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NASA CR-170592

# Odetics

Report Number:
9121010

1859 S. Manchester Avenue
Anaheim, California

# HIGH DENSITY
# TAPE/HEAD INTERFACE
# STUDY

(NASA-CR-170592) HIGH DENSITY TAPE/HEAD INTERFACE STUDY Final Report (Odetics, Inc., Anaheim, Calif.) 36 p HC A03/MF A01
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April 1983
Final Report

Prepared for:
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Greenbelt, Maryland 20771

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### Tables



### Figures

## 1.0 INTRODUCTION

This final report presents the results of Odetics efforts performed under NASA GSFC Contract No. NAS5-26571 entitled "Tape/Head Interface Study". This investigation of high energy ($H_c \cong 650$ oersteds) tapes and high track density (84 tracks per inch) heads had, as its goal, the definition of optimum combinations of head and tape, including the control required of their interfacial dynamics that would enable the manufacture of high rate (150 Mbps) digital tape recorders for unattended space flight.

At the time of contract award, Odetics was nearing completion of a 50 Mbps digital tape recorder (SPOT) for the French Space Agency (CNES) and saw the efforts contracted for under this study as a logical extension of the state-of-the-art established during the SPOT development.

The SPOT development established 42 tracks per inch on low energy instrumentation tape with error correction coding as a reliable concept for long life unattended space flight magnetic tape recorders.

The challenge became one of extending these concepts to twice the track density at increased bit packing density on yet to be space proven high energy video tapes.

Odetics used its quarter SPOT feasibility model tape transport, Spin Physics 21 track per 1/4 inch heads, and Ampex 721 and 3M5198 magnetic tapes to conduct its investigations.

1.0 (Contd) Time and funding constraints did not allow the desired goal of tape/head optimization to be realized; however, from the results obtained, it can be concluded that acceptable 84 track per inch longitudinal tipped recording heads can be manufactured; but commerically available video tapes require advancements in tape handling techniques and the addition of error correction coding to meet the performance requirements of 150 Mbps systems.

## 2.0 TAPES

After a review of manufacturers' specifications and discussions with tape manufacturers, GSFC, and IITRI, Odetics selected and placed orders with IITRI for the following four high energy tape types in 1/4 inch widths:

a. Ampex 721
b. Ampex 466
c. Ampex 196
d. 3M5198

Although we would have liked to evaluate Fuji tapes, we were informed that they would not be available in 1/4 inch widths or in 9200 foot lengths. Also, it was later determined that Ampex 196 would not be made available in 1/4 inch widths; so, it was eliminated from the study.

In addition to the three high energy tapes, Ampex 799 tape (available in our inventory) was used to provide baseline comparison data and resolve tape tracking anomolies. Comparison of the key magnetic characteristics is provided in Table 1.

At various times during the evaluation, Ampex 721 and 3M5198 were tested. The results were inconclusive as to which tape would best fulfill the needs of high density recording due primarily to the difficulties incountered in acheiving acceptable tracking in both the forward and reverse directions with either tape type.

| TAPE TYPE | BATCH NO. | PRIMARY USAGE | COERCIVITY, $H_{ci}$ (OERSTEDS) | | RETENTIVITY $B_{rs}$ (GAUSS) | ERASURE FIELD (OERSTEDS) |
|---|---|---|---|---|---|---|
| | | | MFR | IITRI | | |
| 3M5198 | 41571-1-01 | INSTRUMENTATION | 700 | 645 | 1350 | UNKNOWN |
| AMPEX 466 | 1182946XX | DIGITAL MASTERING | 650 | 689 | UNKNOWN | UNKNOWN |
| AMPEX 721 | 11Q024171 | INSTRUMENTATION | 650 | 633 | 1000 | 2000 |
| AMPEX 799 | 192444091 | PCM | 310 | —— | 1000 | 1000 |



INTRINSIC MAGNETIC CHARACTERISTICS

TABLE 1

2.0 (Contd) Odetics tape transports and associated tape guidance techniques were designed and optimized for 3M900 and Ampex 797/799 tapes with their gamma ferric oxide particle and associated binder system. Testing of the baseline system, with a production lot of Ampex 799, produced excellent tracking and recording results which were not duplicated with the high energy tapes.

Only after a significant amount of time was used to investigate the tracking problems with the high energy tapes, and modifications not recommended for long life satellite recorders implemented, could tracking performance acceptable for evaluating the high density heads be obtained. These nonprescribed modifications consisted of edge guiding the tape with the reel flanges and texturizing the capstans to increase the coefficient of friction beyond that previously used on Odetics recorders.

Whether or not production lots, rather than the custom lots used in this study, would yield acceptable tracking results should be determined before extensive investigations into improved tracking techniques are undertaken.

## 3.0 HEADS

After detailed engineering design, the head specifications of Appendix A were developed for procurement of record and reproduce heads from Spin Physics, Inc. of San Diego, California. The heads are designed for 35 Kbpi recording/reproduction and have as their essential characteristics the following:

a. 21 tracks per 1/4 inch, comprised of an interlaced set of heads with eleven and ten tracks respectively

b. 0.008 inch effective record track width with 0.0035 inch guard band

c. 0.006 inch effective reproduce track width with 0.0055 inch guard band

d. Ferrite cores with solid alfesil tips

e. 3 degree wrap angle

Heads developed and manufactured by Spin Physics to these specifications were successfully acceptance tested with Ampex 799 tape and further evaluated with high energy tapes on the quarter SPOT test system.

3.0 (Contd) Although no technical problems were reported by Spin Physics during the development or manufacture of the 21 track heads, nontechnical problems which threatened delivery of the heads prompted Odetics to undertake an 84 track/inch head development with its own head division, Omutec, using discretionary funds. It was hoped that the outcome of the parallel development effort would be available to provide comparative test results by the end of this present study contract; however, this was not accomplished.

The results obtained from this study were sufficient to ascertain that the technology does exist to build 84 track/inch tipped heads for longitudinal recording in space satellite applications.

## 4.0 EVALUATION TESTING

The tape and head evaluation philosophy that Odetics adopted was to establish performance on a baseline system and then reassess performance by changing the tape and/or head type. By minimizing the unknowns, less ambiguity would be introduced into the results.

The primary technique that Odetics uses to quantitatively assess the head/tape interface is transition density analysis. This is a method that quantifies the "eye pattern" by use of a company developed transition density analyzer (TDA). The TDA accepts any serial input and measures the time between transitions to a granularity of 20 nanoseconds. The number of total bits sampled is typically $10^6$ or $10^7$ bits. The output of the TDA is a printout of the number of transitions that occurred within each 20 nanosecond "window" from the previous transition. The windows or segments are sequentially numbered and the resulting plot represents a normal distribution about the data content bit cells. The absence of any transitions between bit cells is a measure of the recorders ability to accurately decode the recorded signal. Actual printouts are included and used to assess performance in the ensuing sections.

### 4.1 Baseline System

The system used to perform the evaluation testing consisted of a 1/4 inch tape transport mechanized to convert NRZ L input data into nine channels of randomized NRZ plus error correction coding for recording on tape. The nine reproduced channels

4.1 (Contd) are then decoded removing the error correction coding and reconverted to a single NRZ L output. To assess the raw (uncorrected) error rate of the system, the activity of the error correction circuitry is monitored. The baseline system uses 0.018 inch effective track width record and 0.016 inch reproduce heads with 0.005 and 0.007 inch guard bands respectively. It is optimized for 3M455 tape at 72 ips. The system is referred to as the quarter SPOT feasibility test model; SPOT being a 36 data track on one inch tape system.

4.2 Baseline Testing

After establishing acceptable performance of the baseline system over a speed range of 50 to 80 ips (packing densities of 35 to 22 Kb/in), tests were conducted using the wide track SPOT heads and the first high energy tape, Ampex 721.

Figure 1 shows that the signal-to-noise ratio (SNR) of the baseline system with SPOT heads and Ampex 721 tape is greater than 50 db. These results were typical of all future testing with 3M tape and Spin Physics heads.

Figures 2 and 3 are transition density analyzer (TDA) printouts of all nine data tracks at densities of 25 Kb/in and 31 Kb/in respectively with a sample size of $10^6$ transitions. The plots clearly show that the decision making zones are void of any transitions which in turn would result in good bit error rates (BER).

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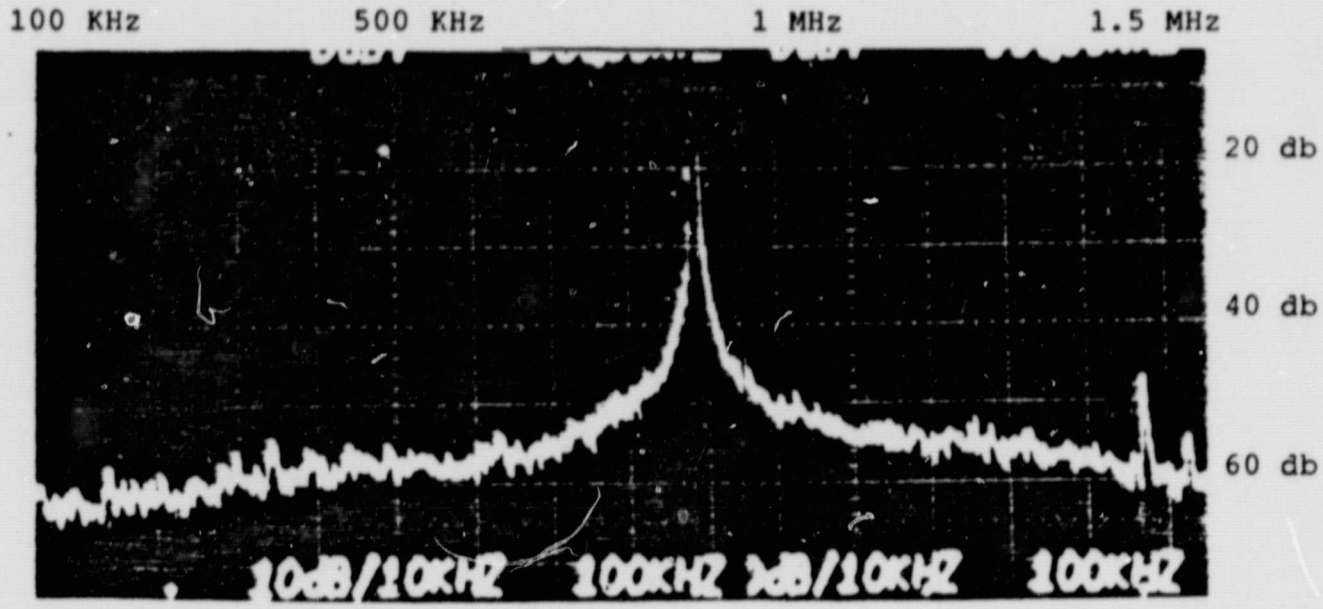


FIGURE 1 - BASELINE SYSTEM NOISE SPECTRUM

SPOT (18 MIL) HEADS
AMPEX 721 TAPE
868 KHz SIGNAL
31 Kb/in DENSITY

(PLOT IS COMPOSITE OF TWO SEPARATE SCANS)

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FIGURE 2

AMPEX 721 TAPE, SPOT HEADS, 25 Kb/in

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK-1
DATE:
TIME:
TESTER:
NOTES: 25KB/in 2ips-1

PRINT MODE: CURSORS

SINGLE DISPLAY: OFF
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20nsec

| SEGMNT NUMBER | SINGLE SAMPLE | LAST MLTPLE SAMPLE |
|---|---|---|
| 20 | 0 | 0 |
| 21 | 0 | 2 |
| 22 | 0 | 19 |
| 23 | 0 | 120 |
| 24 | 0 | 658 |
| 25 | 0 | 2,670 |
| 26 | 0 | 9,850 |
| 27 | 0 | 25,694 |
| 28 | 0 | 52,448 |
| 29 | 0 | 65,535 |
| 30 | 0 | 65,535 |
| 31 | 0 | 65,535 |
| 32 | 0 | 54,336 |
| 33 | 0 | 27,752 |
| 34 | 0 | 10,776 |
| 35 | 0 | 3,110 |
| 36 | 0 | 720 |
| 37 | 0 | 142 |
| 38 | 0 | 23 |
| 39 | 0 | 3 |
| 40 | 0 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 0 | 0 |
| 48 | 0 | 0 |
| 49 | 0 | 11 |
| 50 | 0 | 80 |
| 51 | 0 | 381 |
| 52 | 0 | 1,755 |
| 53 | 0 | 5,619 |
| 54 | 0 | 14,113 |
| 55 | 0 | 27,524 |
| 56 | 0 | 41,154 |
| 57 | 0 | 47,159 |
| 58 | 0 | 43,413 |
| 59 | 0 | 30,780 |
| 60 | 0 | 17,366 |
| 61 | 0 | 7,385 |
| 62 | 0 | 2,427 |
| 63 | 0 | 623 |
| 64 | 0 | 119 |
| 65 | 0 | 14 |
| 66 | 0 | 3 |
| 67 | 0 | 0 |
| 68 | 0 | 0 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 0 |
| 76 | 0 | 1 |
| 77 | 0 | 1 |
| 78 | 0 | 9 |
| 79 | 0 | 58 |
| 80 | 0 | 316 |
| 81 | 0 | 1,235 |
| 82 | 0 | 3,735 |
| 83 | 0 | 8,755 |
| 84 | 0 | 16,385 |
| 85 | 0 | 23,579 |
| 86 | 0 | 27,201 |
| 87 | 0 | 25,973 |
| 88 | 0 | 19,960 |
| 89 | 0 | 12,355 |
| 90 | 0 | 6,158 |
| 91 | 0 | 2,427 |
| 92 | 0 | 754 |
| 93 | 0 | 205 |
| 94 | 0 | 26 |

END

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK-2
DATE:
TIME:
TESTER:
NOTES: 25KB/in 2ips-1

PRINT MODE: CURSORS

SINGLE DISPLAY: OFF
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20nsec

| SEGMNT NUMBER | SINGLE SAMPLE | LAST MLTPLE SAMPLE |
|---|---|---|
| 20 | 0 | 0 |
| 21 | 0 | 0 |
| 22 | 0 | 8 |
| 23 | 0 | 62 |
| 24 | 0 | 658 |
| 25 | 0 | 4,130 |
| 26 | 0 | 17,262 |
| 27 | 0 | 43,607 |
| 28 | 0 | 65,535 |
| 29 | 0 | 65,535 |
| 30 | 0 | 65,535 |
| 31 | 0 | 65,517 |
| 32 | 0 | 33,871 |
| 33 | 0 | 12,592 |
| 34 | 0 | 3,253 |
| 35 | 0 | 549 |
| 36 | 0 | 60 |
| 37 | 0 | 5 |
| 38 | 0 | 0 |
| 39 | 0 | 0 |
| 40 | 0 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 3 |
| 46 | 0 | 21 |
| 47 | 0 | 138 |
| 48 | 0 | 572 |
| 49 | 0 | 1,628 |
| 50 | 0 | 3,636 |
| 51 | 0 | 6,703 |
| 52 | 0 | 10,080 |
| 53 | 0 | 13,851 |
| 54 | 0 | 17,485 |
| 55 | 0 | 21,433 |
| 56 | 0 | 25,574 |
| 57 | 0 | 28,244 |
| 58 | 0 | 28,551 |
| 59 | 0 | 26,841 |
| 60 | 0 | 21,968 |
| 61 | 0 | 15,569 |
| 62 | 0 | 9,584 |
| 63 | 0 | 4,726 |
| 64 | 0 | 1,829 |
| 65 | 0 | 81 |
| 66 | 0 | 125 |
| 67 | 0 | 18 |
| 68 | 0 | 1 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 1 |
| 76 | 0 | 17 |
| 77 | 0 | 128 |
| 78 | 0 | 443 |
| 79 | 0 | 1,128 |
| 80 | 0 | 2,562 |
| 81 | 0 | 4,244 |
| 82 | 0 | 6,668 |
| 83 | 0 | 9,059 |
| 84 | 0 | 11,982 |
| 85 | 0 | 14,243 |
| 86 | 0 | 16,435 |
| 87 | 0 | 17,183 |
| 88 | 0 | 16,874 |
| 89 | 0 | 15,086 |
| 90 | 0 | 12,415 |
| 91 | 0 | 9,287 |
| 92 | 0 | 5,988 |
| 93 | 0 | 3,852 |
| 94 | 0 | 1,190 |

END

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK-3
DATE:
TIME:
TESTER:
NOTES: 25KB/in 2ips-1

PRINT MODE: CURSORS

SINGLE DISPLAY: OFF
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20nsec

| SEGMNT NUMBER | SINGLE SAMPLE | LAST MLTPLE SAMPLE |
|---|---|---|
| 20 | 0 | 4 |
| 21 | 0 | 34 |
| 22 | 0 | 151 |
| 23 | 0 | 636 |
| 24 | 0 | 2,479 |
| 25 | 0 | 7,119 |
| 26 | 0 | 16,791 |
| 27 | 0 | 30,568 |
| 28 | 0 | 46,023 |
| 29 | 0 | 57,541 |
| 30 | 0 | 63,653 |
| 31 | 0 | 61,994 |
| 32 | 0 | 55,787 |
| 33 | 0 | 43,149 |
| 34 | 0 | 29,020 |
| 35 | 0 | 15,761 |
| 36 | 0 | 6,599 |
| 37 | 0 | 2,164 |
| 38 | 0 | 584 |
| 39 | 0 | 112 |
| 40 | 0 | 18 |
| 41 | 0 | 1 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 0 | 11 |
| 48 | 0 | 77 |
| 49 | 0 | 296 |
| 50 | 0 | 966 |
| 51 | 0 | 2,478 |
| 52 | 0 | 5,168 |
| 53 | 0 | 8,871 |
| 54 | 0 | 13,636 |
| 55 | 0 | 18,223 |
| 56 | 0 | 22,463 |
| 57 | 0 | 24,975 |
| 58 | 0 | 26,953 |
| 59 | 0 | 27,023 |
| 60 | 0 | 25,245 |
| 61 | 0 | 21,985 |
| 62 | 0 | 17,123 |
| 63 | 0 | 11,911 |
| 64 | 0 | 7,124 |
| 65 | 0 | 38 |
| 66 | 0 | 1,507 |
| 67 | 0 | 491 |
| 68 | 0 | 151 |
| 69 | 0 | 23 |
| 70 | 0 | 5 |
| 71 | 0 | 1 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 2 |
| 76 | 0 | 14 |
| 77 | 0 | 53 |
| 78 | 0 | 171 |
| 79 | 0 | 521 |
| 80 | 0 | 1,271 |
| 81 | 0 | 2,534 |
| 82 | 0 | 4,476 |
| 83 | 0 | 6,882 |
| 84 | 0 | 9,321 |
| 85 | 0 | 11,699 |
| 86 | 0 | 13,339 |
| 87 | 0 | 14,451 |
| 88 | 0 | 15,379 |
| 89 | 0 | 14,956 |
| 90 | 0 | 14,123 |
| 91 | 0 | 12,544 |
| 92 | 0 | 10,167 |
| 93 | 0 | 7,242 |
| 94 | 0 | 4,762 |

END

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK-4
DATE:
TIME:
TESTER:
NOTES: 25KB/in 2ips-1

PRINT MODE: CURSORS

SINGLE DISPLAY: OFF
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20nsec

| SEGMNT NUMBER | SINGLE SAMPLE | LAST MLTPLE SAMPLE |
|---|---|---|
| 20 | 0 | 0 |
| 21 | 0 | 1 |
| 22 | 0 | 5 |
| 23 | 0 | 37 |
| 24 | 0 | 413 |
| 25 | 0 | 2,258 |
| 26 | 0 | 9,471 |
| 27 | 0 | 26,464 |
| 28 | 0 | 54,157 |
| 29 | 0 | 65,535 |
| 30 | 0 | 65,535 |
| 31 | 0 | 65,535 |
| 32 | 0 | 58,232 |
| 33 | 0 | 34,568 |
| 34 | 0 | 14,939 |
| 35 | 0 | 4,583 |
| 36 | 0 | 991 |
| 37 | 0 | 143 |
| 38 | 0 | 13 |
| 39 | 0 | 0 |
| 40 | 0 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 2 |
| 46 | 0 | 18 |
| 47 | 0 | 92 |
| 48 | 0 | 395 |
| 49 | 0 | 1,248 |
| 50 | 0 | 3,112 |
| 51 | 0 | 6,030 |
| 52 | 0 | 10,067 |
| 53 | 0 | 15,058 |
| 54 | 0 | 20,675 |
| 55 | 0 | 25,040 |
| 56 | 0 | 29,347 |
| 57 | 0 | 29,024 |
| 58 | 0 | 26,294 |
| 59 | 0 | 22,822 |
| 60 | 0 | 18,945 |
| 61 | 0 | 14,031 |
| 62 | 0 | 8,920 |
| 63 | 0 | 4,360 |
| 64 | 0 | 1,690 |
| 65 | 0 | 524 |
| 66 | 0 | 122 |
| 67 | 0 | 19 |
| 68 | 0 | 1 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 0 |
| 76 | 0 | 31 |
| 77 | 0 | 155 |
| 78 | 0 | 578 |
| 79 | 0 | 1,383 |
| 80 | 0 | 2,985 |
| 81 | 0 | 4,996 |
| 82 | 0 | 7,508 |
| 83 | 0 | 10,610 |
| 84 | 0 | 14,371 |
| 85 | 0 | 16,481 |
| 86 | 0 | 17,314 |
| 87 | 0 | 16,260 |
| 88 | 0 | 14,427 |
| 89 | 0 | 12,756 |
| 90 | 0 | 10,673 |
| 91 | 0 | 7,965 |
| 92 | 0 | 5,197 |
| 93 | 0 | 2,666 |
| 94 | 0 | 1,157 |

END

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK-5
DATE:
TIME:
TESTER:
NOTES: 25KB/in 2ips-1

PRINT MODE: CURSORS

SINGLE DISPLAY: OFF
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20nsec

| SEGMNT NUMBER | SINGLE SAMPLE | LAST MLTPLE SAMPLE |
|---|---|---|
| 20 | 0 | 31 |
| 21 | 0 | 129 |
| 22 | 0 | 446 |
| 23 | 0 | 1,511 |
| 24 | 0 | 4,474 |
| 25 | 0 | 10,468 |
| 26 | 0 | 21,851 |
| 27 | 0 | 37,645 |
| 28 | 0 | 56,260 |
| 29 | 0 | 65,535 |
| 30 | 0 | 65,535 |
| 31 | 0 | 63,253 |
| 32 | 0 | 47,536 |
| 33 | 0 | 29,668 |
| 34 | 0 | 15,522 |
| 35 | 0 | 6,776 |
| 36 | 0 | 2,541 |
| 37 | 0 | 762 |
| 38 | 0 | 217 |
| 39 | 0 | 57 |
| 40 | 0 | 11 |
| 41 | 0 | 2 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 0 | 4 |
| 48 | 0 | 31 |
| 49 | 0 | 99 |
| 50 | 0 | 443 |
| 51 | 0 | 1,375 |
| 52 | 0 | 3,656 |
| 53 | 0 | 7,803 |
| 54 | 0 | 14,138 |
| 55 | 0 | 22,619 |
| 56 | 0 | 30,977 |
| 57 | 0 | 36,817 |
| 58 | 0 | 36,348 |
| 59 | 0 | 32,149 |
| 60 | 0 | 23,858 |
| 61 | 0 | 14,847 |
| 62 | 0 | 8,087 |
| 63 | 0 | 3,715 |
| 64 | 0 | 1,388 |
| 65 | 0 | 73 |
| 66 | 0 | 188 |
| 67 | 0 | 30 |
| 68 | 0 | 4 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 2 |
| 76 | 0 | 7 |
| 77 | 0 | 33 |
| 78 | 0 | 112 |
| 79 | 0 | 409 |
| 80 | 0 | 1,074 |
| 81 | 0 | 2,547 |
| 82 | 0 | 5,168 |
| 83 | 0 | 8,835 |
| 84 | 0 | 13,826 |
| 85 | 0 | 18,208 |
| 86 | 0 | 21,228 |
| 87 | 0 | 21,781 |
| 88 | 0 | 19,801 |
| 89 | 0 | 15,481 |
| 90 | 0 | 10,746 |
| 91 | 0 | 6,254 |
| 92 | 0 | 3,163 |
| 93 | 0 | 1,319 |
| 94 | 0 | 467 |

END

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK-6
DATE:
TIME:
TESTER:
NOTES: 25KB/in 2ips-1

PRINT MODE: CURSORS

SINGLE DISPLAY: OFF
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20nsec

| SEGMNT NUMBER | SINGLE SAMPLE | LAST MLTPLE SAMPLE |
|---|---|---|
| 20 | 0 | 8 |
| 21 | 0 | 27 |
| 22 | 0 | 125 |
| 23 | 0 | 529 |
| 24 | 0 | 2,111 |
| 25 | 0 | 7,470 |
| 26 | 0 | 22,569 |
| 27 | 0 | 51,066 |
| 28 | 0 | 65,535 |
| 29 | 0 | 65,535 |
| 30 | 0 | 65,535 |
| 31 | 0 | 51,488 |
| 32 | 0 | 22,181 |
| 33 | 0 | 6,863 |
| 34 | 0 | 1,597 |
| 35 | 0 | 355 |
| 36 | 0 | 71 |
| 37 | 0 | 13 |
| 38 | 0 | 3 |
| 39 | 0 | 0 |
| 40 | 0 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 1 |
| 46 | 0 | 5 |
| 47 | 0 | 35 |
| 48 | 0 | 156 |
| 49 | 0 | 495 |
| 50 | 0 | 1,383 |
| 51 | 0 | 3,217 |
| 52 | 0 | 6,402 |
| 53 | 0 | 10,399 |
| 54 | 0 | 15,741 |
| 55 | 0 | 21,568 |
| 56 | 0 | 28,188 |
| 57 | 0 | 33,210 |
| 58 | 0 | 35,744 |
| 59 | 0 | 31,922 |
| 60 | 0 | 24,062 |
| 61 | 0 | 14,488 |
| 62 | 0 | 7,394 |
| 63 | 0 | 2,959 |
| 64 | 0 | 1,037 |
| 65 | 0 | 212 |
| 66 | 0 | 59 |
| 67 | 0 | 5 |
| 68 | 0 | 1 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 0 |
| 76 | 0 | 1 |
| 77 | 0 | 22 |
| 78 | 0 | 72 |
| 79 | 0 | 289 |
| 80 | 0 | 825 |
| 81 | 0 | 2,042 |
| 82 | 0 | 3,987 |
| 83 | 0 | 6,722 |
| 84 | 0 | 10,383 |
| 85 | 0 | 13,894 |
| 86 | 0 | 18,266 |
| 87 | 0 | 21,156 |
| 88 | 0 | 21,988 |
| 89 | 0 | 19,094 |
| 90 | 0 | 14,833 |
| 91 | 0 | 8,297 |
| 92 | 0 | 4,494 |
| 93 | 0 | 1,937 |
| 94 | 0 | 734 |

END

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK-7
DATE:
TIME:
TESTER:
NOTES: 25KB/in 2ips-1

PRINT MODE: CURSORS

SINGLE DISPLAY: OFF
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20nsec

| SEGMNT NUMBER | SINGLE SAMPLE | LAST MLTPLE SAMPLE |
|---|---|---|
| 20 | 0 | 42 |
| 21 | 0 | 201 |
| 22 | 0 | 695 |
| 23 | 0 | 1,970 |
| 24 | 0 | 5,349 |
| 25 | 0 | 13,386 |
| 26 | 0 | 28,179 |
| 27 | 0 | 48,029 |
| 28 | 0 | 65,535 |
| 29 | 0 | 65,535 |
| 30 | 0 | 65,535 |
| 31 | 0 | 56,776 |
| 32 | 0 | 36,894 |
| 33 | 0 | 18,927 |
| 34 | 0 | 8,026 |
| 35 | 0 | 2,930 |
| 36 | 0 | 868 |
| 37 | 0 | 196 |
| 38 | 0 | 51 |
| 39 | 0 | 9 |
| 40 | 0 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 2 |
| 47 | 0 | 5 |
| 48 | 0 | 36 |
| 49 | 0 | 155 |
| 50 | 0 | 525 |
| 51 | 0 | 1,470 |
| 52 | 0 | 3,650 |
| 53 | 0 | 7,649 |
| 54 | 0 | 14,381 |
| 55 | 0 | 22,250 |
| 56 | 0 | 30,912 |
| 57 | 0 | 36,312 |
| 58 | 0 | 37,226 |
| 59 | 0 | 32,877 |
| 60 | 0 | 24,835 |
| 61 | 0 | 14,900 |
| 62 | 0 | 7,748 |
| 63 | 0 | 3,488 |
| 64 | 0 | 1,251 |
| 65 | 0 | 378 |
| 66 | 0 | 131 |
| 67 | 0 | 22 |
| 68 | 0 | 7 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 1 |
| 76 | 0 | 18 |
| 77 | 0 | 30 |
| 78 | 0 | 100 |
| 79 | 0 | 307 |
| 80 | 0 | 870 |
| 81 | 0 | 1,909 |
| 82 | 0 | 4,226 |
| 83 | 0 | 7,653 |
| 84 | 0 | 12,169 |
| 85 | 0 | 16,780 |
| 86 | 0 | 20,595 |
| 87 | 0 | 22,389 |
| 88 | 0 | 20,739 |
| 89 | 0 | 16,402 |
| 90 | 0 | 11,249 |
| 91 | 0 | 6,824 |
| 92 | 0 | 3,699 |
| 93 | 0 | 1,645 |
| 94 | 0 | 650 |

END

ORIGINAL PAGE IS
OF POOR QUALITY

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK=5

DATE:

TIME:

TESTER:

NOTES: 2 TRACKS 220-1

PRINT MODE: CURSORS

SINGLE DISPLAY: OFF

MULTIPLE DISPLAY:

SAMPLE SIZE: 10**6

SEGMNT TIME: 20nsec

| LAST SINGLE SAMPLE | LAST MLTPLE SAMPLE | SEGMNT NUMBER | SINGLE SAMPLE | MLTPLE SAMPLE |
|---|---|---|---|---|
| 31 | 0 | 20 | 0 | 0 |
| 129 | 0 | 21 | 0 | 27 |
| 446 | 0 | 22 | 0 | 125 |
| 1,511 | 0 | 23 | 0 | 529 |
| 4,474 | 0 | 24 | 0 | 2,111 |
| 10,460 | 0 | 25 | 0 | 7,470 |
| 21,851 | 0 | 26 | 0 | 22,569 |
| 37,645 | 0 | 27 | 0 | 51,066 |
| 56,268 | 0 | 28 | 0 | 65,535 |
| 65,535 | 0 | 29 | 0 | 65,535 |
| 65,535 | 0 | 30 | 0 | 65,535 |
| 63,283 | 0 | 31 | 0 | 51,408 |
| 47,536 | 0 | 32 | 0 | 22,181 |
| 29,668 | 0 | 33 | 0 | 6,863 |
| 15,522 | 0 | 34 | 0 | 1,597 |
| 6,776 | 0 | 35 | 0 | 355 |
| 2,541 | 0 | 36 | 0 | 71 |
| 762 | 0 | 37 | 0 | 13 |
| 217 | 0 | 38 | 0 | 3 |
| 57 | 0 | 39 | 0 | 0 |
| 11 | 0 | 40 | 0 | 0 |
| 2 | 0 | 41 | 0 | 0 |
| 0 | 0 | 42 | 0 | 0 |
| 0 | 0 | 43 | 0 | 0 |
| 0 | 0 | 44 | 0 | 0 |
| 0 | 0 | 45 | 0 | 1 |
| 0 | 0 | 46 | 0 | 5 |
| 4 | 0 | 47 | 0 | 35 |
| 31 | 0 | 48 | 0 | 156 |
| 99 | 0 | 49 | 0 | 495 |
| 443 | 0 | 50 | 0 | 1,383 |
| 1,375 | 0 | 51 | 0 | 3,217 |
| 3,656 | 0 | 52 | 0 | 6,402 |
| 7,803 | 0 | 53 | 0 | 10,399 |
| 14,138 | 0 | 54 | 0 | 15,741 |
| 22,619 | 0 | 55 | 0 | 21,568 |
| 30,977 | 0 | 56 | 0 | 28,188 |
| 36,817 | 0 | 57 | 0 | 33,210 |
| 36,348 | 0 | 58 | 0 | 35,744 |
| 32,149 | 0 | 59 | 0 | 31,922 |
| 23,858 | 0 | 60 | 0 | 24,062 |
| 14,847 | 0 | 61 | 0 | 14,488 |
| 8,087 | 0 | 62 | 0 | 7,394 |
| 3,715 | 0 | 63 | 0 | 2,959 |
| 1,360 | 0 | 64 | 0 | 1,037 |
| 73 | 0 | 65 | 0 | 212 |
| 198 | 0 | 66 | 0 | 59 |
| 30 | 0 | 67 | 0 | 5 |
| 4 | 0 | 68 | 0 | 1 |
| 0 | 0 | 69 | 0 | 0 |
| 0 | 0 | 70 | 0 | 0 |
| 0 | 0 | 71 | 0 | 0 |
| 0 | 0 | 72 | 0 | 0 |
| 0 | 0 | 73 | 0 | 0 |
| 0 | 0 | 74 | 0 | 0 |
| 2 | 0 | 75 | 0 | 0 |
| 7 | 0 | 76 | 0 | 1 |
| 33 | 0 | 77 | 0 | 22 |
| 112 | 0 | 78 | 0 | 72 |
| 409 | 0 | 79 | 0 | 289 |
| 1,074 | 0 | 80 | 0 | 825 |
| 2,547 | 0 | 81 | 0 | 2,042 |
| 5,168 | 0 | 82 | 0 | 3,987 |
| 8,835 | 0 | 83 | 0 | 6,722 |
| 13,826 | 0 | 84 | 0 | 10,383 |
| 18,208 | 0 | 85 | 0 | 13,894 |
| 21,228 | 0 | 86 | 0 | 16,266 |
| 21,781 | 0 | 87 | 0 | 21,156 |
| 19,301 | 0 | 88 | 0 | 21,988 |
| 15,481 | 0 | 89 | 0 | 19,094 |
| 10,746 | 0 | 90 | 0 | 14,033 |
| 6,254 | 0 | 91 | 0 | 8,297 |
| 3,163 | 0 | 92 | 0 | 4,494 |
| 1,319 | 0 | 93 | 0 | 1,937 |
| 467 | 0 | 94 | 0 | 734 |

END

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK=6

DATE:

TIME:

TESTER:

NOTES: 2 TRACKS 220-1

PRINT MODE: CURSORS

SINGLE DISPLAY: OFF

MULTIPLE DISPLAY:

SAMPLE SIZE: 10**6

SEGMNT TIME: 20nsec

| LAST SINGLE SAMPLE | LAST MLTPLE SAMPLE | SEGMNT NUMBER | SINGLE SAMPLE | MLTPLE SAMPLE |
|---|---|---|---|---|
| 42 | 0 | 20 | 0 | 0 |
| 201 | 0 | 21 | 0 | 0 |
| 695 | 0 | 22 | 0 | 0 |
| 1,970 | 0 | 23 | 0 | 0 |
| 5,549 | 0 | 24 | 0 | 0 |
| 13,386 | 0 | 25 | 0 | 0 |
| 28,179 | 0 | 26 | 0 | 0 |
| 48,029 | 0 | 27 | 0 | 0 |
| 65,535 | 0 | 28 | 0 | 0 |
| 65,535 | 0 | 29 | 0 | 0 |
| 65,535 | 0 | 30 | 0 | 0 |
| 56,776 | 0 | 31 | 0 | 0 |
| 36,894 | 0 | 32 | 0 | 0 |
| 18,927 | 0 | 33 | 0 | 0 |
| 8,026 | 0 | 34 | 0 | 0 |
| 2,930 | 0 | 35 | 0 | 0 |
| 850 | 0 | 36 | 0 | 0 |
| 196 | 0 | 37 | 0 | 0 |
| 51 | 0 | 38 | 0 | 0 |
| 9 | 0 | 39 | 0 | 0 |
| 0 | 0 | 40 | 0 | 0 |
| 0 | 0 | 41 | 0 | 0 |
| 0 | 0 | 42 | 0 | 0 |
| 0 | 0 | 43 | 0 | 0 |
| 0 | 0 | 44 | 0 | 0 |
| 0 | 0 | 45 | 0 | 0 |
| 2 | 0 | 46 | 0 | 0 |
| 5 | 0 | 47 | 0 | 0 |
| 36 | 0 | 48 | 0 | 0 |
| 155 | 0 | 49 | 0 | 0 |
| 525 | 0 | 50 | 0 | 0 |
| 1,478 | 0 | 51 | 0 | 0 |
| 3,498 | 0 | 52 | 0 | 0 |
| 7,649 | 0 | 53 | 0 | 0 |
| 14,301 | 0 | 54 | 0 | 0 |
| 22,258 | 0 | 55 | 0 | 0 |
| 30,912 | 0 | 56 | 0 | 0 |
| 36,312 | 0 | 57 | 0 | 0 |
| 37,226 | 0 | 58 | 0 | 0 |
| 32,877 | 0 | 59 | 0 | 0 |
| 24,835 | 0 | 60 | 0 | 0 |
| 14,908 | 0 | 61 | 0 | 0 |
| 7,748 | 0 | 62 | 0 | 0 |
| 3,488 | 0 | 63 | 0 | 0 |
| 1,251 | 0 | 64 | 0 | 0 |
| 378 | 0 | 65 | 0 | 0 |
| 131 | 0 | 66 | 0 | 0 |
| 22 | 0 | 67 | 0 | 0 |
| 7 | 0 | 68 | 0 | 0 |
| 0 | 0 | 69 | 0 | 0 |
| 0 | 0 | 70 | 0 | 0 |
| 0 | 0 | 71 | 0 | 0 |
| 0 | 0 | 72 | 0 | 0 |
| 0 | 0 | 73 | 0 | 0 |
| 0 | 0 | 74 | 0 | 0 |
| 1 | 0 | 75 | 0 | 0 |
| 18 | 0 | 76 | 0 | 0 |
| 30 | 0 | 77 | 0 | 0 |
| 168 | 0 | 78 | 0 | 0 |
| 387 | 0 | 79 | 0 | 0 |
| 870 | 0 | 80 | 0 | 0 |
| 1,909 | 0 | 81 | 0 | 0 |
| 4,226 | 0 | 82 | 0 | 0 |
| 7,653 | 0 | 83 | 0 | 0 |
| 12,169 | 0 | 84 | 0 | 0 |
| 16,788 | 0 | 85 | 0 | 0 |
| 20,595 | 0 | 86 | 0 | 0 |
| 22,389 | 0 | 87 | 0 | 0 |
| 20,739 | 0 | 88 | 0 | 0 |
| 16,489 | 0 | 89 | 0 | 0 |
| 11,249 | 0 | 90 | 0 | 0 |
| 6,824 | 0 | 91 | 0 | 0 |
| 3,699 | 0 | 92 | 0 | 0 |
| 1,643 | 0 | 93 | 0 | 0 |
| 658 | 0 | 94 | 0 | 0 |

END

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK=7

DATE:

TIME:

TESTER:

NOTES: 2 TRACKS 220-1

PRINT MODE: CURSORS

SINGLE DISPLAY: OFF

MULTIPLE DISPLAY:

SAMPLE SIZE: 10**6

SEGMNT TIME: 20nsec

| LAST SINGLE SAMPLE | LAST MLTPLE SAMPLE | SEGMNT NUMBER | SINGLE SAMPLE | MLTPLE SAMPLE |
|---|---|---|---|---|
| 0 | 0 | 20 | 0 | 0 |
| 7 | 0 | 21 | 0 | 0 |
| 31 | 0 | 22 | 0 | 0 |
| 204 | 0 | 23 | 0 | 0 |
| 1,121 | 0 | 24 | 0 | 0 |
| 4,814 | 0 | 25 | 0 | 0 |
| 16,105 | 0 | 26 | 0 | 0 |
| 38,029 | 0 | 27 | 0 | 0 |
| 65,535 | 0 | 28 | 0 | 0 |
| 65,535 | 0 | 29 | 0 | 0 |
| 65,535 | 0 | 30 | 0 | 0 |
| 65,450 | 0 | 31 | 0 | 0 |
| 42,471 | 0 | 32 | 0 | 0 |
| 22,338 | 0 | 33 | 0 | 0 |
| 9,292 | 0 | 34 | 0 | 0 |
| 2,994 | 0 | 35 | 0 | 0 |
| 736 | 0 | 36 | 0 | 0 |
| 144 | 0 | 37 | 0 | 0 |
| 17 | 0 | 38 | 0 | 0 |
| 2 | 0 | 39 | 0 | 0 |
| 0 | 0 | 40 | 0 | 0 |
| 0 | 0 | 41 | 0 | 0 |
| 0 | 0 | 42 | 0 | 0 |
| 0 | 0 | 43 | 0 | 0 |
| 0 | 0 | 44 | 0 | 0 |
| 7 | 0 | 45 | 0 | 0 |
| 38 | 0 | 46 | 0 | 0 |
| 152 | 0 | 47 | 0 | 0 |
| 623 | 0 | 48 | 0 | 0 |
| 1,634 | 0 | 49 | 0 | 0 |
| 3,489 | 0 | 50 | 0 | 0 |
| 6,353 | 0 | 51 | 0 | 0 |
| 10,245 | 0 | 52 | 0 | 0 |
| 14,315 | 0 | 53 | 0 | 0 |
| 18,842 | 0 | 54 | 0 | 0 |
| 22,891 | 0 | 55 | 0 | 0 |
| 26,734 | 0 | 56 | 0 | 0 |
| 27,585 | 0 | 57 | 0 | 0 |
| 27,092 | 0 | 58 | 0 | 0 |
| 23,371 | 0 | 59 | 0 | 0 |
| 19,674 | 0 | 60 | 0 | 0 |
| 14,912 | 0 | 61 | 0 | 0 |
| 10,485 | 0 | 62 | 0 | 0 |
| 6,188 | 0 | 63 | 0 | 0 |
| 3,150 | 0 | 64 | 0 | 0 |
| 783 | 0 | 65 | 0 | 0 |
| 427 | 0 | 66 | 0 | 0 |
| 120 | 0 | 67 | 0 | 0 |
| 19 | 0 | 68 | 0 | 0 |
| 3 | 0 | 69 | 0 | 0 |
| 0 | 0 | 70 | 0 | 0 |
| 0 | 0 | 71 | 0 | 0 |
| 0 | 0 | 72 | 0 | 0 |
| 0 | 0 | 73 | 0 | 0 |
| 1 | 0 | 74 | 0 | 0 |
| 10 | 0 | 75 | 0 | 0 |
| 48 | 0 | 76 | 0 | 0 |
| 199 | 0 | 77 | 0 | 0 |
| 582 | 0 | 78 | 0 | 0 |
| 1,412 | 0 | 79 | 0 | 0 |
| 2,944 | 0 | 80 | 0 | 0 |
| 4,836 | 0 | 81 | 0 | 0 |
| 7,526 | 0 | 82 | 0 | 0 |
| 10,261 | 0 | 83 | 0 | 0 |
| 13,179 | 0 | 84 | 0 | 0 |
| 15,645 | 0 | 85 | 0 | 0 |
| 17,009 | 0 | 86 | 0 | 0 |
| 16,719 | 0 | 87 | 0 | 0 |
| 15,206 | 0 | 88 | 0 | 0 |
| 12,679 | 0 | 89 | 0 | 0 |
| 10,607 | 0 | 90 | 0 | 0 |
| 8,225 | 0 | 91 | 0 | 0 |
| 5,634 | 0 | 92 | 0 | 0 |
| 3,260 | 0 | 93 | 0 | 0 |
| 1,569 | 0 | 94 | 0 | 0 |

END

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK=2

DATE:

TIME:

TESTER:

NOTES: 2 TRACKS 220-1

PRINT MODE: CURSORS

SINGLE DISPLAY: OFF

MULTIPLE DISPLAY:

SAMPLE SIZE: 10**6

SEGMNT TIME: 20nsec

| LAST SINGLE SAMPLE | LAST MLTPLE SAMPLE | SEGMNT NUMBER | SINGLE SAMPLE | MLTPLE SAMPLE |
|---|---|---|---|---|
| 37 | 0 | 20 | 0 | 0 |
| 170 | 0 | 21 | 0 | 0 |
| 829 | 0 | 22 | 0 | 0 |
| 2,855 | 0 | 23 | 0 | 0 |
| 9,907 | 0 | 24 | 0 | 0 |
| 27,136 | 0 | 25 | 0 | 0 |
| 52,418 | 0 | 26 | 0 | 0 |
| 65,535 | 0 | 27 | 0 | 0 |
| 65,535 | 0 | 28 | 0 | 0 |
| 65,535 | 0 | 29 | 0 | 0 |
| 60,469 | 0 | 30 | 0 | 0 |
| 36,607 | 0 | 31 | 0 | 0 |
| 14,689 | 0 | 32 | 0 | 0 |
| 3,207 | 0 | 33 | 0 | 0 |
| 290 | 0 | 34 | 0 | 0 |
| 7 | 0 | 35 | 0 | 0 |
| 0 | 0 | 36 | 0 | 0 |
| 0 | 0 | 37 | 0 | 0 |
| 0 | 0 | 38 | 0 | 0 |
| 0 | 0 | 39 | 0 | 0 |
| 0 | 0 | 40 | 0 | 0 |
| 0 | 0 | 41 | 0 | 0 |
| 0 | 0 | 42 | 0 | 0 |
| 0 | 0 | 43 | 0 | 0 |
| 7 | 0 | 44 | 0 | 0 |
| 53 | 0 | 45 | 0 | 0 |
| 300 | 0 | 46 | 0 | 0 |
| 1,081 | 0 | 47 | 0 | 0 |
| 2,823 | 0 | 48 | 0 | 0 |
| 5,252 | 0 | 49 | 0 | 0 |
| 7,943 | 0 | 50 | 0 | 0 |
| 10,461 | 0 | 51 | 0 | 0 |
| 14,590 | 0 | 52 | 0 | 0 |
| 20,178 | 0 | 53 | 0 | 0 |
| 26,325 | 0 | 54 | 0 | 0 |
| 27,110 | 0 | 55 | 0 | 0 |
| 25,224 | 0 | 56 | 0 | 0 |
| 23,429 | 0 | 57 | 0 | 0 |
| 22,293 | 0 | 58 | 0 | 0 |
| 19,763 | 0 | 59 | 0 | 0 |
| 13,579 | 0 | 60 | 0 | 0 |
| 7,224 | 0 | 61 | 0 | 0 |
| 2,623 | 0 | 62 | 0 | 0 |
| 586 | 0 | 63 | 0 | 0 |
| 102 | 0 | 64 | 0 | 0 |
| 5 | 0 | 65 | 0 | 0 |
| 0 | 0 | 66 | 0 | 0 |
| 0 | 0 | 67 | 0 | 0 |
| 0 | 0 | 68 | 0 | 0 |
| 0 | 0 | 69 | 0 | 0 |
| 0 | 0 | 70 | 0 | 0 |
| 0 | 0 | 71 | 0 | 0 |
| 7 | 0 | 72 | 0 | 0 |
| 75 | 0 | 73 | 0 | 0 |
| 426 | 0 | 74 | 0 | 0 |
| 1,243 | 0 | 75 | 0 | 0 |
| 2,244 | 0 | 76 | 0 | 0 |
| 2,965 | 0 | 77 | 0 | 0 |
| 4,460 | 0 | 78 | 0 | 0 |
| 6,478 | 0 | 79 | 0 | 0 |
| 10,008 | 0 | 80 | 0 | 0 |
| 14,259 | 0 | 81 | 0 | 0 |
| 17,795 | 0 | 82 | 0 | 0 |
| 19,277 | 0 | 83 | 0 | 0 |
| 19,257 | 0 | 84 | 0 | 0 |
| 17,613 | 0 | 85 | 0 | 0 |
| 13,660 | 0 | 86 | 0 | 0 |
| 8,734 | 0 | 87 | 0 | 0 |
| 4,939 | 0 | 88 | 0 | 0 |
| 2,540 | 0 | 89 | 0 | 0 |
| 1,234 | 0 | 90 | 0 | 0 |
| 519 | 0 | 91 | 0 | 0 |
| 126 | 0 | 92 | 0 | 0 |
| 24 | 0 | 93 | 0 | 0 |
| 3 | 0 | 94 | 0 | 0 |

END

2

FOLDOUT FRAME

FIGURE 3

AMPEX 721 TAPE, SPOT HEADS , 31 Kb/in

ORIGINAL PAGE IS
OF POOR QUALITY

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK-1
DATE:
TIME:
TESTER:
NOTES: 31KB
2**-1
PRINT MODE: CURSORS

SINGLE DISPLAY: OFF
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20nsec

| SEGMNT NUMBER | SINGLE SAMPLE | LAST MLTPLE SAMPLE |
|---|---|---|
| 20 | 0 | 0 |
| 21 | 0 | 2 |
| 22 | 0 | 33 |
| 23 | 0 | 259 |
| 24 | 0 | 1,533 |
| 25 | 0 | 5,608 |
| 26 | 0 | 15,445 |
| 27 | 0 | 32,393 |
| 28 | 0 | 55,549 |
| 29 | 0 | 65,535 |
| 30 | 0 | 65,535 |
| 31 | 0 | 65,535 |
| 32 | 0 | 65,535 |
| 33 | 0 | 38,225 |
| 34 | 0 | 15,532 |
| 35 | 0 | 4,630 |
| 36 | 0 | 1,242 |
| 37 | 0 | 277 |
| 38 | 0 | 40 |
| 39 | 0 | 4 |
| 40 | 0 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 0 | 0 |
| 48 | 0 | 0 |
| 49 | 0 | 5 |
| 50 | 0 | 71 |
| 51 | 0 | 389 |
| 52 | 0 | 1,792 |
| 53 | 0 | 6,031 |
| 54 | 0 | 16,311 |
| 55 | 0 | 33,119 |
| 56 | 0 | 51,857 |
| 57 | 0 | 57,414 |
| 58 | 0 | 46,739 |
| 59 | 0 | 27,578 |
| 60 | 0 | 12,111 |
| 61 | 0 | 3,933 |
| 62 | 0 | 922 |
| 63 | 0 | 162 |
| 64 | 0 | 16 |
| 65 | 0 | 1 |
| 66 | 0 | 0 |
| 67 | 0 | 0 |
| 68 | 0 | 0 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 0 |
| 76 | 0 | 0 |
| 77 | 0 | 2 |
| 78 | 0 | 9 |
| 79 | 0 | 57 |
| 80 | 0 | 307 |
| 81 | 0 | 1,302 |
| 82 | 0 | 3,969 |
| 83 | 0 | 9,811 |
| 84 | 0 | 17,955 |
| 85 | 0 | 23,838 |
| 86 | 0 | 23,756 |
| 87 | 0 | 18,469 |
| 88 | 0 | 11,044 |
| 89 | 0 | 4,997 |
| 90 | 0 | 1,656 |
| 91 | 0 | 455 |
| 92 | 0 | 89 |
| 93 | 0 | 10 |
| 94 | 0 | 2 |
| 95 | 0 | 0 |
| 96 | 0 | 0 |
| 97 | 0 | 0 |

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK-2
DATE:
TIME:
TESTER:
NOTES: 31KB
2**-1
PRINT MODE: CURSORS

SINGLE DISPLAY: OFF
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20nsec

| SEGMNT NUMBER | SINGLE SAMPLE | LAST MLTPLE SAMPLE |
|---|---|---|
| 20 | 0 | 0 |
| 21 | 0 | 0 |
| 22 | 0 | 5 |
| 23 | 0 | 90 |
| 24 | 0 | 707 |
| 25 | 0 | 3,069 |
| 26 | 0 | 8,822 |
| 27 | 0 | 22,229 |
| 28 | 0 | 46,576 |
| 29 | 0 | 65,535 |
| 30 | 0 | 65,535 |
| 31 | 0 | 65,535 |
| 32 | 0 | 60,872 |
| 33 | 0 | 32,753 |
| 34 | 0 | 13,037 |
| 35 | 0 | 4,067 |
| 36 | 0 | 828 |
| 37 | 0 | 128 |
| 38 | 0 | 16 |
| 39 | 0 | 2 |
| 40 | 0 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 0 | 0 |
| 48 | 0 | 21 |
| 49 | 0 | 123 |
| 50 | 0 | 668 |
| 51 | 0 | 2,314 |
| 52 | 0 | 5,896 |
| 53 | 0 | 11,940 |
| 54 | 0 | 20,423 |
| 55 | 0 | 29,875 |
| 56 | 0 | 35,165 |
| 57 | 0 | 36,602 |
| 58 | 0 | 33,411 |
| 59 | 0 | 25,356 |
| 60 | 0 | 16,378 |
| 61 | 0 | 8,473 |
| 62 | 0 | 3,468 |
| 63 | 0 | 1,091 |
| 64 | 0 | 240 |
| 65 | 0 | 36 |
| 66 | 0 | 1 |
| 67 | 0 | 0 |
| 68 | 0 | 0 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 0 |
| 76 | 0 | 0 |
| 77 | 0 | 11 |
| 78 | 0 | 85 |
| 79 | 0 | 501 |
| 80 | 0 | 1,527 |
| 81 | 0 | 3,731 |
| 82 | 0 | 7,735 |
| 83 | 0 | 13,004 |
| 84 | 0 | 18,555 |
| 85 | 0 | 22,481 |
| 86 | 0 | 23,707 |
| 87 | 0 | 21,245 |
| 88 | 0 | 17,281 |
| 89 | 0 | 12,346 |
| 90 | 0 | 7,142 |
| 91 | 0 | 3,396 |
| 92 | 0 | 1,193 |
| 93 | 0 | 303 |
| 94 | 0 | 56 |

END

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK-3
DATE:
TIME:
TESTER:
NOTES: 31KB
2**-1
PRINT MODE: CURSORS

SINGLE DISPLAY: OFF
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20nsec

| SEGMNT NUMBER | SINGLE SAMPLE | LAST MLTPLE SAMPLE |
|---|---|---|
| 20 | 0 | 0 |
| 21 | 0 | 48 |
| 22 | 0 | 348 |
| 23 | 0 | 2,014 |
| 24 | 0 | 7,115 |
| 25 | 0 | 16,271 |
| 26 | 0 | 27,163 |
| 27 | 0 | 36,315 |
| 28 | 0 | 47,613 |
| 29 | 0 | 60,853 |
| 30 | 0 | 65,535 |
| 31 | 0 | 65,535 |
| 32 | 0 | 65,535 |
| 33 | 0 | 56,385 |
| 34 | 0 | 37,734 |
| 35 | 0 | 20,280 |
| 36 | 0 | 8,453 |
| 37 | 0 | 2,562 |
| 38 | 0 | 533 |
| 39 | 0 | 94 |
| 40 | 0 | 14 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 0 | 0 |
| 48 | 0 | 16 |
| 49 | 0 | 120 |
| 50 | 0 | 772 |
| 51 | 0 | 3,872 |
| 52 | 0 | 9,096 |
| 53 | 0 | 18,072 |
| 54 | 0 | 28,657 |
| 55 | 0 | 34,006 |
| 56 | 0 | 34,426 |
| 57 | 0 | 32,083 |
| 58 | 0 | 29,175 |
| 59 | 0 | 25,468 |
| 60 | 0 | 20,499 |
| 61 | 0 | 13,435 |
| 62 | 0 | 6,398 |
| 63 | 0 | 2,068 |
| 64 | 0 | 467 |
| 65 | 0 | 25 |
| 66 | 0 | 12 |
| 67 | 0 | 0 |
| 68 | 0 | 0 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 0 |
| 76 | 0 | 1 |
| 77 | 0 | 6 |
| 78 | 0 | 46 |
| 79 | 0 | 409 |
| 80 | 0 | 1,810 |
| 81 | 0 | 4,984 |
| 82 | 0 | 9,194 |
| 83 | 0 | 12,997 |
| 84 | 0 | 14,198 |
| 85 | 0 | 13,133 |
| 86 | 0 | 12,276 |
| 87 | 0 | 11,037 |
| 88 | 0 | 9,995 |
| 89 | 0 | 7,332 |
| 90 | 0 | 4,288 |
| 91 | 0 | 1,859 |
| 92 | 0 | 571 |
| 93 | 0 | 116 |
| 94 | 0 | 18 |

END

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK-4
DATE:
TIME:
TESTER:
NOTES: 31KB
2**-1
PRINT MODE: CURSORS

SINGLE DISPLAY: OFF
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20nsec

| SEGMNT NUMBER | SINGLE SAMPLE | LAST MLTPLE SAMPLE |
|---|---|---|
| 20 | 0 | 0 |
| 21 | 0 | 3 |
| 22 | 0 | 19 |
| 23 | 0 | 144 |
| 24 | 0 | 926 |
| 25 | 0 | 3,479 |
| 26 | 0 | 8,935 |
| 27 | 0 | 17,247 |
| 28 | 0 | 30,825 |
| 29 | 0 | 48,838 |
| 30 | 0 | 65,367 |
| 31 | 0 | 65,535 |
| 32 | 0 | 64,812 |
| 33 | 0 | 54,829 |
| 34 | 0 | 37,715 |
| 35 | 0 | 19,841 |
| 36 | 0 | 7,783 |
| 37 | 0 | 2,298 |
| 38 | 0 | 680 |
| 39 | 0 | 99 |
| 40 | 0 | 5 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 0 | 2 |
| 48 | 0 | 19 |
| 49 | 0 | 215 |
| 50 | 0 | 1,072 |
| 51 | 0 | 3,588 |
| 52 | 0 | 9,145 |
| 53 | 0 | 17,033 |
| 54 | 0 | 25,216 |
| 55 | 0 | 30,688 |
| 56 | 0 | 32,360 |
| 57 | 0 | 31,329 |
| 58 | 0 | 28,394 |
| 59 | 0 | 22,863 |
| 60 | 0 | 15,338 |
| 61 | 0 | 8,361 |
| 62 | 0 | 3,419 |
| 63 | 0 | 1,049 |
| 64 | 0 | 251 |
| 65 | 0 | 41 |
| 66 | 0 | 5 |
| 67 | 0 | 0 |
| 68 | 0 | 0 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 2 |
| 76 | 0 | 5 |
| 77 | 0 | 13 |
| 78 | 0 | 249 |
| 79 | 0 | 1,097 |
| 80 | 0 | 3,325 |
| 81 | 0 | 7,166 |
| 82 | 0 | 12,276 |
| 83 | 0 | 17,061 |
| 84 | 0 | 19,662 |
| 85 | 0 | 20,259 |
| 86 | 0 | 19,430 |
| 87 | 0 | 17,769 |
| 88 | 0 | 14,631 |
| 89 | 0 | 10,449 |
| 90 | 0 | 6,066 |
| 91 | 0 | 2,823 |
| 92 | 0 | 994 |
| 93 | 0 | 238 |
| 94 | 0 | 58 |

END

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK-5
DATE:
TIME:
TESTER:
NOTES: 31KB
2**-1
PRINT MODE: CURSORS

SINGLE DISPLAY: OFF
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20nsec

| SEGMNT NUMBER | SINGLE SAMPLE | LAST MLTPLE SAMPLE |
|---|---|---|
| 20 | 0 | 29 |
| 21 | 0 | 198 |
| 22 | 0 | 942 |
| 23 | 0 | 3,930 |
| 24 | 0 | 12,021 |
| 25 | 0 | 22,467 |
| 26 | 0 | 30,141 |
| 27 | 0 | 34,642 |
| 28 | 0 | 42,607 |
| 29 | 0 | 55,830 |
| 30 | 0 | 65,535 |
| 31 | 0 | 65,535 |
| 32 | 0 | 65,535 |
| 33 | 0 | 55,756 |
| 34 | 0 | 34,959 |
| 35 | 0 | 18,335 |
| 36 | 0 | 8,030 |
| 37 | 0 | 2,416 |
| 38 | 0 | 503 |
| 39 | 0 | 97 |
| 40 | 0 | 15 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 0 | 0 |
| 48 | 0 | 5 |
| 49 | 0 | 68 |
| 50 | 0 | 368 |
| 51 | 0 | 1,859 |
| 52 | 0 | 5,454 |
| 53 | 0 | 10,892 |
| 54 | 0 | 18,239 |
| 55 | 0 | 27,462 |
| 56 | 0 | 36,872 |
| 57 | 0 | 41,545 |
| 58 | 0 | 41,113 |
| 59 | 0 | 33,188 |
| 60 | 0 | 22,662 |
| 61 | 0 | 11,596 |
| 62 | 0 | 4,008 |
| 63 | 0 | 881 |
| 64 | 0 | 109 |
| 65 | 0 | 6 |
| 66 | 0 | 2 |
| 67 | 0 | 0 |
| 68 | 0 | 0 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 0 |
| 76 | 0 | 0 |
| 77 | 0 | 6 |
| 78 | 0 | 50 |
| 79 | 0 | 288 |
| 80 | 0 | 900 |
| 81 | 0 | 2,589 |
| 82 | 0 | 5,717 |
| 83 | 0 | 11,097 |
| 84 | 0 | 17,899 |
| 85 | 0 | 21,356 |
| 86 | 0 | 19,703 |
| 87 | 0 | 13,095 |
| 88 | 0 | 7,145 |
| 89 | 0 | 2,593 |
| 90 | 0 | 921 |
| 91 | 0 | 284 |
| 92 | 0 | 50 |
| 93 | 0 | 2 |
| 94 | 0 | 0 |

END

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK-6
DATE:
TIME:
TESTER:
NOTES: 31KB
2**-1
PRINT MODE: CURSORS

SINGLE DISPLAY: OFF
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20nsec

| SEGMNT NUMBER | SINGLE SAMPLE | LAST MLTPLE SAMPLE |
|---|---|---|
| 20 | 0 | 4 |
| 21 | 0 | 22 |
| 22 | 0 | 117 |
| 23 | 0 | 548 |
| 24 | 0 | 2,311 |
| 25 | 0 | 7,443 |
| 26 | 0 | 17,690 |
| 27 | 0 | 32,152 |
| 28 | 0 | 51,142 |
| 29 | 0 | 65,535 |
| 30 | 0 | 65,535 |
| 31 | 0 | 65,535 |
| 32 | 0 | 51,100 |
| 33 | 0 | 25,773 |
| 34 | 0 | 10,027 |
| 35 | 0 | 2,953 |
| 36 | 0 | 828 |
| 37 | 0 | 169 |
| 38 | 0 | 27 |
| 39 | 0 | 6 |
| 40 | 0 | 1 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 0 | 0 |
| 48 | 0 | 7 |
| 49 | 0 | 42 |
| 50 | 0 | 235 |
| 51 | 0 | 946 |
| 52 | 0 | 3,164 |
| 53 | 0 | 8,188 |
| 54 | 0 | 16,859 |
| 55 | 0 | 28,569 |
| 56 | 0 | 39,688 |
| 57 | 0 | 43,819 |
| 58 | 0 | 38,359 |
| 59 | 0 | 26,532 |
| 60 | 0 | 15,269 |
| 61 | 0 | 6,613 |
| 62 | 0 | 2,348 |
| 63 | 0 | 588 |
| 64 | 0 | 127 |
| 65 | 0 | 14 |
| 66 | 0 | 1 |
| 67 | 0 | 0 |
| 68 | 0 | 0 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 0 |
| 76 | 0 | 0 |
| 77 | 0 | 1 |
| 78 | 0 | 9 |
| 79 | 0 | 71 |
| 80 | 0 | 359 |
| 81 | 0 | 1,332 |
| 82 | 0 | 3,978 |
| 83 | 0 | 8,887 |
| 84 | 0 | 16,338 |
| 85 | 0 | 23,637 |
| 86 | 0 | 28,114 |
| 87 | 0 | 26,749 |
| 88 | 0 | 21,127 |
| 89 | 0 | 12,988 |
| 90 | 0 | 6,824 |
| 91 | 0 | 2,868 |
| 92 | 0 | 968 |
| 93 | 0 | 237 |
| 94 | 0 | 53 |

END

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK-2
DATE:
TIME:
TESTER:
NOTES: 31KB
2**-1
PRINT MODE: CURSORS

SINGLE DISPLAY: OFF
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20nsec

| SEGMNT NUMBER | SINGLE SAMPLE | LAST MLTPLE SAMPLE |
|---|---|---|
| 20 | 0 | 11 |
| 21 | 0 | 67 |
| 22 | 0 | 535 |
| 23 | 0 | 2,689 |
| 24 | 0 | 9,008 |
| 25 | 0 | 19,408 |
| 26 | 0 | 33,362 |
| 27 | 0 | 45,449 |
| 28 | 0 | 56,346 |
| 29 | 0 | 65,535 |
| 30 | 0 | 65,535 |
| 31 | 0 | 65,535 |
| 32 | 0 | 65,535 |
| 33 | 0 | 43,969 |
| 34 | 0 | 21,724 |
| 35 | 0 | 7,841 |
| 36 | 0 | 1,519 |
| 37 | 0 | 235 |
| 38 | 0 | 28 |
| 39 | 0 | 2 |
| 40 | 0 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 0 | 0 |
| 48 | 0 | 0 |
| 49 | 0 | 10 |
| 50 | 0 | 68 |
| 51 | 0 | 560 |
| 52 | 0 | 2,733 |
| 53 | 0 | 7,974 |
| 54 | 0 | 16,650 |
| 55 | 0 | 27,298 |
| 56 | 0 | 37,240 |
| 57 | 0 | 42,981 |
| 58 | 0 | 43,170 |
| 59 | 0 | 35,880 |
| 60 | 0 | 24,010 |
| 61 | 0 | 12,330 |
| 62 | 0 | 5,115 |
| 63 | 0 | 1,596 |
| 64 | 0 | 354 |
| 65 | 0 | 51 |
| 66 | 0 | 9 |
| 67 | 0 | 1 |
| 68 | 0 | 0 |
| 69 | 0 | 0 |
| 70 | 0 | 1 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 0 |
| 76 | 0 | 0 |
| 77 | 0 | 0 |
| 78 | 0 | 4 |
| 79 | 0 | 68 |
| 80 | 0 | 338 |
| 81 | 0 | 1,216 |
| 82 | 0 | 3,244 |
| 83 | 0 | 6,566 |
| 84 | 0 | 11,241 |
| 85 | 0 | 15,933 |
| 86 | 0 | 19,336 |
| 87 | 0 | 18,234 |
| 88 | 0 | 14,351 |
| 89 | 0 | 8,297 |
| 90 | 0 | 3,816 |
| 91 | 0 | 1,485 |
| 92 | 0 | 561 |
| 93 | 0 | 120 |
| 94 | 0 | 20 |

END

FOLDOUT FRAME

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OF POOR QUALITY

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK=5
DATE:
TIME:
TESTER:
NOTES: 31KB

PRINT MODE: CURSORS

SINGLE DISPLAY: OFF
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20nsec

| SEGMNT NUMBER | SINGLE SAMPLE | LAST MLTPLE SAMPLE |
|---|---|---|
| 20 | 0 | 29 |
| 21 | 0 | 198 |
| 22 | 0 | 942 |
| 23 | 0 | 3,930 |
| 24 | 0 | 12,021 |
| 25 | 0 | 22,467 |
| 26 | 0 | 30,141 |
| 27 | 0 | 34,642 |
| 28 | 0 | 42,687 |
| 29 | 0 | 55,830 |
| 30 | 0 | 65,535 |
| 31 | 0 | 65,535 |
| 32 | 0 | 65,535 |
| 33 | 0 | 55,756 |
| 34 | 0 | 34,959 |
| 35 | 0 | 10,335 |
| 36 | 0 | 1,830 |
| 37 | 0 | 2,416 |
| 38 | 0 | 503 |
| 39 | 0 | 97 |
| 40 | 0 | 15 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 0 | 0 |
| 48 | 0 | 5 |
| 49 | 0 | 68 |
| 50 | 0 | 368 |
| 51 | 0 | 1,859 |
| 52 | 0 | 5,454 |
| 53 | 0 | 10,892 |
| 54 | 0 | 18,239 |
| 55 | 0 | 27,462 |
| 56 | 0 | 36,872 |
| 57 | 0 | 41,545 |
| 58 | 0 | 41,113 |
| 59 | 0 | 33,188 |
| 60 | 0 | 22,662 |
| 61 | 0 | 11,596 |
| 62 | 0 | 4,008 |
| 63 | 0 | 881 |
| 64 | 0 | 109 |
| 65 | 0 | 6 |
| 66 | 0 | 2 |
| 67 | 0 | 0 |
| 68 | 0 | 0 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 0 |
| 76 | 0 | 0 |
| 77 | 0 | 6 |
| 78 | 0 | 50 |
| 79 | 0 | 288 |
| 80 | 0 | 908 |
| 81 | 0 | 2,589 |
| 82 | 0 | 5,717 |
| 83 | 0 | 11,097 |
| 84 | 0 | 17,899 |
| 85 | 0 | 21,356 |
| 86 | 0 | 19,703 |
| 87 | 0 | 13,095 |
| 88 | 0 | 7,145 |
| 89 | 0 | 2,593 |
| 90 | 0 | 921 |
| 91 | 0 | 304 |
| 92 | 0 | 58 |
| 93 | 0 | 2 |
| 94 | 0 | 0 |

END

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK=6
DATE:
TIME:
TESTER:
NOTES: 31KB

PRINT MODE: CURSORS

SINGLE DISPLAY: OFF
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20nsec

| SEGMNT NUMBER | SINGLE SAMPLE | LAST MLTPLE SAMPLE |
|---|---|---|
| 20 | 0 | 4 |
| 21 | 0 | 22 |
| 22 | 0 | 117 |
| 23 | 0 | 548 |
| 24 | 0 | 2,311 |
| 25 | 0 | 7,443 |
| 26 | 0 | 17,698 |
| 27 | 0 | 32,152 |
| 28 | 0 | 51,142 |
| 29 | 0 | 65,535 |
| 30 | 0 | 65,535 |
| 31 | 0 | 65,535 |
| 32 | 0 | 51,100 |
| 33 | 0 | 25,773 |
| 34 | 0 | 10,027 |
| 35 | 0 | 2,953 |
| 36 | 0 | 828 |
| 37 | 0 | 169 |
| 38 | 0 | 27 |
| 39 | 0 | 6 |
| 40 | 0 | 1 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 0 | 0 |
| 48 | 0 | 7 |
| 49 | 0 | 42 |
| 50 | 0 | 235 |
| 51 | 0 | 946 |
| 52 | 0 | 3,184 |
| 53 | 0 | 8,108 |
| 54 | 0 | 16,859 |
| 55 | 0 | 28,569 |
| 56 | 0 | 39,688 |
| 57 | 0 | 43,819 |
| 58 | 0 | 38,359 |
| 59 | 0 | 26,532 |
| 60 | 0 | 15,269 |
| 61 | 0 | 6,613 |
| 62 | 0 | 2,348 |
| 63 | 0 | 588 |
| 64 | 0 | 127 |
| 65 | 0 | 14 |
| 66 | 0 | 1 |
| 67 | 0 | 0 |
| 68 | 0 | 0 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 0 |
| 76 | 0 | 0 |
| 77 | 0 | 1 |
| 78 | 0 | 0 |
| 79 | 0 | 71 |
| 80 | 0 | 359 |
| 81 | 0 | 1,332 |
| 82 | 0 | 3,978 |
| 83 | 0 | 8,[illegible] |
| 84 | 0 | 16,338 |
| 85 | 0 | 23,637 |
| 86 | 0 | 28,114 |
| 87 | 0 | 26,749 |
| 88 | 0 | 21,127 |
| 89 | 0 | 12,988 |
| 90 | 0 | 6,824 |
| 91 | 0 | 2,860 |
| 92 | 0 | 960 |
| 93 | 0 | 237 |
| 94 | 0 | 53 |

END

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK=2
DATE:
TIME:
TESTER:
NOTES: 31KB

PRINT MODE: CURSORS

SINGLE DISPLAY: OFF
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20nsec

| SEGMNT NUMBER | SINGLE SAMPLE | LAST MLTPLE SAMPLE |
|---|---|---|
| 20 | 0 | 11 |
| 21 | 0 | 67 |
| 22 | 0 | 535 |
| 23 | 0 | 2,689 |
| 24 | 0 | 9,008 |
| 25 | 0 | 19,408 |
| 26 | 0 | 33,362 |
| 27 | 0 | 45,449 |
| 28 | 0 | 56,346 |
| 29 | 0 | 65,535 |
| 30 | 0 | 65,535 |
| 31 | 0 | 65,535 |
| 32 | 0 | 65,535 |
| 33 | 0 | 43,969 |
| 34 | 0 | 21,724 |
| 35 | 0 | 7,041 |
| 36 | 0 | 1,519 |
| 37 | 0 | 235 |
| 38 | 0 | 28 |
| 39 | 0 | 2 |
| 40 | 0 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 0 | 0 |
| 48 | 0 | 0 |
| 49 | 0 | 10 |
| 50 | 0 | 68 |
| 51 | 0 | 568 |
| 52 | 0 | 2,733 |
| 53 | 0 | 7,974 |
| 54 | 0 | 16,658 |
| 55 | 0 | 27,298 |
| 56 | 0 | 37,240 |
| 57 | 0 | 42,981 |
| 58 | 0 | 43,178 |
| 59 | 0 | 35,888 |
| 60 | 0 | 24,818 |
| 61 | 0 | 12,338 |
| 62 | 0 | 5,115 |
| 63 | 0 | 1,596 |
| 64 | 0 | 354 |
| 65 | 0 | 51 |
| 66 | 0 | 9 |
| 67 | 0 | 1 |
| 68 | 0 | 0 |
| 69 | 0 | 0 |
| 70 | 0 | 1 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 0 |
| 76 | 0 | 0 |
| 77 | 0 | 0 |
| 78 | 0 | 6 |
| 79 | 0 | 68 |
| 80 | 0 | 338 |
| 81 | 0 | 1,216 |
| 82 | 0 | 3,244 |
| 83 | 0 | 6,566 |
| 84 | 0 | 11,241 |
| 85 | 0 | 15,933 |
| 86 | 0 | 19,936 |
| 87 | 0 | 18,234 |
| 88 | 0 | 14,351 |
| 89 | 0 | 8,297 |
| 90 | 0 | 3,816 |
| 91 | 0 | 1,485 |
| 92 | 0 | 561 |
| 93 | 0 | 120 |
| 94 | 0 | 20 |

END

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK=1
DATE:
TIME:
TESTER:
NOTES: 31KB

PRINT MODE: CURSORS

SINGLE DISPLAY: OFF
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20nsec

| SEGMNT NUMBER | SINGLE SAMPLE | LAST MLTPLE SAMPLE |
|---|---|---|
| 20 | 0 | 0 |
| 21 | 0 | 0 |
| 22 | 0 | 11 |
| 23 | 0 | 54 |
| 24 | 0 | 394 |
| 25 | 0 | 1,910 |
| 26 | 0 | 7,232 |
| 27 | 0 | 19,492 |
| 28 | 0 | 40,272 |
| 29 | 0 | 63,184 |
| 30 | 0 | 65,535 |
| 31 | 0 | 65,535 |
| 32 | 0 | 64,748 |
| 33 | 0 | 41,527 |
| 34 | 0 | 21,918 |
| 35 | 0 | 9,223 |
| 36 | 0 | 3,048 |
| 37 | 0 | 782 |
| 38 | 0 | 201 |
| 39 | 0 | 31 |
| 40 | 0 | 8 |
| 41 | 0 | 1 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 0 | 5 |
| 48 | 0 | 18 |
| 49 | 0 | 144 |
| 50 | 0 | 757 |
| 51 | 0 | 2,312 |
| 52 | 0 | 6,194 |
| 53 | 0 | 12,758 |
| 54 | 0 | 21,765 |
| 55 | 0 | 29,331 |
| 56 | 0 | 34,177 |
| 57 | 0 | 34,139 |
| 58 | 0 | 30,454 |
| 59 | 0 | 24,437 |
| 60 | 0 | 16,837 |
| 61 | 0 | 9,746 |
| 62 | 0 | 4,541 |
| 63 | 0 | 1,668 |
| 64 | 0 | 481 |
| 65 | 0 | 65 |
| 66 | 0 | 20 |
| 67 | 0 | 5 |
| 68 | 0 | 0 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 0 |
| 76 | 0 | 2 |
| 77 | 0 | 7 |
| 78 | 0 | 88 |
| 79 | 0 | 447 |
| 80 | 0 | 1,674 |
| 81 | 0 | 4,412 |
| 82 | 0 | 9,886 |
| 83 | 0 | 14,078 |
| 84 | 0 | 20,027 |
| 85 | 0 | 22,775 |
| 86 | 0 | 22,738 |
| 87 | 0 | 20,000 |
| 88 | 0 | 16,178 |
| 89 | 0 | 11,078 |
| 90 | 0 | 6,486 |
| 91 | 0 | 3,185 |
| 92 | 0 | 1,148 |
| 93 | 0 | 348 |
| 94 | 0 | 90 |

END

ODETICS

TRANSITION DENSITY ANALYSIS

TEST ID: TRK=3
DATE:
TIME:
TESTER:
NOTES: 31KB

PRINT MODE: CURSORS

SINGLE DISPLAY: OFF
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20nsec

| SEGMNT NUMBER | SINGLE SAMPLE | LAST MLTPLE SAMPLE |
|---|---|---|
| 20 | 0 | 1 |
| 21 | 0 | 0 |
| 22 | 0 | 0 |
| 23 | 0 | 7 |
| 24 | 0 | 341 |
| 25 | 0 | 3,260 |
| 26 | 0 | 17,764 |
| 27 | 0 | 43,215 |
| 28 | 0 | 65,535 |
| 29 | 0 | 65,535 |
| 30 | 0 | 65,535 |
| 31 | 0 | 59,488 |
| 32 | 0 | 47,222 |
| 33 | 0 | 29,144 |
| 34 | 0 | 8,687 |
| 35 | 0 | 983 |
| 36 | 0 | 45 |
| 37 | 0 | 0 |
| 38 | 0 | 0 |
| 39 | 0 | 0 |
| 40 | 0 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 0 | 2 |
| 48 | 0 | 30 |
| 49 | 0 | 306 |
| 50 | 0 | 1,631 |
| 51 | 0 | 4,756 |
| 52 | 0 | 8,462 |
| 53 | 0 | 12,263 |
| 54 | 0 | 18,993 |
| 55 | 0 | 24,491 |
| 56 | 0 | 26,936 |
| 57 | 0 | 24,941 |
| 58 | 0 | 21,734 |
| 59 | 0 | 20,834 |
| 60 | 0 | 22,985 |
| 61 | 0 | 20,470 |
| 62 | 0 | 11,511 |
| 63 | 0 | 4,044 |
| 64 | 0 | 764 |
| 65 | 0 | 55 |
| 66 | 0 | 0 |
| 67 | 0 | 0 |
| 68 | 0 | 0 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 0 |
| 76 | 0 | 6 |
| 77 | 0 | 86 |
| 78 | 0 | 674 |
| 79 | 0 | 2,305 |
| 80 | 0 | 4,193 |
| 81 | 0 | 5,546 |
| 82 | 0 | 7,870 |
| 83 | 0 | 13,273 |
| 84 | 0 | 18,778 |
| 85 | 0 | 20,618 |
| 86 | 0 | 20,780 |
| 87 | 0 | 20,874 |
| 88 | 0 | 17,688 |
| 89 | 0 | 9,866 |
| 90 | 0 | 5,325 |
| 91 | 0 | 2,796 |
| 92 | 0 | 1,104 |
| 93 | 0 | 461 |
| 94 | 0 | 140 |

END



2 FOLDOUT FRAME

4.2 (Contd) The lower speed (higher density) 31 Kb/in plot contains wider (larger number of segments) zones of zero transitions due to better tracking of the baseline system at low speeds.

BER performance was measured for reference purposes. Data was taken at both 25 Kb/in and 31 Kb/in with comparable results. The raw or uncorrected BER for the 31 Kb/in recording was $1 \times 10^{-5}$ for a typical track, but some sections of tape were as high as $5 \times 10^{-5}$. In general, the corrected BER over the entire tape length was better than $1 \times 10^{-6}$. This measurement included two large bursts that were greater than the correction capability of the baseline system and indicates that a dual burst correction system like that implemented on the SPOT flight models is in order to mask such errors.

4.3 High Density Testing

A sample of Ampex 721 tape was evaluated for bit error rate performance by modifying the baseline system originally configured for the SPOT feasibility study. In the modified configuration, the normal 42 track/in heads manufactured by Omutec were replaced with an 84 track/in configuration manufactured by Spin Physics.

Nine adjacent tape tracks selected about the tape center line were used to interface with the data signal conditioning electronics. A servo clock required for the reproduce dejitter function was recorded redundantly on tape tracks nearest the tape edge.

4.3 (Contd) In the normal mode of tape evaluation, a 12.5 Mbps $2^{20}$ -1 PN sequence word is recorded at one of four predetermined tape packing densities on the nine data tracks. The data is then reproduced in the reverse direction and bit error rate verified with and without error correction. This data was supplemented with at least one sample of transition density data for each track at each of the four densities selected; see Figures 4 through 7.

The theoretical error correction properties are presented in Figure 8 by three straight lines that indicate the bit error rate improvement as a function of single block error events ($\delta = 0$) or 100% random errors ($\delta = 1$). Also plotted is a case where 10% of the error events are of a random error probability ($\delta = .1$).

Empirical BER data was accumulated by first optimizing each track for the best TDA display. Once it was verified that all tracks were optimized, a recording using a $20^{20}$ -1 PN sequence was reproduced with the error correction feature disconnected as a means of measuring the raw bit error rate. Corrected BER was then obtained by rewinding the tape and making a second pass with the error correction logic active. This procedure was repeated several times for each of the four densities selected.

The results of these empirical measurements are also plotted in Figure 8 for a direct comparison with the theoretical code properties.

FIGURE 4

AMPEX 721 TAPE, SPIN PHYSICS HEADS, 24.8 Kb/in

ORIGINAL PAGE IS
OF POOR QUALITY

ODETICS, INC

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 24.8KB/IN

PRINT MODE: ALL

SINGLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20MSEC
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20MSEC

| SEGMNT NUMBER | TK1 SINGLE SAMPLE | TK1 MLTPLE SAMPLE | TK2 SINGLE SAMPLE | TK2 MLTPLE SAMPLE |
|---|---|---|---|---|
| 22 | 0 | 0 | 1 | 0 |
| 23 | 0 | 2 | 2 | 1 |
| 24 | 56 | 59 | 35 | 35 |
| 25 | 847 | 810 | 473 | 466 |
| 26 | 7,199 | 7,714 | 5,814 | 5,603 |
| 27 | 32,212 | 38,992 | 32,335 | 33,252 |
| 28 | 65,535 | 65,535 | 65,535 | 65,535 |
| 29 | 65,535 | 65,535 | 65,535 | 65,535 |
| 30 | 65,535 | 65,535 | 65,535 | 65,535 |
| 31 | 65,535 | 61,105 | 65,535 | 65,535 |
| 32 | 39,744 | 20,702 | 27,886 | 24,411 |
| 33 | 12,501 | 4,823 | 7,577 | 5,923 |
| 34 | 2,639 | 814 | 1,491 | 1,049 |
| 35 | 417 | 105 | 206 | 116 |
| 36 | 49 | 5 | 14 | 15 |
| 37 | 7 | 0 | 3 | 1 |
| 38 | 0 | 0 | 3 | 0 |
| 39 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 1 | 0 |
| 41 | 0 | 0 | 0 | 0 |
| 42 | 0 | 0 | 0 | 0 |
| 43 | 0 | 0 | 0 | 0 |
| 44 | 0 | 0 | 0 | 0 |
| 45 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 0 | 0 |
| 48 | 0 | 2 | 0 | 0 |
| 49 | 0 | 14 | 4 | 6 |
| 50 | 9 | 134 | 38 | 58 |
| 51 | 90 | 600 | 303 | 280 |
| 52 | 579 | 1,908 | 1,244 | 1,212 |
| 53 | 2,532 | 5,183 | 3,872 | 3,973 |
| 54 | 9,264 | 11,104 | 10,655 | 10,208 |
| 55 | 24,822 | 20,596 | 21,449 | 21,291 |
| 56 | 47,482 | 34,419 | 38,137 | 36,754 |
| 57 | 60,460 | 47,397 | 51,192 | 50,861 |
| 58 | 53,619 | 51,505 | 52,112 | 53,241 |
| 59 | 31,934 | 40,905 | 38,653 | 39,748 |
| 60 | 13,909 | 22,966 | 20,596 | 21,049 |
| 61 | 4,258 | 9,651 | 8,274 | 8,098 |
| 62 | 975 | 3,037 | 2,504 | 2,224 |
| 63 | 179 | 738 | 584 | 468 |
| 64 | 24 | 120 | 117 | 83 |
| 65 | 1 | 22 | 17 | 9 |
| 66 | 1 | 0 | 1 | 2 |
| 67 | 0 | 0 | 0 | 0 |
| 68 | 0 | 0 | 0 | 0 |
| 69 | 0 | 0 | 0 | 0 |
| 70 | 0 | 0 | 0 | 0 |
| 71 | 0 | 0 | 0 | 0 |
| 72 | 0 | 0 | 0 | 0 |
| 73 | 0 | 0 | 0 | 0 |
| 74 | 0 | 0 | 0 | 0 |
| 75 | 0 | 0 | 0 | 0 |
| 76 | 0 | 0 | 0 | 0 |
| 77 | 0 | 2 | 2 | 1 |
| 78 | 2 | 25 | 19 | 4 |
| 79 | 22 | 93 | 95 | 70 |
| 80 | 127 | 454 | 411 | 317 |
| 81 | 625 | 1,327 | 1,358 | 1,154 |
| 82 | 2,185 | 3,276 | 3,476 | 3,095 |
| 83 | 6,587 | 6,353 | 7,428 | 6,720 |
| 84 | 15,054 | 11,390 | 14,011 | 12,694 |
| 85 | 24,858 | 17,466 | 21,227 | 19,819 |
| 86 | 29,253 | 23,521 | 25,431 | 25,067 |
| 87 | 24,017 | 23,775 | 23,069 | 24,145 |
| 88 | 13,994 | 18,727 | 15,388 | 17,346 |
| 89 | 5,893 | 11,186 | 8,108 | 9,255 |
| 90 | 1,958 | 5,658 | 3,344 | 3,671 |
| 91 | 481 | 1,857 | 1,112 | 1,125 |
| 92 | 97 | 458 | 299 | 274 |
| 93 | 11 | 97 | 60 | 46 |
| 94 | 1 | 18 | 18 | 6 |
| 95 | 0 | 1 | 2 | 1 |
| 96 | 0 | 0 | 0 | 0 |
| 97 | 0 | 0 | 0 | 0 |
| 98 | 0 | 0 | 0 | 0 |
| 99 | 0 | 0 | 0 | 0 |
| 100 | 0 | 0 | 0 | 0 |
| 101 | 0 | 0 | 0 | 0 |
| 102 | 0 | 0 | 0 | 0 |

ODETICS, INC

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 24.8KB/IN

PRINT MODE: ALL

SINGLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20MSEC
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20MSEC

| SEGMNT NUMBER | TK3 SINGLE SAMPLE | TK3 MLTPLE SAMPLE | TK4 SINGLE SAMPLE | TK4 MLTPLE SAMPLE |
|---|---|---|---|---|
| 22 | 1 | 0 | 4 | 14 |
| 23 | 2 | 1 | 6 | 103 |
| 24 | 35 | 35 | 102 | 767 |
| 25 | 473 | 466 | 1,681 | 4,866 |
| 26 | 5,814 | 5,603 | 10,902 | 21,000 |
| 27 | 32,335 | 33,252 | 39,536 | 57,719 |
| 28 | 65,535 | 65,535 | 65,535 | 65,535 |
| 29 | 65,535 | 65,535 | 65,535 | 65,535 |
| 30 | 65,535 | 65,535 | 65,535 | 65,535 |
| 31 | 65,535 | 65,535 | 65,535 | 57,643 |
| 32 | 27,886 | 24,411 | 36,786 | 24,375 |
| 33 | 7,577 | 5,923 | 13,101 | 7,675 |
| 34 | 1,491 | 1,049 | 3,348 | 1,694 |
| 35 | 206 | 116 | 607 | 335 |
| 36 | 14 | 15 | 95 | 46 |
| 37 | 3 | 1 | 9 | 4 |
| 38 | 3 | 0 | 1 | 0 |
| 39 | 0 | 0 | 0 | 0 |
| 40 | 1 | 0 | 0 | 0 |
| 41 | 0 | 0 | 0 | 0 |
| 42 | 0 | 0 | 1 | 0 |
| 43 | 0 | 0 | 0 | 0 |
| 44 | 0 | 0 | 0 | 0 |
| 45 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 0 | 1 |
| 48 | 0 | 0 | 1 | 15 |
| 49 | 4 | 6 | 5 | 61 |
| 50 | 38 | 58 | 27 | 204 |
| 51 | 303 | 280 | 187 | 744 |
| 52 | 1,244 | 1,212 | 939 | 2,074 |
| 53 | 3,872 | 3,973 | 3,458 | 4,908 |
| 54 | 10,655 | 10,208 | 9,777 | 10,771 |
| 55 | 21,449 | 21,291 | 21,886 | 20,258 |
| 56 | 38,137 | 36,754 | 38,902 | 33,283 |
| 57 | 51,192 | 50,861 | 51,001 | 44,153 |
| 58 | 52,112 | 53,241 | 50,911 | 48,085 |
| 59 | 38,653 | 39,748 | 37,579 | 40,081 |
| 60 | 20,596 | 21,049 | 21,208 | 25,899 |
| 61 | 8,274 | 8,098 | 9,520 | 12,910 |
| 62 | 2,504 | 2,224 | 3,257 | 4,908 |
| 63 | 584 | 468 | 873 | 1,429 |
| 64 | 117 | 83 | 186 | 367 |
| 65 | 17 | 9 | 26 | 74 |
| 66 | 1 | 2 | 1 | 15 |
| 67 | 0 | 0 | 0 | 1 |
| 68 | 0 | 0 | 0 | 0 |
| 69 | 0 | 0 | 0 | 0 |
| 70 | 0 | 0 | 0 | 0 |
| 71 | 0 | 0 | 0 | 0 |
| 72 | 0 | 0 | 0 | 0 |
| 73 | 0 | 0 | 0 | 0 |
| 74 | 0 | 0 | 0 | 0 |
| 75 | 0 | 0 | 0 | 0 |
| 76 | 0 | 0 | 0 | 5 |
| 77 | 2 | 1 | 2 | 9 |
| 78 | 19 | 4 | 15 | 38 |
| 79 | 95 | 70 | 94 | 167 |
| 80 | 411 | 317 | 384 | 451 |
| 81 | 1,358 | 1,154 | 1,242 | 1,133 |
| 82 | 3,476 | 3,095 | 3,596 | 2,798 |
| 83 | 7,428 | 6,720 | 7,615 | 5,546 |
| 84 | 14,011 | 12,694 | 14,304 | 10,248 |
| 85 | 21,227 | 19,819 | 20,849 | 15,975 |
| 86 | 25,431 | 25,067 | 24,162 | 21,273 |
| 87 | 23,069 | 24,145 | 21,778 | 22,454 |
| 88 | 15,388 | 17,346 | 15,409 | 19,751 |
| 89 | 8,108 | 9,255 | 8,734 | 13,226 |
| 90 | 3,344 | 3,671 | 3,937 | 7,156 |
| 91 | 1,112 | 1,125 | 1,573 | 3,649 |
| 92 | 299 | 274 | 486 | 1,827 |
| 93 | 60 | 46 | 111 | 259 |
| 94 | 18 | 6 | 22 | 80 |
| 95 | 2 | 1 | 3 | 19 |
| 96 | 0 | 0 | 0 | 4 |
| 97 | 0 | 0 | 0 | 0 |
| 98 | 0 | 0 | 1 | 0 |
| 99 | 0 | 0 | 1 | 0 |
| 100 | 0 | 0 | 0 | 0 |
| 101 | 0 | 0 | 0 | 0 |
| 102 | 0 | 0 | 1 | 0 |

ODETICS, INC

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 24.8KB/IN

PRINT MODE: ALL

SINGLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20MSEC
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20MSEC

| SEGMNT NUMBER | TK5 SINGLE SAMPLE | TK5 MLTPLE SAMPLE | TK6 SINGLE SAMPLE | TK6 MLTPLE SAMPLE |
|---|---|---|---|---|
| 22 | 11 | 2 | 1 | 0 |
| 23 | 107 | 0 | 36 | 0 |
| 24 | 979 | 118 | 408 | 0 |
| 25 | 5,498 | 1,231 | 3,281 | 0 |
| 26 | 21,399 | 9,027 | 16,439 | 0 |
| 27 | 55,137 | 38,786 | 58,883 | 0 |
| 28 | 65,535 | 65,535 | 65,535 | 0 |
| 29 | 65,535 | 65,535 | 65,535 | 0 |
| 30 | 65,535 | 65,535 | 65,535 | 0 |
| 31 | 61,253 | 65,535 | 63,094 | 0 |
| 32 | 28,679 | 15,769 | 27,551 | 0 |
| 33 | 10,280 | 7,169 | 8,577 | 0 |
| 34 | 2,813 | 1,355 | 1,919 | 0 |
| 35 | 619 | 194 | 285 | 0 |
| 36 | 95 | 23 | 39 | 0 |
| 37 | 13 | 2 | 6 | 0 |
| 38 | 1 | 0 | 0 | 0 |
| 39 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 0 | 0 |
| 41 | 0 | 0 | 0 | 0 |
| 42 | 1 | 0 | 0 | 0 |
| 43 | 0 | 0 | 0 | 0 |
| 44 | 1 | 0 | 0 | 0 |
| 45 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 0 | 0 |
| 47 | 4 | 1 | 0 | 0 |
| 48 | 15 | 2 | 4 | 0 |
| 49 | 60 | 18 | 5 | 0 |
| 50 | 235 | 54 | 79 | 0 |
| 51 | 795 | 512 | 292 | 0 |
| 52 | 2,267 | 1,828 | 1,061 | 0 |
| 53 | 5,419 | 4,946 | 3,387 | 0 |
| 54 | 11,473 | 11,102 | 9,625 | 0 |
| 55 | 20,545 | 20,790 | 21,160 | 0 |
| 56 | 33,148 | 34,728 | 36,798 | 0 |
| 57 | 42,953 | 47,271 | 49,964 | 0 |
| 58 | 45,891 | 50,414 | 51,582 | 0 |
| 59 | 39,134 | 40,252 | 39,369 | 0 |
| 60 | 26,034 | 23,199 | 22,607 | 0 |
| 61 | 13,689 | 10,195 | 9,627 | 0 |
| 62 | 5,861 | 3,300 | 3,214 | 0 |
| 63 | 1,951 | 839 | 793 | 0 |
| 64 | 587 | 138 | 152 | 0 |
| 65 | 117 | 17 | 22 | 0 |
| 66 | 23 | 4 | 2 | 0 |
| 67 | 3 | 0 | 0 | 0 |
| 68 | 1 | 0 | 0 | 0 |
| 69 | 1 | 1 | 0 | 0 |
| 70 | 0 | 0 | 0 | 0 |
| 71 | 0 | 0 | 0 | 0 |
| 72 | 0 | 0 | 0 | 0 |
| 73 | 0 | 0 | 0 | 0 |
| 74 | 0 | 0 | 0 | 0 |
| 75 | 0 | 0 | 0 | 0 |
| 76 | 1 | 0 | 0 | 0 |
| 77 | 9 | 5 | 1 | 0 |
| 78 | 69 | 18 | 16 | 0 |
| 79 | 190 | 107 | 48 | 0 |
| 80 | 616 | 438 | 248 | 0 |
| 81 | 1,432 | 1,353 | 794 | 0 |
| 82 | 3,297 | 3,297 | 2,316 | 0 |
| 83 | 6,247 | 6,759 | 5,638 | 0 |
| 84 | 11,177 | 11,813 | 11,188 | 0 |
| 85 | 16,449 | 18,163 | 18,691 | 0 |
| 86 | 21,009 | 23,286 | 24,448 | 0 |
| 87 | 21,915 | 23,327 | 24,529 | 0 |
| 88 | 18,494 | 18,249 | 18,574 | 0 |
| 89 | 12,485 | 18,661 | 18,990 | 0 |
| 90 | 7,026 | 5,131 | 4,830 | 0 |
| 91 | 3,129 | 1,754 | 1,723 | 0 |
| 92 | 1,188 | 492 | 468 | 0 |
| 93 | 393 | 99 | 115 | 0 |
| 94 | 106 | 17 | 24 | 0 |
| 95 | 29 | 1 | 4 | 0 |
| 96 | 2 | 0 | 0 | 0 |
| 97 | 1 | 0 | 0 | 0 |
| 98 | 1 | 0 | 0 | 0 |
| 99 | 0 | 0 | 0 | 0 |
| 100 | 1 | 0 | 0 | 0 |
| 101 | 0 | 0 | 0 | 0 |
| 102 | 0 | 0 | 0 | 0 |

ODETICS, INC.

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 24.8KB/IN

PRINT MODE: ALL

SINGLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20MSEC
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20MSEC

| SEGMNT NUMBER | TK7 SINGLE SAMPLE | TK7 MLTPLE SAMPLE | TK8 SINGLE SAMPLE | TK8 MLTPLE SAMPLE |
|---|---|---|---|---|
| 22 | 11 | 2 | 1 | 0 |
| 23 | 107 | 0 | 36 | 0 |
| 24 | 979 | 118 | 408 | 0 |
| 25 | 5,498 | 1,231 | 3,281 | 0 |
| 26 | 21,399 | 9,027 | 16,439 | 0 |
| 27 | 55,137 | 38,786 | 58,883 | 0 |
| 28 | 65,535 | 65,535 | 65,535 | 0 |
| 29 | 65,535 | 65,535 | 65,535 | 0 |
| 30 | 65,535 | 65,535 | 65,535 | 0 |
| 31 | 61,253 | 65,535 | 63,094 | 0 |
| 32 | 28,679 | 15,769 | 27,551 | 0 |
| 33 | 10,280 | 7,169 | 8,577 | 0 |
| 34 | 2,813 | 1,355 | 1,919 | 0 |
| 35 | 619 | 194 | 285 | 0 |
| 36 | 95 | 23 | 39 | 0 |
| 37 | 13 | 2 | 6 | 0 |
| 38 | 1 | 0 | 0 | 0 |
| 39 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 0 | 0 |
| 41 | 0 | 0 | 0 | 0 |
| 42 | 1 | 0 | 0 | 0 |
| 43 | 0 | 0 | 0 | 0 |
| 44 | 1 | 0 | 0 | 0 |
| 45 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 0 | 0 |
| 47 | 4 | 1 | 0 | 0 |
| 48 | 15 | 2 | 4 | 0 |
| 49 | 60 | 18 | 5 | 0 |
| 50 | 235 | 54 | 79 | 0 |
| 51 | 795 | 512 | 292 | 0 |
| 52 | 2,267 | 1,828 | 1,061 | 0 |
| 53 | 5,419 | 4,946 | 3,387 | 0 |
| 54 | 11,473 | 11,102 | 9,625 | 0 |
| 55 | 20,545 | 20,790 | 21,160 | 0 |
| 56 | 33,148 | 34,728 | 36,798 | 0 |
| 57 | 42,953 | 47,271 | 49,964 | 0 |
| 58 | 45,891 | 50,414 | 51,582 | 0 |
| 59 | 39,134 | 40,252 | 39,369 | 0 |
| 60 | 26,034 | 23,199 | 22,607 | 0 |
| 61 | 13,689 | 10,195 | 9,627 | 0 |
| 62 | 5,861 | 3,300 | 3,214 | 0 |
| 63 | 1,951 | 839 | 793 | 0 |
| 64 | 587 | 138 | 152 | 0 |
| 65 | 117 | 17 | 22 | 0 |
| 66 | 23 | 4 | 2 | 0 |
| 67 | 3 | 0 | 0 | 0 |
| 68 | 1 | 0 | 0 | 0 |
| 69 | 1 | 1 | 0 | 0 |
| 70 | 0 | 0 | 0 | 0 |
| 71 | 0 | 0 | 0 | 0 |
| 72 | 0 | 0 | 0 | 0 |
| 73 | 0 | 0 | 0 | 0 |
| 74 | 0 | 0 | 0 | 0 |
| 75 | 0 | 0 | 0 | 0 |
| 76 | 1 | 0 | 0 | 0 |
| 77 | 9 | 5 | 1 | 0 |
| 78 | 69 | 18 | 16 | 0 |
| 79 | 190 | 107 | 48 | 0 |
| 80 | 616 | 438 | 248 | 0 |
| 81 | 1,432 | 1,353 | 794 | 0 |
| 82 | 3,297 | 3,297 | 2,316 | 0 |
| 83 | 6,247 | 6,759 | 5,638 | 0 |
| 84 | 11,177 | 11,813 | 11,188 | 0 |
| 85 | 16,449 | 18,163 | 18,691 | 0 |
| 86 | 21,009 | 23,286 | 24,448 | 0 |
| 87 | 21,915 | 23,327 | 24,529 | 0 |
| 88 | 18,494 | 18,249 | 18,574 | 0 |
| 89 | 12,485 | 18,661 | 18,990 | 0 |
| 90 | 7,026 | 5,131 | 4,830 | 0 |
| 91 | 3,129 | 1,754 | 1,723 | 0 |
| 92 | 1,188 | 492 | 468 | 0 |
| 93 | 393 | 99 | 115 | 0 |
| 94 | 106 | 17 | 24 | 0 |
| 95 | 29 | 1 | 4 | 0 |
| 96 | 2 | 0 | 0 | 0 |
| 97 | 1 | 0 | 0 | 0 |
| 98 | 1 | 0 | 0 | 0 |
| 99 | 0 | 0 | 0 | 0 |
| 100 | 1 | 0 | 0 | 0 |
| 101 | 0 | 0 | 0 | 0 |
| 102 | 0 | 0 | 0 | 0 |

ODETICS, INC.

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 24.8KB/IN

PRINT MODE: ALL

SINGLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20MSEC
MULTIPLE DISPLAY:
OFF

| SEGMNT NUMBER | TK9 LAST SINGLE SAMPLE | TK9 LAST MLTPLE SAMPLE |
|---|---|---|
| 22 | 1 | 0 |
| 23 | 36 | 0 |
| 24 | 408 | 0 |
| 25 | 3,281 | 0 |
| 26 | 16,439 | 0 |
| 27 | 58,883 | 0 |
| 28 | 65,535 | 0 |
| 29 | 65,535 | 0 |
| 30 | 65,535 | 0 |
| 31 | 63,094 | 0 |
| 32 | 27,551 | 0 |
| 33 | 8,577 | 0 |
| 34 | 1,919 | 0 |
| 35 | 285 | 0 |
| 36 | 39 | 0 |
| 37 | 6 | 0 |
| 38 | 0 | 0 |
| 39 | 0 | 0 |
| 40 | 0 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 0 | 0 |
| 48 | 4 | 0 |
| 49 | 5 | 0 |
| 50 | 79 | 0 |
| 51 | 292 | 0 |
| 52 | 1,061 | 0 |
| 53 | 3,387 | 0 |
| 54 | 9,625 | 0 |
| 55 | 21,160 | 0 |
| 56 | 36,798 | 0 |
| 57 | 49,964 | 0 |
| 58 | 51,582 | 0 |
| 59 | 39,369 | 0 |
| 60 | 22,607 | 0 |
| 61 | 9,627 | 0 |
| 62 | 3,214 | 0 |
| 63 | 793 | 0 |
| 64 | 152 | 0 |
| 65 | 22 | 0 |
| 66 | 2 | 0 |
| 67 | 0 | 0 |
| 68 | 0 | 0 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 0 |
| 76 | 0 | 0 |
| 77 | 1 | 0 |
| 78 | 16 | 0 |
| 79 | 48 | 0 |
| 80 | 248 | 0 |
| 81 | 794 | 0 |
| 82 | 2,316 | 0 |
| 83 | 5,638 | 0 |
| 84 | 11,188 | 0 |
| 85 | 18,691 | 0 |
| 86 | 24,448 | 0 |
| 87 | 24,529 | 0 |
| 88 | 18,574 | 0 |
| 89 | 18,990 | 0 |
| 90 | 4,830 | 0 |
| 91 | 1,723 | 0 |
| 92 | 468 | 0 |
| 93 | 115 | 0 |
| 94 | 24 | 0 |
| 95 | 4 | 0 |
| 96 | 0 | 0 |
| 97 | 0 | 0 |
| 98 | 0 | 0 |
| 99 | 0 | 0 |
| 100 | 0 | 0 |
| 101 | 0 | 0 |
| 102 | 0 | 0 |

FIGURE 5

AMPEX 721 TAPE, SPIN PHYSICS HEADS, 27.2 Kb/in

ORIGINAL PAGE IS
OF POOR QUALITY

ODETICS, INC.

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 27.2 KB/IN

PRINT MODE: ALL

SINGLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20MSEC
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20MSEC

| SEGMNT NUMBER | TK1 SINGLE SAMPLE | TK2 MLTPLE SAMPLE |
|---|---|---|
| 22 | 2 | 1 |
| 23 | 28 | 6 |
| 24 | 263 | 157 |
| 25 | 2,053 | 1,599 |
| 26 | 11,424 | 10,428 |
| 27 | 37,294 | 41,908 |
| 28 | 65,535 | 65,535 |
| 29 | 65,535 | 65,535 |
| 30 | 65,535 | 65,535 |
| 31 | 65,535 | 63,758 |
| 32 | 44,835 | 24,871 |
| 33 | 17,140 | 7,033 |
| 34 | 4,662 | 1,352 |
| 35 | 1,053 | 194 |
| 36 | 193 | 18 |
| 37 | 32 | 4 |
| 38 | 4 | 1 |
| 39 | 1 | 0 |
| 40 | 1 | 1 |
| 41 | 0 | 0 |
| 42 | 1 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 1 | 0 |
| 47 | 0 | 2 |
| 48 | 0 | 9 |
| 49 | 6 | 56 |
| 50 | 40 | 249 |
| 51 | 190 | 967 |
| 52 | 956 | 2,861 |
| 53 | 3,539 | 6,297 |
| 54 | 11,141 | 12,376 |
| 55 | 26,189 | 21,360 |
| 56 | 46,218 | 33,821 |
| 57 | 57,815 | 45,258 |
| 58 | 50,360 | 48,553 |
| 59 | 32,458 | 39,076 |
| 60 | 15,097 | 23,674 |
| 61 | 5,369 | 10,916 |
| 62 | 1,401 | 3,833 |
| 63 | 322 | 1,058 |
| 64 | 53 | 245 |
| 65 | 7 | 49 |
| 66 | 0 | 3 |
| 67 | 0 | 0 |
| 68 | 0 | 1 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 1 |
| 75 | 1 | 1 |
| 76 | 0 | 0 |
| 77 | 2 | 11 |
| 78 | 13 | 50 |
| 79 | 54 | 224 |
| 80 | 273 | 725 |
| 81 | 965 | 1,759 |
| 82 | 2,874 | 3,722 |
| 83 | 7,514 | 6,909 |
| 84 | 15,377 | 11,696 |
| 85 | 23,186 | 17,068 |
| 86 | 27,077 | 21,623 |
| 87 | 22,381 | 22,364 |
| 88 | 14,259 | 18,393 |
| 89 | 6,826 | 11,649 |
| 90 | 2,585 | 6,846 |
| 91 | 719 | 2,381 |
| 92 | 165 | 765 |
| 93 | 22 | 194 |
| 94 | 0 | 31 |
| 95 | 2 | 5 |
| 96 | 0 | 0 |
| 97 | 0 | 0 |
| 98 | 0 | 0 |
| 99 | 0 | 0 |
| 100 | 0 | 0 |
| 101 | 0 | 0 |
| 102 | 1 | 0 |

ODETICS, INC.

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 27.2 KB/IN

PRINT MODE: ALL

SINGLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20MSEC
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20MSEC

| SEGMNT NUMBER | TK3 SINGLE SAMPLE | TK4 MLTPLE SAMPLE |
|---|---|---|
| 22 | 0 | 0 |
| 23 | 5 | 5 |
| 24 | 106 | 72 |
| 25 | 1,308 | 908 |
| 26 | 9,614 | 8,188 |
| 27 | 37,792 | 37,305 |
| 28 | 65,535 | 65,535 |
| 29 | 65,535 | 65,535 |
| 30 | 65,535 | 65,535 |
| 31 | 65,535 | 65,535 |
| 32 | 32,694 | 29,530 |
| 33 | 11,121 | 8,747 |
| 34 | 2,797 | 1,796 |
| 35 | 497 | 387 |
| 36 | 62 | 16 |
| 37 | 5 | 4 |
| 38 | 1 | 0 |
| 39 | 0 | 0 |
| 40 | 0 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 0 | 0 |
| 48 | 1 | 2 |
| 49 | 26 | 16 |
| 50 | 145 | 115 |
| 51 | 533 | 522 |
| 52 | 1,954 | 1,977 |
| 53 | 5,106 | 5,291 |
| 54 | 11,626 | 11,619 |
| 55 | 22,127 | 21,448 |
| 56 | 35,682 | 35,412 |
| 57 | 46,723 | 47,264 |
| 58 | 47,733 | 49,764 |
| 59 | 38,817 | 38,947 |
| 60 | 23,278 | 22,970 |
| 61 | 11,236 | 10,188 |
| 62 | 4,363 | 3,520 |
| 63 | 1,401 | 926 |
| 64 | 342 | 183 |
| 65 | 66 | 29 |
| 66 | 13 | 5 |
| 67 | 1 | 0 |
| 68 | 0 | 0 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 1 | 0 |
| 76 | 1 | 1 |
| 77 | 9 | 1 |
| 78 | 38 | 31 |
| 79 | 241 | 156 |
| 80 | 673 | 608 |
| 81 | 1,939 | 1,661 |
| 82 | 4,268 | 3,668 |
| 83 | 7,815 | 7,141 |
| 84 | 13,968 | 12,453 |
| 85 | 19,167 | 18,290 |
| 86 | 22,626 | 22,875 |
| 87 | 21,846 | 22,441 |
| 88 | 15,937 | 17,528 |
| 89 | 9,374 | 10,343 |
| 90 | 4,723 | 5,120 |
| 91 | 1,929 | 1,837 |
| 92 | 671 | 547 |
| 93 | 188 | 122 |
| 94 | 42 | 25 |
| 95 | 7 | 2 |
| 96 | 0 | 1 |
| 97 | 0 | 0 |
| 98 | 0 | 0 |
| 99 | 0 | 0 |
| 100 | 0 | 0 |
| 101 | 0 | 0 |
| 102 | 0 | 0 |

ODETICS, INC.

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 27.2 KB/IN

PRINT MODE: ALL

SINGLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20MSEC
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20MSEC

| SEGMNT NUMBER | TK5 SINGLE SAMPLE | TK6 MLTPLE SAMPLE |
|---|---|---|
| 22 | 2 | 39 |
| 23 | 37 | 288 |
| 24 | 387 | 1,643 |
| 25 | 2,937 | 7,568 |
| 26 | 14,777 | 26,002 |
| 27 | 43,422 | 60,663 |
| 28 | 65,535 | 65,535 |
| 29 | 65,535 | 65,535 |
| 30 | 65,535 | 65,535 |
| 31 | 65,535 | 56,361 |
| 32 | 39,715 | 25,158 |
| 33 | 16,275 | 8,410 |
| 34 | 4,986 | 2,133 |
| 35 | 1,190 | 438 |
| 36 | 188 | 52 |
| 37 | 26 | 6 |
| 38 | 4 | 0 |
| 39 | 1 | 0 |
| 40 | 0 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 0 | 3 |
| 48 | 8 | 32 |
| 49 | 12 | 106 |
| 50 | 101 | 402 |
| 51 | 388 | 1,080 |
| 52 | 1,518 | 2,673 |
| 53 | 4,386 | 5,773 |
| 54 | 11,330 | 11,894 |
| 55 | 22,160 | 19,675 |
| 56 | 36,219 | 30,569 |
| 57 | 46,201 | 40,772 |
| 58 | 47,082 | 44,964 |
| 59 | 37,576 | 39,539 |
| 60 | 23,827 | 28,041 |
| 61 | 11,973 | 15,383 |
| 62 | 5,046 | 6,825 |
| 63 | 1,685 | 2,408 |
| 64 | 478 | 681 |
| 65 | 114 | 152 |
| 66 | 19 | 27 |
| 67 | 2 | 3 |
| 68 | 0 | 1 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 0 |
| 76 | 2 | 8 |
| 77 | 8 | 24 |
| 78 | 55 | 91 |
| 79 | 160 | 228 |
| 80 | 587 | 653 |
| 81 | 1,637 | 1,381 |
| 82 | 3,927 | 2,875 |
| 83 | 7,747 | 5,442 |
| 84 | 13,537 | 9,370 |
| 85 | 18,925 | 14,175 |
| 86 | 22,187 | 18,763 |
| 87 | 20,699 | 21,331 |
| 88 | 16,188 | 19,803 |
| 89 | 10,359 | 14,835 |
| 90 | 5,445 | 9,615 |
| 91 | 2,480 | 4,463 |
| 92 | 892 | 1,860 |
| 93 | 236 | 615 |
| 94 | 51 | 193 |
| 95 | 14 | 44 |
| 96 | 2 | 5 |
| 97 | 1 | 0 |
| 98 | 0 | 0 |
| 99 | 0 | 0 |
| 100 | 0 | 0 |
| 101 | 0 | 0 |
| 102 | 0 | 0 |

ODETICS, INC.

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 27.2 KB/IN

PRINT MODE: ALL

SINGLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20MSEC
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20MSEC

| SEGMNT NUMBER | TK7 SINGLE SAMPLE | TK8 MLTPLE SAMPLE |
|---|---|---|
| 22 | 36 | 1 |
| 23 | 335 | 36 |
| 24 | 2,219 | 391 |
| 25 | 9,009 | 2,721 |
| 26 | 27,413 | 13,602 |
| 27 | 59,923 | 44,630 |
| 28 | 65,535 | 65,535 |
| 29 | 65,535 | 65,535 |
| 30 | 65,535 | 65,535 |
| 31 | 59,202 | 65,535 |
| 32 | 29,401 | 30,319 |
| 33 | 11,265 | 10,092 |
| 34 | 3,366 | 2,428 |
| 35 | 817 | 421 |
| 36 | 159 | 64 |
| 37 | 28 | 5 |
| 38 | 3 | 1 |
| 39 | 1 | 0 |
| 40 | 0 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 2 | 0 |
| 47 | 6 | 2 |
| 48 | 27 | 11 |
| 49 | 73 | 79 |
| 50 | 357 | 267 |
| 51 | 1,075 | 987 |
| 52 | 2,648 | 2,853 |
| 53 | 6,174 | 6,410 |
| 54 | 12,352 | 12,658 |
| 55 | 21,508 | 22,180 |
| 56 | 32,179 | 34,365 |
| 57 | 41,061 | 44,174 |
| 58 | 43,155 | 46,429 |
| 59 | 37,270 | 37,818 |
| 60 | 26,535 | 23,782 |
| 61 | 14,761 | 11,692 |
| 62 | 6,880 | 4,581 |
| 63 | 2,644 | 1,474 |
| 64 | 813 | 326 |
| 65 | 220 | 81 |
| 66 | 46 | 10 |
| 67 | 7 | 4 |
| 68 | 2 | 0 |
| 69 | 0 | 0 |
| 70 | 1 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 1 | 0 |
| 74 | 0 | 0 |
| 75 | 1 | 2 |
| 76 | 10 | 1 |
| 77 | 25 | 9 |
| 78 | 85 | 73 |
| 79 | 280 | 270 |
| 80 | 744 | 782 |
| 81 | 1,638 | 2,600 |
| 82 | 3,497 | 4,084 |
| 83 | 6,366 | 7,415 |
| 84 | 10,701 | 11,909 |
| 85 | 15,543 | 17,169 |
| 86 | 19,696 | 21,506 |
| 87 | 20,979 | 21,299 |
| 88 | 18,427 | 17,671 |
| 89 | 13,302 | 11,430 |
| 90 | 7,941 | 6,845 |
| 91 | 3,925 | 2,522 |
| 92 | 1,632 | 835 |
| 93 | 577 | 247 |
| 94 | 148 | 48 |
| 95 | 32 | 7 |
| 96 | 4 | 1 |
| 97 | 3 | 0 |
| 98 | 0 | 0 |
| 99 | 0 | 0 |
| 100 | 0 | 0 |
| 101 | 0 | 0 |
| 102 | 0 | 0 |

ODETICS, INC.

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 27.2 KB/IN

PRINT MODE: ALL

SINGLE DISPLAY
SAMPLE SIZE: 10**6
SEGMNT TIME: 20MSEC
MULTIPLE DISPLAY
OFF

| SEGMNT NUMBER | TK9 SINGLE SAMPLE | LHST MLTPLE SAMPLE |
|---|---|---|
| 22 | 15 | 0 |
| 23 | 97 | 0 |
| 24 | 684 | 0 |
| 25 | 3,177 | 0 |
| 26 | 20,281 | 0 |
| 27 | 53,128 | 0 |
| 28 | 65,535 | 0 |
| 29 | 65,535 | 0 |
| 30 | 65,535 | 0 |
| 31 | 64,417 | 0 |
| 32 | 31,198 | 0 |
| 33 | 11,166 | 0 |
| 34 | 3,155 | 0 |
| 35 | 600 | 0 |
| 36 | 91 | 0 |
| 37 | 13 | 0 |
| 38 | 5 | 0 |
| 39 | 0 | 0 |
| 40 | 0 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 0 | 0 |
| 48 | 2 | 0 |
| 49 | 24 | 0 |
| 50 | 128 | 0 |
| 51 | 490 | 0 |
| 52 | 1,629 | 0 |
| 53 | 4,509 | 0 |
| 54 | 10,855 | 0 |
| 55 | 21,368 | 0 |
| 56 | 35,350 | 0 |
| 57 | 46,448 | 0 |
| 58 | 48,449 | 0 |
| 59 | 38,329 | 0 |
| 60 | 24,352 | 0 |
| 61 | 11,818 | 0 |
| 62 | 4,460 | 0 |
| 63 | 1,255 | 0 |
| 64 | 331 | 0 |
| 65 | 67 | 0 |
| 66 | 6 | 0 |
| 67 | 1 | 0 |
| 68 | 0 | 0 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 0 |
| 75 | 0 | 0 |
| 76 | 1 | 0 |
| 77 | 6 | 0 |
| 78 | 24 | 0 |
| 79 | 118 | 0 |
| 80 | 461 | 0 |
| 81 | 1,170 | 0 |
| 82 | 2,779 | 0 |
| 83 | 6,013 | 0 |
| 84 | 11,081 | 0 |
| 85 | 17,378 | 0 |
| 86 | 22,593 | 0 |
| 87 | 22,619 | 0 |
| 88 | 18,621 | 0 |
| 89 | 12,105 | 0 |
| 90 | 6,152 | 0 |
| 91 | 2,495 | 0 |
| 92 | 853 | 0 |
| 93 | 258 | 0 |
| 94 | 63 | 0 |
| 95 | 8 | 0 |
| 96 | 1 | 0 |
| 97 | 1 | 0 |
| 98 | 0 | 0 |
| 99 | 0 | 0 |
| 100 | 0 | 0 |
| 101 | 0 | 0 |
| 102 | 0 | 0 |

FIGURE 6
AMPEX 721 TAPE, SPIN PHYSICS HEADS, 31.4 Kb/in

ORIGINAL PAGE IS
OF POOR QUALITY

ODETICS, INC.

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 31.4KB/IN

PRINT MODE: ALL

SINGLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20NSEC
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20NSEC

| SEGMNT NUMBER | TK1 LTK2 SINGLE SAMPLE | MLTPLE SAMPLE |
|---|---|---|
| 22 | 96 | 41 |
| 23 | 491 | 272 |
| 24 | 2,184 | 1,395 |
| 25 | 7,784 | 5,817 |
| 26 | 21,776 | 19,554 |
| 27 | 45,263 | 49,226 |
| 28 | 65,535 | 65,535 |
| 29 | 65,535 | 65,535 |
| 30 | 65,535 | 65,535 |
| 31 | 65,535 | 65,535 |
| 32 | 48,259 | 35,289 |
| 33 | 24,676 | 14,012 |
| 34 | 10,524 | 4,418 |
| 35 | 3,770 | 1,061 |
| 36 | 1,169 | 221 |
| 37 | 382 | 37 |
| 38 | 105 | 3 |
| 39 | 29 | 0 |
| 40 | 11 | 0 |
| 41 | 1 | 0 |
| 42 | 1 | 0 |
| 43 | 1 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 4 |
| 47 | 8 | 15 |
| 48 | 20 | 78 |
| 49 | 67 | 278 |
| 50 | 236 | 832 |
| 51 | 888 | 2,129 |
| 52 | 2,801 | 4,429 |
| 53 | 7,823 | 8,375 |
| 54 | 14,917 | 14,347 |
| 55 | 27,501 | 22,426 |
| 56 | 39,822 | 32,148 |
| 57 | 45,890 | 39,450 |
| 58 | 43,205 | 41,354 |
| 59 | 32,409 | 35,186 |
| 60 | 19,660 | 24,613 |
| 61 | 9,465 | 14,137 |
| 62 | 3,933 | 6,673 |
| 63 | 1,314 | 2,659 |
| 64 | 389 | 879 |
| 65 | 96 | 236 |
| 66 | 26 | 53 |
| 67 | 8 | 11 |
| 68 | 2 | 2 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 1 | 0 |
| 73 | 1 | 0 |
| 74 | 2 | 0 |
| 75 | 4 | 5 |
| 76 | 7 | 23 |
| 77 | 41 | 89 |
| 78 | 113 | 247 |
| 79 | 346 | 674 |
| 80 | 940 | 1,476 |
| 81 | 2,128 | 2,759 |
| 82 | 4,653 | 4,772 |
| 83 | 8,672 | 7,564 |
| 84 | 14,178 | 11,198 |
| 85 | 19,877 | 15,476 |
| 86 | 21,635 | 18,715 |
| 87 | 19,683 | 19,062 |
| 88 | 15,226 | 16,769 |
| 89 | 9,651 | 12,140 |
| 90 | 4,993 | 7,634 |
| 91 | 2,081 | 3,918 |
| 92 | 781 | 1,838 |
| 93 | 258 | 718 |
| 94 | 68 | 283 |
| 95 | 14 | 57 |
| 96 | 3 | 15 |
| 97 | 0 | 2 |
| 98 | 0 | 0 |
| 99 | 0 | 0 |
| 100 | 0 | 0 |
| 101 | 1 | 0 |
| 102 | 0 | 0 |

ODETICS, INC.

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 31.4KB/IN

PRINT MODE: ALL

SINGLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20NSEC
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20NSEC

| SEGMNT NUMBER | TK3 LTK4 SINGLE SAMPLE | MLTPLE SAMPLE |
|---|---|---|
| 22 | 23 | 0 |
| 23 | 208 | 76 |
| 24 | 1,295 | 627 |
| 25 | 5,910 | 3,456 |
| 26 | 20,022 | 15,345 |
| 27 | 48,086 | 44,810 |
| 28 | 65,535 | 65,535 |
| 29 | 65,535 | 65,535 |
| 30 | 65,535 | 65,535 |
| 31 | 65,535 | 65,535 |
| 32 | 38,393 | 36,476 |
| 33 | 16,568 | 13,856 |
| 34 | 5,906 | 4,036 |
| 35 | 1,648 | 920 |
| 36 | 372 | 144 |
| 37 | 54 | 23 |
| 38 | 11 | 2 |
| 39 | 0 | 0 |
| 40 | 0 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 0 | 0 |
| 47 | 5 | 6 |
| 48 | 29 | 18 |
| 49 | 114 | 97 |
| 50 | 407 | 425 |
| 51 | 1,213 | 1,338 |
| 52 | 3,097 | 3,498 |
| 53 | 6,828 | 7,550 |
| 54 | 13,539 | 13,981 |
| 55 | 23,507 | 23,512 |
| 56 | 35,063 | 35,585 |
| 57 | 42,463 | 43,992 |
| 58 | 42,844 | 44,197 |
| 59 | 34,765 | 34,725 |
| 60 | 23,259 | 22,218 |
| 61 | 13,099 | 11,417 |
| 62 | 5,947 | 4,602 |
| 63 | 2,254 | 1,640 |
| 64 | 732 | 439 |
| 65 | 216 | 110 |
| 66 | 68 | 23 |
| 67 | 18 | 4 |
| 68 | 0 | 0 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 1 |
| 74 | 0 | 0 |
| 75 | 3 | 2 |
| 76 | 21 | 11 |
| 77 | 61 | 45 |
| 78 | 219 | 161 |
| 79 | 610 | 488 |
| 80 | 1,421 | 1,286 |
| 81 | 2,845 | 2,698 |
| 82 | 5,408 | 5,646 |
| 83 | 9,037 | 8,504 |
| 84 | 14,014 | 13,308 |
| 85 | 18,158 | 17,847 |
| 86 | 20,189 | 20,619 |
| 87 | 19,038 | 19,742 |
| 88 | 14,976 | 15,682 |
| 89 | 9,987 | 10,393 |
| 90 | 5,480 | 5,598 |
| 91 | 2,709 | 2,581 |
| 92 | 1,094 | 1,062 |
| 93 | 382 | 334 |
| 94 | 140 | 83 |
| 95 | 29 | 13 |
| 96 | 4 | 4 |
| 97 | 0 | 0 |
| 98 | 0 | 0 |
| 99 | 0 | 0 |
| 100 | 0 | 0 |
| 101 | 0 | 0 |
| 102 | 0 | 0 |

ODETICS, INC.

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 31.4KB/IN

PRINT MODE: ALL

SINGLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20NSEC
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20NSEC

| SEGMNT NUMBER | TK5 LTK6 SINGLE SAMPLE | MLTPLE SAMPLE |
|---|---|---|
| 22 | 70 | 768 |
| 23 | 545 | 2,524 |
| 24 | 2,667 | 7,448 |
| 25 | 9,785 | 18,571 |
| 26 | 25,479 | 38,814 |
| 27 | 50,656 | 64,864 |
| 28 | 65,535 | 65,535 |
| 29 | 65,535 | 65,535 |
| 30 | 65,535 | 65,535 |
| 31 | 65,535 | 55,468 |
| 32 | 43,352 | 31,200 |
| 33 | 22,002 | 14,143 |
| 34 | 9,429 | 5,261 |
| 35 | 3,087 | 1,598 |
| 36 | 877 | 427 |
| 37 | 204 | 98 |
| 38 | 38 | 15 |
| 39 | 6 | 1 |
| 40 | 2 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 1 |
| 45 | 0 | 2 |
| 46 | 0 | 16 |
| 47 | 4 | 66 |
| 48 | 13 | 174 |
| 49 | 68 | 459 |
| 50 | 284 | 1,017 |
| 51 | 1,011 | 2,269 |
| 52 | 2,771 | 4,530 |
| 53 | 6,513 | 9,017 |
| 54 | 13,458 | 13,237 |
| 55 | 23,111 | 20,844 |
| 56 | 33,951 | 28,772 |
| 57 | 41,008 | 34,976 |
| 58 | 41,456 | 37,029 |
| 59 | 34,963 | 34,287 |
| 60 | 24,961 | 27,449 |
| 61 | 14,567 | 18,533 |
| 62 | 7,532 | 10,511 |
| 63 | 3,115 | 5,036 |
| 64 | 1,144 | 2,046 |
| 65 | 343 | 714 |
| 66 | 89 | 231 |
| 67 | 14 | 58 |
| 68 | 1 | 17 |
| 69 | 0 | 4 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 2 |
| 73 | 0 | 1 |
| 74 | 0 | 7 |
| 75 | 1 | 13 |
| 76 | 12 | 48 |
| 77 | 51 | 111 |
| 78 | 172 | 241 |
| 79 | 499 | 575 |
| 80 | 1,179 | 1,220 |
| 81 | 2,698 | 2,895 |
| 82 | 5,028 | 5,858 |
| 83 | 8,726 | 6,385 |
| 84 | 13,397 | 9,348 |
| 85 | 17,152 | 12,835 |
| 86 | 19,351 | 15,968 |
| 87 | 18,382 | 17,481 |
| 88 | 15,323 | 16,973 |
| 89 | 10,762 | 14,397 |
| 90 | 6,464 | 10,338 |
| 91 | 3,331 | 6,362 |
| 92 | 1,462 | 3,584 |
| 93 | 607 | 1,671 |
| 94 | 175 | 666 |
| 95 | 57 | 237 |
| 96 | 21 | 77 |
| 97 | 2 | 17 |
| 98 | 0 | 0 |
| 99 | 0 | 0 |
| 100 | 0 | 0 |
| 101 | 0 | 0 |
| 102 | 0 | 0 |

ODETICS, INC.

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 31.4KB/IN

PRINT MODE: ALL

SINGLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20NSEC
MULTIPLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20NSEC

| SEGMNT NUMBER | TK7 LTK8 SINGLE SAMPLE | MLTPLE SAMPLE |
|---|---|---|
| 22 | 1,240 | 222 |
| 23 | 3,713 | 803 |
| 24 | 9,655 | 2,859 |
| 25 | 21,148 | 9,144 |
| 26 | 40,599 | 24,627 |
| 27 | 63,089 | 52,227 |
| 28 | 65,535 | 65,535 |
| 29 | 65,535 | 65,535 |
| 30 | 65,535 | 65,535 |
| 31 | 64,269 | 65,535 |
| 32 | 32,798 | 37,196 |
| 33 | 16,771 | 16,458 |
| 34 | 7,886 | 6,842 |
| 35 | 2,495 | 1,834 |
| 36 | 821 | 489 |
| 37 | 244 | 93 |
| 38 | 45 | 17 |
| 39 | 21 | 5 |
| 40 | 6 | 0 |
| 41 | 0 | 0 |
| 42 | 1 | 0 |
| 43 | 0 | 0 |
| 44 | 3 | 0 |
| 45 | 4 | 0 |
| 46 | 17 | 4 |
| 47 | 50 | 25 |
| 48 | 160 | 112 |
| 49 | 425 | 339 |
| 50 | 1,041 | 988 |
| 51 | 2,339 | 2,146 |
| 52 | 4,726 | 4,563 |
| 53 | 8,445 | 8,651 |
| 54 | 13,982 | 14,997 |
| 55 | 21,108 | 23,082 |
| 56 | 28,689 | 31,884 |
| 57 | 34,337 | 38,535 |
| 58 | 36,395 | 40,142 |
| 59 | 33,108 | 34,879 |
| 60 | 26,373 | 24,376 |
| 61 | 18,881 | 14,305 |
| 62 | 11,066 | 7,379 |
| 63 | 5,790 | 3,097 |
| 64 | 2,600 | 1,151 |
| 65 | 1,010 | 353 |
| 66 | 326 | 100 |
| 67 | 113 | 19 |
| 68 | 25 | 7 |
| 69 | 9 | 1 |
| 70 | 4 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 1 | 0 |
| 74 | 4 | 3 |
| 75 | 19 | 8 |
| 76 | 65 | 36 |
| 77 | 125 | 105 |
| 78 | 319 | 313 |
| 79 | 711 | 724 |
| 80 | 1,343 | 1,597 |
| 81 | 2,505 | 2,838 |
| 82 | 4,278 | 5,090 |
| 83 | 6,615 | 7,783 |
| 84 | 10,033 | 11,959 |
| 85 | 13,389 | 15,602 |
| 86 | 16,080 | 18,127 |
| 87 | 17,263 | 18,265 |
| 88 | 16,251 | 15,960 |
| 89 | 13,542 | 11,902 |
| 90 | 9,909 | 7,560 |
| 91 | 6,273 | 4,077 |
| 92 | 3,582 | 1,895 |
| 93 | 1,750 | 783 |
| 94 | 775 | 274 |
| 95 | 299 | 86 |
| 96 | 109 | 23 |
| 97 | 38 | 3 |
| 98 | 6 | 1 |
| 99 | 2 | 1 |
| 100 | 1 | 0 |
| 101 | 0 | 0 |
| 102 | 0 | 0 |

ODETICS, INC.

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 31.4KB/IN

PRINT MODE: ALL

SINGLE DISPLAY:
SAMPLE SIZE: 10**6
SEGMNT TIME: 20NSEC
MULTIPLE DISPLAY:
OFF

| SEGMNT NUMBER | TK9 LAST SINGLE SAMPLE | MLTPLE SAMPLE |
|---|---|---|
| 22 | 435 | 0 |
| 23 | 1,530 | 0 |
| 24 | 5,435 | 0 |
| 25 | 14,907 | 0 |
| 26 | 33,280 | 0 |
| 27 | 59,019 | 0 |
| 28 | 65,535 | 0 |
| 29 | 65,535 | 0 |
| 30 | 65,535 | 0 |
| 31 | 60,598 | 0 |
| 32 | 36,087 | 0 |
| 33 | 17,443 | 0 |
| 34 | 7,047 | 0 |
| 35 | 2,308 | 0 |
| 36 | 675 | 0 |
| 37 | 148 | 0 |
| 38 | 32 | 0 |
| 39 | 7 | 0 |
| 40 | 1 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 0 |
| 46 | 3 | 0 |
| 47 | 12 | 0 |
| 48 | 42 | 0 |
| 49 | 175 | 0 |
| 50 | 510 | 0 |
| 51 | 1,375 | 0 |
| 52 | 3,408 | 0 |
| 53 | 7,093 | 0 |
| 54 | 13,688 | 0 |
| 55 | 21,952 | 0 |
| 56 | 31,881 | 0 |
| 57 | 39,005 | 0 |
| 58 | 40,188 | 0 |
| 59 | 35,470 | 0 |
| 60 | 25,782 | 0 |
| 61 | 15,728 | 0 |
| 62 | 8,182 | 0 |
| 63 | 3,543 | 0 |
| 64 | 1,344 | 0 |
| 65 | 439 | 0 |
| 66 | 113 | 0 |
| 67 | 28 | 0 |
| 68 | 5 | 0 |
| 69 | 0 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 1 | 0 |
| 75 | 4 | 0 |
| 76 | 21 | 0 |
| 77 | 60 | 0 |
| 78 | 162 | 0 |
| 79 | 432 | 0 |
| 80 | 1,014 | 0 |
| 81 | 2,049 | 0 |
| 82 | 4,070 | 0 |
| 83 | 6,988 | 0 |
| 84 | 11,073 | 0 |
| 85 | 15,853 | 0 |
| 86 | 18,402 | 0 |
| 87 | 19,273 | 0 |
| 88 | 17,105 | 0 |
| 89 | 12,955 | 0 |
| 90 | 8,353 | 0 |
| 91 | 4,538 | 0 |
| 92 | 2,180 | 0 |
| 93 | 919 | 0 |
| 94 | 323 | 0 |
| 95 | 96 | 0 |
| 96 | 31 | 0 |
| 97 | 11 | 0 |
| 98 | 2 | 0 |
| 99 | 0 | 0 |
| 100 | 0 | 0 |
| 101 | 0 | 0 |
| 102 | 0 | 0 |

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FIGURE 7

AMPEX 721 TAPE, SPIN PHYSICS HEADS, 33.6 Kb/in

ODETICS, INC.

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 33.6KB/IN

PRINT MODE: ALL

SINGLE DISPLAY:
SAMPLE SIZE: 10##6
SEGMNT TIME: 20#SEC
MULTIPLE DISPLAY:
SAMPLE SIZE: 10##6
SEGMNT TIME: 20#SEC

| SEGMNT NUMBER | TK1 SINGLE SAMPLE | TK2 LAST MLTPLE SAMPLE |
|---|---|---|
| 22 | 186 | 158 |
| 23 | 889 | 620 |
| 24 | 3,663 | 2,453 |
| 25 | 10,907 | 8,328 |
| 26 | 26,649 | 23,666 |
| 27 | 50,384 | 52,353 |
| 28 | 65,535 | 65,535 |
| 29 | 65,535 | 65,535 |
| 30 | 65,535 | 65,535 |
| 31 | 65,535 | 65,535 |
| 32 | 44,234 | 34,605 |
| 33 | 23,156 | 14,405 |
| 34 | 10,108 | 4,656 |
| 35 | 3,657 | 1,183 |
| 36 | 1,161 | 240 |
| 37 | 333 | 35 |
| 38 | 98 | 5 |
| 39 | 32 | 0 |
| 40 | 4 | 0 |
| 41 | 1 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 2 |
| 46 | 0 | 5 |
| 47 | 6 | 25 |
| 48 | 12 | 114 |
| 49 | 54 | 468 |
| 50 | 241 | 1,181 |
| 51 | 840 | 2,613 |
| 52 | 2,613 | 5,163 |
| 53 | 6,568 | 8,965 |
| 54 | 14,381 | 14,637 |
| 55 | 25,672 | 22,267 |
| 56 | 37,779 | 31,692 |
| 57 | 44,778 | 37,792 |
| 58 | 43,038 | 39,823 |
| 59 | 33,655 | 34,306 |
| 60 | 21,644 | 24,759 |
| 61 | 11,421 | 14,715 |
| 62 | 4,892 | 7,474 |
| 63 | 1,834 | 3,268 |
| 64 | 595 | 1,217 |
| 65 | 128 | 400 |
| 66 | 38 | 87 |
| 67 | 8 | 27 |
| 68 | 3 | 4 |
| 69 | 0 | 1 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 0 | 3 |
| 75 | 4 | 12 |
| 76 | 15 | 35 |
| 77 | 48 | 165 |
| 78 | 132 | 370 |
| 79 | 385 | 846 |
| 80 | 930 | 1,705 |
| 81 | 2,285 | 2,923 |
| 82 | 4,715 | 4,816 |
| 83 | 8,447 | 7,638 |
| 84 | 13,596 | 10,888 |
| 85 | 18,331 | 14,570 |
| 86 | 20,782 | 17,496 |
| 87 | 19,903 | 18,164 |
| 88 | 15,869 | 16,239 |
| 89 | 10,409 | 12,273 |
| 90 | 5,588 | 7,978 |
| 91 | 2,589 | 4,569 |
| 92 | 986 | 2,228 |
| 93 | 334 | 976 |
| 94 | 93 | 377 |
| 95 | 18 | 92 |
| 96 | 5 | 28 |
| 97 | 0 | 6 |
| 98 | 1 | 1 |
| 99 | 0 | 1 |
| 100 | 0 | 0 |
| 101 | 0 | 0 |
| 102 | 0 | 0 |

ODETICS, INC.

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 33.6KB/IN

PRINT MODE: ALL

SINGLE DISPLAY:
SAMPLE SIZE: 10##6
SEGMNT TIME: 20#SEC
MULTIPLE DISPLAY:
SAMPLE SIZE: 10##6
SEGMNT TIME: 20#SEC

| SEGMNT NUMBER | TK3 SINGLE SAMPLE | TK4 LAST MLTPLE SAMPLE |
|---|---|---|
| 22 | 147 | 59 |
| 23 | 657 | 373 |
| 24 | 2,628 | 1,765 |
| 25 | 8,911 | 6,952 |
| 26 | 24,585 | 21,008 |
| 27 | 50,099 | 48,772 |
| 28 | 65,535 | 65,535 |
| 29 | 65,535 | 65,535 |
| 30 | 65,535 | 65,535 |
| 31 | 65,535 | 65,535 |
| 32 | 41,951 | 40,568 |
| 33 | 20,455 | 18,286 |
| 34 | 8,222 | 6,728 |
| 35 | 2,886 | 1,977 |
| 36 | 745 | 490 |
| 37 | 191 | 100 |
| 38 | 28 | 12 |
| 39 | 6 | 6 |
| 40 | 1 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 0 | 1 |
| 46 | 1 | 4 |
| 47 | 17 | 23 |
| 48 | 52 | 90 |
| 49 | 238 | 312 |
| 50 | 667 | 874 |
| 51 | 1,752 | 2,132 |
| 52 | 3,968 | 4,631 |
| 53 | 7,989 | 8,901 |
| 54 | 14,352 | 15,077 |
| 55 | 23,242 | 23,611 |
| 56 | 31,965 | 32,772 |
| 57 | 38,773 | 38,795 |
| 58 | 39,328 | 39,627 |
| 59 | 33,734 | 33,467 |
| 60 | 24,492 | 23,791 |
| 61 | 15,203 | 14,076 |
| 62 | 7,955 | 7,081 |
| 63 | 3,699 | 2,955 |
| 64 | 1,534 | 1,082 |
| 65 | 459 | 369 |
| 66 | 135 | 95 |
| 67 | 38 | 19 |
| 68 | 3 | 4 |
| 69 | 1 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 0 | 0 |
| 74 | 2 | 1 |
| 75 | 15 | 16 |
| 76 | 31 | 37 |
| 77 | 129 | 115 |
| 78 | 345 | 317 |
| 79 | 892 | 761 |
| 80 | 1,806 | 1,638 |
| 81 | 3,209 | 3,198 |
| 82 | 5,515 | 5,365 |
| 83 | 8,821 | 8,155 |
| 84 | 12,824 | 12,663 |
| 85 | 16,375 | 15,886 |
| 86 | 18,387 | 18,312 |
| 87 | 17,708 | 18,276 |
| 88 | 15,665 | 15,338 |
| 89 | 10,849 | 11,228 |
| 90 | 6,841 | 7,307 |
| 91 | 3,682 | 3,951 |
| 92 | 1,832 | 1,812 |
| 93 | 824 | 751 |
| 94 | 306 | 269 |
| 95 | 90 | 65 |
| 96 | 32 | 21 |
| 97 | 10 | 2 |
| 98 | 0 | 0 |
| 99 | 0 | 0 |
| 100 | 0 | 0 |
| 101 | 0 | 0 |
| 102 | 0 | 0 |

ODETICS, INC.

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 33.6KB/IN

PRINT MODE: ALL

SINGLE DISPLAY:
SAMPLE SIZE: 10##6
SEGMNT TIME: 20#SEC
MULTIPLE DISPLAY:
SAMPLE SIZE: 10##6
SEGMNT TIME: 20#SEC

| SEGMNT NUMBER | TK5 SINGLE SAMPLE | TK6 LAST MLTPLE SAMPLE |
|---|---|---|
| 22 | 351 | 2,400 |
| 23 | 1,492 | 5,823 |
| 24 | 4,978 | 13,014 |
| 25 | 13,484 | 25,609 |
| 26 | 29,393 | 43,963 |
| 27 | 52,152 | 64,105 |
| 28 | 65,535 | 65,535 |
| 29 | 65,535 | 65,535 |
| 30 | 65,535 | 65,535 |
| 31 | 65,535 | 51,327 |
| 32 | 43,121 | 31,146 |
| 33 | 23,531 | 15,312 |
| 34 | 10,853 | 7,130 |
| 35 | 4,160 | 2,725 |
| 36 | 1,501 | 882 |
| 37 | 459 | 259 |
| 38 | 112 | 52 |
| 39 | 31 | 14 |
| 40 | 5 | 2 |
| 41 | 3 | 1 |
| 42 | 0 | 0 |
| 43 | 0 | 1 |
| 44 | 0 | 3 |
| 45 | 0 | 8 |
| 46 | 0 | 42 |
| 47 | 9 | 97 |
| 48 | 90 | 256 |
| 49 | 154 | 626 |
| 50 | 448 | 1,317 |
| 51 | 1,255 | 2,626 |
| 52 | 3,201 | 4,829 |
| 53 | 6,847 | 8,268 |
| 54 | 13,363 | 13,206 |
| 55 | 22,101 | 19,258 |
| 56 | 31,956 | 26,316 |
| 57 | 38,418 | 31,857 |
| 58 | 39,495 | 34,515 |
| 59 | 34,662 | 32,993 |
| 60 | 25,889 | 27,387 |
| 61 | 16,418 | 20,057 |
| 62 | 9,049 | 13,200 |
| 63 | 4,316 | 7,278 |
| 64 | 1,800 | 3,607 |
| 65 | 704 | 1,499 |
| 66 | 209 | 618 |
| 67 | 66 | 193 |
| 68 | 17 | 48 |
| 69 | 2 | 21 |
| 70 | 0 | 5 |
| 71 | 0 | 0 |
| 72 | 0 | 2 |
| 73 | 2 | 5 |
| 74 | 3 | 9 |
| 75 | 6 | 28 |
| 76 | 32 | 79 |
| 77 | 81 | 172 |
| 78 | 246 | 427 |
| 79 | 620 | 888 |
| 80 | 1,394 | 1,513 |
| 81 | 2,694 | 2,534 |
| 82 | 5,120 | 4,125 |
| 83 | 8,233 | 6,230 |
| 84 | 12,243 | 8,954 |
| 85 | 15,782 | 11,900 |
| 86 | 18,311 | 14,479 |
| 87 | 17,838 | 16,685 |
| 88 | 15,339 | 15,878 |
| 89 | 11,712 | 13,970 |
| 90 | 7,661 | 11,852 |
| 91 | 4,449 | 7,591 |
| 92 | 2,279 | 4,698 |
| 93 | 977 | 2,678 |
| 94 | 379 | 1,269 |
| 95 | 149 | 516 |
| 96 | 43 | 225 |
| 97 | 11 | 63 |
| 98 | 1 | 24 |
| 99 | 0 | 7 |
| 100 | 0 | 2 |
| 101 | 0 | 0 |
| 102 | 0 | 2 |

ODETICS, INC.

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 33.6KB/IN

PRINT MODE: ALL

SINGLE DISPLAY:
SAMPLE SIZE: 10##6
SEGMNT TIME: 20#SEC
MULTIPLE DISPLAY:
SAMPLE SIZE: 10##6
SEGMNT TIME: 20#SEC

| SEGMNT NUMBER | TK7 SINGLE SAMPLE | TK8 LAST MLTPLE SAMPLE |
|---|---|---|
| 22 | 2,856 | 675 |
| 23 | 6,484 | 1,848 |
| 24 | 13,864 | 5,360 |
| 25 | 25,609 | 13,190 |
| 26 | 42,502 | 29,297 |
| 27 | 60,247 | 53,688 |
| 28 | 65,535 | 65,535 |
| 29 | 65,535 | 65,535 |
| 30 | 65,535 | 65,535 |
| 31 | 52,908 | 64,439 |
| 32 | 35,136 | 38,817 |
| 33 | 20,158 | 19,183 |
| 34 | 10,240 | 8,097 |
| 35 | 4,415 | 2,836 |
| 36 | 1,695 | 861 |
| 37 | 634 | 241 |
| 38 | 207 | 41 |
| 39 | 41 | 10 |
| 40 | 12 | 5 |
| 41 | 4 | 0 |
| 42 | 1 | 0 |
| 43 | 4 | 0 |
| 44 | 6 | 0 |
| 45 | 15 | 1 |
| 46 | 28 | 13 |
| 47 | 132 | 53 |
| 48 | 296 | 192 |
| 49 | 636 | 483 |
| 50 | 1,406 | 1,345 |
| 51 | 2,686 | 2,848 |
| 52 | 5,316 | 5,358 |
| 53 | 8,733 | 9,146 |
| 54 | 13,736 | 15,132 |
| 55 | 19,618 | 22,671 |
| 56 | 25,928 | 30,697 |
| 57 | 30,649 | 35,810 |
| 58 | 33,161 | 37,490 |
| 59 | 31,173 | 32,562 |
| 60 | 26,629 | 24,796 |
| 61 | 20,417 | 15,750 |
| 62 | 13,474 | 8,678 |
| 63 | 8,268 | 4,233 |
| 64 | 4,355 | 1,838 |
| 65 | 2,226 | 666 |
| 66 | 924 | 250 |
| 67 | 388 | 72 |
| 68 | 121 | 18 |
| 69 | 50 | 2 |
| 70 | 18 | 2 |
| 71 | 6 | 0 |
| 72 | 2 | 0 |
| 73 | 10 | 1 |
| 74 | 29 | 9 |
| 75 | 55 | 25 |
| 76 | 116 | 68 |
| 77 | 264 | 194 |
| 78 | 524 | 448 |
| 79 | 959 | 930 |
| 80 | 1,766 | 1,793 |
| 81 | 3,025 | 3,214 |
| 82 | 4,487 | 5,176 |
| 83 | 6,730 | 7,971 |
| 84 | 9,491 | 11,197 |
| 85 | 12,132 | 14,293 |
| 86 | 14,336 | 16,885 |
| 87 | 15,888 | 17,210 |
| 88 | 14,872 | 15,423 |
| 89 | 12,975 | 11,844 |
| 90 | 10,323 | 8,218 |
| 91 | 7,480 | 4,846 |
| 92 | 4,867 | 2,628 |
| 93 | 2,852 | 1,290 |
| 94 | 1,467 | 482 |
| 95 | 698 | 194 |
| 96 | 305 | 68 |
| 97 | 129 | 24 |
| 98 | 61 | 5 |
| 99 | 12 | 3 |
| 100 | 11 | 0 |
| 101 | 2 | 0 |
| 102 | 1 | 0 |

ODETICS, INC.

TRANSITION DENSITY ANALYSIS

TEST ID: 1/4 SPOT
DATE: 3-11-83
TIME:
TESTER:
NOTES: 33.6KB/IN

PRINT MODE: ALL

SINGLE DISPLAY:
SAMPLE SIZE: 10##6
SEGMNT TIME: 20#SEC
MULTIPLE DISPLAY:
OFF

| SEGMNT NUMBER | TK9 LAST SINGLE SAMPLE | MLTPLE SAMPLE |
|---|---|---|
| 22 | 1,153 | 0 |
| 23 | 3,361 | 0 |
| 24 | 8,554 | 0 |
| 25 | 19,736 | 0 |
| 26 | 38,536 | 0 |
| 27 | 59,950 | 0 |
| 28 | 65,535 | 0 |
| 29 | 65,535 | 0 |
| 30 | 65,535 | 0 |
| 31 | 57,911 | 0 |
| 32 | 36,582 | 0 |
| 33 | 15,648 | 0 |
| 34 | 6,672 | 0 |
| 35 | 3,307 | 0 |
| 36 | 1,066 | 0 |
| 37 | 286 | 0 |
| 38 | 81 | 0 |
| 39 | 12 | 0 |
| 40 | 2 | 0 |
| 41 | 0 | 0 |
| 42 | 0 | 0 |
| 43 | 0 | 0 |
| 44 | 0 | 0 |
| 45 | 1 | 0 |
| 46 | 8 | 0 |
| 47 | 25 | 0 |
| 48 | 91 | 0 |
| 49 | 274 | 0 |
| 50 | 780 | 0 |
| 51 | 1,972 | 0 |
| 52 | 4,026 | 0 |
| 53 | 7,781 | 0 |
| 54 | 13,848 | 0 |
| 55 | 21,720 | 0 |
| 56 | 29,725 | 0 |
| 57 | 35,782 | 0 |
| 58 | 37,517 | 0 |
| 59 | 33,915 | 0 |
| 60 | 26,352 | 0 |
| 61 | 17,357 | 0 |
| 62 | 10,203 | 0 |
| 63 | 4,957 | 0 |
| 64 | 2,175 | 0 |
| 65 | 767 | 0 |
| 66 | 259 | 0 |
| 67 | 75 | 0 |
| 68 | 14 | 0 |
| 69 | 1 | 0 |
| 70 | 0 | 0 |
| 71 | 0 | 0 |
| 72 | 0 | 0 |
| 73 | 1 | 0 |
| 74 | 2 | 0 |
| 75 | 12 | 0 |
| 76 | 43 | 0 |
| 77 | 112 | 0 |
| 78 | 258 | 0 |
| 79 | 593 | 0 |
| 80 | 1,246 | 0 |
| 81 | 2,401 | 0 |
| 82 | 4,353 | 0 |
| 83 | 6,824 | 0 |
| 84 | 10,429 | 0 |
| 85 | 14,684 | 0 |
| 86 | 17,850 | 0 |
| 87 | 17,570 | 0 |
| 88 | 16,332 | 0 |
| 89 | 13,250 | 0 |
| 90 | 9,372 | 0 |
| 91 | 5,666 | 0 |
| 92 | 3,071 | 0 |
| 93 | 1,509 | 0 |
| 94 | 629 | 0 |
| 95 | 210 | 0 |
| 96 | 62 | 0 |
| 97 | 14 | 0 |
| 98 | 10 | 0 |
| 99 | 3 | 0 |
| 100 | 1 | 0 |
| 101 | 0 | 0 |
| 102 | 0 | 0 |

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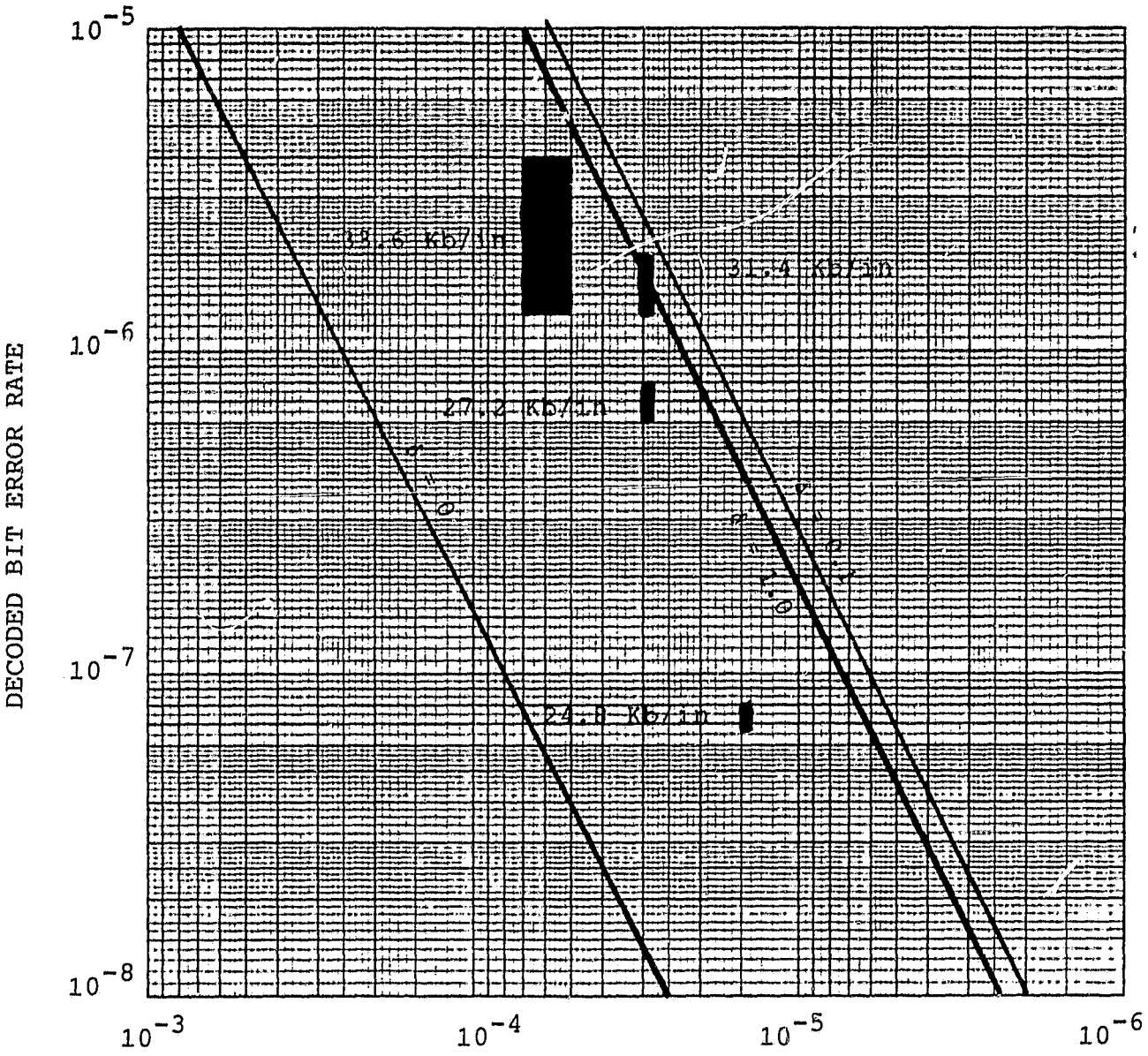


Fig. 8 Performance for (9,8;2) Code

4.3 (Contd) As shown in Figure 8, the widest performance variation occurred at the highest packing density of 33.6 Kb/in and is most likely attributed to the poor TDA response observed for TK6 and TK7 at this density (see Figure 7). Even under this condition, the BER improvement was well over 10:1. Lowering the density to 24.8 Kb/in yielded a significant performance improvement. For instance, at the 24.8 Kb/in density, the corrected BER improvement over the 33.6 Kb/in data jumped from 10 to 187 with a raw bit error rate improvement of only 4 to 1.

It should be emphasized here that the data presented in this report is not intended to demonstrate the ultimate but only to indicate the generic performance trends for high track density configurations.

In essence, BER histograms generated from each tape sample under test would exhibit unique signatures; but in general, it is concluded by this evaluation that there would be few tape samples yielding a raw bit error rate better than $1 \times 10^{-5}$.

These observations do imply that some algorithms for error correction are in order for ultimate guaranteed BER performance.

Using the tape quality discussion above as a given, it is obvious from the test results obtained to date that a more powerful error correction code would be in order for BER improvements in excess of 100 to 1 when the tape packing density exceeds 25 Kb/in. However, this task is not out of reach with present code technologies illustrated in Figure 9. The data of Figure 9 plots

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OF POOR QUALITY

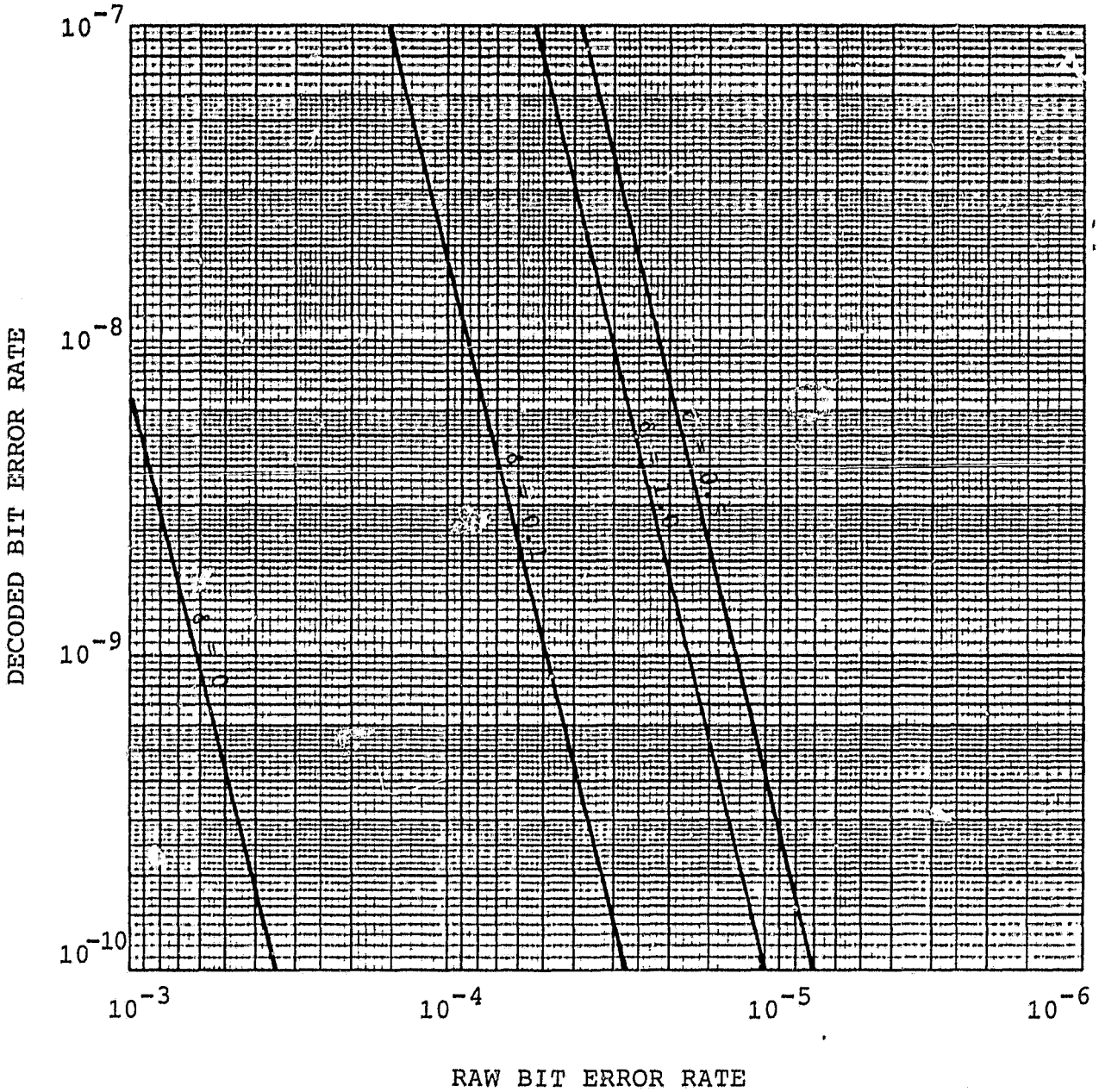


Fig. 9 Performance Estimate for Reed Solomon Double Burst Correcting Code

4.3 (Contd) the predicted results of a double burst error correction concept used on the final SPOT recorder configuration. In this case, a raw bit error rate of $10^{-4}$ based on $\delta = .1$ would yield a $1.5 \times 10^{-8}$ corrected bit error rate.

# APPENDIX A

## Head Specifications

The information disclosed herein was originated by and is the property of ODETICS, INC. and except for rights expressly granted to the United States government, ODETICS, INC. reserves all patent, proprietary, design, use, sale, manufacturing and reproduction rights thereto.

# RECORD HEAD CHARACTERISTICS ⚠1

## MECHANICAL

| PARAMETER | DIM | UNIT | SPEC | TOL |
|---|---|---|---|---|
| ANGLE | A | DEGREE | 10 | MIN |
| FACE RADIUS | B | INCH | .125 | ±.025 |
| TIP DEPTH | — | MIL | 1.5 | ±.5 |
| GAP LENGTH | — | MICROINCH | 25 | ±2.5 |
| TAPE WRAP | C | DEGREE | 3 | ±½ |
| TAPE TENSION | D | OUNCE | 3 | ±1 |
| AZIMUTH | E | MINUTES OF ARC | 1 | MAX |
| TILT | F | MINUTES OF ARC | 1 | MAX |
| GAP SCATTER | — | MICROINCH | 50 | MAX |
| CORE TYPE | | FERRITE | | |
| CORE TIP CONSTRUCTION | | SOLID ALFESIL | | |
| | — | | | |
| TERMINATION | | ⚠6 | | |
| WIDTH | G | INCH | .562 | +.000 −.250 |
| DEPTH | H | INCH | .800 | MAX |
| GAP ℄ TO MOUNTING SURFACE | J | INCH | .281 | ±.001 |
| MOUNTING SURFACE | K | | ⚠4 | |
| HEIGHT | L | INCH | .635 | ±.015 |
| MTG HOLE | M | INCH | .435 | ±.005 |
| MTG HOLE | N | INCH | .100 | ±.003 |
| MTG HOLE | P | INCH | .532 | ±.005 |
| EFFECTIVE DATA TRACK WIDTH | R | MIL | 8 | ±0.7 |
| EFFECTIVE DATA TRACK SPACING | S | MIL | 23. | REF |
| TAPE ℄ TO BASE | T | INCH | .317 | REF |
| BASE TO TRACK 1 | U | INCH | .198 | ±.0007 |
| BASE TO TRACK 2 | V | INCH | .221 | |
| BASE TO TRACK 3 | W | INCH | .244 | |
| BASE TO TRACK 4 | X | INCH | .267 | |
| BASE TO TRACK 5 | Y | INCH | .290 | |
| BASE TO TRACK 6 | Z | INCH | .313 | |
| BASE TO TRACK 7 | CC | INCH | .336 | |
| BASE TO TRACK 8 | EE | INCH | .359 | |
| BASE TO TRACK 9 | FF | INCH | .382 | |
| BASE TO TRACK 10 | GG | INCH | .405 | |
| BASE TO TRACK 11 | HH | INCH | .428 | ±.0007 |

## ELECTRICAL : DATA TRACKS ⚠6

| PARAMETER | | UNIT | SPEC | TOL |
|---|---|---|---|---|
| SHIELD TO CASE RESISTANCE | | OHM | 20 | MAX |
| INSULATION RESISTANCE | | MEGOHM | 50 | MIN |
| | | | | |
| TRANSFORMER CROSSTALK | | db | 40 | MIN |
| DATA FREQUENCY | LOWEST | KHz | 3 | MIN |
| | HIGHEST | MHz | 2 | MAX |
| SHORTEST WAVELENGTH OF INTEREST | | MICROINCH | 60 | REF |
| HEAD DRIVER VOLTAGE ⚠5 | | VOLTS | 11 | ±2% |
| SIGNAL CURRENT FOR MAX REPRO OUTPUT | | mA P-P | 19 | ±18% |
| WAVELENGTH FOR CURRENT SET | | MICROINCH | 60 | REF |
| CURRENT RISE TIME ⚠5 | | µS | TBD | MAX |

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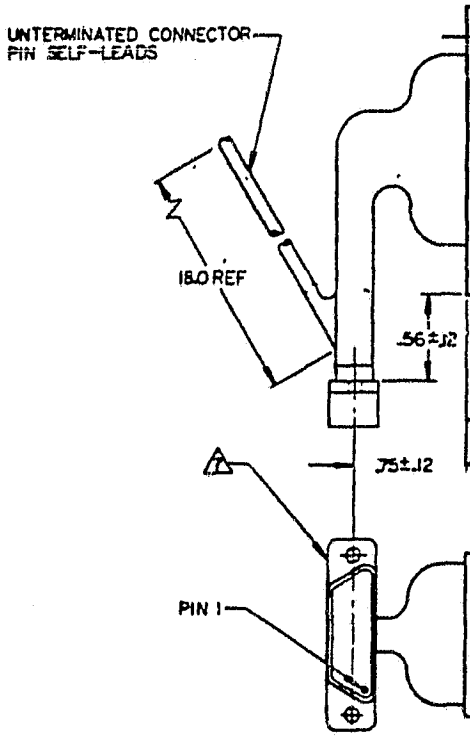
OF POOR QUALITY

| TRACK I.D. | CONNECTOR PIN NO. | | |
|---|---|---|---|
| 11 | 11 | 13 | 24 |
| 10 | 10 | 12 | 23 |
| 9 | 9 | 11 | 22 |
| 8 | 8 | 10 | 21 |
| 7 | 7 | 19 | 20 |
| 6 | 6 | 18 | 19 |
| 5 | 5 | 17 | 18 |
| 4 | 4 | 16 | 17 |
| 3 | 3 | 15 | 16 |
| 2 | 2 | 14 | 15 |
| 1 | 1 | 13 | 14 |
| UNTERMINATED PIN | | | 25 |




⚠9 SELF-LEADED CONNECTOR (SUPPLIED BY ODETICS): WIRE COLOR CODE IS PER MIL-STD-681, SYSTEM 1. PART NO. SHALL BE ONE OF THE FOLLOWING:

A. DSR2598HS-18.0 CODE IDENT: 54455
B. 095-9685-1035 (MCDM1-37P6D7-18.0) CODE IDENT: 98278
C. DSH37P6HS-18.0 CODE IDENT: 54455

⚠8 TRACKS HAVING COMMON CONNECTOR PINS ARE INTERCONNECTED INTERNAL TO HEAD. (T B D)

⚠7 PERFORMANCE DATA SHALL BE MEASURED PER 3.1.1 OF 5450001.

⚠6 TEST DATA BASED ON AMPEX 799 TAPE AT 60 IPS.

5. CORE GROUNDING: THE FERRITE CORES SHALL BE GROUNDED TO THE CASE BY USING SILVER CONDUCTIVE EPOXY OR ODETICS APPROVED EQUIVALENT. SILVER EPOXY SHALL NOT BE USED EXCLUSIVELY FOR SECURING THE CORES.

⚠4 MARK INDICATED SURFACE PER ODETICS' STD 5900000-4 WITH PART NO. 64108054, MANUFACTURERS NAME, AND SERIAL NO.

⚠3 ALL ELECTRICAL PARAMETERS, DIMENSIONS AND TOLERANCES INDICATED IN THIS SPEC ARE MEASURED WITH THIS SURFACE ATTACHED TO A PLANE INFINITELY STIFF IN STRUCTURE AND FLAT TO A MAX OF 5 LIGHT BANDS WHEN ATTACHMENT SCREWS ARE TORQUED TO 2.5 - 3.5 IN-LBS.

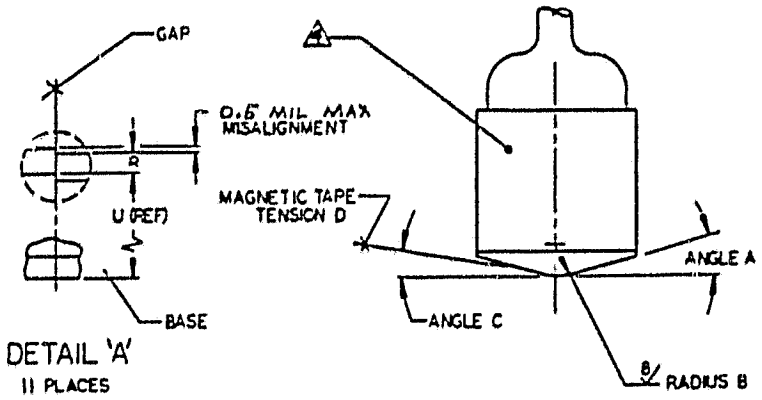
2. HEAD CHARACTERISTICS TO BE MATED WITH READ HEAD IN ACCORDANCE WITH SPEC CONTROL DWG. 64108085

⚠1 APPLICABLE DOCUMENTS: ODETICS, INC. SPEC CONTROL DOCUMENT 5450001 AND 5450002.

NOTE: UNLESS OTHERWISE SPECIFIED

FOLDOUT FRAME

| REVISIONS | | | | |
|---|---|---|---|---|
| SYM | DESCRIPTION | DRFT | DATE | APPROVAL |
| | | | | |




DETAIL 'A'
11 PLACES

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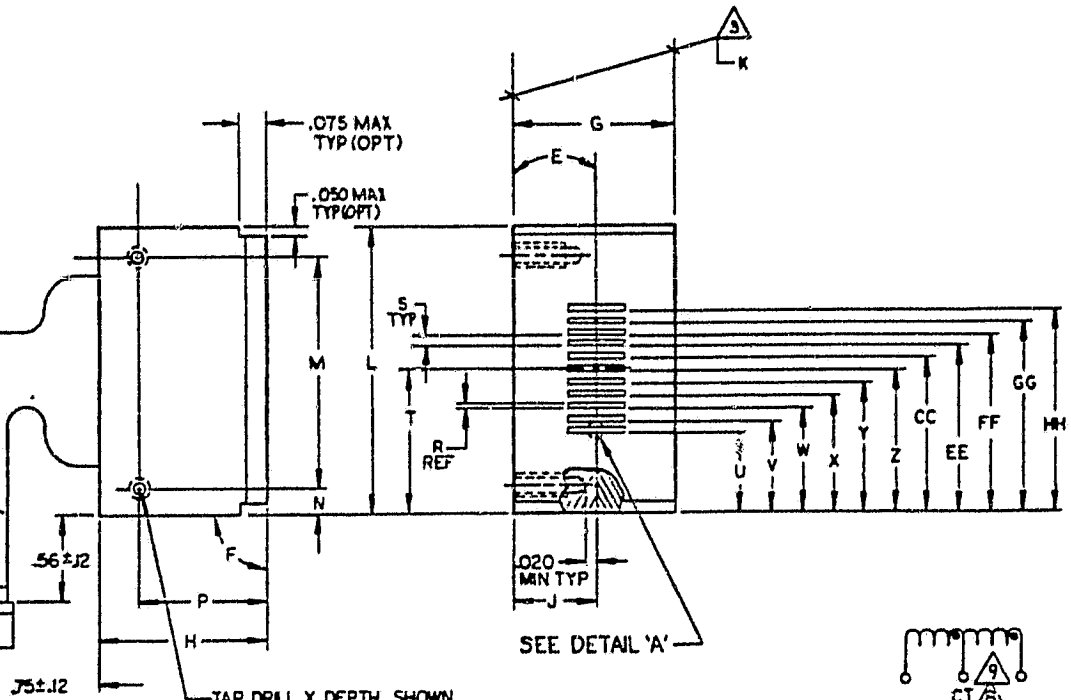
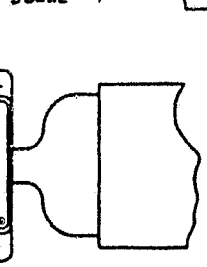
2 FOLDOUT FRAME







SCHEMATIC DIAGRAM
TYP 11 TRACKS



SPECIFICATION CONTROL DRAWING

| QTY REQD | ITEM NO. | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION | MATERIAL | SPECIFICATION | CODE |
|---|---|---|---|---|---|---|

LIST OF MATERIALS OR PARTS LIST

| | | | |
|---|---|---|---|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES | CONTRACT NO. | Adetics Inc. | ANAHEIM CALIFORNIA |
| TOLERANCES | DRAWN | HEAD, WRITE, 11 DATA TRACKS, WIDEBAND, 1/4 IN. TAPE, ODD, RIGHT HAND MOUNT | |
| FRACTIONS ± / .XX ± | CHECKED | | |
| ANGLES ± / .XXX ± | DESIGN | | |
| MATERIAL | MECH. ENG. | | |
| | ELEC. ENG. J. Weld 4/24 | | |
| FINISH | Q & R A | | |
| | MFG. ENG. | SIZE D / CODE IDENT NO. 32964 / DWG NO. X-5408055 / REV B | |
| | PRGM MGR. | | |
| QTY N A / QTY F/A / NEXT ASSEMBLY / FINAL ASSEMBLY | RELEASE | SCALE NONE / WEIGHT ~ / SHEET 1 OF 1 | |
| APPLICATION | | | |
| SURFACE ROUGHNESS ✓ | | | |

X-5408065 B

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# RECORD HEAD CHARACTERISTICS ⚠1

## MECHANICAL

| PARAMETER | DIM | UNIT | SPEC | TOL |
|---|---|---|---|---|
| ANGLE | A | DEGREE | 10 | MIN |
| FACE RADIUS | B | INCH | .125 | +.025 −.000 |
| TIP DEPTH | — | MIL | 1.5 | +0.5 −0.2 |
| GAP LENGTH | — | MICROINCH | 25 | ± 2.5 |
| TAPE WRAP | C | DEGREE | 9 | ±2 |
| TAPE TENSION | D | OUNCE | 3 | ±1 |
| AZIMUTH | E | MINUTES OF ARC | 1 | MAX |
| TILT | F | MINUTES OF ARC | 1 | MAX |
| GAP SCATTER | — | MICROINCH | 50 | MAX |
| CORE TYPE | FERRITE | | | |
| CORE TIP CONSTRUCTION | SOLID ALFESIL | | | |
| | — | | | |
| TERMINATION | | | ⚠4 ⚠8 | |
| WIDTH | G | INCH | .562 | +.000 −.030 |
| DEPTH | H | INCH | .800 | MAX |
| GAP ℄ TO MOUNTING SURFACE | J | INCH | .281 | ±.001 |
| MOUNTING SURFACE | K | | ⚠5 | |
| HEIGHT | L | INCH | .695 | ±.015 |
| MTG HOLE | M | INCH | .935 | ±.005 |
| MTG HOLE | N | INCH | .100 | ±.003 |
| MTG HOLE | P | INCH | .332 | ±.005 |
| EFFECTIVE DATA TRACK WIDTH | R | MIL | 8 | ±0.7 |
| EFFECTIVE DATA TRACK SPACING | S | MIL | 23 | REF |
| TAPE ℄ TO BASE | T | INCH | .317 | REF |
| BASE TO TRACK 1 | U | INCH | .2095 | ±.0007 |
| BASE TO TRACK 2 | V | INCH | .2325 | |
| BASE TO TRACK 3 | W | INCH | .2555 | |
| BASE TO TRACK 4 | X | INCH | .2785 | |
| BASE TO TRACK 5 | Y | INCH | .3015 | |
| BASE TO TRACK 6 | Z | INCH | .3245 | |
| BASE TO TRACK 7 | CC | INCH | .3475 | |
| BASE TO TRACK 8 | EE | INCH | .3705 | |
| BASE TO TRACK 9 | FF | INCH | .3935 | |
| BASE TO TRACK 10 | GG | INCH | .4165 | ±.0007 |
| BASE TO DUMMY TRK A | AA | INCH | .203 | ±.001 |
| BASE TO DUMMY TRK B | BB | INCH | .430 | ±.001 |
| EFFECTIVE DUMMY TRACK WIDTH | DD | MIL | 16 | ±.003 |

## ELECTRICAL: DATA TRACKS ⚠6

| PARAMETER | | UNIT | SPEC | TOL |
|---|---|---|---|---|
| SHIELD TO CASE RESISTANCE | | OHM | 1.0 | MAX |
| INSULATION RESISTANCE | | MEGOHM | 50 | MIN |
| | | | | |
| TRANSFORMER CROSSTALK | | dB | 40 | MIN |
| DATA FREQUENCY | LOWEST | KHz | 3 | MIN |
| | HIGHEST | MHz | 2 | MAX |
| SHORTEST WAVELENGTH OF INTEREST | | MICROINCH | 60 | REF |
| HEAD DRIVER VOLTAGE ⚠7 | | VOLTS | 11 | ±2% |
| SIGNAL CURRENT FOR MAX REPRO OUTPUT | | MA P-P | 19 | ±15% |
| WAVELENGTH FOR CURRENT SET | | MICROINCH | 60 | REF |
| CURRENT RISE TIME ⚠7 | | µS | TBD | MAX |

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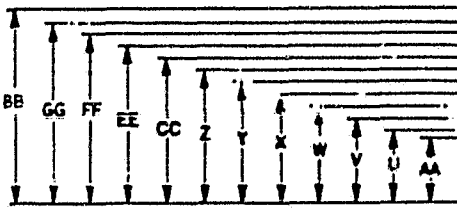
OF POOR QUALITY

| TRACK I.D. | CONNECTOR PIN NO. | | |
|---|---|---|---|
| 10 | 10 | 12 | 23 |
| 9 | 9 | 13 | 22 |
| 8 | 8 | 12 | 21 |
| 7 | 7 | 13 | 20 |
| 6 | 6 | 12 | 19 |
| 5 | 5 | 13 | 18 |
| 4 | 4 | 12 | 17 |
| 3 | 3 | 13 | 16 |
| 2 | 2 | 12 | 15 |
| 1 | 1 | 13 | 14 |
| UNTERMINATED PIN | | | 11, 24, 25 |




SCHEMATIC DIAGRAM
TYP 10 TRACKS

⚠9 SELF-LEADED CONNECTOR (SUPPLIED BY ODETICS):
WIRE COLOR CODE IS PER MIL-STD-681, SYSTEM 1,
PART NO. SHALL BE ONE OF THE FOLLOWING:

A. DSR2550H5-18.0 CODE IDENT: 54455
B. 095-9685-1035 (MCDM1-37P6D7-18.0) CODE IDENT: 98278
C. DSM37P6H5-18.0 CODE IDENT: 54455

⚠8 TRACKS HAVING COMMON CONNECTOR PINS ARE INTERCONNECTED INTERNAL TO HEAD.

⚠7 PERFORMANCE DATA SHALL BE MEASURED PER 3.1.1 OF 5450001.

⚠6 TEST DATA BASED ON AMPEX 799 TAPE AT 60 IPS.

5. CORE GROUNDING: THE FERRITE CORES SHALL BE GROUNDED TO THE CASE BY USING SILVER CONDUCTIVE EPOXY OR ODETICS APPROVED EQUIVALENT. SILVER EPOXY SHALL NOT BE USED EXCLUSIVELY FOR SECURING THE CORES.

⚠4 MARK INDICATED SURFACE PER ODETICS' STD 5900000-4 WITH PART NO. 5408056-1, MANUFACTURERS NAME, AND SERIAL NO.

⚠3 ALL ELECTRICAL PARAMETERS, DIMENSIONS AND TOLERANCES INDICATED IN THIS SPEC ARE MEASURED WITH THIS SURFACE ATTACHED TO A PLANE INFINITELY STIFF IN STRUCTURE AND FLAT TO A MAX OF 5 LIGHT BANDS WHEN ATTACHMENT SCREWS ARE TORQUED TO 2.5 - 3.5 IN-LBS.

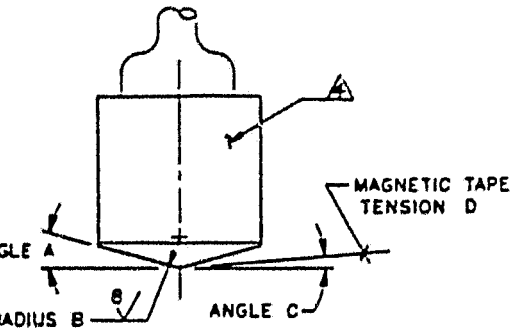
2. HEAD CHARACTERISTICS TO BE MATED WITH READ HEAD IN ACCORDANCE WITH SPEC CONTROL DWG. 5418056

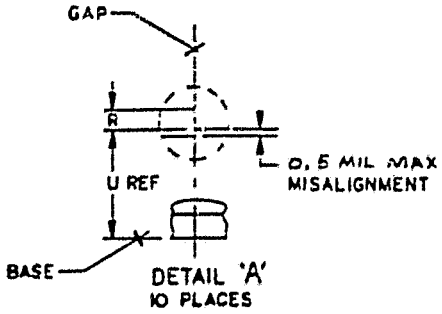
⚠1 APPLICABLE DOCUMENTS: ODETICS, INC. SPEC CONTROL DOCUMENT 5450001 AND 5450002.

NOTE: UNLESS OTHERWISE SPECIFIED

FOLDOUT FRAME

| REVISIONS | | | | |
|---|---|---|---|---|
| SYM | DESCRIPTION | DRFT | DATE | APPROVAL |
| | | | | |

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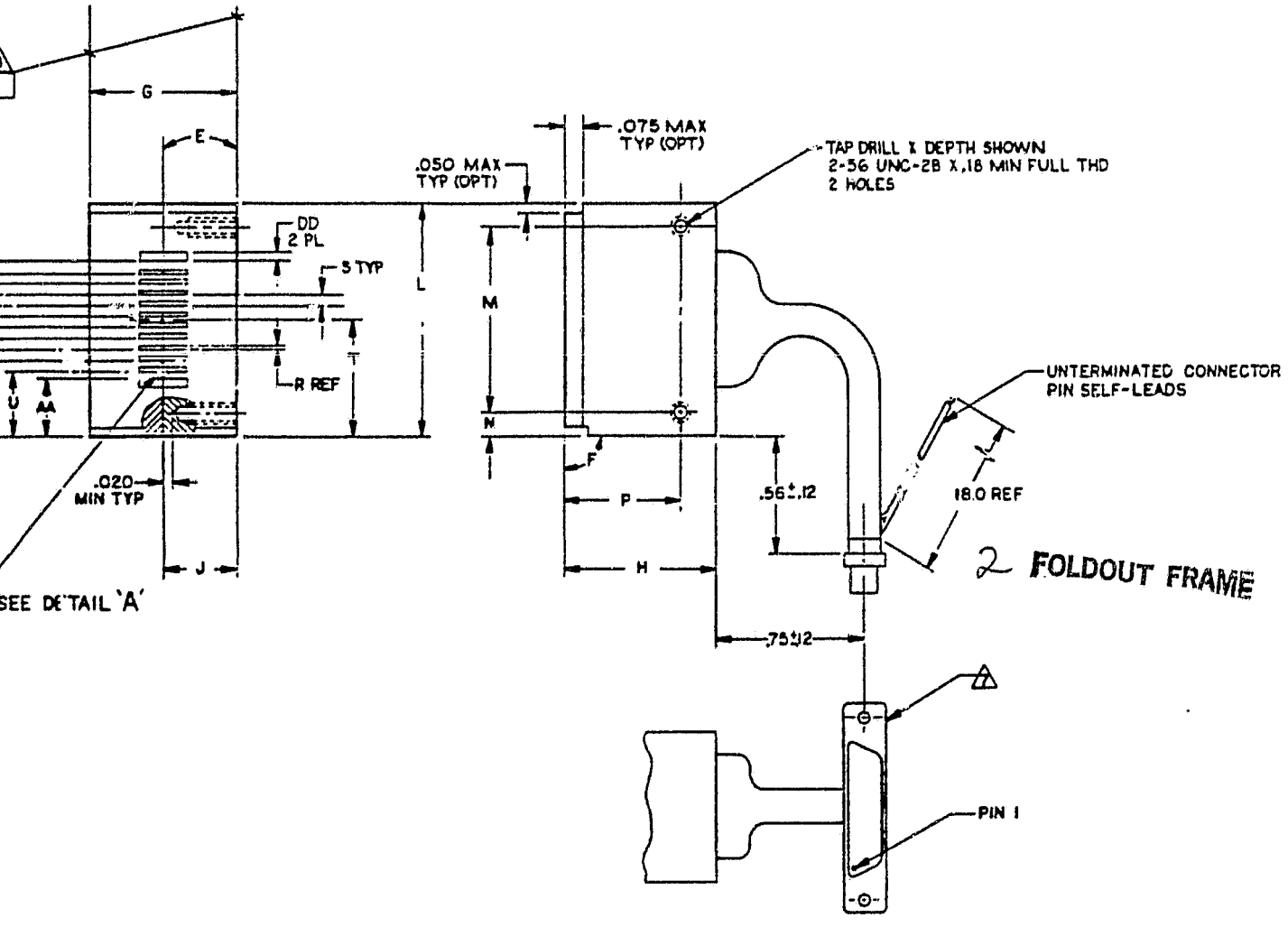


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SPECIFICATION CONTROL DRAWING

| QTY REQD | ITEM NO. | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION | MATERIAL | SPECIFICATION | CODE |
|---|---|---|---|---|---|---|

LIST OF MATERIALS OR PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES
FRACTIONS ± | .XX ±
ANGLES ± | .XXX ±
MATERIAL
FINISH
SURFACE ROUGHNESS

CONTRACT NO.
DRAWN
CHECKED
DESIGN
MECH. ENG.
ELEC. ENG. Gwell Hunt
Q & R A
MFG. ENG.
PROJ. ENG.
RELEASE

QTY REQ'D NEXT ASSEMBLY FINAL ASSEMB.
N A P/A
APPLICATION

Qdetics Inc ANAHEIM CALIFORNIA

HEAD, WRITE, 10 DATA TRACKS, WIDEBAND, 1/4 IN. TAPE, EVEN, LEFT HAND MOUNT

| SIZE | CAGE IDENT NO. | DWG NO. | REV |
|---|---|---|---|
| D | 32964 | X-5408056 | B |

SCALE NONE WEIGHT ~ SHEET 1 OF 1

7508056

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# REPRODUCE HEAD CHARACTERISTICS ⚠1

## MECHANICAL

| PARAMETER | DIM | UNIT | SPEC | TOL |
|---|---|---|---|---|
| ANGLE | A | DEGREE | 10 | MIN |
| FACE RADIUS | B | INCH | .195 | ±.005 |
| TIP DEPTH | — | MIL | 1.5 | +0 -.5 |
| GAP LENGTH | — | MICROINCH | 25 | ± 2.5 |
| TAPE WRAP | C | DEGREE | 3 | ±.5 |
| TAPE TENSION | D | OUNCE | 3 | ±1 |
| AZIMUTH | E | MINUTES OF ARC | 1 | MAX |
| TILT | F | MINUTES OF ARC | 1 | MAX |
| GAP SCATTER | — | MICROINCH | 50 | MAX |
| CORE TYPE | FERRITE | | | |
| CORE TIP CONSTRUCTION | SOLID ALFESIL | | | |
| TERMINATION | TERMINAL USECO 20658I | | | |
| WIDTH | G | INCH | .562 | +.000 -.020 |
| DEPTH | H | INCH | .600 | MAX |
| GAP ℄ TO MOUNTING SURFACE | J | INCH | .281 | ±.001 |
| MOUNTING SURFACE | K | | ⚠5 | |
| HEIGHT | L | INCH | .635 | ±.015 |
| MTG HOLE | M | INCH | .495 | ±.005 |
| MTG HOLE | N | INCH | .100 | ±.003 |
| MTG HOLE | P | INCH | .992 | ±.005 |
| EFFECTIVE DATA TRACK WIDTH | R | MIL | 6 | ±.7 |
| EFFECTIVE DATA TRACK STACING | S | MIL | 23 | REF |
| TAPE ℄ TO BASE | T | INCH | .317 | REF |
| BASE TO TRACK 1 | U | INCH | .199 | ±.0007 |
| BASE TO TRACK 2 | V | INCH | .222 | |
| BASE TO TRACK 3 | W | INCH | .245 | |
| BASE TO TRACK 4 | X | INCH | .267 | |
| BASE TO TRACK 5 | Y | INCH | .291 | |
| BASE TO TRACK 6 | Z | INCH | .314 | |
| BASE TO TRACK 7 | CC | INCH | .337 | |
| BASE TO TRACK 8 | EE | INCH | .360 | |
| BASE TO TRACK 9 | FF | INCH | .383 | |
| BASE TO TRACK 10 | GG | INCH | .406 | |
| BASE TO TRACK 11 | HH | INCH | .429 | ±.0007 |

## ELECTRICAL DATA TRACKS ⚠5

| PARAMETER | | UNIT | SPEC | TOL |
|---|---|---|---|---|
| SHIELD TO CASE RESISTANCE | | OHM | 10 | MAX |
| INSULATION RESISTANCE | | MEGOHM | 50 | MIN |
| SELF RESONANCE | | MHZ | 2 | MIN |
| TRANSFORMER CROSSTALK | | db | 36 | MIN |
| PEAK OUTPUT LEVEL | | mV RMS | 60 | MIN |
| OUTPUT AT λ RELATIVE TO PEAK | λ=10 MIL | dB | -18 | ±2 |
| | λ=.2 MIL | dB | -1 | +1 -2 |
| | λ=.1 MIL | dB | -5 | +1 -2 |
| | λ=.08MIL | dB | -7 | +1 -2 |
| | λ=.06MIL | dB | -12 | +1 -3 |
| INDIVIDUAL GAP AZIMUTH MISALIGNMENT | | dB | 1 | MAX |
| SHORTEST WAVELENGTH OF INTEREST | | MICRO-INCH | 60 | MIN |

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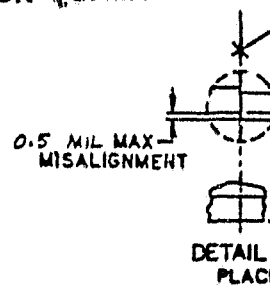
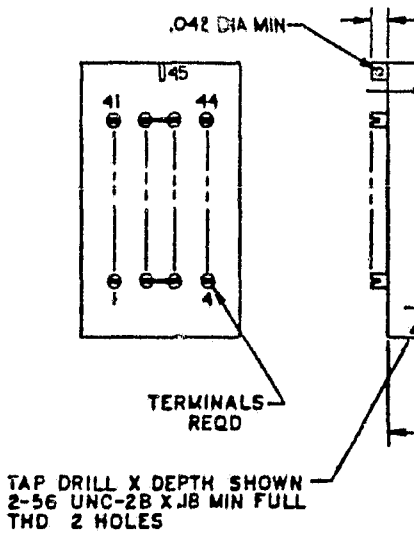



⚠5 TEST DATA BASED ON AMPEX 797 TAPE AT 60 IPS.

5. CORE GROUNDING: THE FERRITE CORES SHALL BE GROUNDED TO THE CASE BY USING SILVER CONDUCTIVE EPOXY OR ODETICS APPROVED EQUIVALENT. SILVER EPOXY SHALL NOT BE USED EXCLUSIVELY FOR SECURING THE CORES.

⚠4 MARK INDICATED SURFACE PER ODETICS' STD 5900000-4 WITH PART NO. 5418055-1, MANUFACTURERS NAME, AND SERIAL NO.

⚠3 ALL ELECTRICAL PARAMETERS, DIMENSIONS AND TOLERANCES INDICATED IN THIS SPEC ARE MEASURED WITH THIS SURFACE ATTACHED TO A PLANE INFINITELY STIFF IN STRUCTURE AND FLAT TO A MAX OF 5 LIGHT BANDS WHEN ATTACHMENT SCREWS ARE TORQUED TO 2.5 - 3.5 IN-LBS.

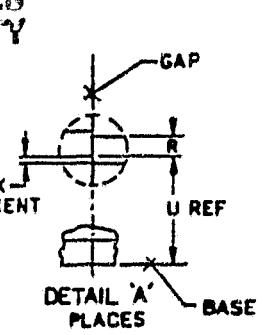
2. HEAD CHARACTERISTICS ARE TO BE MATED WITH WRITE HEAD IN ACCORDANCE WITH SPEC CONTROL DWG. 5406055

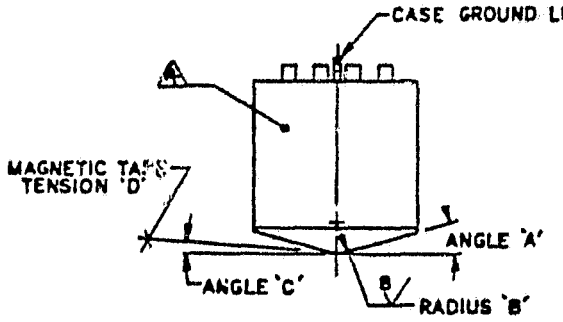
⚠1 APPLICABLE DOCUMENTS: ODETICS, INC. SPEC CONTROL DOCUMENT 5450001 AND 5450002.

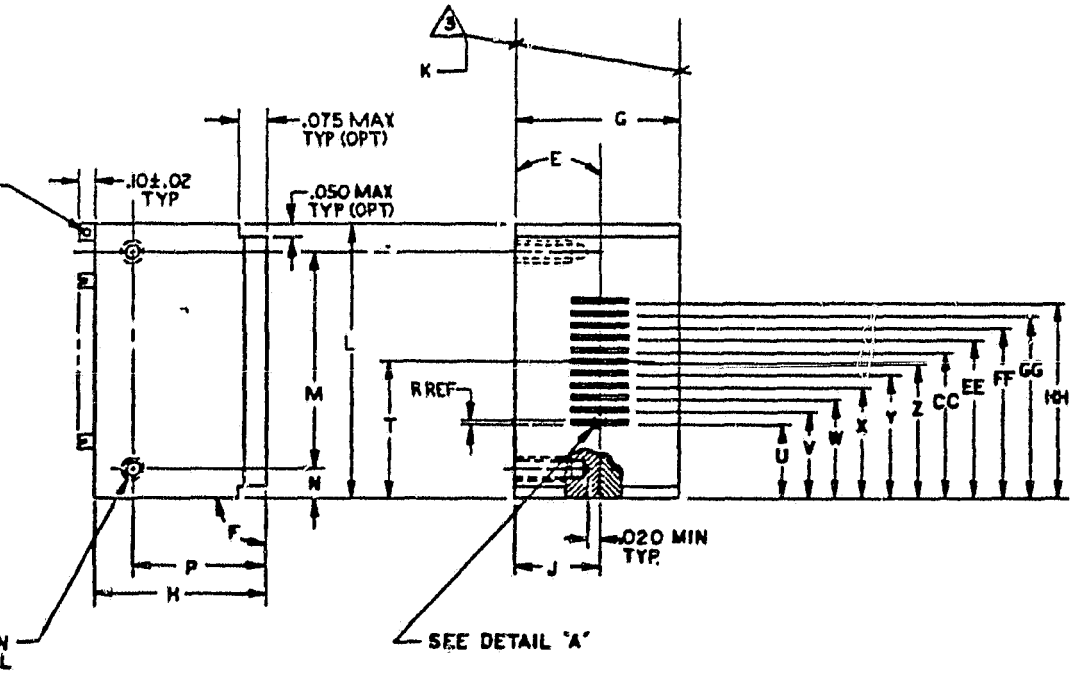
NOTE: UNLESS OTHERWISE SPECIFIED

FOLDOUT FRAME

| REVISIONS | | | | |
|---|---|---|---|---|
| SYM | DESCRIPTION | DRFT | DATE | APPROVAL |
| | | | | |

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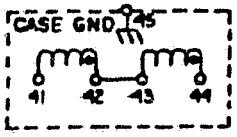


SCHEMATIC DIAGRAM
TYP II TRACKS

SPECIFICATION CONTROL DRAWING

| QTY REQD | ITEM NO. | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION | MATERIAL | SPECIFICATION | CODE |
|---|---|---|---|---|---|---|

LIST OF MATERIALS OR PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES
FRACTIONS ± .XX ±
ANGLES ± .XXX ±
MATERIAL
FINISH
SURFACE ROUGHNESS ✓

CONTRACT NO.
DRAWN
CHECKED
DESIGN
MECH. ENG.
ELEC. ENG. [signature] 6/9/81
Q & R A
MFG ENG.
PROJ MGR.
RELEASE

Qdetics Inc. ANAHEIM CALIFORNIA

HEAD, READ, 11 DATA TRACKS, WIDEBAND, 1/4 IN. TAPE, ODD, RIGHT HAND MOUNT

| SIZE | CODE IDENT NO. | DWG NO. | REV |
|---|---|---|---|
| D | 32964 | X-5418055 | A |

SCALE NONE | WEIGHT ~ | SHEET 1 OF 1

| QTY N A | QTY F/A | NEXT ASSEMBLY | FINAL ASSEMBLY |
|---|---|---|---|
| | | APPLICATION | |

X5418055

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# REPRODUCE HEAD CHARACTERISTICS ⚠1

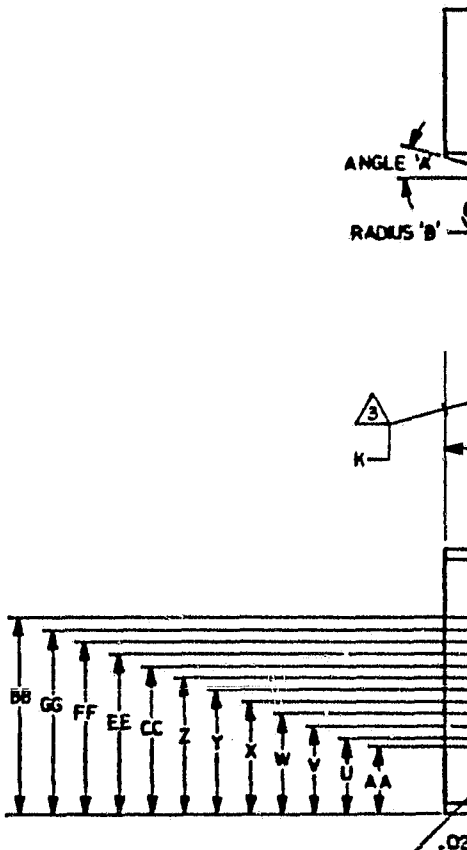
## MECHANICAL

| PARAMETER | DIM | UNIT | SPEC | TOL |
|---|---|---|---|---|
| ANGLE | A | DEGREE | 10 | MIN |
| FACE RADIUS | B | INCH | .125 | ±.005 |
| TIP DEPTH | — | MIL | 1.6 | +0.5 -0.8 |
| GAP LENGTH | — | MICROINCH | 25 | ±2.5 |
| TAPE WRAP | C | DEGREE | 3 | ±½ |
| TAPE TENSION | D | OUNCE | 3 | ±1 |
| AZIMUTH | E | MINUTES OF ARC | 1 | MAX |
| TILT | F | MINUTES OF ARC | 1 | MAX |
| GAP SCATTER | — | MICROINCH | 50 | MAX |
| CORE TYPE | FERRITE | | | |
| CORE TIP CONSTRUCTION | SOLID ALFESIL | | | |
| | — | | | |
| TERMINATION | TERMINALS USECO 2065BI | | | |
| WIDTH | G | INCH | .562 | +.000 -.050 |
| DEPTH | H | INCH | .600 | MAX |
| GAP ℄ TO MOUNTING SURFACE | J | INCH | .281 | ±.001 |
| MOUNTING SURFACE | K | | ⚠4 | |
| HEIGHT | L | INCH | .435 | ±.015 |
| MTG HOLE | M | INCH | .435 | ±.005 |
| MTG HOLE | N | INCH | .100 | ±.003 |
| MTG HOLE | P | INCH | .392 | ±.005 |
| EFFECTIVE DATA TRACK WIDTH | R | MIL | 6 | ±.7 |
| EFFECTIVE DATA TRACK SPACING | S | MIL | 23 | REF |
| TAPE ℄ TO BASE | T | INCH | .317 | REF |
| BASE TO TRACK 1 | U | INCH | .2105 | ±.0007 |
| BASE TO TRACK 2 | V | INCH | .2335 | |
| BASE TO TRACK 3 | W | INCH | .2565 | |
| BASE TO TRACK 4 | X | INCH | .2795 | |
| BASE TO TRACK 5 | Y | INCH | .3025 | |
| BASE TO TRACK 6 | Z | INCH | .3255 | |
| BASE TO TRACK 7 | CC | INCH | .3485 | |
| BASE TO TRACK 8 | EE | INCH | .3715 | |
| BASE TO TRACK 9 | FF | INCH | .3945 | |
| BASE TO TRACK 10 | GG | INCH | .4175 | ±.0007 |
| BASE TO DUMMY TRACK A | AA | INCH | .203 | ±.001 |
| BASE TO DUMMY TRACK B | BB | INCH | .403 | ±.001 |
| EFFECTIVE DUMMY TRACK WIDTH | DD | MIL | 16 | ±.003 |

## ELECTRICAL ; DATA TRACKS ⚠6

| PARAMETER | | UNIT | SPEC | TOL |
|---|---|---|---|---|
| SHIELD TO CASE RESISTANCE | | OHM | 10 | MAX |
| INSULATION RESISTANCE | | MEGOHM | 50 | MIN |
| SELF RESONANCE | | MHz | 9 | MIN |
| TRANSFORMER CROSSTALK | | dB | 36 | MIN |
| PEAK OUTPUT LEVEL | | mV RMS | 60 | MIN |
| OUTPUT AT λ RELATIVE TO PEAK | λ=10 MIL | dB | -18 | ±2 |
| | λ=2 MIL | dB | -1 | ±½ |
| | λ=1 MIL | dB | -5 | ±½ |
| | λ=.08 MIL | dB | -7 | ±½ |
| | λ=.06 MIL | dB | -12 | ±½ |
| INDIVIDUAL GAP AZIMUTH MISALIGNMENT | | dB | 1 | MAX |
| SHORTEST WAVELENGTH OF INTEREST | | MICROINCH | 60 | MIN |

ORIGINAL PAGE IS
OF POOR QUALITY




FOLDOUT FRAME

⚠6 TEST DATA BASED ON AMPEX 799 TAPE AT 60 IPS.

5. CORE GROUNDING: THE FERRITE CORES SHALL BE GROUNDED TO THE CASE BY USING SILVER CONDUCTIVE EPOXY OR ODETICS APPROVED EQUIVALENT. SILVER EPOXY SHALL NOT BE USED EXCLUSIVELY FOR SECURING THE CORES.

⚠4 MARK INDICATED SURFACE PER ODETICS' STD 5900000-4 WITH PART NO. 6418056-1, MANUFACTURERS NAME, AND SERIAL NO.

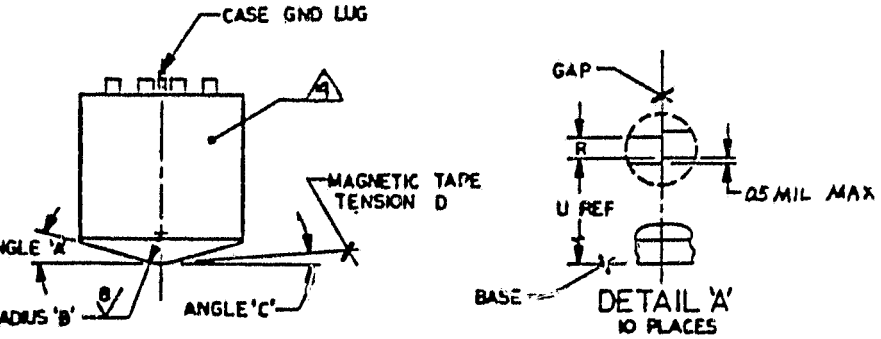
⚠3 ALL ELECTRICAL PARAMETERS, DIMENSIONS AND TOLERANCES INDICATED IN THIS SPEC ARE MEASURED WITH THIS SURFACE ATTACHED TO A PLANE INFINITELY STIFF IN STRUCTURE AND FLAT TO A MAX OF 5 LIGHT BANDS WHEN ATTACHMENT SCREWS ARE TORQUED TO 2.5 - 3.5 IN-LBS.

2. HEAD CHARACTERISTICS ARE TO BE MATED WITH WRITE HEAD IN ACCORDANCE WITH SPEC CONTROL DWG. 5408066

⚠1 APPLICABLE DOCUMENTS: ODETICS, INC. SPEC CONTROL DOCUMENT 5450001 AND 5450002.

NOTE: UNLESS OTHERWISE SPECIFIED

| REVISIONS | | | | |
|---|---|---|---|---|
| SYM | DESCRIPTION | DRFT | DATE | APPROVAL |
| | | | | |

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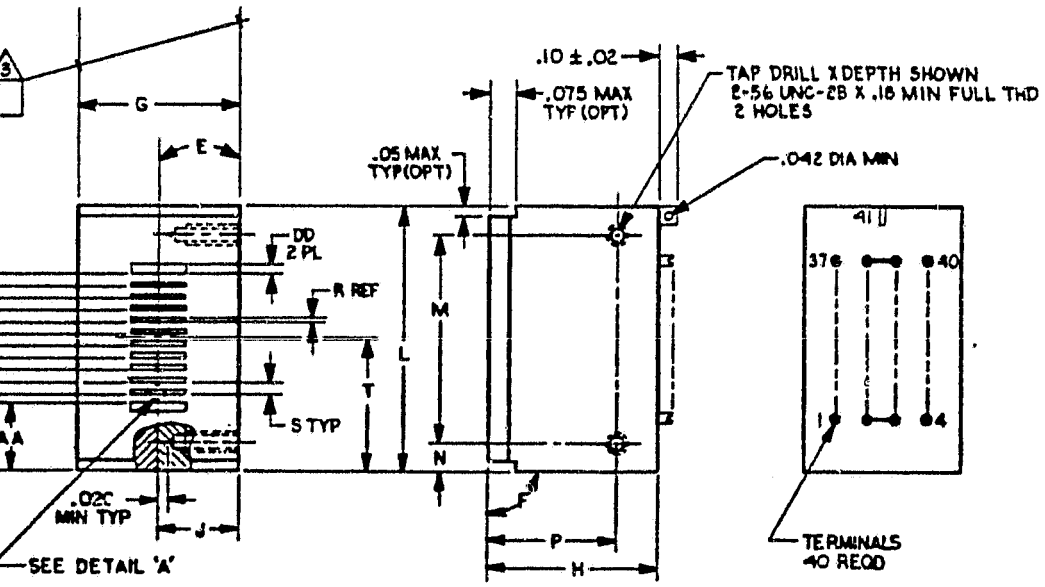
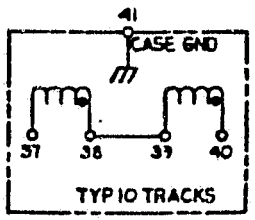



FOLDOUT FRAME




SCHEMATIC DIAGRAM

SPECIFICATION CONTROL DRAWING

| QTY REQD | ITEM NO. | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION | MATERIAL | SPECIFICATION | CODE |
|---|---|---|---|---|---|---|

LIST OF MATERIALS OR PARTS LIST

| | | | |
|---|---|---|---|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES | | CONTRACT NO. | Odetics Inc. ANAHEIM CALIFORNIA |
| TOLERANCES | | DRAWN | |
| FRACTIONS ± | .XX ± | CHECKED | |
| ANGLES ± | .XXX ± | DESIGN | HEAD, READ, 10 DATA TRACKS, WIDEBAND, 1/4 IN. TAPE, EVEN, LEFT HAND MOUNT |
| MATERIAL | | MECH. ENG. | |
| | | ELEC. ENG. | |
| | | Q & R | |
| FINISH | | MFG. ENG. | |
| | | PROJ MGR | |
| | | RELEASE | |
| SURFACE ROUGHNESS ✓ | | | SIZE D · CODE IDENT NO. 32964 · DWG NO. X-5418056 · REV A |
| | | | SCALE NONE · WEIGHT ~ · SHEET 1 OF 1 |

| QTY N/A | QTY F/A | NEXT ASSEMBLY | FINAL ASSEMBLY |
|---|---|---|---|
| | | APPLICATION | |

EX-5418056 A