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RC3502 IMS Testprogram Package

User's Guide

PN: 99200170

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RC3502, RC3542, RC3548, IMS, Testprogram.

Abstract: This manual describes the reliability testprogram for the IMS208, IMS209, IMS210, IMS211, and IMS212. It is split up into two groups of subprograms, the first group testing one IMS208-firmware alone and the second group testing two IMS' against each other (in the same RC3502). Each group has two subprograms. The first one will give access to a subset of the parameters in the other one. (30 printed pages).

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1. INTRODUCTION

This manual describes the reliability test program for test of RC3542 IMS driver and firmware, which supports 8 full duplex asynchronous V.24 lines (ref. 1, ref. 2).

The test program can exercise RC3548 (IMS210, IMS212) too. Chapter 4 describes how to test RC3548.

The test program can exercise one IMS connected to one RC3502 by connecting pairs of channels together with either a test cable CBL 693 or a modem connection.

It can also exercise two IMS´, connected to one RC3502 or connected to two different RC3502´s. In the latter case there must be an incarnation of the test program in both RC3502´s. The two tests will be each others mirrors.

As it is described in ref. 2, it is possible to vary line speed, parity mode, data size and several other parameters for the transmission independently. Therefore, the parameter list to this test program is rather long (as it is shown in section 1.2.2).

However, for a relevant test, at subset of these parameters will satisfy the demands. Therefore it is possible to select a version of the test, where the parameters accessible for the user are the ones shown in section 1.2.1. The values not accessible will have the default values shown in 1.2.2.

The test program has 4 subtests: "a", "b", "c", and "d". Subtest "a" and "b" are used, when only one IMS is connected, "c" and "d" when two IMS-controllers are connected to one RC3502.

If subtest "b" or "d" is selected, you will get access to all parameters, selection of "a" or "c" will give access to the subset of parameters, mentioned (1.2.1).

A few parameters (p009 and p012) have only meaning for test "c" and "d" as explained later on.

The subtests are illustrated in fig. 1 and fig. 2.

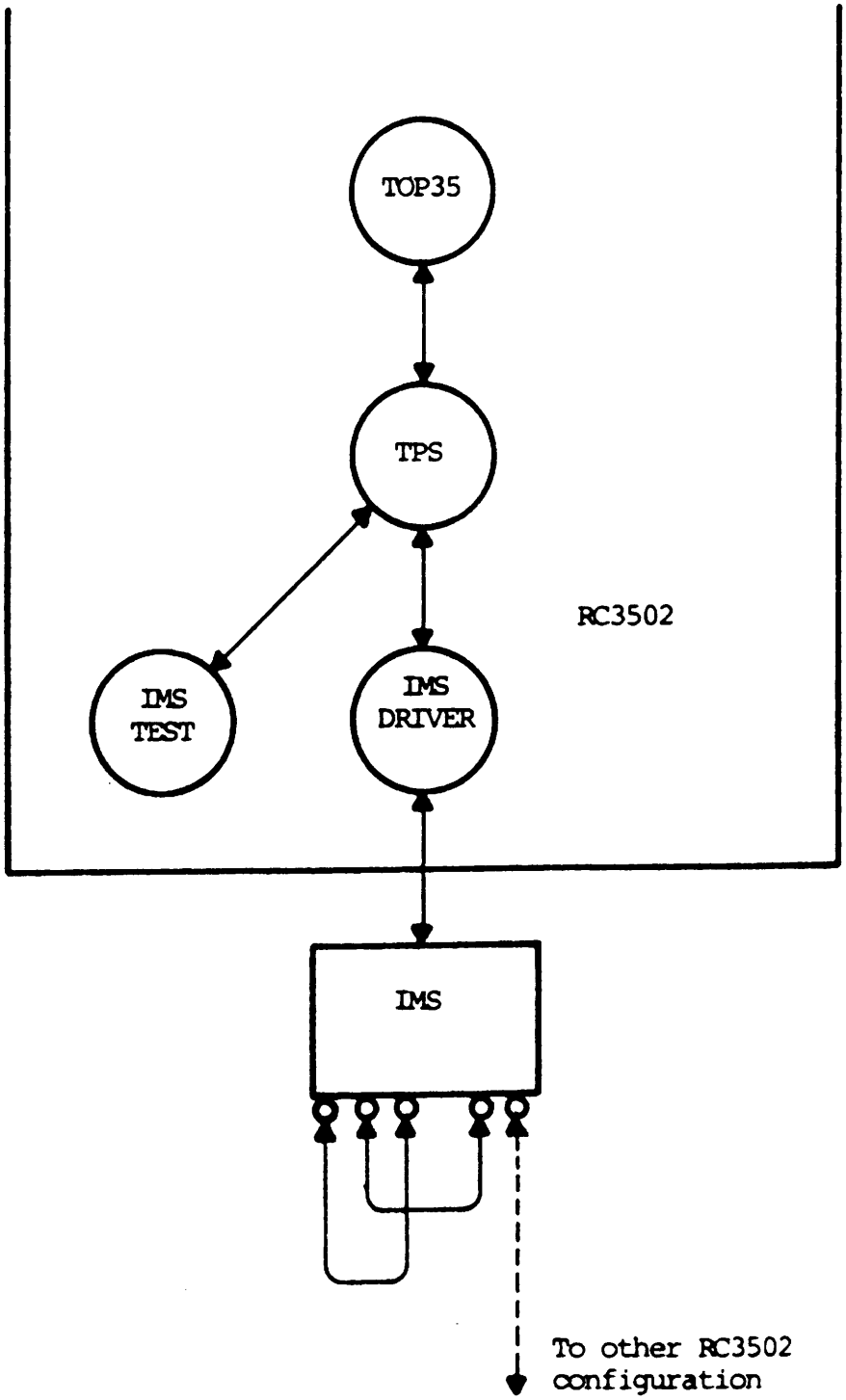
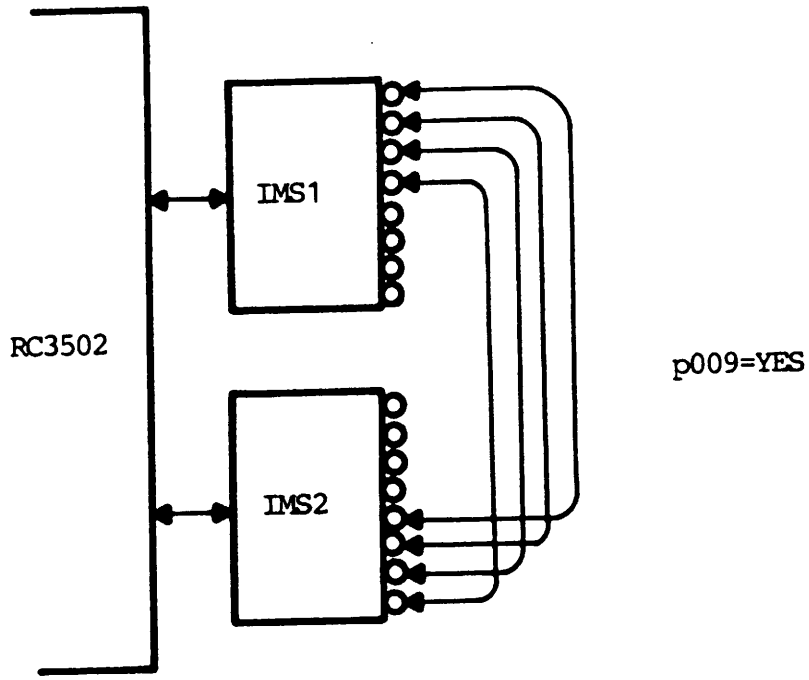


Fig. 1. Tests "a" and "b": 1 IMS / 1 or 2 RC3502



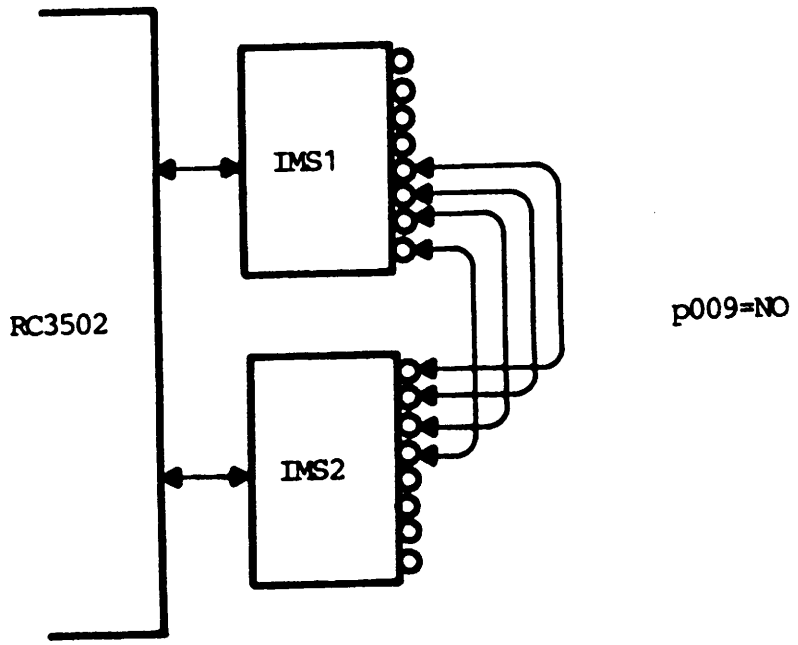


Fig. 2. Tests "c" and "d": 2 IMS / 1 RC3502

1.1 Configuration Requirements

1.1

The minimum configuration for the RC3502 test system with a connection to an RC8000 or another load medium possibility for loading the test system TOP35 and the test program.
For IMS208, IMS209, IMS211 cable CBL693 or testplug CBL718 may be used.
For IMS210 and IMS212 cable CBL724 and modems can be used.

1.2 Parameter Values

1.2

1.2.1 Parameter List for Subtest "a" or "c"

1.2

Param.No.	Text	Default	Min.	Max.
000	testprogram	a	a	d
001	no of runs	1	1	32765
002	1st IMS level	8	8	122
003	module no	128	128	142
004	IMS-16K (0-3)	0	0	3
008	ALC-mode	NO	NO	YES
009	IMS 1 lowest?	YES	NO	YES
012	2nd IMS level	9	8	122
019	line speed	-1	-1	15
026	min. block size	10	4	p027
027	max. block size	10	4	900/1200
028	data kind (0-4)	4	0	4
049	max. error messages	5	0	32765

1.2.2 Parameter List for Subtest "b" or "d" 1.2.2

Param.No.	Text	Default	Min.	Max.
000	testprogram	b	a	d
001	no of runs	4	1	32765
002	1st IMS level	8	8	122
003	module no	128	128	142
004	IMS-16K (0-3)	0	0	3
005	status inform	NO	NO	YES
006	data check	YES	NO	YES
008	ALC-mode	NO	NO	YES
009	IMS 1 lowest ?	YES	NO	YES
010	first channel	-1	-1	7
011	second channel	-1	-1	7
012	2nd IMS level	9	8	122
018	conversion table	1	0	1
019	line speed	-1	-1	15
020	data size	2	0	3
021	stop bit	3	1	3
022	parity mode	1	0	3
026	min block size	10	4	p027
027	max block size	109	4	900/1200
028	data kind	4	0	4
031	test mode	0	0	5
049	max error messages	5	0	32765

Remarks

p000: Subtest, selection of no of controllers and parameterset.

p002: Interrupt level for the first IMS.

p003
and
p004: Are memory module No. and 16K section, belonging to p002.

p005: If true, modem status will be printed on the console after a line control message.

p006: If true, it is checked that the chars received in the receive buffer are the same as the one in the corresponding transmit buffer.

p008: If true, the driver will transmit in ALC-mode (ref. 1, ref. 2).

p009: Cf. remarks to p010 and p011, and see fig. 2.

p010
and
p011: If only 2 channels are connected, you can insert the channel numbers here.

If you keep the values -1, you can connect up to all 8 channels. The program will find out, which ones are in use.

If subtest "c" or "d" is selected, the two IMS have to share the 8 channels.

Default the 1st IMS has access to the channels number 0 to 3 (IMS 1 lowest is true (p009)), 4-7 belong to the 2nd IMS.

If p009 is false, the opposite will be the case. Cf. fig. 2.

p012: Interrupt level for the second IMS, only used in subtest "c" or "d".

p018: Conversion-table-No.:

Value 0 means no conversion.

If ALC-mode is selected, the value must be zero (checked and possibly corrected by the test program). Values different from zero will point out the conversion table used.

At the moment only one table is included, p018 = 1, but more can be introduced in the test program text.

p019: Line speed can have the following values:

-1: All linespeeds and datasizes, stopbits, and parities are tested.

0: 50 bps (bits per second)
1: 75 bps
2: 110 bps
3: 134.5 bps
4: 150 bps

```
 5:    300   bps
 6:    600   bps
 7:   1200   bps
 8:   1800   bps
 9:   2000   bps
10:   2400   bps
11:   3600   bps
12:   4800   bps
13:   7200   bps
14:   9600   bps
15:  19200   bps
```

p020: Data size can have the values:

```
0: 5 bits
1: 6 bits
2: 7 bits  (The conversion table can  only  use
           this size)
3: 8 bits: (Must be selected in ALC-mode)
```

p021: Stop bits can have the values:

```
1: 1 stop bit
2: 1.5 stop bit
3: 2 stop bits (selected in ALC-mode)
```

p022: Parity can have the values:

```
0: ignore parity
1: odd parity (selected in ALC-mode)
2: no parity
3: even parity
```

p026: Mininum blocksize in bytes:

```
4   if ALC-mode.
3   if IMS210 or IMS212.
2   otherwise
```

p027: Maximum blocksize in bytes, must be >= p026. If p026 = p027 then five transmissions are performed per run.
For IMS210 or IMS212 maximum is 900.
For the others maximum is 1200.

p028: Data kind can have the values:

0: All characters are 0.

1: All characters are 255.

3: The characters are alternately 55 and AA (HEX).

4: Characters have values in the range from 33 to 124 (alphanumeric range).

Kind 4 is used if conversion is selected (not ALC); data size must then be 2. For kind 0 to 3 datasize must be 3 (8 bits).

p031: Test mode can have the values:

0: Normal data transmission is started without attention character.

1: The transmission of data is started up by sending an input buffer with an attention message. The driver then will return an answer when an attention character is received (conversion must be selected). When an attention character is received the normal data transmission is started.

4: Echoing of input characters are performed.

5: A combination of 4 and 1.

1.3 Load and Start of the Test

How to load in general, see ref. 3. TOP35 and the IMS-test are loaded and stored as described in ref. 4.

To start the test, type "NEW: IMS" when TOP35 is waiting for input. This causes the test to start and wait for selection of subtest. When the subtest is selected, the test is ready to have its parameters changed or to be started.

2. TEST DESCRIPTION

2.1 Dynamic Test Buffers

The program allocates one transmit buffer and four receive buffers for each line.

If the allocation meets limitations in memory, it is tries to get fewer or smaller buffers, and the test will write as follows:

```
--- maximum test buffer size:       <size>
--- maximum queue length for xfer:  <length>
```

2.2 Test Strategy

All functions supplied by the IMS-driver are described in ref. 2.

The IMS-testprogram will test all the functions as described in the succeeding part and illustrated in the diagram, fig. 3. At first the value of some of the most important parameters is written on the console (compare 2.2.3):

```
ALC MODE/NOT ALC          CONVERSION
MODEM STATE:
STOP-BITS: STOPBIT <xx>
PTY-MODE: <parity>
DATA-SIZE: <bit size>
LINE SPEED: VAL = <xx>, <yyyy> BPS
```

When finished the test writes:

```
<NNN> transmitted ,    <MMM> received on line:  <L>
```

Please note that some few blocks which was under transmission when the test is terminated migth be missing. This is not a hardware failure.

action \ next	mod att	con	sense	set timer	conv tab	get att	rec	trm	new run	reset mod	re-set
1 start	c0										
2 mod att		c1		c2	c2	c2	c2				
3 con	c3		c4	c5							
4 sense		c6		c2	c2	c2	c2				c7
5 set timer					c0						
6 conv tab						c8	-,c8				
7 get att							c0				
8 rec							c9	-,c9			
9 trm							-,c10	c10	c11		
10 new run							-,c10	c10		c12	c13
11 reset mod											0
12 reset											X

Fig. 3. State Diagram

The meaning of the conditions, named cxx is described in the following.

Conditions: cxx

c0: next unconditioned

c1: if modem check count > 0 (disconnected)

c2: if previous was "next"

c3: if modem-check count > 0 and
modem-att not sent

c4: if modem-check count > 0 and
modem-att sent

c5: if modem-check count = 0 (connected)

c6: if not connected (modem-check count > 0)

c7: if admstate = terminating

c8: if attention is expected

c9: if i-buf-no < i-queue

c10: if o-buf-no < 1

c11: if a test section (run) has finished

c12: if the test is finished and
modem attention is pending

c13: if the test is finished and
modem attention is not pending

2.2.1 Modem Attention (Action: 2) 2.2.1

This is the first command sent to all lines connected to the driver. Only a change in the incoming modem signal or a reset modem command will return the modem attention message, with the result: attention or not processed (see ref. 2). This will cause the test program to send a sense-line-command (see 2.2.3).

2.2.2 Line Control (Action: 3) 2.2.2

The characteristics for the transmission line is sent in the datapart of the message. Most of the values are received from the parameter values, namely:

line speed
data size
stop bit
parity
xon-enable

If testmode is 0 (default value), then

rts (ready to send) and
dtr (data terminal ready)

are set in the status information, and in the answer is expected that

dsr (data set ready) and
dcd (data carrier detected)

are set. If this is not the case, another line control message is sent and this is repeated until the correct answer or until a maximum times is reached.

The checking of the modem signals can only be done by sending a sense line message.

2.2.3 Sense Line (Action: 4) 2.2.3

A sense line message will return with the line status information in the data buffer (ref. 2).

If parameter p005, "status inform", is true, the resulting modem status will be written on the console:

module <module no> channel <channel no>
<dsr> <dcd> <rts> <dtr> <xon-state>

If the status bits dsr and dcd are updated in the answer, the line state is connected and the following text is printed on the console:

--- LINE: <line no> ON LEVEL: <level no> CONNECTED

2.2.4 Set Timer (Action: 5)

In the data part of the set timer message, 3 timeout values are sent.

The first one defines the timeout before first character input. It is set to 180, that means an input buffer is timed out after 18 seconds, waiting for the first character.

The second value defines the timeout between input characters (6 sec).

The last one defines the timeout per character output (24 sec).

2.2.5 Send Conversion Table (Action: 6)

If conversion table no (parameter p018) is different from zero, a conversion table is initiated and sent to all lines connected to the driver. At the moment, only one conversion table is available, but others can be implemented in the test program if wanted.

If conversion table no is zero, the information "no conversion" is sent to the driver. This must be the case, if ALC-mode is selected. This is controlled and possibly corrected by the test program.

2.2.6 Get Attention (Action: 7)

If testmode has the values 1 or 5, then the first receive buffer is sent with function: attention.

This means that the buffer is waiting until a character of class attention is received (conversion must be included).

The next receive buffer is then sent with one of the normal receive functions.

2.2.7 Receive (Action: 8)

The data transmission is normally started by sending four receive buffers (default queue length) to each line. When data are received or timeout has occurred, the receive buffer is returned. If the parameter p006 (data check) is true, it is checked that the data received is as expected, dependent on the selected data kind: 0, 1, 3, 4 and data size (parameter p020).

2.2.8 Transmit (Action: 9)

The data filled in the output buffer is determined by the data kind (0, 1, 3, 4). The length of output buffer is varied from min. size (parameter p026) to max. size (parameter p027) and back to min. size for every run wanted (parameter p001).

In case of ALC-mode the operation code 28 is inserted in the first character and the length of information (in bytes) in the second one.

2.2.9 Reset Modem (Action: 11)

The message will return a modem attention message, if present on the line.

The returnal of this message will cause a sense line message to be sent. In this way you will get the new status information of the line. If the parameter p005 (status inform) is true, the result will be printed on the console.

2.2.10 Reset (Action: 12)

When the wanted number of runs are executed or in case of error, a line control is sent to clear modem signals RTS and DTR, and a reset function is sent to all lines, and the program is terminated by writing on the console the numbers of all databuffers transmitted and all databuffers received for every line involved.

3. ERRORTEXTS

3.

If an error is detected during operation, an associated errortext is written on the output media as follows:

```
<errortext>
module no:     <xxx>
channel no:    <x>
block length:  <xxx>
```

Furthermore, two lines with expected and received (in HEX) will be printed if it is a data error or block length error.

The errortexts may be:

"illegal drivercommand"
The function is unknown to the driver.

"timeout on output"
Confer section 2.2.4.

"timeout on input"
Confer section 2.2.4.

"data error, hard error"
The received data differs from the one transmitted (occurs mostly in connection with blocklength error).

"blocklength error"
The length of the received block differs from the one expected.

"crc-error"
May occur in ALC-mode and means error in ALC-check sum or error in format or stop bit.

"parity or stop bit error"
Error in format, parity or stop bit (not ALC-mode).

"data overrun, chars lost"
Characters lost because of hardware overrun or internal buffer overrun. Try with fewer lines or lower linespeed.

"line status error: RTS, DTR, XON "
Error in modem signals.

"chars skipped in alc-mode"
Characters have been skipped before recognizing an <STX> character.

In case of a fatal error in the IMS the following error messages may occur:

"interrupt not received"
"answer field not set"
"no acknowledge is received"
"illegal line from IMS"
"illegal length from IMS"
"timeout on reset operation"

4. Test of RC3548, Synchronous IMS. 4.

4.1 Configuration Requirements 4.1

The synchronous IMS (IMS210 or IMS212) is making synchronous transmission so the connections between channels must produce clock signals. CBL724 and modem or modem simulators can be used.
The software package must include a special driver for IMS210, "bsc-driver".
When the testprogram starts, it reads the IMS memory and selects the appropriate driver.

4.2 Parameter Values. 4.2

Following parameters are ignored: p008, p018 to p022.
Line speed is taken from modem.
Minimum blocksize is 3.
Maximum blocksize is 900.
The datablock format is SYN,SYN,DLE,STX, data, DLE,ETX,SUM1,SUM2. The first 2 databytes are blocksize, SUM1 and SUM2 are CRC checksum.

4.3 Errors 4.3

Most errors are detected by the IMS firmware, so the error texts refer to answer values given by the firmware. This relationship is as follows:

"timeout on output"
Error codes: 38, 41, 42.

"error during input echo"
The controller could not recognice the block format.

"parity- or stopbits-error"
Firmware answer is "syntax" (=34).

"dataoverrun, chars lost"
Firmware answer is "overload" (=33).

"mark characters"
A short control block is received: ACK, NAK, etc.

"interrupt not received"
Error in the bsc-driver.

A. REFERENCES

1. RCSL No.: 52-AA1117
   RC3542 IMS Software Maintenance Manual
   Revision 2

2. RCSL No.: 52-AA1116
   RC3502 IMS Driver Reference Manual

3. RCSL No.: 99 0 00771
   RC3502/2 Operating Guide

4. RCSL No.: 30-M329
   RC3502, TOP35, Test Operating System,
   User"s Guide

5. RCSL No.: 99 0 00781
   IMS210 Firmware Description
   Maintenance Manual

B. ADVICES CONCERNING CHOICE OF PARAMETER VALUES B.

Some of the parameters listed in section 1.2 have greater influence on the course of the test than others.

These parameters are:

p006: data check
p008: ALC-mode
p018: conversion
p019: line speed
p020: data size
p021: stopbits
p027: max. block-size

Generally checking the data by selecting data check in connection with conversion is slower than checking by selecting ALC-mode.

If only one cable is used (connecting two channels), it should be possible to run the test for all block lengths without conversion at a line speed up to 19200 bps.

However, if all channels are in use, you may only go up to 2400 bps.

So "dataoverrun" errors during testing may disappear if you try one or more of the following changes:

1) decrease line speed
2) run without conversion
3) increase datasize
4) increase no of stopbits
5) run without datacheck
6) decrease max. block length
   or
7) change to ALC-mode

These figures are for IMS209, IMS208 has only the half of this capacity.

C. EXAMPLES C.

```
>TOP
NEW:IMS
imstest      initiated as ims01
Select function:
>ims01
-- IMS208-212 test  -- ver 86.05.01 --
testprogram a
a: 1 ims, few params
b: 1 ims, all params
c: 2 ims, few params
d: 2 ims, all params
Select test:
A
Select function:
LIST
-- IMS208-212 test  -- ver 86.05.01 -- LIST OF PARAMETERS :
p  0  testprogram          :      a
p  1  no of runs           :      1
p  2  1st IMS-level        :      8  h08
p  3  modul no             :    128  h80
p  4  ims_16k      ( 0-3 ):      0  h00
p  8  ALC-mode             :     no
p 19  line speed(-1 - 15):     -1
p 26  min blocksize        :     10
p 27  max blocksize        :     10
p 28  data kind    ( 0-4 ):      4
p 49  max error messages :       5
Select function:
START
Select function:

all baud rates and data formats are tested.
run no.      1           1986.05.28  10.03.07

-- line :    0 on level:    8 connected

-- line :    1 on level:    8 connected

-- line :    4 on level:    8 connected

     315 transmitted ,      314 received on line:    0
     315 transmitted .      314 received on line:    1
     315 transmitted .      314 received on line:    4
--  Test terminated.
-- IMS208-212 test  -- ver 86.05.01 -- LIST OF ERRORS :
--------------- run no.     1  : ---------------
No errors detected by testprogram.
----------------------- 1986.05.28  10.15.17 ----
Select function:
```

D. STATISTICAL COUNTERS

Index	Meaning
0	illegal driver command
1	timeout on output
2	timeout on input
3	reset request
4	attention received on output
5	attention received on input
6	error during input echo
7	data error, hard error
8	CRC error
9	parity- or stopbits-error
10	dataoverrun, characters lost
11	line status error: RTS, DTR, XON
12	characters skipped in ALC-mode
13	mark characters
14	blocklength error
15	interrupt not received
16	answer field not set
17	no acknowledge received
18	illegal line from IMS
19	illegal IMS transfer
20	illegal length from IMS
21	timeout on reset operation

All other counters are not used.

E. INDICES

E.1 Survey of Figures

RETURN LETTER

RC3502 IMS Testprogram Package,

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