 1 | 63.521 | 14.220 | 1.837 | 8.714 | .000 | 11.699 |
| 2 | 63.955 | 13.777 | 1.929 | 8.820 | .000 | 11.509 |
| 3 | 65.390 | 11.966 | 1.867 | 9.242 | .000 | 11.529 |
| 4 | 65.859 | 12.076 | 2.017 | 8.638 | .000 | 11.404 |
| 5 | 66.220 | 10.791 | 1.708 | 9.117 | .000 | 12.160 |
| 6 | 65.666 | 12.607 | 1.691 | 8.503 | .000 | 11.527 |

Average Lattice Time = 87.3

- RUN 3 -

TASK TIMING STATISTICS

| PLANNED TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 3060 | 2 | 0 | 11 | 1 | 2 |
| AOØ | 765 | 1 | 0 | 9 | 1 | 1 |
| CORC | 766 | 1 | 1 | 7 | 0 | 0 |
| CRIT1 | 766 | 1 | 0 | 6 | 0 | 0 |
| DOP | 765 | 14 | 5 | 23 | 2 | 4 |
| IFI | 765 | 1 | 0 | 10 | 0 | 0 |
| IFO | 765 | 7 | 2 | 15 | 1 | 1 |
| KOFA | 765 | 4 | 3 | 46 | 2 | 5 |
| MAT | 765 | 1 | 0 | 10 | 1 | 1 |
| MSAW | 3060 | 2 | 1 | 10 | 1 | 1 |
| MTI | 765 | 1 | 0 | 8 | 0 | 0 |
| PAUS | 2295 | 14 | 0 | 51 | 10 | 114 |
| PAUS1 | 1530 | 17 | 1 | 47 | 8 | 77 |
| PAUS2 | 1530 | 14 | 0 | 50 | 9 | 84 |
| PDOP | 766 | 6 | 0 | 34 | 8 | 65 |
| RDOP | 765 | 14 | 3 | 22 | 4 | 17 |
| RKIP | 766 | 7 | 3 | 18 | 1 | 3 |
| RTDOP | 765 | 2 | 1 | 6 | 1 | 1 |
| SCTME | 2295 | 1 | 0 | 13 | 1 | 2 |
| SLINK | 765 | 8 | 1 | 53 | 9 | 93 |
| SWABS | 3060 | 1 | 0 | 10 | 0 | 0 |
| TCRSS | 3060 | 7 | 0 | 52 | 8 | 80 |
| TDOP | 2295 | 4 | 2 | 39 | 2 | 5 |
| TDOP1 | 1530 | 4 | 2 | 26 | 1 | 3 |
| TEDC | 3060 | 2 | 0 | 21 | 2 | 5 |
| TEXEC | 765 | 2 | 1 | 14 | 1 | 1 |
| TINIT | 1532 | 3 | 0 | 35 | 2 | 8 |
| TINT1 | 1531 | 2 | 0 | 20 | 2 | 4 |
| TPRED | 3060 | 5 | 0 | 40 | 5 | 32 |
| TPSEC | 3060 | 7 | 0 | 47 | 7 | 57 |
| TPUR | 3060 | 12 | 0 | 111 | 19 | 370 |
| TROUT | 1531 | 3 | 0 | 10 | 1 | 2 |
| TROU1 | 1531 | 2 | 0 | 9 | 1 | 1 |
| TUDS | 766 | 9 | 1 | 22 | 6 | 44 |
| TUD | 765 | 7 | 1 | 24 | 7 | 49 |

- RUN 3 -

PROCESSOR UTILIZATION FOR PLANNED TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 8067 | 5 | 0 | 101 | 7 | 60 |
| 1 | 6993 | 6 | 0 | 105 | 8 | 69 |
| 2 | 8212 | 5 | 0 | 105 | 7 | 63 |
| 3 | 8113 | 5 | 0 | 106 | 8 | 66 |
| 4 | 7994 | 5 | 0 | 106 | 8 | 66 |
| 5 | 7848 | 6 | 0 | 110 | 8 | 71 |
| 6 | 7863 | 5 | 0 | 111 | 8 | 64 |
| TOTAL | 55090 | 5 | | | | |

AD-A087 243 STERLING SYSTEMS INC WASHINGTON DC F/G 17/7

ASSESSMENT OF THE CAPACITY OF THE AUTOMATED RADAR TERMINAL SYST--ETC(U)

JUN 80 W PAILEN, H C WINTERMOYER, R SITTLER DOT-FA78WAI-942

UNCLASSIFIED FAA-RD-80-51 NL

4 OF 5

AD A087243

- RUN 3 -

**TASK TIMING STATISTICS**

| POPUP TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| CDT | 58 | 4 | 2 | 10 | 1 | 3 |
| CTIP | 129 | 2 | 1 | 4 | 0 | 0 |
| EDISC | 701 | 3 | 1 | 10 | 1 | 1 |
| IFI | 3 | 1 | 1 | 1 | 0 | 0 |
| KIP | 1011 | 39 | 30 | 56 | 4 | 22 |
| PSRAP | 921 | 19 | 6 | 42 | 5 | 33 |

**PROCESSOR UTILIZATION FOR POPUP TASK**

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 498 | 22 | 1 | 46 | 14 | 207 |
| 1 | 409 | 24 | 0 | 56 | 17 | 304 |
| 2 | 407 | 19 | 1 | 49 | 14 | 205 |
| 3 | 389 | 19 | 0 | 49 | 14 | 200 |
| 4 | 372 | 20 | 1 | 48 | 14 | 224 |
| 5 | 375 | 19 | 0 | 47 | 14 | 209 |
| 6 | 373 | 21 | 0 | 54 | 15 | 251 |
| TOTAL | 2823 | 21 | | | | |

- RUN 3 -

PERCENT OF PROCESSING TIME DISTRIBUTION

| PROCESSOR | PLANNED | POPUP | DEAD | INACTIVE | IDLE | OVERHEAD |
|---|---|---|---|---|---|---|
| 0 | 61.585 | 16.833 | 1.894 | 9.089 | .000 | 10.589 |
| 1 | 62.923 | 15.089 | 1.658 | 9.175 | .000 | 11.146 |
| 2 | 65.640 | 11.808 | 1.830 | 9.466 | .000 | 11.248 |
| 3 | 65.791 | 11.179 | 1.765 | 9.628 | .000 | 11.628 |
| 4 | 65.687 | 11.044 | 1.857 | 9.789 | .000 | 11.615 |
| 5 | 66.072 | 11.000 | 1.730 | 9.460 | .000 | 11.732 |
| 6 | 65.230 | 11.947 | 1.791 | 9.916 | .000 | 11.109 |

Average Lattice Time = 86

- RUN 5 -

TASK TIMING STATISTICS

| PLANNED TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 1668 | 2 | 0 | 9 | 1 | 3 |
| AOØ | 417 | 1 | 0 | 7 | 0 | 0 |
| CDRC | 417 | 1 | 1 | 4 | 0 | 0 |
| CRIT1 | 417 | 3 | 0 | 76 | 10 | 114 |
| DOP | 417 | 13 | 4 | 24 | 1 | 3 |
| IFI | 417 | 1 | 0 | 5 | 0 | 0 |
| IFO | 417 | 9 | 1 | 17 | 1 | 2 |
| KOFA | 417 | 4 | 3 | 9 | 1 | 1 |
| MAT | 417 | 1 | 0 | 19 | 1 | 1 |
| MSAW | 1668 | 2 | 1 | 8 | 1 | 1 |
| MT1 | 417 | 1 | 0 | 5 | 0 | 0 |
| PAUS | 1251 | 20 | 0 | 179 | 18 | 326 |
| PAUS1 | 834 | 26 | 0 | 128 | 15 | 229 |
| PAUS2 | 834 | 20 | 0 | 133 | 16 | 271 |
| PDOP | 417 | 8 | 0 | 33 | 9 | 99 |
| RDOP | 417 | 15 | 3 | 21 | 2 | 6 |
| RKIP | 417 | 8 | 4 | 14 | 1 | 2 |
| RTDOP | 417 | 4 | 2 | 7 | 1 | 1 |
| SCTME | 1251 | 1 | 0 | 14 | 1 | 3 |
| SLINK | 417 | 7 | 3 | 44 | 4 | 19 |
| SWABS | 1668 | 1 | 0 | 8 | 0 | 0 |
| TCRSS | 1668 | 7 | 0 | 39 | 6 | 48 |
| TDOP | 1251 | 7 | 5 | 16 | 1 | 2 |
| TDOP1 | 834 | 7 | 5 | 27 | 1 | 2 |
| TEDC | 1668 | 12 | 0 | 65 | 14 | 212 |
| TEXEC | 417 | 2 | 1 | 9 | 1 | 1 |
| TINIT | 834 | 5 | 0 | 23 | 4 | 24 |
| TINT1 | 834 | 3 | 0 | 29 | 3 | 14 |
| TPRED | 1668 | 8 | 0 | 39 | 7 | 54 |
| TPSEC | 1668 | 7 | 0 | 28 | 5 | 30 |
| TPUR | 1668 | 3 | 0 | 64 | 5 | 35 |
| TROUT | 834 | 3 | 0 | 11 | 1 | 2 |
| TROU1 | 834 | 3 | 0 | 9 | 1 | 2 |
| TUDS | 417 | 8 | 1 | 20 | 6 | 43 |
| TUD | 417 | 3 | 1 | 22 | 4 | 21 |

- RUN 5 -

**PROCESSOR UTILIZATION FOR PLANNED TASK**

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 4251 | 6 | 0 | 122 | 9 | 89 |
| 1 | 3756 | 7 | 0 | 128 | 9 | 97 |
| 2 | 4404 | 6 | 0 | 133 | 9 | 85 |
| 3 | 4549 | 6 | 0 | 179 | 9 | 91 |
| 4 | 4355 | 6 | 0 | 97 | 9 | 86 |
| 5 | 4424 | 7 | 0 | 140 | 9 | 92 |
| 6 | 4285 | 7 | 0 | 124 | 9 | 89 |
| TOTAL | 30024 | 7 | | | | |

- RUN 5 -

TASK TIMING STATISTICS

| POPUP TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| CDT | 24 | 4 | 2 | 7 | 1 | 2 |
| CTIP | 84 | 2 | 1 | 4 | 0 | 0 |
| EDISC | 1795 | 4 | 1 | 99 | 6 | 37 |
| IFI | 3 | 1 | 1 | 2 | 1 | 1 |
| KIP | 646 | 38 | 30 | 61 | 5 | 25 |
| PSRAP | 295 | 143 | 69 | 261 | 36 | 1361 |

PROCESSOR UTILIZATION FOR POPUP TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 466 | 25 | 1 | 234 | 42 | 1811 |
| 1 | 374 | 33 | 1 | 261 | 54 | 2970 |
| 2 | 392 | 27 | 0 | 202 | 43 | 1930 |
| 3 | 398 | 24 | 0 | 218 | 41 | 1712 |
| 4 | 411 | 26 | 0 | 237 | 42 | 1824 |
| 5 | 406 | 24 | 0 | 223 | 39 | 1566 |
| 6 | 400 | 27 | 0 | 222 | 43 | 1915 |
| TOTAL | 2847 | 26 | | | | |

- RUN 5 -

PERCENT OF PROCESSING TIME DISTRIBUTION

| PROCESSOR | PLANNED | POPUP | DEAD | INACTIVE | IDLE | OVERHEAD |
|---|---|---|---|---|---|---|
| 0 | 62.585 | 26.242 | .859 | 2.625 | .000 | 7.683 |
| 1 | 60.894 | 28.273 | .521 | 2.490 | .000 | 7.818 |
| 2 | 64.408 | 23.960 | .830 | 2.832 | .000 | 7.964 |
| 3 | 66.281 | 21.871 | .792 | 2.482 | .000 | 8.566 |
| 4 | 64.380 | 24.103 | .849 | 2.312 | .000 | 8.349 |
| 5 | 66.546 | 22.072 | .482 | 2.558 | .000 | 8.335 |
| 6 | 64.457 | 24.285 | .654 | 2.353 | .000 | 8.244 |

Average Lattice Time = 104.3

- RUN 6 -

TASK TIMING STATISTICS

| PLANNED TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 3516 | 2 | 0 | 16 | 1 | 3 |
| AOØ | 879 | 1 | 0 | 6 | 0 | 0 |
| CDRC | 878 | 1 | 1 | 6 | 0 | 0 |
| CRIT1 | 879 | 3 | 0 | 86 | 10 | 109 |
| DOP | 878 | 14 | 5 | 23 | 1 | 3 |
| IFI | 879 | 1 | 0 | 5 | 0 | 0 |
| IFO | 879 | 9 | 3 | 16 | 1 | 1 |
| KOFA | 879 | 4 | 3 | 11 | 1 | 1 |
| MAT | 879 | 1 | 0 | 18 | 1 | 1 |
| MSAW | 3516 | 2 | 1 | 9 | 1 | 1 |
| MT1 | 879 | 1 | 0 | 4 | 0 | 0 |
| PAUS | 2637 | 20 | 0 | 70 | 15 | 225 |
| PAUS1 | 1758 | 24 | 1 | 71 | 13 | 174 |
| PAUS2 | 1758 | 21 | 1 | 70 | 13 | 170 |
| PDOP | 879 | 6 | 1 | 32 | 7 | 63 |
| RDOP | 879 | 15 | 3 | 23 | 3 | 11 |
| RKIP | 878 | 8 | 4 | 18 | 1 | 3 |
| RTDOP | 879 | 4 | 3 | 9 | 1 | 1 |
| SCTME | 2637 | 1 | 0 | 16 | 2 | 4 |
| SLINK | 879 | 8 | 3 | 31 | 4 | 19 |
| SWABS | 3516 | 1 | 0 | 10 | 0 | 0 |
| TCRSS | 3516 | 6 | 0 | 42 | 7 | 49 |
| TDOP | 2637 | 7 | 5 | 16 | 1 | 2 |
| TDOP1 | 1758 | 7 | 5 | 13 | 1 | 1 |
| TEDC | 3516 | 10 | 0 | 66 | 13 | 189 |
| TEXEC | 879 | 2 | 1 | 13 | 1 | 2 |
| TINIT | 1758 | 5 | 0 | 40 | 5 | 31 |
| TINT1 | 1758 | 3 | 0 | 30 | 3 | 15 |
| TPRED | 3516 | 8 | 0 | 49 | 8 | 71 |
| TPSEC | 3516 | 6 | 0 | 34 | 5 | 34 |
| TPUR | 3516 | 2 | 0 | 64 | 4 | 23 |
| TROUT | 1758 | 3 | 0 | 13 | 1 | 3 |
| TROU1 | 1758 | 3 | 0 | 10 | 1 | 2 |
| TUDS | 878 | 7 | 1 | 21 | 6 | 43 |
| TUD | 879 | 3 | 1 | 20 | 4 | 17 |

- RUN 6 -

PROCESSOR UTILIZATION FOR PLANNED TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 9355 | 6 | 0 | 78 | 8 | 77 |
| 1 | 8159 | 7 | 0 | 86 | 9 | 89 |
| 2 | 9462 | 6 | 0 | 76 | 8 | 77 |
| 3 | 9361 | 6 | 0 | 74 | 8 | 76 |
| 4 | 8919 | 7 | 0 | 77 | 8 | 79 |
| 5 | 9011 | 6 | 0 | 76 | 8 | 80 |
| 6 | 9017 | 6 | 0 | 76 | 8 | 78 |
| TOTAL | 63284 | 6 | | | | |

## - RUN 6 -

## TASK TIMING STATISTICS

| POPUP TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| CDT | 84 | 4 | 2 | 12 | 1 | 3 |
| CTIP | 159 | 2 | 1 | 4 | 0 | 0 |
| EDISC | 3319 | 4 | 1 | 94 | 5 | 34 |
| IFI | 3 | 1 | 1 | 1 | 0 | 0 |
| KIP | 1214 | 40 | 30 | 63 | 5 | 31 |
| PSRAP | 1123 | 7 | 1 | 28 | 3 | 15 |

## PROCESSOR UTILIZATION FOR POPUP TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 1003 | 11 | 0 | 85 | 14 | 202 |
| 1 | 810 | 14 | 0 | 94 | 17 | 312 |
| 2 | 871 | 11 | 1 | 89 | 14 | 200 |
| 3 | 832 | 12 | 1 | 86 | 14 | 214 |
| 4 | 813 | 12 | 1 | 88 | 14 | 214 |
| 5 | 771 | 12 | 0 | 92 | 15 | 226 |
| 6 | 802 | 12 | 0 | 84 | 15 | 227 |
| TOTAL | 5902 | 12 | | | | |

- RUN 6 -

PERCENT OF PROCESSING TIME DISTRIBUTION

| PROCESSOR | PLANNED | POPUP | DEAD | INACTIVE | IDLE | OVERHEAD |
|---|---|---|---|---|---|---|
| 0 | 69.187 | 13.925 | 1.933 | 4.283 | .000 | 10.666 |
| 1 | 69.871 | 13.904 | 1.498 | 4.087 | .000 | 10.634 |
| 2 | 70.974 | 12.130 | 1.800 | 4.294 | .000 | 10.794 |
| 3 | 71.388 | 11.958 | 1.871 | 4.273 | .000 | 10.503 |
| 4 | 71.197 | 12.343 | 1.830 | 4.083 | .000 | 10.539 |
| 5 | 71.792 | 11.353 | 1.619 | 4.050 | .000 | 11.179 |
| 6 | 71.667 | 11.796 | 1.750 | 4.433 | .000 | 10.347 |

Average Lattice Time = 92.7

- RUN 7 -

TASK TIMING STATISTICS

| PLANNED TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 2428 | 2 | 0 | 12 | 1 | 3 |
| AOØ | 607 | 1 | 0 | 4 | 0 | 0 |
| CDRC | 607 | 1 | 1 | 6 | 0 | 0 |
| CRIT1 | 607 | 3 | 1 | 82 | 9 | 99 |
| DOP | 607 | 14 | 7 | 26 | 1 | 3 |
| IFI | 607 | 1 | 0 | 5 | 0 | 0 |
| IFO | 607 | 9 | 2 | 17 | 1 | 1 |
| KOFA | 607 | 6 | 3 | 51 | 7 | 49 |
| MAT | 607 | 2 | 0 | 18 | 3 | 9 |
| MSAW | 2428 | 2 | 1 | 10 | 1 | 1 |
| MT1 | 607 | 1 | 0 | 5 | 0 | 0 |
| PAUS | 1821 | 23 | 0 | 68 | 14 | 224 |
| PAUS1 | 1214 | 28 | 5 | 65 | 12 | 155 |
| PAUS2 | 1214 | 25 | 1 | 62 | 12 | 159 |
| PDOP | 607 | 11 | 0 | 47 | 13 | 194 |
| RDOP | 607 | 16 | 3 | 23 | 2 | 7 |
| RKIP | 607 | 8 | 4 | 17 | 1 | 3 |
| RTDOP | 607 | 4 | 2 | 8 | 1 | 1 |
| SCTME | 1821 | 2 | 0 | 27 | 1 | 3 |
| SLINK | 607 | 7 | 3 | 35 | 5 | 27 |
| SWABS | 2428 | 1 | 0 | 8 | 0 | 0 |
| TCRSS | 2428 | 7 | 0 | 42 | 7 | 53 |
| TDOP | 1821 | 6 | 4 | 28 | 1 | 2 |
| TDOP1 | 1214 | 6 | 4 | 28 | 1 | 2 |
| TEDC | 2428 | 12 | 0 | 65 | 14 | 200 |
| TEXEC | 608 | 2 | 1 | 11 | 1 | 1 |
| TINIT | 1214 | 4 | 1 | 24 | 3 | 10 |
| TINT1 | 1214 | 3 | 0 | 21 | 2 | 7 |
| TPRED | 2428 | 9 | 0 | 47 | 8 | 65 |
| TPSEC | 2428 | 7 | 0 | 38 | 5 | 34 |
| TPUR | 2428 | 3 | 0 | 68 | 5 | 29 |
| TROUT | 1214 | 4 | 0 | 11 | 2 | 4 |
| TROU1 | 1214 | 3 | 0 | 11 | 1 | 2 |
| TUDS | 607 | 9 | 1 | 21 | 6 | 44 |
| TUD | 607 | 4 | 1 | 22 | 5 | 28 |

- RUN 7 -

PROCESSOR UTILIZATION FOR PLANNED TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 6549 | 7 | 0 | 69 | 9 | 89 |
| 1 | 5714 | 8 | 0 | 82 | 10 | 103 |
| 2 | 6387 | 7 | 0 | 70 | 9 | 92 |
| 3 | 6453 | 7 | 0 | 72 | 9 | 89 |
| 4 | 6255 | 7 | 0 | 69 | 9 | 92 |
| 5 | 6160 | 7 | 0 | 64 | 9 | 94 |
| 6 | 6187 | 7 | 0 | 65 | 9 | 94 |
| TOTAL | 43705 | 7 | | | | |

- RUN 7 -

TASK TIMING STATISTICS

| POPUP TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| CDT | 84 | 3 | 2 | 9 | 1 | 2 |
| CTIP | 119 | 2 | 1 | 4 | 1 | 1 |
| EDISC | 2474 | 4 | 1 | 96 | 5 | 35 |
| IFI | 3 | 1 | 1 | 1 | 0 | 0 |
| KIP | 910 | 40 | 30 | 64 | 5 | 34 |
| PSRAP | 846 | 8 | 1 | 25 | 3 | 15 |

PROCESSOR UTILIZATION FOR POPUP TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 722 | 11 | 0 | 84 | 14 | 210 |
| 1 | 609 | 14 | 0 | 96 | 17 | 319 |
| 2 | 647 | 12 | 1 | 87 | 14 | 218 |
| 3 | 643 | 12 | 0 | 54 | 14 | 202 |
| 4 | 625 | 12 | 1 | 87 | 15 | 235 |
| 5 | 593 | 13 | 0 | 86 | 15 | 227 |
| 6 | 597 | 12 | 1 | 86 | 15 | 232 |
| TOTAL | 4436 | 12 | | | | |

- RUN 7 -

PERCENT OF PROCESSING TIME DISTRIBUTION

| PROCESSOR | PLANNED | POPUP | DEAD | INACTIVE | IDLE | OVERHEAD |
|---|---|---|---|---|---|---|
| 0 | 70.945 | 13.095 | 2.302 | 4.076 | .000 | 9.574 |
| 1 | 70.097 | 13.787 | 2.132 | 4.037 | .000 | 9.941 |
| 2 | 71.943 | 12.714 | 2.207 | 3.849 | .000 | 9.281 |
| 3 | 71.687 | 12.421 | 2.218 | 3.990 | .000 | 9.677 |
| 4 | 71.978 | 12.546 | 1.884 | 3.994 | .000 | 9.591 |
| 5 | 72.080 | 12.292 | 1.992 | 3.876 | .000 | 9.753 |
| 6 | 72.683 | 12.013 | 2.103 | 3.802 | .000 | 9.392 |

Average Lattice Time = 100.7

- RUN 7 -

TASK TIMING STATISTICS
START TIME = 0:08:01.696
END TIME = 0:09:01.215

| PLANNED TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 2568 | 2 | 0 | 12 | 1 | 3 |
| AOØ | 643 | 1 | 0 | 8 | 0 | 0 |
| CDRC | 643 | 1 | 1 | 7 | 0 | 0 |
| CRIT1 | 643 | 3 | 0 | 87 | 10 | 111 |
| DOP | 643 | 14 | 7 | 27 | 2 | 4 |
| IFI | 642 | 1 | 0 | 6 | 0 | 0 |
| IFO | 643 | 9 | 2 | 17 | 1 | 2 |
| KOFA | 642 | 4 | 3 | 11 | 1 | 1 |
| MAT | 643 | 1 | 0 | 21 | 1 | 1 |
| MSAW | 2568 | 2 | 0 | 14 | 1 | 1 |
| MT1 | 642 | 1 | 0 | 5 | 0 | 0 |
| PAUS | 1926 | 20 | 0 | 100 | 15 | 244 |
| PAUS1 | 1284 | 24 | 1 | 106 | 13 | 195 |
| PAUS2 | 1284 | 22 | 1 | 90 | 13 | 193 |
| PDOP | 643 | 12 | 0 | 51 | 16 | 259 |
| RDOP | 642 | 15 | 3 | 22 | 3 | 11 |
| RKIP | 643 | 8 | 4 | 24 | 1 | 3 |
| RTDOP | 642 | 4 | 2 | 8 | 1 | 1 |
| SCTME | 1926 | 1 | 0 | 18 | 2 | 4 |
| SLINK | 642 | 9 | 2 | 48 | 5 | 31 |
| SWABS | 2568 | 1 | 0 | 10 | 0 | 0 |
| TCRSS | 2568 | 7 | 0 | 46 | 7 | 51 |
| TDOP | 1926 | 8 | 4 | 18 | 1 | 2 |
| TDOP1 | 1284 | 8 | 5 | 22 | 1 | 2 |
| TEDC | 2568 | 11 | 0 | 66 | 14 | 197 |
| TEXEC | 643 | 2 | 1 | 12 | 1 | 1 |
| TINIT | 1286 | 4 | 0 | 36 | 4 | 24 |
| TINT1 | 1286 | 3 | 0 | 36 | 3 | 11 |
| TPRED | 2568 | 8 | 0 | 52 | 8 | 74 |
| TPSEC | 2568 | 6 | 0 | 26 | 5 | 33 |
| TPUR | 2568 | 2 | 0 | 47 | 4 | 20 |
| TROUT | 1286 | 4 | 0 | 12 | 1 | 3 |
| TROU1 | 1286 | 3 | 0 | 10 | 1 | 2 |
| TUDS | 643 | 7 | 1 | 22 | 6 | 46 |
| TUD | 643 | 3 | 1 | 25 | 4 | 21 |

- RUN 7 -

PROCESSOR UTILIZATION FOR PLANNED TASK
START TIME = 0:08:01.696
END TIME = 0:09:01.215

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 6768 | 6 | 0 | 80 | 9 | 85 |
| 1 | 6068 | 7 | 0 | 87 | 9 | 99 |
| 2 | 6985 | 6 | 0 | 100 | 9 | 82 |
| 3 | 6703 | 7 | 0 | 97 | 9 | 85 |
| 4 | 6665 | 7 | 0 | 91 | 9 | 85 |
| 5 | 6445 | 7 | 0 | 106 | 9 | 88 |
| 6 | 6609 | 7 | 0 | 90 | 9 | 83 |
| TOTAL | 46243 | 7 | | | | |

- RUN 7 -

TASK TIMING STATISTICS
START TIME = 0:08:01.696
END TIME = 0:09:01.215

| POPUP TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| CDT | 90 | 3 | 2 | 10 | 1 | 2 |
| CTIP | 119 | 2 | 1 | 4 | 0 | 0 |
| EDISC | 2469 | 4 | 1 | 89 | 5 | 33 |
| IFI | 3 | 1 | 1 | 1 | 0 | 0 |
| KIP | 910 | 41 | 31 | 68 | 5 | 32 |
| PSRAP | 832 | 7 | 1 | 25 | 4 | 16 |
| QLOOK | 2 | 39 | 15 | 62 | 33 | 1104 |

PROCESSOR UTILIZATION FOR POPUP TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 727 | 12 | 0 | 83 | 15 | 248 |
| 1 | 614 | 14 | 0 | 68 | 17 | 315 |
| 2 | 693 | 11 | 0 | 87 | 14 | 204 |
| 3 | 588 | 12 | 0 | 50 | 14 | 213 |
| 4 | 608 | 13 | 0 | 89 | 16 | 264 |
| 5 | 587 | 13 | 0 | 58 | 15 | 242 |
| 6 | 608 | 12 | 0 | 86 | 15 | 243 |
| TOTAL | 4425 | 12 | | | | |

- RUN 7 -

PERCENT OF PROCESSING TIME DISTRIBUTION
START TIME = 0:08:01.696
END TIME = 0:09:01.215

| PROCESSOR | PLANNED | POPUP | DEAD | INACTIVE | IDLE | OVERHEAD |
|---|---|---|---|---|---|---|
| 0 | 69.898 | 14.597 | 1.558 | 3.736 | .000 | 10.205 |
| 1 | 70.496 | 13.910 | 1.259 | 3.828 | .000 | 10.501 |
| 2 | 71.316 | 12.460 | 1.427 | 4.244 | .000 | 10.544 |
| 3 | 72.345 | 11.775 | 1.619 | 4.089 | .000 | 10.166 |
| 4 | 71.435 | 12.646 | 1.566 | 4.113 | .000 | 10.234 |
| 5 | 71.384 | 12.787 | 1.589 | 3.566 | .000 | 10.667 |
| 6 | 71.792 | 12.193 | 1.472 | 4.269 | .000 | 10.267 |

Average Lattice Time = 94.7

- RUN 8 -

TASK TIMING STATISTICS

| PLANNED TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 432 | 1 | 0 | 8 | 1 | 1 |
| AOØ | 109 | 1 | 1 | 9 | 1 | 1 |
| CDRC | 109 | 1 | 1 | 5 | 0 | 0 |
| CRIT1 | 109 | 2 | 1 | 75 | 7 | 50 |
| DOP | 109 | 11 | 4 | 25 | 4 | 16 |
| IFI | 108 | 1 | 1 | 6 | 1 | 1 |
| IFO | 109 | 9 | 3 | 15 | 1 | 1 |
| KOFA | 108 | 5 | 3 | 10 | 1 | 1 |
| MAT | 109 | 1 | 0 | 20 | 2 | 4 |
| MSAW | 432 | 1 | 0 | 8 | 0 | 0 |
| MT1 | 109 | 1 | 0 | 6 | 1 | 1 |
| PAUS | 324 | 6 | 1 | 16 | 3 | 9 |
| PAUS1 | 216 | 7 | 4 | 12 | 1 | 1 |
| PAUS2 | 21[illegible] | 7 | 1 | 10 | 1 | 2 |
| PDOP | 1[illegible] | 4 | 0 | 21 | 5 | 25 |
| RDOP | 10[illegible] | 10 | 3 | 22 | 6 | 40 |
| RKIP | 10[illegible] | 5 | 3 | 13 | 1 | 2 |
| RTDOP | 108 | 4 | 3 | 10 | 1 | 1 |
| SCTME | 324 | 1 | 1 | 14 | 1 | 2 |
| SLINK | 108 | 6 | 5 | 12 | 1 | 2 |
| SWABS | 432 | 1 | 0 | 8 | 0 | 0 |
| TCRSS | 433 | 1 | 0 | 12 | 1 | 1 |
| TDOP | 324 | 10 | 6 | 18 | 3 | 9 |
| TDOP1 | 216 | 10 | 5 | 18 | 3 | 10 |
| TEDC | 433 | 1 | 0 | 11 | 1 | 1 |
| TEXEC | 109 | 2 | 1 | 11 | 1 | 2 |
| TINIT | 218 | 1 | 0 | 6 | 1 | 1 |
| TINT1 | 218 | 1 | 1 | 5 | 0 | 0 |
| TPRED | 432 | 1 | 0 | 7 | 1 | 1 |
| TPSEC | 433 | 1 | 0 | 21 | 1 | 2 |
| TPUR | 432 | 1 | 0 | 7 | 1 | 1 |
| TROUT | 218 | 2 | 1 | 6 | 1 | 1 |
| TROU1 | 218 | 1 | 0 | 6 | 0 | 0 |
| TUDS | 109 | 2 | 1 | 15 | 2 | 4 |
| TUD | 109 | 2 | 1 | 15 | 1 | 3 |

- RUN 8 -

PROCESSOR UTILIZATION FOR PLANNED TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 1176 | 3 | 0 | 20 | 3 | 11 |
| 1 | 1066 | 3 | 0 | 22 | 3 | 15 |
| 2 | 1160 | 3 | 0 | 16 | 3 | 10 |
| 3 | 1145 | 3 | 0 | 20 | 3 | 11 |
| 4 | 1029 | 4 | 0 | 75 | 4 | 20 |
| 5 | 1094 | 3 | 0 | 18 | 3 | 12 |
| 6 | 1130 | 3 | 0 | 25 | 3 | 12 |
| TOTAL | 7800 | 3 | | | | |

- RUN 8 -

## TASK TIMING STATISTICS

| POPUP TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ANCTK | 92 | 7 | 1 | 41 | 7 | 60 |
| CDT | 2 | 2 | 2 | 2 | 0 | 0 |
| CTIP | 12 | 2 | 1 | 2 | 0 | 0 |
| EDISC | 106 | 4 | 1 | 8 | 1 | 2 |
| KIP | 92 | 40 | 34 | 50 | 3 | 13 |
| MSP | 4 | 3 | 1 | 5 | 2 | 4 |
| PSRAP | 84 | 1 | 0 | 3 | 0 | 0 |

## PROCESSOR UTILIZATION FOR POPUP TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 73 | 12 | 0 | 43 | 15 | 238 |
| 1 | 60 | 12 | 0 | 48 | 15 | 234 |
| 2 | 55 | 14 | 0 | 45 | 16 | 286 |
| 3 | 52 | 15 | 0 | 48 | 17 | 306 |
| 4 | 48 | 11 | 0 | 48 | 15 | 240 |
| 5 | 59 | 10 | 0 | 49 | 15 | 229 |
| 6 | 45 | 13 | 0 | 50 | 17 | 295 |
| TOTAL | 392 | 12 | | | | |

- RUN 8 -

PERCENT OF PROCESSING TIME DISTRIBUTION

| PROCESSOR | PLANNED | POPUP | DEAD | INACTIVE | IDLE | OVERHEAD |
|---|---|---|---|---|---|---|
| 0 | 54.744 | 14.521 | 4.042 | 5.613 | .000 | 21.072 |
| 1 | 57.552 | 11.595 | 3.275 | 5.246 | .000 | 22.326 |
| 2 | 55.312 | 13.066 | 3.925 | 4.427 | .000 | 23.261 |
| 3 | 55,414 | 12,732 | 3.826 | 4,394 | .000 | 23.628 |
| 4 | 61.931 | 8.505 | 2.707 | 6.097 | .000 | 20.753 |
| 5 | 58.238 | 9.826 | 3.341 | 5.263 | .000 | 23.328 |
| 6 | 57.986 | 9.892 | 3.742 | 5,546 | .000 | 22.826 |

Average Lattice Time = 54.7

- RUN 8 -

TASK TIMING STATISTICS
START TIME = 1:03:02.865
END TIME = 1:03:07.543

| PLANNED TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 341 | 1 | 0 | 8 | 1 | 1 |
| AOØ | 86 | 1 | 0 | 5 | 0 | 0 |
| CDRC | 86 | 1 | 1 | 8 | 1 | 1 |
| CRIT1 | 86 | 2 | 1 | 76 | 8 | 66 |
| DOP | 86 | 11 | 4 | 20 | 3 | 14 |
| IFI | 85 | 1 | 1 | 5 | 0 | 0 |
| IFO | 86 | 9 | 8 | 17 | 1 | 2 |
| KOFA | 85 | 5 | 3 | 9 | 1 | 1 |
| MAT | 86 | 1 | 1 | 7 | 1 | 1 |
| MSAW | 341 | 1 | 0 | 7 | 0 | 0 |
| MT1 | 86 | 1 | 1 | 4 | 0 | 0 |
| PAUS | 258 | 6 | 0 | 18 | 3 | 10 |
| PAUS1 | 172 | 8 | 5 | 13 | 1 | 2 |
| PAUS2 | 172 | 7 | 1 | 14 | 2 | 4 |
| PDOP | 86 | 3 | 1 | 20 | 4 | 23 |
| RDOP | 85 | 10 | 3 | 20 | 5 | 28 |
| RKIP | 86 | 5 | 3 | 16 | 1 | 3 |
| RTDOP | 85 | 4 | 3 | 7 | 1 | 1 |
| SCTME | 258 | 1 | 1 | 19 | 2 | 5 |
| SLINK | 85 | 6 | 5 | 12 | 1 | 3 |
| SWABS | 341 | 1 | 0 | 6 | 0 | 0 |
| TCRSS | 341 | 2 | 0 | 20 | 2 | 4 |
| TDOP | 255 | 10 | 5 | 17 | 3 | 10 |
| TDOP1 | 170 | 10 | 5 | 16 | 3 | 10 |
| TEDC | 341 | 1 | 0 | 7 | 1 | 1 |
| TEXEC | 86 | 2 | 1 | 7 | 1 | 1 |
| TINIT | 172 | 1 | 0 | 6 | 0 | 0 |
| TINT1 | 172 | 1 | 0 | 8 | 1 | 1 |
| TPRED | 340 | 2 | 0 | 21 | 1 | 3 |
| TPSEC | 341 | 2 | 0 | 26 | 2 | 7 |
| TPUR | 340 | 1 | 0 | 10 | 1 | 1 |
| TROUT | 172 | 2 | 1 | 7 | 1 | 1 |
| TROU1 | 172 | 1 | 1 | 5 | 0 | 0 |
| TUDS | 86 | 2 | 1 | 14 | 2 | 5 |
| TUD | 86 | 1 | 1 | 7 | 1 | 1 |

- RUN 8 -

PROCESSOR UTILIZATION FOR PLANNED TASK
START TIME = 1:03:02.865
END TIME = 1:03:07.543

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 890 | 3 | 0 | 22 | 3 | 12 |
| 1 | 856 | 3 | 0 | 21 | 3 | 14 |
| 2 | 936 | 3 | 0 | 76 | 4 | 16 |
| 3 | 884 | 3 | 0 | 26 | 3 | 13 |
| 4 | 820 | 3 | 0 | 20 | 3 | 15 |
| 5 | 875 | 3 | 0 | 20 | 3 | 14 |
| 6 | 895 | 3 | 0 | 18 | 3 | 12 |
| TOTAL | 6156 | 3 | | | | |

- RUN 8 -

TASK TIMING STATISTICS
START TIME = 1:03:02.865
END TIME = 1:03:07.543

| POPUP TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ANCTK | 73 | 13 | 1 | 81 | 16 | 279 |
| CDT | 1 | 2 | 2 | 2 | 1 | 1 |
| CTIP | 9 | 2 | 1 | 2 | 0 | 0 |
| EDISC | 86 | 4 | 2 | 6 | 1 | 1 |
| KIP | 74 | 39 | 32 | 49 | 3 | 13 |
| MSP | 2 | 4 | 2 | 5 | 2 | 4 |
| PSRAP | 67 | 1 | 0 | 2 | 0 | 0 |

PROCESSOR UTILIZATION FOR POPUP TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 59 | 15 | 1 | 42 | 16 | 270 |
| 1 | 60 | 11 | 0 | 49 | 15 | 243 |
| 2 | 43 | 16 | 0 | 56 | 17 | 306 |
| 3 | 37 | 14 | 0 | 81 | 19 | 372 |
| 4 | 37 | 14 | 0 | 57 | 17 | 311 |
| 5 | 32 | 14 | 0 | 73 | 18 | 332 |
| 6 | 44 | 12 | 0 | 47 | 15 | 251 |
| TOTAL | 312 | 14 | | | | |

- RUN 8 -

PERCENT OF PROCESSING TIME DISTRIBUTED
START TIME = 1:03:02.865
END TIME = 1:03:07.543

| PROCESSOR | PLANNED | POPUP | DEAD | INACTIVE | IDLE | OVERHEAD |
|---|---|---|---|---|---|---|
| 0 | 54.904 | 18.328 | 3.318 | 4.591 | .000 | 18.851 |
| 1 | 56.033 | 13.693 | 3.443 | 5.468 | .000 | 21.355 |
| 2 | 56.742 | 14.382 | 2.482 | 4.382 | .000 | 22.003 |
| 3 | 59.185 | 11.105 | 3.402 | 4.779 | .000 | 21.523 |
| 4 | 58.871 | 10.855 | 3.611 | 6.095 | .000 | 20.562 |
| 5 | 61.042 | 9.142 | 4.091 | 3.923 | .000 | 21.794 |
| 6 | 58.642 | 11.376 | 3.505 | 5.009 | .000 | 21.460 |

Average Lattice Time = 55.7

- RUN 8 -

TASK TIMING STATISTICS
START TIME = 1:04:03.776
END TIME = 1:04:08.492

| PLANNED TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 340 | 1 | 0 | 9 | 1 | 1 |
| AOØ | 85 | 1 | 1 | 5 | 0 | 0 |
| CDRC | 85 | 1 | 1 | 4 | 0 | 0 |
| CRIT1 | 86 | 2 | 1 | 74 | 7 | 62 |
| DOP | 85 | 11 | 4 | 21 | 3 | 15 |
| IFI | 85 | 1 | 1 | 5 | 0 | 0 |
| IFO | 85 | 9 | 8 | 16 | 1 | 2 |
| KOFA | 85 | 5 | 3 | 10 | 1 | 2 |
| MAT | 85 | 1 | 0 | 3 | 0 | 0 |
| MSAW | 340 | 1 | 0 | 8 | 0 | 0 |
| MT1 | 85 | 1 | 0 | 6 | 1 | 1 |
| PAUS | 258 | 6 | 1 | 15 | 3 | 9 |
| PAUS1 | 172 | 7 | 3 | 13 | 1 | 2 |
| PAUS2 | 172 | 7 | 1 | 13 | 2 | 4 |
| PDOP | 85 | 4 | 1 | 23 | 5 | 28 |
| RDOP | 85 | 10 | 3 | 22 | 6 | 39 |
| RKIP | 86 | 5 | 3 | 11 | 1 | 1 |
| RTDOP | 85 | 4 | 3 | 8 | 1 | 1 |
| SCTME | 258 | 1 | 1 | 14 | 1 | 2 |
| SLINK | 85 | 6 | 5 | 13 | 2 | 4 |
| SWABS | 340 | 1 | 0 | 7 | 1 | 1 |
| TCRSS | 340 | 2 | 0 | 21 | 2 | 4 |
| TDOP | 255 | 10 | 5 | 23 | 3 | 9 |
| TDOPI | 170 | 10 | 5 | 18 | 3 | 10 |
| TEDC | 340 | 1 | 0 | 8 | 1 | 1 |
| TEXEC | 86 | 2 | 1 | 11 | 1 | 1 |
| TINIT | 172 | 1 | 1 | 5 | 0 | 0 |
| TINT1 | 172 | 1 | 0 | 5 | 0 | 0 |
| TPRED | 340 | 2 | 0 | 16 | 1 | 2 |
| TPSEC | 340 | 2 | 0 | 28 | 2 | 8 |
| TPUR | 340 | 1 | 0 | 9 | 1 | 1 |
| TROUT | 172 | 2 | 1 | 5 | 1 | 1 |
| TROUI | 171 | 2 | 1 | 7 | 1 | 1 |
| TUDS | 86 | 2 | 1 | 19 | 3 | 10 |
| TUD | 86 | 1 | 1 | 14 | 1 | 2 |

- RUN 8 -

PROCESSOR UTILIZATION FOR PLANNED TASK
START TIME = 1:04:03.776
END TIME = 1:04:08.492

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 857 | 3 | 0 | 74 | 4 | 17 |
| 1 | 795 | 4 | 0 | 23 | 4 | 18 |
| 2 | 931 | 3 | 0 | 21 | 3 | 12 |
| 3 | 912 | 3 | 0 | 19 | 3 | 13 |
| 4 | 871 | 3 | 0 | 21 | 3 | 13 |
| 5 | 952 | 3 | 0 | 28 | 3 | 12 |
| 6 | 824 | 3 | 0 | 23 | 3 | 15 |
| TOTAL | 6142 | 3 | | | | |

- RUN 8 -

TASK TIMING STATISTICS
START TIME = 1:04:03.776
END TIME = 1:04:08.492

| POPUP TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ANCTK | 73 | 13 | 1 | 83 | 16 | 263 |
| CDT | 2 | 2 | 2 | 2 | 0 | 0 |
| CTIP | 9 | 1 | 1 | 2 | 0 | 0 |
| EDISC | 85 | 4 | 2 | 7 | 1 | 2 |
| KIP | 73 | 40 | 32 | 51 | 4 | 19 |
| MSP | 2 | 3 | 1 | 5 | 2 | 8 |
| PSRAP | 68 | 1 | 0 | 5 | 0 | 0 |

PROCESSOR UTILIZATION FOR POPUP TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 69 | 14 | 0 | 60 | 16 | 271 |
| 1 | 49 | 13 | 0 | 49 | 17 | 299 |
| 2 | 39 | 16 | 0 | 83 | 20 | 432 |
| 3 | 40 | 13 | 0 | 48 | 16 | 262 |
| 4 | 44 | 15 | 0 | 49 | 17 | 309 |
| 5 | 37 | 10 | 0 | 48 | 14 | 206 |
| 6 | 34 | 17 | 0 | 51 | 18 | 360 |
| TOTAL | 312 | 14 | | | | |

- RUN 8 -

PERCENT OF PROCESSING TIME DISTRIBUTION
START TIME = 1:04:03.776
END TIME = 1:04:08.492

| PROCESSOR | PLANNED | POPUP | DEAD | INACTIVE | IDLE | OVERHEAD |
|---|---|---|---|---|---|---|
| 0 | 53.613 | 19.775 | 2.753 | 4.845 | .000 | 19.009 |
| 1 | 58.851 | 13.251 | 2.773 | 4.740 | .000 | 20.375 |
| 2 | 57.320 | 12.609 | 3.808 | 4.927 | .000 | 21.328 |
| 3 | 59.431 | 10.808 | 3.187 | 4.658 | .000 | 21.908 |
| 4 | 57.298 | 13.376 | 3.457 | 4.244 | .000 | 21.619 |
| 5 | 60.052 | 7.806 | 3.748 | 4.451 | .000 | 23.937 |
| 6 | 58.396 | 12.050 | 3.996 | 5.714 | .000 | 19.837 |

Average Lattice Time = 56.3

- RUN 8 -

TASK TIMING STATISTICS
START TIME = 1:05:12.750
END TIME = 1:08:58.772

| PLANNED TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 14864 | 1 | 0 | 14 | 1 | 1 |
| AOØ | 3717 | 1 | 0 | 9 | 1 | 1 |
| CDRC | 3717 | 1 | 1 | 8 | 0 | 0 |
| CRIT1 | 3717 | 2 | 0 | 91 | 8 | 77 |
| DOP | 3716 | 13 | 4 | 24 | 3 | 11 |
| IFI | 3716 | 1 | 0 | 10 | 1 | 1 |
| IFO | 3717 | 10 | 1 | 27 | 2 | 6 |
| KOFA | 3716 | 5 | 3 | 118 | 4 | 22 |
| MAT | 3717 | 2 | 0 | 39 | 2 | 5 |
| MSAW | 14864 | 1 | 0 | 16 | 1 | 1 |
| MT1 | 3715 | 1 | 0 | 10 | 1 | 1 |
| PAUS | 11148 | 7 | 0 | 36 | 3 | 15 |
| PAUS1 | 7432 | 8 | 1 | 35 | 2 | 6 |
| PAUS2 | 7432 | 7 | 0 | 33 | 3 | 9 |
| PDOP | 3716 | 4 | 0 | 30 | 5 | 34 |
| RDOP | 3716 | 11 | 3 | 31 | 6 | 38 |
| RKIP | 3717 | 5 | 3 | 15 | 1 | 2 |
| RTDOP | 3716 | 5 | 3 | 14 | 1 | 1 |
| SCTME | 11148 | 1 | 0 | 16 | 1 | 3 |
| SLINK | 3716 | 7 | 4 | 25 | 2 | 6 |
| SWABS | 14864 | 1 | 0 | 13 | 0 | 0 |
| TCRSS | 14863 | 2 | 0 | 70 | 4 | 18 |
| TDOP | 11148 | 10 | 5 | 25 | 3 | 10 |
| TDOP1 | 7432 | 10 | 5 | 26 | 3 | 10 |
| TEDC | 14863 | 2 | 0 | 65 | 2 | 7 |
| TEXEC | 3716 | 2 | 1 | 13 | 1 | 1 |
| TINIT | 7434 | 2 | 0 | 50 | 3 | 10 |
| TINT1 | 7434 | 2 | 0 | 44 | 2 | 4 |
| TPRED | 14864 | 2 | 0 | 70 | 3 | 13 |
| TPSEC | 14864 | 2 | 0 | 52 | 3 | 15 |
| TPUR | 14864 | 2 | 0 | 53 | 2 | 5 |
| TROUT | 7434 | 2 | 0 | 14 | 1 | 1 |
| TROU1 | 7433 | 2 | 0 | 10 | 1 | 1 |
| TUDS | 3716 | 4 | 1 | 33 | 5 | 29 |
| TUD | 3716 | 3 | 1 | 33 | 4 | 18 |

- RUN 8 -

PROCESSOR UTILIZATION FOR PLANNED TASK
START TIME = 1:05:12.750
END TIME = 1:08:58.772

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 41100 | 3 | 0 | 78 | 4 | 16 |
| 1 | 34836 | 4 | 0 | 91 | 4 | 22 |
| 2 | 39147 | 3 | 0 | 87 | 4 | 19 |
| 3 | 38712 | 3 | 0 | 82 | 4 | 19 |
| 4 | 37203 | 4 | 0 | 85 | 4 | 20 |
| 5 | 37066 | 4 | 0 | 90 | 4 | 20 |
| 6 | 39498 | 3 | 0 | 118 | 4 | 18 |
| TOTAL | 267562 | 3 | | | | |

- RUN 8 -

TASK TIMING STATISTICS
START TIME = 1:05:12.750
END TIME = 1:08:58.772

| POPUP TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ANCTK | 3224 | 29 | 0 | 342 | 40 | 1667 |
| CDT | 56 | 2 | 1 | 3 | 0 | 0 |
| CTIP | 452 | 2 | 1 | 5 | 0 | 0 |
| EDISC | 3478 | 3 | 1 | 13 | 1 | 1 |
| IFI | 12 | 1 | 1 | 4 | 1 | 1 |
| KIP | 3566 | 40 | 30 | 64 | 4 | 23 |
| MSP | 22 | 4 | 1 | 8 | 2 | 6 |
| PSRAP | 3259 | 1 | 0 | 8 | 0 | 0 |

PROCESSOR UTILIZATION FOR POPUP TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 2539 | 17 | 0 | 228 | 23 | 553 |
| 1 | 2075 | 20 | 0 | 342 | 29 | 854 |
| 2 | 2054 | 18 | 0 | 244 | 25 | 639 |
| 3 | 1902 | 18 | 0 | 284 | 26 | 680 |
| 4 | 1817 | 18 | 0 | 240 | 24 | 621 |
| 5 | 1773 | 18 | 0 | 324 | 27 | 730 |
| 6 | 1909 | 17 | 0 | 305 | 24 | 610 |
| TOTAL | 14069 | 18 | | | | |

- RUN 8 -

PERCENT OF PROCESSING TIME DISTRIBUTION
START TIME = 1:05:12.750
END TIME = 1:08:58.772

| PROCESSOR | PLANNED | POPUP | DEAD | INACTIVE | IDLE | OVERHEAD |
|---|---|---|---|---|---|---|
| 0 | 54.707 | 18.648 | 4.337 | 4.689 | .000 | 17.613 |
| 1 | 55.613 | 18.230 | 3.986 | 4.728 | .000 | 17.435 |
| 2 | 57.216 | 15.712 | 4.283 | 4.300 | .000 | 18.482 |
| 3 | 58.111 | 14.509 | 4.257 | 4.337 | .000 | 18.777 |
| 4 | 58.570 | 14.189 | 4.386 | 4.457 | .000 | 18.392 |
| 5 | 58.791 | 13.916 | 4.138 | 4.021 | .000 | 19.128 |
| 6 | 58.812 | 13.974 | 4.494 | 4.328 | .000 | 18.384 |

Average Lattice Time = 987.9

- RUN 8 -

TASK TIMING STATISTICS
START TIME = 1:09:05.689
END TIME = 1:09:13.591

| PLANNED TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 524 | 1 | 0 | 11 | 1 | 1 |
| AOØ | 131 | 1 | 0 | 5 | 0 | 0 |
| CDRC | 131 | 1 | 1 | 8 | 1 | 1 |
| CRIT1 | 131 | 2 | 0 | 79 | 9 | 92 |
| DOP | 131 | 13 | 4 | 21 | 3 | 13 |
| IFI | 131 | 1 | 1 | 4 | 0 | 0 |
| IFO | 131 | 10 | 8 | 22 | 2 | 6 |
| KOFA | 131 | 5 | 3 | 11 | 1 | 3 |
| MAT | 131 | 1 | 0 | 4 | 0 | 0 |
| MSAW | 524 | 1 | 0 | 13 | 1 | 1 |
| MT1 | 131 | 1 | 0 | 4 | 0 | 0 |
| PAUS | 393 | 7 | 1 | 21 | 3 | 15 |
| PAUS1 | 262 | 8 | 1 | 18 | 2 | 6 |
| PAUS2 | 262 | 7 | 1 | 22 | 3 | 10 |
| PDOP | 131 | 4 | 0 | 30 | 5 | 33 |
| RDOP | 131 | 11 | 3 | 22 | 6 | 36 |
| RKIP | 131 | 5 | 3 | 11 | 1 | 2 |
| RTDOP | 131 | 5 | 4 | 11 | 1 | 1 |
| SCTME | 393 | 1 | 1 | 15 | 1 | 3 |
| SLINK | 131 | 7 | 5 | 19 | 3 | 9 |
| SWABS | 524 | 1 | 0 | 8 | 0 | 0 |
| TCRSS | 524 | 2 | 0 | 49 | 3 | 13 |
| TDOP | 393 | 10 | 5 | 20 | 3 | 10 |
| TDOP1 | 262 | 10 | 5 | 20 | 3 | 10 |
| TEDC | 524 | 2 | 0 | 42 | 3 | 13 |
| TEXEC | 130 | 2 | 1 | 9 | 1 | 1 |
| TINIT | 262 | 2 | 0 | 20 | 1 | 3 |
| TINT1 | 262 | 2 | 0 | 13 | 1 | 2 |
| TPRED | 524 | 2 | 0 | 47 | 3 | 13 |
| TPSEC | 524 | 2 | 0 | 38 | 3 | 14 |
| TPUR | 524 | 2 | 0 | 17 | 1 | 2 |
| TROUT | 262 | 2 | 1 | 7 | 1 | 1 |
| TROU1 | 262 | 2 | 1 | 10 | 1 | 1 |
| TUDS | 130 | 4 | 1 | 29 | 6 | 36 |
| TUD | 130 | 1 | 1 | 14 | 1 | 2 |

- RUN 8 -

PROCESSOR UTILIZATION FOR PLANNED TASK
START TIME = 1:09:05.689
END TIME = 1:09:13.591

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 1395 | 3 | 0 | 49 | 4 | 17 |
| 1 | 1239 | 4 | 0 | 79 | 5 | 25 |
| 2 | 1365 | 3 | 0 | 23 | 3 | 14 |
| 3 | 1386 | 3 | 0 | 28 | 4 | 16 |
| 4 | 1335 | 4 | 0 | 79 | 4 | 22 |
| 5 | 1307 | 4 | 0 | 42 | 4 | 19 |
| 6 | 1402 | 3 | 0 | 29 | 4 | 16 |
| TOTAL | 9429 | 3 | | | | |

- RUN 8 -

TASK TIMING STATISTICS
START TIME = 1:09:05.689
END TIME = 1:09:13.591

| POPUP TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ANCTK | 108 | 35 | 1 | 299 | 49 | 2408 |
| CDT | 2 | 2 | 1 | 2 | 0 | 0 |
| CTIP | 16 | 2 | 1 | 3 | 0 | 0 |
| EDISC | 123 | 3 | 1 | 5 | 1 | 1 |
| KIP | 124 | 40 | 33 | 54 | 4 | 24 |
| MSP | 2 | 3 | 1 | 5 | 2 | 8 |
| PSRAP | 114 | 1 | 0 | 6 | 0 | 0 |

PROCESSOR UTILIZATION FOR POPUP TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 91 | 20 | 0 | 205 | 26 | 709 |
| 1 | 68 | 20 | 0 | 155 | 27 | 783 |
| 2 | 76 | 21 | 0 | 186 | 34 | 1177 |
| 3 | 68 | 19 | 0 | 299 | 40 | 1621 |
| 4 | 60 | 16 | 0 | 70 | 20 | 432 |
| 5 | 56 | 22 | 0 | 120 | 27 | 734 |
| 6 | 70 | 15 | 0 | 120 | 22 | 520 |
| TOTAL | 489 | 19 | | | | |

- RUN 8 -

PERCENT OF PROCESSING TIME DISTRIBUTION
START TIME = 1:09:05.689
END TIME = 1:09:13.591

| PROCESSOR | PLANNED | POPUP | DEAD | INACTIVE | IDLE | OVERHEAD |
|---|---|---|---|---|---|---|
| 0 | 52.267 | 22.492 | 4.212 | 4.843 | .000 | 16.177 |
| 1 | 57.482 | 16.660 | 2.693 | 5.363 | ,000 | 17.796 |
| 2 | 54,072 | 19.761 | 3.435 | 4.349 | ,000 | 18.376 |
| 3 | 57,878 | 15,781 | 4,064 | 4.238 | ,000 | 18.031 |
| 4 | 60,992 | 12.185 | 3,373 | 3.941 | ,000 | 19.501 |
| 5 | 58,447 | 15,412 | 2.816 | 4.115 | .000 | 19.205 |
| 6 | 59,769 | 13,347 | 2,890 | 5.078 | .000 | 18.908 |

Average Lattice Time = 61.3

- RUN 8 -

TASK TIMING STATISTICS
START TIME = 1:12:00.861
END TIME = 1:12:04.447

| PLANNED TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 244 | 1 | 0 | 8 | 1 | 1 |
| AOØ | 62 | 1 | 1 | 4 | 0 | 0 |
| CDRC | 62 | 1 | 1 | 4 | 0 | 0 |
| CRIT1 | 62 | 2 | 1 | 75 | 9 | 88 |
| DOP | 61 | 13 | 4 | 21 | 3 | 11 |
| IFI | 61 | 1 | 0 | 6 | 1 | 1 |
| IFO | 62 | 10 | 8 | 21 | 2 | 8 |
| KOFA | 61 | 5 | 3 | 9 | 1 | 2 |
| MAT | 62 | 1 | 0 | 2 | 0 | 0 |
| MSAW | 245 | 1 | 0 | 10 | 1 | 1 |
| MT1 | 62 | 2 | 1 | 5 | 1 | 1 |
| PAUS | 186 | 7 | 0 | 18 | 4 | 16 |
| PAUS1 | 124 | 8 | 5 | 17 | 2 | 5 |
| PAUS2 | 124 | 7 | 1 | 18 | 3 | 10 |
| PDOP | 62 | 4 | 1 | 23 | 6 | 37 |
| RDOP | 61 | 10 | 3 | 22 | 5 | 34 |
| RKIP | 62 | 5 | 3 | 8 | 1 | 2 |
| RTDOP | 61 | 4 | 4 | 7 | 1 | 1 |
| SCTME | 186 | 1 | 1 | 6 | 0 | 0 |
| SLINK | 61 | 7 | 5 | 14 | 2 | 5 |
| SWABS | 245 | 1 | 0 | 6 | 0 | 0 |
| TCRSS | 244 | 2 | 0 | 29 | 3 | 11 |
| TDOP | 183 | 10 | 5 | 22 | 3 | 11 |
| TDOP1 | 122 | 10 | 5 | 19 | 3 | 11 |
| TEDC | 245 | 2 | 0 | 25 | 3 | 9 |
| TEXEC | 62 | 2 | 1 | 3 | 0 | 0 |
| TINIT | 124 | 2 | 1 | 10 | 1 | 2 |
| TINT1 | 124 | 1 | 1 | 8 | 1 | 1 |
| TPRED | 245 | 2 | 0 | 52 | 3 | 15 |
| TPSEC | 245 | 2 | 1 | 40 | 4 | 16 |
| TPUR | 245 | 1 | 0 | 14 | 1 | 2 |
| TROUT | 124 | 2 | 0 | 6 | 1 | 1 |
| TROU1 | 124 | 2 | 1 | 5 | 1 | 1 |
| TUDS | 62 | 2 | 1 | 13 | 2 | 5 |
| TUD | 62 | 1 | 1 | 2 | 0 | 0 |

- RUN 8 -

PROCESSOR UTILIZATION FOR PLANNED TASK
START TIME = 1:12:00.861
END TIME = 1:12:04.447

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK (MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 698 | 3 | 0 | 25 | 3 | 14 |
| 1 | 620 | 4 | 0 | 40 | 4 | 20 |
| 2 | 617 | 3 | 0 | 20 | 3 | 13 |
| 3 | 610 | 4 | 0 | 75 | 5 | 29 |
| 4 | 601 | 4 | 0 | 23 | 4 | 17 |
| 5 | 634 | 3 | 0 | 22 | 4 | 16 |
| 6 | 647 | 3 | 0 | 29 | 4 | 16 |
| TOTAL | 4427 | 3 | | | | |

- RUN 8 -

TASK TIMING STATISTICS
START TIME = 1:12:00.861
END TIME = 1:12:04.447

| POPUP TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 50 | 33 | 1 | 230 | 43 | 1909 |
| CDT | 1 | 1 | 1 | 1 | 1 | 1 |
| CTIP | 7 | 2 | 1 | 3 | 1 | 1 |
| EDISC | 65 | 4 | 1 | 8 | 1 | 2 |
| KIP | 56 | 40 | 32 | 50 | 4 | 23 |
| MSP | 2 | 3 | 1 | 5 | 2 | 8 |
| PSRAP | 52 | 1 | 0 | 3 | 0 | 0 |

PROCESSOR UTILIZATION FOR POPUP TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 49 | 14 | 0 | 99 | 19 | 397 |
| 1 | 39 | 13 | 0 | 51 | 17 | 308 |
| 2 | 34 | 25 | 0 | 117 | 27 | 776 |
| 3 | 25 | 25 | 0 | 230 | 46 | 2148 |
| 4 | 31 | 17 | 0 | 53 | 19 | 386 |
| 5 | 26 | 20 | 0 | 145 | 35 | 1249 |
| 6 | 29 | 18 | 0 | 45 | 17 | 301 |
| TOTAL | 233 | 18 | | | | |

- RUN 8 -

PERCENT OF PROCESSING TIME DISTRIBUTION
START TIME = 1:12:00.861
END TIME = 1:12:04.447

| PROCESSOR | PLANNED | POPUP | DEAD | INACTIVE | IDLE | OVERHEAD |
|---|---|---|---|---|---|---|
| 0 | 56.480 | 18.109 | 1.878 | 4.601 | .000 | 18.925 |
| 1 | 60.755 | 13.398 | 2.640 | 5.228 | .000 | 17.972 |
| 2 | 52.068 | 23.365 | 2.531 | 3.974 | .000 | 18.054 |
| 3 | 59.503 | 17.292 | 1.468 | 3.429 | .000 | 18.298 |
| 4 | 58.986 | 14.486 | 2.832 | 4.410 | .000 | 19.279 |
| 5 | 58.740 | 14.105 | 2.859 | 3.974 | .000 | 20.314 |
| 6 | 60.320 | 14.160 | 2.177 | 4.382 | .000 | 18.953 |

Average Lattice Time = 59.3

TASK TIMING STATISTICS

| PLANNED TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 2825 | 2 | 0 | 12 | 1 | 2 |
| AOØ | 707 | 1 | 0 | 9 | 0 | 0 |
| CDRC | 707 | 1 | 1 | 6 | 0 | 0 |
| CRITI | 707 | 3 | 0 | 77 | 9 | 97 |
| DOP | 707 | 4 | 2 | 14 | 1 | 3 |
| IFI | 706 | 1 | 0 | 7 | 0 | 0 |
| IFO | 707 | 8 | 1 | 16 | 2 | 4 |
| KOFA | 706 | 8 | 2 | 77 | 13 | 187 |
| MAT | 706 | 3 | 0 | 32 | 6 | 38 |
| MSAW | 2824 | 2 | 0 | 11 | 1 | 1 |
| MTI | 706 | 1 | 0 | 8 | 0 | 0 |
| PAUS | 2118 | 19 | 1 | 167 | 13 | 171 |
| PAUS1 | 1412 | 22 | 1 | 173 | 12 | 145 |
| PAUS2 | 1412 | 20 | 1 | 129 | 11 | 128 |
| PDOP | 707 | 4 | 0 | 18 | 4 | 16 |
| RDOP | 706 | 12 | 3 | 21 | 3 | 12 |
| RKIP | 707 | 4 | 3 | 14 | 1 | 1 |
| RTDOP | 706 | 4 | 2 | 8 | 1 | 1 |
| SCTME | 2118 | 1 | 0 | 16 | 1 | 3 |
| SLINK | 706 | 8 | 3 | 60 | 4 | 23 |
| SWABS | 2824 | 1 | 0 | 10 | 0 | 0 |
| TCRSS | 2825 | 6 | 0 | 49 | 7 | 52 |
| TDOP | 2118 | 7 | 4 | 47 | 1 | 3 |
| TDOP1 | 1412 | 7 | 4 | 47 | 1 | 3 |
| TEDC | 2825 | 10 | 0 | 65 | 13 | 191 |
| TEXEC | 707 | 2 | 1 | 12 | 1 | 1 |
| TINIT | 1413 | 4 | 0 | 37 | 5 | 27 |
| TINTI | 1414 | 3 | 0 | 33 | 3 | 14 |
| TPRED | 2824 | 8 | 0 | 49 | 8 | 65 |
| TPSEC | 2824 | 6 | 0 | 27 | 5 | 32 |
| TPUR | 2824 | 2 | 0 | 50 | 4 | 21 |
| TROUT | 1414 | 3 | 0 | 13 | 1 | 2 |
| TROU1 | 1414 | 2 | 0 | 9 | 1 | 2 |
| TUDS | 707 | 7 | 0 | 24 | 6 | 37 |
| TUD | 707 | 4 | 1 | 20 | 5 | 27 |

- RUN 9 -

PROCESSOR UTILIZATION FOR PLANNED TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 7186 | 6 | 0 | 167 | 8 | 76 |
| 1 | 7485 | 6 | 0 | 116 | 8 | 68 |
| 2 | 7451 | 6 | 0 | 144 | 8 | 72 |
| 3 | 7249 | 6 | 0 | 173 | 8 | 73 |
| 4 | 7197 | 6 | 0 | 129 | 8 | 68 |
| 5 | 7379 | 6 | 0 | 110 | 8 | 70 |
| 6 | 6905 | 6 | 0 | 158 | 8 | 76 |
| TOTAL | 50852 | 6 | | | | |

- RUN 9 -

TASK TIMING STATISTICS

| POPUP TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| CDT | 35 | 6 | 2 | 10 | 1 | 2 |
| CTIP | 120 | 2 | 1 | 4 | 0 | 0 |
| EDISC | 2590 | 4 | 1 | 87 | 5 | 33 |
| KIP | 923 | 13 | 8 | 26 | 2 | 7 |
| PSRAP | 852 | 8 | 1 | 25 | 4 | 19 |

PROCESSOR UTILIZATION FOR POPUP TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 711 | 6 | 1 | 87 | 6 | 40 |
| 1 | 718 | 7 | 1 | 84 | 7 | 61 |
| 2 | 644 | 7 | 1 | 25 | 4 | 23 |
| 3 | 635 | 7 | 1 | 86 | 7 | 50 |
| 4 | 619 | 7 | 1 | 23 | 4 | 21 |
| 5 | 564 | 6 | 1 | 84 | 6 | 39 |
| 6 | 629 | 7 | 1 | 86 | 5 | 32 |
| TOTAL | 4520 | 7 | | | | |

- RUN 9 -

**PERCENT OF PROCESSING TIME DISTRIBUTION**

| PROCESSOR | PLANNED | POPUP | DEAD | INACTIVE | IDLE | OVERHEAD |
|---|---|---|---|---|---|---|
| 0 | 70.160 | 7.375 | 5.589 | 4.447 | .000 | 12.419 |
| 1 | 68.931 | 8.035 | 5.777 | 5.421 | .000 | 11.828 |
| 2 | 69.906 | 6.955 | 6.332 | 4.990 | .000 | 11.812 |
| 3 | 69.564 | 7.011 | 6.289 | 4.839 | .000 | 12.291 |
| 4 | 69.960 | 6.548 | 6.658 | 4.888 | .000 | 11.939 |
| 5 | 70.427 | 5.921 | 6.458 | 4.998 | .000 | 12.189 |
| 6 | 70.146 | 6.923 | 6.322 | 4.796 | .000 | 11.804 |

Average Lattice Time = 87.3

- RUN 10 -

## TASK TIMING STATISTICS

| PLANNED TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 2928 | 2 | 0 | 12 | 1 | 3 |
| AOØ | 733 | 1 | 0 | 8 | 0 | 0 |
| CDBC | 733 | 1 | 1 | 10 | 1 | 1 |
| CRIT1 | 733 | 3 | 0 | 89 | 10 | 108 |
| DOP | 733 | 4 | 2 | 20 | 1 | 3 |
| IFI | 732 | 1 | 0 | 11 | 0 | 0 |
| IFO | 733 | 8 | 1 | 17 | 2 | 4 |
| KOFA | 732 | 7 | 3 | 84 | 12 | 151 |
| MAT | 732 | 3 | 0 | 34 | 6 | 43 |
| MSAW | 2928 | 2 | 1 | 11 | 1 | 1 |
| MT1 | 732 | 1 | 0 | 4 | 0 | 0 |
| PAUS | 2196 | 17 | 0 | 70 | 10 | 108 |
| PAUS1 | 1464 | 20 | 1 | 64 | 9 | 86 |
| PAUS2 | 1464 | 18 | 1 | 65 | 8 | 80 |
| PDOP | 733 | 3 | 0 | 16 | 3 | 12 |
| RDOP | 732 | 12 | 3 | 19 | 3 | 13 |
| RKIP | 733 | 4 | 3 | 14 | 1 | 1 |
| RTDOP | 732 | 5 | 2 | 9 | 1 | 1 |
| SCTME | 2196 | 1 | 0 | 16 | 2 | 4 |
| SLINK | 733 | 9 | 3 | 52 | 5 | 26 |
| SWABS | 2928 | 1 | 0 | 8 | 0 | 0 |
| TCRSS | 2928 | 6 | 0 | 47 | 7 | 49 |
| TDOP | 2196 | 8 | 4 | 40 | 2 | 4 |
| TDOP1 | 1464 | 8 | 4 | 40 | 2 | 4 |
| REDC | 2928 | 10 | 0 | 65 | 13 | 187 |
| TEXEC | 733 | 2 | 1 | 13 | 1 | 1 |
| TINIT | 1464 | 4 | 0 | 32 | 4 | 22 |
| TINT1 | 1464 | 3 | 0 | 26 | 3 | 11 |
| TPRED | 2928 | 8 | 0 | 48 | 8 | 69 |
| TPSEC | 2928 | 6 | 0 | 30 | 5 | 31 |
| TPUR | 2928 | 2 | 0 | 69 | 4 | 22 |
| TROUT | 1464 | 3 | 0 | 10 | 1 | 3 |
| TROU1 | 1464 | 2 | 0 | 9 | 1 | 2 |
| TUDS | 732 | 7 | 1 | 23 | 6 | 36 |
| TUD | 733 | 3 | 1 | 19 | 4 | 24 |

- RUN 10 -

PROCESSOR UTILIZATION FOR PLANNED TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 7566 | 6 | 0 | 84 | 7 | 62 |
| 1 | 7747 | 6 | 0 | 79 | 7 | 60 |
| 2 | 7760 | 6 | 0 | 78 | 7 | 58 |
| 3 | 7544 | 6 | 0 | 81 | 7 | 57 |
| 4 | 7482 | 6 | 0 | 78 | 7 | 61 |
| 5 | 7429 | 6 | 0 | 78 | 7 | 62 |
| 6 | 7186 | 6 | 0 | 89 | 7 | 63 |
| TOTAL | 52714 | 6 | | | | |

- RUN 10 -

TASK TIMING STATISTICS

| POPUP TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| CDT | 37 | 6 | 5 | 9 | 1 | 1 |
| CTIP | 120 | 1 | 1 | 4 | 0 | 0 |
| EDISC | 2598 | 4 | 1 | 93 | 5 | 34 |
| KIP | 934 | 11 | 6 | 22 | 2 | 5 |
| PSRAP | 861 | 7 | 1 | 25 | 3 | 15 |

PROCESSOR UTILIZATION FOR POPUP TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 719 | 6 | 1 | 82 | 4 | 24 |
| 1 | 748 | 6 | 1 | 18 | 3 | 13 |
| 2 | 666 | 6 | 1 | 82 | 4 | 22 |
| 3 | 612 | 6 | 1 | 86 | 5 | 34 |
| 4 | 592 | 6 | 1 | 85 | 4 | 24 |
| 5 | 584 | 6 | 1 | 86 | 5 | 34 |
| 6 | 629 | 7 | 1 | 93 | 8 | 76 |
| TOTAL | 4550 | 6 | | | | |

- RUN 10 -

**PERCENT OF PROCESSING TIME DISTRIBUTION**

| PROCESSOR | PLANNED | POPUP | DEAD | INACTIVE | IDLE | OVERHEAD |
|---|---|---|---|---|---|---|
| 0 | 70.460 | 6.775 | 5.490 | 4.492 | .000 | 12.777 |
| 1 | 69.750 | 7.160 | 5.873 | 4.896 | .000 | 12.316 |
| 2 | 69.550 | 6.564 | 6.630 | 5.093 | .000 | 12.154 |
| 3 | 69.710 | 6.357 | 6.308 | 5.130 | .000 | 12.486 |
| 4 | 70.332 | 5.628 | 6.546 | 5.162 | .000 | 12.324 |
| 5 | 70.494 | 5.904 | 6.423 | 4.814 | .000 | 12.357 |
| 6 | 69.494 | 6.941 | 6.509 | 4.994 | .000 | 12.054 |

Average Lattice Time = 84.3

- RUN 11 -

TASK TIMING STATISTICS

| PLANNED TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 3128 | 2 | 0 | 11 | 1 | 2 |
| AOØ | 782 | 1 | 1 | 8 | 0 | 0 |
| CDRC | 783 | 1 | 1 | 8 | 0 | 0 |
| CRIT1 | 783 | 3 | 0 | 83 | 10 | 103 |
| DOP | 783 | 4 | 1 | 15 | 2 | 4 |
| IFI | 782 | 1 | 0 | 7 | 0 | 0 |
| IFO | 782 | 9 | 1 | 15 | 2 | 4 |
| KOFA | 782 | 4 | 3 | 8 | 0 | 0 |
| MAT | 782 | 1 | 0 | 36 | 2 | 8 |
| MSAW | 3128 | 2 | 1 | 14 | 1 | 1 |
| MT1 | 782 | 1 | 0 | 5 | 0 | 0 |
| PAUS | 2346 | 17 | 0 | 181 | 12 | 149 |
| PAUS1 | 1564 | 20 | 5 | 240 | 12 | 150 |
| PAUS2 | 1564 | 18 | 1 | 231 | 12 | 151 |
| PDOP | 782 | 4 | 0 | 17 | 4 | 17 |
| RDOP | 782 | 11 | 3 | 19 | 3 | 15 |
| RKIP | 783 | 4 | 3 | 13 | 1 | 1 |
| RTDOP | 782 | 5 | 3 | 9 | 1 | 1 |
| SCTME | 2346 | 1 | 0 | 18 | 2 | 4 |
| SLINK | 782 | 8 | 4 | 28 | 3 | 13 |
| SWABS | 3128 | 1 | 0 | 12 | 0 | 0 |
| TCRSS | 3128 | 6 | 0 | 41 | 6 | 48 |
| TDOP | 2346 | 8 | 5 | 23 | 1 | 2 |
| TDOP1 | 1564 | 8 | 5 | 14 | 1 | 2 |
| TEDC | 3128 | 9 | 0 | 64 | 13 | 181 |
| TEXEC | 783 | 2 | 1 | 13 | 1 | 1 |
| TINIT | 1565 | 4 | 0 | 59 | 4 | 23 |
| TINT1 | 1566 | 2 | 0 | 51 | 3 | 11 |
| TPRED | 3128 | 7 | 0 | 52 | 8 | 67 |
| TPSEC | 3128 | 5 | 0 | 32 | 5 | 31 |
| TPUR | 3128 | 2 | 0 | 67 | 4 | 22 |
| TROUT | 1565 | 3 | 0 | 13 | 1 | 3 |
| TROU1 | 1565 | 2 | 0 | 8 | 1 | 2 |
| TUDS | 783 | 6 | 1 | 21 | 5 | 34 |
| TUD | 783 | 3 | 1 | 19 | 3 | 15 |

- RUN 11 -

PROCESSOR UTILIZATION FOR PLANNED TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 8054 | 6 | 0 | 240 | 8 | 67 |
| 1 | 8346 | 5 | 0 | 231 | 7 | 63 |
| 2 | 8248 | 5 | 0 | 142 | 7 | 59 |
| 3 | 8003 | 6 | 0 | 118 | 7 | 60 |
| 4 | 7908 | 6 | 0 | 212 | 7 | 63 |
| 5 | 8000 | 6 | 0 | 181 | 7 | 63 |
| 6 | 7757 | 6 | 0 | 172 | 8 | 67 |
| TOTAL | 56316 | 6 | | | | |

- RUN 11 -

TASK TIMING STATISTICS

| POPUP TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| CDT | 16 | 2 | 2 | 2 | 0 | 0 |
| CTIP | 122 | 2 | 1 | 4 | 0 | 0 |
| EDISC | 2620 | 4 | 1 | 87 | 5 | 33 |
| KIP | 936 | 13 | 8 | 29 | 3 | 9 |
| MSP | 417 | 3 | 0 | 7 | 1 | 3 |
| PSRAP | 871 | 7 | 1 | 22 | 3 | 15 |

PROCESSOR UTILIZATION FOR POPUP TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 813 | 6 | 0 | 85 | 5 | 26 |
| 1 | 762 | 6 | 0 | 84 | 7 | 50 |
| 2 | 725 | 6 | 0 | 85 | 6 | 36 |
| 3 | 686 | 6 | 1 | 87 | 6 | 38 |
| 4 | 682 | 6 | 1 | 81 | 5 | 25 |
| 5 | 673 | 6 | 0 | 82 | 5 | 33 |
| 6 | 641 | 6 | 0 | 86 | 5 | 29 |
| TOTAL | 4982 | 6 | | | | |

- RUN 11 -

PERCENT OF PROCESSING TIME DISTRIBUTION

| PROCESSOR | PLANNED | POPUP | DEAD | INACTIVE | IDLE | OVERHEAD |
|---|---|---|---|---|---|---|
| 0 | 71.083 | 7.443 | 2.964 | 4.814 | .000 | 13.687 |
| 1 | 70.957 | 7.587 | 3.191 | 5.000 | .000 | 13.261 |
| 2 | 71.093 | 7.351 | 3.066 | 5.097 | .000 | 13.384 |
| 3 | 71.273 | 6.986 | 3.072 | 4.988 | .000 | 13.673 |
| 4 | 71.523 | 6.775 | 3.318 | 5.078 | .000 | 13.300 |
| 5 | 71.593 | 6.410 | 3.244 | 5.050 | .000 | 13.695 |
| 6 | 71.421 | 6.417 | 3.533 | 4.972 | .000 | 13.650 |

Average Lattice Time = 80.3

- RUN 12 -

TASK TIMING STATISTICS

| PLANNED TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 540 | 2 | 0 | 9 | 1 | 2 |
| AOØ | 135 | 1 | 0 | 4 | 0 | 0 |
| CDRC | 135 | 1 | 1 | 5 | 0 | 0 |
| CRIT1 | 135 | 2 | 1 | 75 | 8 | 79 |
| DOP | 135 | 3 | 1 | 21 | 2 | 4 |
| IFI | 135 | 1 | 0 | 6 | 0 | 0 |
| IFO | 135 | 9 | 2 | 13 | 1 | 1 |
| KOFA | 135 | 4 | 3 | 8 | 1 | 1 |
| MAT | 135 | 1 | 0 | 18 | 1 | 2 |
| MSAW | 540 | 2 | 0 | 8 | 1 | 1 |
| MT1 | 135 | 1 | 0 | 6 | 0 | 0 |
| PAUS | 405 | 11 | 0 | 39 | 6 | 42 |
| PAUS1 | 270 | 13 | 6 | 38 | 5 | 27 |
| PAUS2 | 270 | 12 | 1 | 34 | 5 | 26 |
| PDOP | 135 | 2 | 0 | 11 | 2 | 4 |
| RDOP | 135 | 10 | 3 | 16 | 4 | 21 |
| RKIP | 135 | 4 | 3 | 5 | 0 | 0 |
| RTDOP | 135 | 4 | 3 | 7 | 1 | 1 |
| SCTME | 405 | 1 | 0 | 14 | 2 | 4 |
| SLINK | 135 | 8 | 3 | 25 | 4 | 16 |
| SWABS | 540 | 1 | 0 | 7 | 0 | 0 |
| TCRSS | 540 | 5 | 0 | 37 | 6 | 42 |
| TDOP | 405 | 7 | 4 | 17 | 1 | 2 |
| TDOP1 | 270 | 7 | 5 | 11 | 1 | 2 |
| TEDC | 540 | 8 | 0 | 60 | 12 | 156 |
| TEXEC | 136 | 2 | 1 | 12 | 1 | 2 |
| TINIT | 270 | 3 | 1 | 18 | 3 | 12 |
| TINT1 | 270 | 2 | 1 | 20 | 3 | 9 |
| TPRED | 540 | 7 | 0 | 44 | 8 | 65 |
| TPSEC | 540 | 5 | 0 | 27 | 5 | 29 |
| TPUR | 540 | 2 | 0 | 47 | 4 | 21 |
| TROUT | 270 | 3 | 1 | 14 | 2 | 4 |
| TROU1 | 270 | 2 | 0 | 6 | 1 | 2 |
| TUDS | 135 | 5 | 1 | 17 | 5 | 31 |
| TUD | 136 | 2 | 1 | 14 | 3 | 12 |

- RUN 12 -

PROCESSOR UTILIZATION FOR PLANNED TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 1358 | 5 | 0 | 60 | 6 | 41 |
| 1 | 1437 | 4 | 0 | 60 | 6 | 36 |
| 2 | 1385 | 5 | 0 | 54 | 6 | 38 |
| 3 | 1355 | 5 | 0 | 60 | 6 | 38 |
| 4 | 1383 | 5 | 0 | 60 | 5 | 34 |
| 5 | 1468 | 4 | 0 | 75 | 5 | 32 |
| 6 | 1336 | 5 | 0 | 44 | 5 | 32 |
| TOTAL | 9722 | 5 | | | | |

- RUN 12 -

TASK TIMING STATISTICS

| POPUP TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| CDT | 2 | 2 | 1 | 2 | 0 | 0 |
| CTIP | 18 | 2 | 1 | 3 | 0 | 0 |
| EDISC | 418 | 4 | 1 | 87 | 5 | 34 |
| KIP | 145 | 10 | 7 | 18 | 2 | 4 |
| MSP | 28 | 3 | 0 | 6 | 1 | 3 |
| PSRAP | 132 | 7 | 1 | 15 | 3 | 13 |

PROCESSOR UTILIZATION FOR POPUP TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 127 | 5 | 0 | 86 | 7 | 63 |
| 1 | 108 | 6 | 0 | 16 | 3 | 12 |
| 2 | 115 | 6 | 0 | 87 | 8 | 67 |
| 3 | 116 | 6 | 0 | 16 | 3 | 12 |
| 4 | 86 | 6 | 1 | 17 | 3 | 12 |
| 5 | 103 | 6 | 0 | 18 | 3 | 14 |
| 6 | 88 | 6 | 0 | 13 | 3 | 11 |
| TOTAL | 743 | 6 | | | | |

- RUN 12 -

PERCENT OF PROCESSING TIME DISTRIBUTION

| PROCESSOR | PLANNED | POPUP | DEAD | INACTIVE | IDLE | OVERHEAD |
|---|---|---|---|---|---|---|
| 0 | 67.947 | 7.218 | 2.929 | 5.933 | .000 | 15.966 |
| 1 | 67.822 | 6.470 | 3.625 | 6.238 | .000 | 15.839 |
| 2 | 66.789 | 6.933 | 3.666 | 6.185 | .000 | 16.419 |
| 3 | 67.199 | 7.103 | 3.572 | 5.921 | .000 | 16.199 |
| 4 | 67.990 | 5.480 | 3.751 | 6.554 | .000 | 16.218 |
| 5 | 67.599 | 6.585 | 2.697 | 6.111 | .000 | 17.000 |
| 6 | 67.474 | 5.375 | 4.152 | 6.775 | .000 | 16.218 |

Average Lattice Time = 70

- RUN 13 -

TASK TIMING STATISTICS

| PLANNED TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 2108 | 2 | 0 | 9 | 1 | 2 |
| AOØ | 528 | 1 | 0 | 6 | 0 | 0 |
| CDRC | 528 | 1 | 1 | 4 | 0 | 0 |
| CRIT1 | 528 | 3 | 0 | 81 | 11 | 128 |
| DOP | 528 | 4 | 2 | 15 | 1 | 3 |
| IFI | 527 | 1 | 0 | 4 | 0 | 0 |
| IFO | 528 | 8 | 1 | 14 | 2 | 5 |
| KOFA | 527 | 7 | 1 | 39 | 10 | 102 |
| MAT | 527 | 2 | 0 | 35 | 3 | 14 |
| MSAW | 2108 | 2 | 0 | 10 | 1 | 1 |
| MTI | 527 | 1 | 0 | 4 | 0 | 0 |
| PAUS | 1581 | 21 | 0 | 103 | 18 | 347 |
| PAUS1 | 1054 | 27 | 0 | 80 | 15 | 255 |
| PAUS2 | 1054 | 17 | 0 | 91 | 18 | 346 |
| PDOP | 528 | 4 | 0 | 16 | 4 | 19 |
| RDOP | 527 | 13 | 3 | 16 | 1 | 3 |
| RKIP | 528 | 4 | 3 | 9 | 0 | 0 |
| RTDOP | 527 | 4 | 3 | 8 | 1 | 1 |
| SCTME | 1581 | 1 | 0 | 14 | 2 | 4 |
| SLINK | 528 | 9 | 4 | 44 | 5 | 29 |
| SWABS | 2108 | 1 | 0 | 6 | 0 | 0 |
| TCRSS | 2108 | 8 | 0 | 35 | 7 | 55 |
| TDOP | 1581 | 7 | 4 | 22 | 1 | 2 |
| TDOP1 | 1054 | 7 | 5 | 17 | 1 | 3 |
| TEDC | 2108 | 13 | 0 | 64 | 14 | 202 |
| TEXEC | 528 | 2 | 1 | 9 | 1 | 1 |
| TINIT | 1055 | 4 | 0 | 46 | 5 | 26 |
| TINT1 | 1054 | 3 | 0 | 51 | 4 | 19 |
| TPRED | 2108 | 10 | 0 | 51 | 7 | 60 |
| TPSEC | 2108 | 7 | 0 | 30 | 5 | 31 |
| TPUR | 2108 | 3 | 0 | 39 | 4 | 23 |
| TROUT | 1054 | 3 | 0 | 7 | 1 | 1 |
| TROU1 | 1054 | 3 | 0 | 8 | 1 | 2 |
| TUDS | 528 | 8 | 0 | 17 | 6 | 36 |
| TUD | 528 | 3 | 0 | 18 | 4 | 23 |

- RUN 13 -

PROCESSOR UTILIZATION FOR PLANNED TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 7464 | 7 | 0 | 85 | 9 | 97 |
| 1 | 7861 | 6 | 0 | 91 | 9 | 94 |
| 2 | 7510 | 7 | 0 | 103 | 9 | 95 |
| 3 | 7552 | 7 | 0 | 80 | 9 | 98 |
| 4 | 7569 | 7 | 0 | 83 | 9 | 94 |
| TOTAL | 37956 | 7 | | | | |

- RUN 13 -

TASK TIMING STATISTICS

| POPUP TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| CDT | 37 | 6 | 2 | 11 | 1 | 2 |
| CTIP | 121 | 1 | 1 | 4 | 0 | 0 |
| EDISC | 2443 | 4 | 1 | 86 | 5 | 32 |
| KIP | 916 | 12 | 8 | 23 | 1 | 3 |
| PSRAP | 839 | 8 | 1 | 30 | 5 | 25 |

PROCESSOR UTILIZATION FOR POPUP TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 912 | 6 | 1 | 83 | 5 | 32 |
| 1 | 882 | 6 | 1 | 28 | 4 | 18 |
| 2 | 885 | 6 | 1 | 84 | 6 | 39 |
| 3 | 829 | 6 | 1 | 86 | 6 | 39 |
| 4 | 848 | 7 | 1 | 86 | 6 | 48 |
| TOTAL | 4356 | 6 | | | | |

- RUN 13 -

PERCENT OF PROCESSING TIME DISTRIBUTION

| PROCESSOR | PLANNED | POPUP | DEAD | INACTIVE | IDLE | OVERHEAD |
|---|---|---|---|---|---|---|
| 0 | 79.720 | 8.708 | 1.078 | 1.669 | .000 | 8.816 |
| 1 | 79.568 | 8.636 | 1.267 | 1.660 | .000 | 8.861 |
| 2 | 79.582 | 9.173 | 1.041 | 1.601 | .000 | 8.597 |
| 3 | 80.023 | 8.535 | .912 | 1.542 | .000 | 8.984 |
| 4 | 79.589 | 9.125 | 1.031 | 1.490 | .000 | 8.759 |

Average Lattice Time = 118

- RUN 14 -

TASK TIMING STATISTICS

| PLANNED TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| ALTRK | 2732 | 2 | 0 | 9 | 1 | 2 |
| AOØ | 684 | 1 | 0 | 5 | 0 | 0 |
| CDRC | 684 | 1 | 0 | 4 | 0 | 0 |
| CRIT1 | 683 | 2 | 0 | 77 | 10 | 102 |
| DOP | 683 | 2 | 1 | 11 | 0 | 0 |
| IFI | 683 | 1 | 0 | 4 | 0 | 0 |
| IFO | 683 | 8 | 1 | 13 | 2 | 4 |
| KOFA | 683 | 4 | 3 | 8 | 0 | 0 |
| MAT | 684 | 1 | 0 | 31 | 2 | 5 |
| MSAW | 2732 | 1 | 0 | 9 | 1 | 1 |
| MT1 | 683 | 1 | 0 | 4 | 0 | 0 |
| PAUS | 2049 | 12 | 0 | 101 | 11 | 122 |
| PAUS1 | 1366 | 14 | 0 | 123 | 10 | 102 |
| PAUS2 | 1366 | 10 | 0 | 95 | 10 | 117 |
| PDOP | 684 | 3 | 0 | 9 | 2 | 6 |
| RDOP | 684 | 12 | 3 | 18 | 2 | 7 |
| RKIP | 683 | 3 | 3 | 7 | 0 | 0 |
| RTDOP | 683 | 4 | 3 | 7 | 1 | 1 |
| SCTME | 2049 | 1 | 0 | 17 | 1 | 3 |
| SLINK | 684 | 8 | 3 | 35 | 4 | 18 |
| SWABS | 2732 | 1 | 0 | 6 | 0 | 0 |
| TCRSS | 2732 | 6 | 0 | 37 | 6 | 45 |
| TDOP | 2049 | 7 | 4 | 15 | 1 | 2 |
| TDOP1 | 1366 | 7 | 4 | 13 | 1 | 2 |
| TEDC | 2732 | 10 | 0 | 64 | 13 | 185 |
| TEXEC | 683 | 2 | 1 | 9 | 1 | 1 |
| TINIT | 1366 | 3 | 0 | 23 | 3 | 14 |
| TINT1 | 1367 | 2 | 0 | 32 | 3 | 11 |
| TPRED | 2732 | 7 | 0 | 40 | 7 | 57 |
| TPSEC | 2732 | 6 | 0 | 25 | 5 | 28 |
| TPUR | 2732 | 2 | 0 | 36 | 4 | 18 |
| TROUT | 1367 | 3 | 0 | 8 | 1 | 2 |
| TROU1 | 1367 | 2 | 0 | 7 | 1 | 2 |
| TUDS | 683 | 6 | 0 | 18 | 5 | 35 |
| TUD | 683 | 2 | 0 | 18 | 3 | 12 |

- RUN 14 -

PROCESSOR UTILIZATION FOR PLANNED TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 9544 | 5 | 0 | 123 | 7 | 50 |
| 1 | 9880 | 5 | 0 | 74 | 6 | 46 |
| 2 | 10139 | 5 | 0 | 96 | 6 | 44 |
| 3 | 9828 | 5 | 0 | 95 | 6 | 47 |
| 4 | 9794 | 5 | 0 | 97 | 6 | 48 |
| TOTAL | 49185 | 5 | | | | |

- RUN 14 -

TASK TIMING STATISTICS

| POPUP TASK | # RUNS | AVERAGE TIME(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| CDT | 47 | 5 | 2 | 8 | 1 | 2 |
| CTIP | 121 | 1 | 1 | 3 | 0 | 0 |
| EDISC | 2554 | 4 | 1 | 86 | 5 | 33 |
| KIP | 934 | 10 | 7 | 15 | 1 | 2 |
| PSRAP | 862 | 6 | 1 | 20 | 3 | 12 |

PROCESSOR UTILIZATION FOR POPUP TASK

| PROCESSOR | # RUNS | AVERAGE TIME PER TASK(MILS) | MINIMUM | MAXIMUM | STANDARD DEVIATION | VARIANCE |
|---|---|---|---|---|---|---|
| 0 | 988 | 6 | 1 | 85 | 5 | 35 |
| 1 | 941 | 6 | 1 | 82 | 4 | 17 |
| 2 | 867 | 5 | 1 | 84 | 6 | 38 |
| 3 | 878 | 5 | 1 | 86 | 4 | 23 |
| 4 | 844 | 5 | 1 | 84 | 4 | 24 |
| TOTAL | 4518 | 6 | | | | |

- RUN 14 -

PERCENT OF PROCESSING TIME DISTRIBUTION

| PROCESSOR | PLANNED | POPUP | DEAD | INACTIVE | IDLE | OVERHEAD |
|---|---|---|---|---|---|---|
| 0 | 76.355 | 9.027 | 1.013 | 1.777 | .000 | 11.820 |
| 1 | 76.867 | 8.529 | 1.048 | 1.931 | .000 | 11.617 |
| 2 | 77.001 | 7.679 | 1.146 | 2.197 | .000 | 11.968 |
| 3 | 77.162 | 7.732 | .890 | 2.046 | .000 | 12.162 |
| 4 | 77.634 | 7.455 | 1.058 | 1.902 | .000 | 11.945 |

Average Lattice Time = 90.3

# APPENDIX L

## PROCESSOR UTILIZATION MODELS FOR THE YEARS 1982 THROUGH 1990

PROCESSOR UTILIZATION MODELS (1982)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| ALTRK | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 2.6$ $\sigma = 0.4$ | $\bar{t} = 1.3$ $\sigma$ - .325 |
| AUT | 1/Lattice | 1/Lattice | $\bar{t} = 1.0$ $\sigma = 0.5$ | |
| CDR | 1/Lattice | 1/Lattice | $\bar{t} = 1.0$ $\sigma = 0.0$ | |
| CRIT | 1/Lattice | 1/Lattice | $\bar{t} = 1.0$ $\sigma = 0.0$ | |
| DOP | 1/Lattice | 1/Lattice | $t = 1.4$(#MDBMs) | |
| IFI | 1/Lattice | 1/Lattice | $\bar{t} = 5.0$ $\sigma = 0.0$ | |
| IFO | 1/Lattice | 1/Lattice | $\bar{t} = 8.3$ $\sigma = 1.6$ | |
| KOFA | 1/Lattice | 1/Lattice | $\bar{t} = 5.4$ $\sigma = 4.3$ | |
| MAT | 1/60 Seconds | 1/Lattice | $t_s = 0.001$(CTS Capacity) ($t_{MAX} = 32$) | $\bar{t} = 1.25$ $\sigma = 0.452$ |
| MSAW | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 1.8$ $\sigma = 1.0$ | $\bar{t} = 1.8$ $\sigma = 1.0$ |
| MTP | 1/Lattice | 1/Lattice | $\bar{t} = 1.0$ $\sigma = 0.0$ | |
| PAUS | P/Lattice (P=#Processors) | P/Lattice | $\sum_{p=1}^{P} t(p) = 0.0381\ (CTS) + 0.425(t_L)(T1)$<br>$T1 = \sum_{j=1}^{\#Snsr} \frac{1}{t_s(j)} \sum_{k=1}^{32} \left[TU(j,k)\right]\left[\#Displays\ (j)\right]$<br>TU = Unassociated Tracks<br>j = Snsr ID<br>k = Sector ID<br>$t_L$ = Execution Time of Previous Lattice<br>$t_s$ = Sensor Scan Time | |

PROCESSOR UTILIZATION MODELS (1982) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| PDOP | 4/Second | 1/Lattice | t = 0.6(#MDBMs) | $\bar{t}$ = 1.7  σ = 1.3 |
| RDOP | 1/Lattice at Sites with RDBMs | 1/Lattice at Sites with RDBMs | t = 2.4(#RDBMs) | |
| RKIP | 1/Lattice at Sites with RDBMs | 1/Lattice at Sites with RDBMs | t = 1.3(#RDBMs) | |
| RTDOP | 1/Lattice at Sites with RDBMs | 1/Lattice at Sites with RDBMs | t = 0.6(#RDBMs) | |
| SCTME | Detroit: 1/Lat<br>NY, CHI, LA } 3/Lat | Detroit: 1/Lat<br>NY, CHI, LA } 3/Lat | $\sum_{i=1}^{I} t(i)$ = 0.0011(CTS Capacity)<br>I = #Executions/Lattice | |
| SLINK | 1/Lattice at Multisnsr Site | 1/Lattice at Multisnsr Site | $\bar{t}$ = 8.2  σ = 2.7  ($t_{MAX}$ = 80) | |
| SWABS | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t}$ = 1.0  σ = 0.0  ($t_{MAX}$ = 64) | $\bar{t}$ = 1.0 |
| TCRSS | 1/Sector/Snsr | 1/Lattice/Snsr | t = 3.7 + TU  ($t_{MAX}$ = 90)<br>TU = #Unassociated Tracks in Sector Processed | $\bar{t}$ = 3.1  σ = 1.3 |
| TDOP | NY: 5/Lattice<br>CHI:3/Lattice<br>LA: 2/Lattice<br>DET:1/Lattice | NY: 5/Lattice<br>CHI:3/Lattice<br>LA: 2/Lattice<br>DET:1/Lattice | $\sum_{i=1}^{I} t(i)$ = 2.9(#MDBMs)<br>I = #Executions/Lattice | |
| TEDC | 1/Sector/Snsr | 1/Lattice/Snsr | t = 1.7 + 0.55(ATD+UTD) + 0.2(TA)(TU)<br>($t_{MAX}$ = 60)<br>ATD = #Discrete Associated Tracks<br>UTD = #Discrete Unassociated Tracks | $\bar{t}$ = 3.5  σ = 2.5 |

PROCESSOR UTILIZATION MODELS (1982) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| IEXEC | 1/Lattice | 1/Lattice | $t = 0.5(\#SNSRs)$ | |
| TINIT | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 4.0 \quad \sigma = 4.1 \quad (t_{MAX} = 200)$ | $\bar{t} = 3.2 \quad \sigma = 1.9$ |
| TPRED | 1/Sector/Snsr | 1/Lattice/Snsr | $t = 3.1 + 1.3(TA+TU)$<br>TA = #Associated Tracks in Sector Processed | $\bar{t} = 3.5 \quad \sigma = 1.8$ |
| TPSEC | 1/Sector/Snsr | 1/Lattice/Snsr | $t = 7.8 + 0.5(TU)$ | $\bar{t} = 3.4 \quad \sigma = 1.8$ |
| TPUR | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 11.9 \quad \sigma = 10.9 \quad (t_{MAX} = 90)$ | $\bar{t} = 3.2 \quad \sigma = 1.9$ |
| TROUT | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 3.3 \quad \sigma = 1.7$ | $\bar{t} = 2.9 \quad \sigma = 1.9$ |
| TUDS | 1/Lattice | 1/Lattice | $t = 0.0066$(CTS Capacity) | |
| TUO | 1/Lattice | 1/Lattice | $t = 0.0038$(CTS Capacity) | |
| CDT | Prd = 1.3 Sec<br>$\sigma$ = 0.79 Sec | Random Popup | $\bar{t} = 3.6 \quad \sigma = 1.7$ | |
| CTIP | Prd=0.049 Sec | Periodic Popup | $\bar{t} = 1.8 \quad \sigma = 0.6$ | |
| EDISC | Prd=48.1 Mils<br>$\sigma$ = 35.8 Mils | Random Popup | $t = 0.0025$(CTS Capacity) | |
| IFI | Prd=19.2 Sec<br>$\sigma$ = 4.7 Sec | Random Popup | $\bar{t} = 1.0 \quad \sigma = 0.0$ | |
| KIP | Prd=64.9 Mils | Periodic Popup | $t = 0.98(\#DBMs)$ | |
| PSRAP | Prd=70.7 Mils | Periodic Popup | $\bar{t} = 19.5 \quad \sigma = 8.0$ | |
| MSP | Prd=48.6 Mils<br>$\sigma$ = 26.4 Mils | Random Popup | $\bar{t} = 4.0 \quad \sigma = 2.6$ | |

PROCESSOR UTILIZATION MODELS (1982) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| Overhead for Task Initiation | Before Each Task | | $\bar{t} = 0.33 \quad \sigma = 0.5$ | |
| Lattice | | | $t_{TIMEOUT} = \begin{cases} 130 \text{ if Prcsng on Schedule} \\ 110 \text{ if 1 Sector Late} \\ 85 \text{ if 2 Sectors Late} \\ 60 \text{ if 3 Sectors Late} \\ 35 \text{ if 4 Sectors Late} \end{cases}$ Lattice Execution Time is Compared to Timeout Value During PAUS Processing If Elapsed Lattice Execution Time Exceeds Timeout, PAUS is terminated. | |
| CA | 1/Sector/Snsr | 1/Lattice/Snsr | $t(j) = 0.0015\left[\sum_{k=1}^{32} CTA(j,k)\right]^2 + 0.084 \sum_{k=1}^{32} CTA(j,k)$ <br> $CTA(j,k)$ = Mode C Beacon Only Associated Tracks + Mode C Radar Reinforced Beacon Associated Tracks + Linked Unassociated Tracks on Sensor j in Sector k. | $\bar{t} = 3$ |
| CATRK | 1/Sector/Snsr | 1/Lattice/Snsr | $t(j) = 2\left[CTA(j,k)\right]$ | $\bar{t} = 3$ |
| CATU | 1/Lattice | 1/Lattice | $\bar{t} = 2$ | |
| TUDX | 1/Lattice | 1/Lattice | $t = 0.0066(CTS)$ | |

PROCESSOR UTILIZATION MODELS (1984)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| AL[illegible]K | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 2.6 \quad \sigma = 0.4$ | $\bar{t} = 1.3 \quad \sigma = .325$ |
| AUT | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.5$ | |
| CDR | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.0$ | |
| CRIT | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.0$ | |
| DOP | 1/Lattice | 1/Lattice | $t = 1.4(\#MDBMs)$ | |
| IFI | 1/Lattice | 1/Lattice | $t = 10.0 \quad \sigma = 3.0$ | |
| IFO | 1/Lattice | 1/Lattice | $\bar{t} = 10.0 \quad \sigma = 3.0$ | |
| KOFA | 1/Lattice | 1/Lattice | $\bar{t} = 5.4 \quad \sigma = 4.3$ | |
| MAT | 1/60 Seconds | 1/Lattice | $t = 0.001(CTS\ Capacity)$ $(t_{MAX} = 32)$ | $\bar{t} = 1.25 \quad \sigma = 0.425$ |
| MSAW | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 1.8 \quad \sigma = 1.0$ | $\bar{t} = 1.8 \quad \sigma = 1.0$ |
| MTP | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.0$ | |
| PAUS | P/Lattice (P=#Processors) | P/Lattice | $\sum_{p=1}^{P} t(p) = 0.0381(CTS) + 0.625(t_L)(T1)$ <br> $T1 = \sum_{j=1}^{\#Snsr} \frac{1}{\bar{t}_s(j)} \sum_{k=1}^{32} \left[TU(j,k)\right]\left[\#Displays\ (j)\right]$ <br> TU = Unassociated Tracks <br> j = Snsr ID <br> k = Sector ID <br> $t_L$ = Execution Time of Previous Lattice <br> $t_s$ = Sensor Scan Time | |

PROCESSOR UTILIZATION MODELS (1984) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| PDOP | 4/Second | 1/Lattice | t = 0.6(#MDBMs) | $\bar{t}$ = 1.7 σ = 1.3 |
| RDOP | 1/Lattice at Sites with RDBMs | 1/Lattice at Sites with RDBMs | t = 2.4(#RDBMs) | |
| RKIP | 1/Lattice at Sites with RDBMs | 1/Lattice at Sites with RDBMs | t = 1.3(#RDBMs) | |
| RTDOP | 1/Lattice at Sites with RDBMs | 1/Lattice at Sites with RDBMs | t = 0.6(#RDBMs) | |
| SCTME | Detroit: 1/Lat<br>NY, CHI, LA: 3/Lat | Detroit: 1/Lat<br>NY, CHI, LA: 3/Lat | $\sum_{i=1}^{I} t(i) = 0.0011$(CTS Capacity)<br>I = #Executions/Lattice | |
| SLINK | 1/Lattice at Multisnsr Site | 1/Lattice at Multisnsr Site | $\bar{t}$ = 8.2 σ = 2.7 ($t_{MAX}$ = 80) | |
| SWABS | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t}$ = 1.0 σ = 0.0 ($t_{MAX}$ = 64) | $\bar{t}$ = 1.0 |
| TCRSS | 1/Sector/Snsr | 1/Lattice/Snsr | t = 3.7 + TU ($t_{MAX}$ = 90)<br>TU = #Unassociated Tracks in Sector Processed | $\bar{t}$ = 3.1 σ = 1.3 |
| TDOP | NY: 5/Lattice<br>CHI:3/Lattice<br>LA: 2/Lattice<br>DET:1/Lattice | NY: 5/Lattice<br>CHI:3/Lattice<br>LA: 2/Lattice<br>DET:1/Lattice | $\sum_{i=1}^{I} t(i) = 0.6$(#DBMs)<br>I = # Executions/Lattice | |
| TEDC | 1/Sector/Snsr | 1/Lattice/Snsr | t = 1.7 + 0.55(ATD+UTD) + 0.2(TA)(TU)<br>($t_{MAX}$ = 60)<br>ATD = #Discrete Associated Tracks<br>UTD = #Discrete Unassociated Tracks | $\bar{t}$ = 3.5 σ = 2.5 |

PROCESSOR UTILIZATION MODELS (1984) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| TEXEC | 1/Lattice | 1/Lattice | $t = 0.5(\#SNSRs)$ | |
| TINIT | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 4.0$  $\sigma = 4.1$  $(t_{MAX} = 200)$ | $\bar{t} = 3.2$  $\sigma = 1.9$ |
| TPRED | 1/Sector/Snsr | 1/Lattice/Snsr | $t = 3.1 + 1.3(TA+TU)$<br>TA = #Associated Tracks in Sector Processed | $\bar{t} = 3.3$  $\sigma = 1.8$ |
| TPSEC | 1/Sector/Snsr | 1/Lattice/Snsr | $t = 7.8 + 0.5(TU)$ | $\bar{t} = 3.4$  $\sigma = 1.8$ |
| TPUR | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 11.9$  $\sigma = 10.9$  $(t_{MAX} = 90)$ | $\bar{t} = 3.2$  $\sigma = 1.9$ |
| TROUT | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 3.3$  $\sigma = 1.7$ | $\bar{t} = 2.9$  $\sigma = 1.9$ |
| TUDS | 1/Lattice | 1/Lattice | $t = 0.0066(CTS\ Capacity)$ | |
| TUD | 1/Lattice | 1/Lattice | $t = 0.0038(CTS\ Capacity)$ | |
| CDT | Prd = 1.3 Sec<br>$\sigma$ - 0.79 Sec | Random Popup | $\bar{t} = 3.6$  $\sigma = 1.7$ | |
| CTIP | Prd=0.049 Sec | Periodic Popup | $\bar{t} = 1.8$  $\sigma = 0.6$ | |
| EDISC | Prd=48.1 Mils<br>$\sigma$ = 35.8 Mils | Random Popup | $t = 0.0025(CTS\ Capacity)$ | |
| IFI | Prd=19.2 Sec<br>$\sigma$ = 4.7 Sec | Random Popup | $\bar{t} = 1.0$  $\sigma = 0.0$ | |
| KIP | Prd=64.9 Mils | Periodic Popup | $t = 0.3(\#DBMs)$ | |
| PSRAP | Prd=70.7 Mils | Periodic Popup | $\bar{t} = 19.5$  $\sigma = 8.0$ (4 Snsr Sites)<br>$\bar{t} = 9.8$  $\sigma = 5.7$ (2 Snsr Sites)<br>$\bar{t} = 4.9$  $\sigma$  4.0 (1 Snsr Sites) | |
| MSP | Prd=48.6 Mils<br>$\sigma$ = 26.4 Mils | Random Popup | | |

PROCESSOR UTILIZATION MODELS (1984) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| Overhead for Task Initiation | Before Each Task | | $\bar{t} = 0.33 \quad \sigma = 0.5$ | |
| Lattice | | | $t_{TIMEOUT} = \begin{cases} 130 \text{ if Prcsng on Schedule} \\ 110 \text{ if 1 Sector Late} \\ 85 \text{ if 2 Sectors Late} \\ 60 \text{ if 3 Sectors Late} \\ 35 \text{ if 4 Sectors Late} \end{cases}$ Lattice Execution Time is Compared to Timeout Value During PAUS Processing If Elapsed Lattice Execution Time Exceeds Timeout, PAUS is Terminated. | |
| CA | 1/Sector/Snsr | 1/Lattice/Snsr | $t(j) = 0.003\left[\sum_{k=1}^{32} CTA(j,k)\right]^2 + 0.164 \sum_{k=1}^{32} CTA(j,k)$ CTA(j,k) - Mode C Beacon Only Associated Tracks + Mode C Radar Reinforced Beacon Associated Tracks + Linked Unassociated Tracks on Sensor j in Sector k. | $\bar{t} = 3$ |
| CAIRK | 1/Sector/Snsr | 1/Lattice/Snsr | $t(j) = 2\lvert CTA(j,k)\rvert$ | $\bar{t} = 3$ |
| CAID | 1/Lattice | 1/Lattice | $t = 2$ | |
| TDDX | 1/Lattice | 1/Lattice | $t = 0.0066(CTS)$ | |

## PROCESSOR UTILIZATION MODELS (1986)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| ALTRK | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 2.6 \quad \sigma = 0.4$ | $\bar{t} = 1.3 \quad \sigma = .325$ |
| AUT | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.5$ | |
| COR | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.0$ | |
| CRIT | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.0$ | |
| DOP | 1/Lattice | 1/Lattice | $t = 1.4(\#MDBMs)$ | |
| IFI | 1/Lattice | 1/Lattice | $\bar{t} = 10.0 \quad \sigma = 3.0$ | |
| IFO | 1/Lattice | 1/Lattice | $\bar{t} = 10.0 \quad \sigma = 3.0$ | |
| KOFA | 1/Lattice | 1/Lattice | $\bar{t} = 5.4 \quad \sigma = 4.3$ | |
| MAT | 1/60 Seconds | 1/Lattice | $t = 0.001(\text{CTS Capacity})$ $(t_{MAX} = 32)$ | $\bar{t} = 1.25 \quad \sigma = 0.425$ |
| MSAW | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 1.8 \quad \sigma = 1.0$ | $\bar{t} = 1.8 \quad \sigma = 1.0$ |
| MTP | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.0$ | |
| PAUS | P/Lattice (P=#Processors) | P/Lattice | $\sum_{p=1}^{P} t(p) = 0.0381(CTS) + 0.625(t_L)(T1)$<br>$T1 = \sum_{j=1}^{\#Snsr} \frac{1}{t_s(j)} \sum_{k=1}^{32} 1.34\left[TA(j,k)\right] + \left[TU(j,k)\right]\left[\#Displays(j)\right]$<br>TA = Associated Tracks<br>TU = Unassociated Tracks<br>j = Snsr ID<br>k = Sector ID<br>$t_L$ = Execution Time of Previous Lattice<br>$t_s$ = Sensor Scan Time | |

PROCESSOR UTILIZATION MODELS (1986) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| PDOP | 4/Second | 1/Lattice | t = 0.6(#MDBMs) | $\bar{t}$ = 1.7 σ = 1.3 |
| RDOP | 1/Lattice at Sites with RDBMs | 1/Lattice at Sites with RDBMs | t = 2.4(#RDBMs) | |
| RKIP | 1/Lattice at Sites with RDBMs | 1/Lattice at Sites with RDBMs | t = 1.3(#RDBMs) | |
| RTDOP | 1/Lattice at Sites with RDBMs | 1/Lattice at Sites with RDBMs | t = 0.6(#RDBMs) | |
| SCTME | Detroit: 1/Lat<br>NY, CHI, LA: 3/Lat | Detroit: 1/Lat<br>NY, CHI, LA: 3/Lat | $\sum_{i=1}^{I} t(i)$ = 0.0011(CTS Capacity)<br>I = #Executions/Lattice | |
| SLINK | 1/Lattice at Multisnsr Site | 1/Lattice at Multisnsr Site | $\bar{t}$ = 8.2 σ = 2.7 ($t_{MAX}$ = 80) | |
| SNABS | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t}$ = 1.0 σ = 0.0 ($t_{MAX}$ = 64) | $\bar{t}$ = 1.0 |
| TCRSS | 1/Sector/Snsr At NY Only | 1/Lattice/Snsr At NY Only | t = 3.7 + TU ($t_{MAX}$ = 90)<br>TU = #Unassociated Tracks in Sector Processed | $\bar{t}$ = 3.1 σ = 1.3 |
| TDOP | NY: 5/Lattice<br>CHI:3/Lattice<br>LA: 2/Lattice<br>DET:1/Lattice | NY: 5/Lattice<br>CHI:3/Lattice<br>LA: 2/Lattice<br>DET:1/Lattice | $\sum_{i=1}^{I} t(i)$ = 0.6(#DBMs)<br>I = # Executions/Lattice | |
| TEDC | 1/Sector/Snsr At NY Only | 1/Lattice/Snsr At NY Only | t = 1.7 + 0.55(ATD+UTD) + 0.2(TA)(TU)<br>($t_{MAX}$ = 60)<br>ATD = #Discrete Associated Tracks<br>UTD = #Discrete Unassociated Tracks | $\bar{t}$ = 3.5 σ = 2.5 |

PROCESSOR UTILIZATION MODELS (1986) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| TEXEC | 1/Lattice | 1/Lattice | $t = 0.5$(#SNSRs) | |
| TINIT | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 4.0$ $\sigma = 4.1$ $(t_{MAX} = 200)$ | $\bar{t} = 3.2$ $\sigma = 1.9$ |
| TPRED | 1/Sector/Snsr | 1/Lattice/Snsr | $t = 3.1 + 1.3$(TA+TU)<br>TA = #Associated Tracks in Sector Processed | $\bar{t} = 3.3$ $\sigma = 1.8$ |
| TPSEC | 1/Sector/Snsr At NY Only | 1/Lattice/Snsr At NY Only | $t = 7.8 + 0.5$(TU) | $\bar{t} = 3.4$ $\sigma = 1.8$ |
| TPUR | 1/Sector/Snsr At NY Only | 1/Lattice/Snsr At NY Only | $\bar{t} = 11.9$ $\sigma = 10.9$ $(t_{MAX} = 90)$ | $\bar{t} = 3.2$ $\sigma = 1.9$ |
| TROUT | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 3.3$ $\sigma = 1.7$ | $\bar{t} = 2.9$ $\sigma = 1.9$ |
| TUDS | 1/Lattice | 1/Lattice | $t = 0.0066$(CTS Capacity) | |
| TUD | 1/Lattice | 1/Lattice | $t = 0.0038$(CTS Capacity) | |
| CDT | Prd = 1.3 Sec<br>$\sigma$ = 0.79 Sec | Random Popup | $\bar{t} = 3.6$ $\sigma = 1.7$ | |
| CTIP | Prd=0.049 Sec | Periodic Popup | $\bar{t} = 1.8$ $\sigma = 0.6$ | |
| EDISC | Prd=48.1 Mils<br>$\sigma$ = 35.8 Mils | Random Popup | $t = 0.0025$(CTS Capacity) | |
| IFI | Prd=19.2 Sec<br>$\sigma$ = 4.7 Sec | Random Popup | $\bar{t} = 1.0$ $\sigma = 0.0$ | |
| KIP | Prd=64.9 Mils | Periodic Popup | $t = 0.3$(#DBMs) | |
| PSRAP | Prd=70.7 Mils | Periodic Popup | $\bar{t} = 19.5$ $\sigma = 8.0$ (4 Snsr Sites)<br>$\bar{t} = 9.8$ $\sigma = 5.7$ (2 Snsr Sites)<br>$\bar{t} = 4.9$ $\sigma = 4.0$ (1 Snsr Sites) | |
| MSP | Prd=48.6 Mils<br>$\sigma$ = 26.4 Mils | Random Popup | $\bar{t} = 4.0$ $\sigma = 2.6$ | |

PROCESSOR UTILIZATION MODELS (1986) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| Overhead for Task Initiation | Before Each Task | | $\bar{t} = 0.33 \quad \sigma = 0.5$ | |
| Lattice | | | $t_{TIMEOUT} = \begin{cases} 130 \text{ if Prcsng on Schedule} \\ 110 \text{ if 1 Sector Late} \\ 85 \text{ if 2 Sectors Late} \\ 60 \text{ if 3 Sectors Late} \\ 35 \text{ if 4 Sectors Late} \end{cases}$<br>Lattice Execution Time is Compared to Timeout Value During PAUS Processing if Elapsed Lattice Execution Time Exceeds Timeout, PAUS is Terminated. | |
| CA | 1/Sector/Snsr | 1/Lattice/Snsr | $t(j) = 0.003\left[\sum_{k=1}^{32} CTA(j,k)\right]^2 + 0.164 \sum_{k=1}^{32} CTA(j,k)$<br>CTA(j,k) = Mode C Beacon Only Associated Tracks + Mode C Radar Reinforced Beacon Assocaited Tracks + Linked Unassociated Tracks on Sensor j in Sector k | $\bar{t} = 3$ |
| CATRK | 1/Sector/Snsr | 1/Lattice/Snsr | $t(j) = 2\left[CTA(j,k)\right]$ | $\bar{t} = 3$ |
| CATU | 1/Lattice | 1/Lattice | $\bar{t} = 2$ | |
| TUDX | 1/Lattice | 1/Lattice | t = 0.0066(CTS) | |
| PUTT | 1/Lattice/Snsr At NY Only | 1/Lattice/Snsr At NY Only | t = 1 | |
| MS | Prd = 153.6Mils | Periodic Popup | $t = 0.11 + 1.7 \sum_{j=1}^{\#Snsr} \sum_{k=1}^{32} TA(j,k)$<br>j = Sensor ID<br>k = Sector ID | |

PROCESSOR UTILIZATION MODELS (1986) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| DABC | 1/Sector/Snsr<br>Not implemented at NY in '86 | 1/Lattice/Snsr | $t = 2.55 + 0.83(TA+TU) + 0.3(TA)(TU)$<br>TA = Associated Tracks in Sector<br>TU = Unassociated Tracks in Sector | $\bar{t} = 3.5$  $\sigma = 2.5$ |

PROCESSOR UTILIZATION MODELS (1988)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| ALTRK | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 2.6 \quad \sigma = 0.4$ | $\bar{t} = 1.3 \quad \sigma = .325$ |
| AUT | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.5$ | |
| CDR | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.0$ | |
| CRIT | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.0$ | |
| DOP | 1/Lattice | 1/Lattice | $t = 1.4(\#MDBMs)$ | |
| IFI | 1/Lattice | 1/Lattice | $\bar{t} = 15.0 \quad \sigma = 3.0$ | |
| IFO | 1/Lattice | 1/Lattice | $\bar{t} = 18.3 \quad \sigma = 3.0$ | |
| KOFA | 1/Lattice | 1/Lattice | $\bar{t} = 5.4 \quad \sigma = 4.3$ | |
| MAT | 1/60 Seconds | 1/Lattice | $t = 0.001(\text{CTS Capacity})$ $(t_{MAX} = 32)$ | $\bar{t} = 1.25 \quad \sigma = 0.425$ |
| MSAW | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 1.8 \quad \sigma = 1.0$ | $\bar{t} = 1.8 \quad \sigma = 1.0$ |
| MTP | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.0$ | |
| PAUS | P/Lattice (P=#Processors) | P/Lattice | $\sum_{p=1}^{P} t(p) = 0.0381(CTS) + 0.625(t_L)(T1)$<br>$T1 = \sum_{j=1}^{\#Snsr} \frac{1}{t_s(j)} \sum_{k=1}^{32} 1.34\left[TA(j,k)\right] + \left[TU(j,k)\right] \left[\#Displays(j)\right]$<br><br>TA = Associated Tracks<br>TU = Unassociated Tracks<br>j = Snsr ID<br>k = Sector ID<br>$t_L$ = Execution Time of Previous Lattice<br>$t_s$ = Sensor Scan Time | |

PROCESSOR UTILIZATION MODELS (1988) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| PDOP | 4/Second | 1/Lattice | $t = 0.6(\#MDBMs)$ | $\bar{t} = 1.7 \quad \sigma = 1.3$ |
| RDOP | 1/Lattice at Sites with RDBMs | 1/Lattice at Sites with RDBMs | $t = 2.4(\#RDBMs)$ | |
| RKIP | 1/Lattice at Sites with RDBMs | 1/Lattice at Sites with RDBMs | $t = 1.3(\#RDBMs)$ | |
| RTDOP | 1/Lattice at Sites with RDBMs | 1/Lattice at Sites with RDBMs | $t = 0.6(\#RDBMs)$ | |
| SCTME | Detroit: 1/Lat<br>NY, CHI, LA: 3/Lat | Detroit: 1/Lat<br>NY, CHI, LA: 3/Lat | $\sum_{i=1}^{I} t(i) = 0.0011(\text{CTS Capacity})$<br>$I$ = #Executions/Lattice | |
| SLINK | 1/Lattice at Multisnsr Site | 1/Lattice at Multisnsr Site | $\bar{t} = 8.2 \quad \sigma = 2.7 \quad (t_{MAX} = 80)$ | |
| SWAPS | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 1.0 \quad \sigma = 0.0 \quad (t_{MAX} = 64)$ | $\bar{t} = 1.0$ |
| TDOP | NY: 5/Lattice<br>CHI:3/Lattice<br>LA: 2/Lattice<br>DET:1/Lattice | NY: 5/Lattice<br>CHI:3/Lattice<br>LA: 2/Lattice<br>DET:1/Lattice | $\sum_{i=1}^{I} t(i) = 0.6(\#DBMs)$<br>I = # Executions/Lattice | |

PROCESSOR UTILIZATION MODELS (1988) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| TEXFC | 1/Lattice | 1/Lattice | $t$ = 0.5(#SNSRs) | |
| TINIT | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t}$ = 4.0 $\sigma$ = 4.1 ($t_{MAX}$ = 200) | $\bar{t}$ = 3.2 $\sigma$ = 1.9 |
| TPRED | 1/Sector/Snsr | 1/Lattice/Snsr | $t$ = 3.1 + 1.3(TA+TU)<br>TA = #Associated Tracks in Sector Processed | $\bar{t}$ = 3.3 $\sigma$ = 1.8 |
| TROUT | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t}$ = 3.3 $\sigma$ = 1.7 | $\bar{t}$ = 2.9 $\sigma$ = 1.9 |
| TUDS | 1/Lattice | 1/Lattice | $t$ = 0.0066(CTS Capacity) | |
| TUD | 1/Lattice | 1/Lattice | $t$ = 0.0038(CTS Capacity) | |
| COT | Prd = 1.3 Sec<br>$\sigma$ = 0.79 Sec | Random Popup | $\bar{t}$ = 3.6 $\sigma$ = 1.7 | |
| CTIP | Prd=0.049 Sec | Periodic Popup | $\bar{t}$ = 1.8 $\sigma$ = 0.6 | |
| EDISC | Prd=48.1 Mils<br>$\sigma$ = 35.8 Mils | Random Popup | $t$ = 0.0025(CTS Capacity) | |
| IFI | Prd=19.2 Sec<br>$\sigma$ = 4.7 Sec | Random Popup | $\bar{t}$ = 1.0 $\sigma$ = 0.0 | |
| KIP | Prd=64.9 Mils | Periodic Popup | $t$ = 0.3(#DBMs) | |
| PSRAP | Prd=70.7 Mils | Periodic Popup | $\bar{t}$ = 19.5 $\sigma$ = 8.0 (4 Snsr Sites)<br>$\bar{t}$ = 9.8 $\sigma$ = 5.7 (2 Snsr Sites)<br>$\bar{t}$ = 4.9 $\sigma$ 4.0 (1 Snsr Sites) | |
| MSP | Prd=48.6 Mils<br>$\sigma$ = 26.4 Mils | Random Popup | $\bar{t}$ = 4.0 $\sigma$ = 2.6 | |

PROCESSOR UTILIZATION MODELS (1988) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| Overhead for Task Initiation | Before Each Task | | $\bar{t} = 0.33 \quad \sigma = 0.5$ | |
| Lattice | | | $t_{TIMEOUT} = \begin{cases} 130 \text{ if Prcsng on Schedule} \\ 110 \text{ if 1 Sector Late} \\ 85 \text{ if 2 Sectors Late} \\ 60 \text{ if 3 Sectors Late} \\ 35 \text{ if 4 Sectors Late} \end{cases}$ Lattice Execution Time is Compared to Timeout Value During PAUS Processing if Elapsed Lattice Execution Time Exceeds Timeout, PAUS is Terminated. | |
| CA | 1/Sector/Snsr | 1/Lattice/Snsr | $t(j) = 0.003\left[\sum_{k=1}^{32} CTA(j,k)\right]^2 + 0.164 \sum_{k=1}^{32} CTA(j,k)$ <br> CTA(j,k) = Mode C Beacon Only Associated Tracks + Mode C Radar Reinforced Beacon Assocaited Tracks + Linked Unassociated Tracks on Sensor j in Sector k | $\bar{t} = 3$ |
| CATRK | 1/Sector/Snsr | 1/Lattice/Snsr | $t(j) = 2\left[CTA(j,k)\right]$ | $\bar{t} = 3$ |
| CATU | 1/Lattice | 1/Lattice | $\bar{t} = 2$ | |
| TUDX | 1/Lattice | 1/Lattice | $t = 0.0066(CTS)$ | |
| MS | Prd=153.6 Mils | Periodic Popup | $t = 0.11 + 1.7 \sum_{j=1}^{\#Snsr} \sum_{k=1}^{32} TA(j,k)$ <br> j = Sensor ID <br> k = Sector ID | |

PROCESSOR UTILIZATION MODELS (1988) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| DABC | 1/Sector/Snsr | 1/Lattice/Snsr | $t = 2.55 + 0.83(TA+TU) + 0.3(TA)(TU)$<br><br>TA = Associated Tracks in Sector<br>TU = Unassociated Tracks in Sector | $\bar{t} = 3.5$  $\sigma = 2.5$ |

PROCESSOR UTILIZATION MODELS ( 1990)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| AL TRK | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 2.6 \quad \sigma = 0.4$ | $\bar{t} = 1.3 \quad \sigma = .325$ |
| AUT | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.5$ | |
| CDR | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.0$ | |
| CRIT | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.0$ | |
| DOP | 1/Lattice | 1/Lattice | $t = 1.4(\#MDBMs)$ | |
| IFI | 1/Lattice | 1/Lattice | $\bar{t} = 15.0 \quad \sigma = 3.0$ | |
| IFO | 1/Lattice | 1/Lattice | $\bar{t} = 18.3 \quad \sigma = 3.0$ | |
| KOFA | 1/Lattice | 1/Lattice | $\bar{t} = 5.4 \quad \sigma = 4.3$ | |
| MAT | 1/60 Seconds | 1/Lattice | $t = 0.001(\text{CTS Capacity})$ $(t_{MAX} = 32)$ | $\bar{t} = 1.25 \quad \sigma = 0.425$ |
| MSAW | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 1.8 \quad \sigma = 1.0$ | $\bar{t} = 1.8 \quad \sigma = 1.0$ |
| MIP | 1/Lattice | 1/Lattice | $\bar{t} = 1.0 \quad \sigma = 0.0$ | |
| PAUS | P/Lattice (P-#Processors) | P/Lattice | $\sum_{p=1}^{P} t(p) = 0.0381(CTS) + 0.625(t_L)(TI)$<br>$TI = \sum_{j=1}^{\#Snsr} \frac{1}{t_s(j)} \sum_{k=1}^{32} 1.34\left[TA(j,k)\right] + \left[TU(j,k)\right] \left[\#Displays(j)\right]$<br><br>TA = Associated Tracks<br>TU = Unassociated Tracks<br>j = Snsr ID<br>k = Sector ID<br>$t_L$ = Execution Time of Previous Lattice<br>$t_s$ = Sensor Scan Time | |

PROCESSOR UTILIZATION MODELS (1990) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| PDOP | 4/Second | 1/Lattice | t = 0.6(#MDBMs) | $\bar{t}$ = 1.7   σ = 1.3 |
| RDOP | 1/Lattice at Sites with RDBMs | 1/Lattice at Sites with RDBMs | t = 2.4(#RDBMs) | |
| RKIP | 1/Lattice at Sites with RDBMs | 1/Lattice at Sites with RDBMs | t = 1.3(#RDBMs) | |
| RTDOP | 1/Lattice at Sites with RDBMs | 1/Lattice at Sites with RDBMs | t = 0.6(#RDBMs) | |
| SCTME | Detroit: 1/Lat<br>NY, CHI, LA } 3/Lat | Detroit: 1/Lat<br>NY, CHI, LA } 3/Lat | $\sum_{i=1}^{I} t(i)$ = 0.0011(CIS Capacity)<br>I = #Executions/Lattice | |
| SLINK | 1/Lattice at Multisnsr Site | 1/Lattice at Multisnsr Site | $\bar{t}$ = 8.2   σ = 2.7   ($t_{MAX}$ = 80) | |
| SWAPS | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t}$ = 1.0   σ = 0.0   ($t_{MAX}$ = 64)<br>TU = #Unassociated Tracks in Sector Processed | $\bar{t}$ = 1.0 |
| TDOP | NY: 5/Lattice<br>CHI: 3/Lattice<br>LA: 2/Lattice<br>DET: 1/Lattice | NY: 5/Lattice<br>CHI: 3/Lattice<br>LA: 2/Lattice<br>DET: 1/Lattice | $\sum_{i=1}^{I} t(i)$ = 0.6(#DBMs)<br>I = # Executions/Lattice | |

PROCESSOR UTILIZATION MODELS (1990) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| TEXEC | 1/Lattice | 1/Lattice | $t = 0.5$(#SNSRs) | |
| TINIT | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 4.0$ $\sigma = 4.1$ ($t_{MAX} = 200$) | $\bar{t} = 3.2$ $\sigma = 1.9$ |
| TPRED | 1/Sector/Snsr | 1/Lattice/Snsr | $t = 3.1 + 1.3(TA+TU)$<br>TA = #Associated Tracks in Sector Processed | $\bar{t} = 3.3$ $\sigma = 1.8$ |
| TROUT | 1/Sector/Snsr | 1/Lattice/Snsr | $\bar{t} = 3.3$ $\sigma = 1.7$ | $\bar{t} = 2.9$ $\sigma = 1.9$ |
| TUDS | 1/Lattice | 1/Lattice | $t = 0.0066$(CTS Capacity) | |
| TUD | 1/Lattice | 1/Lattice | $t = 0.0038$(CTS Capacity) | |
| CDT | Prd = 1.3 Sec<br>$\sigma = 0.79$ Sec | Random Popup | $\bar{t} = 3.6$ $\sigma = 1.7$ | |
| CTIP | Prd=0.049 Sec | Periodic Popup | $\bar{t} = 1.8$ $\sigma = 0.6$ | |
| EDISC | Prd=48.1 Mils<br>$\sigma = 35.8$ Mils | Random Popup | $t = 0.0025$(CTS Capacity) | |
| IFI | Prd=19.2 Sec<br>$\sigma = 4.7$ Sec | Random Popup | $\bar{t} = 1.0$ $\sigma = 0.0$ | |
| XIP | Prd=64.9 Mils | Periodic Popup | $t = 0.3$(#DBMs) | |
| PSRAP | Prd=70.7 Mils | Periodic Popup | $\bar{t} = 19.5$ $\sigma = 8.0$ (4 Snsr Sites)<br>$\bar{t} = 9.8$ $\sigma = 5.7$ (2 Snsr Sites)<br>$\bar{t} = 4.9$ $\sigma$ 4.0 (1 Snsr Sites) | |
| MSP | Prd=48.6 Mils<br>$\sigma = 26.4$ Mils | Periodic Popup | $\bar{t} = 4.0$ $\sigma = 2.6$ | |

PROCESSOR UTILIZATION MODELS (1990) (Cont'd.)

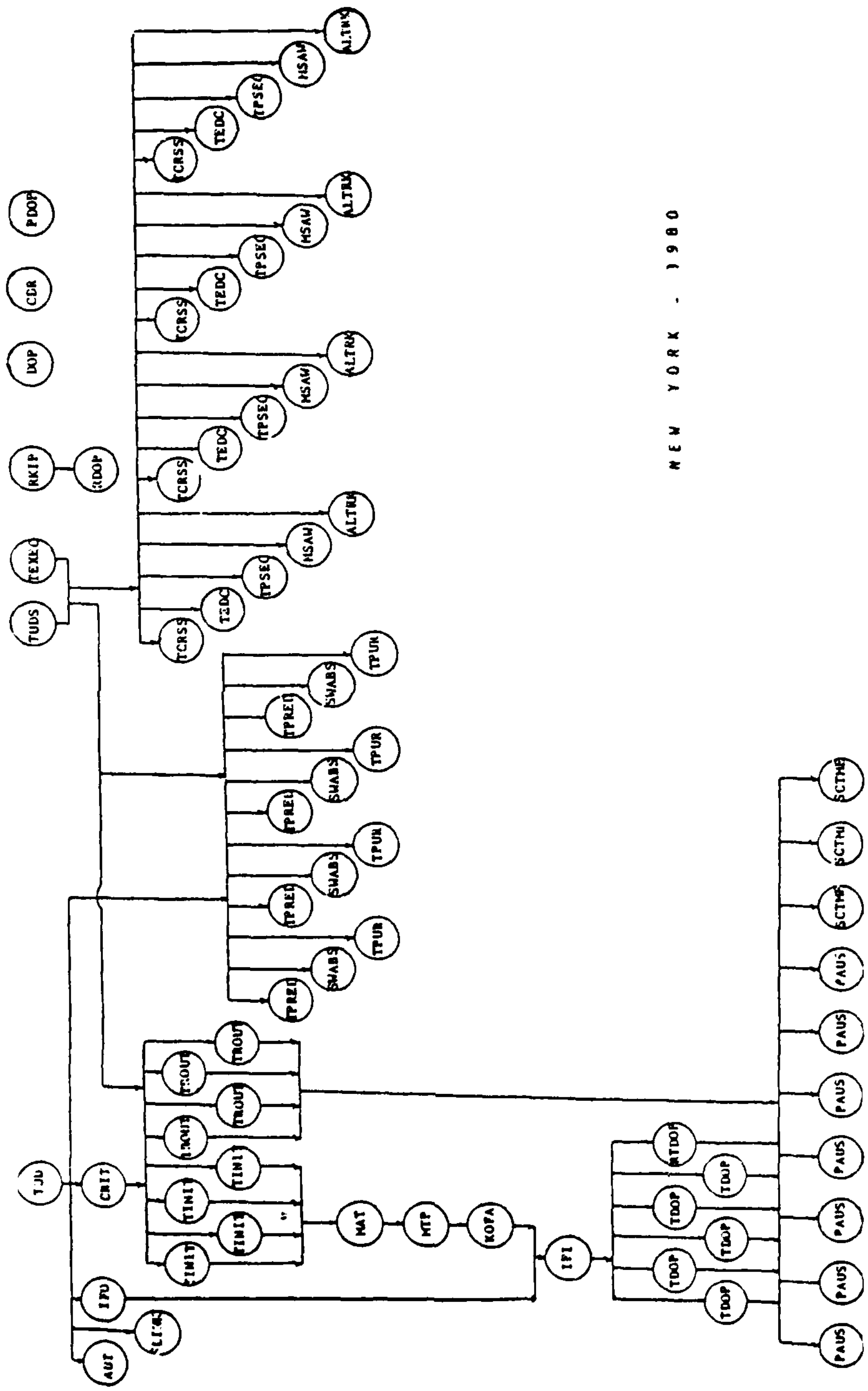
| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| Overhead for Task Initiation | Before Each Task | | $\bar{t} = 0.33 \quad \sigma = 0.5$ | |
| Lattice | | | $t_{TIMEOUT} = \begin{cases} 130 \text{ if Prcsng on Schedule} \\ 110 \text{ if 1 Sector Late} \\ 85 \text{ if 2 Sectors Late} \\ 60 \text{ if 3 Sectors Late} \\ 35 \text{ if 4 Sectors Late} \end{cases}$ Lattice Execution Time is Compared to Timeout Value During PAUS Processing if Elapsed Lattice Execution Time Exceeds Timeout, PAUS is Terminated. | |
| CA | 1/Sector/Snsr | 1/Lattice/Snsr | $t(j) = 0.003\left[\sum_{k=1}^{32} CTA(j,k)\right]^2 + 0.164 \sum_{k=1}^{32} CTA(j,k)$ CTA(j,k) = Mode C Beacon Only Associated Tracks + Mode C Radar Reinforced Beacon Assocaited Tracks + Linked Unassociated Tracks on Sensor j in Sector k | $\bar{t} = 3$ |
| CATRK | 1/Sector/Snsr | 1/Lattice/Snsr | $t(j) = 2\left[CTA(j,k)\right]$ | $\bar{t} = 3$ |
| CATII | 1/Lattice | 1/Lattice | $\bar{t} = 2$ | |
| TUDX | 1/Lattice | 1/Lattice | $t = 0.0066(CTS)$ | |
| MS | Prd=153.6 Mils | Periodic Popup | $t = 0.11 + 1.7\sum_{j=1}^{\#Snsr} \sum_{k=1}^{32} TA(j,k)$ j = Sensor ID k = Sector ID | |

PROCESSOR UTILIZATION MODELS (1990) (Cont'd.)

| FUNCTION | FREQUENCY EXECUTED | FREQUENCY INITIATED | PROCESS TIME (MILS) WHEN EXECUTED | PROCESS TIME (MILS) WHEN INITIATED BUT NOT EXECUTED |
|---|---|---|---|---|
| DABC | 1/Sector/Snsr | 1/Lattice/Snsr | $t = 2.55 + 0.83(TA+TU) + 0.3(TA)(TU)$<br>TA = Associated Tracks in Sector<br>TU = Unassociated Tracks in Sector | $\bar{t} = 3.5$    $\sigma = 2.5$ |

# APPENDIX M

## LATTICE DESCRIPTIONS FOR THE NEW YORK TRACON


NEW YORK - 1980
PDOP
CDR
DOP
RKIP
RDOP
TUDS
TCRSS
TEDC
TPSEQ
MSAW
TPUR
SWABS
SCTMS
PAUS
TROUT
TINIT
CRIT
TJU
IFU
AUT
MAT
MTP
KOPA
IFI
TDOP

LATTICE STRUCTURE

NEW YORK 1980

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | TINIT1 | TROUT1 | TINIT3 | TROUT3 | TINIT2 | TROUT2 | TINIT4 | TROUT4 |
| | TPSEC1 | TCRSS1 | TEDC1 | TPRED1 | TPUR1 | ALTRK1 | MSAW1 | SWABS1 |
| | TPSEC2 | TCRSS2 | TEDC2 | TPRED2 | TPUR2 | ALTRK2 | MSAW2 | SWABS2 |
| | TPSEC3 | TCRSS3 | TEDC3 | TPRED3 | TPUR3 | ALTRK3 | MSAW3 | SWABS3 |
| | TPSEC4 | TCRSS4 | TEDC4 | TPRED4 | TPUR4 | ALTRK4 | MSAW4 | SWABS4 |
| TUD | CRIT | IFO | AUT | SLINK | TPRED1 | TPUR1 | SWABS1 | TPRED2 |
| | TPUR2 | SWABS2 | TPRED3 | TPUR3 | SWABS3 | TPRED4 | TPUR4 | SWABS4 |
| TUDS | TINIT1 | TROUT1 | TINIT3 | TROUT3 | TINIT2 | TROUT2 | TINIT4 | TROUT4 |
| | TPSEC1 | TCRSS1 | TEDC1 | TPRED1 | TPUR1 | ALTRK1 | MSAW1 | SQABS1 |
| | TPSEC2 | TCRSS2 | TEDC2 | TPRED2 | TPUR2 | ALTRK2 | MSAW2 | SWABS2 |
| | TPSEC3 | TCRSS3 | TEDC3 | TPRED3 | TPUR3 | ALTRK3 | MSAW3 | SWABS3 |
| | TPSEC4 | TCRSS4 | TEDC4 | TPRED4 | TPUR4 | ALTRK4 | MSAW4 | SWABS4 |
| RKIP | RDOP | | | | | | | |
| RDOP | | | | | | | | |
| DOP | | | | | | | | |
| CDR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | TINIT1 | TROUT1 | TINIT3 | TROUT3 | TINIT2 | TROUT2 | TINIT4 | TROUT4 |
| IFO | IFI | | | | | | | |
| TINIT1 | MAT | | | | | | | |
| TINIT2 | MAT | | | | | | | |
| TINIT3 | MAT | | | | | | | |
| TINIT4 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS3 | PAUS4 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT3 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT4 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | TDOP4 | RTDOP | TDOP2 | TDOP5 | TDOP3 | | |
| TDOP1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |

## LATTICE STRUCTURE

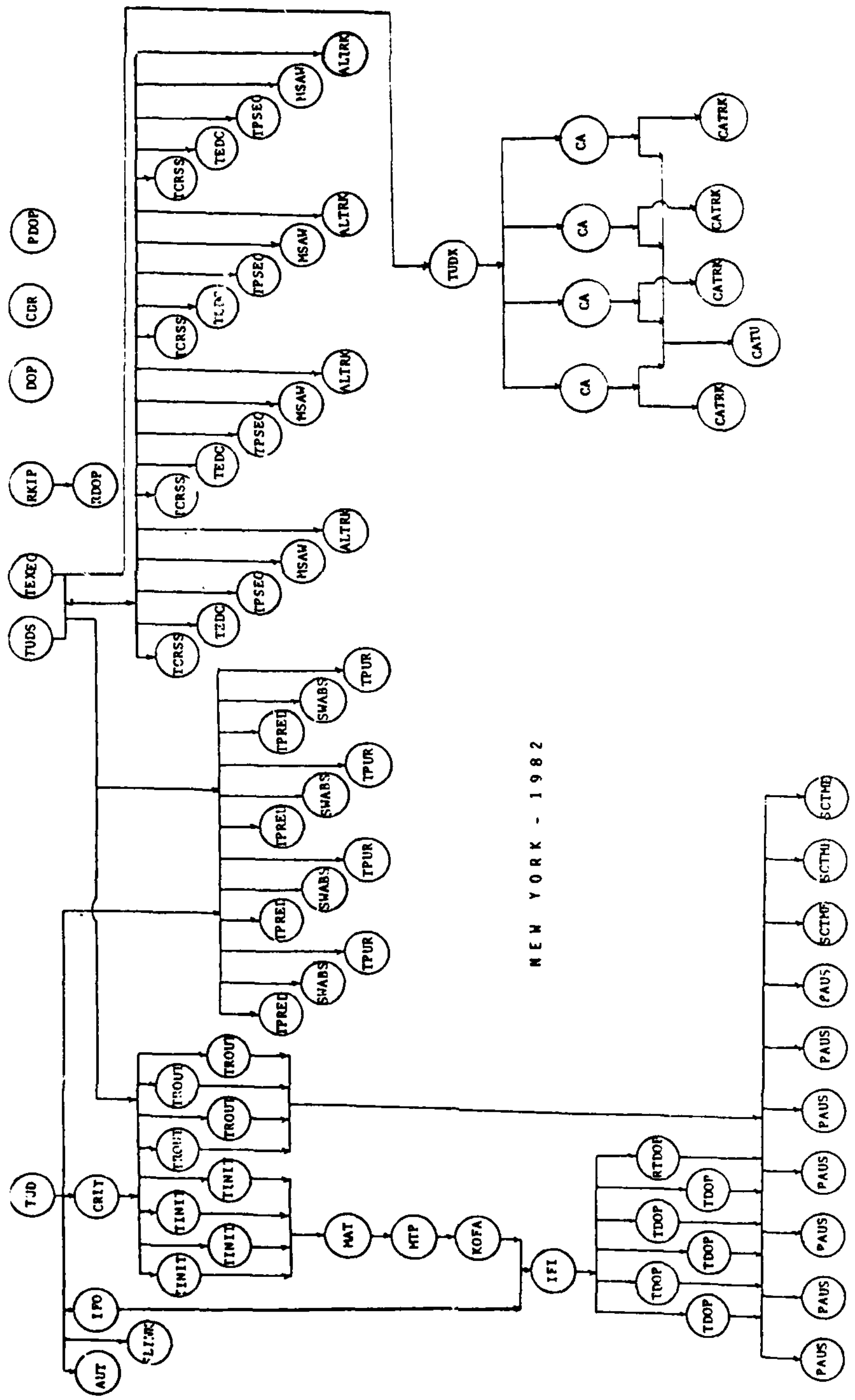
## NEW YORK 1980 (Cont'd.)

| TASK | SUCCESSORS |
|---|---|
| TDOP2 | PAUS1 PAUS2 PAUS3 PAUS4 PAUS5 PAUS6 PAUS7 SCTME1 SCTME2 SCTME3 |
| TDOP3 | PAUS1 PAUS2 PAUS3 PAUS4 PAUS5 PAUS6 PAUS7 SCTME1 SCTME2 SCTME3 |
| TDOP4 | PAUS1 PAUS2 PAUS3 PAUS4 PAUS5 PAUS6 PAUS7 SCTME1 SCTME2 SCTME3 |
| TDOP5 | PAUS1 PAUS2 PAUS3 PAUS4 PAUS5 PAUS6 PAUS7 SCTME1 SCTME2 SCTME3 |
| RTDOP | PAUS1 PAUS2 PAUS3 PAUS4 PAUS5 PAUS6 PAUS7 SCTME1 SCTME2 SCTME3 |
| TPRED1 | |
| SWABS1 | |
| TPUR1 | |
| TPRED2 | |
| SWABS2 | |
| TPUR2 | |
| TPRED3 | |
| SWABS3 | |
| TPUR3 | |
| TPRED4 | |
| SWABS4 | |
| TPUR4 | |
| TCRSS1 | |
| TEDC1 | |
| TPSEC1 | |
| MSAW1 | |
| ALTRK1 | |
| TCRSS2 | |
| TEDC2 | |
| TPSEC2 | |
| MSAW2 | |
| ALTRK2 | |
| TCRSS3 | |
| TEDC3 | |
| TPSEC3 | |
| MSAW3 | |
| ALTRK3 | |
| TCRSS4 | |
| TEDC4 | |
| TPSEC4 | |
| MSAW4 | |
| ALTRK4 | |
| AUT | |
| SLINK | |

LATTICE STRUCTURE

NEW YORK 1980 (Cont'd.)

| TASK | SUCCESSORS |
| --- | --- |
| PAUS1 | |
| PAUS2 | |
| PAUS3 | |
| PAUS4 | |
| PAUS5 | |
| PAUS6 | |
| PAUS7 | |
| SCTME1 | |
| SCTME2 | |
| SCTME3 | |




NEW YORK - 1982

AD-A087 243 STERLING SYSTEMS INC WASHINGTON DC F/G 17/7
ASSESSMENT OF THE CAPACITY OF THE AUTOMATED RADAR TERMINAL SYST--ETC(U)
JUN 80 W PAILEN, H C WINTERMOYER, R SITTLER DOT-FA78WAI-942
UNCLASSIFIED FAA-RD-80-51 NL

5 OF 5
AD
A087243

END
DATE
FILMED
9-80
DTIC

# LATTICE STRUCTURE

# NEW YORK 1982

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | TINIT1 | TROUT1 | TINIT3 | TROUT3 | TINIT2 | TROUT2 | TINIT4 | TROUT4 |
| | CA1 | CA2 | CA3 | CA4 | TPSEC1 | TCRSS1 | TEDC1 | TPRED1 |
| | TPUR1 | ALTRK1 | MSAW1 | SWABS1 | TPSEC2 | TCRSS2 | TEDC2 | TPRED2 |
| | TPUR2 | ALTRK2 | MSAW2 | SWABS2 | TPSEC3 | TCRSS3 | TEDC3 | TPRED3 |
| | TPUR4 | ALTRK4 | MSAW4 | SWABS4 | | | | |
| TUD | CRIT | IFO | AUT | SLINK | TPRED1 | TPUR1 | SWABS1 | TPRED2 |
| | TPUR2 | SWABS2 | TPRED3 | TPUR3 | SWABS3 | TPRED4 | TPUR4 | SWABS4 |
| TUDS | TINIT1 | TROUT1 | TINIT3 | TROUT3 | TINIT2 | TROUT2 | TINIT4 | TROUT4 |
| | CA1 | CA2 | CA3 | CA4 | TPSEC1 | TCRSS1 | TEDC1 | TPRED1 |
| | TPUR1 | ALTRK1 | MSAW1 | SWABS1 | TPSEC2 | TCRSS2 | TEDC2 | TPRED2 |
| | TPUR2 | ALTRK2 | MSAW2 | SWABS2 | TPSEC3 | TCRSS3 | TEDC3 | TPRED3 |
| | TPUR3 | ALTRK3 | MSAW3 | SWABS3 | TPSEC4 | TCRSS4 | TEDC4 | TPRED4 |
| | TPUR4 | ALTRK4 | MSAW4 | SWABS4 | | | | |
| TUDX | CA1 | CA2 | CA3 | CA4 | | | | |
| RKIP | RDOP | | | | | | | |
| RDOP | | | | | | | | |
| DOP | | | | | | | | |
| CDR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | TINIT1 | TROUT1 | TINIT3 | TROUT3 | TINIT2 | TROUT2 | TINIT4 | TROUT4 |
| IFO | IFI | | | | | | | |
| TINIT1 | MAT | | | | | | | |
| TINIT2 | MAT | | | | | | | |
| TINIT3 | MAT | | | | | | | |
| TINIT4 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT3 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT4 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | TDOP4 | RTDOP | TDOP2 | TDOP5 | TDOP3 | | |

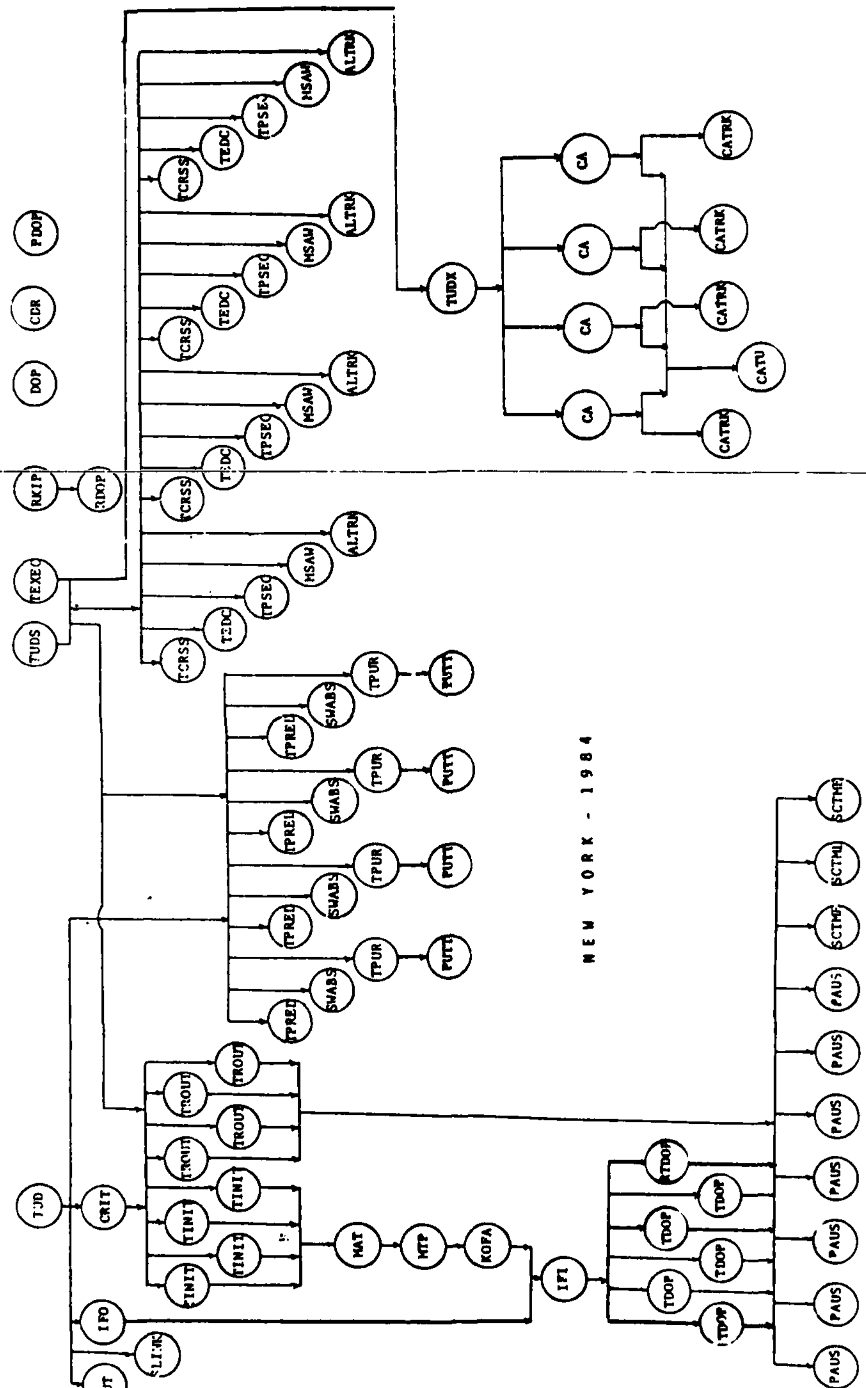
## LATTICE STRUCTURE
## NEW YORK 1982 (Cont'd.)

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TDOP1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP3 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP4 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP5 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| RTDOP | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| CA1 | CATRK1 | CATU | | | | | | |
| CATRK1 | | | | | | | | |
| CA2 | CATRK2 | CATU | | | | | | |
| CATRK2 | | | | | | | | |
| CA3 | CATRK3 | CATU | | | | | | |
| CATRK3 | | | | | | | | |
| CA4 | CATRK4 | CATU | | | | | | |
| CATRK4 | | | | | | | | |
| TPRED1 | | | | | | | | |
| SWABS1 | | | | | | | | |
| TPUR1 | | | | | | | | |
| TPRED2 | | | | | | | | |
| SWABS2 | | | | | | | | |
| TPUR2 | | | | | | | | |
| TPRED3 | | | | | | | | |
| SWABS3 | | | | | | | | |
| TPUR3 | | | | | | | | |
| TPRED4 | | | | | | | | |
| SWABS4 | | | | | | | | |
| TPUR4 | | | | | | | | |
| TCRSS1 | | | | | | | | |
| TEDC1 | | | | | | | | |
| TPSEC1 | | | | | | | | |
| MSAW1 | | | | | | | | |
| ALTRK1 | | | | | | | | |
| TCRSS2 | | | | | | | | |
| TEDC2 | | | | | | | | |
| TPSEC2 | | | | | | | | |
| MSAW2 | | | | | | | | |
| ALTRK2 | | | | | | | | |
| TCRSS3 | | | | | | | | |
| TEDC3 | | | | | | | | |

LATTICE STRUCTURE

NEW YORK 1982 (Cont'd.)

| TASK | SUCCESSORS |
| --- | --- |
| TPSEC3 | |
| MSAW3 | |
| ALTRK3 | |
| TCRSS4 | |
| TEDC4 | |
| TPSEC4 | |
| MSAW4 | |
| ALTRK4 | |
| AUT | |
| SLINK | |
| CATU | |
| PAUS1 | |
| PAUS2 | |
| PAUS3 | |
| PAUS4 | |
| PAUS5 | |
| PAUS6 | |
| PAUS7 | |
| SCTME1 | |
| SCTME2 | |
| SCTME3 | |



NEW YORK - 1984

## LATTICE STRUCTURE

## NEW YORK 1984

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | TINIT1 | TROUT1 | TINIT3 | TROUT3 | TINIT2 | TROUT2 | TINIT4 | TROUT4 |
| | CA1 | CA2 | CA3 | CA4 | TPSEC1 | TCRSS1 | TEDC1 | TPRED1 |
| | TPUR1 | ALTRK1 | MSAW1 | SWABS1 | TPSEC2 | TCRSS2 | TEDC2 | TPRED2 |
| | TPUR2 | ALTRK2 | MSAW2 | SWABS2 | TPSEC3 | TCRSS3 | TEDC3 | TPRED3 |
| | TPUR3 | ALTRK3 | MSAW3 | SWABS3 | TPSEC4 | TCRSS4 | TEDC4 | TPRED4 |
| | TPUR4 | ALTRK4 | MSAW4 | SWABS4 | | | | |
| TUD | CRIT | IFO | AUT | SLINK | TPRED1 | TPUR1 | SWABS1 | TPRED2 |
| | TPUR2 | SWABS2 | TPRED3 | TPUR3 | SWABS3 | TPRED4 | TPUR4 | SWABS4 |
| TUDS | TINIT1 | TROUT1 | TINIT3 | TROUT3 | TINIT2 | TINIT4 | TROUT4 | |
| | CA1 | CA2 | CA3 | CA4 | TPSEC1 | TCRSS1 | TEDC1 | TPRED1 |
| | TPUR1 | ALTRK1 | MSAW1 | SWABS1 | TPSEC2 | TCRSS2 | TEDC2 | TPRED2 |
| | TPUR2 | ALTRK2 | MSAW2 | SWABS2 | TPSEC3 | TCRSS3 | TEDC3 | TPRED3 |
| | TPUR3 | ALTRK3 | SMAW3 | SWABS3 | TPSEC4 | TCRSS4 | TEDC4 | TPRED4 |
| | TPUR4 | ALTRK4 | MSAW4 | SWABS4 | | | | |
| TUDX | CA1 | CA2 | CA3 | CA4 | | | | |
| RKIP | RDOP | | | | | | | |
| RDOP | | | | | | | | |
| DOP | | | | | | | | |
| CDR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | TINIT1 | TROUT1 | TINIT3 | TROUT3 | TINIT2 | TROUT2 | TINIT4 | TROUT4 |
| IFO | IFI | | | | | | | |
| TINIT1 | MAT | | | | | | | |
| TINIT2 | MAT | | | | | | | |
| TINIT3 | MAT | | | | | | | |
| TINIT4 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PASU4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT3 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT4 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | TDOP4 | RTDOP | TDOP2 | TDOP5 | TDOP3 | | |

## LATTICE STRUCTURE

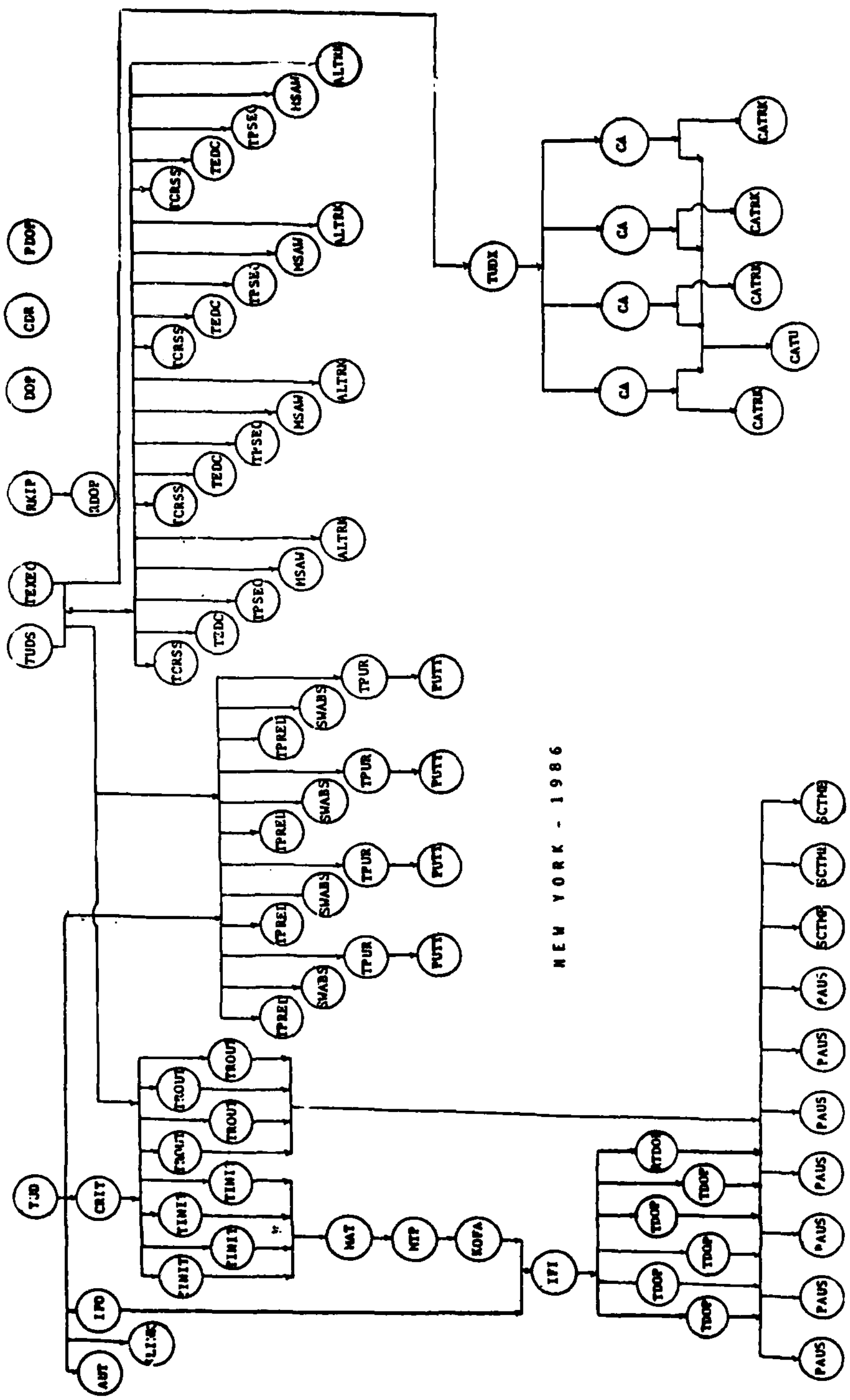
## NEW YORK 1984 (Cont'd.)

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TDOP1 | PAUS1<br>SCTME2 | PAUS2<br>SCTME3 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| TDOP2 | PAUS1<br>SCTME2 | PAUS2<br>SCTME3 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| TDOP3 | PAUS1<br>SCTME2 | PAUS2<br>SCTME3 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| TDOP4 | PAUS1<br>SCTME2 | PAUS2<br>SCTME3 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| TDOP5 | PAUS1<br>SCTME2 | PAUS2<br>SCTME3 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| RTDOP | PAUS1<br>SCTME2 | PAUS2<br>SCTME3 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| CA1 | CATRK1 | CATU | | | | | | |
| CATRK1 | | | | | | | | |
| CA2 | CATRK2 | CATU | | | | | | |
| CATRK2 | | | | | | | | |
| CA3 | CATRK3 | CATU | | | | | | |
| CATRK3 | | | | | | | | |
| CA4 | CATRK4 | CATU | | | | | | |
| CATRK4 | | | | | | | | |
| TPRED1 | | | | | | | | |
| SWABS1 | | | | | | | | |
| TPUR1 | PUTT1 | | | | | | | |
| PUTT1 | | | | | | | | |
| TPRED2 | | | | | | | | |
| SWABS2 | | | | | | | | |
| TPUR2 | PUTT2 | | | | | | | |
| PUTT2 | | | | | | | | |
| TPRED3 | | | | | | | | |
| SWABS3 | | | | | | | | |
| TPUR3 | PUTT3 | | | | | | | |
| PUTT3 | | | | | | | | |
| TPRED4 | | | | | | | | |
| SWABS4 | | | | | | | | |
| TPUR4 | PUTT4 | | | | | | | |
| PUTT4 | | | | | | | | |
| TCRSS1 | | | | | | | | |
| TEDC1 | | | | | | | | |
| TPSEC1 | | | | | | | | |
| MSAW1 | | | | | | | | |
| ALTRK1 | | | | | | | | |

LATTICE STRUCTURE

NEW YORK 1984 (Cont'd.)

| TASK | SUCCESSOR |
|---|---|
| TCRSS2 | |
| TEDC2 | |
| TPSEC2 | |
| MSAW2 | |
| ATLRK2 | |
| TCRSS3 | |
| TEDC3 | |
| TPSEC3 | |
| MSAW3 | |
| ALTRK3 | |
| TCRSS4 | |
| TEDC4 | |
| TPSEC4 | |
| MSAW4 | |
| ALTRK4 | |
| AUT | |
| SLINK | |
| CATU | |
| PAUS1 | |
| PAUS2 | |
| PAUS3 | |
| PAUS4 | |
| PAUS5 | |
| PAUS6 | |
| PAUS7 | |
| SCTME1 | |
| SCTME2 | |
| SCTME3 | |


NEW YORK - 1986
TJD
CRIT
IPO
AUT
TUDS
TEXEC
RKIP
DOP
CDR
PDOP
TCRSS
TEDC
TPSEQ
MSAW
ALTRK
TPREL
SWABS
TPUR
PUTT
TROUT
TINIT
MAT
MTP
KOFA
IFI
TDOP
PAUS
SCTME
TUDX
CA
CATRK
CATU

LATTICE STRUCTURE

NEW YORK 1986

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | TINIT1 | TROUT1 | TINIT3 | TROUT3 | TINIT2 | TROUT2 | TINIT4 | TROUT4 |
| | CA1 | CA2 | CA3 | CA4 | TPSEC1 | TCRSS1 | TEDC1 | TPRED1 |
| | TPUR1 | ALTRK1 | MSAW1 | SWABS1 | TPSEC2 | TCRSS2 | TEDC2 | TPRED2 |
| | TPUR2 | ALTRK2 | MSAW2 | SWABS2 | TPSEC3 | TCRSS3 | TEDC3 | TPRED3 |
| | TPUR3 | ALTRK3 | MSAW3 | SWABS3 | TPSEC4 | TCRSS4 | TEDC4 | TPRED4 |
| | TPUR4 | ALTRK4 | MSAW4 | SWABS4 | | | | |
| TUD | CRIT | IFO | AUT | SLINK | TPRED1 | TPUR1 | SWABS1 | TPRED2 |
| | TPUR2 | SWABS2 | TPRED3 | TPUR3 | SWABS3 | TPRED4 | TPUR4 | SWABS4 |
| TUDS | TINIT1 | TROUT1 | TINIT3 | TROUT3 | TINIT2 | TROUT2 | TINIT4 | TROUT4 |
| | CA1 | CA2 | CA3 | CA4 | TPSEC1 | TCRSS1 | TEDC1 | TPRED1 |
| | TPUR1 | ALTRK1 | MSAW1 | SWABS1 | TPSEC2 | TCRSS2 | TEDC2 | TPRED2 |
| | TPUR2 | ALTRK2 | MSAW2 | SWABS2 | TPSEC3 | TCRSS3 | TEDC3 | TPRED3 |
| | TPUR3 | ALTRK3 | MSAW3 | SWABS3 | TPSEC4 | TCRSS4 | TEDC4 | TPRED4 |
| | TPUR4 | ALTRK4 | MSAW4 | SWABS4 | | | | |
| TUDX | CA1 | CA2 | CA3 | CA4 | | | | |
| RKIP | RDOP | | | | | | | |
| RDOP | | | | | | | | |
| DOP | | | | | | | | |
| CDR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | TINIT1 | TROUT1 | TINIT3 | TROUT3 | TINIT2 | TROUT2 | TINIT4 | TROUT4 |
| IFO | IFI | | | | | | | |
| TINIT1 | MAT | | | | | | | |
| TINIT2 | MAT | | | | | | | |
| TINIT3 | MAT | | | | | | | |
| TINIT4 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT3 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT4 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | TDOP4 | RTDOP | TDOP2 | TDOP5 | TDOP3 | | |

## LATTICE STRUCTURE

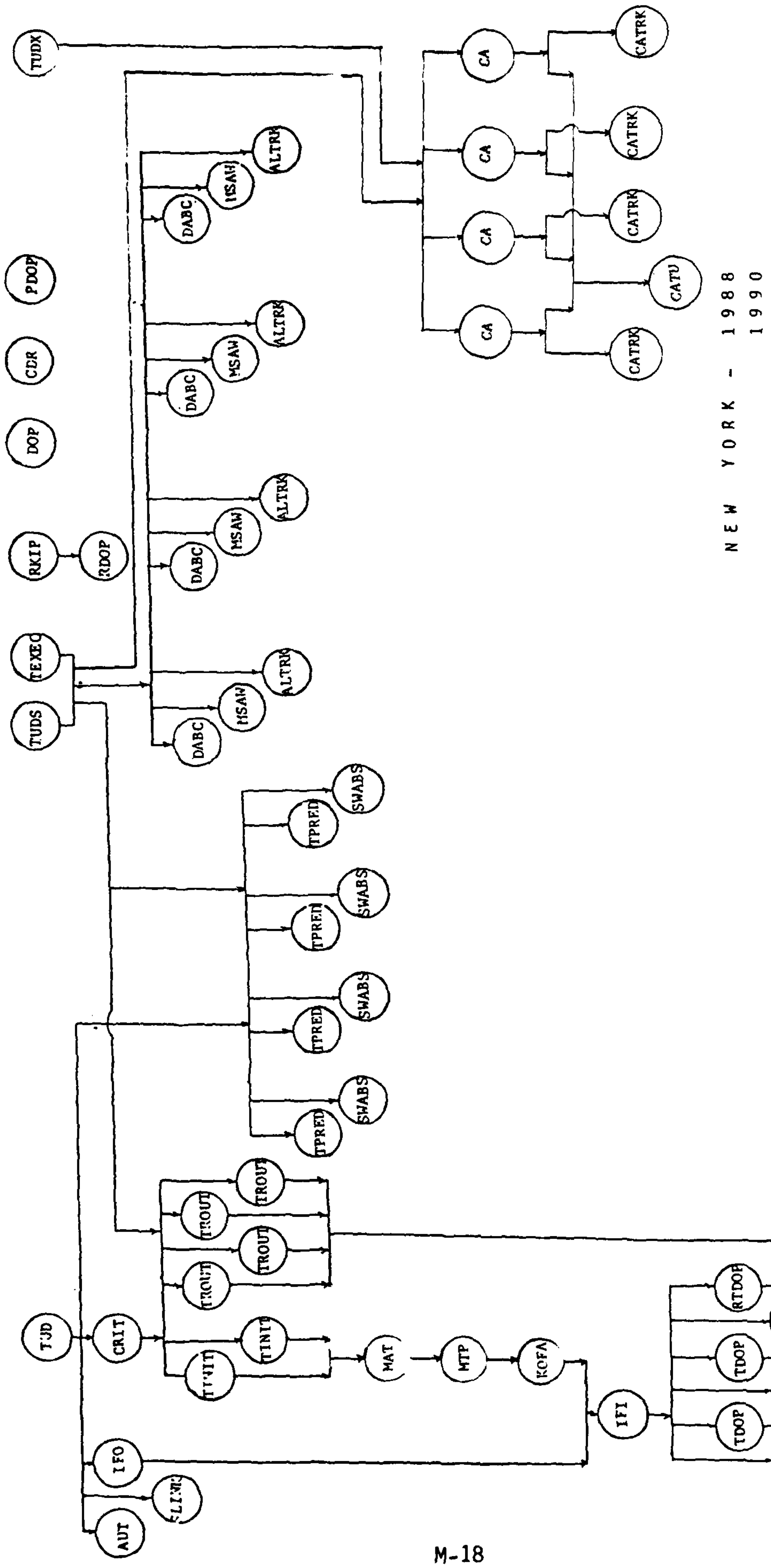
## NEW YORK 1986 (Cont'd.)

| TASK | SUCCESSORS |
|---|---|
| TDOP1 | PAUS1 PAUS2 PAUS3 PAUS4 PAUS5 PAUS6 PAUS7 SCTME1 SCTME2 SCTME3 |
| TDOP2 | PAUS1 PAUS2 PAUS3 PAUS4 PAUS5 PAUS6 PAUS7 SCTME1 SCTME2 SCTME3 |
| TDOP3 | PAUS1 PAUS2 PAUS3 PAUS4 PAUS5 PAUS6 PAUS7 SCTME1 SCTME2 SCTME3 |
| TDOP4 | PAUS1 PAUS2 PAUS3 PAUS4 PAUS5 PAUS6 PAUS7 SCTME1 SCTME2 SCTME3 |
| TDOP5 | PAUS1 PAUS2 PAUS3 PAUS4 PAUS5 PAUS6 PAUS7 SCTME1 SCTME2 SCTME3 |
| RTDOP | PAUS1 PAUS2 PAUS3 PAUS4 PAUS5 PAUS6 PAUS7 SCTME1 SCTME2 SCTME3 |
| CA1 | CATRK1 CATU |
| CATRK1<br>CA2 | CATRK2 CATU |
| CATRK2<br>CA3 | CATRK3 CATU |
| CATRK3<br>CA4 | CATRK4 CATU |
| CATRK4<br>TPRED1<br>SWABS1<br>TPUR1 | PUTT1 |
| PUTT1<br>TPRED2<br>SWABS1<br>TPUR1 | PUTT1 |
| PUTT1<br>TPRED2<br>SWABS2<br>TPUR2 | PUTT2 |
| PUTT2<br>TPRED3<br>SWABS3<br>TPUR3 | PUTT3 |
| PUTT3<br>TPRED4<br>SWABS4<br>TPUR4 | PUTT4 |

LATTICE STRUCTURE

NEW YORK 1986 (Cont'd.)

| TASK | SUCCESSORS |
|---|---|
| PUTT4 | |
| TCRSS1 | |
| TEDC1 | |
| TPSEC1 | |
| MSAW1 | |
| ALTRK1 | |
| TCRSS2 | |
| TEDC2 | |
| TPSEC2 | |
| MSAW2 | |
| ALTRK2 | |
| TCRSS3 | |
| TEDC3 | |
| TPSEC3 | |
| MSAW3 | |
| ALTRK3 | |
| TCRSS4 | |
| TEDC4 | |
| TPSEC4 | |
| MSAW4 | |
| ALTRK4 | |
| AUT | |
| SLINK | |
| CATU | |
| PAUS1 | |
| PAUS2 | |
| PAUS3 | |
| PAUS4 | |
| PAUS5 | |
| PAUS6 | |
| PAUS7 | |
| SCTME1 | |
| SCTME2 | |
| SCTME3 | |


NEW YORK - 1988
1990
TUDX
CA
CATRK
CATU
ALTRK
MSAW
DABC
PDOP
CDR
DOP
RKIP
RDOP
TEXEC
TUDS
SWABS
TPRED
TROUT
TINIT
TJD
CRIT
MAT
MTP
KOFA
IFI
IFO
AUT
RTDOP
TDOP
PAUS
SCTME
SCTMU

## LATTICE STRUCTURE

## NEW YORK 1988

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | DINIT1 | TROUT1 | DINIT3 | TROUT3 | DINIT2 | TROUT2 | DINIT4 | TROUT4 |
| | CA1 | CA2 | CA3 | CA4 | DABC1 | TPRED1 | ALTRK1 | MSAW1 |
| | SWABS1 | DABC2 | TPRED2 | ALTRK2 | MSAW2 | SWABS2 | DABC3 | TPRED3 |
| | ALTRK3 | MSAW3 | SWABS3 | DABC4 | TPRED4 | ALTRK4 | MSAW4 | SWABS4 |
| TUD | CRIT | IFO | AUT | SLINK | TPRED1 | SWABS1 | TPRED2 | SWABS2 |
| | TPRED3 | SWABS3 | TPRED4 | SWABS4 | | | | |
| TUDS | DINIT1 | TROUT1 | DINIT3 | TROUT3 | DINIT2 | TROUT2 | DINIT4 | TROUT4 |
| | CA1 | CA2 | CA3 | CA4 | DABC1 | TPRED1 | ALTRK1 | MSAW1 |
| | SWABS1 | DABC2 | TPRED2 | ALTRK2 | MSAW2 | SWABS2 | DABC3 | TPRED3 |
| | ALTRK3 | MSAW3 | SWABS3 | DABC4 | TPRED4 | ALTRK4 | MSAW4 | SWABS4 |
| TUDX | CA1 | CA2 | C A3 | CA4 | | | | |
| RKIP | RDOP | | | | | | | |
| RDOP | | | | | | | | |
| DOP | | | | | | | | |
| CDR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | DINIT1 | TROUT1 | DINIT3 | TROUT3 | DINIT2 | TROUT2 | DINIT4 | TROUT4 |
| IFO | IFI | | | | | | | |
| DINIT1 | MAT | | | | | | | |
| DINIT2 | MAT | | | | | | | |
| DINIT3 | MAT | | | | | | | |
| DINIT4 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | sctme2 | SCTME3 | | | | | | |
| TROUT3 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT4 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | TDOP4 | TRDOP | TDOP2 | TDOP5 | TDOP3 | | |
| TDOP1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |

LATTICE STRUCTURE

NEW YORK 1988 (Cont'd.)

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TDOP2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP3 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP4 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP5 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| RTDOP | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| CA1 | CATRK1 | CATU | | | | | | |
| CATRK1 | | | | | | | | |
| CA2 | CATRK2 | CATU | | | | | | |
| CATRK2 | | | | | | | | |
| CA3 | CATRK3 | CATU | | | | | | |
| CATRK3 | | | | | | | | |
| CA4 | CATRK4 | CATU | | | | | | |
| CATRK4 | | | | | | | | |
| TPRED1 | | | | | | | | |
| SWABS1 | | | | | | | | |
| TPRED2 | | | | | | | | |
| SWABS2 | | | | | | | | |
| TPRED3 | | | | | | | | |
| SWABS3 | | | | | | | | |
| TPRED4 | | | | | | | | |
| SWABS4 | | | | | | | | |
| DABC1 | | | | | | | | |
| MSAW1 | | | | | | | | |
| ALTRK1 | | | | | | | | |
| DABC2 | | | | | | | | |
| MSAW2 | | | | | | | | |
| ALTRK2 | | | | | | | | |
| DABC3 | | | | | | | | |
| MSAW3 | | | | | | | | |
| ALTRK3 | | | | | | | | |
| DABC4 | | | | | | | | |
| MSAW4 | | | | | | | | |
| ALTRK4 | | | | | | | | |
| AUT | | | | | | | | |
| SLINK | | | | | | | | |
| CATU | | | | | | | | |
| PAUD1 | | | | | | | | |
| PAUS2 | | | | | | | | |

## LATTICE STRUCTURE

## NEW YORK 1988 (Cont'd.)

| TASK | SUCCESSORS |
| --- | --- |
| OAYS3 | |
| PAUS4 | |
| PAUS5 | |
| PAUS6 | |
| PAUS7 | |
| SCTME1 | |
| SCTME2 | |
| SCTME3 | |

## LATTICE STRUCTURE

## NEW YORK 1990

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | DINIT1 | TROUT1 | DINIT3 | TROUT3 | DINIT2 | TROUT2 | DINIT4 | TROUT4 |
| | CA1 | CA2 | CA3 | CA4 | DABC1 | TPRED1 | ALTRK1 | MSAW1 |
| | SWABS1 | DABC2 | TPRED2 | ALTRK2 | MSAW2 | SWABS2 | DABC3 | TPRED3 |
| | ALTRK3 | MSAW3 | SWABS3 | DABC4 | TPRED4 | ALTRK4 | MSAW4 | SWABS4 |
| TUD | CRIT | IFO | AUT | SLINK | TPRED1 | SWABS1 | TPRED2 | SWABS2 |
| | TPRED3 | SWABS3 | TPRED4 | SWABS4 | | | | |
| TUDS | DINIT1 | TROUT1 | DINIT3 | TROUT3 | DINIT2 | TROUT2 | DINIT4 | TROUT4 |
| | CA1 | CA2 | CA3 | CA4 | DABC1 | TPRED1 | ALTRK1 | MSAW1 |
| | SWABS1 | DABC2 | TPRED2 | ALTRK2 | MSAW2 | SWABS2 | DABC3 | TPRED3 |
| | ALTRK3 | MSAW3 | SWABS3 | DABC4 | TPRED4 | ALTRK4 | MSAW4 | SWABS4 |
| TUDX | CA1 | CA2 | CA3 | CA4 | | | | |
| RKIP | RDOP | | | | | | | |
| RDOP | | | | | | | | |
| DOP | | | | | | | | |
| CDR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | DINIT1 | TROUT1 | DINIT3 | TROUT3 | DINIT2 | TROUT2 | DINIT4 | TROUT4 |
| IFO | IFI | | | | | | | |
| DINIT1 | MAT | | | | | | | |
| DINIT2 | MAT | | | | | | | |
| DINIT3 | MAT | | | | | | | |
| DINIT4 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT3 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT4 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | TDOP4 | RTDOP | TDOP2 | TDOP5 | TDOP3 | | |
| TDOP1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |

## LATTICE STRUCTURE
## NEW YORK 1990 (Cont'd.)

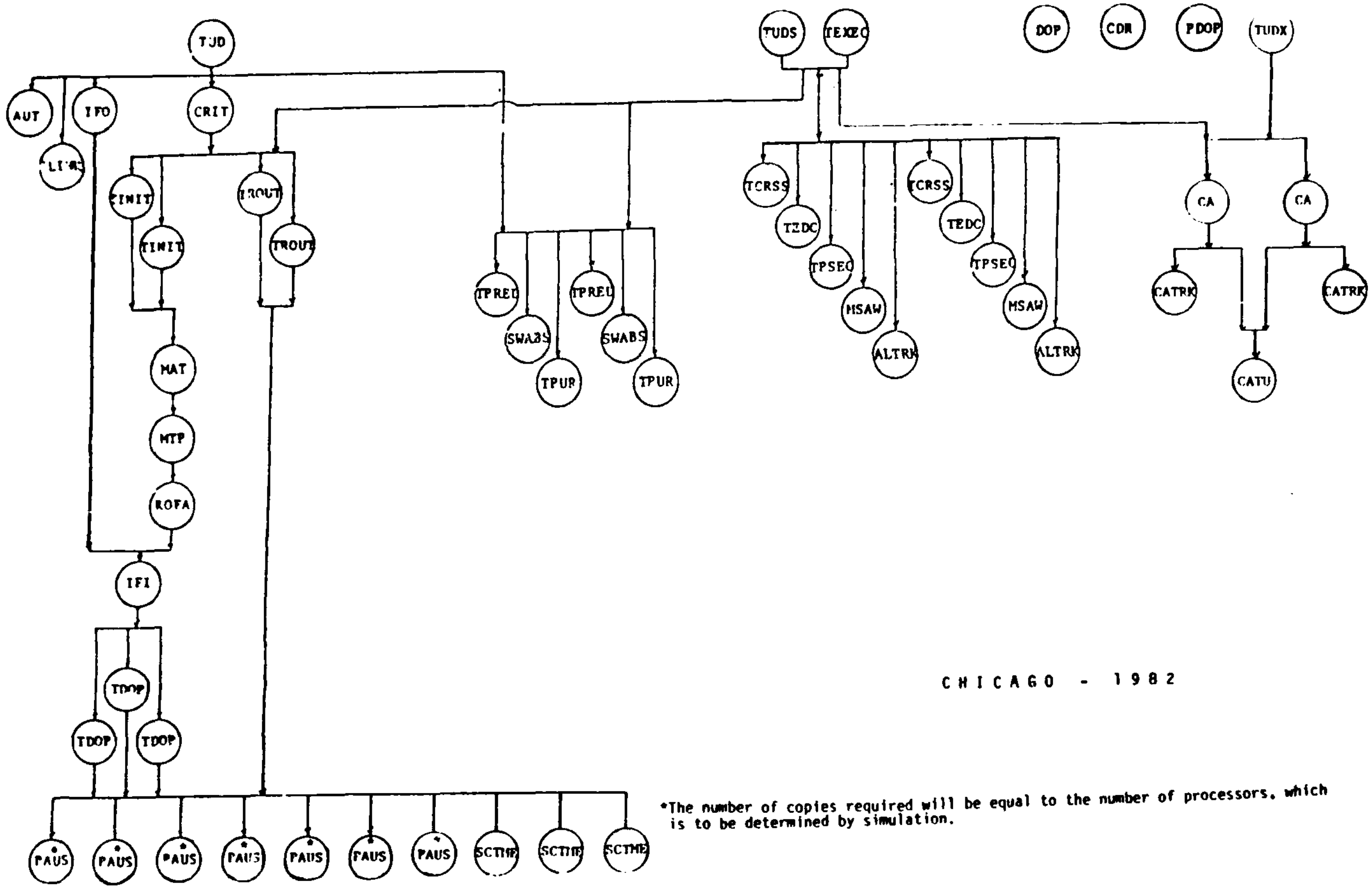
| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TDOP2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP3 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP4 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP5 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| RTDOP | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| CA1 | CATRK1 | CATU | | | | | | |
| CATRK1 | | | | | | | | |
| CA2 | CATRK2 | CATU | | | | | | |
| CATRK2 | | | | | | | | |
| CA3 | CATRK3 | CATU | | | | | | |
| CATRK3 | | | | | | | | |
| CA4 | CATRK4 | CATU | | | | | | |
| CATRK4 | | | | | | | | |
| TPRED1 | | | | | | | | |
| SWABS1 | | | | | | | | |
| TPRED2 | | | | | | | | |
| SWABS2 | | | | | | | | |
| TPRED3 | | | | | | | | |
| SWABS3 | | | | | | | | |
| TPRED4 | | | | | | | | |
| SWABS4 | | | | | | | | |
| DABC1 | | | | | | | | |
| MSAW1 | | | | | | | | |
| ALTRK1 | | | | | | | | |
| DABC2 | | | | | | | | |
| MSAW2 | | | | | | | | |
| ALTRK2 | | | | | | | | |
| DABC3 | | | | | | | | |
| MSAW3 | | | | | | | | |
| ALTRK3 | | | | | | | | |
| DABC4 | | | | | | | | |
| MSAW4 | | | | | | | | |
| ALTRK4 | | | | | | | | |
| AUT | | | | | | | | |
| SLINK | | | | | | | | |
| CATU | | | | | | | | |
| PAUS1 | | | | | | | | |
| PAUS2 | | | | | | | | |

## LATTICE STRUCTURE
## NEW YORK 1990 (Cont'd.)

| TASK | SUCCESSORS |
|---|---|
| PAUS3 | |
| PAUS4 | |
| PAUS5 | |
| PAUS6 | |
| PAUS7 | |
| SCTME1 | |
| SCTME2 | |
| SCTME3 | |

# APPENDIX N

## LATTICE DESCRIPTIONS FOR THE CHICAGO TRACON




CHICAGO - 1982

*The number of copies required will be equal to the number of processors, which is to be determined by simulation.

LATTICE STRUCTURE

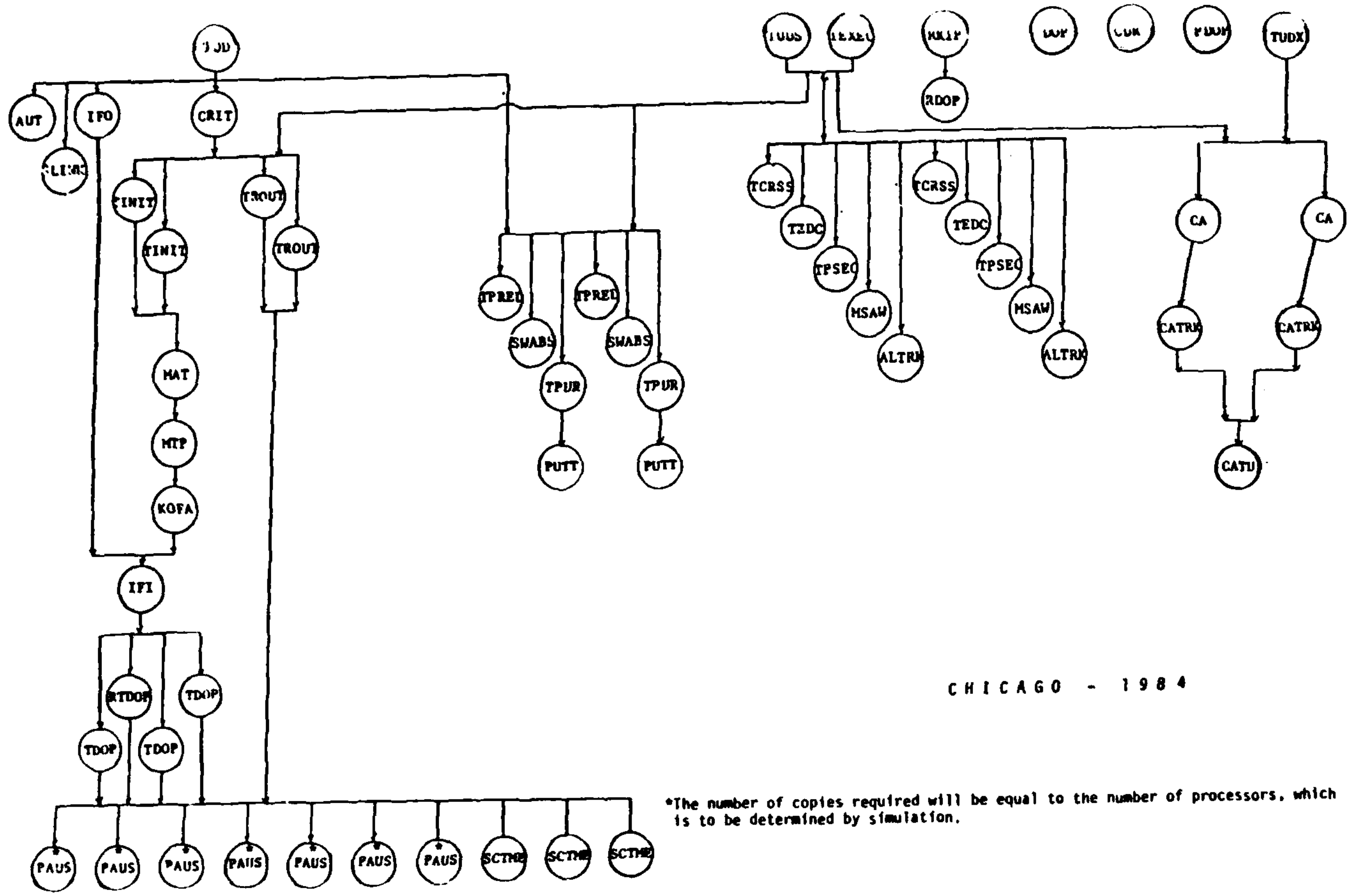
CHICAGO 1982

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | TINIT1 | TROUT1 | TINIT2 | TROUT2 | CA1 | CA2 | TPSEC1 | TCRSS1 |
| | TEDC1 | TPRED1 | TPUR1 | ALTRK1 | MSAW1 | SWABS1 | TPSEC2 | TCRSS2 |
| | TEDC1 | TPRED2 | TPUR2 | ALTRK2 | MSAW2 | SWABS2 | | |
| TUD | CRIT | IFO | AUT | SLINK | TPRED1 | TPUR1 | SWABS1 | TPRED2 |
| | TPUR2 | SWABS2 | | | | | | |
| TUDS | TINIT1 | TROUT1 | TINIT2 | TROUT2 | CA1 | CA2 | TPSEC1 | TRSS1 |
| | TEDC1 | TPRED1 | TPUR1 | ALTRK1 | MSAW1 | SWABS1 | TPSEC2 | TCRSS2 |
| | TEDC2 | TPRED2 | TPUR2 | ALTRK2 | MSAW2 | SWABS2 | | |
| TUDX | CA1 | CA2 | | | | | | |
| DOP | | | | | | | | |
| DCR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | TINIT1 | TROUT1 | TINIT2 | TROUT2 | | | | |
| IFO | IFI | | | | | | | |
| TINIT1 | MAT | | | | | | | |
| TINTI2 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | TDOP2 | TDOP3 | | | | | |
| TDOP1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP3 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| CA1 | CATRK1 | CATU | | | | | | |
| CATRK1 | | | | | | | | |
| CA2 | CATRK2 | CATU | | | | | | |
| CATRK1 | | | | | | | | |
| TPRED1 | | | | | | | | |
| SWABS1 | | | | | | | | |
| TPUR1 | | | | | | | | |

LATTICE STRUCTURE

CHICAGO 1982 (Cont'd.)

| TASK | SUCCESSORS |
|---|---|
| TPRED2 | |
| SWABS2 | |
| TPUR2 | |
| TCRSS1 | |
| TEDC1 | |
| TPSEC1 | |
| MSAW1 | |
| ALTRK1 | |
| TCRSS2 | |
| TEDC2 | |
| TPSEC2 | |
| MSAW2 | |
| ALTRK2 | |
| AUT | |
| SLINK | |
| CATU | |
| PAUS1 | |
| PAUS2 | |
| PAUS3 | |
| PAUS4 | *INHIBITED* |
| PAUS5 | *INHIBITED* |
| PAUS6 | *INHIBITED* |
| PAUS7 | *INHIBITED* |
| SCTME1 | |
| SCTME2 | |
| SCTME3 | |




CHICAGO - 1984

*The number of copies required will be equal to the number of processors, which is to be determined by simulation.

## LATTICE STRUCTURE

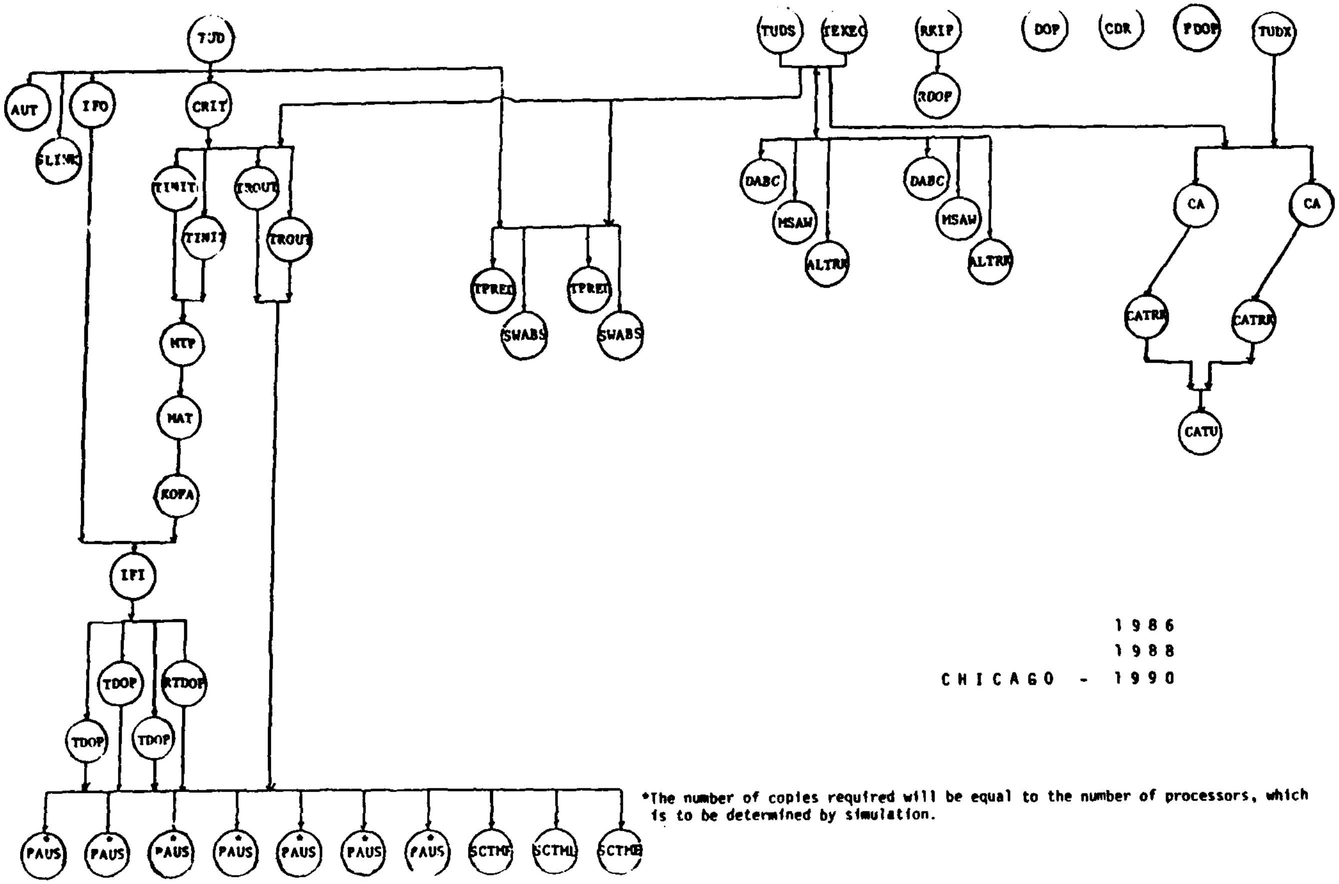
## CHICAGO 1984

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | TINIT1 | TROUT1 | TINIT2 | TROUT2 | CA1 | CA2 | TPSEC1 | TCRSS1 |
| | TEDC1 | TPRED1 | TPUR1 | ALTRK1 | MSAW1 | SWABS1 | TPSEC2 | TCRSS2 |
| | TEDC2 | TPRED2 | TPUR2 | ALTRK2 | MSAW2 | SWABS2 | | |
| TUD | CRIT | IFO | AUT | SLINK | TPRED1 | TPUR1 | SWABS1 | TPRED2 |
| | TPUR2 | SWABS2 | | | | | | |
| TUDS | TINIT1 | TROUT1 | TINIT2 | TROUT2 | CA1 | CA2 | TPSEC1 | TCRSS1 |
| | TEDC1 | TPRED1 | TPUR1 | ALTRK1 | MSAW1 | SWABS1 | TPSEC2 | TCRSS2 |
| | TEDC2 | TPRED2 | TPUR2 | ALTRK2 | MSAW2 | SWABS2 | | |
| TUDX | CA1 | CA2 | | | | | | |
| RKIP | RDOP | | | | | | | |
| RDOP | | | | | | | | |
| DOP | | | | | | | | |
| CDR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | TINIT1 | TROUT1 | TINIT2 | TROUT2 | | | | |
| IFO | IFI | | | | | | | |
| TINIT1 | MAT | | | | | | | |
| TINIT2 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | RTDOP | TDOP2 | TDOP3 | | | | |
| TDOP1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP3 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| RTDOP | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| CA1 | CATRK1 | CATU | | | | | | |
| CATRK1 | | | | | | | | |
| CA2 | CATRK2 | CATU | | | | | | |

LATTICE STRUCTURE

CHICAGO 1984 (Cont'd.)

| TASK | SUCCESSORS |
|---|---|
| CATRK2 | |
| TPRED1 | |
| SWABS1 | |
| TPUR1 | PUTT1 |
| PUTT1 | |
| TPRED2 | |
| SWABS2 | |
| TPUR2 | PUTT2 |
| PUTT2 | |
| TCRSS1 | |
| TEDC1 | |
| TPSEC1 | |
| MSAW1 | |
| ALTRK1 | |
| TCRSS2 | |
| TEDC2 | |
| TPSEC2 | |
| MSAW2 | |
| ALTRK2 | |
| AUT | |
| SLINK | |
| CATU | |
| PAUS1 | |
| PAUS2 | |
| PAUS3 | |
| PAUS4 | |
| PAUS5 | *INHIBITED* |
| PAUS6 | *INHIBITED* |
| PAUS7 | *INHIBITED* |
| SCTME1 | |
| SCTME2 | |
| SCTME3 | |




1986
1988
CHICAGO - 1990

*The number of copies required will be equal to the number of processors, which is to be determined by simulation.

## LATTICE STRUCTURE

## CHICAGO 1986

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | DINIT1 | TROUT1 | DINIT2 | TROUT2 | CA1 | CA2 | DABC1 | TPRED1 |
| | ALTRK1 | MSAW1 | SWABS1 | DABC2 | TPRED2 | ALTRK2 | MSAW2 | SWABS2 |
| TUD | CRIT | IFO | AUT | SLINK | TPRED1 | SWABS1 | TPRED2 | SWABS2 |
| TUDS | DINIT1 | TROUT1 | DINIT2 | TROUT2 | CA1 | CA2 | DABC1 | TPRED1 |
| | ALTRK1 | MSAW1 | SWABS1 | DABC2 | TPRED2 | ALTRK2 | MSAW2 | SWABS2 |
| TUDX | CA1 | CA2 | | | | | | |
| RKIP | RDOP | | | | | | | |
| RDOP | | | | | | | | |
| DOP | | | | | | | | |
| CDR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | DINIT1 | TROUT1 | DINIT2 | TROUT2 | | | | |
| IFO | IFI | | | | | | | |
| DINIT1 | MAT | | | | | | | |
| DINIT2 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | RTDOP | TDOP2 | TDOP3 | | | | |
| TDOP1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP3 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| RTDOP | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| CA1 | CATRK1 | CATU | | | | | | |
| CATRK1 | | | | | | | | |
| CA2 | CATRK2 | CATU | | | | | | |
| CATRK2 | | | | | | | | |
| TPRED1 | | | | | | | | |
| SWABS1 | | | | | | | | |

LATTICE STRUCTURE

CHICAGO 1986 (Cont'd.)

| TASK | | SUCCESSORS |
|---|---|---|
| TPRED2 | | |
| SWABS2 | | |
| DABC1 | | |
| MSAW1 | | |
| ALTRK1 | | |
| DABC2 | | |
| MSAW2 | | |
| ALTRK2 | | |
| AUT | | |
| SLINK | | |
| CATU | | |
| PAUS1 | | |
| PAUS2 | | |
| PAUS3 | | |
| PAUS4 | | |
| PAUS5 | *INHIBITED* | |
| PAUS6 | *INHIBITED* | |
| PAUS7 | *INHIBITED* | |
| SCTME1 | | |
| SCTME2 | | |
| SCTME3 | | |

<u>LATTICE STRUCTURE</u>

<u>CHICAGO 1988</u>

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | DINIT1 | TROUT1 | DINIT2 | TROUT2 | CA1 | CA2 | DABC1 | TPRED1 |
| | ALTRK1 | MSAW1 | SWABS1 | DABC2 | TPRED2 | ALTRK2 | MSAW2 | SWABS2 |
| TUD | CRIT | IFO | AUT | SLINK | TPRED1 | SWABS1 | TPRED2 | SWABS2 |
| TUDS | DINIT1 | TROUT1 | DINIT2 | TROUT2 | CA1 | CA2 | DABC1 | TPRED1 |
| | ALTRK1 | MSAW1 | SWABS1 | DABC2 | TPRED2 | ALTRK2 | MSAW2 | SWABS2 |
| TUDX | CA1 | CA2 | | | | | | |
| RKIP | RDOP | | | | | | | |
| RDOP | | | | | | | | |
| DOP | | | | | | | | |
| CDR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | DINIT1 | TROUT1 | DINIT2 | TROUT2 | | | | |
| IFO | IFI | | | | | | | |
| DINIT1 | MAT | | | | | | | |
| DINIT2 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | RTDOP | TDOP2 | TDOP3 | | | | |
| TDOP1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP3 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| RTDOP | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| CA1 | CATRK1 | CATU | | | | | | |
| CATRK1 | | | | | | | | |
| CA2 | CATRK2 | CATU | | | | | | |
| CATRK2 | | | | | | | | |
| TPRED1 | | | | | | | | |
| SWABS1 | | | | | | | | |

## LATTICE STRUCTURE

## CHICAGO 1988 (Cont'd.)

| TASK | | SUCCESSORS |
|---|---|---|
| TPRED2 | | |
| SWABS2 | | |
| DABC1 | | |
| MSAW1 | | |
| ALTRK1 | | |
| DABC2 | | |
| MSAW2 | | |
| ALTRK2 | | |
| AUT | | |
| SLINK | | |
| CATU | | |
| PAUS1 | | |
| PAUS2 | | |
| PAUS3 | | |
| PAUS4 | | |
| PAUS5 | *INHIBITED* | |
| PAUS6 | *INHIBITED* | |
| PAUS7 | *INHIBITED* | |
| SCTME1 | | |
| SCTME2 | | |
| SCTME3 | | |

# LATTICE STRUCTURE

## CHICAGO 1990

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | DINIT1 | TROUT1 | DINIT2 | TROUT2 | CA1 | CA2 | DABC1 | TPRED1 |
| | ALTRK1 | MSAW1 | SWABS1 | DABC2 | TPRED2 | ALTRK2 | MSAW2 | SWABS2 |
| TUD | CRIT | IFO | AUT | SLINK | TPRED1 | SWABS1 | TPRED2 | SWABS2 |
| TUDS | DINIT1 | TROUT1 | DINIT2 | TROUT2 | CA1 | CA2 | DABC1 | TPRED1 |
| | ALTRK1 | MSAW1 | SWABS1 | DABC2 | TPRED2 | ALTRK2 | MSAW2 | SWABS2 |
| TUDX | CA1 | CA2 | | | | | | |
| RKIP | RDOP | | | | | | | |
| RDOP | | | | | | | | |
| DOP | | | | | | | | |
| CDR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | DINIT1 | TROUT1 | DINIT2 | TROUT2 | | | | |
| IFO | IFI | | | | | | | |
| DINIT1 | MAT | | | | | | | |
| DINIT2 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | RTDOP | TDOP2 | TDOP3 | | | | |
| TDOP1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP3 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| RTDOP | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| CA1 | CATRK1 | CATU | | | | | | |
| CATRK1 | | | | | | | | |
| CA2 | CATRK2 | CATU | | | | | | |
| CATRK2 | | | | | | | | |
| TPRED1 | | | | | | | | |
| SWABS1 | | | | | | | | |

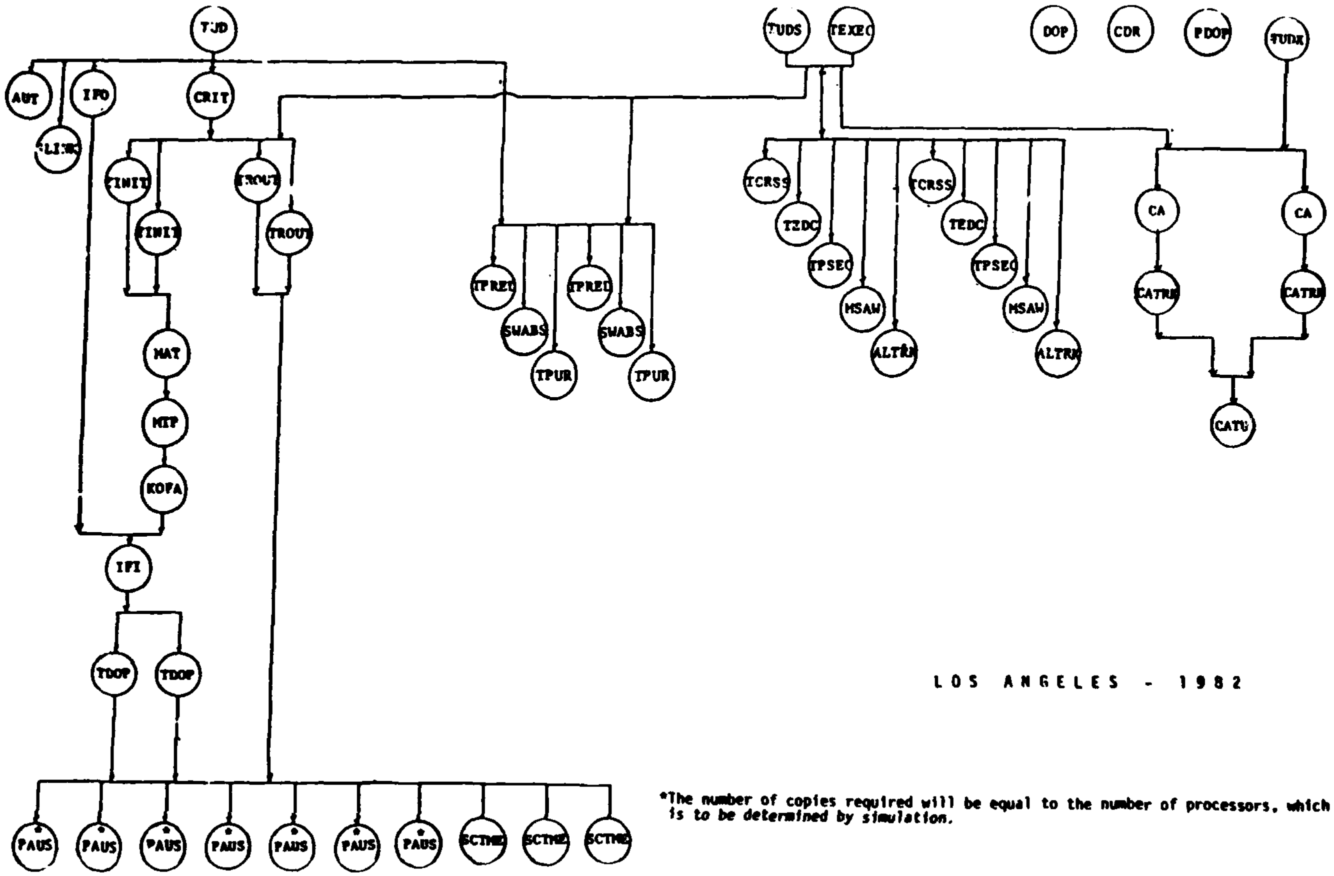
## LATTICE STRUCTURE

## CHICAGO 1990 (Cont'd.)

| TASK | | SUCCESSORS |
|---|---|---|
| TPRED2 | | |
| SWABS2 | | |
| DABC1 | | |
| MSAW1 | | |
| ALTRK1 | | |
| DABC2 | | |
| MSAW2 | | |
| ALTRK2 | | |
| AUi | | |
| SLINK | | |
| CATU | | |
| PAUS1 | | |
| PAUS2 | | |
| PAUS3 | | |
| PAUS4 | | |
| PAUS5 | *INHIBITED* | |
| PAUS6 | *INHIBITED* | |
| PAUS7 | *INHIBITED* | |
| SCTME1 | | |
| SCTME2 | | |
| SCTME3 | | |

## APPENDIX O

LATTICE DESCRIPTIONS FOR THE LOS ANGELES TRACON




LOS ANGELES - 1982

*The number of copies required will be equal to the number of processors, which is to be determined by simulation.

# LATTICE STRUCTURE

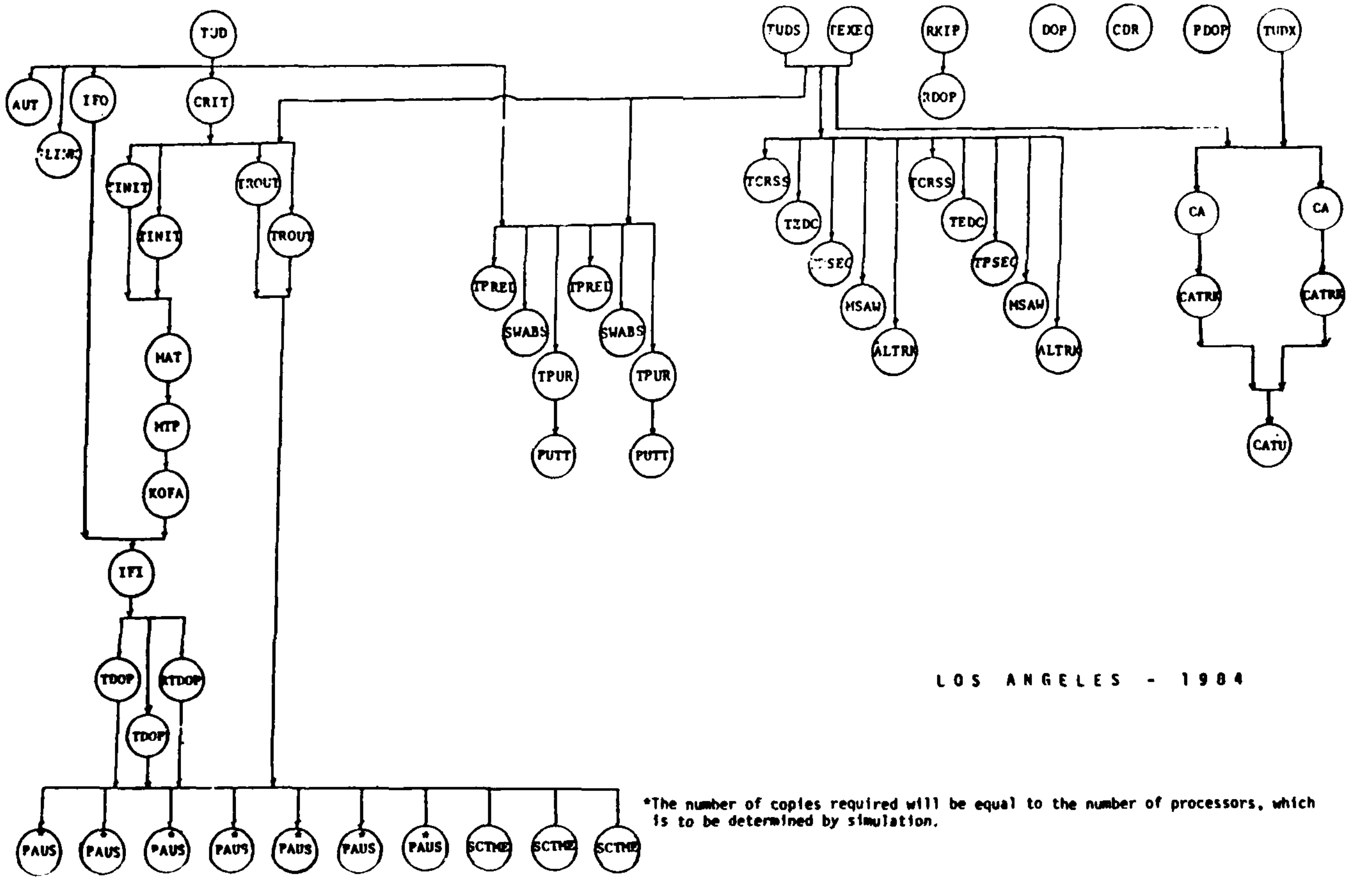
## LOS ANGELES 1982

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | TINIT1 | TROUT1 | TINIT2 | TROUT2 | CA1 | CA2 | TPSEC1 | TCRSS1 |
| | TEDC1 | TPRED1 | TPUR1 | ALTRK1 | MSAW1 | SWABS1 | TPSEC2 | TCRSS2 |
| | TEDC2 | TPRED2 | TPUR2 | ALTRK2 | MSAW2 | SWABS2 | | |
| TUD | CRIT | IFO | AUT | SLINK | TPRED1 | TPUR1 | SWABS1 | TPRED2 |
| | TPUR2 | SWABS2 | | | | | | |
| TUDS | TINIT1 | TROUT1 | TINIT2 | TROUT2 | CA1 | CA2 | TPSEC1 | TCRSS1 |
| | TEDC1 | TPRED1 | TPUR1 | ALTRK1 | MSAW1 | SWABS1 | TPSEC2 | TCRSS2 |
| | TEDC2 | TPRED2 | TPUR2 | ALTRK2 | MSAW2 | SWABS2 | | |
| TUDX | CA1 | CA2 | | | | | | |
| DOP | | | | | | | | |
| CDR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | TINIT1 | TROUT1 | TINIT2 | TROUT2 | | | | |
| IFO | IFI | | | | | | | |
| TINIT1 | MAT | | | | | | | |
| TINIT2 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | TDOP2 | | | | | | |
| TDOP1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| CA1 | CATRK1 | CATU | | | | | | |
| CATRK1 | | | | | | | | |
| CA2 | CATRK2 | CATU | | | | | | |
| CATRK2 | | | | | | | | |
| TPRED1 | | | | | | | | |
| SWABS1 | | | | | | | | |
| TPUR1 | | | | | | | | |
| TPRED2 | | | | | | | | |
| SWABS2 | | | | | | | | |
| TPUR2 | | | | | | | | |
| TCRSS1 | | | | | | | | |

## LATTICE STRUCTURE

## LOS ANGELES 1982 (Cont'd.)

| TASK | | SUCCESSORS |
|---|---|---|
| TEDC1 | | |
| TPSEC1 | | |
| MSAW1 | | |
| ALTRK1 | | |
| TCRSS2 | | |
| TEDC2 | | |
| TPSEC2 | | |
| MSAW2 | | |
| ALTRK2 | | |
| AUT | | |
| SLINK | | |
| CATU | | |
| PAUS1 | | |
| PAUS2 | | |
| PAUS3 | | |
| PAUS4 | *INHIBITED* | |
| PAUS5 | *INHIBITED* | |
| PAUS6 | *INHIBITED* | |
| PAUS7 | *INHIBITED* | |
| SCTEM1 | | |
| SCTME2 | | |
| SCTME3 | | |




LOS ANGELES - 1984

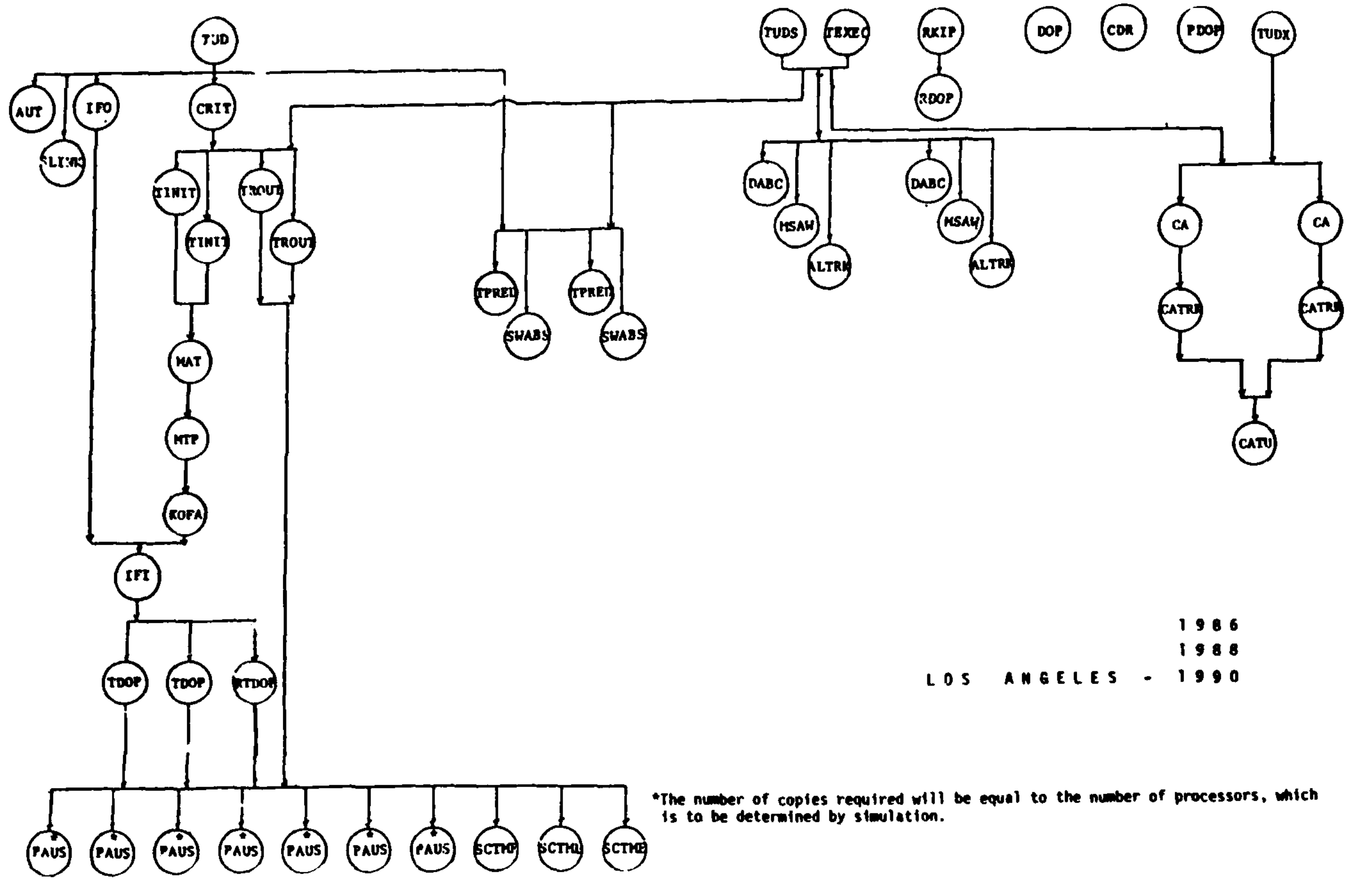
*The number of copies required will be equal to the number of processors, which is to be determined by simulation.

# LATTICE STRUCTURE
# LOS ANGELES 1984

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | TINIT1 | TROUT1 | TINIT2 | TROUT2 | CA1 | CA2 | TPSEC1 | TCRSS1 |
| | TEDC1 | TPRED1 | TPUR1 | ALTRK1 | MSAW1 | SWABS1 | TPSEC2 | TCRSS2 |
| | TEDC2 | TPRED2 | TPUR2 | ALTRK2 | MSAW2 | SWABS2 | | |
| TUD | CRIT | IFO | AUT | SLINK | TPRED1 | TPUR1 | SWABS1 | TPRED2 |
| | TPUR2 | SWABS2 | | | | | | |
| TUDS | TINIT1 | TROUT1 | TINIT2 | TROUT2 | CA1 | CA2 | TPSEC1 | TCRSS1 |
| | TEDC1 | TPRED1 | TPUR1 | ALTRK1 | MSAW1 | SWABS1 | TPSEC2 | TCRSS2 |
| | TEDC2 | TPRED2 | TPUR2 | ALTRK2 | MSAW2 | SWABS2 | | |
| TUDX | CA1 | CA2 | | | | | | |
| RKIP | RDOP | | | | | | | |
| RDOP | | | | | | | | |
| DOP | | | | | | | | |
| CDR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | TINIT1 | TROUT1 | TINIT2 | TROUT2 | | | | |
| IFO | IFI | | | | | | | |
| TINIT1 | MAT | | | | | | | |
| TINIT2 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | RTDOP | TDOP2 | | | | | |
| TDOP1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| RTDOP | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| CA1 | CATRK1 | CATU | | | | | | |
| CATRK1 | | | | | | | | |
| CA2 | CATRK2 | CATU | | | | | | |
| CATRK2 | | | | | | | | |
| TPRED1 | | | | | | | | |

## LATTICE STRUCTURE
## LOS ANGELES 1984 (Cont'd.)

| TASK | SUCCESSORS |
|---|---|
| SWABS1 | |
| TPUR1 | PUTT1 |
| PUTT1 | |
| TPRED2 | |
| SWABS2 | |
| TPUR2 | PUTT2 |
| PUTT2 | |
| TCRSS1 | |
| TEDC1 | |
| TPSEC1 | |
| MSAW1 | |
| ALTRK1 | |
| TCRSS2 | |
| TEDC2 | |
| TPSEC2 | |
| MSAW2 | |
| ALTRK2 | |
| AUT | |
| SLINK | |
| CATU | |
| PAUS1 | |
| PAUS2 | |
| PAUS3 | |
| PAUS4 | |
| paus5 | *INHIBITED* |
| PAUS6 | *INHIBITED* |
| PAUS7 | *INHIBITED* |
| SCTME1 | |
| SCTME2 | |
| SCTME3 | |




1986
1988
LOS ANGELES - 1990

*The number of copies required will be equal to the number of processors, which is to be determined by simulation.

# LATTICE STRUCTURE
## LOS ANGELES 1986

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | DINIT1 | TROUT1 | DINIT2 | TROUT2 | CA1 | CA2 | DABC1 | TPRED1 |
| | ALTRK1 | MSAW1 | SWABS1 | DABC2 | TPRED2 | ALTRK2 | MSAW2 | SWABS2 |
| TUD | CRIT | IFO | AUT | SLINK | TPRED1 | SWABS1 | TPRED2 | SWABS2 |
| TUDS | DINIT1 | TROUT1 | DINIT2 | TROUT2 | CA1 | CA2 | DABC1 | TPRED1 |
| | ALTRK1 | MSAW1 | SWABS1 | DABC2 | TPRED2 | ALTRK2 | MSAW2 | SWABS2 |
| TUDX | CA1 | CA2 | | | | | | |
| RKIP | RDOP | | | | | | | |
| RDOP | | | | | | | | |
| DOP | | | | | | | | |
| CDR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | DINIT1 | TROUT1 | DINIT2 | TROUT2 | | | | |
| IFO | IFI | | | | | | | |
| DINIT1 | MAT | | | | | | | |
| DINIT2 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | RTDOP | TDOP2 | | | | | |
| TDOP1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| RTDOP | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| CA1 | CATRK1 | CATU | | | | | | |
| CATRK1 | | | | | | | | |
| CA2 | CATRK2 | CATU | | | | | | |
| CATRK2 | | | | | | | | |
| TPRED 1 | | | | | | | | |
| SWABS1 | | | | | | | | |
| TPRED2 | | | | | | | | |
| SWABS2 | | | | | | | | |
| DABC1 | | | | | | | | |

## LATTICE STRUCTURE

## LOS ANGELES 1986 (Cont'd.)

| TASK | | SUCCESSORS |
|---|---|---|
| MSAW1 | | |
| ASLTRK1 | | |
| DABC2 | | |
| MSAW2 | | |
| ALTRK2 | | |
| AUT | | |
| SLINK | | |
| CATU | | |
| PAUS1 | | |
| PAUS2 | | |
| PAUS3 | | |
| PAUS4 | | |
| PAUS5 | *INHIBITED* | |
| PAUS6 | *INHIBITED* | |
| PAUS7 | *INHIBITED* | |
| SCTME1 | | |
| SCTME2 | | |
| SCTME3 | | |

# LATTICE STRUCTURE

## LOS ANGELES 1988

| TASK | STRUCTURE | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | DINIT1 | TROUT1 | DINIT2 | TROUT2 | CA1 | CA2 | DABC1 | TPRED1 |
| | ALTRK1 | MSAW1 | SWABS1 | DABC2 | TPRED2 | ALTRK2 | MSAW2 | SWABS2 |
| TUD | CRIT | IFO | AUT | SLINK | TPRED1 | SWABS1 | TPRED2 | SWABS2 |
| TUDS | DINIT1 | TROUT1 | DINIT2 | TROUT2 | CA1 | CA2 | DABC1 | TPRED1 |
| | ALTRK1 | MSAW1 | SWABS1 | DABC2 | TPRED2 | ALTRK2 | MSAW2 | SWABS2 |
| TUDX | CA1 | CA2 | | | | | | |
| RKIP | RDOP | | | | | | | |
| RDOP | | | | | | | | |
| DOP | | | | | | | | |
| CDR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | DINIT1 | TROUT1 | DINIT2 | TROUT2 | | | | |
| IFO | IFI | | | | | | | |
| DINIT1 | MAT | | | | | | | |
| DINIT2 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | RTDOP | TDOP2 | | | | | |
| TDOP1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| RTDOP | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| CA1 | CATRK1 | CATU | | | | | | |
| CATRK1 | | | | | | | | |
| CA2 | CATRK2 | CATU | | | | | | |
| CATRK2 | | | | | | | | |
| TPRED1 | | | | | | | | |
| SWABS1 | | | | | | | | |
| TPRED2 | | | | | | | | |
| SWABS2 | | | | | | | | |
| DABC1 | | | | | | | | |

## LATTICE STRUCTURE

## LOS ANGELES 1988 (Cont'd.)

| TASK | | SUCCESSORS |
|---|---|---|
| MSAW1 | | |
| ALTRK1 | | |
| DABC2 | | |
| MSAW2 | | |
| ALTRK2 | | |
| AUT | | |
| SLINK | | |
| CATU | | |
| PAUS1 | | |
| PAUS2 | | |
| PAUS3 | | |
| PAUS4 | | |
| PAUS5 | *INHIBITED* | |
| PAUS6 | *INHIBITED* | |
| PAUS7 | *INHIBITED* | |
| SCTME1 | | |
| SCTME2 | | |
| SCTME3 | | |

# LATTICE STRUCTURE

# LOS ANGELES 1990

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | DINIT1 | TROUT1 | DINIT2 | TROUT2 | CA1 | CA2 | DABC1 | TPRED1 |
| | ALTRK1 | MSAW1 | SWABS1 | DABC2 | TPRED2 | ALTRK2 | MSAW2 | SWABS2 |
| TUD | CRIT | IFO | AUT | SLINK | TPRED1 | SWABS1 | TPRED2 | SWABS2 |
| TUDS | DINIT1 | TROUT1 | DINIT2 | TROUT2 | CA1 | CA2 | DABC1 | TPRED1 |
| | ALTRK1 | MSAW1 | SWABS1 | DABC2 | TPRED2 | ALTRK2 | MSAW2 | SWABS2 |
| TUDX | CA1 | CA2 | | | | | | |
| RKIP | RDOP | | | | | | | |
| RDOP | | | | | | | | |
| DOP | | | | | | | | |
| CDR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | DINIT1 | TROUT1 | DINIT2 | TROUT2 | | | | |
| IFO | IFI | | | | | | | |
| DINIT1 | MAT | | | | | | | |
| DINIT2 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TROUT2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | RTDOP | TDOP2 | | | | | |
| TDOP1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TDOP2 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| RTDOP | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| CA1 | CATRK1 | CATU | | | | | | |
| CATRK1 | | | | | | | | |
| CA2 | CATRK2 | CATU | | | | | | |
| CATRK2 | | | | | | | | |
| TPRED1 | | | | | | | | |
| SWABS1 | | | | | | | | |
| TPRED2 | | | | | | | | |
| SWABS2 | | | | | | | | |
| DABC1 | | | | | | | | |

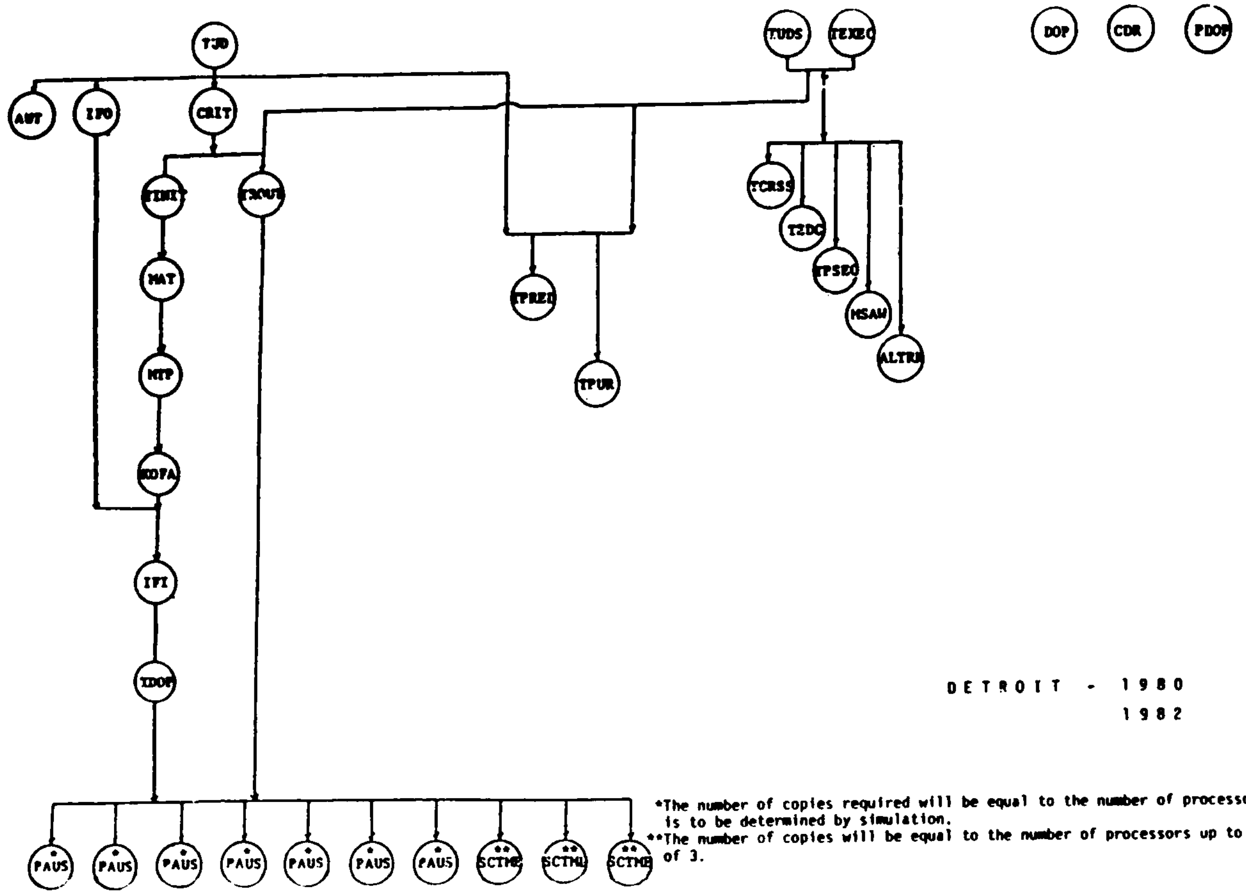
LATTICE STRUCTURE

LOS ANGELES 1990 (Cont'd.)

| TASK | | SUCCESSORS |
|---|---|---|
| MSAW1 | | |
| ALTRK1 | | |
| DABC2 | | |
| MSAW2 | | |
| ALTRK2 | | |
| AUT | | |
| SLINK | | |
| CATU | | |
| PAUS1 | | |
| PAUS2 | | |
| PAUS3 | | |
| PAUS4 | | |
| PAUS5 | *INHIBITED* | |
| PAUS6 | *INHIBITED* | |
| PAUS7 | *INHIBITED* | |
| SCTME1 | | |
| SCTME2 | | |
| SCTME3 | | |

# APPENDIX P

LATTICE DESCRIPTIONS FOR THE DETROIT TRACON




DETROIT - 1980
1982

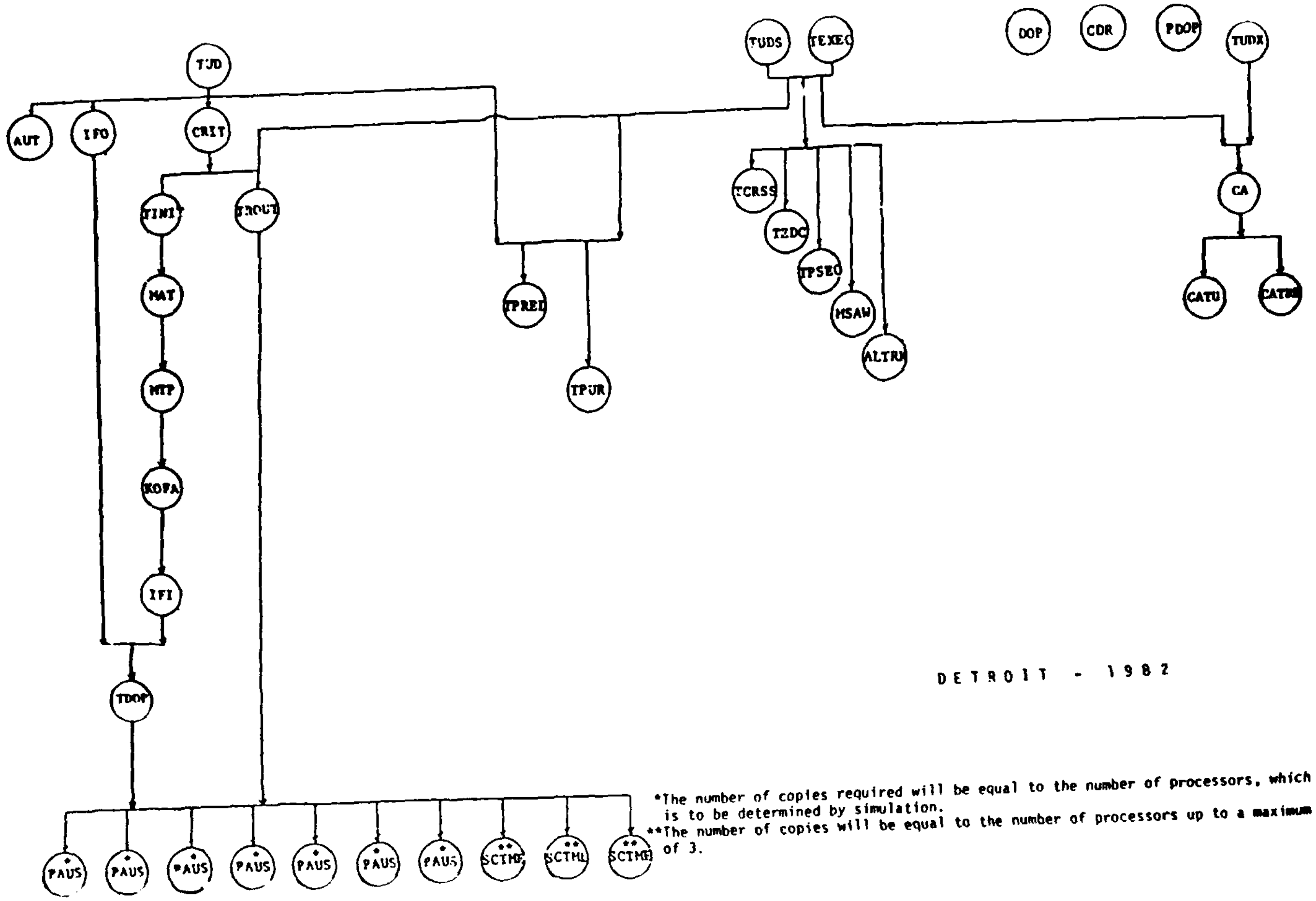
*The number of copies required will be equal to the number of processors, which is to be determined by simulation.

**The number of copies will be equal to the number of processors up to a maximum of 3.

## LATTICE STRUCTURE

## DETROIT 1980

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | TINIT1 | TROUT1 | TPSEC1 | TCRSS1 | TPRED1 | TPUR1 | ALTRK1 | |
| | MSAW1 | | | | | | | |
| TUD | CRIT | IFO | AUT | TPRED1 | TPUR1 | | | |
| TUDS | TINIT1 | TROUT1 | TPSEC1 | TCRSS1 | TEDC1 | TPRED1 | TPUR1 | ALTRK1 |
| | MSAW1 | | | | | | | |
| DOP | | | | | | | | |
| CDR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | TINIT1 | TROUT1 | | | | | | |
| IFO | IFI | | | | | | | |
| TINIT1 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | | | | | | | |
| TDOP1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| TPRED1 | | | | | | | | |
| TPUR1 | | | | | | | | |
| TCRSS1 | | | | | | | | |
| TEDC1 | | | | | | | | |
| TPSEC1 | | | | | | | | |
| MSAW1 | | | | | | | | |
| ALTRK1 | | | | | | | | |
| AUT | | | | | | | | |
| PAUS1 | | | | | | | | |
| PAUS2 | *INHIBITED* | | | | | | | |
| PAUS3 | *INHIBITED* | | | | | | | |
| PAUS4 | *INHIBITED* | | | | | | | |
| PAUS5 | *INHIBITED* | | | | | | | |
| PAUS6 | *INHIBITED* | | | | | | | |
| PAUS7 | *INHIBITED* | | | | | | | |
| SCTME1 | | | | | | | | |
| SCTME2 | *INHIBITED* | | | | | | | |
| SCTME3 | *INHIBITED* | | | | | | | |




DETROIT - 1982

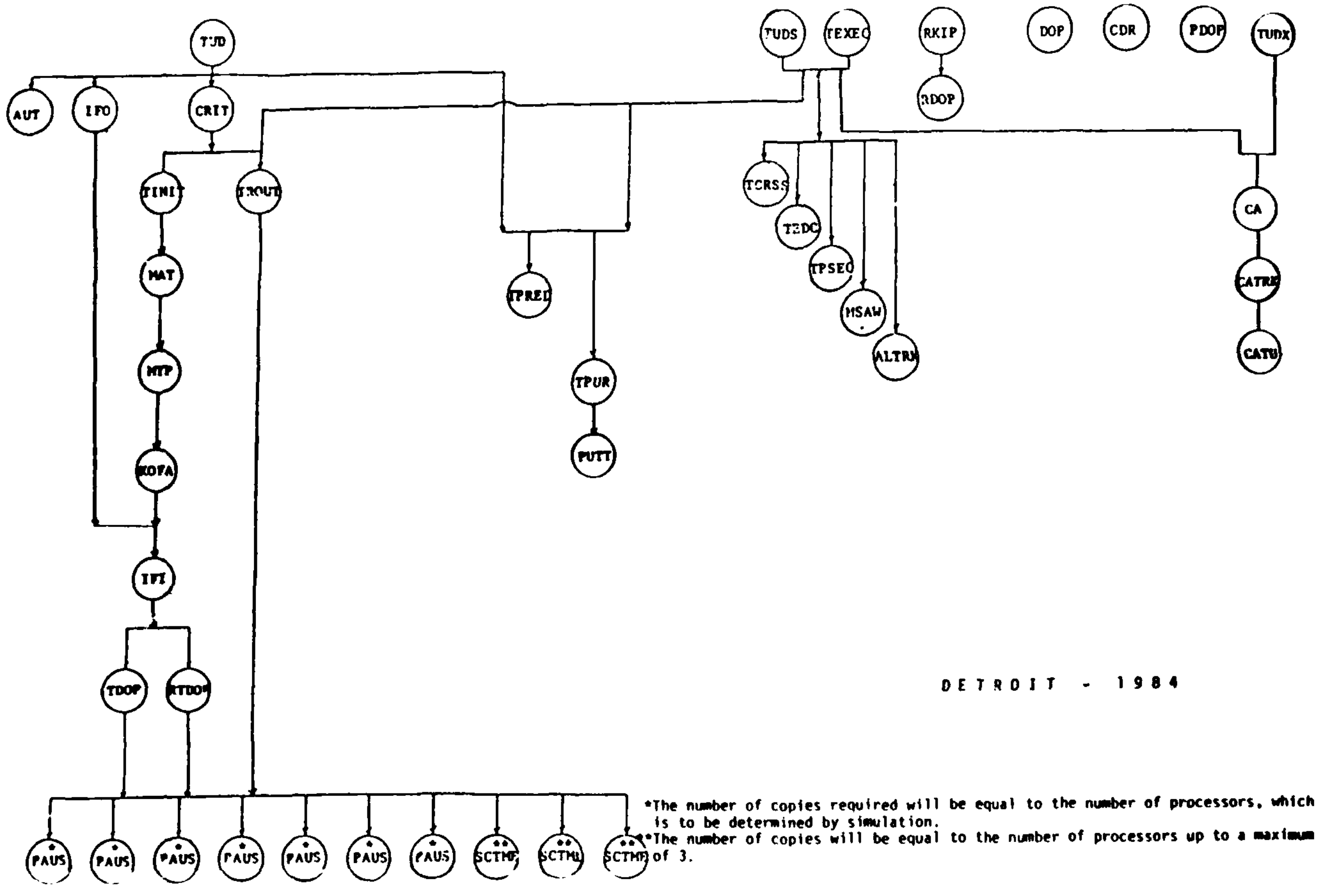
*The number of copies required will be equal to the number of processors, which is to be determined by simulation.

**The number of copies will be equal to the number of processors up to a maximum of 3.

## LATTICE STRUCTURE

## DETROIT 1982

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | TINIT1 | TROUT1 | CA1 | TPSEC1 | TCRSS1 | TEDC1 | TPRED1 | TPUR1 |
| | ALTRK1 | MSAW1 | | | | | | |
| TUD | CRIT | IFO | AUT | TPRED1 | TPUR1 | | | |
| TUDS | TINIT1 | TROUT1 | CA1 | TPSEC1 | TCRSS1 | TEDC1 | TPRED1 | TPUR1 |
| | ALTRK1 | MSAW1 | | | | | | |
| TUDX | CA1 | | | | | | | |
| DOP | | | | | | | | |
| CDR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | TINIT1 | TROUT1 | | | | | | |
| IFO | IFI | | | | | | | |
| TINIT1 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | | | | | | | |
| TDOP1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| CA1 | CATRK1 | CATU | | | | | | |
| CATRK1 | | | | | | | | |
| TPRED1 | | | | | | | | |
| TPUR1 | | | | | | | | |
| TCRSS1 | | | | | | | | |
| TEDC1 | | | | | | | | |
| TPSEC1 | | | | | | | | |
| MSAW1 | | | | | | | | |
| ALTRK1 | | | | | | | | |
| AUT | | | | | | | | |
| CATU | | | | | | | | |
| PAUS1 | | | | | | | | |
| PAUS2 | | | | | | | | |
| PAUS3 | | | | | | | | |
| PAUS4 | *INHIBITED* | | | | | | | |
| PAUS5 | *INHIBITED* | | | | | | | |
| PAUS6 | *INHIBITED* | | | | | | | |
| PAUS7 | *INHIBITED* | | | | | | | |
| SCTME1 | | | | | | | | |
| SCTME2 | | | | | | | | |
| SCTME3 | | | | | | | | |




DETROIT - 1984

*The number of copies required will be equal to the number of processors, which is to be determined by simulation.
**The number of copies will be equal to the number of processors up to a maximum of 3.

## LATTICE STRUCTURE

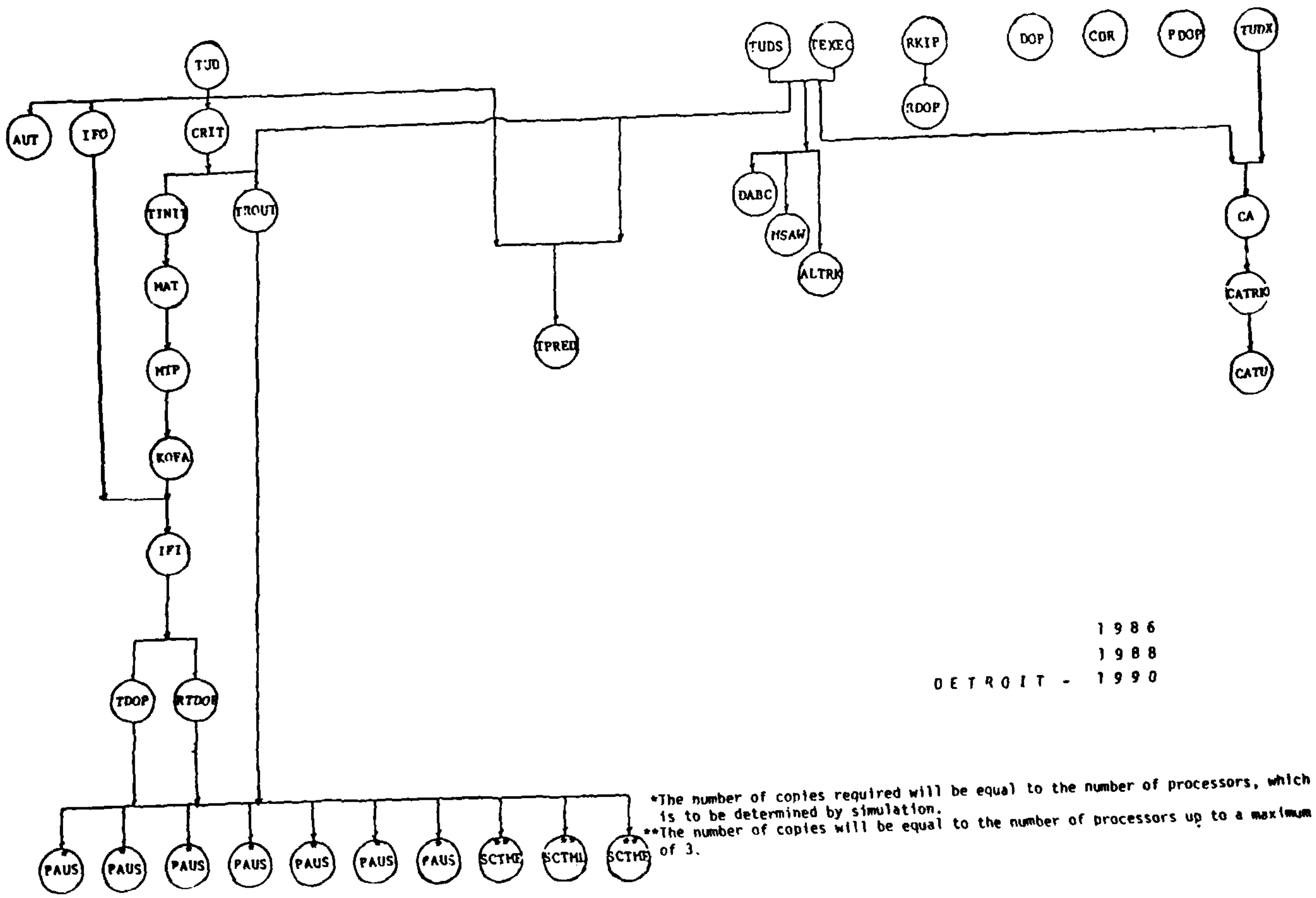
## DETROIT 1984

| TASK | SUCCESSORS |
|---|---|
| TEXEC | TINIT1 TROUT1 CA1 TPSEC1 TCRSS1 TEDC1 TPRED1 TPUR1 ALTRK1 MSAW1 |
| TUD | CRIT IFO AUT TPRED1 TPUR1 |
| TUDS | TINIT1 TROUT1 CA1 TPSEC1 TCRSS1 TEDC1 TPRED1 TPUR1 ALTRK1 MSAW1 |
| TUDX | CA1 |
| RKIP | RDOP |
| RDOP | |
| DOP | |
| CDR | |
| PDOP | |
| CRIT | TINIT1 TROUT1 |
| IFO | IFI |
| TINIT1 | MAT |
| TROUT1 | PAUS1 PAUS2 PAUS3 PAUS4 PAUS5 PAUS6 PAUS7 SCTME1 SCTME2 SCTME3 |
| MAT | MTP |
| MTP | KOFA |
| KOFA | IFI |
| IFI | TDOP1 RTDOP |
| TDOP1 | PAUS1 PAUS2 PAUS3 PAUS4 PAUS5 PAUS6 PAUS7 SCTME1 SCTME2 SCTME3 |
| RTDOP | PAUS1 PAUS2 PAUS3 PAUS4 PAUS5 PAUS6 PAUS7 SCTME1 SCTME2 SCTME3 |
| CA1 | CATRK1 CATU |
| CATRK1 | |
| TPRED1 | |
| TPUR1 | PUTT1 |
| PUTT1 | |
| TCRSS1 | |
| TEDC2 | |
| TPSEC1 | |
| MSAW1 | |
| ALTRK1 | |
| AUT | |
| CATU | |
| PAUS1 | |
| PAUS2 | |
| PAUS3 | |

## LATTICE STRUCTURE

## DETROIT 1984 (Cont'd.)

| TASK | SUCCESSORS |
|---|---|
| PAUS4 | *INHIBITED* |
| PAUS5 | *INHIBITED* |
| PAUS6 | *INHIBITED* |
| PAUS7 | *INHIBITED* |
| SCTME1 | |
| SCTME2 | |
| SCTME3 | |




1986
1988
DETROIT - 1990

*The number of copies required will be equal to the number of processors, which is to be determined by simulation.
**The number of copies will be equal to the number of processors up to a maximum of 3.

LATTICE STRUCTURE

DETROIT 1986

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | DINIT1 | TROUT1 | CA1 | DABC1 | TPRED1 | ALTRK1 | MSAW1 | |
| TUD | CRIT | IFO | AUT | TPRED1 | TPUR1 | | | |
| TUDS | DINIT1 | TROUT1 | CA1 | DABC1 | TPRED1 | ALTRK1 | MSAW1 | |
| TUDX | CA1 | | | | | | | |
| RKIP | RDOP | | | | | | | |
| RDOP | | | | | | | | |
| DOP | | | | | | | | |
| CDR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | DINIT1 | TROUT1 | | | | | | |
| IFO | IFI | | | | | | | |
| DINIT1 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | RTDOP | | | | | | |
| TDOP1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| RTDOP | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| CA1 | CATRK1 | CATU | | | | | | |
| CATRK1 | | | | | | | | |
| TPRED1 | | | | | | | | |
| DARC1 | | | | | | | | |
| MSAW1 | | | | | | | | |
| ALTRK1 | | | | | | | | |
| AUT | | | | | | | | |
| CATU | | | | | | | | |
| PAUS1 | | | | | | | | |
| PAUS2 | | | | | | | | |
| PAUS3 | | | | | | | | |
| PAUS4 | *INHIBITED* | | | | | | | |
| PAUS5 | *INHIBITED* | | | | | | | |
| PAUS6 | *INHIBITED* | | | | | | | |
| PAUS7 | *INHIBITED* | | | | | | | |
| SCTME1 | | | | | | | | |
| SCTME2 | | | | | | | | |
| SCTME3 | | | | | | | | |

# LATTICE STRUCTURE

## DETROIT 1988

| TASK | SUCCESSORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEXEC | DINIT1 | TROUT1 | CA1 | DABC1 | TPRED1 | ALTRK1 | MSAW1 | |
| TUD | CRIT | IFO | AUT | TPRED1 | TPUR1 | | | |
| TUDS | DINIT1 | TROUT1 | CA1 | DABC1 | TPRED1 | ALTRK1 | MSAW1 | |
| TUDX | CA1 | | | | | | | |
| RKIP | RDOP | | | | | | | |
| RDOP | | | | | | | | |
| DOP | | | | | | | | |
| CDR | | | | | | | | |
| PDOP | | | | | | | | |
| CRIT | DINIT1 | TROUT1 | | | | | | |
| IFO | IFI | | | | | | | |
| DINIT1 | MAT | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| MAT | MTP | | | | | | | |
| MTP | KOFA | | | | | | | |
| KOFA | IFI | | | | | | | |
| IFI | TDOP1 | RTDOP | | | | | | |
| TDOP1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 |
| | SCTME2 | SCTME3 | | | | | | |
| CA1 | CATRK1 | CATU | | | | | | |
| CATRK1 | | | | | | | | |
| TPRED1 | | | | | | | | |
| DABC1 | | | | | | | | |
| MSAW1 | | | | | | | | |
| ALTRK1 | | | | | | | | |
| AUT | | | | | | | | |
| CATU | | | | | | | | |
| PAUS1 | | | | | | | | |
| PAUS2 | | | | | | | | |
| PAUS3 | | | | | | | | |
| PAUS4 | | | | | | | | |
| PAUS5 | *INHIBITED* | | | | | | | |
| PAUS6 | *INHIBITED* | | | | | | | |
| PAUS7 | *INHIBITED* | | | | | | | |
| SCTME1 | | | | | | | | |
| SCTME2 | | | | | | | | |
| SCTME3 | | | | | | | | |

# LATTICE STRUCTURE

## DETROIT 1990

| TASK | SUCCESSORS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TEXEC | DINIT1 | TROUT1 | CA1 | DABC1 | TPRED1 | ALTRK1 | MSAW1 | | | |
| TUD | CRIT | IFO | AUT | TPRED1 | TPUR1 | | | | | |
| TUDS | DINIT1 | TROUT1 | CA1 | DABC1 | TPRED1 | ALTRK1 | MSAW1 | | | |
| TUDX | CA1 | | | | | | | | | |
| RKIP | RDOP | | | | | | | | | |
| RDOP | | | | | | | | | | |
| DOP | | | | | | | | | | |
| CDR | | | | | | | | | | |
| PDOP | | | | | | | | | | |
| CRIT | DINIT1 | TROUT1 | | | | | | | | |
| IFO | IFI | | | | | | | | | |
| DINIT1 | MAT | | | | | | | | | |
| TROUT1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 | SCTME2 | SCTME3 |
| MAT | MTP | | | | | | | | | |
| MTP | KOFA | | | | | | | | | |
| KOFA | IFI | | | | | | | | | |
| IFI | TDOP1 | RTDOP | | | | | | | | |
| TDOP1 | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 | SCTME2 | SCTME3 |
| RTDOP | PAUS1 | PAUS2 | PAUS3 | PAUS4 | PAUS5 | PAUS6 | PAUS7 | SCTME1 | SCTME2 | SCTME3 |
| CA1 | CATRK1 | CATU | | | | | | | | |
| CATRK1 | | | | | | | | | | |
| TPRED1 | | | | | | | | | | |
| DARC1 | | | | | | | | | | |
| MSAW1 | | | | | | | | | | |
| ALTRK1 | | | | | | | | | | |
| AUT | | | | | | | | | | |
| CATU | | | | | | | | | | |
| PAUS1 | | | | | | | | | | |
| PAUS2 | | | | | | | | | | |
| PAUS3 | | | | | | | | | | |
| PAUS4 | | | | | | | | | | |
| PAUS5 | *INHIBITED* | | | | | | | | | |
| PAUS6 | *INHIBITED* | | | | | | | | | |
| PAUS7 | *INHIBITED* | | | | | | | | | |
| SCTME1 | | | | | | | | | | |
| SCTME2 | | | | | | | | | | |
| SCTME3 | | | | | | | | | | |

## APPENDIX Q

## REFERENCES

## REFERENCES


1. Engineering and Development Program Plan - Terminal/Tower Control, FAA-ED-14-2A, Federal Aviation Administration, November 1978.
2. ARTS IIIA Systems Design Data, ATC 2300, Sperry UNIVAC Defense Systems, December 1977.
3. ATC Hardware Design Data, ATC 2100, Sperry UNIVAC Defense Systems, May 1977.
4. Metering and Spacing - ARTS III Design Data, PX 11123, Revision 4, Sperry UNIVAC Defense Systems, April 1979.
5. Terminal Information Processing System (TIPS) Preliminary Design Data, Lockheed Electronics Company, June 1979.
6. DABS/SRAP II/ARTS III Design Data, ATC 10300, Revision B Sperry UNIVAC Defense Systems, November 1978.
7. ARTS Multiprocessor Executive Simulation Model Detailed Description, PX 10473, Sperry UNIVAC Defense Systems, September 1974.
8. Remote Display Buffer Memory Design Data Document, ATC 10704, Sperry UNIVAC Defense Systems, April 1978.
9. Definition, Description, and Interfaces of the FAA's Developmental Programs, FAA-EM-78-16, II, Federal Aviation Administration, September 1978.
10. Preliminary Tower Automated Ground Surveillance (TAGS) Operational System Definition, MTR-7153, MITRE Corporation, February 1976.
11. Airport/Facility Directory, National Oceanographic and Atmospheric Administration, September 1978.
12. Terminal Area Forecasts Fiscal Years 1979-1990, FAA-AVP-78-6, Federal Aviation Administration, June 1978.
13. FAA Air Traffic Activity Peak Day and Terminal Area Relationships Calendar Year 1973, Federal Aviation Administration, February 1974.
14. FAA Air Traffic Activity Fiscal Year and Calendar Year 1972, Federal Aviation Administration, June 1973.
15. Air Traffic Activity Terminal Area Relationships Fiscal Year 1976, Federal Aviation Administration, March 1977.

16. FAA Air Traffic Activity Fiscal Year 1977, Federal Aviation Administration, September 1977.

17. Military Air Traffic Activity Report Calendar Year 1976, Federal Aviation Administration.

18. Metering and Spacing Design Data - ARTS III, UNIVAC, April 1979 (PX 11123, Rev. 4)

19. Terminal Information System: ARTS III Input/Output Requirements, MITRE, November 1976 (MTR - 7161)

20. Terminal Information System ER (FAA-ER-D-120-006)

21. Tower Automated Ground Surveillance System (TAGS) Alternatives Study, MITRE, January 1979 (MTR-79W00017)

22. Full Digital ARTS Display (FDAD) ER, FAA-ER-D-120-007

23. ARTS III - ARTS IIIA - EARTS - NYTRACON Site Configurations, Sperry UNIVAC Defense Systems, November 1977.

24. Excerpts from PRIMARY/SECONDARY TERMINAL RADAR SITING HANDBOOK, Order 6310.6, July 1976.

25. Terminal Area Air Traffic Relationships Fiscal Year 1971. Federal Aviation Administration, December 1971..

26. Tower Airport Statistics Handbook Calendar Year 1977, FAA-AVP-78-10, Federal Aviation Administration, July 1978.

27. Location Identifiers, Order 7350.4N, Federal Aviation Administration, September 1978.

28. Design Data for Conflict Alert Stage 1, UNIVAC, Dec' 76 Rev. May 1977 (ATC 10410)

29. Terminal Area Conflict Alert Design Verification Test Results, MITRE, January 1978 (MTR-7677).

30. Terminal Area Conflict Alert: Design Evaluation Test Results for ARTS III Dual Beacon Sites, MITRE, September 1978 (MTR-7928).

# APPENDIX R

## GLOSSARY OF TERMS

## GLOSSARY OF TERMS

| Task | Definition |
|---|---|
| ADB | Altitude Data Blocks |
| ALTRK | Altitude Tracker |
| AT | Associated Tracks requiring Display Change |
| ATB | Associated Tracks with Beacon Codes |
| ATC | Associated Tracks with Mode C |
| ATD | Associated Tracks with Discrete Beacon |
| ATH | Associated Tracks in Handoff |
| AUT | Automatic Offset of Display Data Blocks |
| BANS | Brite Alpha Numeric System |
| BOR | Beacon Only Reports |
| BOT | Beacon Only Tracking Table |
| CA | Conflict Alert |
| CATRK | CA Tracking |
| CATU | CA Data Base Manager |
| CCT | Number of Changes to CTS Threads |
| CDR | Continuous Data Recording |
| CDT | Console Data Terminal |
| CMA | Central Memory Access |
| CMC | Communications Multiplexer Controller |
| CRIT | Critical Data Recording |
| CTA | Associated Tracks for Mode C Beacon Equipped Aircraft, Plus Unassociated Linked Tracks |
| CTS | Central Track Store |
| DABS | Discrete Address Beacon System |
| DEDS | Data Entry and Display System |
| DOP | Display Output Processing |
| DSPL | Quantity of Displays |
| DTT | Deviation Trial Tracks |
| EDISC | Disk Control |
| FD | Full Data Blocks requiring Display Change |
| FDAD | Full Digital ARTS Display |
| IAC | Instantaneous Airborne Count |
| IFI | Interfacility Input |

## GLOSSARY OF TERMS (cont'd)

| Task | Definition |
|---|---|
| IFO | Interfacility Output |
| IOP | Input Output Processor |
| KOFA | Keyboard Operational Functions |
| LD | Limited Data Blocks requiring Display Change |
| MAT | Flight Plan Tab List Data Monitor |
| MD | MSAW Data Blocks requiring Display Change |
| MDBM | Multiplexed Display Buffer Memory |
| MOP | Map Output Processing |
| MPE | Multiprocessor Executive |
| M&S | Terminal Metering and Spacing |
| MSAW | Minimum Safe Altitude Waring |
| MSP | Medium Speed Printer Control |
| MSPOP | Metering and Spacing Popup Task |
| MTP | Magentic Tape Processing |
| NAT | Number of Associated Threads Updated |
| NCS | Number of Changes to Sector Threads |
| NDT | Number of Tracks Flagged for Delay Terminations |
| NM | Number of Tracks in the MSAW Tab List |
| NPC | Number of Tracks in the Coast/Suspend List |
| NPS | Tracks in the Store List |
| NT | Number of Tracks, Total |
| NTT | Tabular Lines |
| PAUS | Track Display Data Output Control |
| PDOP | Periodic Display Output Processing |
| PSRAP | SRAP Input Processing |
| PUTT | Process Untracked Targets |
| RAT | Radar Address Table |
| RDBM | Remote Display Buffer Memory |
| RDOP | Remote Display Output Processing |
| RFDU | Reconfiguration and Fault Detection Unit |
| RKIP | Remote Keyboard Input Processing |
| ROR | Radar Only Reports |
| ROT | Radar Only Tracking Table |
| RRR | Radar Reinforced Beacon Reports |

GLOSSARY OF TERMS (cont'd)

| Task | Definition |
| --- | --- |
| RTDOP | Remote Tabular Display Output Processing |
| SCTME | Scratch Pad Display Monitor |
| SEC | Sector Number of given Sensor |
| SLINK | Inter-Sensor Track Link |
| SNS | Sensor Number |
| SNSR | Quantity of Sensors |
| SRAP | Sensor Receiver and Processor |
| SS | Single Symbols requiring Display Update |
| SWABS | Software Adaption to Beacon System |
| T | Total Tracks |
| TA | Associated Tracks - Total |
| TAA | Number of Associated Threads Added |
| TAD | Number of Associated Tracks Displays |
| TAF | Number of Associated Tracks requiring a FDB Update |
| TCDD | Tower Cab Digital Display |
| TCRSS | Track Cross Reference |
| TDOP | Tabular Display Output Processing |
| TEDC | Track Early Discrete Correlation |
| TEXEC | Tracking Executive |
| TINIT | Track Initialization |
| TIPS | Terminal Information Processing System |
| TL | Tabular Lines requiring Display Update |
| TO | Number of Threads Added/Deleted |
| TPRED | Track Prediction |
| TPSEC | Primary/Secondary Correlation |
| TPUR | Process Unused Reports |
| TROUT | Track Output |
| TSL | Number of Tracks in the Store List |
| TSS | Number of Tracks requiring Single Symbol Updates |
| TTT | Turning Trial Tracks |
| TU | Number of Unassociated Tracks, Total |
| TUD | Thread Update |
| TUDS | Sector Thread Update |
| TUDX | Thread Update for Conflict Alert |

## GLOSSARY OF TERMS (cont'd)

| Task | Definition |
| --- | --- |
| TUF | Number of Unassociated Tracks requiring FDB Update |
| TUL | Unassociated Linked Tracks, Total |
| TUU | Unassociated Unlined Tracks, Total |
| UBR | Unused Beacon Reports |
| URR | Unused Radar Reports |
| UT | Unassociated Tracks, requiring Display Update |
| UTB | Unassociated Tracks, Beacon |
| UTC | Unassociated Tracks, Mode C |
| UTD | Unassociated Tracks, Discrete Beacon |
| UTL | Unassociated Tracks requiring LDB Update |

☆U.S. GOVERNMENT PRINTING OFFICE: 1980-311-586/193