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The Data Multiplexing Network (DMN) Phase III Extended Distance Data Cable (EDDC) Test and Evaluation

Wayne E. Bell
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16. Abstract

This test report contains the results of the Extended Distance Data Cable (EDDC) Test and Evaluation of the Data Multiplexing Network (DMN) Phase IIIB Commercial Off-The-Shelf (COTS) equipment. The test was accomplished at the federal Aviation Administration (FAA) Technical Center. The test results determined the maximum cable length of low loss cable and octopus cable which can be installed with the DMN Phase IIIB COTS equipment.

ASM-300 will prepare the Network Engineering Drawing and Cable Management for the first Operational Readiness Demonstration (ORD) site, Minneapolis Air Route Traffic Control Center (ARTCC), based on the results of this test.

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EXECUTIVE SUMMARY

The Data Multiplexing Network (DMN) Phase III Extended Distance Data Cable Test and Evaluation was conducted at the request of the Program Office and was comprised of the following test areas:

1. Low Loss Cable tests
2. Octopus Cable tests
3. Service Test with Codex 3600 Modem tests
4. Codex 3500/Codex 6216 Electronic Industries Association (EIA)-patch panel (PP) tests

These tests were conducted at the Federal Aviation Administration (FAA) Technical Center. The tests proved that communications equipment can be separated from the DMN equipment using either low loss cable or octopus cable within the distance limitations described in this report.

1. INTRODUCTION.

The Data Multiplexer Network (DMN) program is a three-phased program to purchase commercial products to satisfy the communications requirements of the National Airspace System (NAS) subsystems.

1.1 BACKGROUND.

The Federal Aviation Administration (FAA) is in the process of installing Codex DMN equipment at the Minneapolis Air Route Traffic Control Center (ARTCC), the first Operational Readiness Demonstration (ORD) site. The NAS services, providing their own data multiplex equipment, will have this equipment replaced with the new Codex equipment in the DMN area. The FAA Technical Center was requested to perform cable length versus transmission rate tests in the DMN laboratory to determine if relocation of communications equipment to a DMN area was possible.

1.2 PURPOSE.

The purpose of the cable test was to determine how long cable lengths between the Data Communications Equipment (DCE) and modems will affect the Bit Error Rate (BER). This test was performed at various data rates to determine the maximum cable length before bit errors occurred. Based on this result, ASM-300 will prepare the network engineering drawing and cable management requirement for the first site installation at Minneapolis, Minnesota.

1.3 PARTICIPANTS.

These tests were conducted by Phillip Hoang, Edward Lind, and Richard Morton of ACW-400. Chuck Morrow and Dan Chess, two representatives from the Program Office, witnessed some of these tests.

2. TEST APPROACH AND CONCEPT.

The test approach was to conduct a laboratory test using Bit Error Rate Test (BERT) testers as the Data Terminal Equipment (DTE) and varying the cable length and type between the BERT and an Electronic Industries Association (EIA) patch panel (PP) which connected the BERT to the modem. The tests consisted of the following four areas: low loss cable tests (paragraph 3.1); octopus cable tests (paragraph 3.2); service test with available services (paragraph 3.3); and Codex 3500/Codex 6216 tests (paragraph 3.4).

3. DMN CABLE TESTS.

Four basic tests were conducted with multiple subtests in each. These tests are described below:

3.1 LOW LOSS CABLE TEST.

This test used various lengths of low loss cable between the BERT and an EIA PP at various data rates with the local and remote modems set for different conditions. Specifications for this cable are presented below. The four tests that were run with the low loss cable are discussed in the following sections.

Low Loss Cable - Extended Distance Data Cable (EDDC)

Conductor Gauge	24 Average Wire Gauge (AWG)
Mutual Capacitance	12 picofarad (pf) +/-2pf
Resistance	.03 ohms/feet

3.1.1 Test A.

The test configuration for this test is shown in figure 1. Modem 1 was set for internal timing and internal sync. Modem 2 was set for loopback timing and internal sync. The BERTS were set for a 511 test pattern and external timing. The length of the cable was increased until a loss of sync occurred at the remote BERT.

3.1.2 Test B.

The test configuration for this test is shown in figure 2. Modem 1 was set for loopback timing and internal sync. Modem 2 was set for internal timing and internal sync. The BERTS were set for a 511 test pattern and external timing. The length of the cable was increased until a loss of sync occurred at the remote BERT.

3.1.3 Test C.

The test configuration for this test is shown in figure 3. Modem 1 was set for external timing and external sync. Modem 2 was set for loopback timing and internal sync. BERT 1 was set for a 511 test pattern and internal timing. BERT 2 was set for a 511 test pattern and external sync. The length of the cable was increased until a loss of sync occurred at the remote BERT.

3.1.4 Test D.

The test configuration for this test is shown in figure 4. Modem 1 was set for loopback timing and internal sync. Modem 2 was set for external timing and external sync. BERT 1 was set for a 511 test pattern and external timing. BERT 2 was set for a 511 test pattern and internal sync. The length of the cable was increased until a loss of sync occurred at the remote BERT.

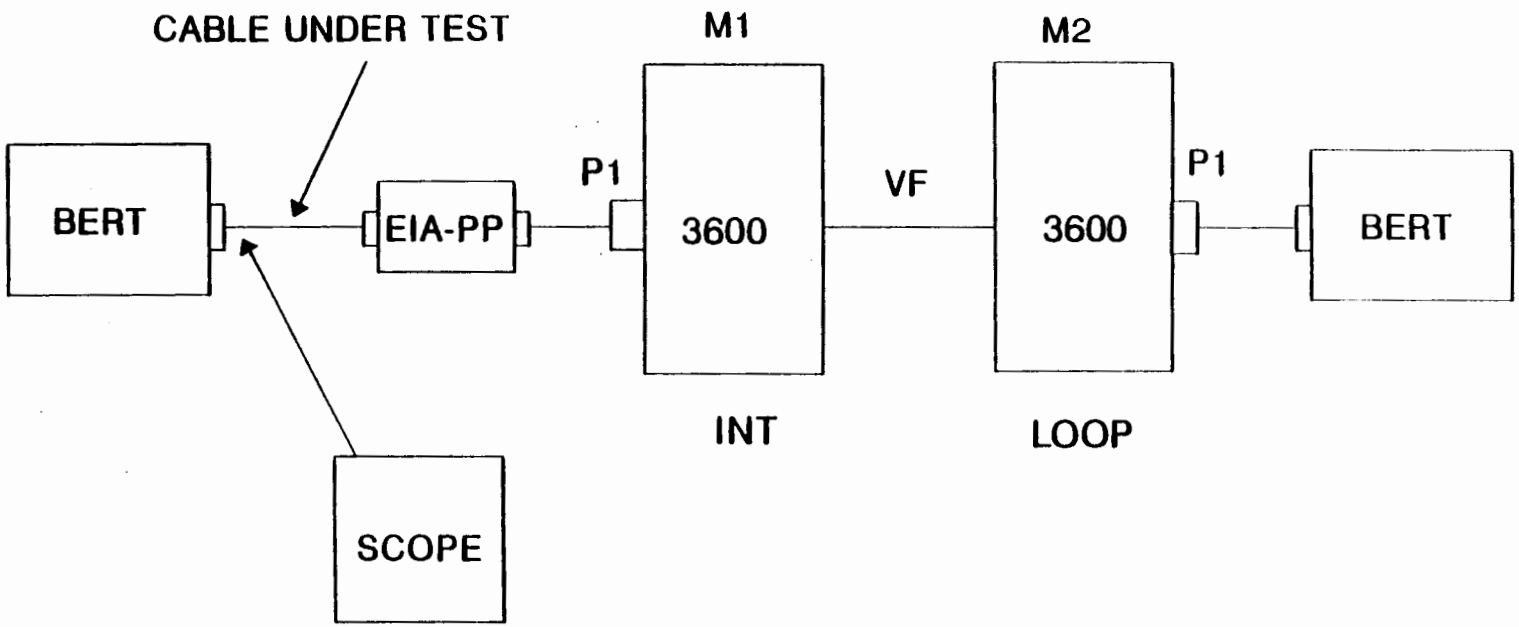

FIGURE 1. TEST A, END-TO-END CABLE TEST

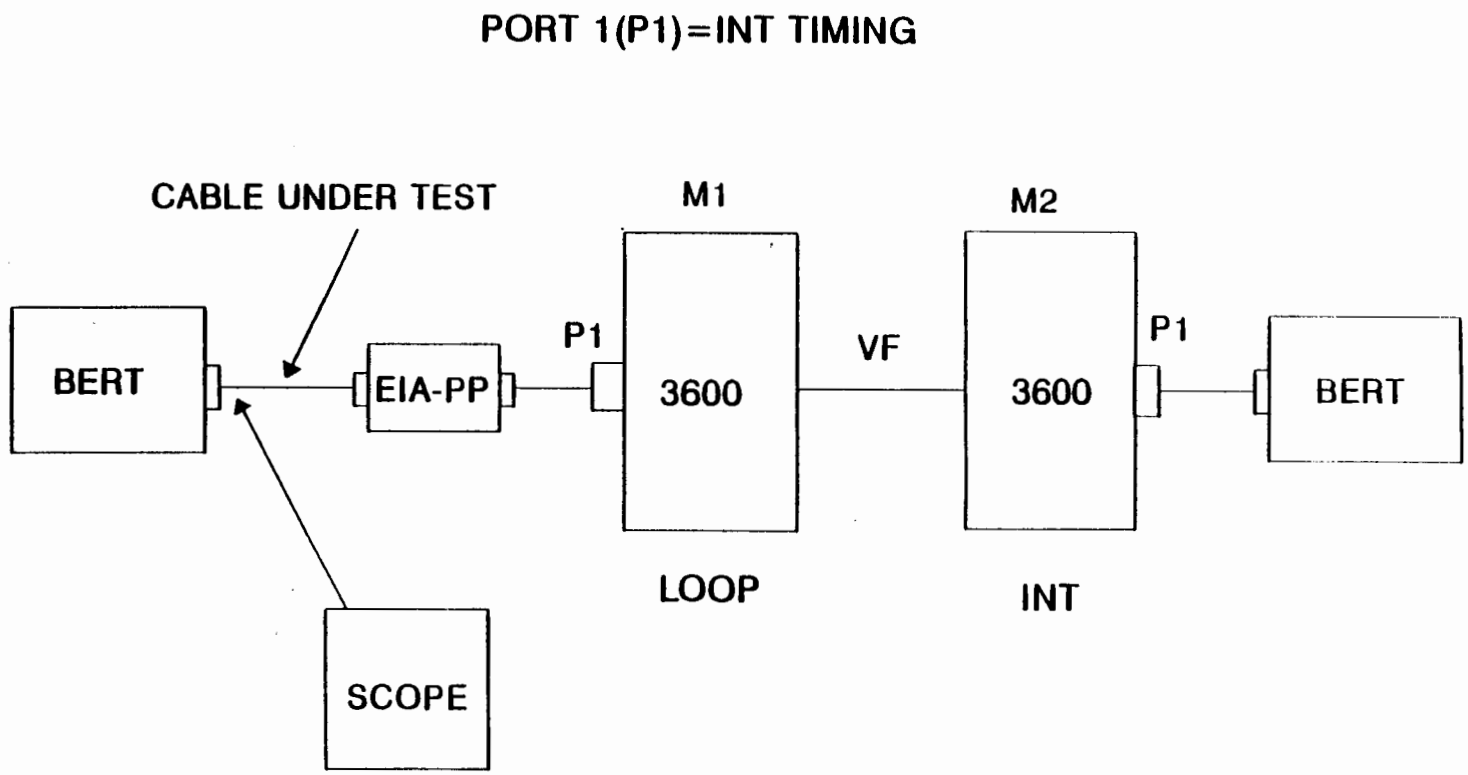

FIGURE 2. TEST B, END-TO-END CABLE TEST

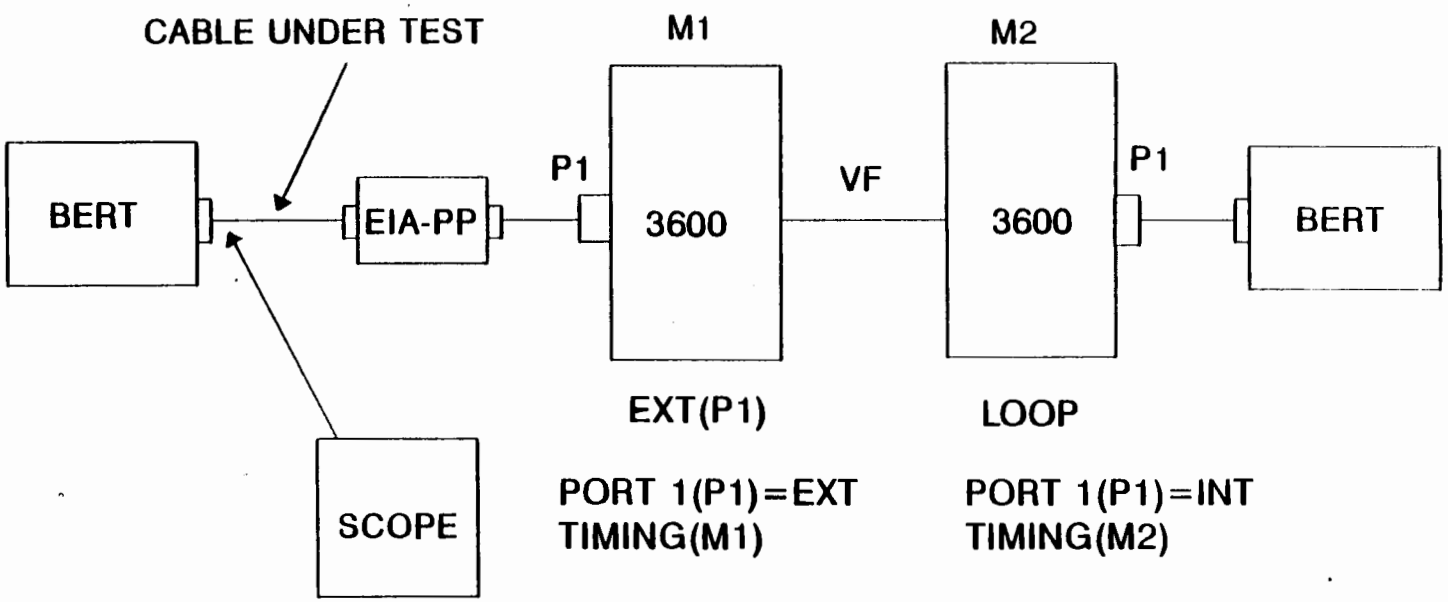

FIGURE 3. TEST C, END-TO-END CABLE TEST

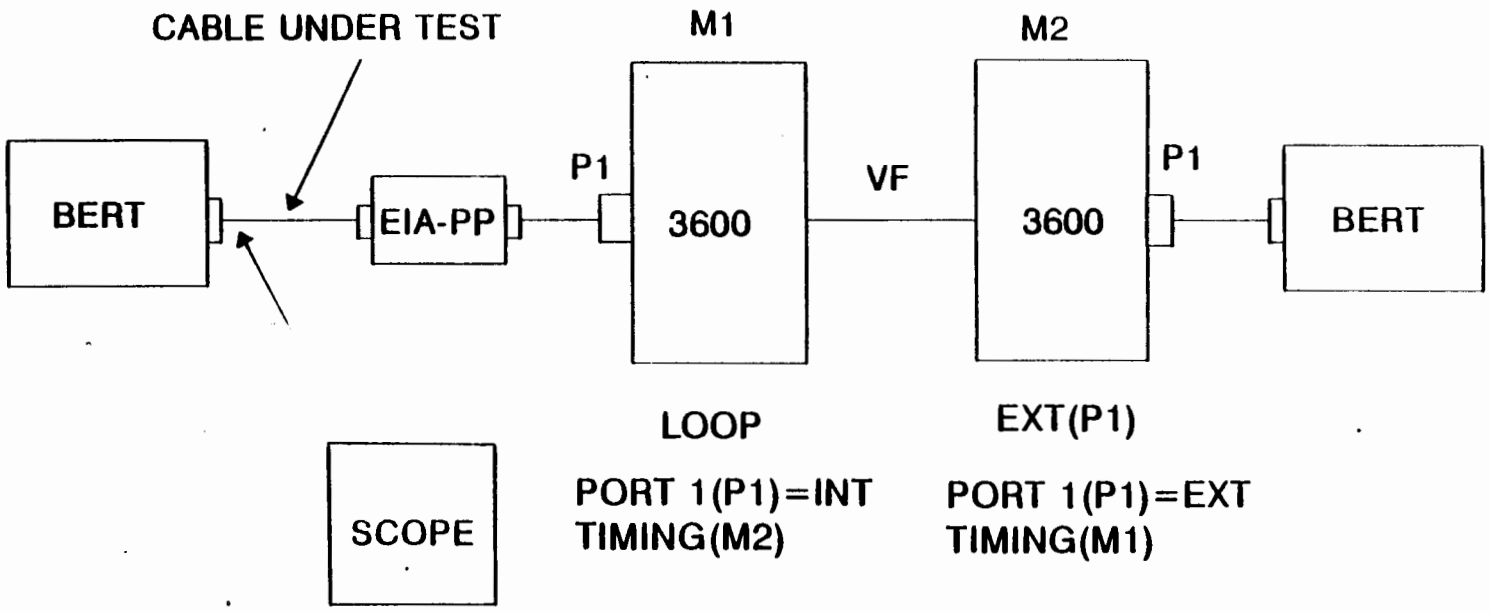

FIGURE 4. TEST D, END-TO-END CABLE TEST

3.2 OCTOPUS CABLE TEST.

This test used 500 feet of low loss cable between the BERT and an EIA PP at various data rates with the local and remote modems set for different conditions. Specifications for this cable are presented below. The four tests that were run with the octopus cable are discussed in the following sections.

Octopus Cable - EDDC.

Conductor Gauge	24 AWG
Mutual Capacitance	12pf +/-2pf
Resistance	.3 ohms/ft

3.2.1 Test A.

The test configuration for this test is shown in figure 5. Modem 1 was set for internal timing and internal sync. Modem 2 was set for loopback timing and internal sync. Both BERTS were set for a 511 test pattern and external timing. The data rate was increased until a loss of sync occurred.

3.2.2 Test B.

The test configuration for this test is shown in figure 5. Modem 1 was set for loopback timing and internal sync. Modem 2 was set for loopback timing and internal sync. Both BERTS were set for a 511 test pattern and external timing. The data rate was increased until a loss of sync occurred.

3.2.3 Test C.

The test configuration for this test is shown in figure 5. Modem 1 was set for external timing and external sync. Modem 2 was set for loopback timing and internal sync. Both BERTS were set for a 511 test pattern and external timing. The data rate was increased until a loss of sync occurred.

3.3 SERVICE TEST WITH CODEX 3600 MODEM.

This area of testing involved the Peripheral Adapter Module Replacement Item (PAMRI), Model 1 Full Capacity (M1FC), and National Airspace Data Interchange Network (NADIN). Tests with the PAMRI were conducted with live data and with Interfacility Data (IDAT). M1FC was tested only with live data (NADIN tests). Each test area is discussed below.

3.3.1 PAMRI Tests With Live Data.

The test configuration for this test is shown in figure 6. The live data from ARTCC Albuquerque was transmitted through the Federal Telecommunications System (FTS) line by using the Codex 3600 modems and Codex 2185 digital bridge. Tests were conducted with 150 feet, 350 feet, 550 feet, 800 feet, and 1650 feet of cable. The Quick Analysis of Radar Site (QARS) data were taken for each test.

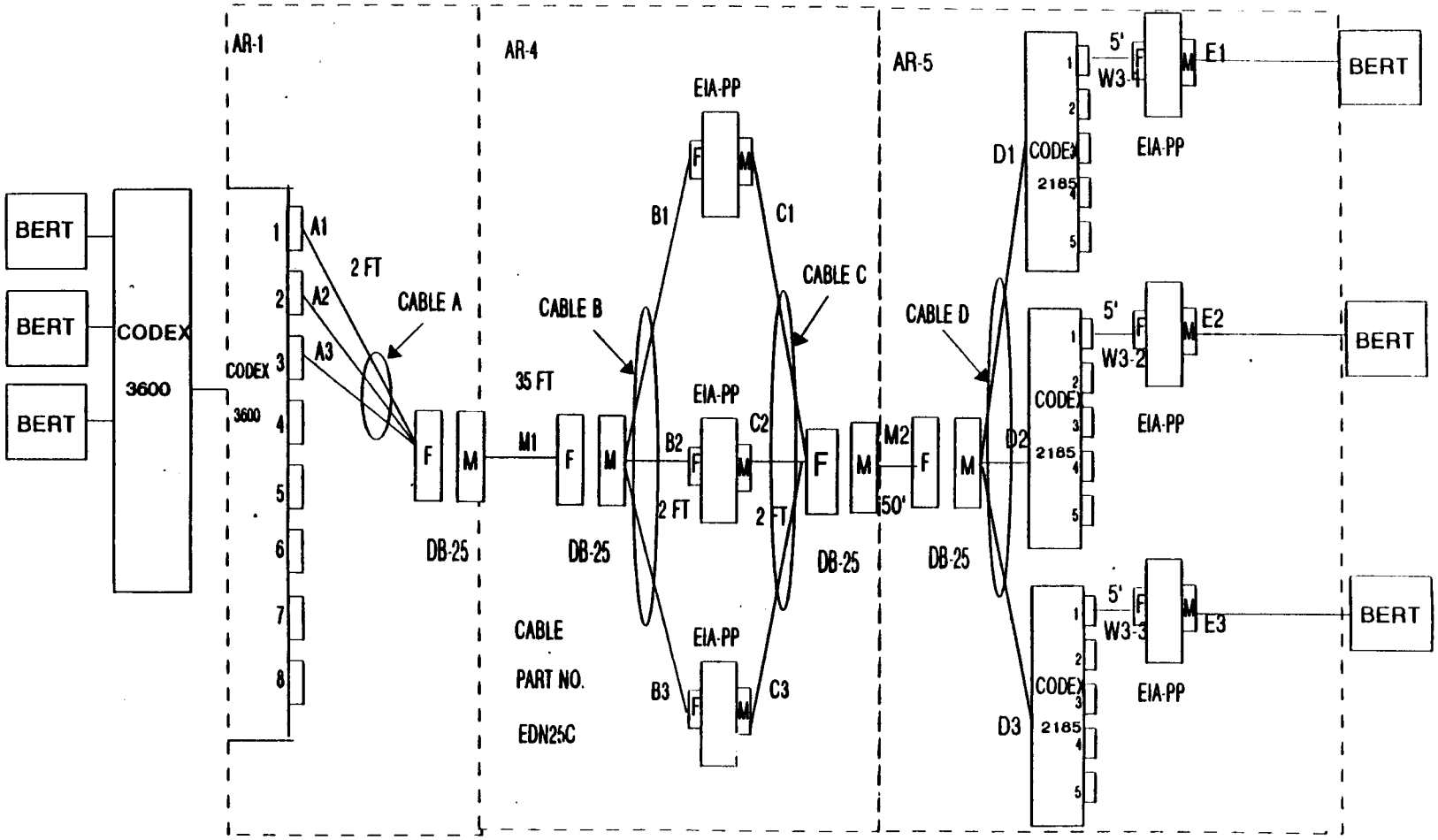

FIGURE 5. OCTOPUS CABLE TEST CONFIGURATION 1

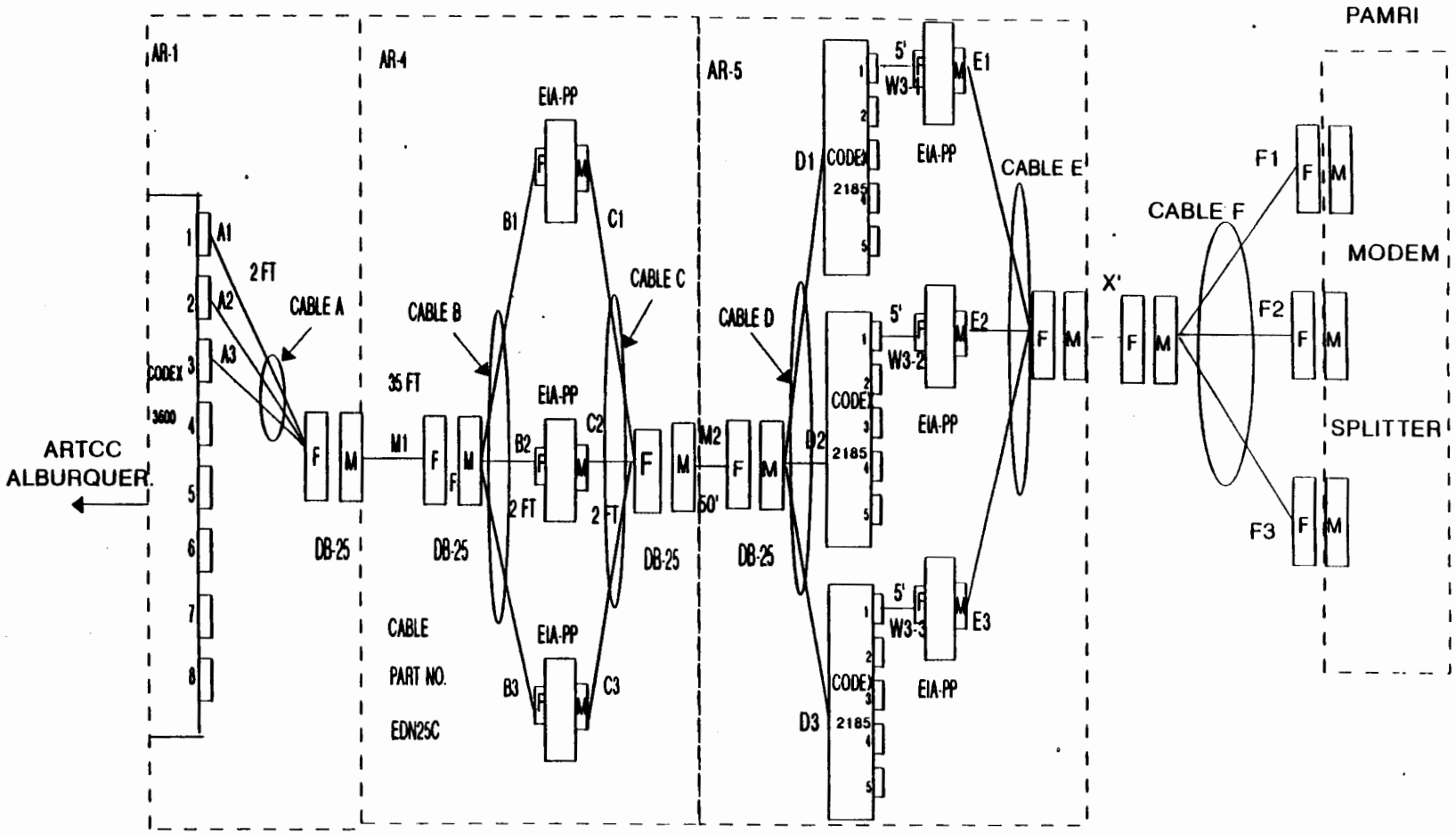

FIGURE 6. OCTOPUS CABLE TEST CONFIGURATION 2

3.3.2 PAMRI Test With IDAT.

The test configuration for this test is shown in figure 7. Tests were conducted with 500 feet of octopus cable with 50 pin connectors. The Codex 3600 modem was set for internal timing, internal sync, and modem check loopback test. The data taken consisted of the plot of RS-232 signals for transmitted data, transmitted clock, received data, and received clock.

3.3.3 M1FC Tests.

The test configuration for this test is shown in figure 8. These tests were also conducted with 500 feet of octopus cable. Modem 1 was set for internal timing and internal sync. Modem 2 was set for loopback timing and internal sync. The data taken consisted of the plot of RS-232 signals for transmitted data, transmitted clock, received data, and received clock.

3.3.4 NADIN Test.

The test configuration for this test is shown in figure 9. Tests were conducted with 500 feet of octopus cable. Modem 1 was set for internal timing and internal sync. Modem 2 was set for loopback timing and internal sync. The data taken consisted of the plot of RS-232 signals for transmitted data, transmitted clock, received data, and received clock.

3.4 CODEX 3500/CODEX 6216/EIA-PP TESTS.

These tests were conducted with low loss cable and octopus cable and are discussed separately below. The test configuration for these tests is shown in figure 10.

3.4.1 Low Loss Cable Test.

These tests were conducted with cable lengths from 300 feet to 1650 feet and at data rates from 19.2 kilo bits per second (kbps) to 2.4 kbps.

3.4.2 Octopus Cable Test.

Tests were conducted with 500 feet of octopus cable with 50 pin connectors. Data were taken at data rates from 2.4 kbps to 19.2 kbps.

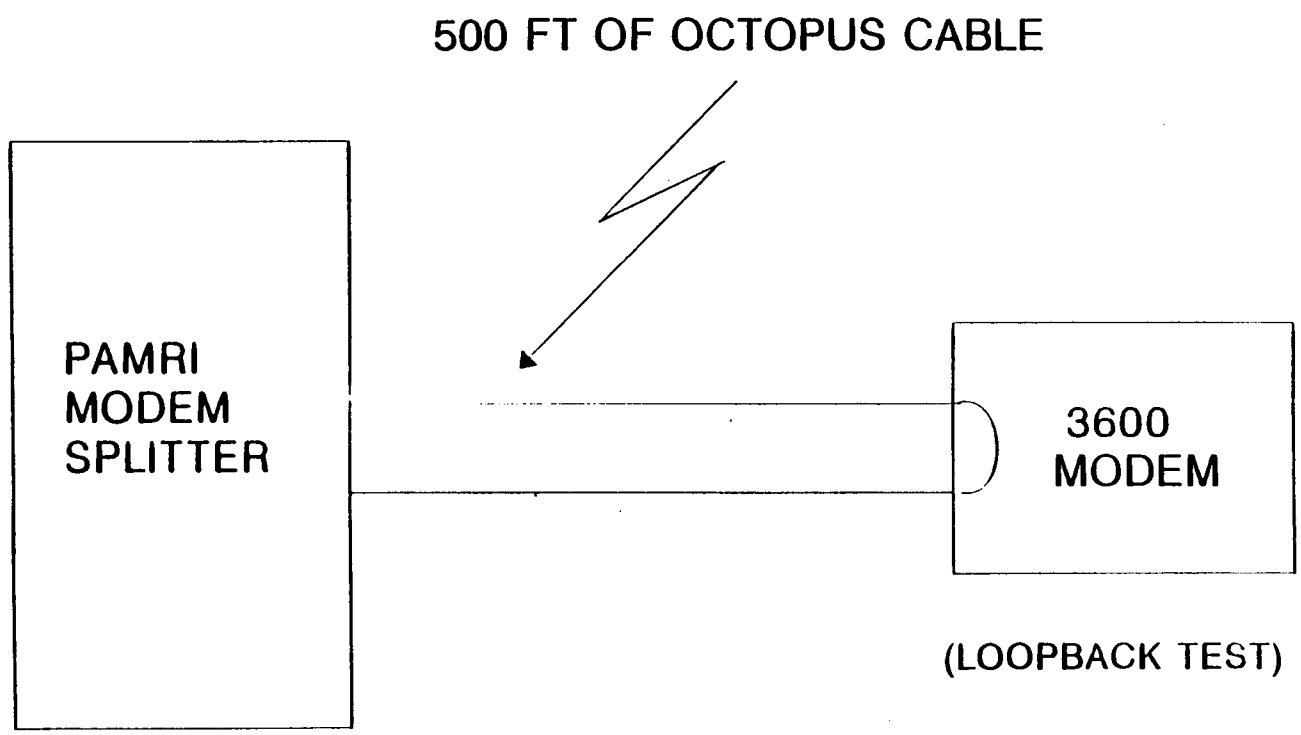

FIGURE 7. PAMRI WITH IDAT TEST CONFIGURATION

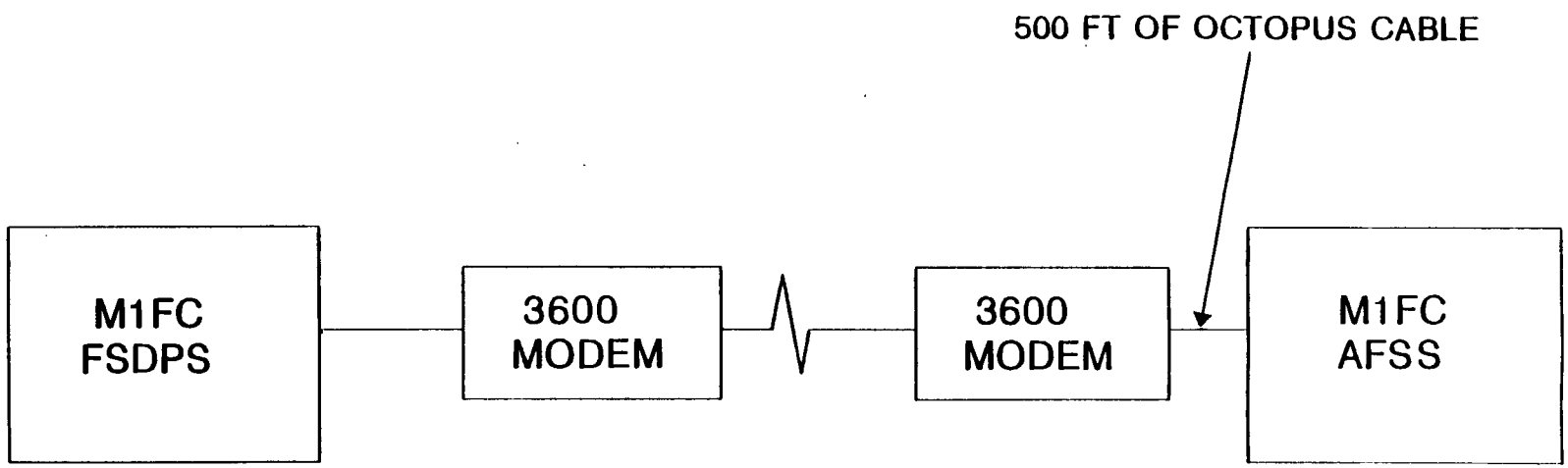

FIGURE 8. M1FC TEST CONFIGURATION

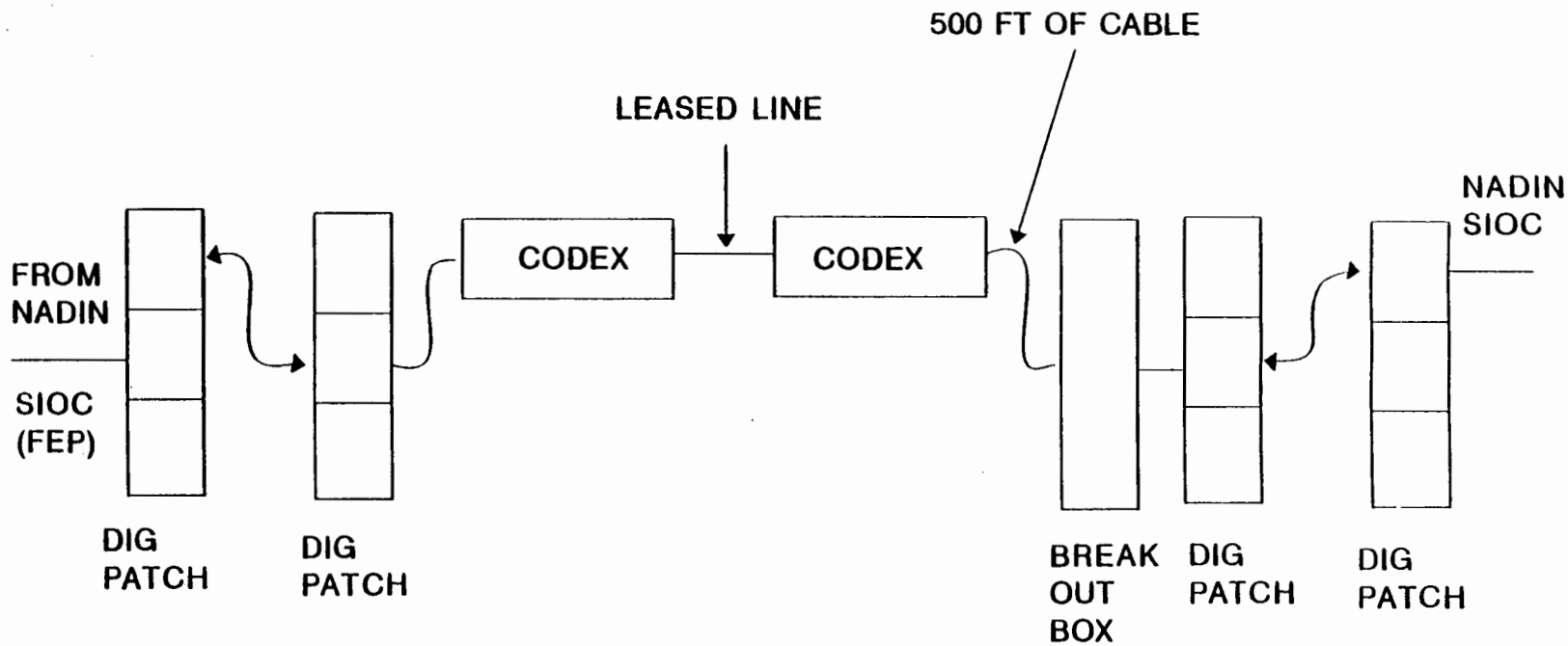

FIGURE 9. NADIN TEST CONFIGURATION

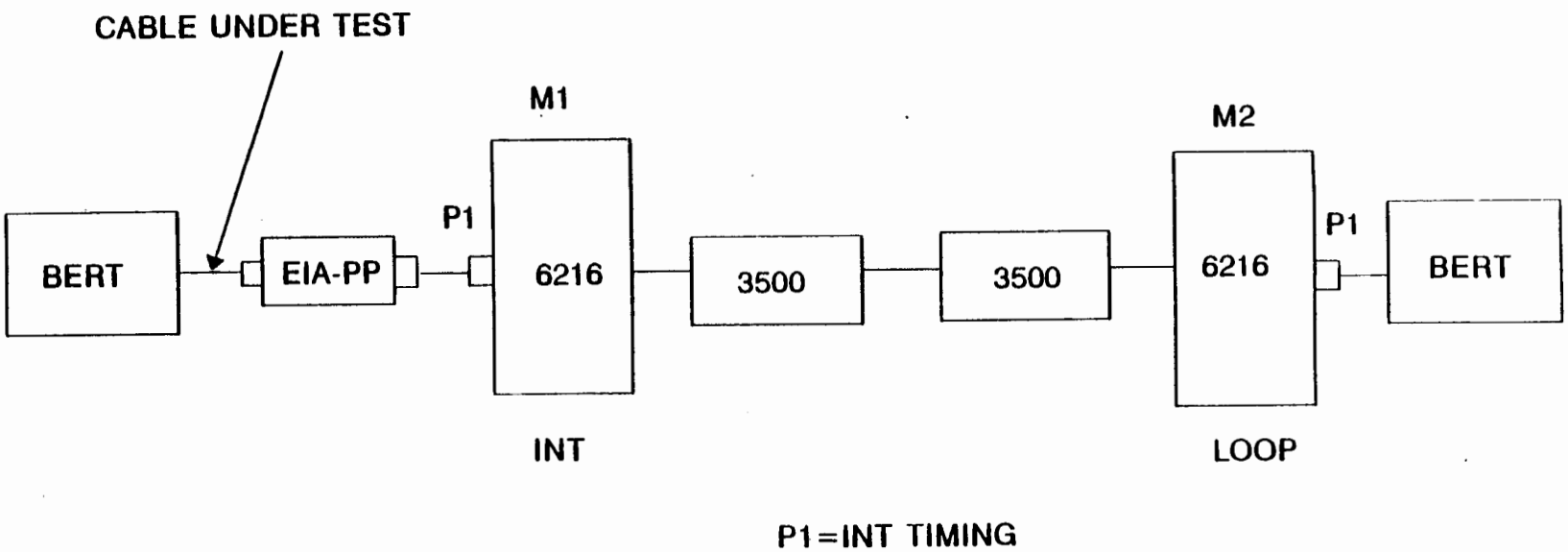

FIGURE 10. CODEX 6216/3500 CABLE TEST

4. TEST RESULTS.

Test results for each of the tests described above are presented in the following paragraphs.

4.1 LOW LOSS CABLE TEST RESULTS.

Test results for each of the four tests conducted with low loss cable are discussed below.

4.1.1 Test A.

The cable length was increased until loss of sync occurred. The BERT ran error free for the following conditions:

Cable Length	Bits Per Second
1650 feet	2400
1650 feet	4800
1650 feet	7200
1650 feet	9600
1650 feet	12,400
600 feet	14,400
550 feet	16,800
500 feet	19,200

Additional data taken included signal amplitude; rise time and fall time for TX data, TC clock, RX data, and RC clock. These test results are presented in appendix A.

4.1.2 Test B.

The cable length was increased until loss of sync occurred. The BERT ran error free for the following conditions:

Cable Length	Bits Per Second
1650 feet	2400
1650 feet	4800
1650 feet	7200
1650 feet	9600
800 feet	12,400
600 feet	14,400
500 feet	16,800
500 feet	19,200

Additional data taken included signal amplitude; rise time and fall time for TX data, TC clock, RX data, and RC clock. These test results are presented in appendix B.

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4.1.3 Test C.

The cable length was increased until loss of sync occurred. The BERT ran error free for the following conditions:

Cable Length	Bits Per Second
1650 feet	2400
1650 feet	4800
1650 feet	7200
1650 feet	9600
1650 feet	12,000
1450 feet	14,400
1350 feet	16,800
1050 feet	19,200

Additional data taken included signal amplitude; rise time and fall time for TX data, TC clock, RX data, and RC clock. These test results are presented in appendix C.

4.1.4 Test D.

The cable length was increased until loss of sync occurred. The BERT ran error free for the following conditions:

Cable Length	Bits Per Second
1650 feet	2400
1650 feet	4800
1400 feet	7200
1050 feet	9600
850 feet	12,000
650 feet	14,400
550 feet	16,800
450 feet	19,200

Additional data taken included signal amplitude; rise time and fall time for TX data, TC clock, RX data, and RC clock. These test results are presented in appendix D.

4.2 OCTOPUS CABLE TEST RESULTS.

Test results for the three tests conducted with the octopus cable are presented below.

4.2.1 Test A.

The BERTS ran error free at 2.4, 4.8, 7.2, 9.6, 12, and 14.4 kbps. The BERTS lost sync at 16.8 and 19.2 kbps.

Additional data taken included signal amplitude; rise time and fall time for TX data, TC clock, RX data, and RC clock. These test results are presented in appendix E.

4.2.2 Test B.

The BERTS ran error free at 2.4, 4.8, 7.2, 9.6, 12.0, and 14.4 kbps. The BERTS lost sync at 16.8 and 19.2 kbps.

Additional data taken included signal amplitude; rise time and fall time for TX data, TC clock, RX data, and RC clock. These test results are presented in appendix F.

4.2.3 Test C.

Test results showed that the BERTS ran error free at 2.4, 4.8, 7.2, 9.6, 12.0, 14.4, 16.8, and 19.2 kbps. Additional data taken included signal amplitude, rise time and fall time for TX data, TC clock, RX data, and RX clock. This data is presented in appendix G.

4.3 SERVICE TEST WITH CODEX 3600 MODEM TEST RESULTS.

Test results for the PAMRI with live data, PAMRI with IDAT, and M1FC with live data are presented below.

4.3.1 PAMRI With Live Data Test Results.

The test results showed that the live radar data transmission between the ARTCC at Albuquerque and the FAA Technical Center was successfully completed with 1650 feet of low loss cable and 500 feet of octopus cable. Data taken for RX data and RX clock for cable lengths of 150 feet, 350 feet, 550 feet, 800 feet, and 1650 feet and at a data rate of 2.4 kbps are presented in the appendix H. This data is followed by the QARS data taken for these same cable lengths.

4.3.2 PAMRI Data With IDAT Test Results.

The test results showed that IDAT data transmission between PAMRI system and the Codex 3600 was successfully completed through 500 feet of octopus cable. Signal amplitude, rise time, and fall time for TX data, TX clock, RX data, and RX clock are presented in appendix I.

4.3.3 M1FC With Live Data.

Live data transmission between M1FC Flight Service Data Processing System (FSDPS) and the Automated Flight Service Station (AFSS) system was successfully completed through 500 feet of octopus cable. Signal amplitude, rise time, and fall time for TX data, TX clock, RX data, and RX clock are presented in appendix J.

4.3.4 NADIN I With Live Data.

The test results showed that the live data transmission between the Front End Processor (FED) and NADIN I Concentrator was successfully completed through the Codex 3600 modems with 500 feet of octopus cable. Signal amplitude, rise time, and fall time for the TX data, TX clock, RX data, and RX clock are presented in appendix K.

4.4 CODEX 3500/CODEX 6216/EIA-PP TEST RESULTS.

Test results for low loss cable tests and octopus cable tests are presented below.

4.4.1 Low Loss Cable Test Results.

The cable length was increased until loss of sync occurred. The BERT ran error free for the following conditions:

Cable Length	Bits Per Second
1650 feet	2400
1600 feet	4800
1050 feet	7200
750 feet	9600
600 feet	12,000
450 feet	14,400
400 feet	16,800
300 feet	19,200

Additional data taken included signal amplitude; rise and fall time for TX data, TX clock, RX data, and RX clock. This data is presented in appendix L.

4.4.2 Octopus Cable Test Results.

Test results showed that the BERTS ran error free at 2.4, 4.8, 7.2, 9.6, 12.0, 14.4, 16.8, and 19.2 kbps. Additional data taken included signal amplitude, rise time, and fall time for TX data, TX clock, RX data, and RX clock and is presented in appendix M.

5. CONCLUSIONS.

Conclusions for each of the tests are presented below.

5.1 LOW LOSS CABLE TEST CONCLUSION.

The maximum length of low loss cable that can be used is 1650 feet at a data rate of 2400 bits per second (bps).

5.2 OCTOPUS CABLE TEST CONCLUSIONS.

The maximum data rate at which 500 feet of octopus cable can be used is 14,400 bps for the case in which modem 1 is set for internal timing and internal sync and modem 2 is set for loopback timing and internal sync. This same limitation applies for the case in which modem 1 is set for loopback timing and internal sync and modem 2 is set for internal timing and internal sync.

In the case in which modem 1 is set for external timing and external sync, and modem 2 is set for loopback timing and internal sync, the maximum data rate that can be used is 19,200 bps.

5.3 CODEX 3600 MODEM TEST CONCLUSIONS.

The PAMRI tests, with live radar data, were successfully run with 1650 feet of low loss cable at a data rate of 2400 bps and with 500 feet of octopus cable.

The PAMRI tests with IDAT, NADIN tests with live data, and M1FC tests with live data were successfully run with 500 feet of octopus cable.

5.4 CODEX 3500/CODEX 6216 TEST CONCLUSIONS.

The maximum length of low loss cable successfully tested was 1650 feet at 2400 bps. The maximum data rate for 500 feet of octopus cable was 19,200 bps.

6. RECOMMENDATIONS.

Communications equipment can be separated from the DMN equipment using either low loss cable or octopus cable within the limitations discussed in section 5.

APPENDIX A

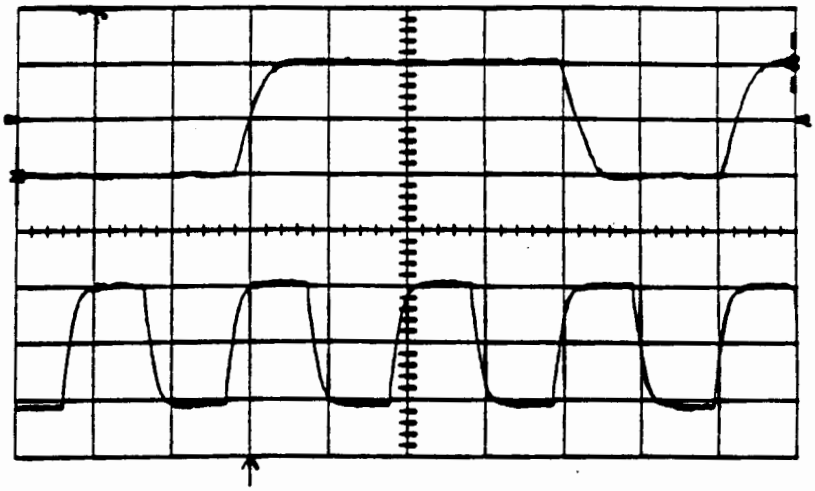
LOW LOSS CABLE TEST
TEST A

TEST A

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

EXTENDED DISTANCE DATA CABLE LENGTH: 1650'

DATA SPEED: 2400 bps

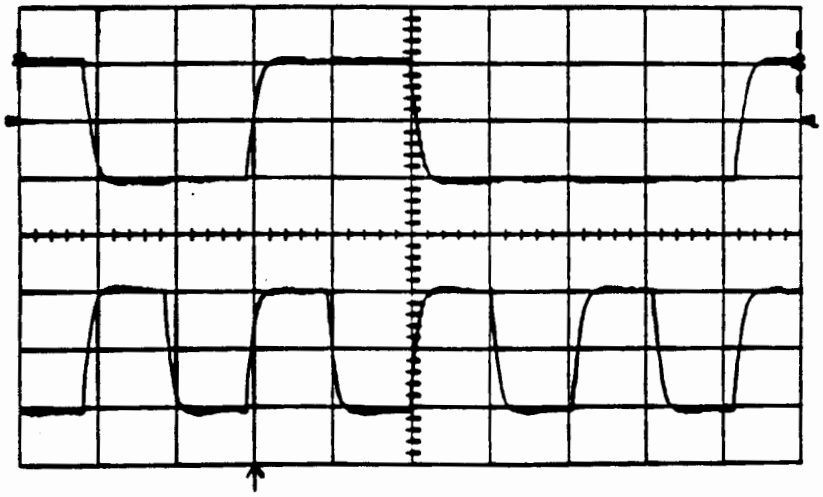


TX DATA (PIN 2)

MAXIMUM: 10.74 MINIMUM: -10.83
RISE: 80.89 FALL: 79.89
T/DIV: .2 ms V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 10.94 MINIMUM: -11.56
RISE: 42.92 FALL: 42.06
T/DIV: .2 ms V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 11.05 V MINIMUM: -11.45 V
RISE: 42.11 µs FALL: 39.17 µs
T/DIV: .2ms V/DIV: 10 V

RC CLOCK (PIN 17)

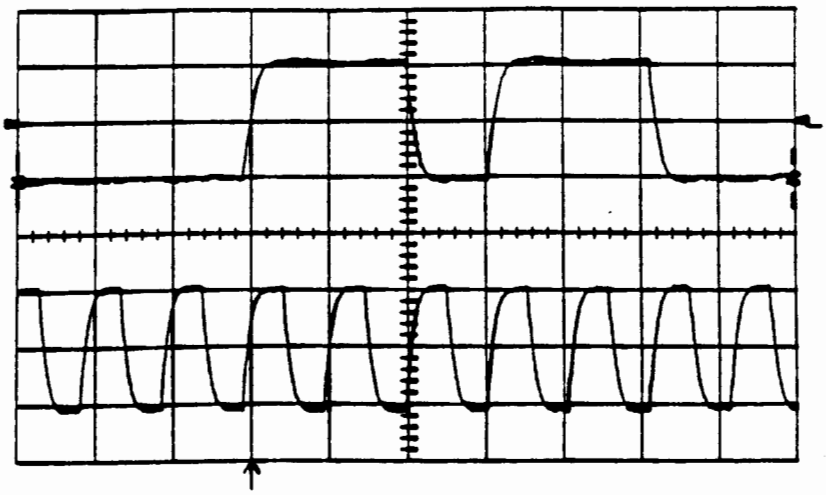
MAXIMUM: 10.94 V MINIMUM: -11.25 V
RISE: 31.88 µs FALL: 31.29 µs
T/DIV: .2 ms V/DIV: 10 V

TEST A

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

EXTENDED DISTANCE DATA CABLE LENGTH: 1650'

DATA SPEED: 4800 bps

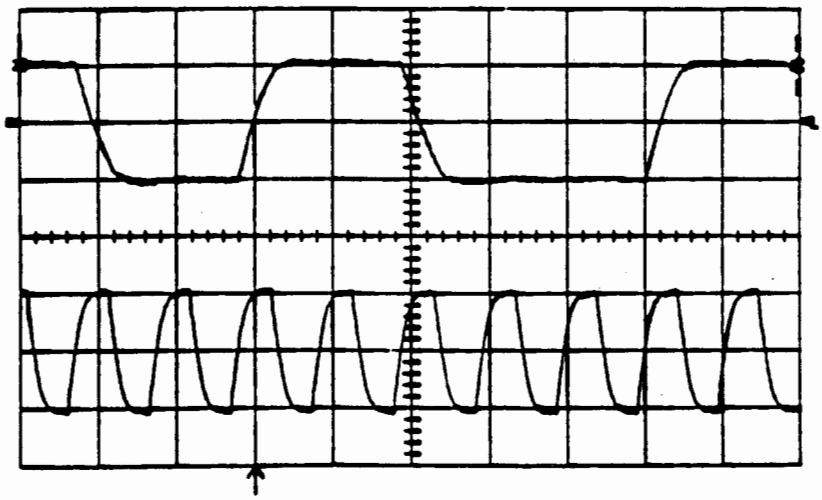


TX DATA (PIN 2)

MAXIMUM: 10.74 MINIMUM: -11.14 V
RISE: 76.98 FALL: 85.10 µs
T/DIV: .2 ms V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 10.62 MINIMUM: -11.25 V
RISE: 39.95 FALL: 41.00 µs
T/DIV: .2ms V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 11.05 MINIMUM: -11.14 V
RISE: 43.28 FALL: 38.00 µs
T/DIV: .2 ms V/DIV: 10 V

RC CLOCK (PIN 17)

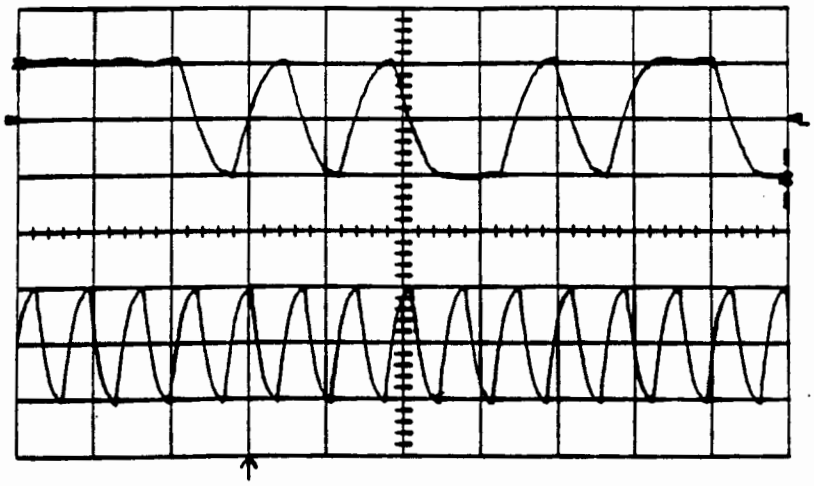
MAXIMUM: 10.94 MINIMUM: -11.25 V
RISE: 31.68 FALL: 31.14 µs
T/DIV: .2 ms V/DIV: 10 V

TEST A

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

EXTENDED DISTANCE DATA CABLE LENGTH: 1650'

DATA SPEED: 7,200 bps

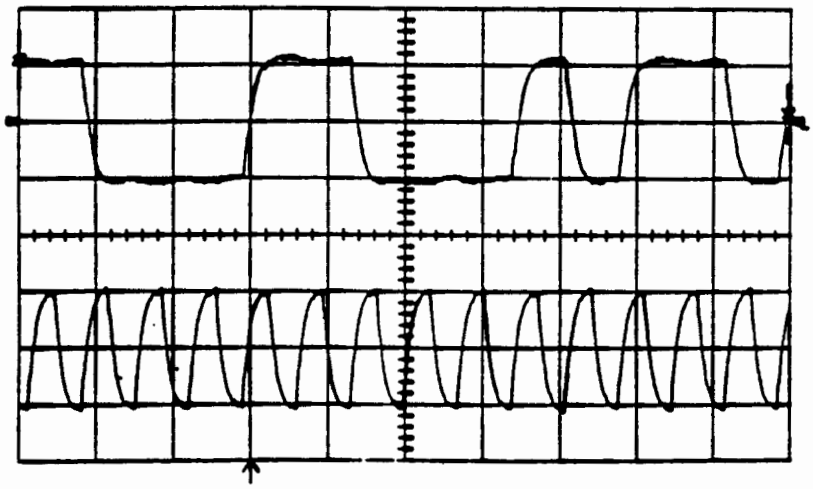


TX DATA (PIN 2)

MAXIMUM: 10.74 V MINIMUM: -10.83 V
RISE: 81.13 µs FALL: 81.81 µs
T/DIV: .2 ms V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 10.31 V MINIMUM: -10.94 V
RISE: 38.45 µs FALL: 37.75 µs
T/DIV: .2 ms V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 11.36 V MINIMUM: -11.14 V
RISE: 41.73 µs FALL: 39.33 µs
T/DIV: .2 ms V/DIV: 10 V

RC CLOCK (PIN 17)

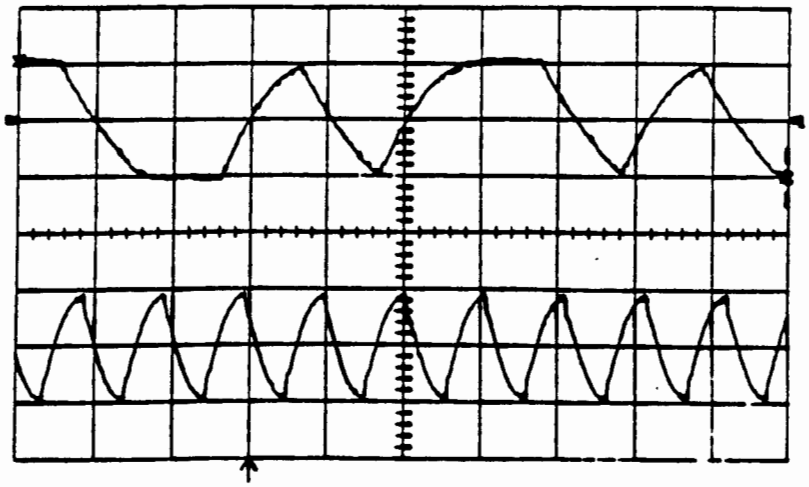
MAXIMUM: 10.62 V MINIMUM: -11.25 V
RISE: 31.56 µs FALL: 31.88 µs
T/DIV: .2 ms V/DIV: 10 V

TEST A

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

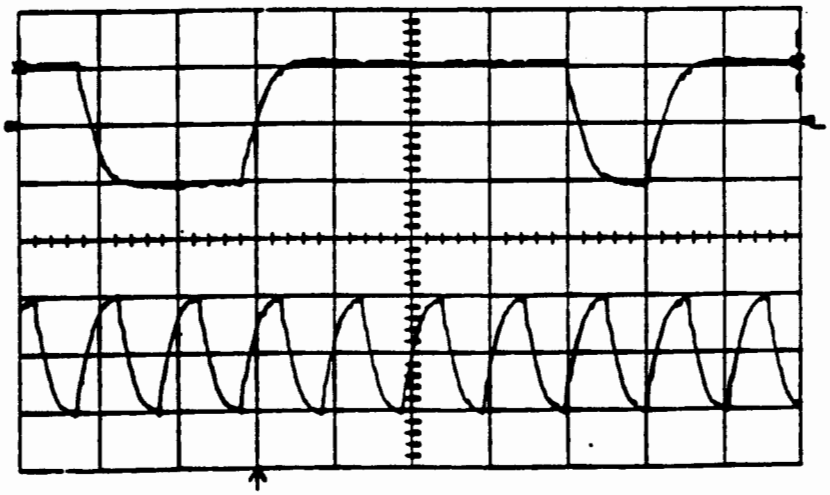
EXTENDED DISTANCE DATA CABLE LENGTH: 1650'

DATA SPEED: 9600 bps



TX DATA (PIN 2)
MAXIMUM: 10.74 V MINIMUM: -10.83 V
RISE: 79.26 µs FALL: 81.82 µs
T/DIV: .1 ms V/DIV: 10V

TC CLOCK (PIN 15)
MAXIMUM: 9.38 V MINIMUM: -10.0 V
RISE: 31.89 µs FALL: 32.55 µs
T/DIV: .1 ms V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 11.05 V MINIMUM: -11.14 V
RISE: 43.28 µs FALL: 37.93 µs
T/DIV: .1 ms V/DIV: 10V

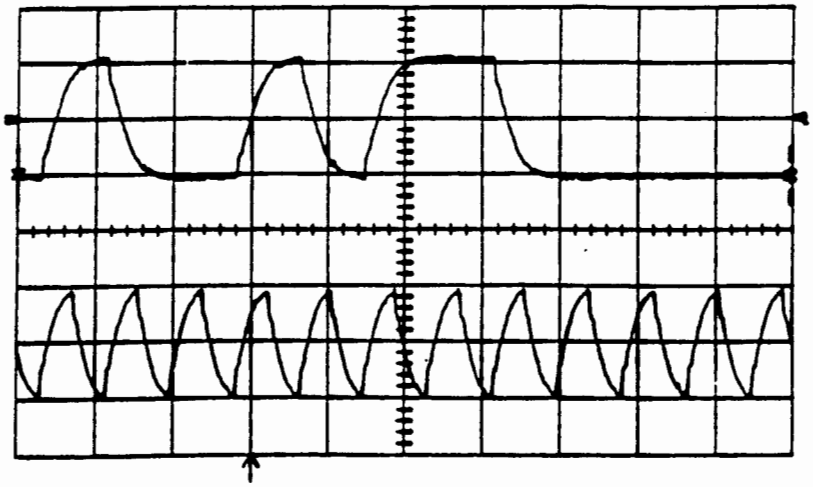
RC CLOCK (PIN 17)
MAXIMUM: 10.31 V MINIMUM: -10.62 V
RISE: 28.61 µs FALL: 26.50 µs
T/DIV: .1 ms V/DIV: 10V

TEST A

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

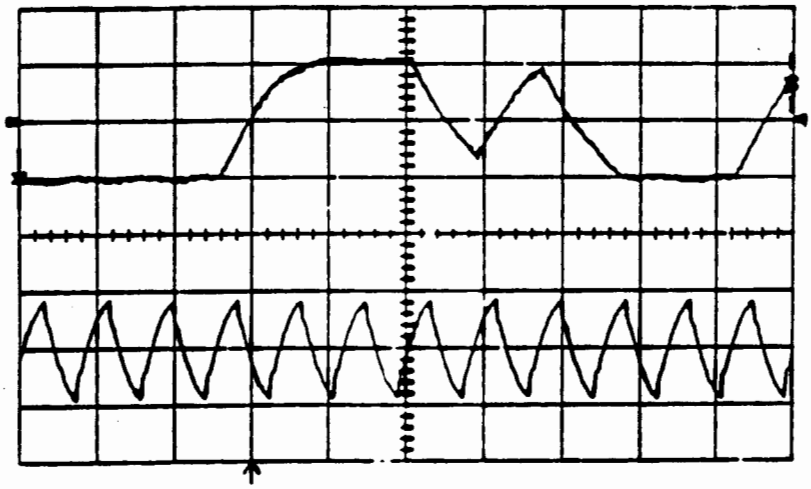
EXTENDED DISTANCE DATA CABLE LENGTH: 1650'

DATA SPEED: 12,000 bps



TX DATA (PIN 2)
MAXIMUM: 11.05 V MINIMUM: -11.14 V
RISE: 41.70 µs FALL: 40.23 µs
T/DIV: .1 ms V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 9.69 V MINIMUM: -10.31 V
RISE: 24.57 µs FALL: 26.01 µs
T/DIV: .1 ms V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 11.05 V MINIMUM: -11.14 V
RISE: 82.11 µs FALL: 243.71 µs
T/DIV: .1 ms V/DIV: 10 V

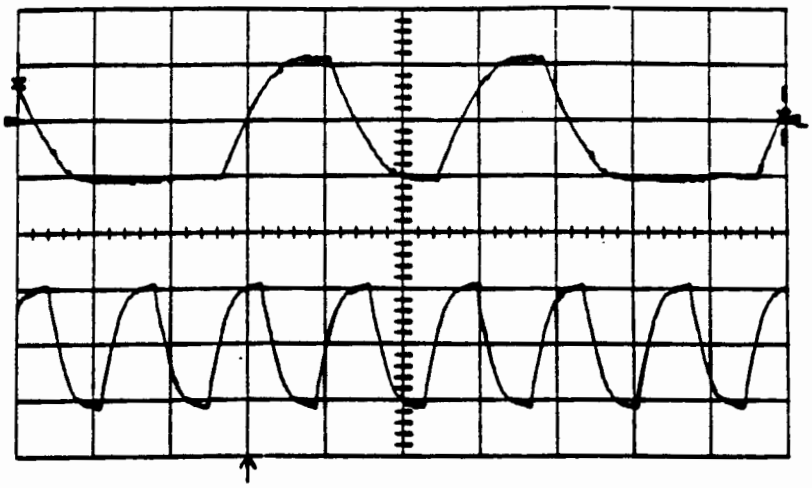
RC CLOCK (PIN 17)
MAXIMUM: 11.05 V MINIMUM: -11.14 V
RISE: 23.60 µs FALL: 27.01 µs
T/DIV: .1 ms V/DIV: 10 V

TEST A

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

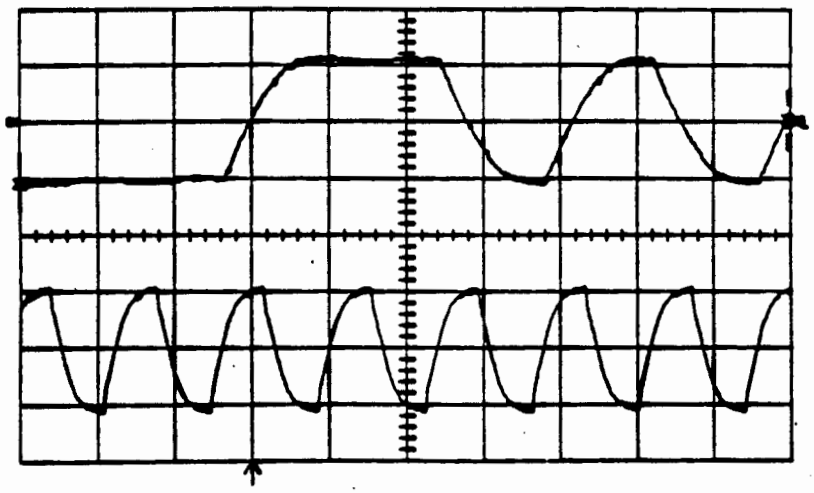
EXTENDED DISTANCE DATA CABLE LENGTH: 600'

DATA SPEED: 14,400 bps



TX DATA (PIN 2)
MAXIMUM: 11.36 V MINIMUM: -11.45 V
RISE: 33.90 µs FALL: 31.93 µs
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 10.94 V MINIMUM: -11.56 V
RISE: 16.09 µs FALL: 16.15 µs
T/DIV: 50 µs V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 11.36 V MINIMUM: -11.14 V
RISE: 35.14 µs FALL: 34.67 µs
T/DIV: 50 µs V/DIV: 10 V

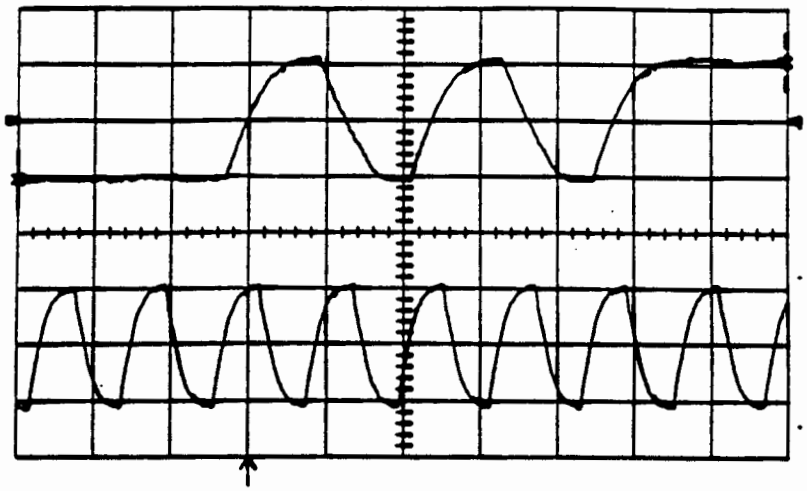
RC CLOCK (PIN 17)
MAXIMUM: 10.94 V MINIMUM: -11.25 V
RISE: 16.49 µs FALL: 16.65 µs
T/DIV: 50 µs V/DIV: 10 V

TEST A

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

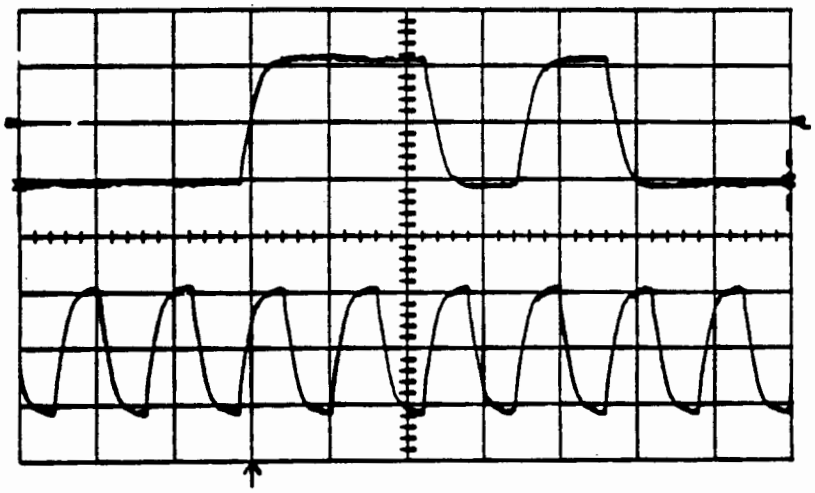
EXTENDED DISTANCE DATA CABLE LENGTH: 550'

DATA SPEED: 16,800 bps



TX DATA (PIN 2)
MAXIMUM: 11.36 V MINIMUM: -11.14 V
RISE: 29.90 µs FALL: 29.71 µs
T/DIV: 50 µs V/DIV: 10V

TC CLOCK (PIN 15)
MAXIMUM: 10.62 V MINIMUM: -11.56 V
RISE: 14.14 µs FALL: 14.64 µs
T/DIV: 50 µs V/DIV: 10V



RX DATA (PIN 3)
MAXIMUM: 11.67 V MINIMUM: -11.76 V
RISE: 14.90 µs FALL: 14.31 µs
T/DIV: 50 µs V/DIV: 10V

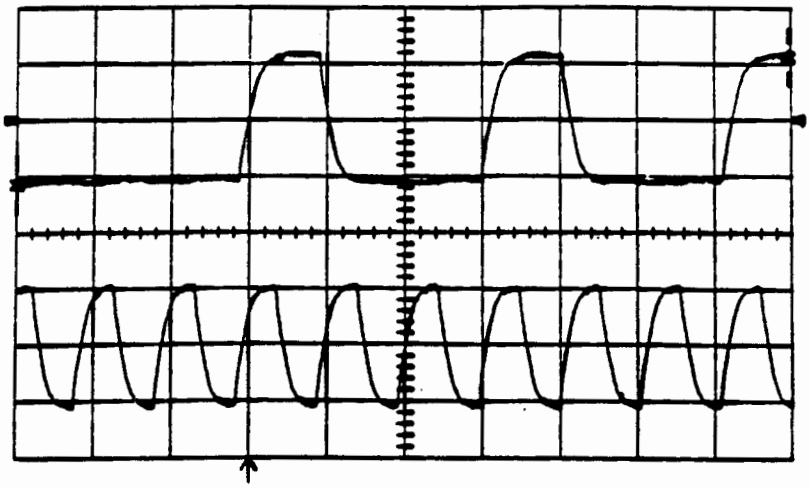
RC CLOCK (PIN 17)
MAXIMUM: 11.25 V MINIMUM: -11.88 V
RISE: 11.97 µs FALL: 12.54 µs
T/DIV: 50 µs V/DIV: 10V

TEST A

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

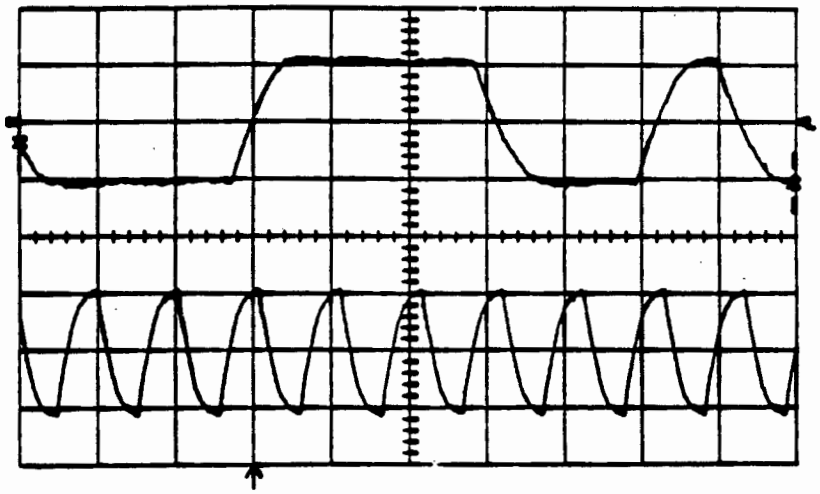
EXTENDED DISTANCE DATA CABLE LENGTH: 500'

DATA SPEED: 19,200 bps



TX DATA (PIN 2)
MAXIMUM: 11.67 V MINIMUM: -11.76 V
RISE: 14.705 µs FALL: 13.23 µs
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 10.94 V MINIMUM: -11.25 V
RISE: 10.96 µs FALL: 10.98 µs
T/DIV: 50 µs V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 11.36 V MINIMUM: -11.45 V
RISE: 25.89 µs FALL: 28.97 µs
T/DIV: 50 µs V/DIV: 10 V

RC CLOCK (PIN 17)
MAXIMUM: 10.96 V MINIMUM: -11.56 V
RISE: 13.147 µs FALL: 13.41 µs
T/DIV: 50 µs V/DIV: 10 V

APPENDIX B

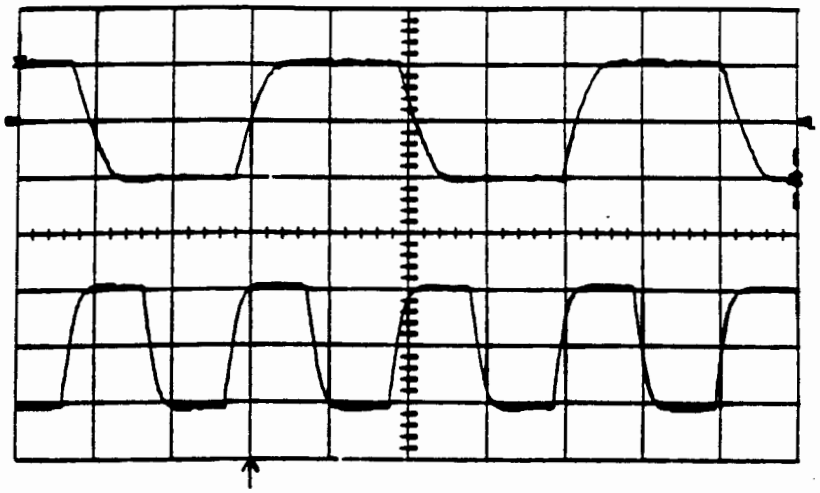
LOW LOSS CABLE TEST
TEST B

TEST B

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

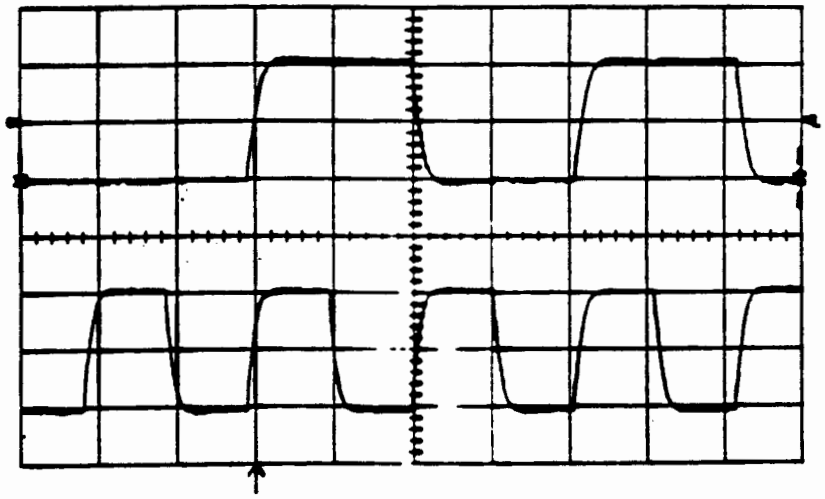
EXTENDED DISTANCE DATA CABLE LENGTH: 1650'

DATA SPEED: 2400 bps



TX DATA (PIN 2)
MAXIMUM: 10.74 V MINIMUM: -10.83 V
RISE: 82.08 µs FALL: 83.83 µs
T/DIV: .2 ms V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 11.25 V MINIMUM: -11.25 V
RISE: 41.87 µs FALL: 42.20 µs
T/DIV: .2 ms V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 11.05 V MINIMUM: -11.14 V
RISE: 42.11 µs FALL: 37.20 µs
T/DIV: .2 ms V/DIV: 10 V

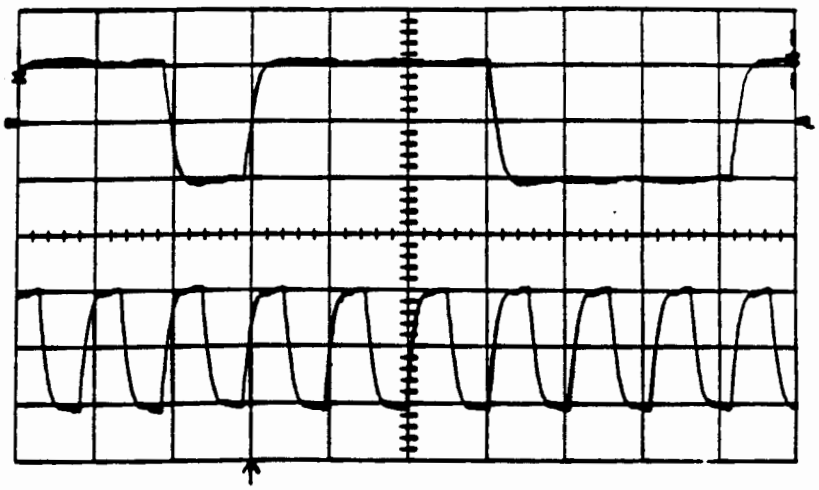
RC CLOCK (PIN 17)
MAXIMUM: 10.96 V MINIMUM: -11.25 V
RISE: 33.41 µs FALL: 32.09 µs
T/DIV: .2 ms V/DIV: 10 V

TEST B

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

EXTENDED DISTANCE DATA CABLE LENGTH: 1650'

DATA SPEED: 4800 bps

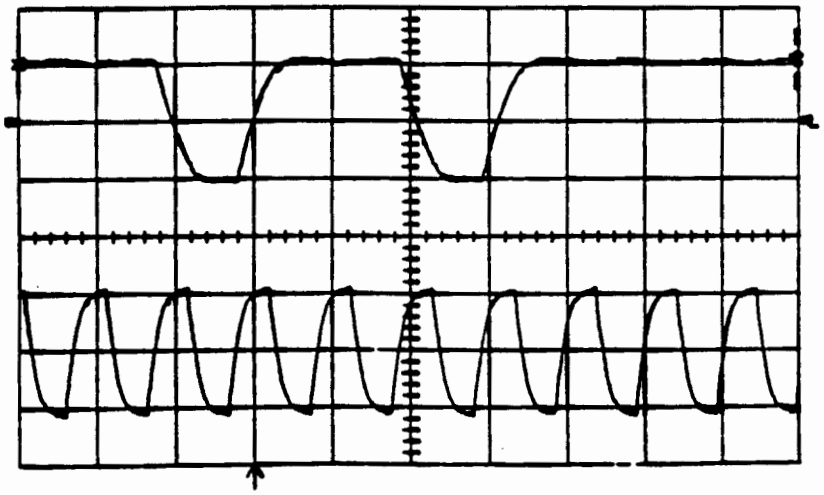


TX DATA (PIN 2)

MAXIMUM: 11.05 V MINIMUM: -10.83 V
RISE: 79.60 µs FALL: 83.54 µs
T/DIV: .2 ms V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 11.25 V MINIMUM: -11.25
RISE: 43.36 µs FALL: 42.42
T/DIV: .2 ms V/DIV: 10



RX DATA (PIN 3)

MAXIMUM: 11.05 V MINIMUM: -11.45 V
RISE: 41.15 µs FALL: 38.24 µs
T/DIV: .2 ms V/DIV: 10V

RC CLOCK (PIN 17)

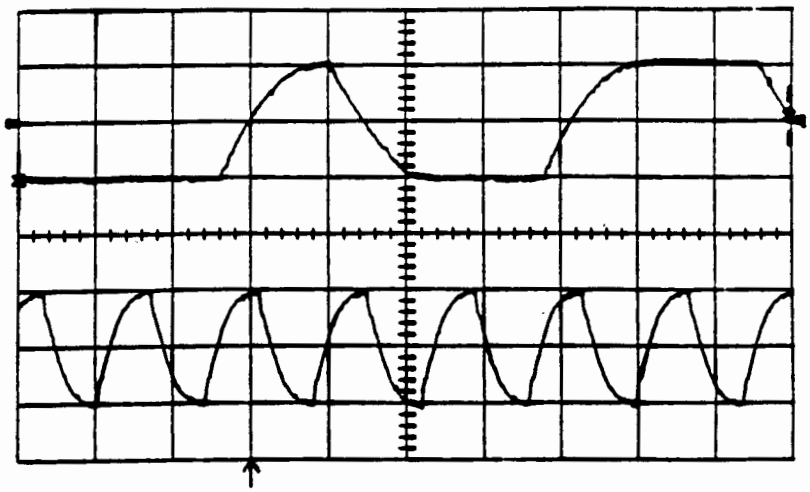
MAXIMUM: 10.62 V MINIMUM: -11.25
RISE: 32.12 µs FALL: 31.82 µs
T/DIV: .2 ms V/DIV: 10 V

TEST B

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

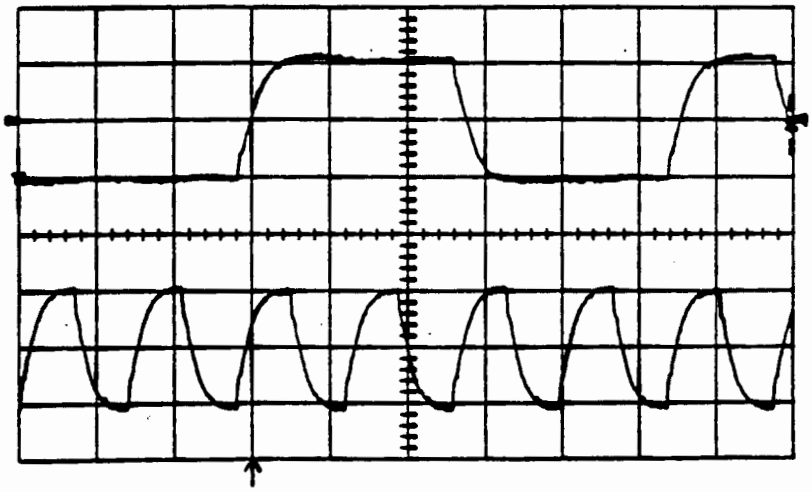
EXTENDED DISTANCE DATA CABLE LENGTH: 1650'

DATA SPEED: 7200 bps



TX DATA (PIN 2)
MAXIMUM: 10.74 V MINIMUM: -10.83 V
RISE: 80.27 µs FALL: 81.79 µs
T/DIV: .1 ms V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 10.31 V MINIMUM: -10.94 V
RISE: 36.15 µs FALL: 37.02 µs
T/DIV: .1 ms V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 11.36 V MINIMUM: -11.14 V
RISE: 42.20 µs FALL: 37.94 µs
T/DIV: .1 ms V/DIV: 10 V

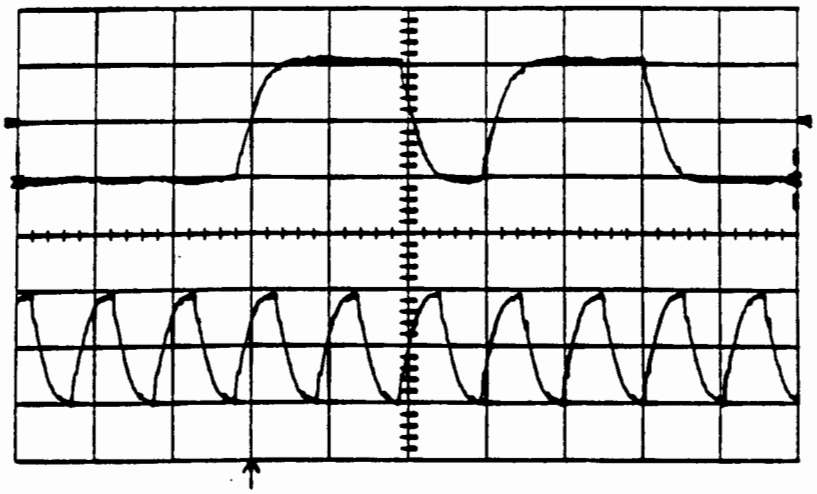
RC CLOCK (PIN 17)
MAXIMUM: 10.62 V MINIMUM: -11.25 V
RISE: 30.74 µs FALL: 31.51 µs
T/DIV: .1 ms V/DIV: 10 V

TEST B

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

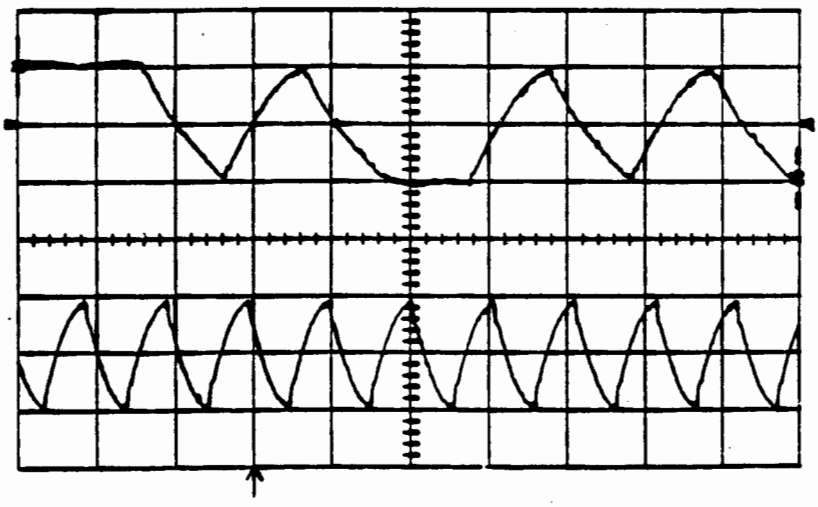
EXTENDED DISTANCE DATA CABLE LENGTH: 1650'

DATA SPEED: 9600 bps



TX DATA (PIN 2)
MAXIMUM: 10.74 V MINIMUM: -10.83 V
RISE: 77.82 µs FALL: 84.85 µs
T/DIV: .1 ms V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 9.69 V MINIMUM: -10.31 V
RISE: 32.65 µs FALL: 33.60 µs
T/DIV: .1 ms V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 11.36 V MINIMUM: -11.14 V
RISE: 42.89 µs FALL: 38.10 µs
T/DIV: .1 ms V/DIV: 10 V

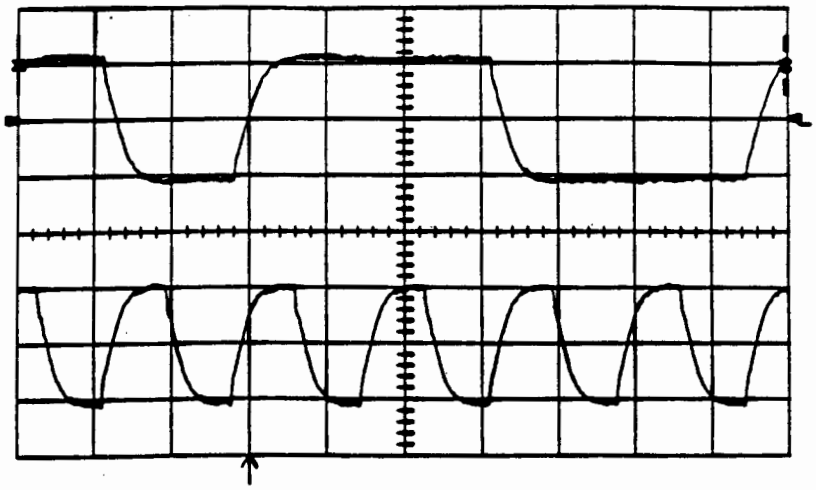
RC CLOCK (PIN 17)
MAXIMUM: 10.00 V MINIMUM: -10.62 V
RISE: 27.67 µs FALL: 26.73 µs
T/DIV: .1 ms V/DIV: 10 V

TEST B

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

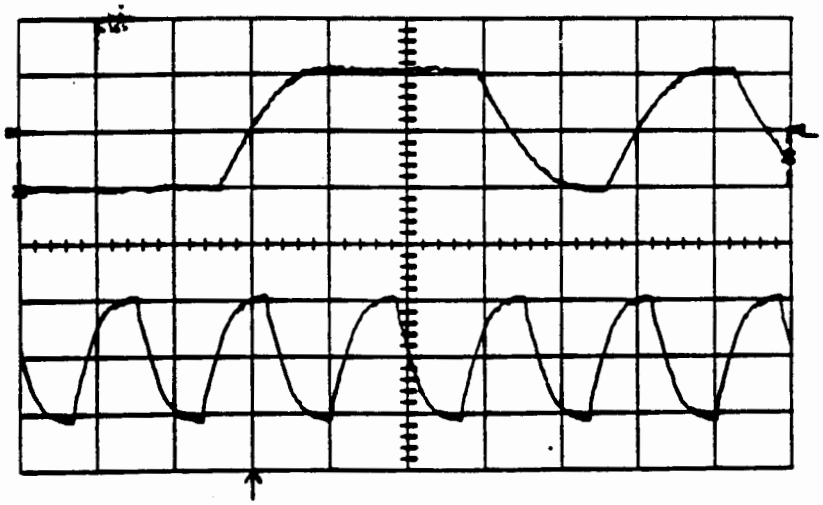
EXTENDED DISTANCE DATA CABLE LENGTH: 800'

DATA SPEED: 12,000 bps



TX DATA (PIN 2)
MAXIMUM: 11.67 V MINIMUM: -11.76 V
RISE: 21.91 µs FALL: 19.196 µs
T/DIV: 50 µs V/DIV: 10V

TC CLOCK (PIN 15)
MAXIMUM: 10.62 V MINIMUM: -11.25 V
RISE: 16.36 µs FALL: 16.23 µs
T/DIV: 50 µs V/DIV: 10V



RX DATA (PIN 3)
MAXIMUM: 11.05 V MINIMUM: -11.14 V
RISE: 40.27 µs FALL: 62.78 µs
T/DIV: 50 µs V/DIV: 10V

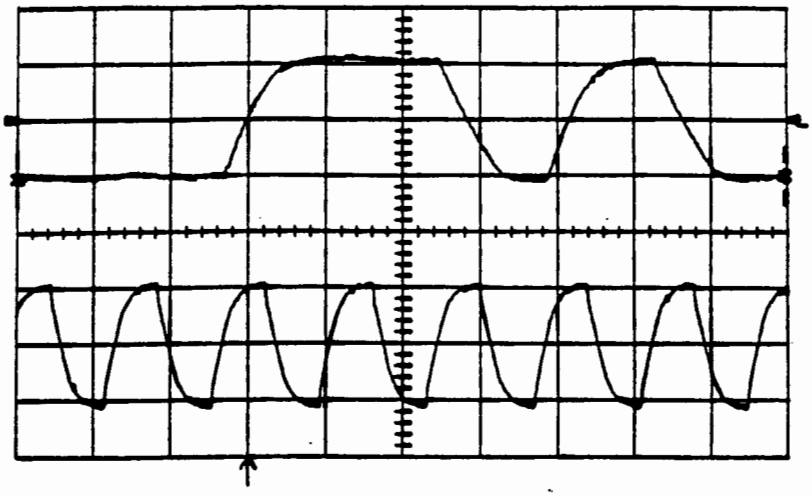
RC CLOCK (PIN 17)
MAXIMUM: 10.94 V MINIMUM: -11.25 V
RISE: 20.88 µs FALL: 20.58 µs
T/DIV: 50 µs V/DIV: 10V

TEST B

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

EXTENDED DISTANCE DATA CABLE LENGTH: 600'

DATA SPEED: 14,400 bps



TX DATA (PIN 2)

MAXIMUM: 11.36 V MINIMUM: -11.14 V

RISE: 30.80 µs FALL: 32.59 µs

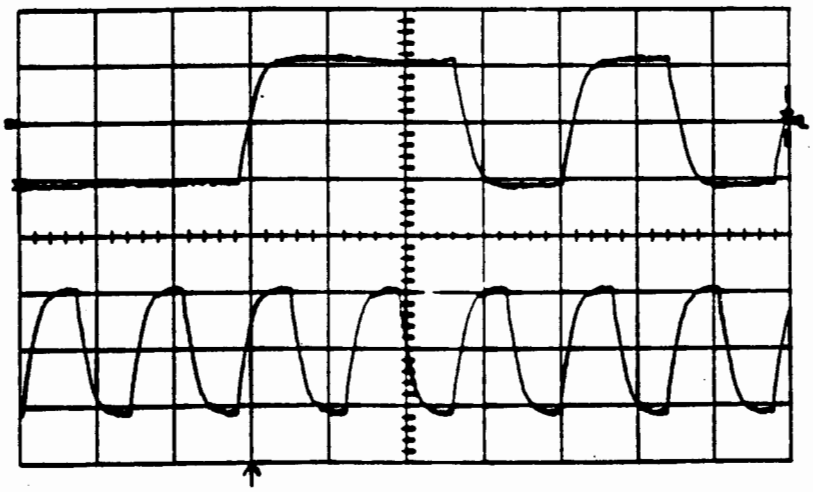
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 10.94 V MINIMUM: -11.56 V

RISE: 16.15 µs FALL: 15.72 µs

T/DIV: 50 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 11.67 V MINIMUM: -11.76 V

RISE: 16.60 µs FALL: 15.27 µs

T/DIV: 50 µs V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 10.94 V MINIMUM: -11.88 V

RISE: 13.01 µs FALL: 12.76 µs

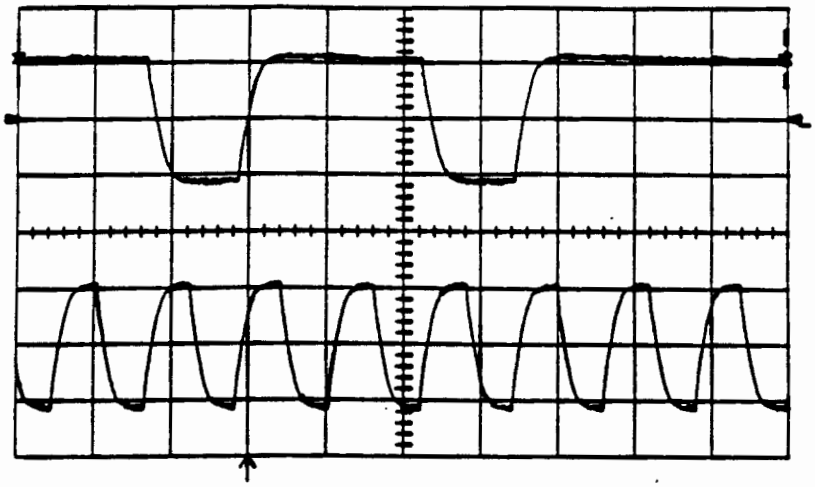
T/DIV: 50 µs V/DIV: 10 V

TEST B

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

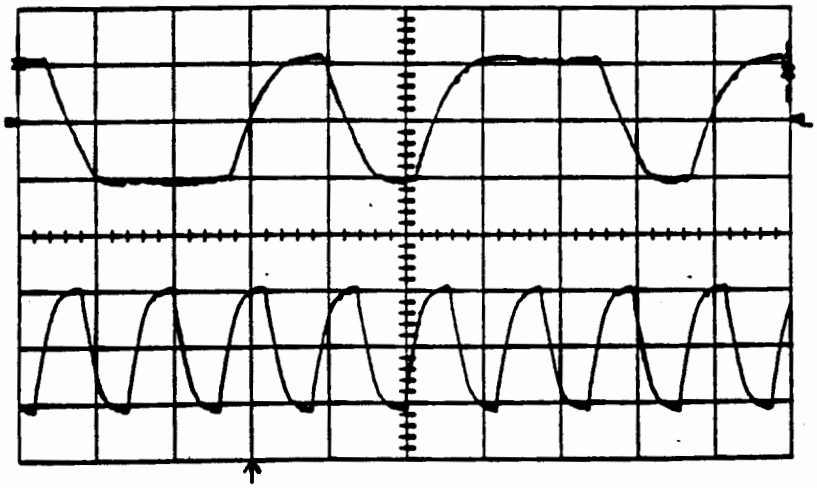
EXTENDED DISTANCE DATA CABLE LENGTH: 500'

DATA SPEED: 16,800 bps



TX DATA (PIN 2)
MAXIMUM: 11.36 V MINIMUM: -12.08 V
RISE: 12.90 µS FALL: 13.74 µS
T/DIV: 50 µS V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 11.25 V MINIMUM: -11.56 V
RISE: 11.51 µS FALL: 11.36 µS
T/DIV: 50 µS V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 11.36 V MINIMUM: -11.14 V
RISE: 28.27 µS FALL: 25.82 µS
T/DIV: 50 µS V/DIV: 10 V

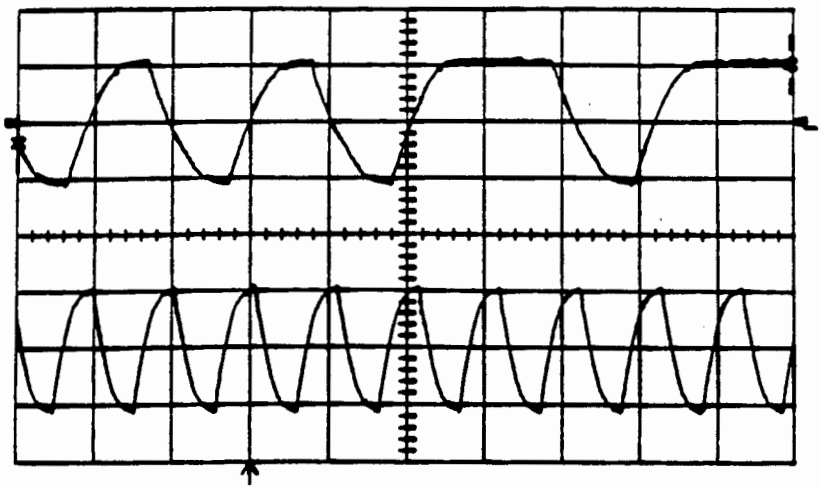
RC CLOCK (PIN 17)
MAXIMUM: 10.94 V MINIMUM: -11.56 V
RISE: 13.66 µS FALL: 13.41 µS
T/DIV: 50 µS V/DIV: 10 V

TEST B

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

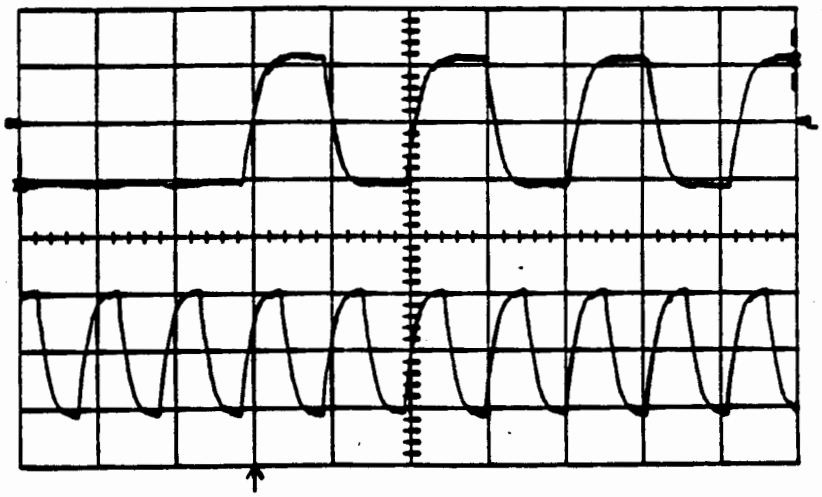
EXTENDED DISTANCE DATA CABLE LENGTH: 500'

DATA SPEED: 19,200 bps



TX DATA (PIN 2)
MAXIMUM: 11.03 V MINIMUM: -11.05 V
RISE: 26.705 µs FALL: 28.36 µs
T/DIV: 50 µs V/DIV: 10V

TC CLOCK (PIN 15)
MAXIMUM: 10.94 V MINIMUM: -11.25 V
RISE: 13.12 µs FALL: 13.16 µs
T/DIV: 50 µs V/DIV: 10V



RX DATA (PIN 3)
MAXIMUM: 11.67 V MINIMUM: -11.05 V
RISE: 14.99 µs FALL: 12.76 µs
T/DIV: 50 µs V/DIV: 10V

RC CLOCK (PIN 17)
MAXIMUM: 10.94 V MINIMUM: -11.56 V
RISE: 11.08 µs FALL: 10.86 µs
T/DIV: 50 µs V/DIV: 10 V

APPENDIX C

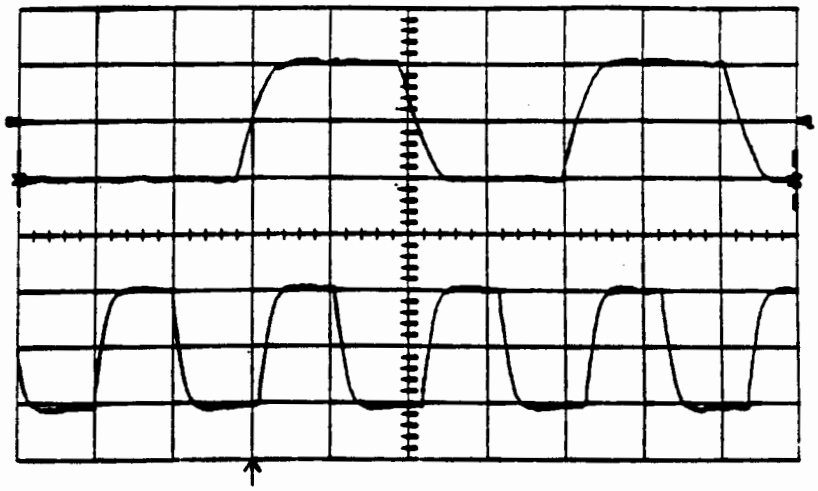
LOW LOSS CABLE TEST
TEST C

TEST C

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

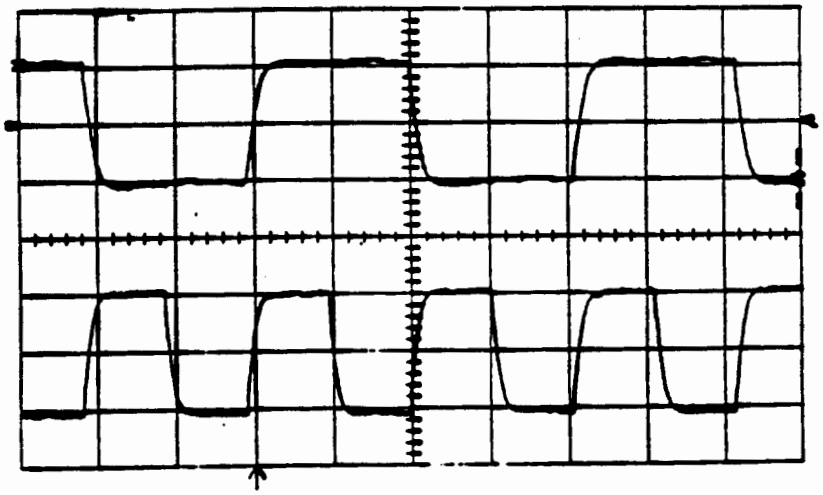
EXTENDED DISTANCE DATA CABLE LENGTH: 1650'

DATA SPEED: 2400 bps



TX DATA (PIN 2)
MAXIMUM: 10.74 V MINIMUM: -10.83 V
RISE: 82.50 µs FALL: 83.88 µs
T/DIV: .2 ms V/DIV: 10V

TC CLOCK (PIN 15)
MAXIMUM: 10.94 MINIMUM: -11.56 V
RISE: 39.38 µs FALL: 40.17 µs
T/DIV: .2 ms V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 11.36 V MINIMUM: -11.45 V
RISE: 41.80 µs FALL: 39.26 µs
T/DIV: .2 ms V/DIV: 10V

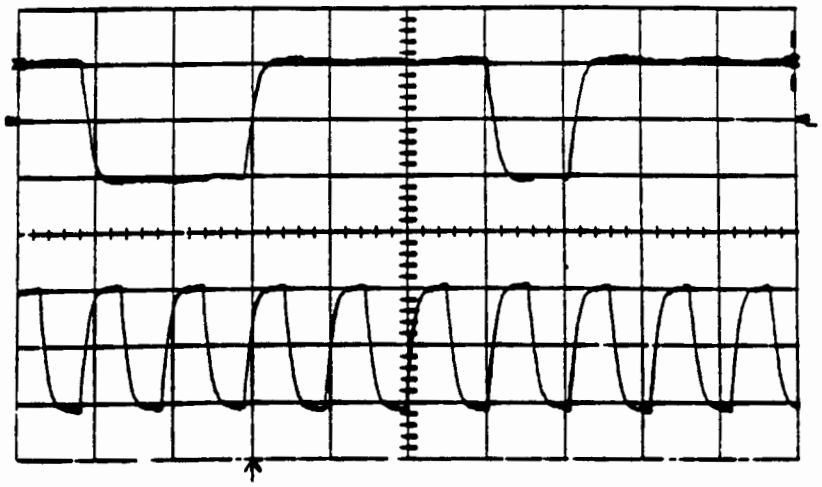
RC CLOCK (PIN 17)
MAXIMUM: 10.94 V MINIMUM: -11.25 V
RISE: 31.76 µs FALL: 31.16 µs
T/DIV: .2 ms V/DIV: 10V

TEST C

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

EXTENDED DISTANCE DATA CABLE LENGTH: 1650'

DATA SPEED: 4800 bps



TX DATA (PIN 2)

MAXIMUM: 11.05 V MINIMUM: -10.83 V

RISE: 81.19 µs FALL: 81.33 µs

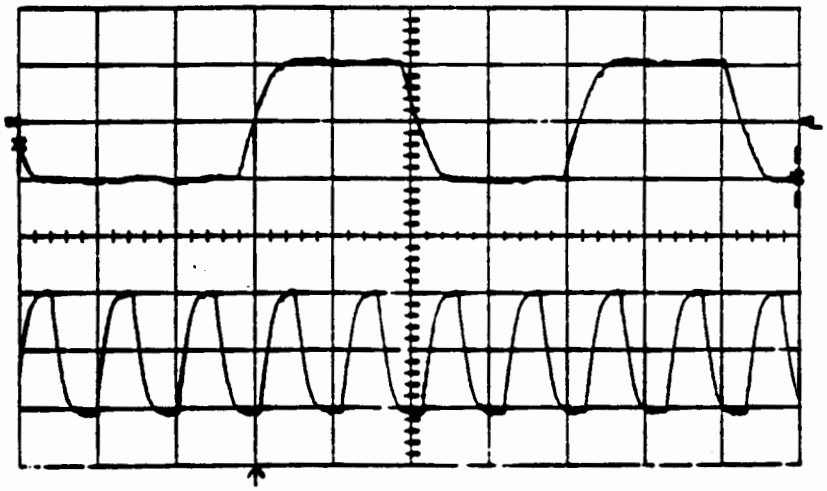
T/DIV: .2 ms V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 10.62 V MINIMUM: -11.25 V

RISE: 39.60 µs FALL: 40.53 µs

T/DIV: .2 ms V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 11.36 V MINIMUM: -11.14 V

RISE: 42.77 µs FALL: 39.27 µs

T/DIV: .2 ms V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 10.94 V MINIMUM: -11.56 V

RISE: 53.93 µs FALL: 54.62 µs

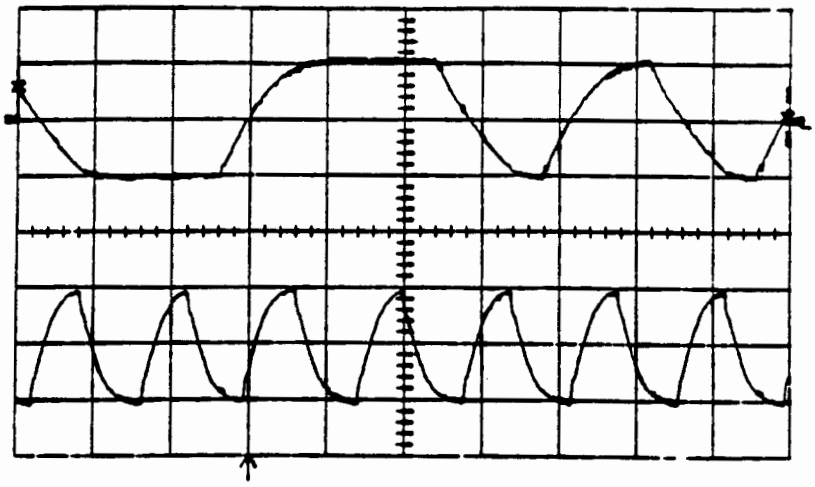
T/DIV: .2 ms V/DIV: 10 V

TEST C

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

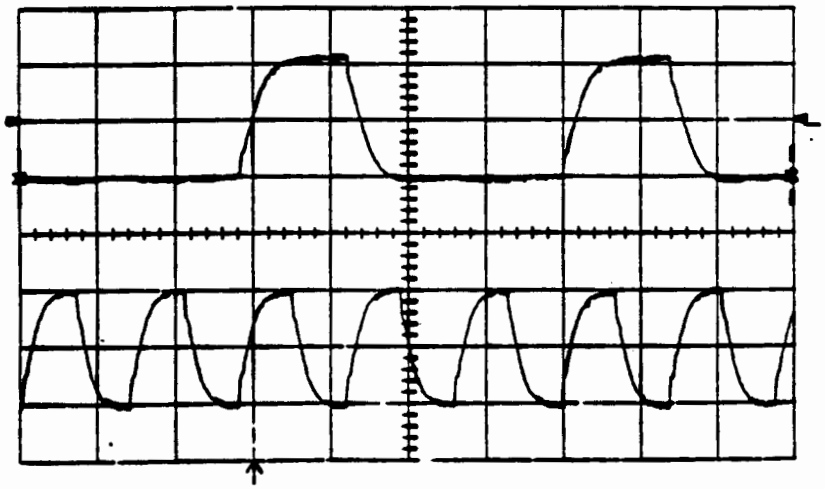
EXTENDED DISTANCE DATA CABLE LENGTH: 1650'

DATA SPEED: 7,200 bps



TX DATA (PIN 2)
MAXIMUM: 10.74 V MINIMUM: -10.83 V
RISE: 78.49 µs FALL: 83.34 µs
T/DIV: .1 ms V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 9.69 V MINIMUM: -10.96
RISE: 35.27 µs FALL: 36.55 µs
T/DIV: .1 ms V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 11.36 V MINIMUM: -11.14 V
RISE: 43.09 µs FALL: 39.79 µs
T/DIV: .1 ms V/DIV: 10 V

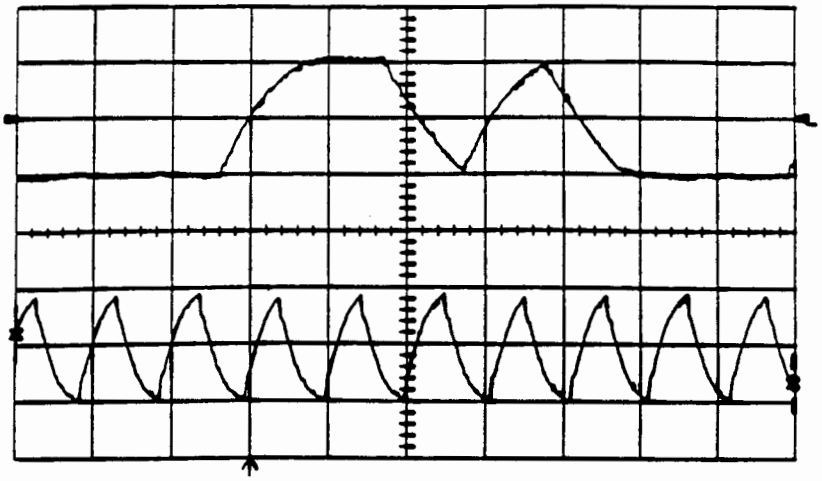
RC CLOCK (PIN 17)
MAXIMUM: 10.62 V MINIMUM: -10.96 V
RISE: 29.03 µs FALL: 29.38 µs
T/DIV: .1 ms V/DIV: 10 V

TEST C

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

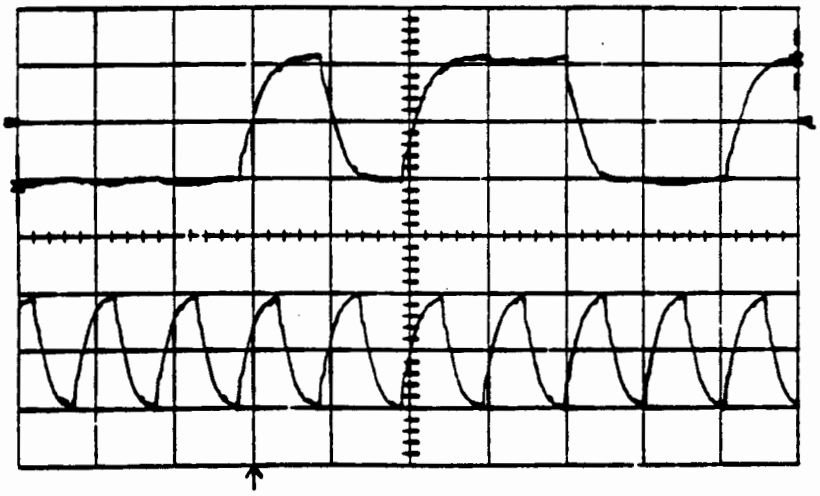
EXTENDED DISTANCE DATA CABLE LENGTH: 1650'

DATA SPEED: 9600 bps



TX DATA (PIN 2)
MAXIMUM: 11.05 V MINIMUM: -11.14 V
RISE: 79.69 µs FALL: 80.81 µs
T/DIV: .1 ms V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 9.06 V MINIMUM: -10.31 V
RISE: 36.43 µs FALL: 32.17 µs
T/DIV: .1 ms V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 11.67 V MINIMUM: -11.45 V
RISE: 43.29 µs FALL: 39.15 µs
T/DIV: .1 ms V/DIV: 10 V

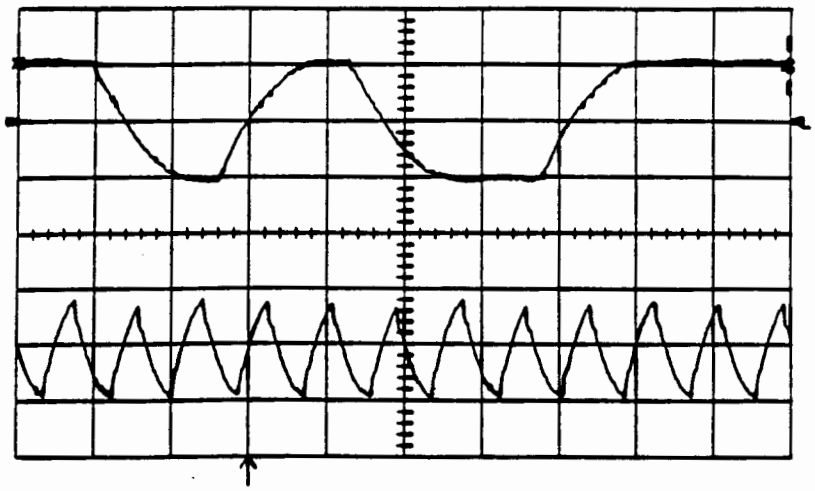
RC CLOCK (PIN 17)
MAXIMUM: 10.31 V MINIMUM: 10.31 V
RISE: 26.87 µs FALL: 25.99 µs
T/DIV: .1 ms V/DIV: 10 V

TEST C

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

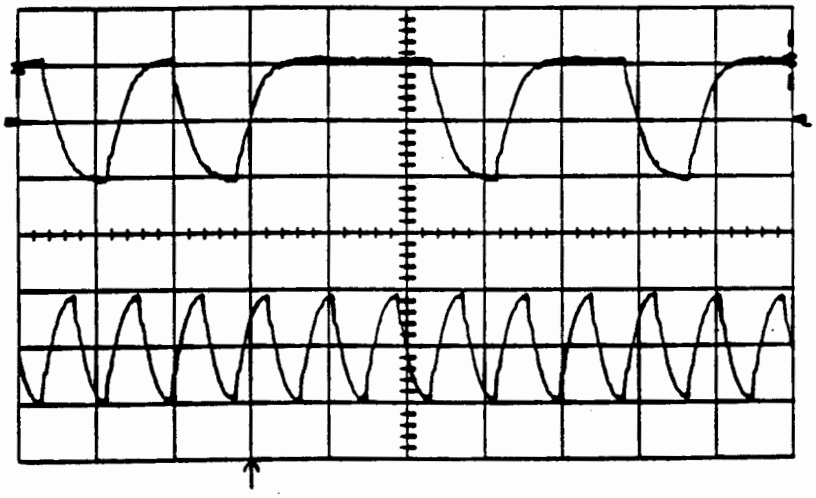
EXTENDED DISTANCE DATA CABLE LENGTH: 1650'

DATA SPEED: 12,000 bps



TX DATA (PIN 2)
MAXIMUM: 11.05 V MINIMUM: -11.14 V
RISE: 79.69 µs FALL: 82.89 µs
T/DIV: .1 ms V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 8.12 V MINIMUM: -9.69 V
RISE: 29.38 µs FALL: 29.38 µs
T/DIV: .1 ms V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 11.05 V MINIMUM: -11.14 V
RISE: 41.65 µs FALL: 38.91 µs
T/DIV: .1 ms V/DIV: 10 V

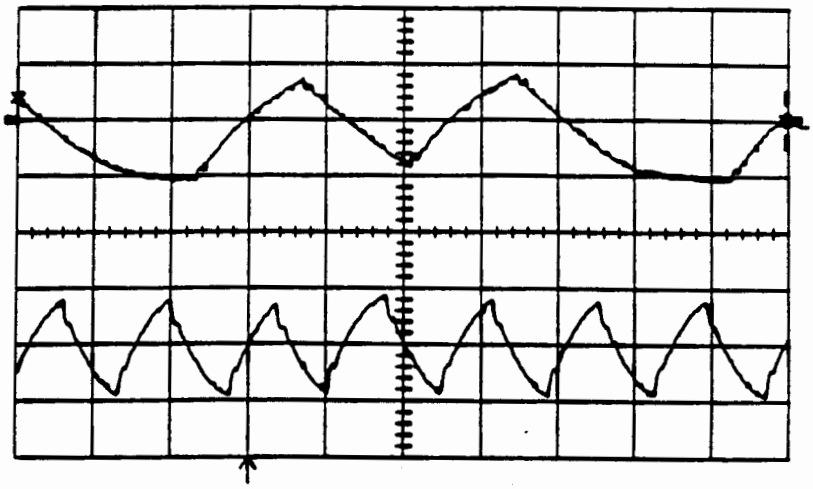
RC CLOCK (PIN 17)
MAXIMUM: 9.69 V MINIMUM: -10.00 V
RISE: 26.71 µs FALL: 24.06 µs
T/DIV: .1 ms V/DIV: 10 V

TEST C

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

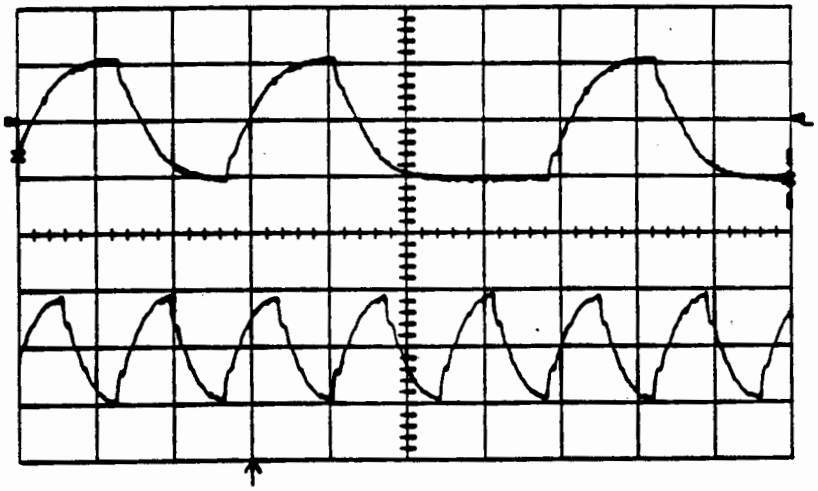
EXTENDED DISTANCE DATA CABLE LENGTH: 1450'

DATA SPEED: 14,400 bps



TX DATA (PIN 2)
MAXIMUM: 7.92 V MINIMUM: -11.14 V
RISE: 58.29 µs FALL: 67.97 µs
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 8.75 V MINIMUM: -9.38 V
RISE: 28.19 µs FALL: 28.38 µs
T/DIV: 50 µs V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 10.74 V MINIMUM: -11.76 V
RISE: 36.80 µs FALL: 35.56 µs
T/DIV: 50 µs V/DIV: 10 V

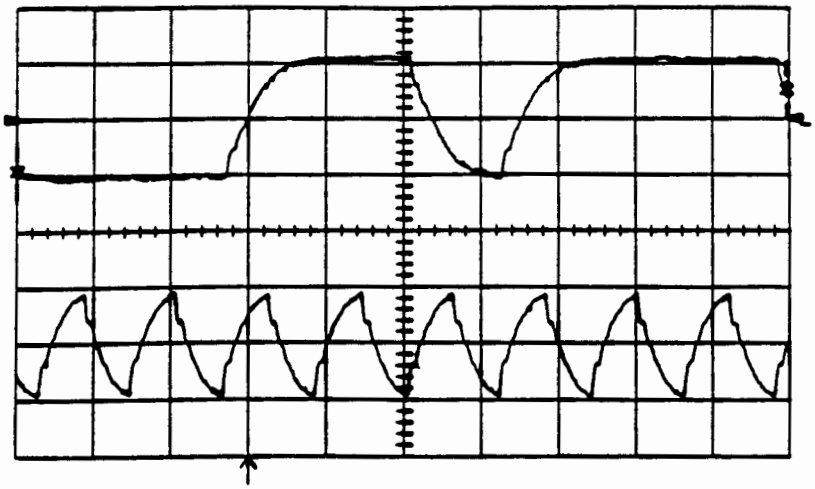
RC CLOCK (PIN 17)
MAXIMUM: 9.38 V MINIMUM: -10.00 V
RISE: 21.01 µs FALL: 19.92 µs
T/DIV: 50 µs V/DIV: 10 V

TEST C

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

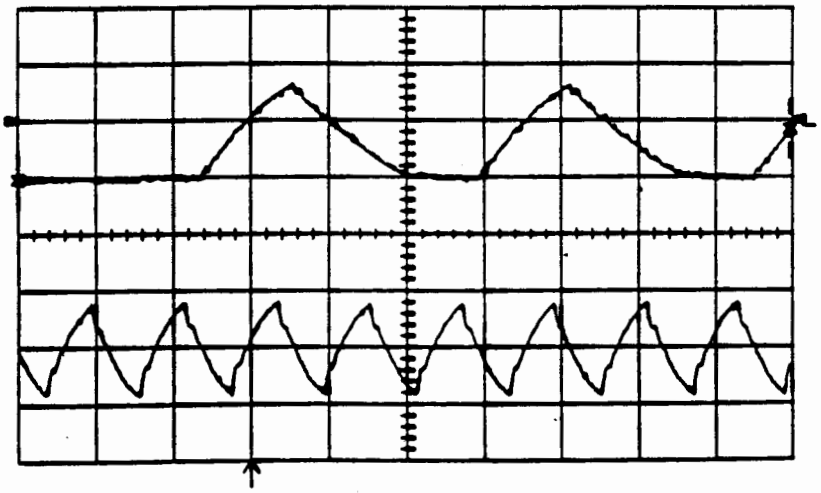
EXTENDED DISTANCE DATA CABLE LENGTH: 1350'

DATA SPEED: 16,800 bps



TX DATA (PIN 2)
MAXIMUM: 11.36 V MINIMUM: -11.14 V
RISE: 36.23 µs FALL: 31.94 µs
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 9.06 V MINIMUM: -9.69 V
RISE: 18.32 µs FALL: 18.56 µs
T/DIV: 50 µs V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 6.36 V MINIMUM: -11.14 V
RISE: 45.26 µs FALL: 58.87 µs
T/DIV: 50 µs V/DIV: 10 V

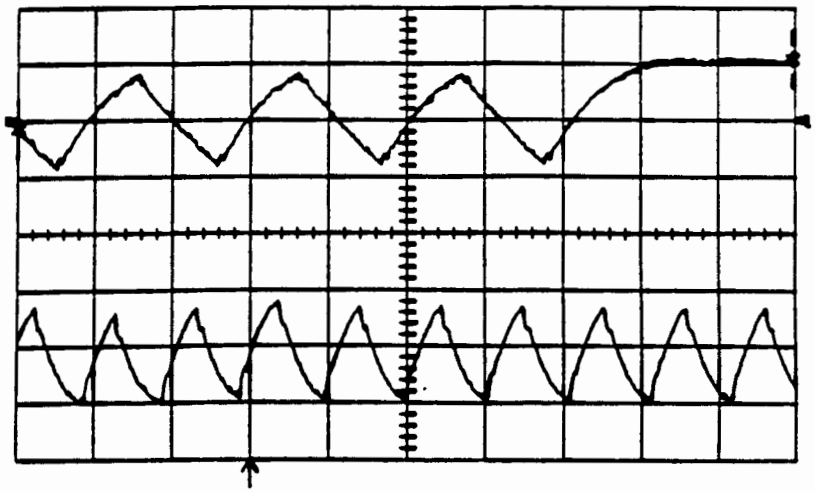
RC CLOCK (PIN 17)
MAXIMUM: 8.12 V MINIMUM: -9.69 V
RISE: 13.52 µs FALL: 19.97 µs
T/DIV: 50 µs V/DIV: 10 V

TEST C

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

EXTENDED DISTANCE DATA CABLE LENGTH: 1050'

DATA SPEED: 19200 bps



TX DATA (PIN 2)

MAXIMUM: 11.05 V MINIMUM: -8.64 V

RISE: FALL:

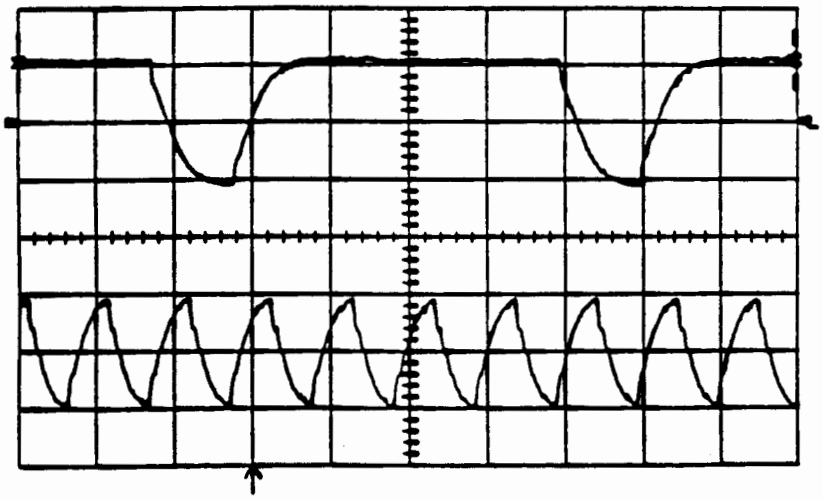
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 8.12 V MINIMUM: -10.31 V

RISE: 11.54 µs FALL: 19.81 µs

T/DIV: 50 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 11.05 V MINIMUM: -11.45 V

RISE: 26.57 µs FALL: 25.61 µs

T/DIV: 50 µs V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 9.38 V MINIMUM: -10.00 V

RISE: 15.17 µs FALL: 16.71 µs

T/DIV: 50 µs V/DIV: 10 V

APPENDIX D

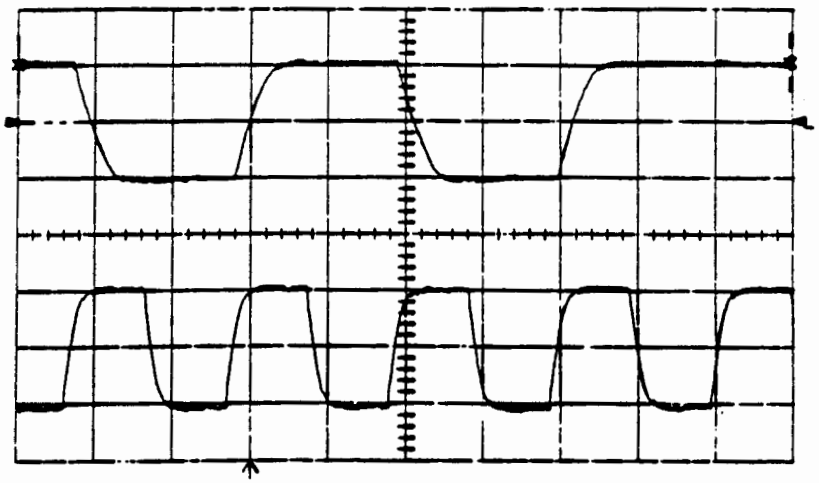
LOW LOSS CABLE TEST
TEST D

TEST D

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BER

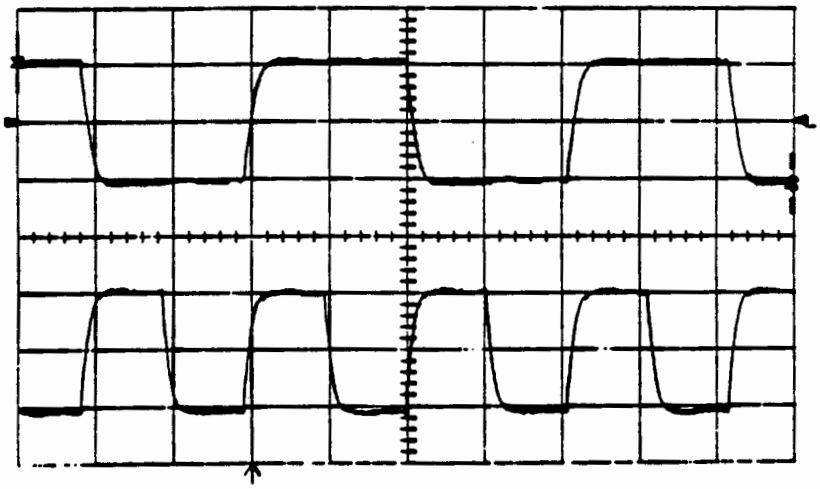
EXTENDED DISTANCE DATA CABLE LENGTH: 1650'

DATA SPEED: 2,400 bps



TX DATA (PIN 2)
MAXIMUM: 10.74 V MINIMUM: -11.14 V
RISE: 80.06 µs FALL: 85.43 µs
T/DIV: .2 ms V/DIV: 10V

TC CLOCK (PIN 15)
MAXIMUM: 10.94 V MINIMUM: -11.25 V
RISE: 42.52 µs FALL: 41.73 µs
T/DIV: .2 ms V/DIV: 10V



RX DATA (PIN 3)
MAXIMUM: 11.05 V MINIMUM: -11.45 V
RISE: 42.62 µs FALL: 39.67 µs
T/DIV: .2 ms V/DIV: 10V

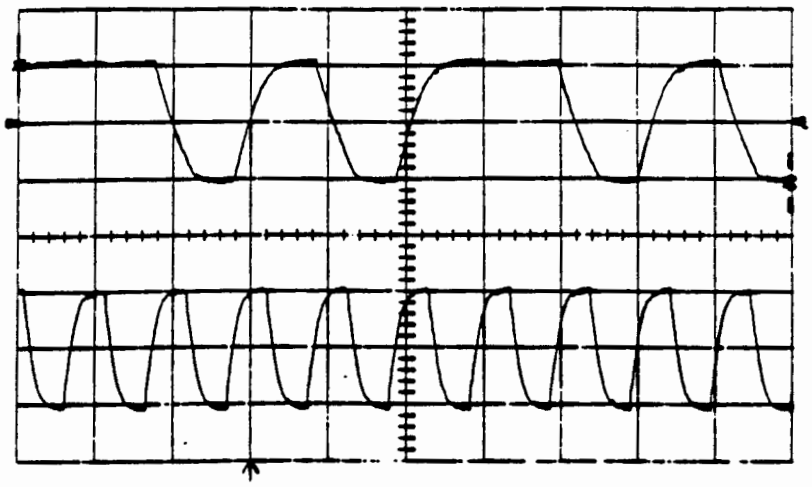
RC CLOCK (PIN 17)
MAXIMUM: 10.94 V MINIMUM: -11.25 V
RISE: 31.50 µs FALL: 30.58 µs
T/DIV: .2 ms V/DIV: 10V

TEST D

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

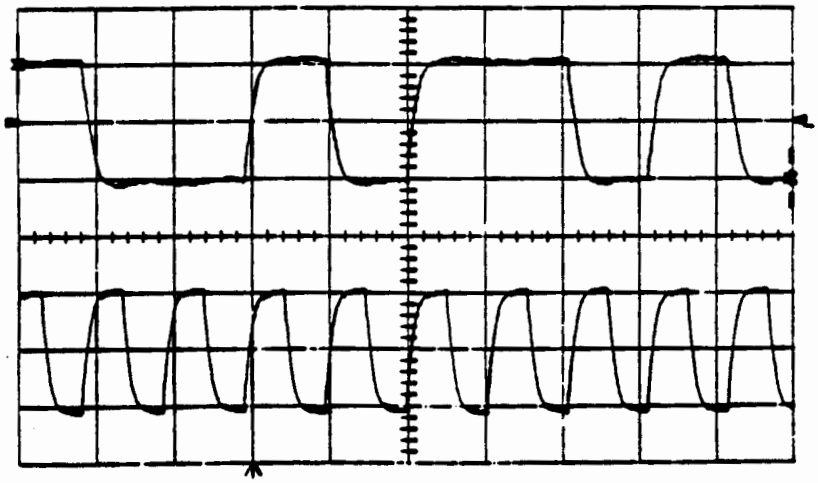
EXTENDED DISTANCE DATA CABLE LENGTH: 1650'

DATA SPEED: 4800 bps



TX DATA (PIN 2)
MAXIMUM: 11.05 V MINIMUM: -10.83 V
RISE: 81.91 µs FALL: 82.37 µs
T/DIV: .2 ms V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 10.62 V MINIMUM: -11.25 V
RISE: 41.06 µs FALL: 42.20 µs
T/DIV: .2 ms V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 11.36 V MINIMUM: -11.45 V
RISE: 40.68 µs FALL: 39.47 µs
T/DIV: .2 ms V/DIV: 10 V

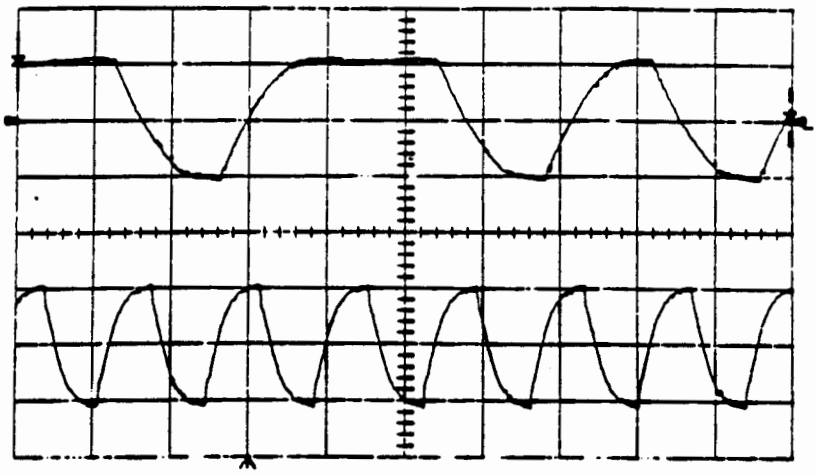
RC CLOCK (PIN 17)
MAXIMUM: 10.94 V MINIMUM: -11.25 V
RISE: 31.20 µs FALL: 31.59 µs
T/DIV: .2 ms V/DIV: 10 V

TEST D

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

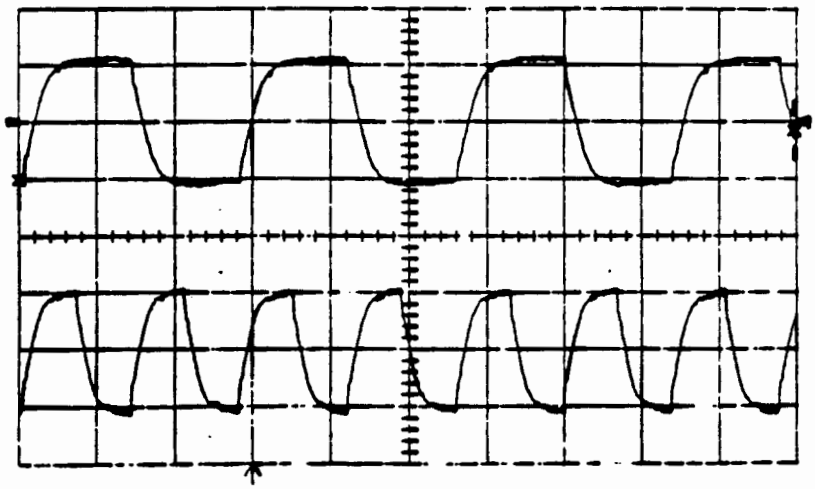
EXTENDED DISTANCE DATA CABLE LENGTH: 1400'

DATA SPEED: 7,200 bps



TX DATA (PIN 2)
MAXIMUM: 11.05 V MINIMUM: -10.83 V
RISE: 68.19 µs FALL: 68.94 µs
T/DIV: .1 ms V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 10.94 V MINIMUM: -11.25 V
RISE: 35.51 µs FALL: 35.67 µs
T/DIV: .1 ms V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 11.36 V MINIMUM: -11.45 V
RISE: 38.26 µs FALL: 32.26 µs
T/DIV: .1 ms V/DIV: 10 V

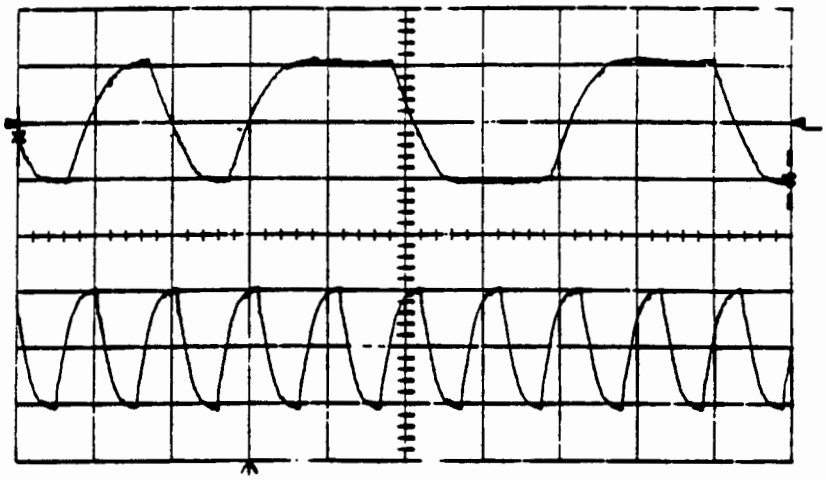
RC CLOCK (PIN 17)
MAXIMUM: 10.62 V MINIMUM: -11.25 V
RISE: 27.35 µs FALL: 26.63 µs
T/DIV: .1 ms V/DIV: 10 V

TEST D

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

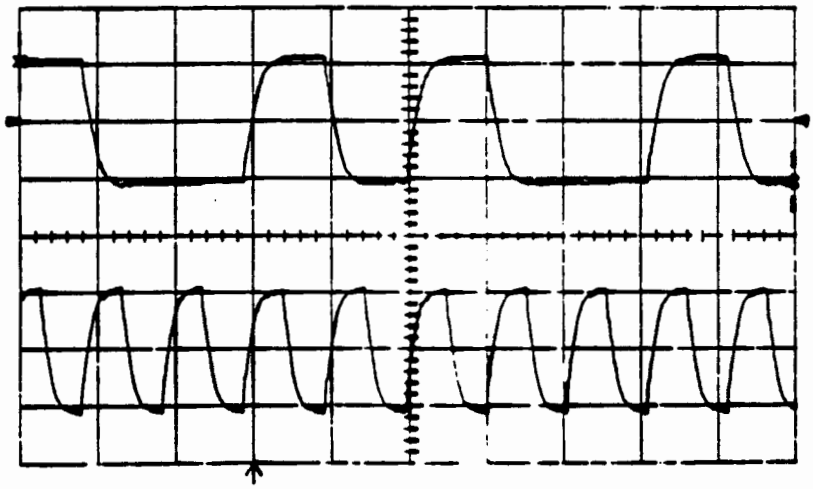
EXTENDED DISTANCE DATA CABLE LENGTH: 1050'

DATA SPEED: 9,600 bps



TX DATA (PIN 2)
MAXIMUM: 11.36 V MINIMUM: -11.14 V
RISE: 56.23 µs FALL: 53.94 µs
T/DIV: .1 ms V/DIV: 10V

TC CLOCK (PIN 15)
MAXIMUM: 10.62 V MINIMUM: -11.25 V
RISE: 25.85 µs FALL: 26.23 µs
T/DIV: .1 ms V/DIV: 10V



RX DATA (PIN 3)
MAXIMUM: 11.36 V MINIMUM: -11.45 V
RISE: 27.49 µs FALL: 26.46 µs
T/DIV: .1 ms V/DIV: 10V

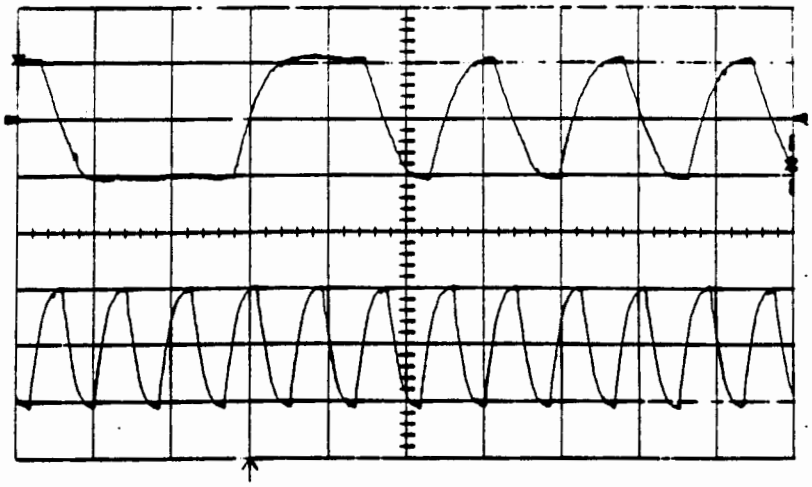
RC CLOCK (PIN 17)
MAXIMUM: 10.94 V MINIMUM: -11.25 V
RISE: 21.11 µs FALL: 20.29 µs
T/DIV: .1 ms V/DIV: 10V

TEST D

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

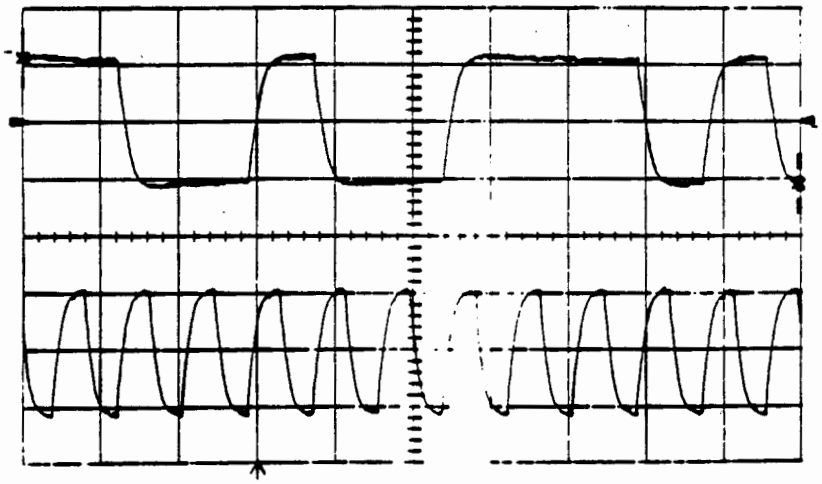
EXTENDED DISTANCE DATA CABLE LENGTH: 850'

DATA SPEED: 12,000 bps



TX DATA (PIN 2)
MAXIMUM: 11.36 V MINIMUM: -11.14 V
RISE: 41.51 µs FALL: 43.45 µs
T/DIV: .1 ms V/DIV: 10V

TC CLOCK (PIN 15)
MAXIMUM: 10.62 V MINIMUM: -11.25
RISE: 20.44 µs FALL: 21.2 µs
T/DIV: .1 ms V/DIV: 10V



RX DATA (PIN 3)
MAXIMUM: 11.67 V MINIMUM: -11.45 V
RISE: 22.06 µs FALL: 21.51 µs
T/DIV: .1 ms V/DIV: 10V

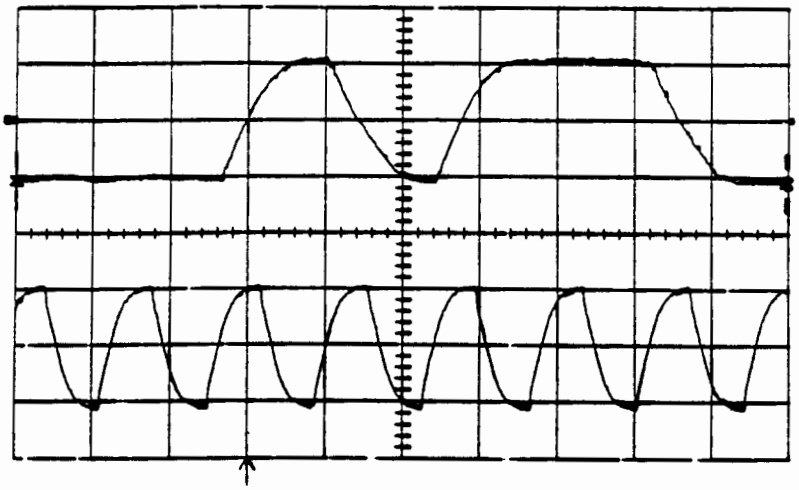
RC CLOCK (PIN 17)
MAXIMUM: 10.94 V MINIMUM: -11.56
RISE: 17.21 µs FALL: 17.80 µs
T/DIV: .1 ms V/DIV: 10V

TEST D

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

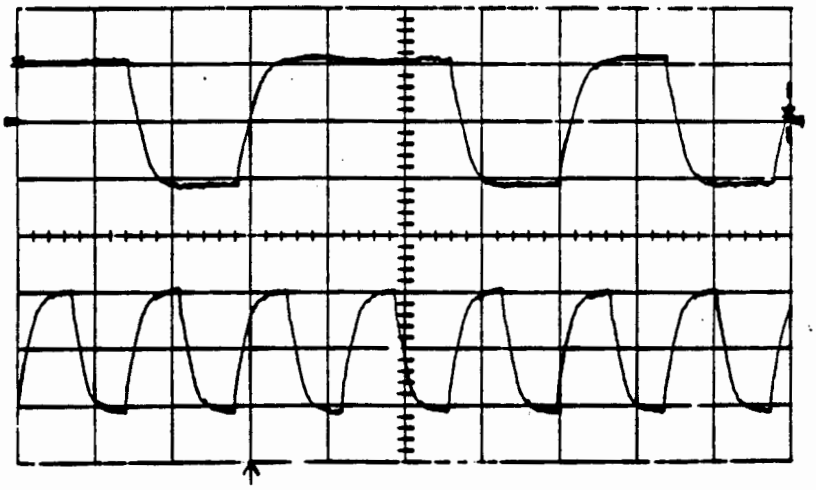
EXTENDED DISTANCE DATA CABLE LENGTH: 650'

DATA SPEED: 14,400 bps



TX DATA (PIN 2)
MAXIMUM: 11.05 V MINIMUM: -11.45 V
RISE: 33.72 µs FALL: 36.65 µs
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 10.62 V MINIMUM: -11.52
RISE: 16.53 µs FALL: 16.64 µs
T/DIV: 50 µs V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 11.36 V MINIMUM: -11.76 V
RISE: 18.154 µs FALL: 15.88 µs
T/DIV: 50 µs V/DIV: 10V

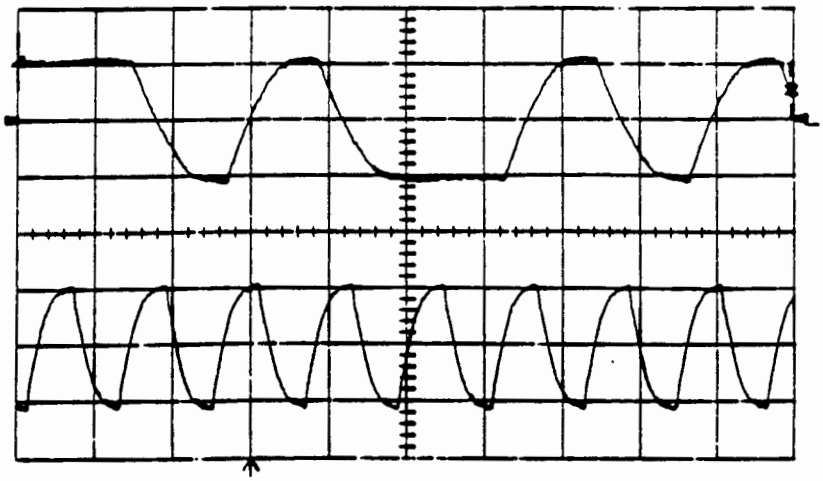
RC CLOCK (PIN 17)
MAXIMUM: 10.94 V MINIMUM: -11.56 V
RISE: 13.99 µs FALL: 12.61 µs
T/DIV: 50 µs V/DIV: 10V

TEST D

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

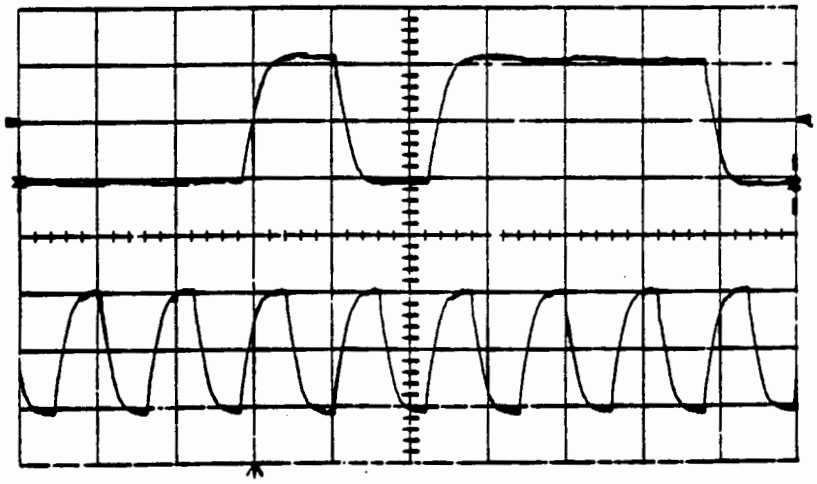
EXTENDED DISTANCE DATA CABLE LENGTH: 550'

DATA SPEED: 16,800 bps



TX DATA (PIN 2)
MAXIMUM: 11.05 V MINIMUM: -11.45 V
RISE: 27.43 µs FALL: 29.99 µs
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 10.94 V MINIMUM: -11.56 V
RISE: 14.44 µs FALL: 14.52 µs
T/DIV: 50 µs V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 11.67 V MINIMUM: -11.76 V
RISE: 14.74 µs FALL: 13.62 µs
T/DIV: 50 µs V/DIV: 10 V

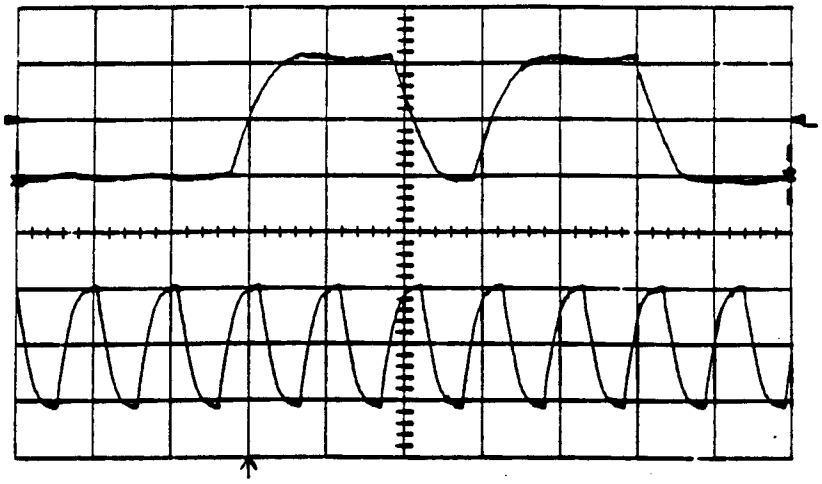
RC CLOCK (PIN 17)
MAXIMUM: 10.62 V MINIMUM: -11.25 V
RISE: 12.17 µs FALL: 11.86 µs
T/DIV: 50 µs V/DIV: 10 V

TEST D

CODEX 3600/HADAX EIA-PP/GEMINI DUAL BERT TESTER

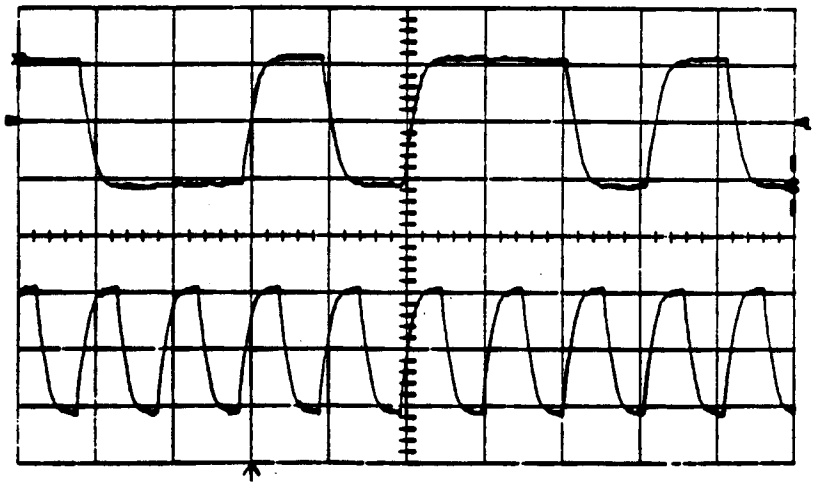
EXTENDED DISTANCE DATA CABLE LENGTH: 450'

DATA SPEED: 19,200 bps



TX DATA (PIN 2)
MAXIMUM: 11.67 V MINIMUM: -11.45 V
RISE: 27.21 µs FALL: 24.71 µs
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 10.62 V MINIMUM: -11.56 V
RISE: 12.03 µs FALL: 12.23 µs
T/DIV: 50 µs V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 11.36 V MINIMUM: -12.08 V
RISE: 12.09 µs FALL: 12.67 µs
T/DIV: 50 µs V/DIV: 10 V

RC CLOCK (PIN 17)
MAXIMUM: 11.25 V MINIMUM: -10.56 V
RISE: 10.15 µs FALL: 10.19 µs
T/DIV: 50 µs V/DIV: 10 V

APPENDIX E

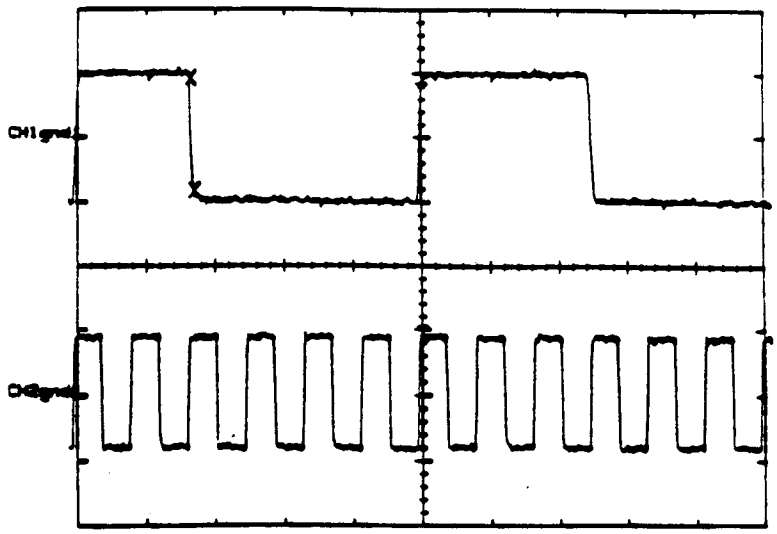
OCTOPUS CABLE TEST
TEST A

TEST A

CODEX 3600/HADAX EIA-PP/CODEX DB 2185/BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 2,400 bps

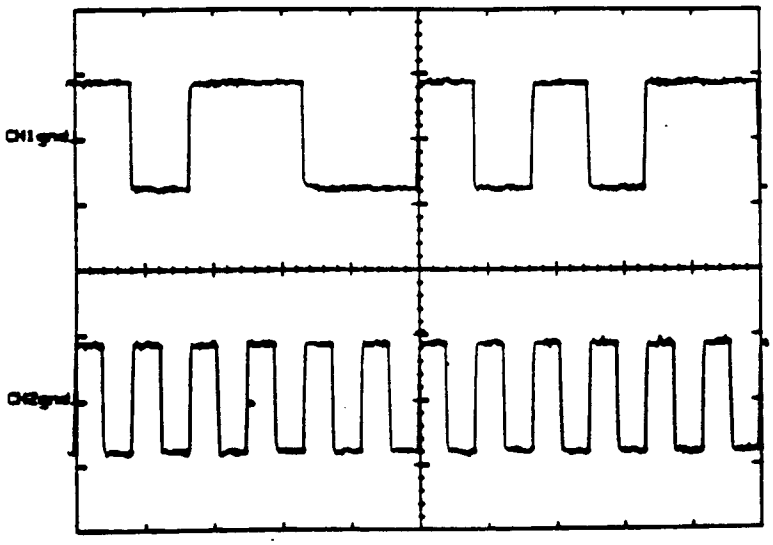


TX DATA (PIN 2)

MAXIMUM: 10.8 V MINIMUM: -10.8 V
RISE: 35.6 µs FALL: 33.1 µs
T/DIV: 500 µs V/DIV: 10V

TC CLOCK (PIN 15)

MAXIMUM: 9.6 V MINIMUM: -9.2 V
RISE: 10.8 µs FALL: 6.71 µs
T/DIV: 500 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 9.6 V MINIMUM: -8.4 V
RISE: 19.0 µs FALL: 9.23 µs
T/DIV: 500 µs V/DIV: 10V

RC CLOCK (PIN 17)

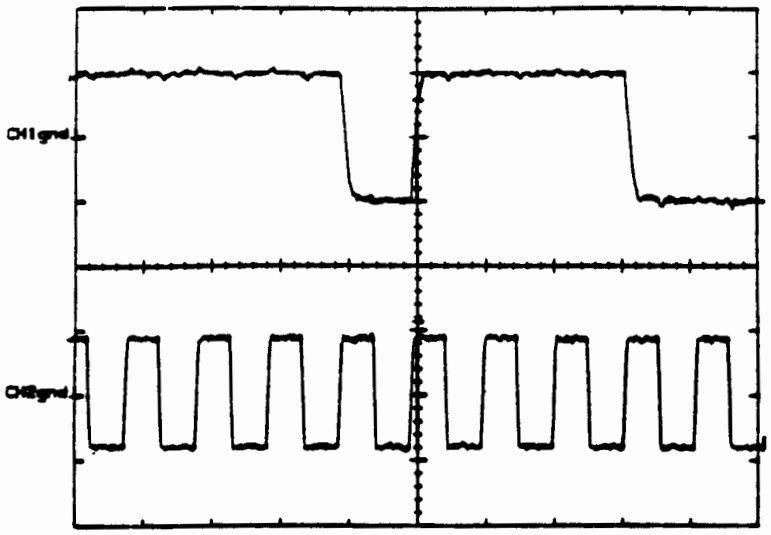
MAXIMUM: 9.6 V MINIMUM: -8.8 V
RISE: 11.0 µs FALL: 7.81 µs
T/DIV: 500 µs V/DIV: 10 V

TEST A

CODEX 3600/HADAX EIA-PP/CODEX DB 2185/BERTS

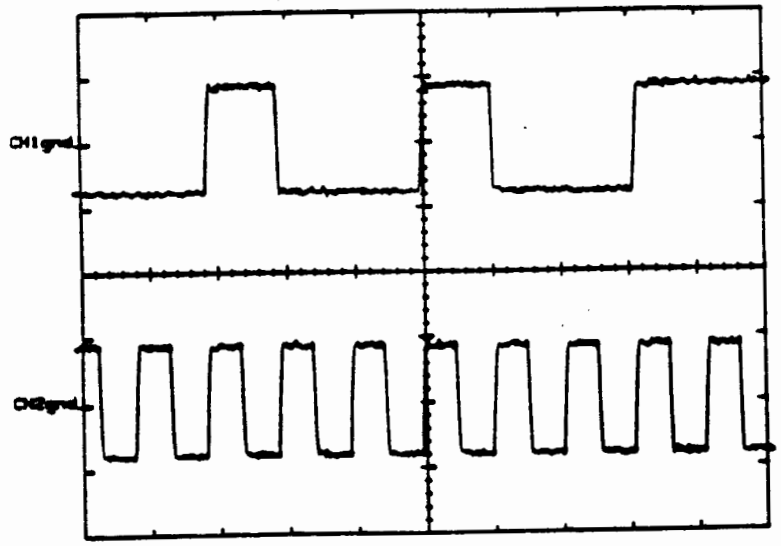
EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 4,800 bps



TX DATA (PIN 2)
MAXIMUM: 10.8 V MINIMUM: -11.2 V
RISE: 30.0 µs FALL: 32.0 µs
T/DIV: 200 µs V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 9.6 V MINIMUM: -8.8 V
RISE: 9.9 µs FALL: 6.45 µs
T/DIV: 200 µs V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 9.6 V MINIMUM: -8.4 V
RISE: 12.1 µs FALL: 9.89 µs
T/DIV: 200 µs V/DIV: 10 V

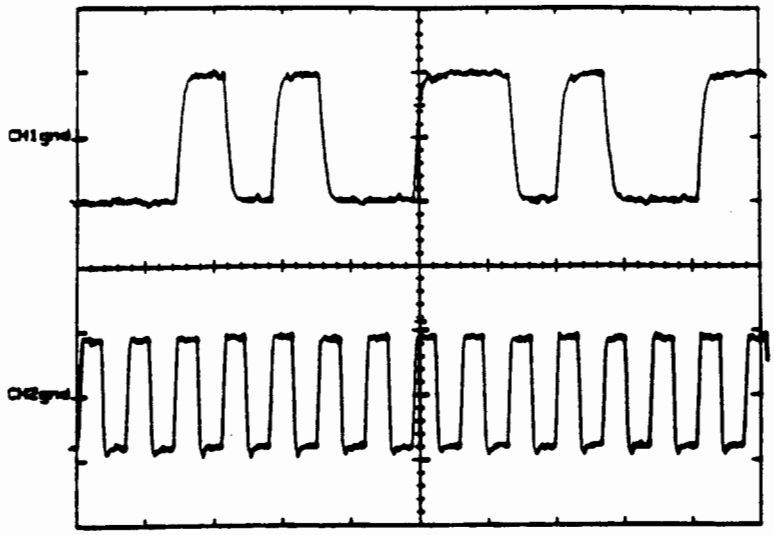
RC CLOCK (PIN 17)
MAXIMUM: 9.6 V MINIMUM: -8.8 V
RISE: 11.0 µs FALL: 6.48 µs
T/DIV: 200 µs V/DIV: 10 V

TEST A

CODEX 3600/HADAX EIA-PP/CODEX DB 2185/BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 7200 bps



TX DATA (PIN 2)

MAXIMUM: 10.8 V MINIMUM: -10.8 V

RISE: 33.6 µs FALL: 33.6 µs

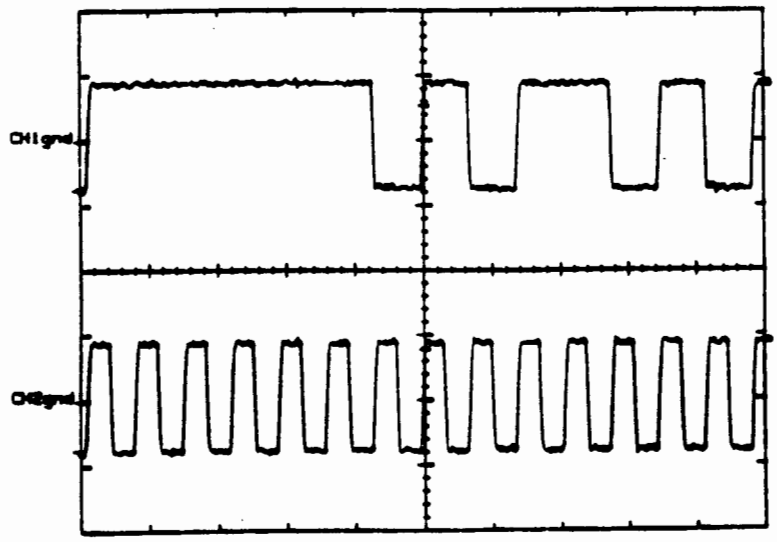
T/DIV: 200 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 10 V MINIMUM: -10 V

RISE: 11.6 µs FALL: 7.42 µs

T/DIV: 200 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 9.6 V MINIMUM: -8.4 V

RISE: 13.2 µs FALL: 10.1 µs

T/DIV: 200 µs V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 10 V MINIMUM: -8.8 V

RISE: 11.1 µs FALL: 7.26 µs

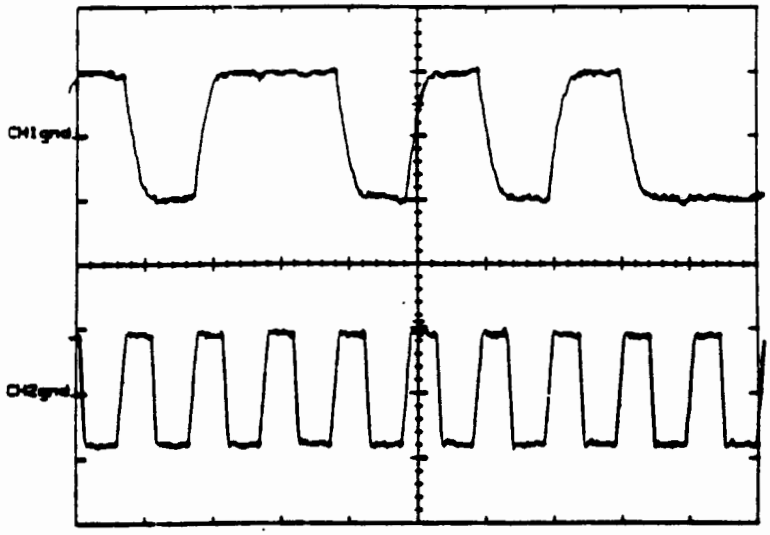
T/DIV: 200 µs V/DIV: 10 V

TEST A

CODEX 3600/HADAX EIA-PP/CODEX DB 2185/BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 9,600 bps

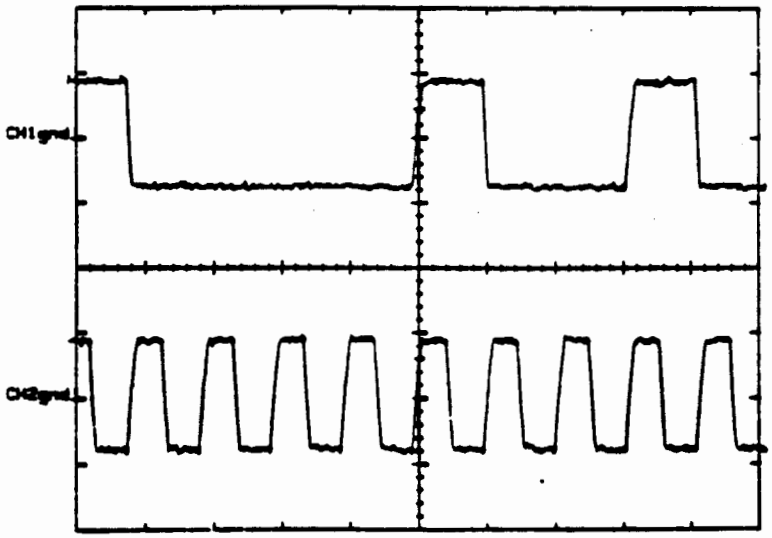


TX DATA (PIN 2)

MAXIMUM: 10.8 V MINIMUM: -10.8 V
RISE: 51.4 µs FALL: 53.1 µs
T/DIV: 100 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 9.6 V MINIMUM: -9.2 V
RISE: 11.5 µs FALL: 6.27 µs
T/DIV: 100 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 9.6 V MINIMUM: -8.0 V
RISE: 12.3 µs FALL: 6.30 µs
T/DIV: 100 µs V/DIV: 10 V

RC CLOCK (PIN 17)

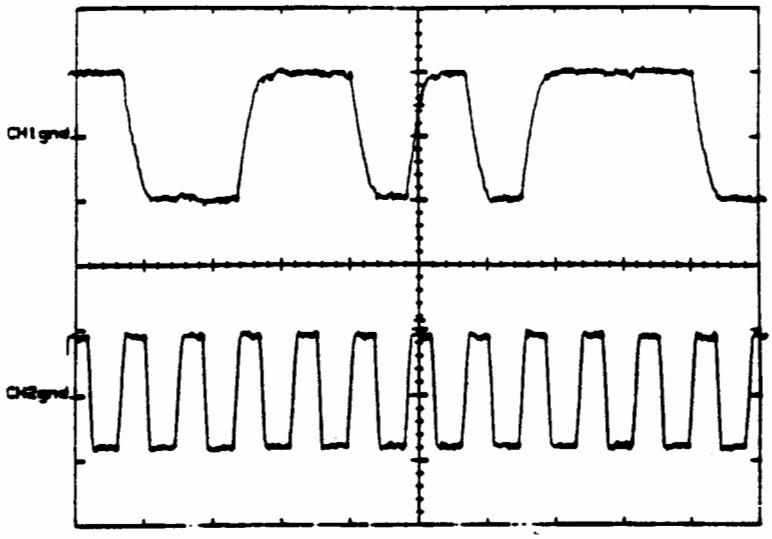
MAXIMUM: 9.6 V MINIMUM: -8.8 V
RISE: 11.8 µs FALL: 8.25 µs
T/DIV: 100 µs V/DIV: 10 V

TEST A

CODEX 3600/HADAX EIA-PP/CODEX DB 2185/BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 12,000 bps

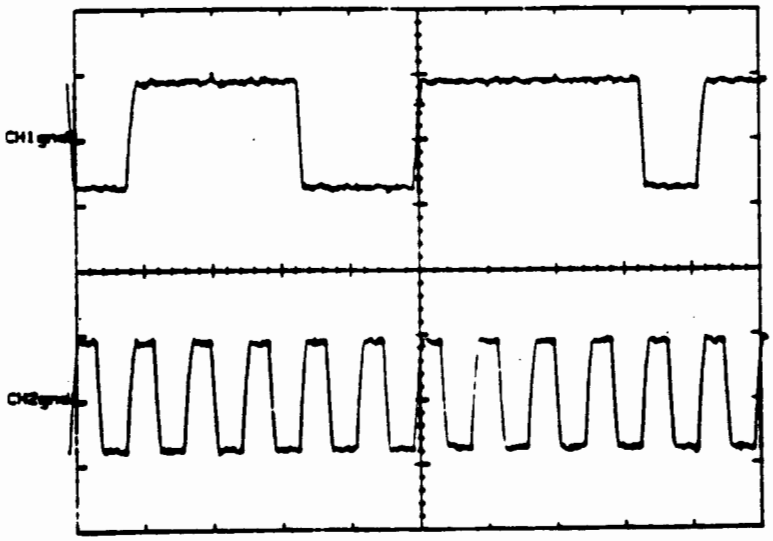


TX DATA (PIN 2)

MAXIMUM: 10.8 V MINIMUM: -10.8 V
RISE: 28.2 µs FALL: 30.7 µs
T/DIV: 100 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 10. V MINIMUM: -8.8 V
RISE: 9.8 µs FALL: 6.82 µs
T/DIV: 100 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 9.6 V MINIMUM: -8.4 V
RISE: 11.8 µs FALL: 8.63 µs
T/DIV: 100 µs V/DIV: 10 V

RC CLOCK (PIN 17)

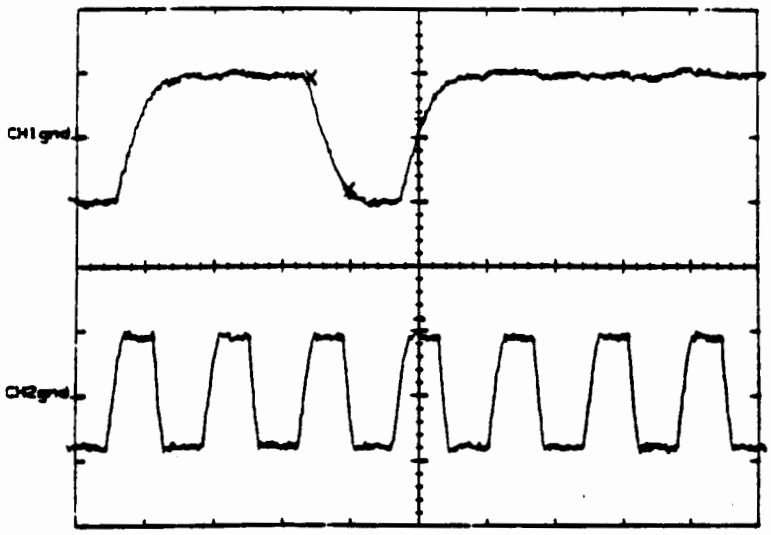
MAXIMUM: 9.6 V MINIMUM: -8.4 V
RISE: 9.96 µs FALL: 7.24 µs
T/DIV: 100 µs V/DIV: 10 V

TEST A

CODEX 3600/HADAX EIA-PP/CODEX DB 2185/BERTS

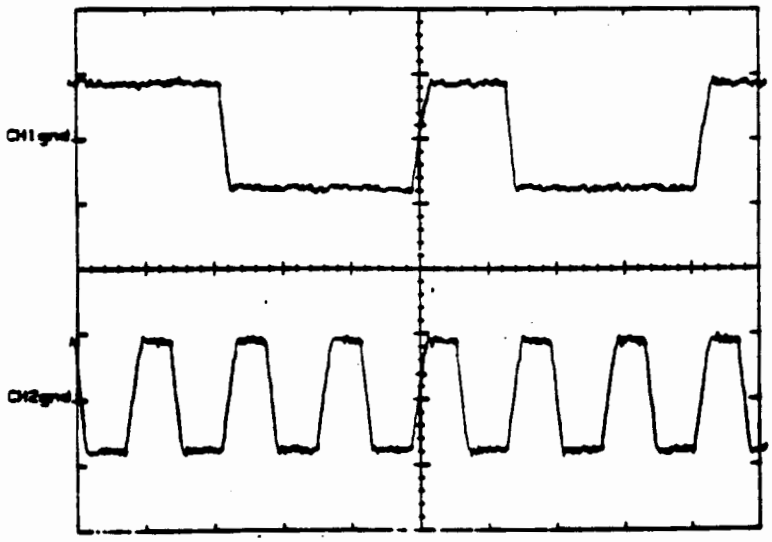
EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 14,400 bps



TX DATA (PIN 2)
MAXIMUM: 10.8 V MINIMUM: -10.8 V
RISE: 37.0 µs FALL: 28.3 µs
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 10 V MINIMUM: -9.2 V
RISE: 10.1 µs FALL: 6.79 µs
T/DIV: 50 µs V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 9.6 V MINIMUM: -8.8 V
RISE: 11.5 µs FALL: 7.6 µs
T/DIV: 50 µs V/DIV: 10 V

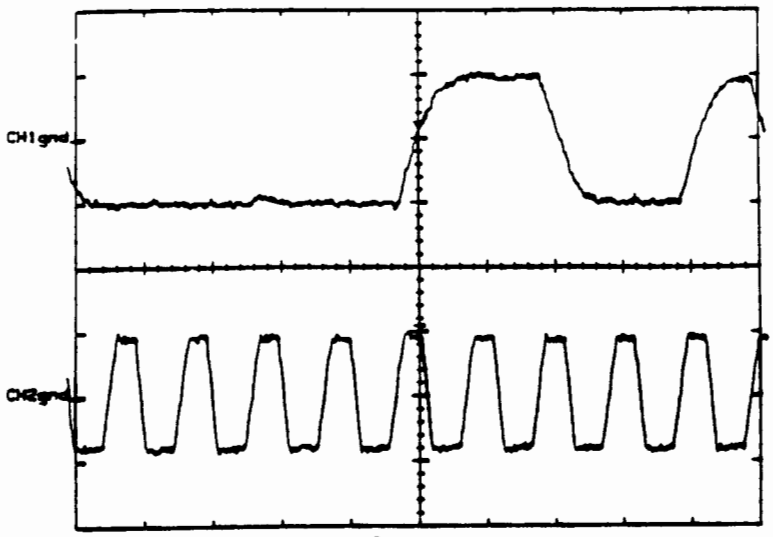
RC CLOCK (PIN 17)
MAXIMUM: 10 V MINIMUM: -8.8 V
RISE: 9.87 µs FALL: 7.17 µs
T/DIV: 50 µs V/DIV: 10 V

TEST A

CODEX 3600/HADAX EIA-PP/CODEX DB 2185/BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 16,800 bps

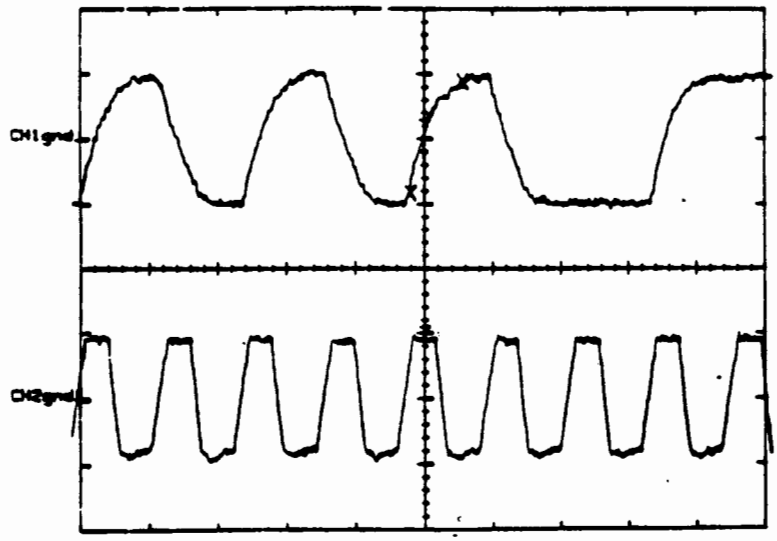


TX DATA (PIN 2)

MAXIMUM: 10.8 V MINIMUM: -11.2 V
RISE: 38.4 µs FALL: 38.9 µs
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 10.0 V MINIMUM: -9.2 V
RISE: 10.5 µs FALL: 6.63 µs
T/DIV: 50 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 10.4 V MINIMUM: -11.2 V
RISE: 31.7 µs FALL: 31.5 µs
T/DIV: 50 µs V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 10.0 V MINIMUM: -9.6
RISE: 12.1 µs FALL: 7.59 µs
T/DIV: 50 µs V/DIV: 10 V

APPENDIX F

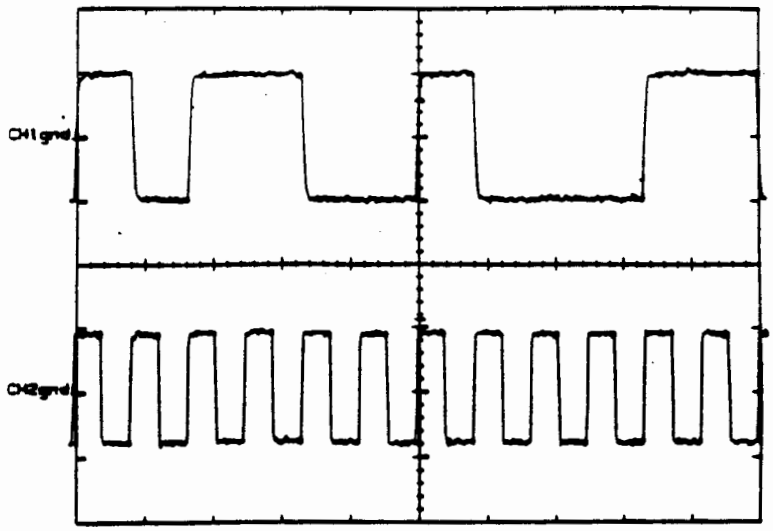
OCTOPUS CABLE TEST
TEST B

TEST B

CODEX 3600/HADAX EIA-PP/CODEX DB 21[illegible]

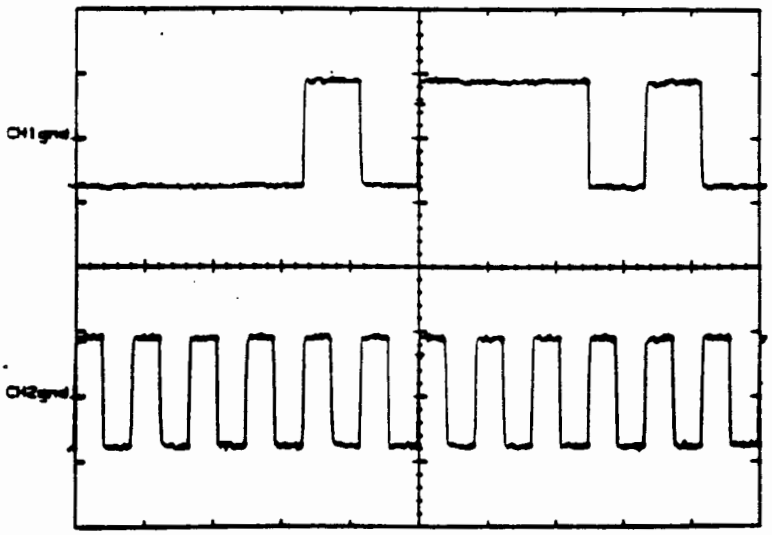
EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 2,400 bps



TX DATA (PIN 2)
MAXIMUM: 10.8 V MINIMUM: -10.8 V
RISE: 32.9 µs FALL: 30.2 µs
T/DIV: 500 µs V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 9.6 V MINIMUM: -8.8 V
RISE: 10.3 µs FALL: 6.61 µs
T/DIV: 500 µs V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 10.0 V MINIMUM: -8.0 V
RISE: 17.4 µs FALL: 9.0 µs
T/DIV: 500 µs V/DIV: 10 V

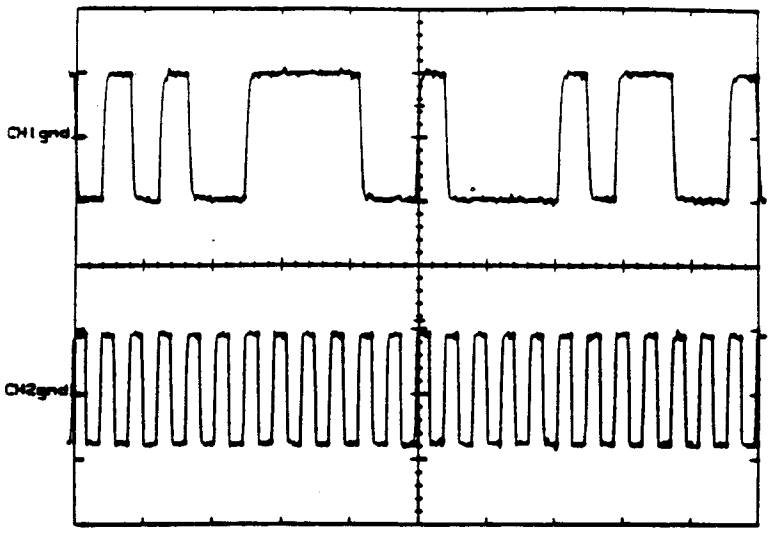
RC CLOCK (PIN 17)
MAXIMUM: 9.6 V MINIMUM: -8.8 V
RISE: 11.3 µs FALL: 7.34 µs
T/DIV: 500 µs V/DIV: 10 V

TEST B—

CODEX 3600/HADAX EIA-PP/CODEX DB 2185/BERTS

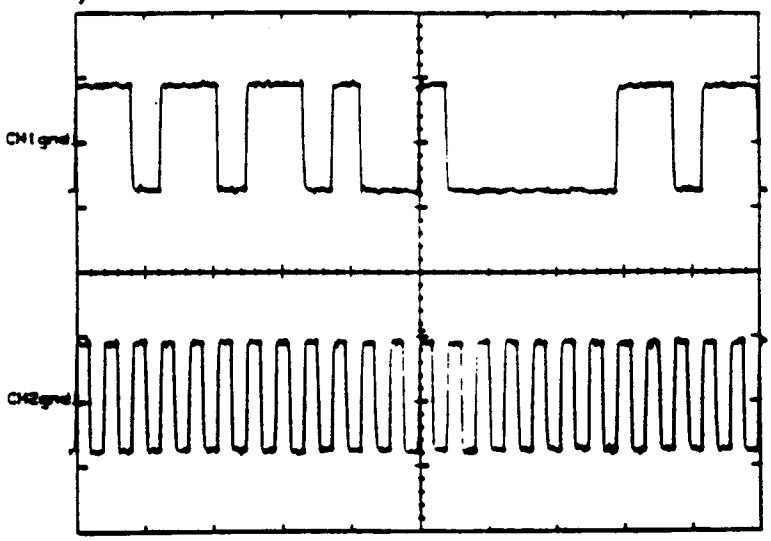
EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 4,800 bps



TX DATA (PIN 2)
MAXIMUM: 11.2 V MINIMUM: -10.8 V
RISE: 37.6 µs FALL: 36.5 µs
T/DIV: 500 µs V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 10.4 V MINIMUM: -8.8 V
RISE: 10.6 µs FALL: 6.73 µs
T/DIV: 500 µs V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 10 V MINIMUM: -8.4 V
RISE: 16.9 µs FALL: 17.5 µs
T/DIV: 500 µs V/DIV: 10 V

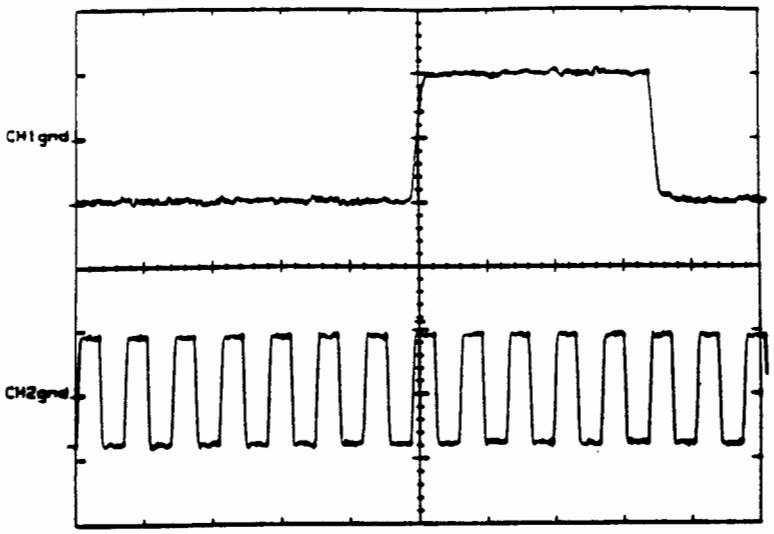
RC CLOCK (PIN 17)
MAXIMUM: 9.6 V MINIMUM: -8.4 V
RISE: 15.7 µs FALL: 8.37 µs
T/DIV: 500 µs V/DIV: 10 V

TEST B

CODEX 3600/HADAX EIA-PP/CODEX DB 2185/BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 500 OCTOPUS

DATA SPEED: 7,200 bps

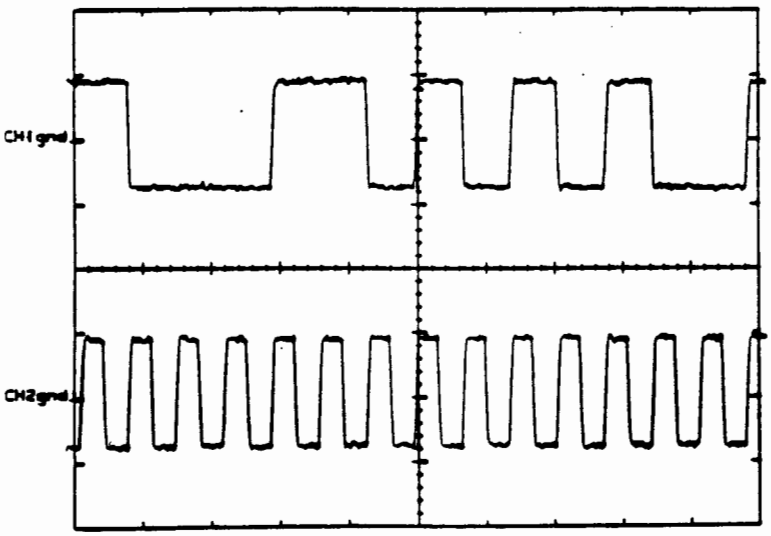


TX DATA (PIN 2)

MAXIMUM: 11.2 V MINIMUM: -10.8 V
RISE: 38.3 µs FALL: 33.8 µs
T/DIV: 200 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 10.0 V MINIMUM: -6.8
RISE: 9.85 µs FALL: 6.87 µs
T/DIV: 200 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 10.0 V MINIMUM: -8.0 V
RISE: 12.4 µs FALL: 7.02 µs
T/DIV: 200 µs V/DIV: 10 V

RC CLOCK (PIN 17)

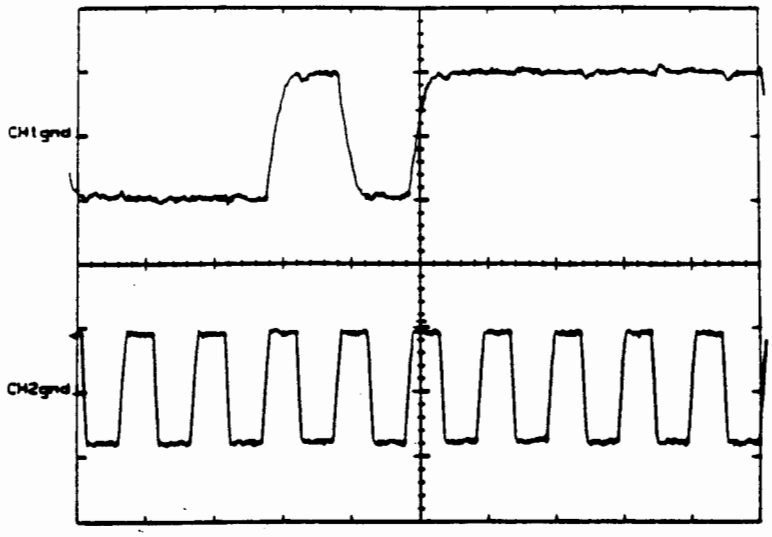
MAXIMUM: 9.6 V MINIMUM: -8.8 V
RISE: 10.6 V FALL: 7.95 V
T/DIV: 200 µs V/DIV: 10 V

TEST B

CODEX 3600/HADAX EIA-PP/CODEX DB 2185/BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 9,600 bps



TX DATA (PIN 2)

MAXIMUM: 11.2 V MINIMUM: -10.8

RISE: 35.7 µs FALL: 30.3 µs

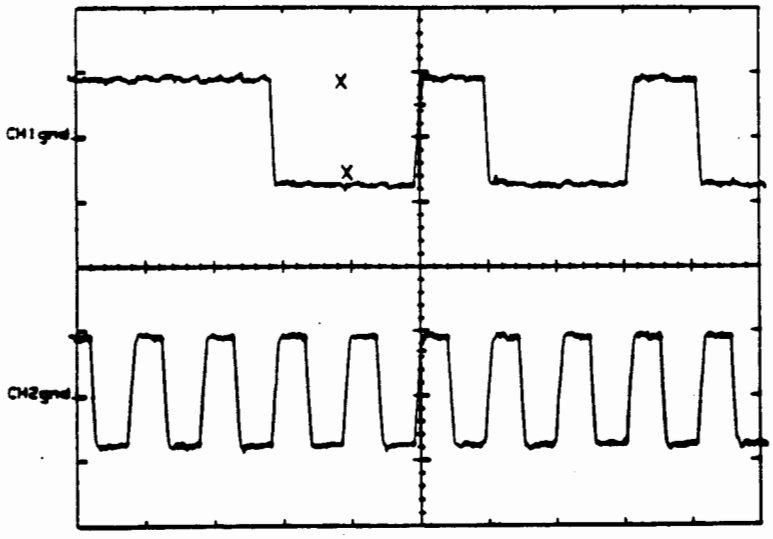
T/DIV: 100 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 10 V MINIMUM: -8.8 V

RISE: 10.4 µs FALL: 6.94 µs

T/DIV: 100 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 10 V MINIMUM: -8 V

RISE: 11.9 µs FALL: 7.83 µs

T/DIV: 100 µs V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 10.4 V MINIMUM: -8.88 V

RISE: 11.2 µs FALL: 7.9 µs

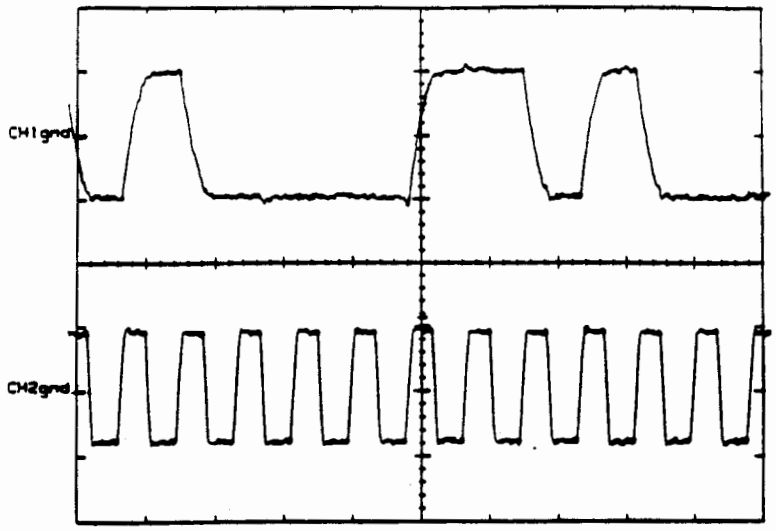
T/DIV: 100 µs V/DIV: 10 V

TEST B

CODEX 3600/HADAX EIA-PP/CODEX DB 2185/BERTS

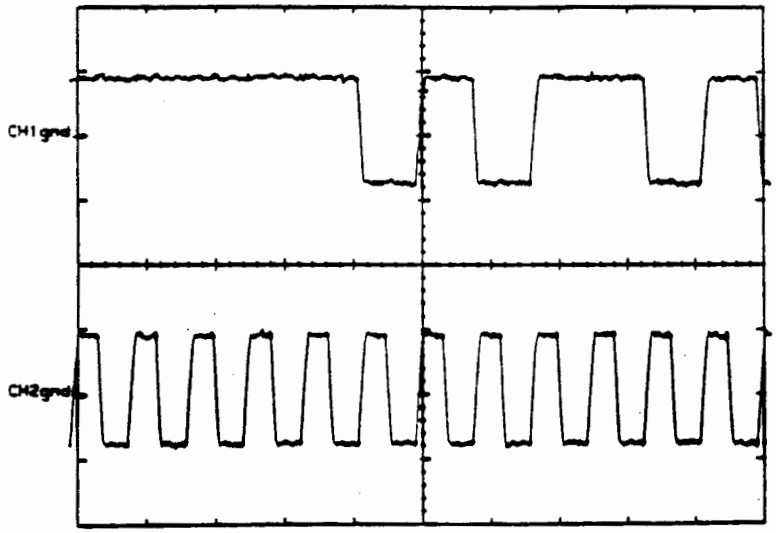
EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 12,000 bps



TX DATA (PIN 2)
MAXIMUM: 10.8 V MINIMUM: -10.8 V
RISE: 29.5 µs FALL: 31.6 µs
T/DIV: 100 µs V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 10 V MINIMUM: -8.8 V
RISE: 8.88 µs FALL: 6.02 µs
T/DIV: 100 µs V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 10.0 V MINIMUM: -8.40 V
RISE: 11.5 µs FALL: 7.40 µs
T/DIV: 100 µs V/DIV: 10 V

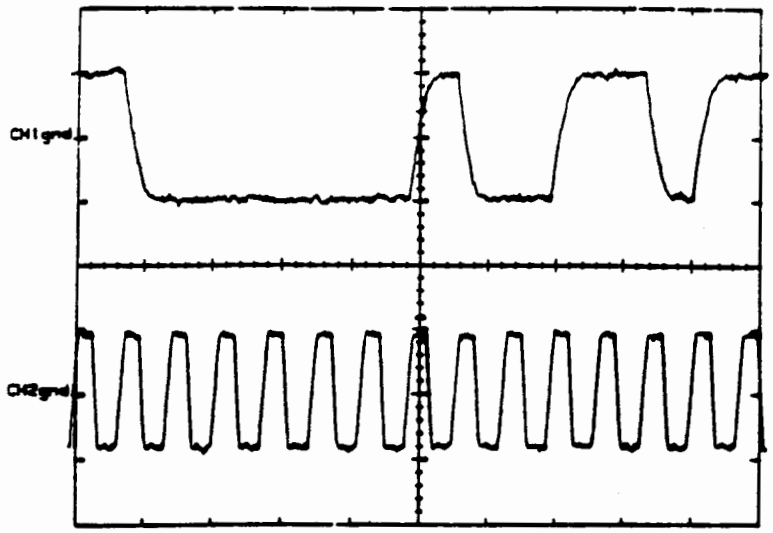
RC CLOCK (PIN 17)
MAXIMUM: 10.0 V MINIMUM: -8.4 V
RISE: 8.88 µs FALL: 9.53 µs
T/DIV: 100 µs V/DIV: 10 V

TEST B

CODEX 3600/HADAX EIA-PP/CODEX DB 2185/BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 14,400 bps

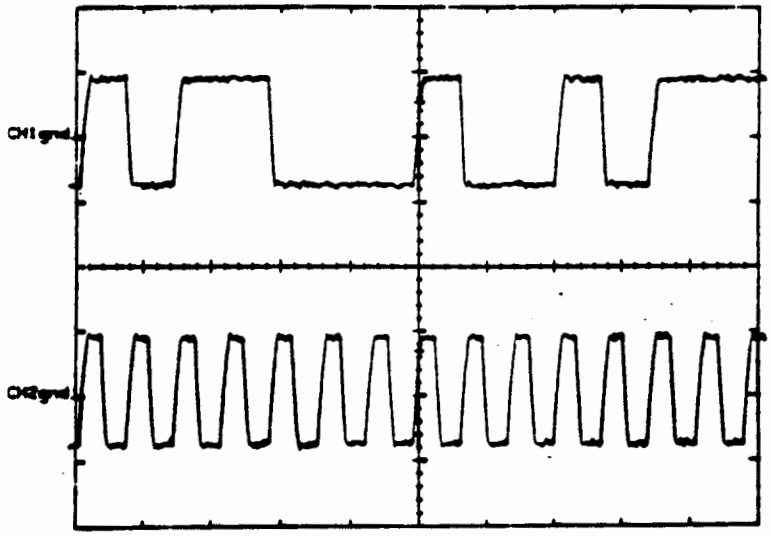


TX DATA (PIN 2)

MAXIMUM: 10.8 V MINIMUM: -10.8 V
RISE: 35.0 µs FALL: 28.7 µs
T/DIV: 100 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 10 V MINIMUM: -9.6 V
RISE: 11.4 µs FALL: 7.79 µs
T/DIV: 100 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 9.6 V MINIMUM: -8.4 V
RISE: 12.2 µs FALL: 6.97 µs
T/DIV: 100 µs V/DIV: 10 V

RC CLOCK (PIN 17)

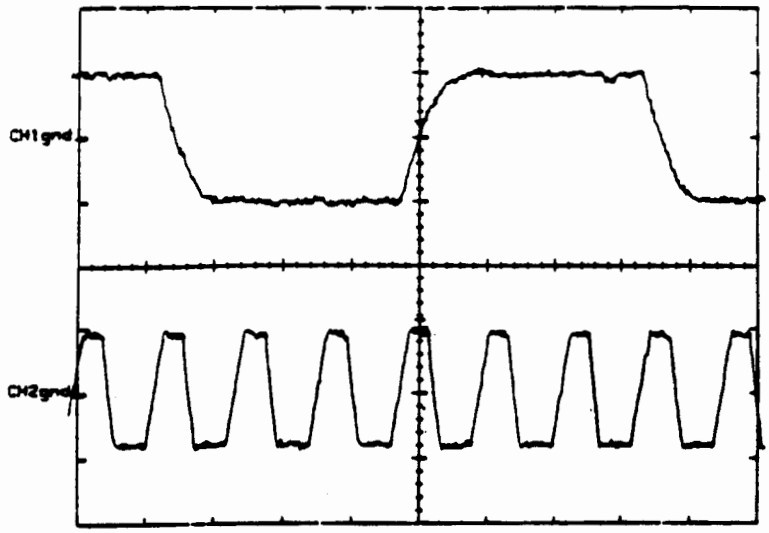
MAXIMUM: 10.0 V MINIMUM: -8.4 V
RISE: 10.5 µs FALL: 7.5 µs
T/DIV: 100 µs V/DIV: 10 V

TEST B___

CODEX 3600/HADAX EIA-PP/CODEX DB 2185/BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 16,800 bps

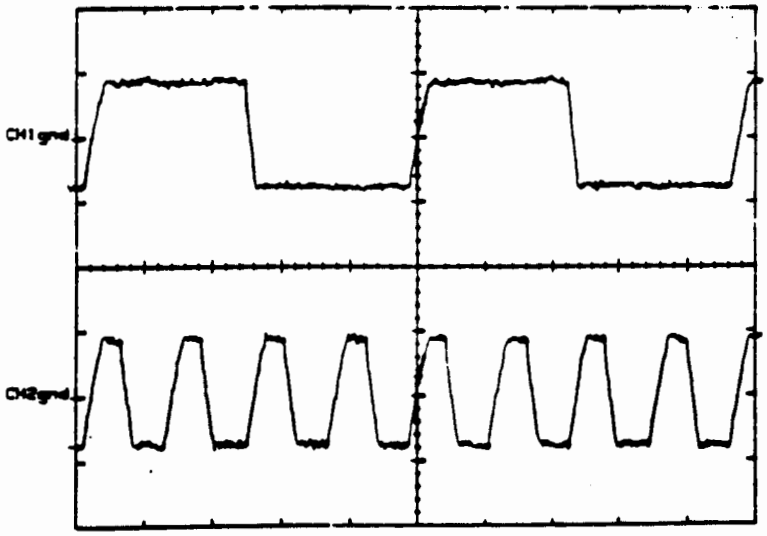


TX DATA (PIN 2)

MAXIMUM: 10.8 V MINIMUM: -10.8 V
RISE: 39.7 µs FALL: 29.9 µs
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 10.0 V MINIMUM: -8.8 V
RISE: 11.4 µs FALL: 7.9 µs
T/DIV: 50 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 9.6 V MINIMUM: -8.8 V
RISE: 13.0 µs FALL: 7.15 µs
T/DIV: 50 µs V/DIV: 10 V

RC CLOCK (PIN 17)

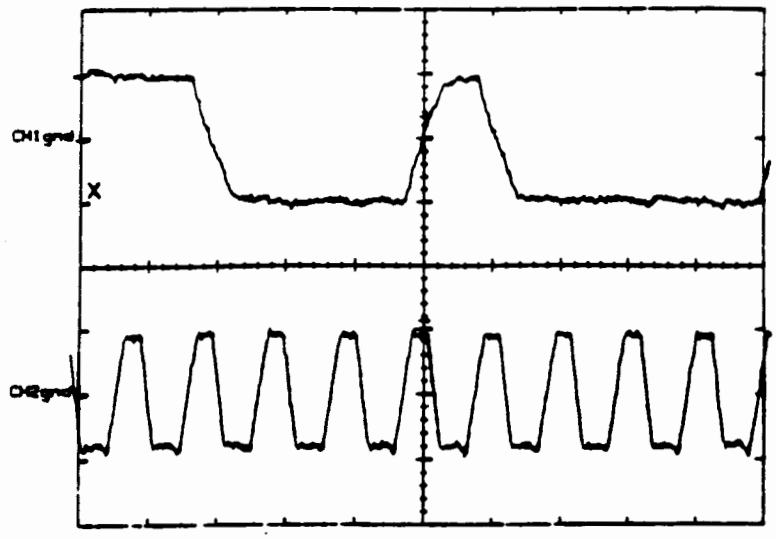
MAXIMUM: 10.0 V MINIMUM: -8.48 V
RISE: 12.8 µs FALL: 8.67 µs
T/DIV: 50 µs V/DIV: 10 V

TEST B

CODEX 3600/HADAX EIA-PP/CODEX DB 2185/BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 19,200 bps



TX DATA (PIN 2)

MAXIMUM: 10.8 V MINIMUM: -10.4 V

RISE: 33.4 µs FALL: 31.7 µs

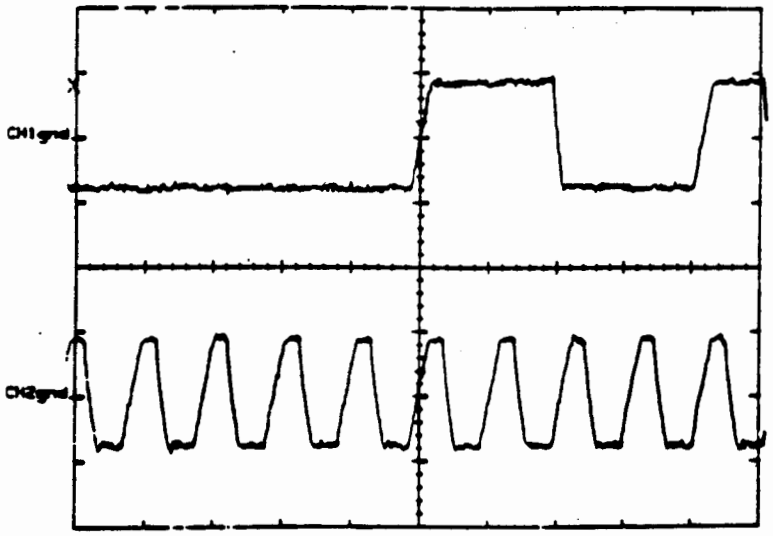
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 10 V MINIMUM: [illegible]

RISE: 11.8 µs FALL: [illegible] µs

T/DIV: 50 µs V/DIV: [illegible]



RX DATA (PIN 3)

MAXIMUM: 9.6 V MINIMUM: -8.8 V

RISE: 12.8 µs FALL: 6.95 µs

T/DIV: 50 µs V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 9.6 V MINIMUM: -8.4 V

RISE: 12.4 µs FALL: 8.42 µs

T/DIV: 50 µs V/DIV: 10 V

APPENDIX G

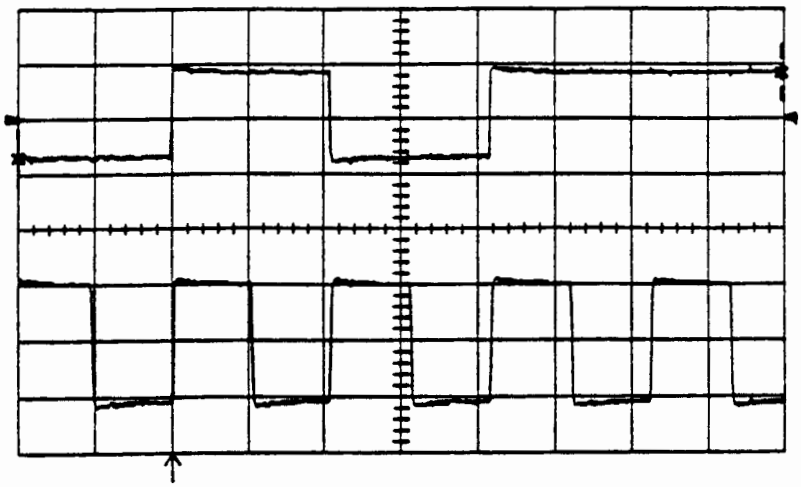
OCTOPUS CABLE TEST
TEST C

TEST C

CODEX 3600/HADAX EIA-PP/CODEX DB 2185/BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 2,400 bps



TX DATA (PIN 2)

MAXIMUM: 9.8 V MINIMUM: -8.33 V

RISE: 2.16 µs FALL: 2.39 µs

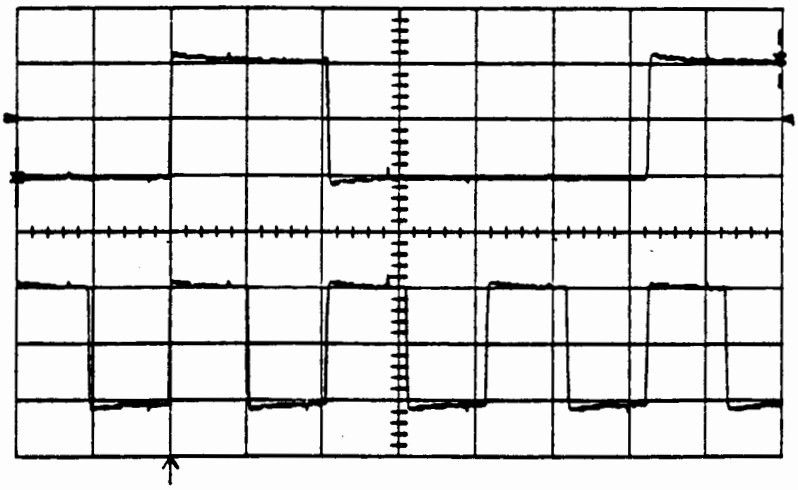
T/DIV: .2 ms V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 11.25 V MINIMUM: -11.88 V

RISE: 4.08 µs FALL: 4.07 µs

T/DIV: .2 ms V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 11.67 V MINIMUM: -12.08 V

RISE: 3.88 µs FALL: 3.43 µs

T/DIV: .2 ms V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 12.50 V MINIMUM: -11.88 V

RISE: 3.56 µs FALL: 3.34 µs

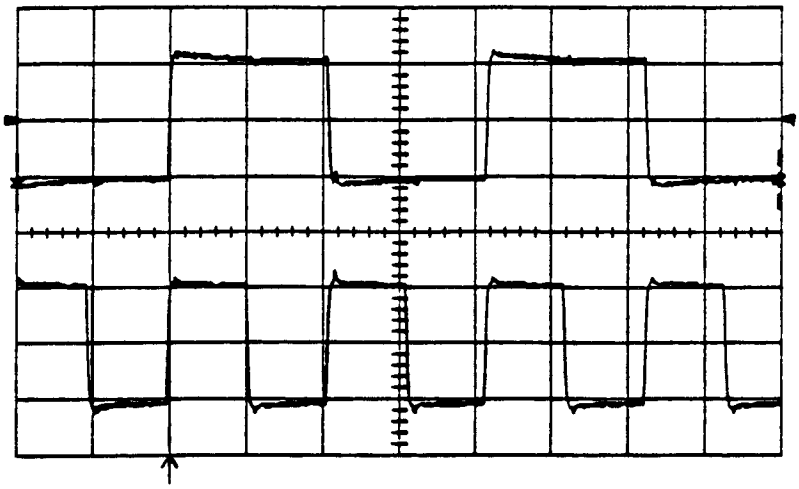
T/DIV: .2 ms V/DIV: 10 V

TEST C

CODEX 3600/HADAX EIA-PP/CODEX DB 2185/BERTS

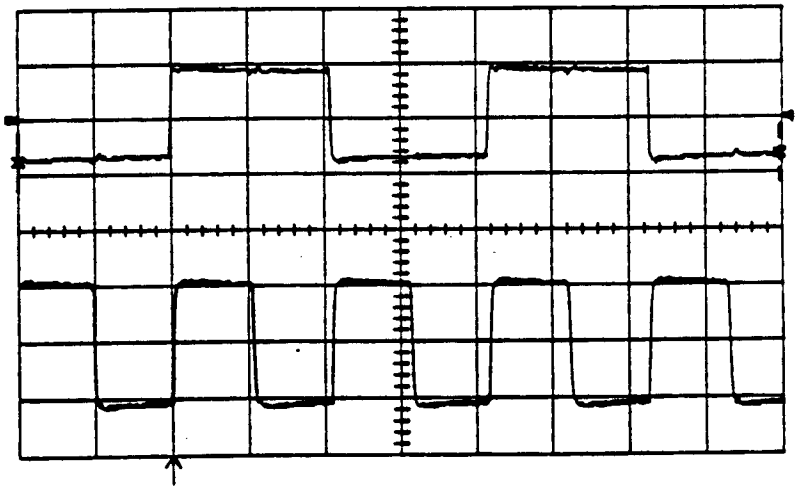
EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 4,800 bps



TX DATA (PIN 2)
MAXIMUM: 12.61 V MINIMUM: -11.76 V
RISE: 4.0 µs FALL: 3.59 µs
T/DIV: .1 ms V/DIV: 10V

TC CLOCK (PIN 15)
MAXIMUM: 11.25 V MINIMUM: -11.68 V
RISE: 4.33 µs FALL: 4.14 µs
T/DIV: .1 ms V/DIV: 10V



RX DATA (PIN 3)
MAXIMUM: 9.49 V MINIMUM: -8.64 V
RISE: 2.21 µs FALL: 2.68 µs
T/DIV: .1 ms V/DIV: 10V

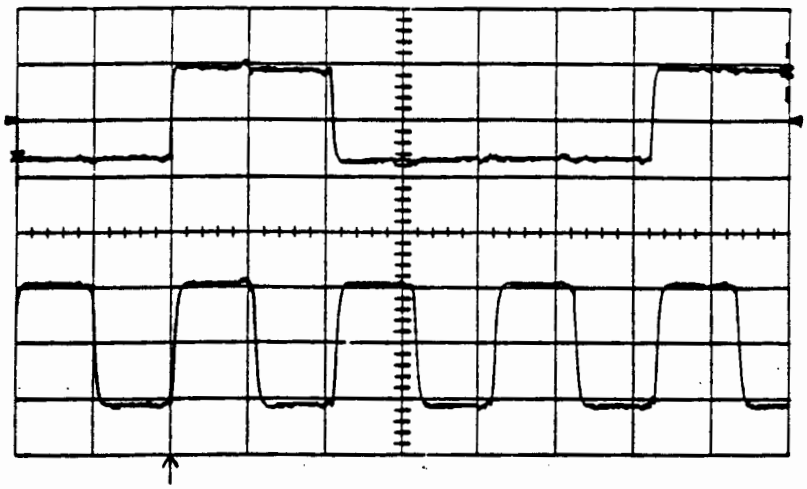
RC CLOCK (PIN 17)
MAXIMUM: 12.81 V MINIMUM: -12.19 V
RISE: 3.89 µs FALL: 3.62 µs
T/DIV: .1 ms V/DIV: 10V

TEST C

CODEX 3600/HADAX EIA-PP/CODEX DB 2185/BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 9,600 bps

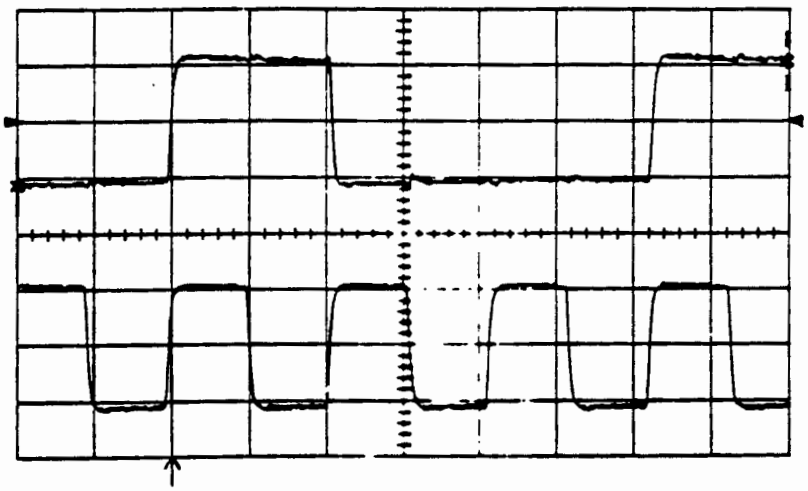


TX DATA (PIN 2)

MAXIMUM: 10.42 V MINIMUM: -8.33 V
RISE: 2.24 µS FALL: 2.54 µS
T/DIV: 50 µS V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 11.56 V MINIMUM: -11.88 V
RISE: 4.24 µS FALL: 4.24 µS
T/DIV: 50 µS V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 11.67 V MINIMUM: -11.76 V
RISE: 4.71 µS FALL: 3.36 µS
T/DIV: 50 µS V/DIV: 10 V

RC CLOCK (PIN 17)

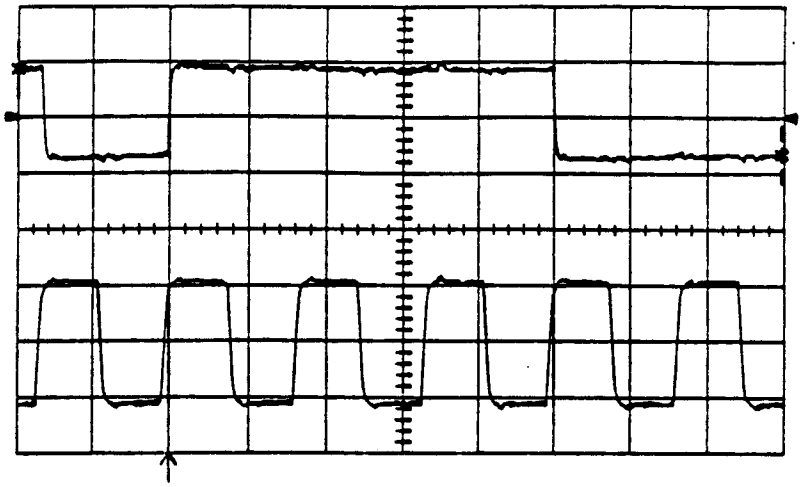
MAXIMUM: 11.25 V MINIMUM: -11.56 V
RISE: 4.42 µS FALL: 4.07 µS
T/DIV: 50 µS V/DIV: 10 V

TEST C

CODEX 3600/HADAX EIA-PP/CODEX DB 2185/BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 12,000 bps



TX DATA (PIN 2)

MAXIMUM: 10.11 V MINIMUM: -8.33 V

RISE: 2.31 µs FALL: 2.52 µs

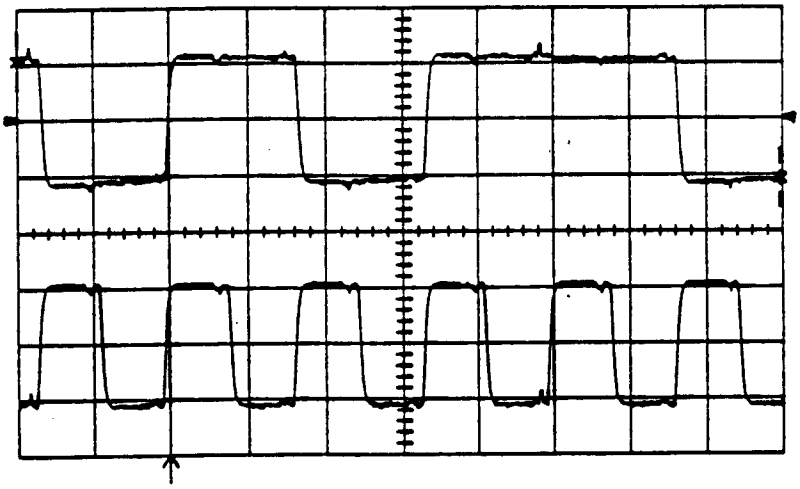
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 11.56 V MINIMUM: -11.88 V

RISE: 3.76 µs FALL: 3.89 µs

T/DIV: 50 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 13.24 V MINIMUM: -12.70 V

RISE: 4.23 µs FALL: 3.73 µs

T/DIV: 50 µs V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 13.24 V MINIMUM: -12.70 V

RISE: 4.23 µs FALL: 3.73 µs

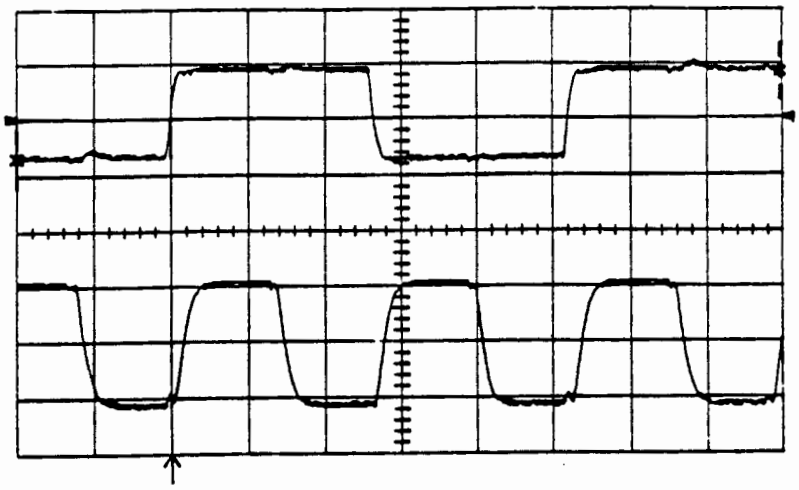
T/DIV: 50 µs V/DIV: 10 V

TEST C

CODEX 3600/HADAX EIA-PP/CODEX DB 2185/BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 19,200 bps



TX DATA (PIN 2)

MAXIMUM: 10.42 V MINIMUM: -8.01 V

RISE: 2.14 µs FALL: 2.54 µs

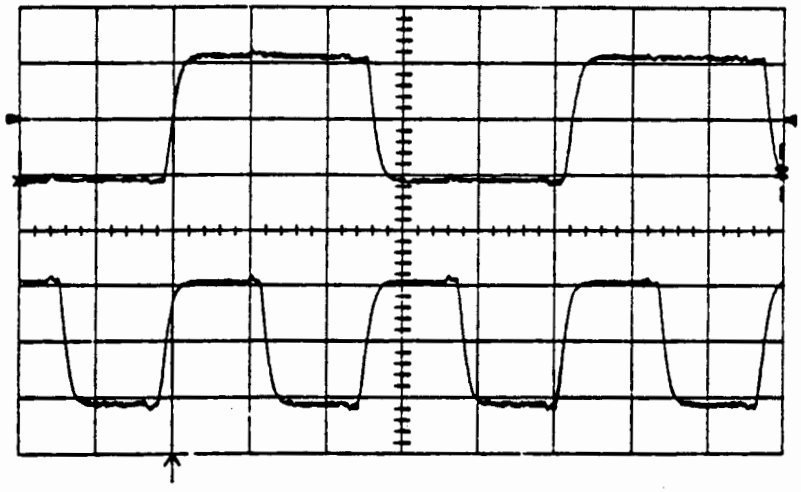
T/DIV: 20 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 11.25 V MINIMUM: -11.88 V

RISE: 4.74 µs FALL: 4.43 µs

T/DIV: 20 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 12.4 V MINIMUM: -12.08 V

RISE: 4.15 µs FALL: 3.8 µs

T/DIV: 20 µs V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 13.44 V MINIMUM: -12.5 V

RISE: 4.05 µs FALL: 3.66 µs

T/DIV: 20 µs V/DIV: 10 V

APPENDIX H

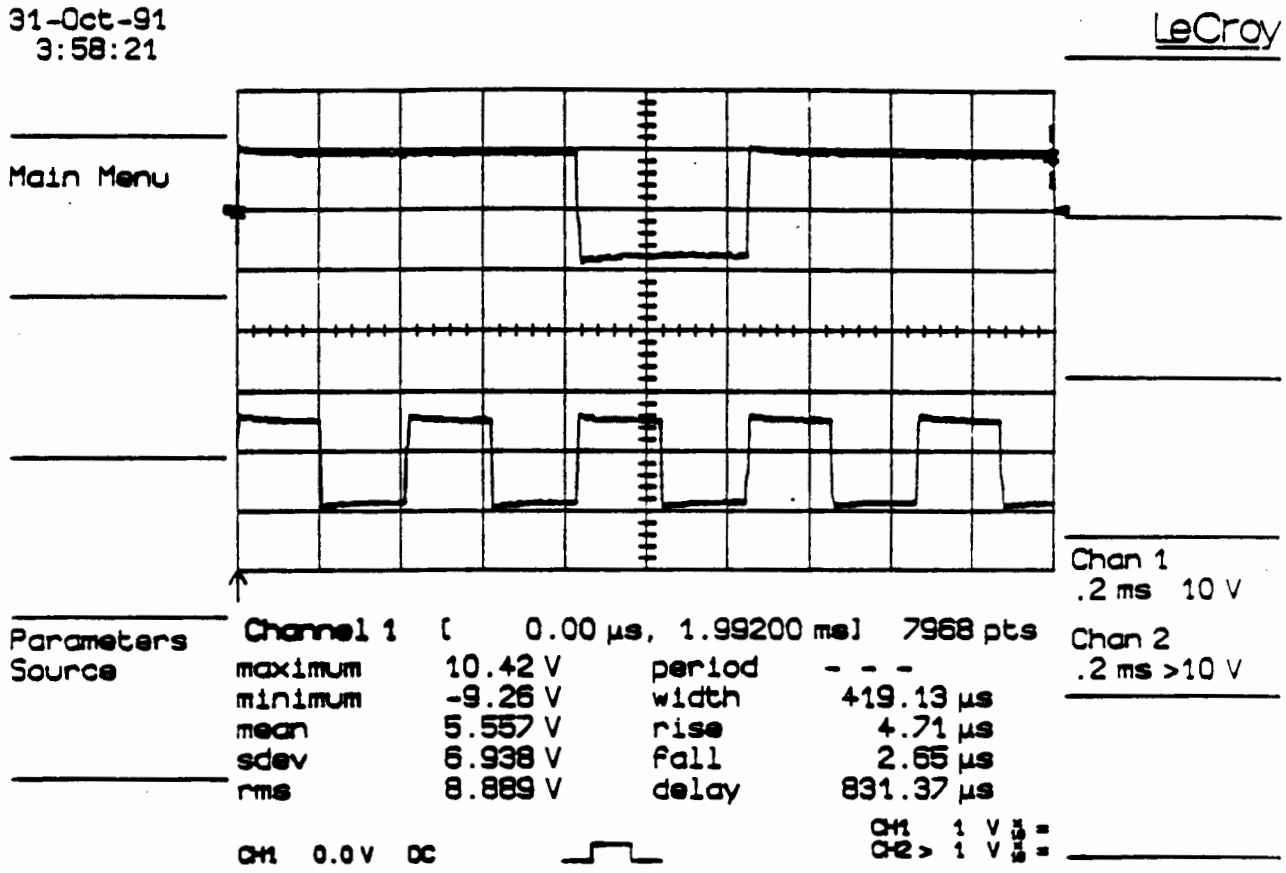
PAMRI WITH LIVE DATA

DMN EQUIPMENT/PAMRI INTERFACE

150 FEET EXTENDED DISTANCE DATA CABLE

LIVE RADAR DATA OF 2400 bps

RX DATA (Pin 3) and RX CLOCK (Pin 17)

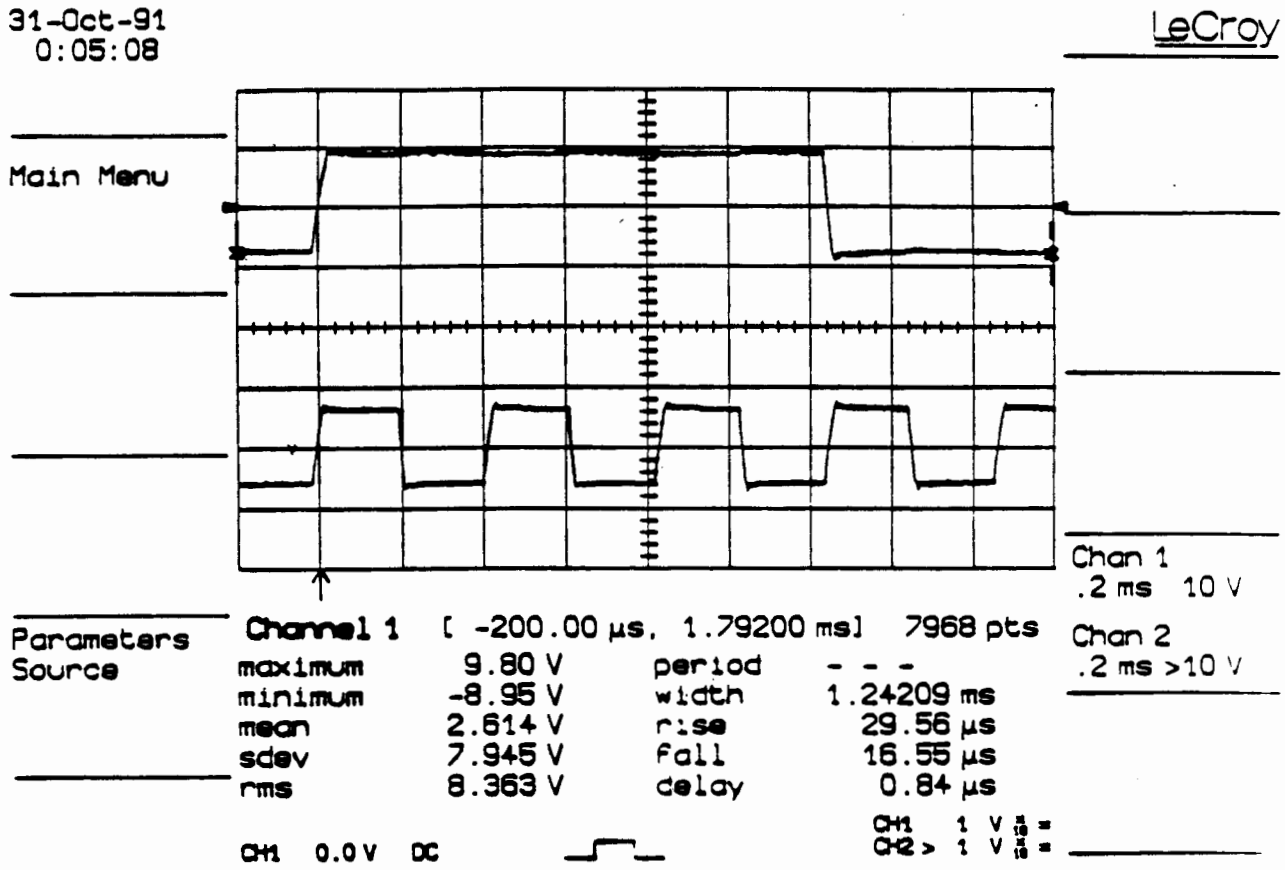


DMN EQUIPMENT/PAMRI INTERFACE

350 FEET EXTENDED DISTANCE DATA CABLE

LIVE RADAR DATA OF 2400 bps

RX DATA (Pin 3) and RX CLOCK (Pin 17)

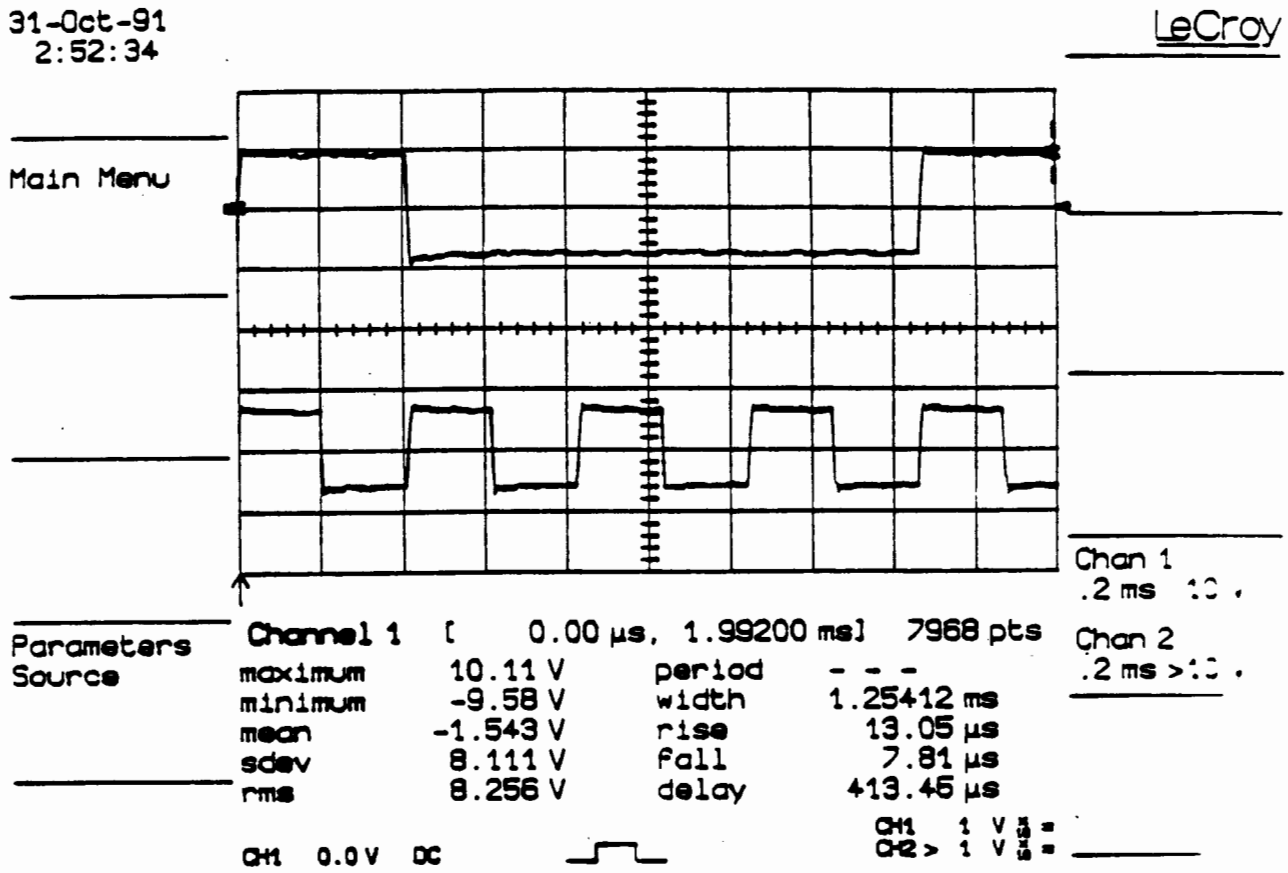


DMN EQUIPMENT/PAMRI INTERFACE

550 FEET EXTENDED DISTANCE DATA CABLE

LIVE RADAR DATA OF 2400 bps

RX DATA (Pin 3) and RX CLOCK (Pin 17)

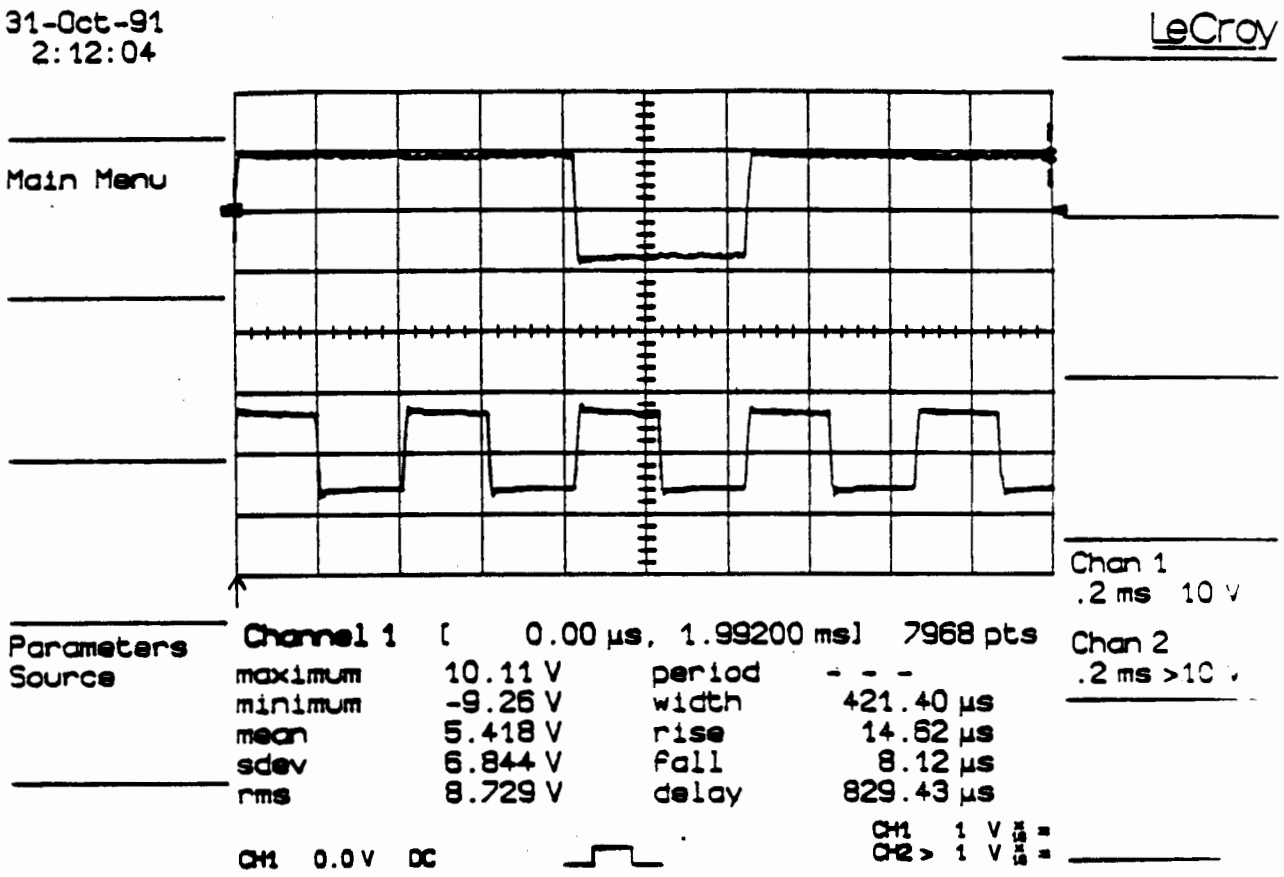


DMN EQUIPMENT/PAMRI INTERFACE

800 FEET EXTENDED DISTANCE DATA CABLE

LIVE RADAR DATA OF 2400 bps

RX DATA (Pin 3) and RX CLOCK (Pin 17)

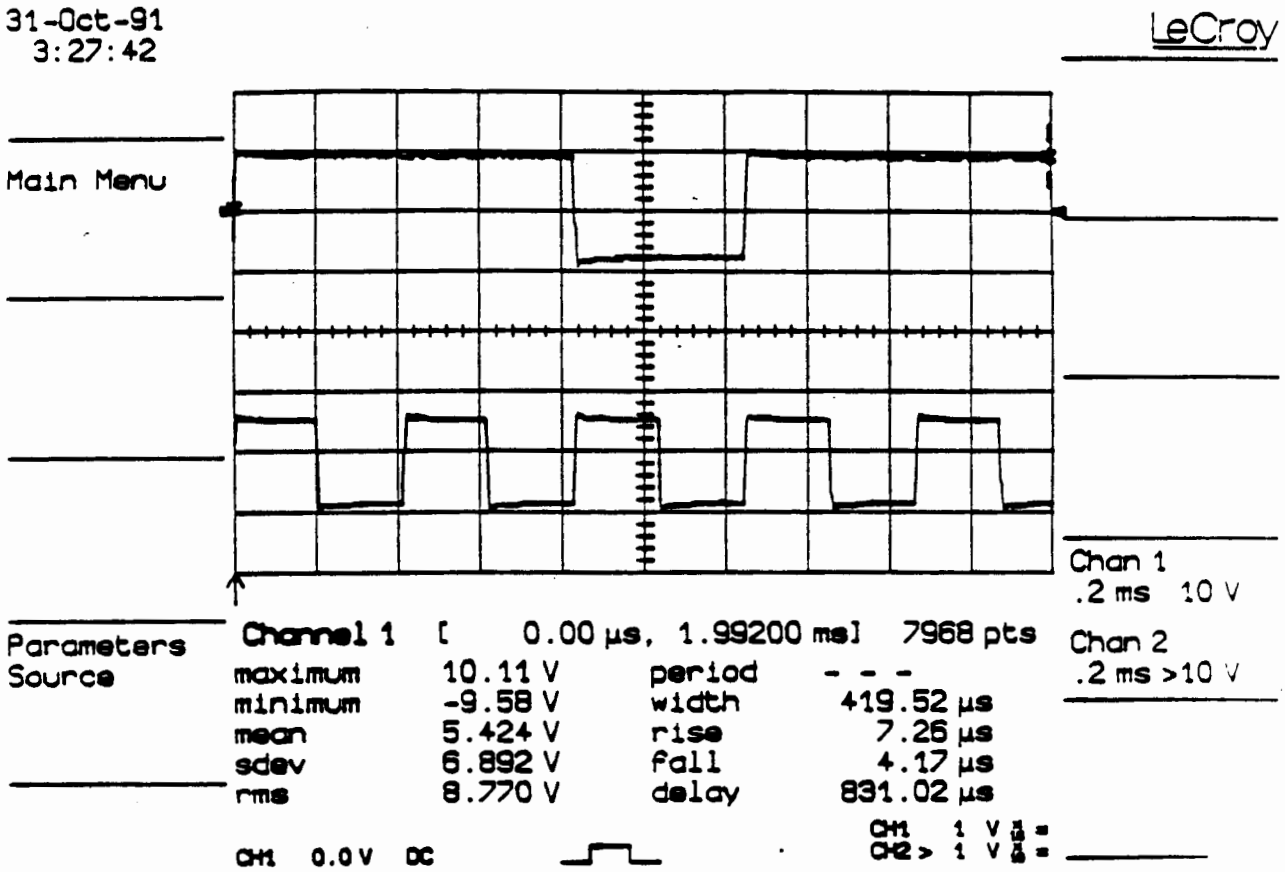


DMN EQUIPMENT/PAMRI INTERFACE

1650 FEET EXTENDED DISTANCE DATA CABLE

LIVE RADAR DATA OF 2400 bps

RX DATA (Pin 3) and RX CLOCK (Pin 17)

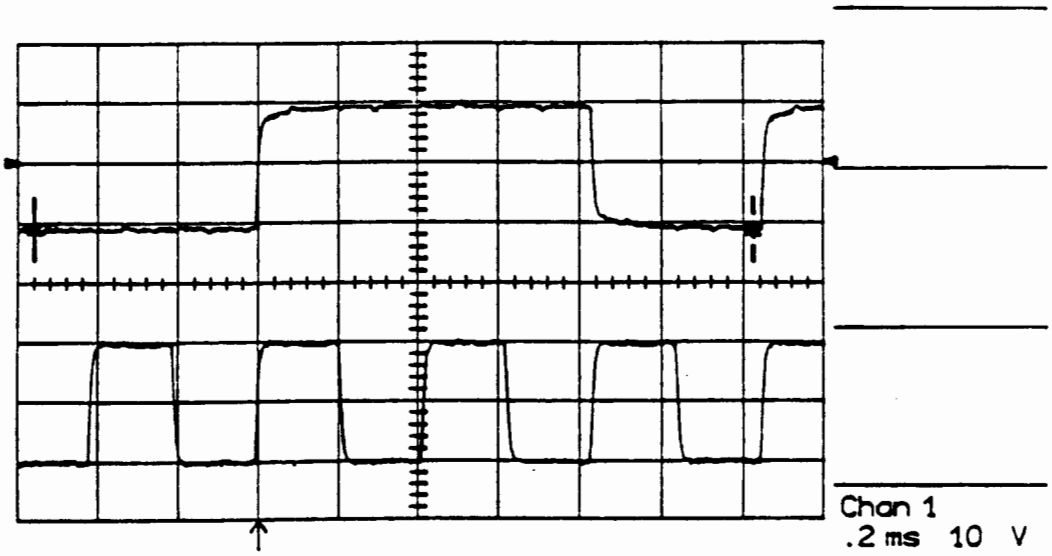


DMN EQUIPMENT/PAMRI INTERFACE

500 FEET OCTOPUS CABLE

LIVE RADAR DATA OF 2400 bps

RX DATA (Pin 3) and RX CLOCK (Pin 17)



Channel 1 [-560.00 µs, 1.22275 ms] 7131 pts

maximum	9.8	V	period	- - -
minimum	-11.8	V	width	834.34 µs
mean	-1.53	V	rise	24.61 µs
sdev	9.88	V	fall	22.93 µs
rms	10.00	V	delay	-0.59 µs

Channel 2 [-560.00 µs, 1.22275 ms] 7131 pts

maximum		9.7	V	period	416.81 µs
minimum		-11.2	V	width	208.55 µs
mean	~	-0.62	V	rise	12.70 µs
sdev	~	9.63	V	fall	13.11 µs
rms	~	9.65	V	delay	-418.48 µs

QARS - Quick Analysis of Radar Sites
Codex 3600/Codex 2185 DB/EIA-PP/PAMRI
Extended Data Distance Cable length: 150'

	EXPECTED	ACTUAL
BECON		
SCANS		1131
BLIP/SCANS	<95%	98.4
SCH-REINFOR	1)<50/60%	61.4
TCT COLL PCT	1)<70/80%	99.8
AZ-SPLIT	>.2%	0
RNG-SPLIT	>.2%	0
RING-AROUND	>.5%	0
REFLECTIONS	>.2%	0
CODE ZEROES	>.5%	0
MODE 3/A REL	<97%	100.0
MODE 3/A/VAL	<97%	100.0
MODE C REL	2)<97/96%	100.0
MODE C VAL	2)<96/94%	99.7
MODE C SCANS		1113
RNG DEV	>0/1	0/0
AZ DEV	>2.0	1.3
LOG/NML		
SCANS		1010
BLIP/SCAN		53.7
COLL PCT	<75%	100.0
AZ-SPLIT	1<70/80%.	0
RNG-SPLIT	>2.0	0
MTI		
SCANS		121
BLIP/SCANS	3)<65/50%	53.7
COLL PCT	1)70/80%	100.0
AZ-SPLIT	>.2%	0
RNG-SPLIT	1)6/3%	0
COLLIMATION		
MTI RNG ERR	>0.8	0
NML RNG ERR	>0.8	+.01
TOT RNG ERR	>0.8	+.01
MTI RNG ERR	>2.0	—
MTI AZ ERR	>2.0	+4.0
TOT AZ ERR	>2.0	+4.0
PE VERIFICATION		
#1 RNG ERROR	>0/1	
#1 AZ ERROR	>2.0	
#1 PCT REL	<80%	0
#2 RNG ERROR	>0/1	
#2 AZ ERROR	>2.0	
#2 PCT REL	<80%	
#3 RNG ERROR	>0/1	
#3 AZ ERROR	>2.0	
#3 PCT REL	<80%	
#4 RNG ERROR	>0/1	
#4 AZ ERROR	<2.0	
#4 PCT REL	<80%	
TOTAL TRACKS		18
SCH/BCN CHANNEL		A/B

QARS - Quick Analysis of Radar Sites
Codex 3600/Codex 2185 DB/EIA-PP/PAMRI
Extended Data Distance Cable length: 350'

	EXPECTED	ACTUAL
BECON		
SCANS		1298
BLIP/SCANS	<95%	98.9
SCH-REINFOR	1)<50/60%	62.7
TCT COLL PCT	1)<70/80%	99.8
AZ-SPLIT	>.2%	0
RNG-SPLIT	>.2%	0
RING-AROUND	>.5%	.1
REFLECTIONS	>.2%	0
CODE ZEROES	>.5%	0
MODE 3/A REL	<97%	100.0
MODE 3/A/VAL	<97%	99.9
MODE C REL	2)<97/96%	100.0
MODE C VAL	2)<96/94%	99.6
MODE C SCANS		1285
RNG DEV	>0/1	0/0
AZ DEV	>2.0	1.25
LOG/NML		
SCANS		1200
BLIP/SCAN		62.7
COLL PCT	<75%	99.8
AZ-SPLIT	1<70/80%	0
RNG-SPLIT	>2.0	.1
MTI		
SCANS		98
BLIP/SCANS	3)<65/50%	56.1
COLL PCT	1)70/80%	100.0
AZ-SPLIT	>.2%	0
RNG-SPLIT	1)6/3%	0
COLLIMATION		
MTI RNG ERR	>0.8	0
NML RNG ERR	>0.8	.01
TOT RNG ERR	>0.8	.01
MTI RNG ERR	>2.0	
MTI AZ ERR	>2.0	-2.0
TOT AZ ERR	>2.0	-2.0
PE VERIFICATION		
#1 RNG ERROR	>0/1	
#1 AZ ERROR	>2.0	
#1 PCT REL	<80%	0
#2 RNG ERROR	>0/1	
#2 AZ ERROR	>2.0	
#2 PCT REL	<80%	0
#3 RNG ERROR	>0/1	
#3 AZ ERROR	>2.0	
#3 PCT REL	<80%	
#4 RNG ERROR	>0/1	
#4 AZ ERROR	<2.0	
#4 PCT REL	<80%	
TOTAL TRACKS		20
SCH/BCN CHANNEL		A/B

QARS - Quick Analysis of Radar Sites
Codex 3600/Codex 2185 DB/EIA-PP/PAMRI
Extended Data Distance Cable length: 550'

	EXPECTED	ACTUAL
BECON		
SCANS		2776
BLIP/SCANS	<95%	98.9
SCH-REINFOR	1)<50/60%	61.0
TCT COLL PCT	1)<70/80%	99.7
AZ-SPLIT	>.2%	0
RNG-SPLIT	>.2%	0
RING-AROUND	>.5%	0
REFLECTIONS	>.2%	0
CODE ZEROES	>.5%	0
MODE 3/A REL	<97%	99.9
MODE 3/A/VAL	<97%	99.8
MODE C REL	2)<97/96%	99.9
MODE C VAL	2)<96/94%	99.4
MODE C SCANS		2733
RNG DEV	>0/1	0/0
AZ DEV	>2.0	1.34
LOG/NML		
SCANS		2264
BLIP/SCAN		60.8
COLL PCT	<75%	99.7
AZ-SPLIT	1<70/80%	0
RNG-SPLIT	>2.0	0
MTI		
SCANS		512
BLIP/SCANS	3)<65/50%	59.7
COLL PCT	1)70/80%	99.6
AZ-SPLIT	>.2%	0
RNG-SPLIT	1)6/3%	0
COLLIMATION		
MTI RNG ERR	>0.8	-.02
NML RNG ERR	>0.8	-.01
TOT RNG ERR	>0.8	-.01
MTI RNG ERR	>2.0	+4.0
MTI AZ ERR	>2.0	-2.0
TOT AZ ERR	>2.0	-.5
PE VERIFICATION		
#1 RNG ERROR	>0/1	
#1 AZ ERROR	>2.0	
#1 PCT REL	<80%	0
#2 RNG ERROR	>0/1	
#2 AZ ERROR	>2.0	
#2 PCT REL	<80%	0
#3 RNG ERROR	>0/1	
#3 AZ ERROR	>2.0	
#3 PCT REL	<80%	
#4 RNG ERROR	>0/1	
#4 AZ ERROR	<2.0	
#4 PCT REL	<80%	
TOTAL TRACKS		44
SCH/BCN CHANNEL		A/B

QARS - Quick Analysis of Radar Sites
Codex 3600/Codex 2185 DB/EIA-PP/PAMRI
Extended Data Distance Cable length: 800'

	EXPECTED	ACTUAL
BECON		
SCANS		3451
BLIP/SCANS	<95%	99.2
SCH-REINFOR	1)<50/60%	65.7
TCT COLL PCT	1)<70/80%	99.7
AZ-SPLIT	>.2%	0
RNG-SPLIT	>.2%	0
RING-AROUND	>.5%	0
REFLECTIONS	>.2%	0
CODE ZEROES	>.5%	0
MODE 3/A REL	<97%	99.9
MODE 3/A/VAL	<97%	99.9
MODE C REL	2)<97/96%	99.9
MODE C VAL	2)<96/94%	99.4
MODE C SCANS		3422
RNG DEV	>0/1	0/0
AZ DEV	>2.0	1.32
LOG/NML		
SCANS		2816
BLIP/SCAN		66.7
COLL PCT	<75%	99.7
AZ-SPLIT	1<70/80%	0
RNG-SPLIT	>2.0	0
MTI		
SCANS		635
BLIP/SCANS	3)<65/50%	59.3
COLL PCT	1)70/80%	99.7
AZ-SPLIT	>.2%	0
RNG-SPLIT	1)6/3%	0
COLLIMATION		
MTI RNG ERR	>0.8	-.01
NML RNG ERR	>0.8	0
TOT RNG ERR	>0.8	0
MTI RNG ERR	>2.0	+3.0
MTI AZ ERR	>2.0	-.8
TOT AZ ERR	>2.0	-.17
PE VERIFICATION		
#1 RNG ERROR	>0/1	
#1 AZ ERROR	>2.0	
#1 PCT REL	<80%	0
#2 RNG ERROR	>0/1	
#2 AZ ERROR	>2.0	
#2 PCT REL	<80%	0
#3 RNG ERROR	>0/1	
#3 AZ ERROR	>2.0	
#3 PCT REL	<80%	
#4 RNG ERROR	>0/1	
#4 AZ ERROR	<2.0	
#4 PCT REL	<80%	
TOTAL TRACKS		43
SCH/BCN CHANNEL		A/B

QARS - Quick Analysis of Radar Sites
Codex 3600/Codex 2185 DB/EIA-PP/PAMRI
Extended Data Distance Cable length: 1650'

	EXPECTED	ACTUAL
BECON		
SCANS		883
BLIP/SCANS	<95%	99.8
SCH-REINFOR	1)<50/60%	59.5
TCT COLL PCT	1)<70/80%	100.0
AZ-SPLIT	>.2%	0
RNG-SPLIT	>.2%	0
RING-AROUND	>.5%	0
REFLECTIONS	>.2%	0
CODE ZEROES	>.5%	0
MODE 3/A REL	<97%	100.0
MODE 3/A/VAL	<97%	100.0
MODE C REL	2)<97/96%	100.0
MODE C VAL	2)<96/94%	99.5
MODE C SCANS		880
RNG DEV	>0/1	0/0
AZ DEV	>2.0	1.27
LOG/NML		
SCANS		847
BLIP/SCAN		59.2
COLL PCT	<75%	100.0
AZ-SPLIT	1<70/80%	0
RNG-SPLIT	>2.0	0
MTI		
SCANS		36
BLIP/SCANS	3)<65/50%	63.8
COLL PCT	1)70/80%	100.0
AZ-SPLIT	>.2%	0
RNG-SPLIT	1)6/3%	0
COLLIMATION		
MTI RNG ERR	>0.8	0
NML RNG ERR	>0.8	0
TOT RNG ERR	>0.8	0
MTI RNG ERR	>2.0	
MTI AZ ERR	>2.0	
TOT AZ ERR	>2.0	
PE VERIFICATION		
#1 RNG ERROR	>0/1	
#1 AZ ERROR	>2.0	
#1 PCT REL	<80%	0
#2 RNG ERROR	>0/1	
#2 AZ ERROR	>2.0	
#2 PCT REL	<80%	0
#3 RNG ERROR	>0/1	
#3 AZ ERROR	>2.0	
#3 PCT REL	<80%	
#4 RNG ERROR	>0/1	
#4 AZ ERROR	<2.0	
#4 PCT REL	<80%	
TOTAL TRACKS		15
SCH/BCN CHANNEL		A/B

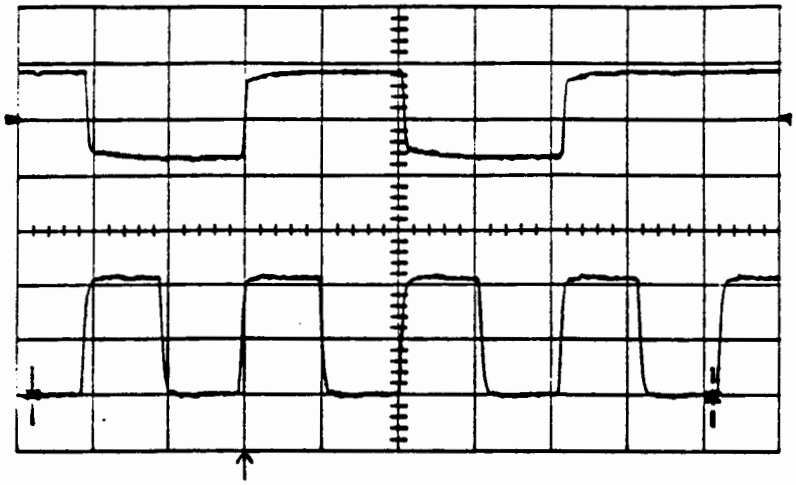
APPENDIX I

PAMRI WITH IDAT

DMN EQUIPMENT/PAMRI INTERFACE

500 FEET OCTOPUS CABLE

IDAT OF 2400 bps



TX DATA (PIN 2)

MAXIMUM: 8.9 V MINIMUM: -7.7 V

RISE: 14.68 µS FALL: 11.80 µS

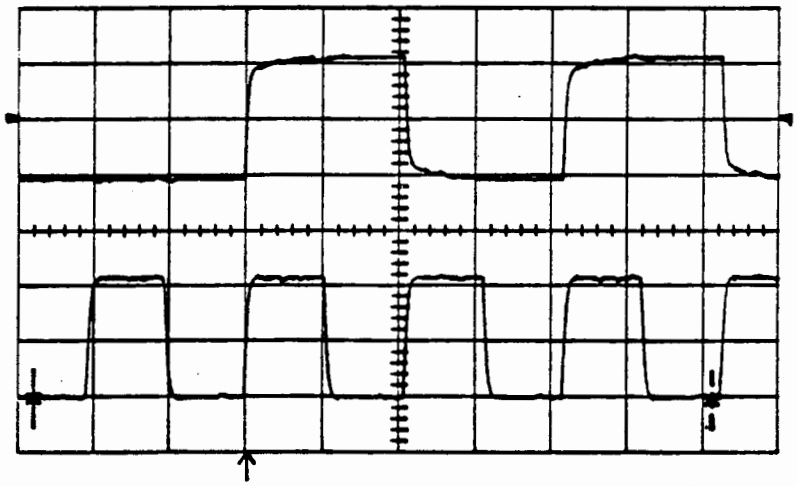
T/DIV: .2 mS V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 11.3 V MINIMUM:

RISE: 15.56 V FALL:

T/DIV: .2 mS V/DIV:



RX DATA (PIN 3)

MAXIMUM: 11.7 V MINIMUM: -11.5 V

RISE: 23.99 µS FALL: 23.55 µS

T/DIV: .2 mS V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 11.3 V MINIMUM:

RISE: 14.98 µS FALL: 15.4 µS

T/DIV: .2 mS V/DIV: 10 V

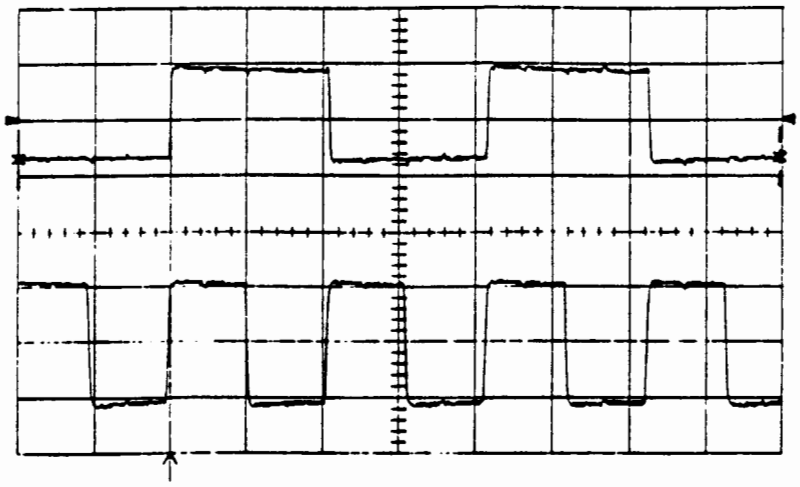
APPENDIX J

M1FC WITH LIVE DATA

DMN EQUIPMENT/M1FC INTERFACE

500 FEET OCTOPUS CABLE

DATA RATE OF 4800 bps

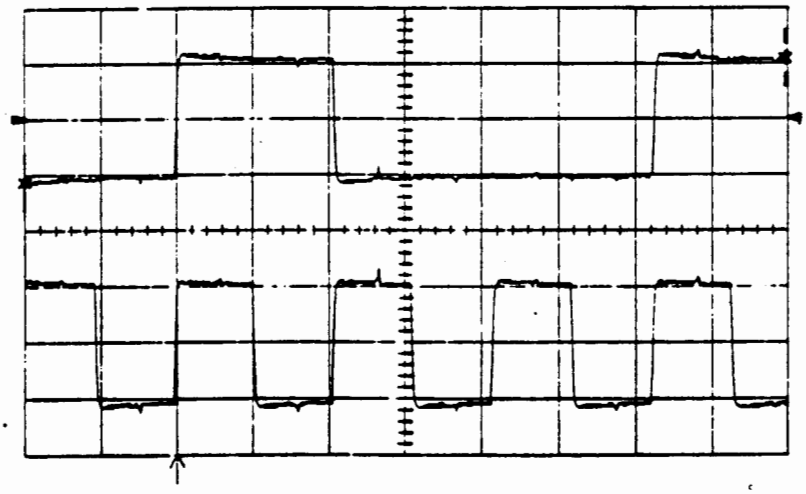


TX DATA (PIN 2)

MAXIMUM: 10.11 V MINIMUM: -8.33 V
RISE: 2.23 µs FALL: 2.33 µs
T/DIV: .1 ms V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 11.25 V MINIMUM: -11.56 V
RISE: 3.83 µs FALL: 3.78 µs
T/DIV: .1 ms V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 12.30 V MINIMUM: -12.08 V
RISE: 3.87 µs FALL: 3.5 µs
T/DIV: .1 ms V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 13.12 V MINIMUM: -12.50 V
RISE: 3.79 µs FALL: 3.44 µs
T/DIV: .1 ms V/DIV: 10 V

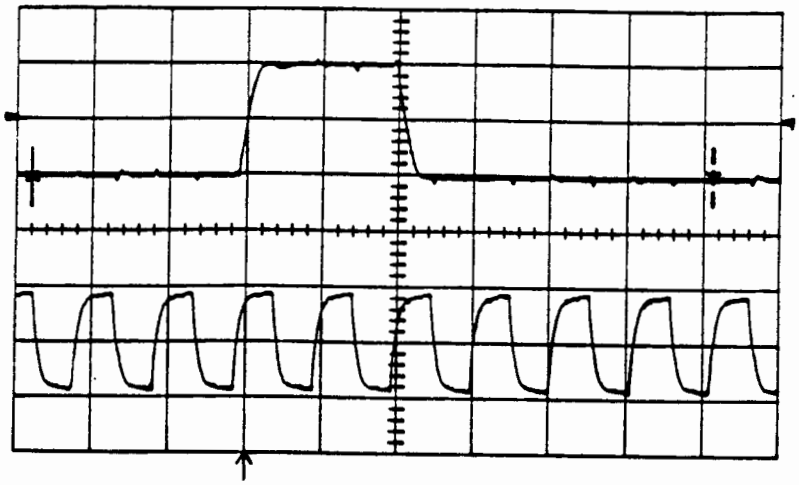
APPENDIX K

NADIN I WITH LIVE DATA

DMN EQUIPMENT/NADIN INTERFACE

500 FEET OCTOPUS CABLE

DATA RATE OF 9600 bps

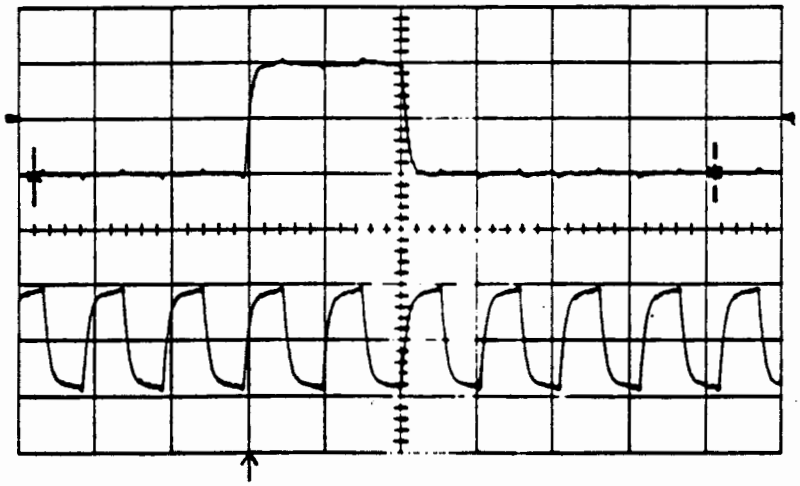


TX DATA (PIN 2)

MAXIMUM: 10.4 V MINIMUM: -11.1 V
RISE: 12.64 µs FALL: 12.14 µs
T/DIV: .1 ms V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 8.8 V MINIMUM: -9.3 V
RISE: 13.33 µs FALL: 13.50 µs
T/DIV: .1 ms V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 10.4 V MINIMUM: -11.8 V
RISE: 20.65 µs FALL: 21.81 µs
T/DIV: .1 ms V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 9.1 V MINIMUM: -9.7 V
RISE: 13.90 µs FALL: 13.82 µs
T/DIV: .1 ms V/DIV: 10 V

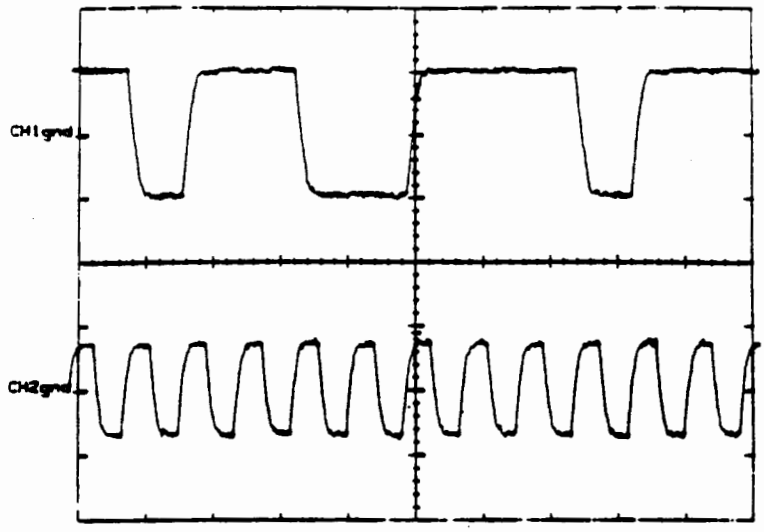
APPENDIX L

LOW LOSS CABLE TEST WITH CODEX 3500/CODEX 6216

CODEX 6216/3500/HADAX EIA-PP/GEMINI DUAL BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 1650'

DATA SPEED: 2,400 bps



TX DATA (PIN 2)

MAXIMUM: 10.8 V MINIMUM: -10.0 V

RISE: 91.6 µs FALL: 96.6 µs

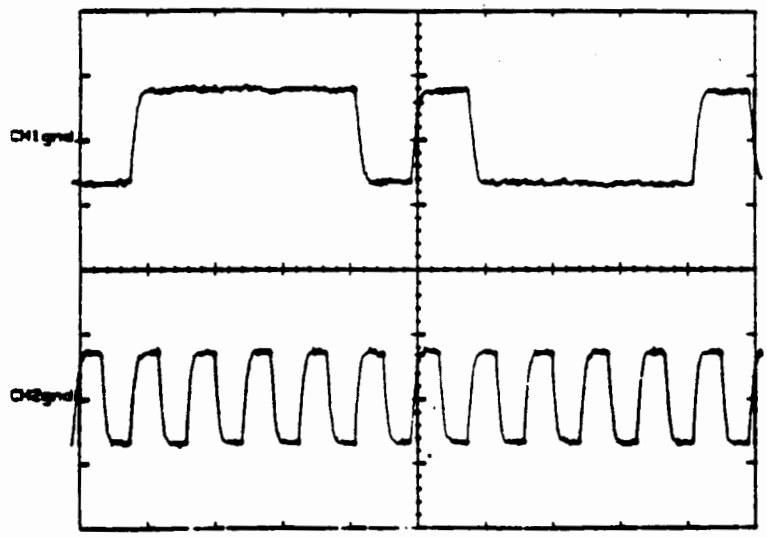
T/DIV: 500 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 8.0 V MINIMUM: 8.0 V

RISE: 78.6 µs FALL: 83.3 µs

T/DIV: 500 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 8.4 V MINIMUM: -7.2 V

RISE: 78.6 µs FALL: 70.8 µs

T/DIV: 500 µs V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 8.4 V MINIMUM: -7.6 V

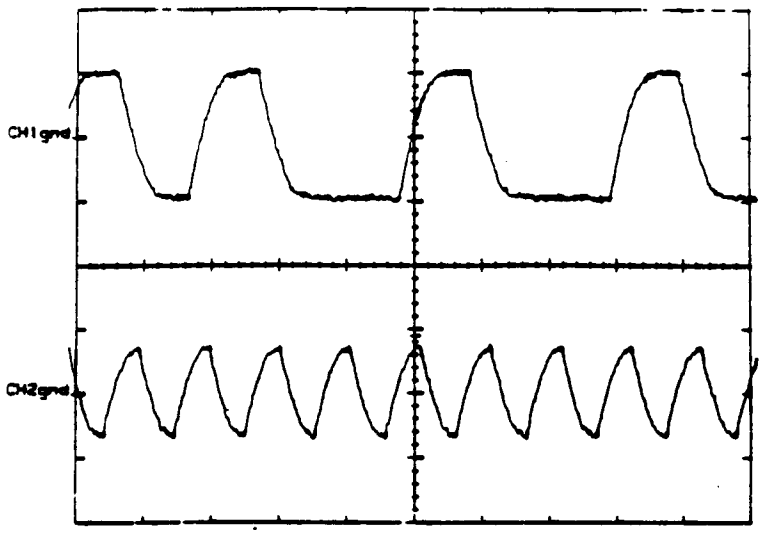
RISE: 70.7 µs FALL: 56.0 µs

T/DIV: 500 µs V/DIV: 10 V

CODEX 6216/3500/HADAX EIA-PP/GEMINI DUAL BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 1600'

DATA SPEED: 4800 bps



TX DATA (PIN 2)

MAXIMUM: 10.8 V MINIMUM: -10.4 V

RISE: 100 µs FALL: 93.5 µs

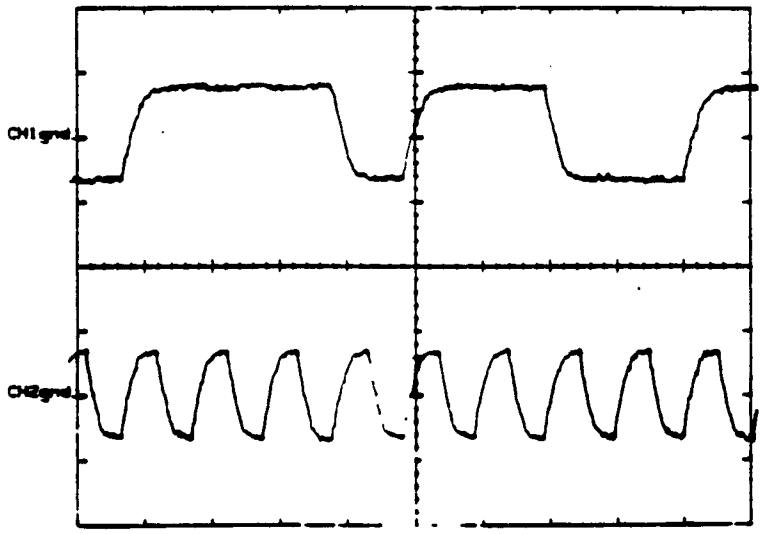
T/DIV: 200 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 7.60 V MINIMUM: -7.20 V

RISE: 73.5 µs FALL: 62.5 µs

T/DIV: 200 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 8.40 V MINIMUM: -7.20 V

RISE: 89.9 µs FALL: 65.0 µs

T/DIV: 200 µs V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 8.00 V MINIMUM: -7.60 V

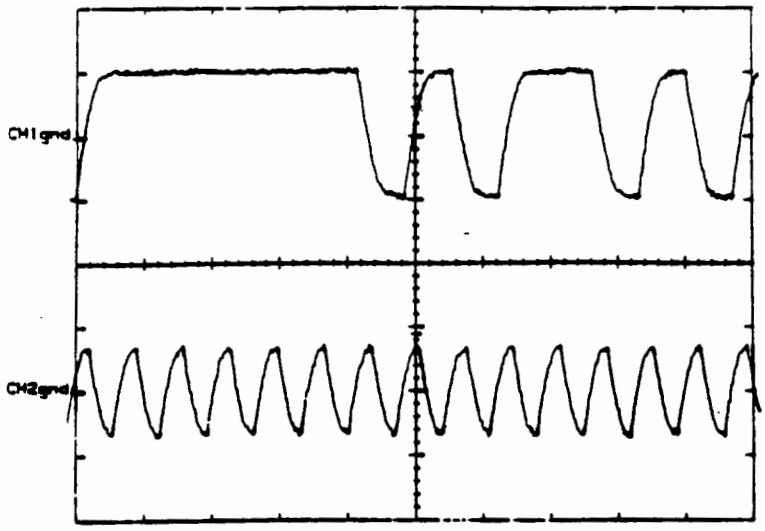
RISE: 62.7 µs FALL: 54.1 µs

T/DIV: 200 µs V/DIV: 10 V

CODEX 6216/3500/HADAX EIA-PP/GEMINI DUAL BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 1050'

DATA SPEED: 7,200 bps



TX DATA (PIN 2)

MAXIMUM: 8.0 V MINIMUM: -7.6 V

RISE: 54.2 µs FALL: 40.5 µs

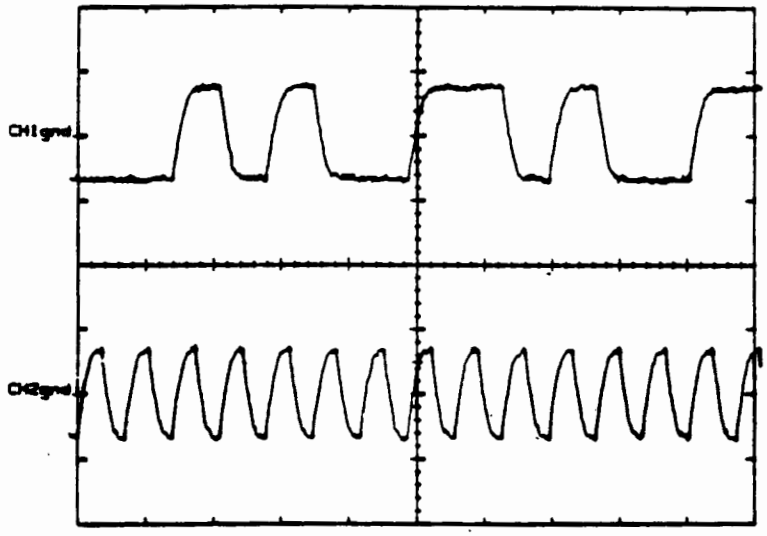
T/DIV: 200 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 8.4 V MINIMUM: -7.6 V

RISE: 50.0 µs FALL: 47.0 µs

T/DIV: 200 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 8.0 V MINIMUM: -7.6 V

RISE: 63.5 µs FALL: 63.7 µs

T/DIV: 200 µs V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 8.0 V MINIMUM: -7.6 V

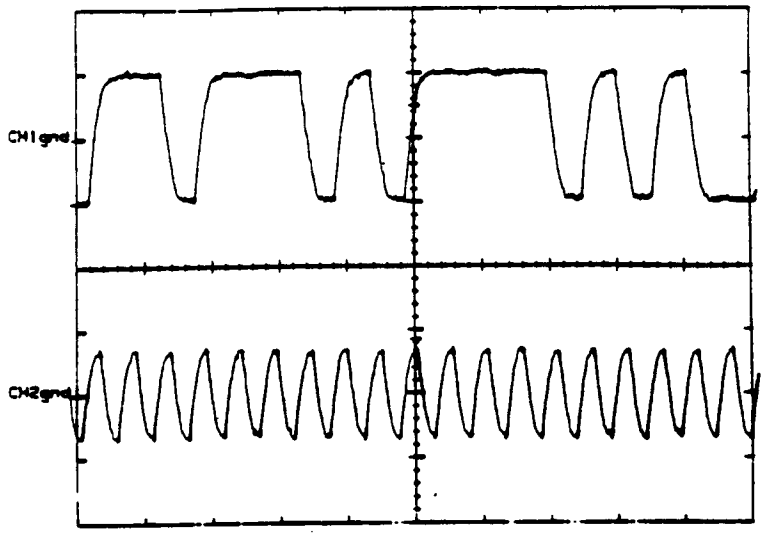
RISE: 47.4 µs FALL: 42.4 µs

T/DIV: 200 µs V/DIV: 10 V

CODEX 6216/3500/HADAX EIA-PP/GEMINI DUAL BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 750'

DATA SPEED: 9,600 bps

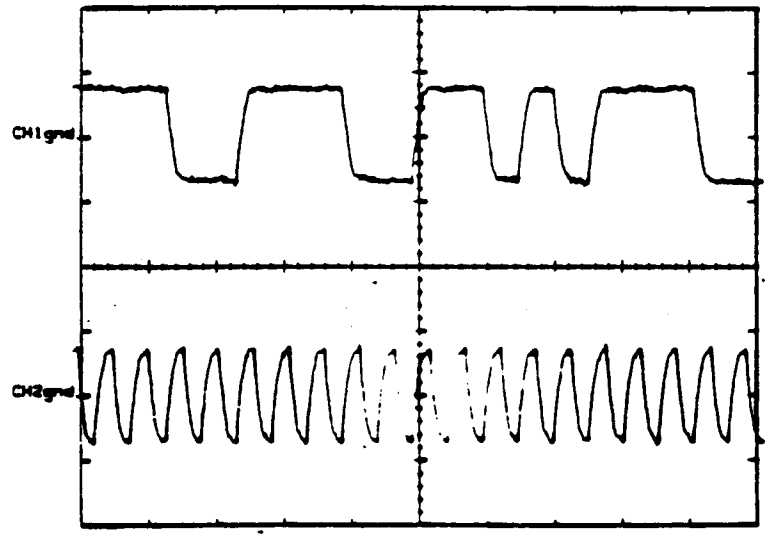


TX DATA (PIN 2)

MAXIMUM: 10.4 V MINIMUM: -10.4 V
RISE: 41.1 µs FALL: 47.4 µs
T/DIV: 200 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 7.6 V MINIMUM: -7.6 V
RISE: 32.6 µs FALL: 36.6 µs
T/DIV: 200 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 8.0 V MINIMUM: -7.4 V
RISE: 42.5 µs FALL: 38.0 µs
T/DIV: 200 µs V/DIV: 10 V

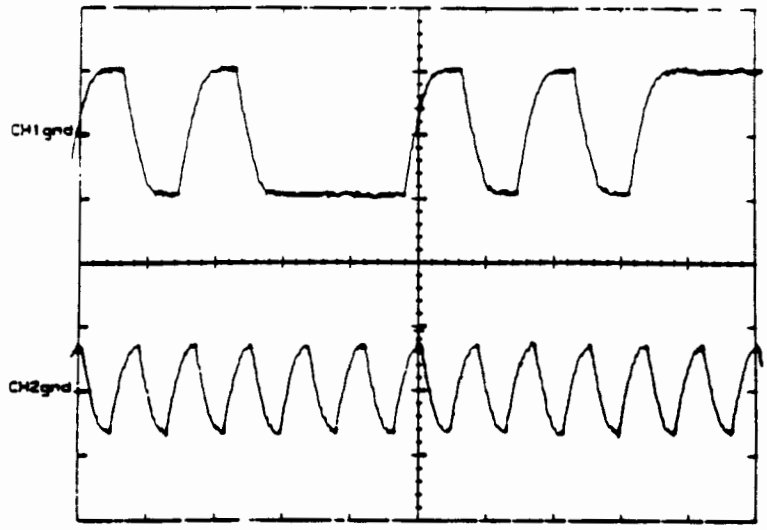
RC CLOCK (PIN 17)

MAXIMUM: 7.6 V MINIMUM: -7.2 V
RISE: 29.7 µs FALL: 27.0 µs
T/DIV: 200 µs V/DIV: 10 V

CODEX 6216/3500/HADAX EIA-PP/GEMINI DUAL BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 600'

DATA SPEED: 12,000 bps



TX DATA (PIN 2)

MAXIMUM: 10.8 V MINIMUM: -10.0 V

RISE: 39.9 µs FALL: 35.0 µs

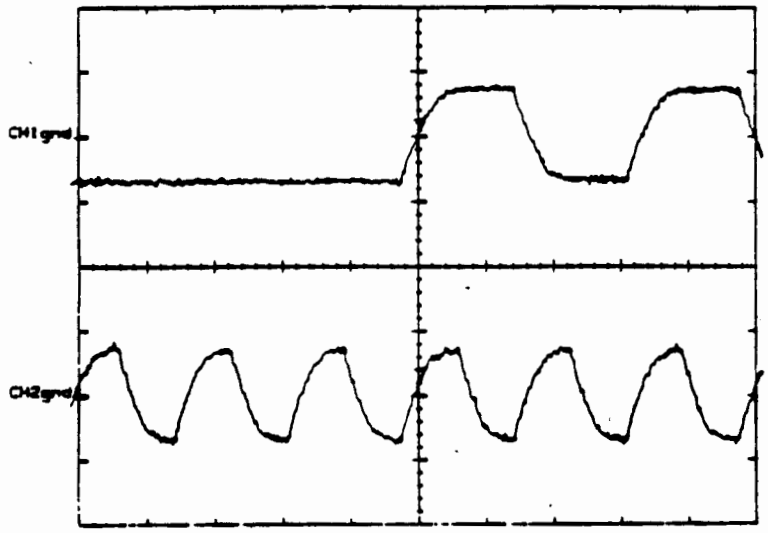
T/DIV: 100 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 7.20 V MINIMUM: -7.60 V

RISE: 26.1 µs FALL: 25.[illegible] µs

T/DIV: 100 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 8.00 V MINIMUM: -7.60 V

RISE: 29.7 µs FALL: 29.1 µs

T/DIV: 50 µs V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 8.40 V MINIMUM: -7.6[illegible]

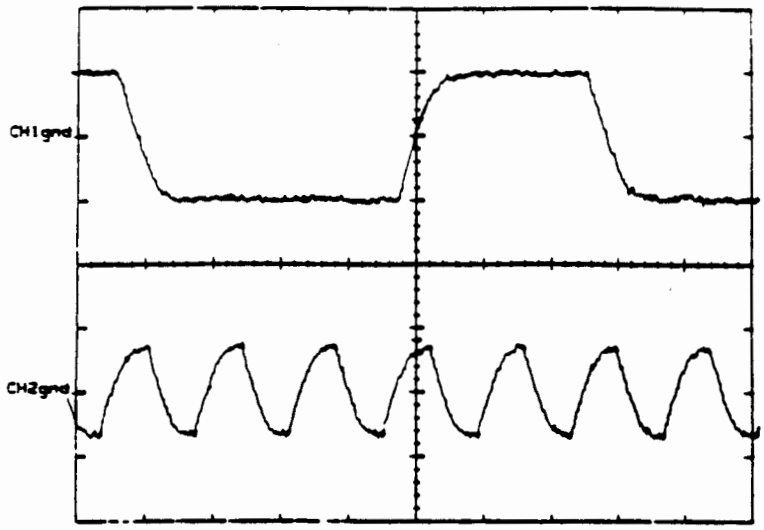
RISE: 30.3 µs FALL: 30.6 µs

T/DIV: 50 µs V/DIV: 10 V

CODEX 6216/3500/HADAX EIA-PP/GEMINI DUAL BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 450'

DATA SPEED: 14,400 bps



TX DATA (PIN 2)

MAXIMUM: 10.4 V MINIMUM: -10.4 V

RISE: 30.8 µs FALL: 28.6 µs

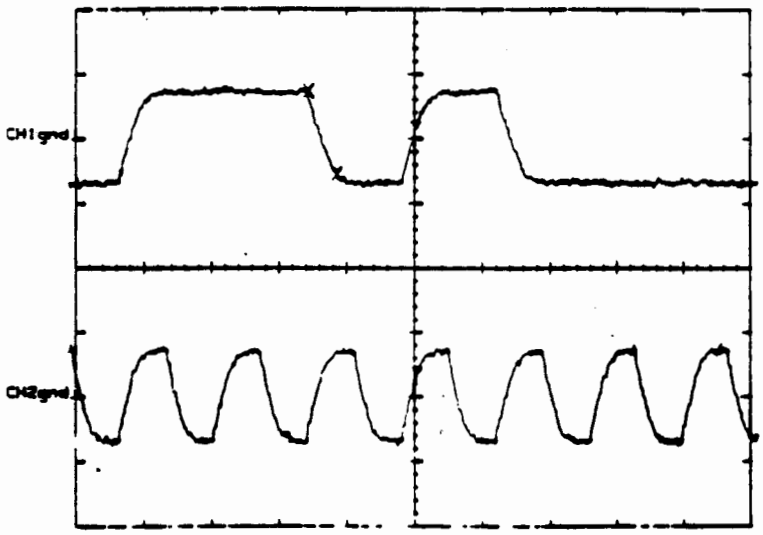
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 7.60 V MINIMUM: 7.60 V

RISE: 23.5 µs FALL: 19.7 µs

T/DIV: 50 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 8.40 V MINIMUM: -7.60 V

RISE: 26.0 µs FALL: 21.5 µs

T/DIV: 50 µs V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 8.00 V MINIMUM: -7.2 V

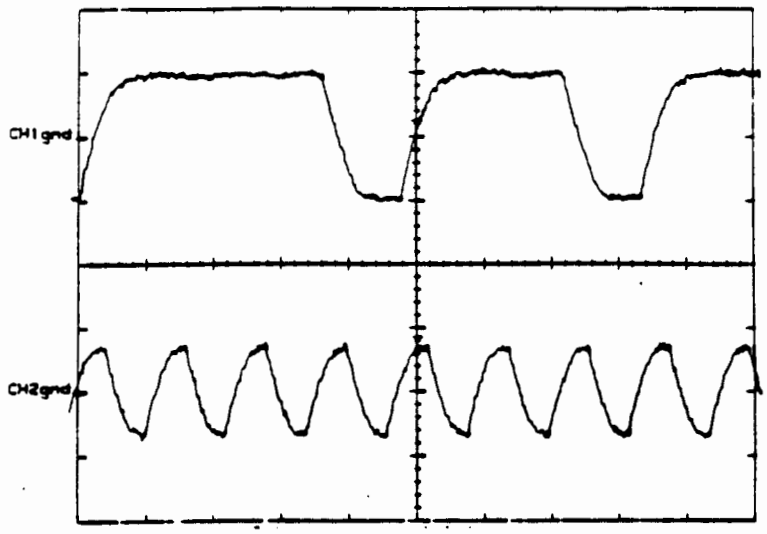
RISE: 21.0 µs FALL: 16.5 µs

T/DIV: 50 µs V/DIV: 10 V

CODEX 6216/3500/HADAX EIA-PP/GEMINI DUAL BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 400'

DATA SPEED: 16,800 bps



TX DATA (PIN 2)

MAXIMUM: 10.8 V MINIMUM: -10.4 V

RISE: -30.4 µs FALL: 25.9 µs

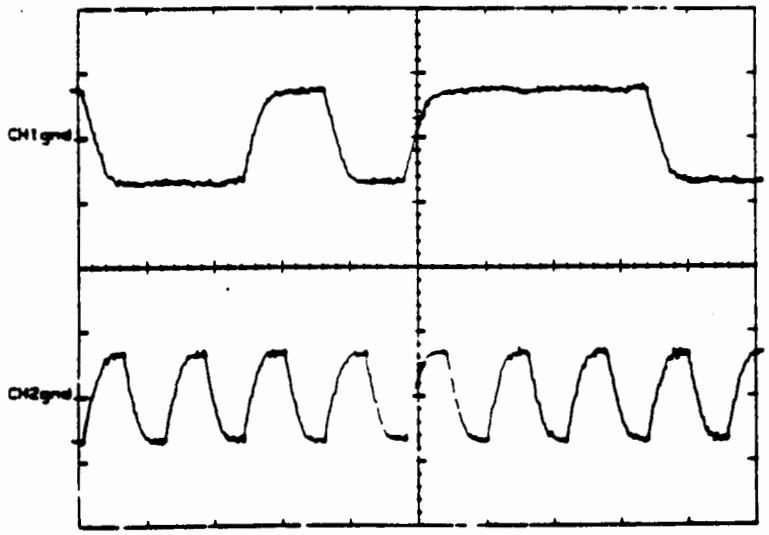
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 7.6 V MINIMUM: -7.6 V

RISE: 20.9 µs FALL: 18.5 µs

T/DIV: 50 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 8.00 V MINIMUM: -8.00

RISE: 22.2 µs FALL: 20.5 µs

T/DIV: 50 µs V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 8.00 V MINIMUM: -7.60 V

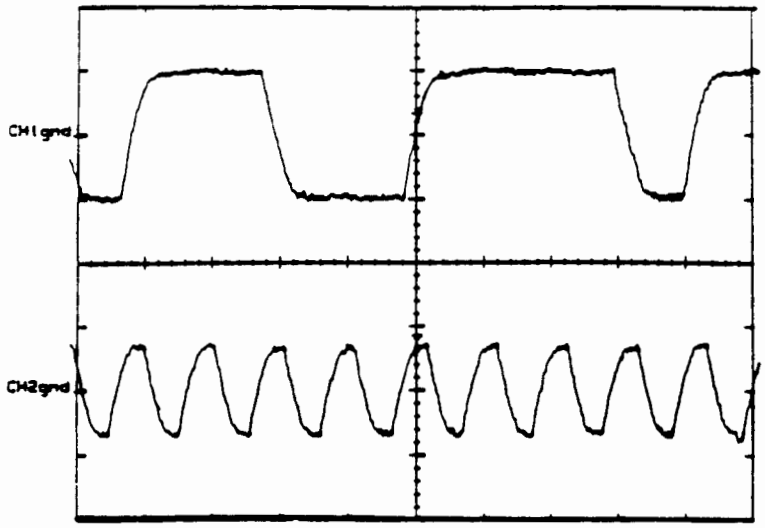
RISE: 19.5 µs FALL: 14.6 µs

T/DIV: 50 µs V/DIV: 10 V

CODEX 6216/3500/HADAX EIA-PP/GEMINI [illegible]

EXTENDED DISTANCE DATA CABLE LENGTH: 300'

DATA SPEED: 19,200 bps



TX DATA (PIN 2)

MAXIMUM: 10.4 V MINIMUM: -10.8 V

RISE: 21.0 µs FALL: 21.9 µs

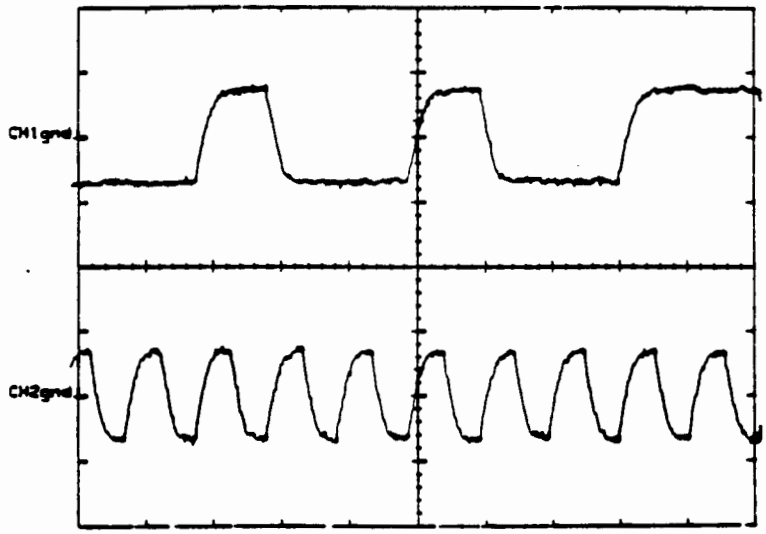
T/DIV: 50 µs V/DIV: 10V

TC CLOCK (PIN 15)

MAXIMUM: 7.6 V MINIMUM: -8.0 V

RISE: 15.9 µs FALL: 16.1 µs

T/DIV: 50 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 8.0 V MINIMUM: -7.6 V

RISE: 15.8 µs FALL: 14.8 µs

T/DIV: 50 µs V/DIV: 10V

RC CLOCK (PIN 17)

MAXIMUM: 7.6 V MINIMUM: -7.6 V

RISE: 14.3 µs FALL: 12.3 µs

T/DIV: 50 µs V/DIV: 10 V

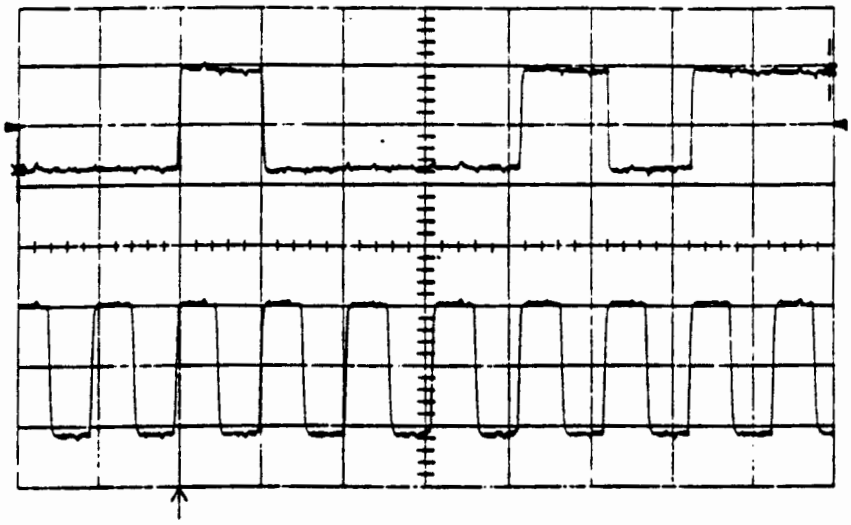
APPENDIX M

OCTOPUS CABLE TEST WITH CODEX 3500/CODEX 6216

CODEX 6216/3500/HADAX EIA-PP/GEMINI DUAL BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 2,400 bps



TX DATA (PIN 2)

MAXIMUM: 11.05 V MINIMUM: -8.64 V

RISE: 2.3 µs FALL: 2.44 µs

T/DIV: .1 ms V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 11.56 V MINIMUM: -11.68 V

RISE: 3.81 µs FALL: 3.84 µs

T/DIV: .1 ms V/DIV: 10 V

RX DATA (PIN 3)

MAXIMUM: 13.24 V MINIMUM: -13.01 V

RISE: 3.95 µs FALL: 3.56 µs

T/DIV: .1 ms V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 11.25 V MINIMUM: -11.68 V

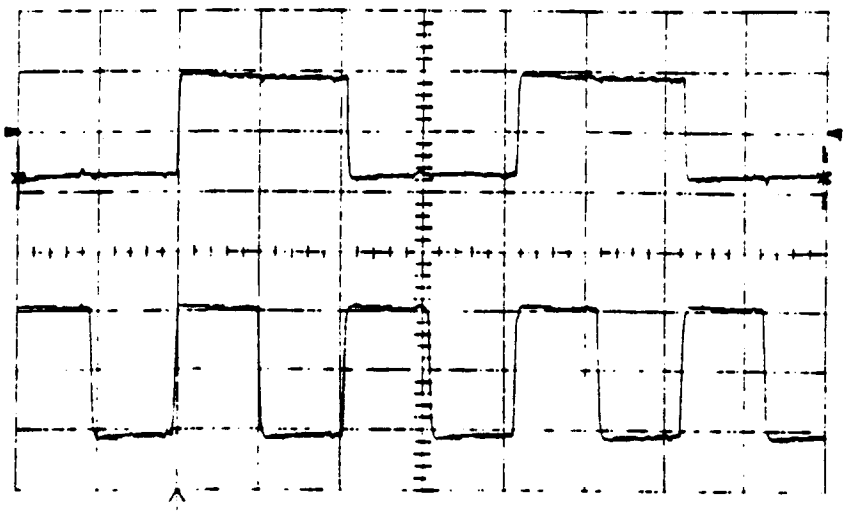
RISE: 3.91 µs FALL: 3.58 µs

T/DIV: .1 ms V/DIV: 10 V

CODEX 6216/3500/HADAX EIA-PP/GEMINI DUAL BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 4,800 bps



TX DATA (PIN 2)

MAXIMUM: 9.8 V MINIMUM: -8.64 V

RISE: 2.31 µS FALL: 2.41 µS

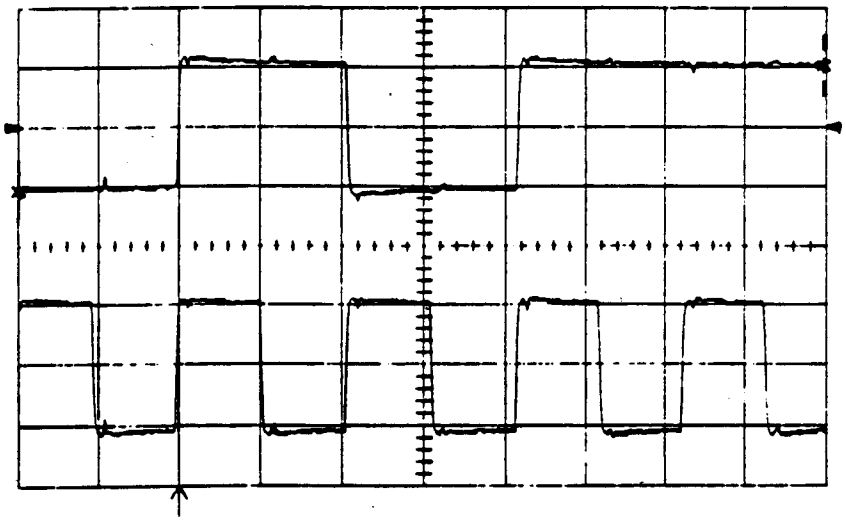
T/DIV: .1 ms V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 11.25 V MINIMUM: -11.88 V

RISE: 3.74 µS FALL: 3.74 µS

T/DIV: .1 ms V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 11.67 V MINIMUM: -12.70 V

RISE: 3.89 µS FALL: 3.50 µS

T/DIV: .1 ms V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 11.25 V MINIMUM: -11.88 V

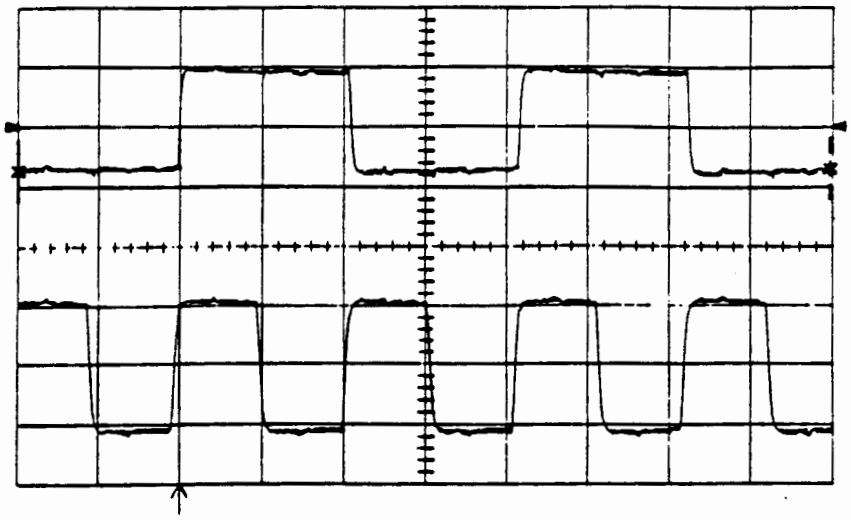
RISE: 3.78 µS FALL: 3.48 µS

T/DIV: .1 ms V/DIV: 10 V

CODEX 6216/3500/HADAX EIA-PP/GEMINI DUAL BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 9,600 bps



TX DATA (PIN 2)

MAXIMUM: 10.11 V MINIMUM: -8.64 V

RISE: 2.47 µs FALL: 2.43 µs

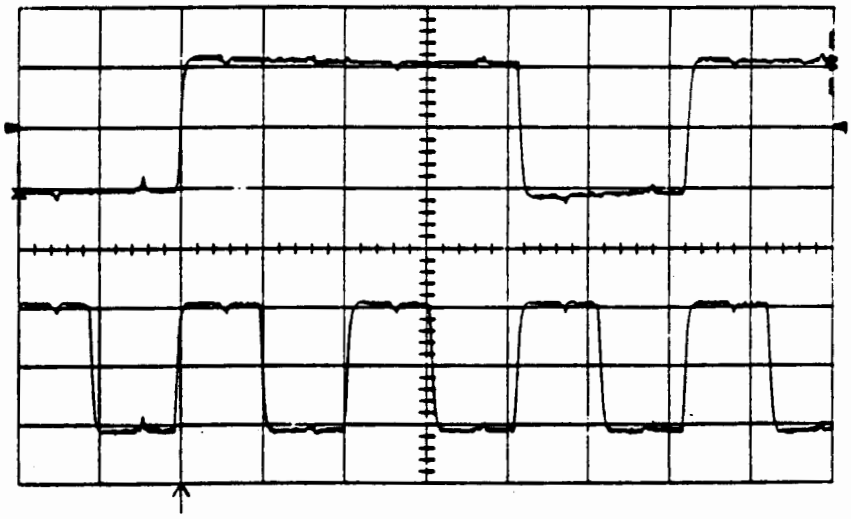
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 11.88 V MINIMUM: -11.88 V

RISE: 3.8 µs FALL: 3.8 µs

T/DIV: 50 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 11.99 V MINIMUM: -12.70 V

RISE: 4.0 µs FALL: 3.52 µs

T/DIV: 50 µs V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 11.25 V MINIMUM: -11.56 V

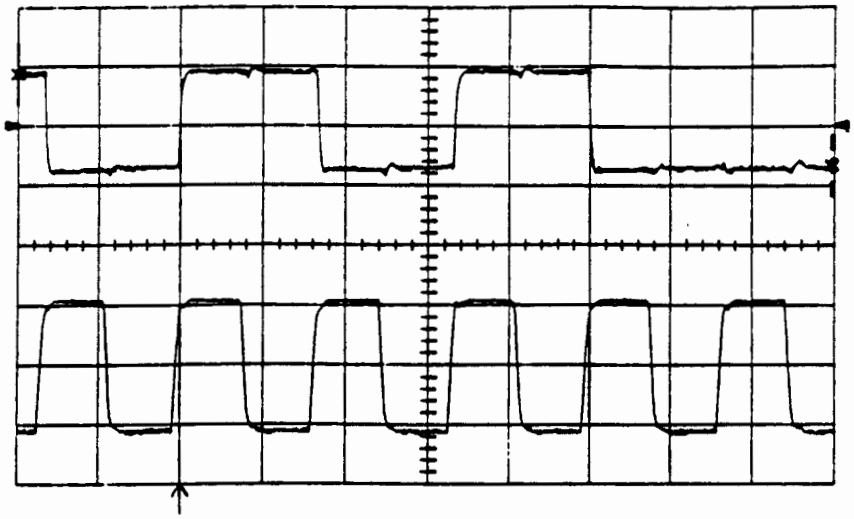
RISE: 3.89 µs FALL: 3.57 µs

T/DIV: 50 µs V/DIV: 10 V

CODEX 6216/3500/HADAX EIA-PP/GEMINI DUAL BERTS

EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 12,000 bps



TX DATA (PIN 2)

MAXIMUM: 10.11 V MINIMUM: -8.64 V

RISE: 3.017 µs FALL: 2.22 µs

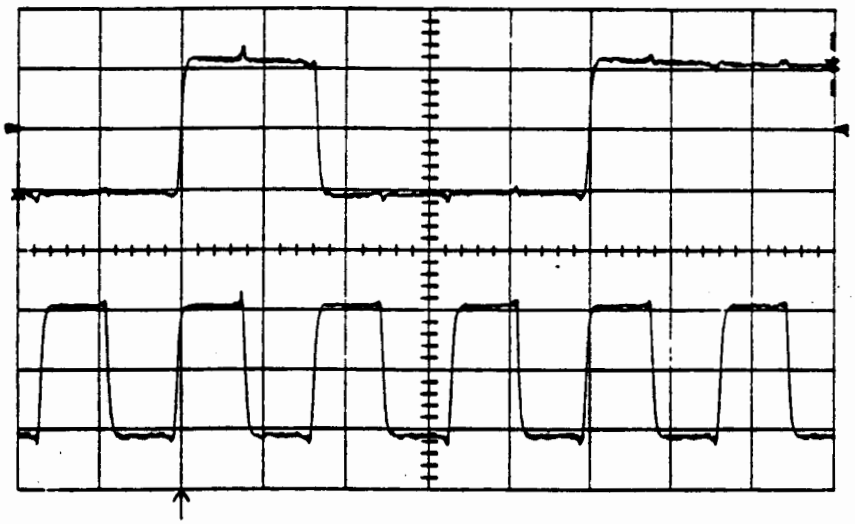
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)

MAXIMUM: 11.25 V MINIMUM: -11.56 V

RISE: 4.07 µs FALL: 3.99 µs

T/DIV: 50 µs V/DIV: 10 V



RX DATA (PIN 3)

MAXIMUM: 13.55 V MINIMUM: -12.08 V

RISE: 4.03 µs FALL: 3.63 µs

T/DIV: 50 µs V/DIV: 10 V

RC CLOCK (PIN 17)

MAXIMUM: 13.12 V MINIMUM: -12.5 V

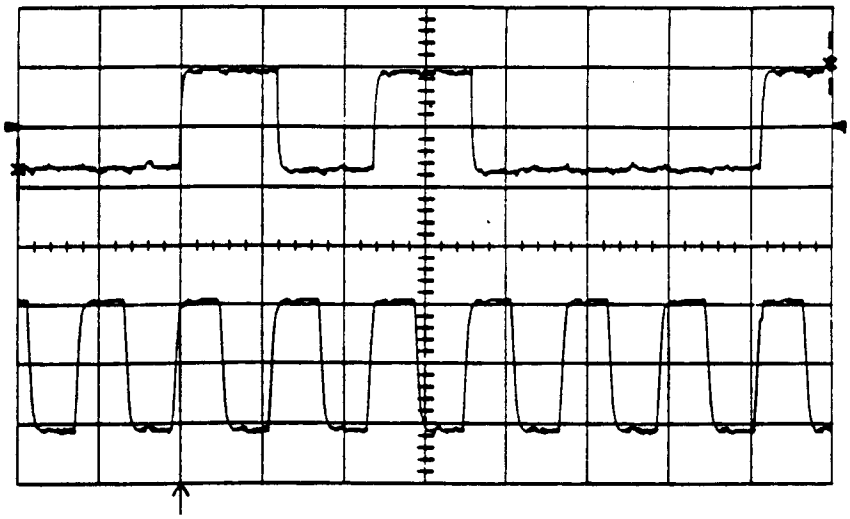
RISE: 3.76 µs FALL: 3.48 µs

T/DIV: 50 µs V/DIV: 10 V

CODEX 6216/3500/HADAX EIA-PP/GEMINI DUAL BERTS

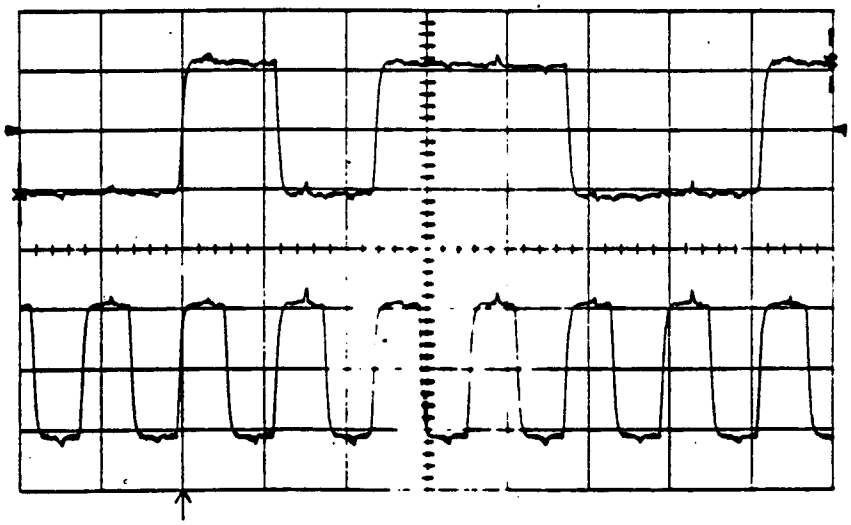
EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 16,800 bps



TX DATA (PIN 2)
MAXIMUM: 10.42 V MINIMUM: -8.33 V
RISE: 2.5 µs FALL: 2.6 µs
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 11.25 V MINIMUM: -11.56 V
RISE: 3.79 µs FALL: 3.86 µs
T/DIV: 50 µs V/DIV: 10 V



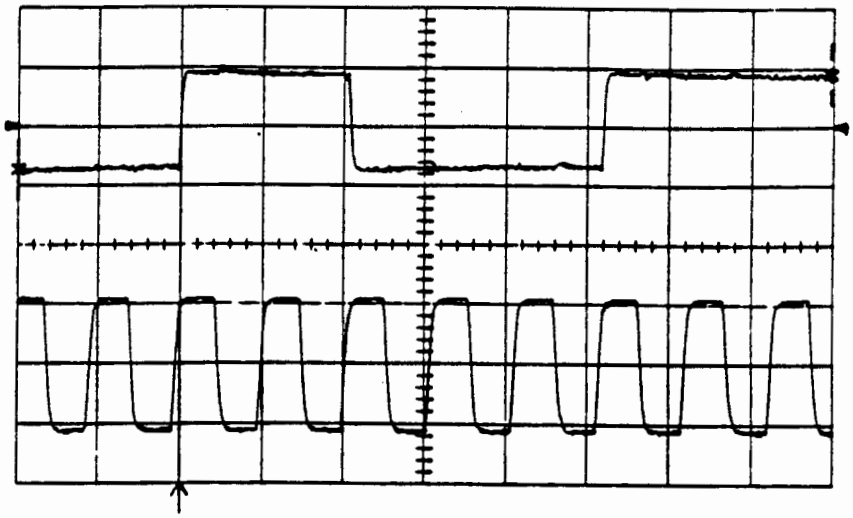
RX DATA (PIN 3)
MAXIMUM: 12.92 V MINIMUM: -12.39 V
RISE: 4.23 µs FALL: 3.79 µs
T/DIV: 50 µs V/DIV: 10 V

RC CLOCK (PIN 17)
MAXIMUM: 13.12 V MINIMUM: -12.81 V
RISE: 3.91 µs FALL: 3.52 µs
T/DIV: 50 µs V/DIV: 10 V

CODEX 6216/3500/HADAX EIA-PP/GEMINI DUAL BERTS

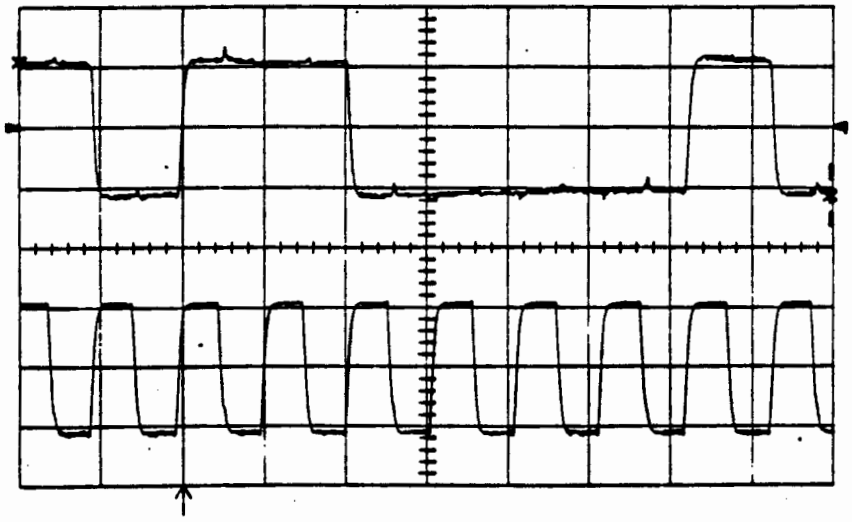
EXTENDED DISTANCE DATA CABLE LENGTH: 500' OCTOPUS

DATA SPEED: 19,200 bps



TX DATA (PIN 2)
MAXIMUM: 10.11 V MINIMUM: -8.01 V
RISE: 2.40 µs FALL: 2.50 µs
T/DIV: 50 µs V/DIV: 10 V

TC CLOCK (PIN 15)
MAXIMUM: 11.25 V MINIMUM: -11.56 V
RISE: 4.04 µs FALL: 4.08 µs
T/DIV: 50 µs V/DIV: 10 V



RX DATA (PIN 3)
MAXIMUM: 13.24 V MINIMUM: -12.39 V
RISE: 4.02 µs FALL: 3.53 µs
T/DIV: 50 µs V/DIV: 10 V

RC CLOCK (PIN 17)
MAXIMUM: 11.25 V MINIMUM: -11.56 V
RISE: 4.11 µs FALL: 4.186 µs
T/DIV: 50 µs V/DIV: 10 V