


# Test Report

## “Modem performance according V.56 *ter*”

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EUT AL4200S Analog Socket Modem  
Test Standard ITU-T V.56 *ter* (08/96)  
Modifications None  
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# 1. General

## 1.1 Identification of Equipment under Test (EUT)

Product Name: Analog Socket Modem  
Model / Type: AL4200S  
Trade Mark: xmodus swiss GmbH  
Serial No: 05470043 / 05470120

### Hardware Identification:

Hardware Revision: 1.1  
Bill of Material: Rev. H  
Circuit Diagram: Rev. I  
PCB: Rev. 1.1

### Software Identification:

Software Version: Rev. 3.8

### Auxiliary equipment (AE) for tests:

Evaluation Board: AL1100S  
Power Supply: Wall Apapter 9V  
Method of sampling: 1 out of 1 EUT  
State of EUT: Production sample  
Date for tests: 25. Juli 2007

## 1.2 Normative references

- ITU-T Recommendation V.24 (02/2000)
- ITU-T Recommendation V.56bis (08/95)
- ITU-T Recommendation V.56ter (08/95)
- EIA/TIA TSB-37A
- EIA/TIA TSB-38
- AT Command Summary, Designer Guide AL4200S

## 1.3 Test equipment

- TAS 1200 Series II Telephone Network Emulator
- TAS 240A Loop Emulator
- TAS Gemini 1022VS Terminal Emulator
- TAS 3508A Modem Test Switch A
- TAS 3508A Modem Test Switch B
- Taskit Auto Test System Rev. 6.40
- Spectra Lab Spectrum Analyzer

## 1.4 Requirements

The test procedures described in this report are designed under the assumption that the two modems being tested are the same model and revision from the same manufacturer. This assumption is based on the fact that different implementations of modems due to some available but not mandatory options in some modem recommendations can lead to different results for the tests given.

Figure 1 shows the components and interconnections in the test setup. The detailed setup depends on the actual equipment used.

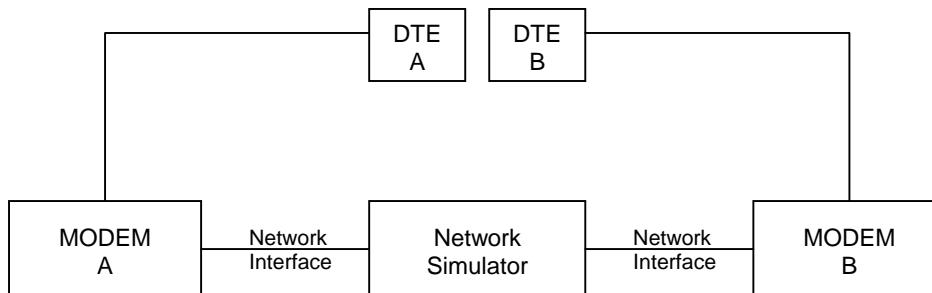


Figure 1 / V.56ter  
**Diagram of test setup**

## 1.4 Network Simulator

These test procedures require a network simulator for accurate, controllable representation of telephone network conditions. Recommendation V.56 *bis* contains functional requirements for the network simulation equipment used in this test procedure. V.56 *bis* compliant simulators shall be used for all testing described in this Recommendation.

All test procedures were made with the TAS (Telecom Analysis Systems) Equipment listed under point 1.3. The TAS System is compliant and approved for this test procedures.



## 2. Test Reports according V.56ter

### 2.1 Throughput versus network model coverage

This procedure measures the modem's asynchronous throughput performance over a number of simulated telephone connections.

#### 2.1.1 Network model coverage

Table 1a (of V.56bis), with its EO-EO impairment combinations, represents the used model of the Intracontinental Network. Table 2 (of V.56bis), with its 7 TLCs, represents the complete local loop model. The set of tests in Table 1 represents 90.55% of the intracontinental network model (according V.56bis) and contains 36 tests, one test for each combination of TLC and EO-EO impairment combination.

Table with network model:

TLC (Test Loop Combinations)								
EO-EO	1	2	3	4	5	6	7	Total
1c	22.8620%	11.4310%	4.9700%	4.9700%	3.9760%	0.7952%	0.6958%	49.70%
2c	7.5440%	3.7720%	1.6400%	1.6400%	1.3120%			15.908%
3c	4.2780%	2.1390%	0.9300%	0.9300%	0.7440%			9.0210%
4c	2.1620%	1.0810%	0.4700%	0.4700%				4.1830%
5c	1.9780%	0.9890%	0.4300%	0.4300%				3.8270%
1b	1.2880%	0.6440%						1.9320%
1a	1.2880%	0.6440%						1.9320%
7c	0.7820%	0.3910%						1.1730%
8c	0.7820%	0.3910%						1.1730%
2b	0.6440%							0.6440%
2a	0.6440%							0.6440%
6c	0.4140%							0.4140%
3b								
3a								
5b								
5a								
4b								
4a								
7b								
7a								
8b								
8a								
6b								
6a								

### 2.1.2 File based without compression (according 6.1.2 of V.56ter)

This procedure determines a modem's asynchronous throughput performance under a variety of telephone network conditions without the obscuring effect of data compression. This test is useful for evaluating the effects of transmission errors on those modems that are incapable of synchronous-DTE operation. This test uses file 1X04.TST.

Modem Setup:           DTE Speed = 115200bps  
                           Settings: Standard (AT&F0)  
                           Error Correction: V.42  
                           Compression: off  
                           Handshake: RTS/CTS

### 2.1.3 Table with throughput vs network model measurements

IC	TLC 1	TLC 2	TLC 3	TLC 4	TLC 5	TLC 6	TLC 7
1c	3610	3740	3300	3380	2480	2770	2650
2c	3670	3760	3390	3510	2310		
3c	3390	3390	3070	3200	1690		
4c	2540	3160	2260	2670			
5c	3930	3880	3370	3290			
1b	3350	3340					
1a	3020	2910					
7c	3370	3390					
8c	3380	3380					
2b	3380						
2a	3250						
6c	3510						

(Throughput values are in Characters/Second)

### 2.1.4 Table with connect speed vs network model measurements

IC	TLC 1	TLC 2	TLC 3	TLC 4	TLC 5	TLC 6	TLC 7
1c	33600	33600	28800	33600	21600	26400	9600
2c	33600	33600	28800	33600	21600		
3c	28800	28800	26400	28800	14400		
4c	21600	28800	19200	24000			
5c	33600	33600	33600	33600			
1b	28800	28800					
1a	28800	28800					
7c	28800	28800					
8c	28800	28800					
2b	28800						
2a	28800						
6c	31200						

(Connect values are in Characters/Second)

## 2.2 Throughput versus file type

This procedure determines a modem's asynchronous throughput performance for a variety of data types. The procedure transmits a number of files selected for their varying degree of compressibility and to represent a broad range of user data.

### 2.2.1 Network model

The EO-EO combination 2c2 per Recommendation V.56*bis* has been selected to minimize the number of symbol errors due to channel impairments. Symbol errors cause the V.42 error control function to request frame retransmissions, thereby disrupting the flow of data and distorting the results of the test.

### 2.2.2 File types (according V.56ter)

The files represent a wide range of different data types. The 1.TST file is representative of number-only files, and is taken from a vector-graphic drawing description. The 2.TST file is taken from a WordPerfect word-processing file. The 3.TST file is a portion of an executable (.EXE) program for the Intel 8086 family of computers. The 4.TST file is taken from a 64-bit random-number generator, and its characteristics are typical for files compressed with Ziv-Lempel algorithms. The 5.TST file is a mixture of different types of files combined into one; it is derived from the file used to examine proposed V.42 *bis* algorithms.

**2.2.3 Test procedure**

Modem Setup: DTE Speed = 115200bps  
 Settings: Standard (AT&F0)  
 Error Correction: V.42  
 Compression: V.42bis  
 Handshake: RTS/CTS  
 Line rate: 33600 bps

Test file	Chars	One way throughput	Two way throughput
1.TST	983040	11'300	8870
2.TST	327680	8730	6420
3.TST	196608	5720	4790
4.TST	131072	3910	3830
5.TST	694528	9490	7970

(Throughput values are in Characters/Second)

**2.3 Connect reliability versus test loop combinations**

The Connect reliability versus test loop combinations test evaluates the ability of the modem to connect and successfully complete a V.42 bis negotiation on each of the seven test loop combinations defined in Recommendation V.56 bis. By cycling through the test loop combinations, the received-signal level, echoes, and linear distortion seen by the modem varies. The effect of these variations on modem connect reliability and connection startup time can be observed.

**2.3.1 Network model**

The EO-EO combinations 1c1 through 1c7 are used in this test because EO-EO impairment combination 1c represents more than 55% of the connections in the PSTN model described in Recommendation V.56 bis.

**2.3.2 Test procedure**

This procedure determines the modem's ability to consistently make connections. It does so by attempting 119 connections over the range of test loop combinations as defined in Table 2/V.56 bis. The total time required to make each connection and transfer a short message is also measured and reported.

Modem Setup: DTE Speed = 115200bps  
 Settings: Standard (AT&F0)  
 Error Correction: V.42 / Compression: V.42bis

### 2.3.3 Table with all measurements for the 119 test runs

The following table shows the total time used to connect at each test loop combination. It represents the handshake time used with V.34bis modulation.

Run	TLC 1	TLC 2	TLC 3	TLC 4	TLC 5	TLC 6	TLC 7
1	14.9	14.9	14.8	14.8	14.8	14.6	22.7
2	14.7	14.8	14.7	14.6	14.8	15.7	30.5
3	14.8	14.7	14.8	14.8	14.6	14.6	0
4	14.8	14.7	14.6	14.8	14.7	14.6	25.5
5	14.7	14.8	14.8	14.9	14.8	15.7	0
6	14.6	14.8	14.8	14.8	14.7	14.6	15.8
7	14.9	14.7	14.6	14.9	14.8	14.6	17.7
8	14.8	14.8	14.8	14.7	14.7	14.6	0
9	14.8	14.8	14.7	14.8	14.8	16.7	16.7
10	14.8	14.8	14.7	14.7	14.8	0	15.7
11	14.7	14.8					
12	14.7	14.8					
13	14.8	14.8					
14	14.8	14.8					
15	14.7	14.8					
16	14.8	14.8					
17	14.6	14.5					
18	14.8	14.9					
19	14.8	14.8					
20	14.8	14.7					
21	14.7	14.8					
22	14.7	14.8					
23	14.8	14.8					
24	14.8						
25	14.8						
26	14.7						
27	14.5						
28	14.8						
29	14.8						
30	14.7						
31	14.8						
32	14.8						
33	14.8						
34	14.6						
35	14.8						
36	14.8						
37	14.7						
38	14.8						
39	14.8						
40	14.7						
41	14.7						
42	14.8						
43	14.7						
44	14.8						
45	14.7						
46	14.7						

### 2.3.4 Tables with summary results

The following tables summarize the data, presenting the percentage of overall successful connections and successful connections for each test loop combination. The success percentage number for the total is a weighted average of the numbers for the test loop combinations, using the likelihood of occurrence scores defined in Recommendation V.56 *bis* as the weighting factors. This is done so that test loop combinations 5, 6, and 7, which have a likelihood of occurrence score of less than 10%, do not unduly influence the total success percentage.

Average, shortest, and longest training time measurements are also listed for all successful connections and successful connections for each test loop combination:

Test loop combination	LOO Score	Trials	Success	Success percentage	Average Training Time	Minimum Training Time	Maximum Training Time
TLC 1	0.46	46	46	100%	14.7	14.5	14.9
TLC 2	0.23	23	23	100%	14.8	14.5	14.9
TLC 3	0.1	10	10	100%	14.7	14.6	14.8
TLC 4	0.1	10	10	100%	14.8	14.6	14.9
TLC 5	0.08	10	10	100%	14.7	14.6	14.8
TLC 6	0.016	10	9	90%	15.1	14.6	16.7
TLC 7	0.014	10	7	70%	22.9	15.7	32.4
Overall		119	115	98%	15.9	14.7	17.6

Average, shortest, and longest transfer time measurements are listed in the following table for all successful connections and successful connections for each test loop combination:

Test loop combination	LOO Score	Trials	Success	Success percentage	Average Connect Time	Minimum Connect Time	Maximum Connect Time
TLC 1	0.46	46	46	100%	19.1	18.8	19.2
TLC 2	0.23	23	23	100%	19.1	18.9	19.2
TLC 3	0.1	10	10	100%	19.1	18.9	19.2
TLC 4	0.1	10	10	100%	19.1	19	19.3
TLC 5	0.08	10	10	100%	19.1	19	19.2
TLC 6	0.016	10	9	90%	19.4	18.9	21.1
TLC 7	0.014	10	7	70%	28.1	20	36.8
Overall		119	115	98%	20.4	19.1	22.0

## 2.4 Character echo delay

This procedure determines the amount of time it takes a character to be sent from a transmitting DTE to a receiving DTE, passing through all components of both modems and over a telephone channel. Latency (also known as propagation delay) is an important factor in the user's perception of modem performance.

### 2.4.1 Network model

EO-EO combination 2c2 is used to minimize the number of symbol errors due to channel impairments. Times measured by this test include propagation (round trip) delays introduced by the network simulator.

### 2.4.2 Test procedure

The character echo delay tests provide also data on the impact of buffering, V.42 transmission decisions, and V.42 *bis* processing. The measurements for error control mode and compression mode have the greatest potential for variation between modems, as they are strongly dependent on the characteristics of the specific V.42 and V.42 *bis* implementations used. For example, the specific data-forwarding criteria used for short (i.e. single-character) V.42 frames can have a great effect on these measurements.

Test modes:

- Direct mode
- Normal mode (asynchron buffered mode)
- Error control mode (V.42)
- Compression mode (V.42bis)

Modem Setup: DTE Speed = 115200bps  
Settings: Standard (AT&F0)  
Transmission according test modes.

### 2.4.3 Tables with summary results

The following table contains raw data for the various modes of operation in one direction. All times are in milliseconds.

Mean values			
Modes	Average	Minimum	Maximum
Direct	80	79	82
Normal	80	77	82
Error Control	86	78	94
Compression	94	80	112

The following table contains raw data for the various modes of operation in both directions (round trip delay). All times are in milliseconds.

Mean values			
Modes	Average	Minimum	Maximum
Direct	160	159	161
Normal	159	155	161
Error Control	170	160	185
Compression	190	186	217