

RC3502 Product Information, Sections



RC Computer

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RC3502 Product Handbook Distribution List

RC:

- BAL: KS(16), STP(8), LLN(8), EL(8), HLJ(8), LW(12), ICH(1), FLC(5), KST(1), JK(2), CAJ(2), HAL(21), KIH(21), PEF(21), LMJ(7A), PKJ(10), MM(10), AMJ(11), PHH(10), ARG(11).
- GLO: JAK, PJ, JSM, FRAH, HSP, JRS, PJP, JOF, KBK, HAC, BLRA, LM, LEH, OMI.
- PA: BC, JSG, PKN, JØA, HEMI.
- HER: TOL.
- ODE: IML.
- ÅRH: PAH, JOE, TG, KAR, GR, ERN, BYN, HM, ALAK, PF, BB, HEJ, POLM, HET, LBR, PED, FAC, JOMO, HLV, HBO (bibliotek).
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Wolfgang Claas,
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RC3502 Communication System

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RC3502 Communication System

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F191 Specification Sheet

CCITT V.24/V.28 Line Adaptor

Highlights:

- * CCITT V.24/V.28 Communications
- * Up to 64 Kbits/sec. Transmission Rate

Description:

F191 is a synchronous line adaptor for the RC3546 HDLC Controller providing one channel with V.24/V.28 interface.

Plugging directly into the RC3546 2 channel HDLC communications controller base board, F191 provides one V.24/V.28 serial communication channel.

The transmit and receive clock must be supplied from the modem.

RC3502 Communication System

F191 Specifications (Continued)

I/O Channel Interface:	CCITT V.24/V.28.
Number of Full Duplex Channels:	1
Baud Rate:	Up to 20 Kbit/sec. acc. to CCITT V.24/V.28 recom. Up to 64 Kbit/sec. for most RC equipment connected.
Power Consumption:	+5.0 V +-5% / 0.5 A +12 V / 0.025 A -12 V / 0.025 A
Environment:	10 degree C to 35 degree C 20% to 80% relative humidity, non-condensing
Heat Dissipation:	3 kcal/h = 11 kJoule/h.
Technical no:	SLA203
Cable Assemblies:	Modem cable CBL721 (15 meter) included with F191. Separately ordered: F526

F192 Specification Sheet

CCITT V.35 Line Adaptor

Highlights:

- * CCITT V.35 Communications
- * Up to 64 Kbits/sec. Transmission Rate

Description:

F191 is a synchronous line adaptor for the RC3546 HDLC Controller providing one channel with V.35 interface.

Plugging directly into the RC3546 2 channel HDLC communications controller base board, F191 provides one V.35 serial communication channel.

The transmit and receive clock must be supplied from the modem.

RC3502 Communication System

F192 Specifications (Continued)

I/O Channel Interface:	CCITT V.35
Number of Full Duplex Channels:	1
Baud Rate:	Up to 64 Kbit/sec.
Power Consumption:	+5.0 V $\pm$ 5% / 0.6 A +12 V / 0.025 A -12 V / 0.025 A
Environment:	10 degree C to 35 degree C 20% to 80% relative humidity, non-condensing
Heat Dissipation:	3 kcal/h = 13 kJoule/h.
Technical no:	SLA204
Cable Assemblies:	Modem cable CBL720 (15 meter) included with F192.

F194 Specification Sheet

CCITT G.703 Line Adaptor

Highlights:

- * CCITT G.703 Contradirectional Communications
- * 64 Kbits/sec. Transmission Rate

Description:

F194 is a synchronous line adapter for the RC3546 HDLC Controller providing one channel with G.703 interface for contradirectional communication.

Plugging directly into the RC3546 2 channel HDLC communications controller base board, F194 provides one G.703 serial communications channel.

The transmit and receive clock are supplied from the G.703 line.

RC3502 Communication System

F194 Specifications (Continued)

I/O Channel Interface:	CCITT G.703 contradirectional
Number of Full Duplex Channels:	1
Baud Rate:	64 Kbit/sec.
Power Consumption:	+5.0 V +-5% / 0.6 A
Environment:	10 degree C to 35 degree C 20% to 80% relative humidity, non-condensing
Heat Dissipation:	3 kcal/h = 11 kJoule/h.
Technical no:	SLA205
Cable Assemblies:	Not supplied.

F199 Specification Sheet

CCITT G.703 Line Adaptor

Highlights:

- * CCITT G.703 Codirectional PCM Communications
- * 64 Kbits/sec. Transmission Rate
- * On-board Transmission Timing Generator

Description:

F199 is a synchronous line adapter for the RC3546 HDLC Controller providing one channel with G.703 interface for codirectional communication.

Plugging directly into the RC3546 2 channel HDLC communications controller base board, F199 provides one G.703 serial communications channel.

The transmit and receive clock may be supplied from the G.703 line, or may be generated by the F199 line adaptor.

RC3502 Communication System

F199 Specifications (Continued)

I/O Channel Interface:	CCITT G.703 codirectional
Number of Full Duplex Channels:	1
Baud Rate:	64 Kbit/sec.
Power Consumption:	+5.0 V $\pm$ 5% / 0.6 A
Environment:	10 degree C to 35 degree C 20% to 80% relative humidity, non-condensing
Heat Dissipation:	3 kcal/h = 11 kJoule/h.
Technical no:	SLA207
Cable Assemblies:	Not supplied.

F507 Specification Sheet

Medium Cabinet for RC3502

Highlights:

- * Accomodates Two RC3502 Systems
- * DIN 41494 (IEC 48D) Standard Hardware
- * Available in white or brown colour
- * Semitransparent Front Door for visual inspection of LED Indicators.

Description:

F507 is a medium cabinet providing space for up to 2 RC3502/2 Processing Units and up to 2 Power Supply Frames.

In its basic version F507 is equipped with ventilation and cabling hardware for one RC3502/2, additional hardware (F509) must be installed for the second RC3502/2.

Operators Control Panel and Power Distribution Panel is part of F507.

The F507 Cabinet is available in brown or white colour.

RC3502 Communication System

F507 Specifications (Continued)

Dimensions:	Height:	1375 mm with panels
	Width:	575 mm with panels
	Depth:	800 mm with panels
Weight:		105 kg.
Power Consumption (vent. only):		220 VAC, 50 - 60 Hz 175 VA.
Heat Dissipation (vent. only):		150 kcal/h = 628 kJoule/h.
Cable Assemblies:		Power Cable: 220 V / 12 m included.
Models available:	F507-1	Brown cabinet with 2 sidedoors.
	F507-2	Brown cabinet with one sidedoor and one frame for assembly with another F507.
	F507-1w	As F507-1 but in white colour.
	F507-2w	As F507-2 but in white colour.

F508 Specification Sheet

High Cabinet for RC3502

Highlights:

- * Accomodates Three RC3502 Systems
- * DIN 41494 (IEC 48D) Standard Hardware
- * Available in white or brown colour
- * Semitransparent Front Door for visual inspection of LED Indicators.

Description:

F508 is a high cabinet providing space for up to 3 RC3502/2 Processing Units and up to 3 Power Supply Frames.

In its basic version F508 is equipped with ventilation and cabling hardware for one RC3502/2, additional hardware (F509, F510) must be installed for the second and third RC3502/2.

Operators Control Panel and Power Distribution Panel is part of F508.

The F508 Cabinet is available in brown or white colour.

RC3502 Communication System

F508 Specifications (Continued)

Dimensions:		Height: 1740 mm with panels Width: 575 mm with panels Depth: 800 mm with panels
Weight:		112 kg.
Power Consumption (vent. only):		220 VAC, 50 - 60 Hz 175 VA (1xRC3502/2) 175 VA (2xRC3502/2) 350 VA (3xRC3502/2)
Heat Dissipation (vent. only):		150 kcal/h = 628 kJoule/h (1xRC3502/2) 150 kcal/h = 628 kJoule/h (2xRC3502/2) 350 kcal/h = 1256 kJoule/h (3xRC3502/2)
Cable Assemblies:		Power Cable: 220 V / 12 m included.
Models available:	F508-1 F508-2	Brown cabinet with 2 sidedoors. Brown cabinet with one sidedoor and one frame for assembly with another F508.
	F508-1w F508-2w	As F508-1 but in white colour. As F508-2 but in white colour.

F 5 0 9 Specification Sheet

Ventilation Kit for 2.nd RC3502

Highlights:

- * Cooling Capacity for 2.nd RC3502 System
- * Cable Trays easing Cable Routing included
- * Simple Installation Procedure

Description:

F509 contains an additional ventilation kit for second RC3502/2 in medium and high cabinets. It provides increased cooling air flow through RC3502/2 crates and power supply frames.

Facilities for routing cables from the front of the cabinet is also part of F509.

Dimensions:

Height: 88.1 mm (2HE).

Power Consumption:

No power is required.

Prerequisites:

F507 or F508 cabinet containing at least 2 RC3502 crates.

F510 Specification Sheet

Ventilation Kit for 3.rd RC3502

Highlights:

- * Cooling Capacity for 3.rd RC3502 System
- * Cable Trays easing Cable Routing included
- * Simple Installation Procedure

Description:

F510 contains an additional ventilation kit for a third RC3502/2 in a cabinet. It provides increased cooling air flow through RC3502/2 crates and power supply frames.

Facilities for routing cables from the front of the cabinet is also part of F510.

Dimensions:

Height: 2 x 88.1 mm (4HE).

Power Consumption:

220 VAC 50 - 60 Hz, 175 VA.

Heat Dissipation:

151 kcal/h = 630 kJoule/h.

Prerequisites:

F508 cabinet containing three RC3502 crates.

F511 Specification Sheet

40 A Power Supply Extension

Highlights:

- * 40 Ampere Additional Power Supply for Large Systems
- * 300 Watt Capacity
- * Extensive Failure Control

Description:

F511 extends the Power Supply capacity of the RC3502/2 Power Supply System. The capacity obtained by adding F511 will be sufficient for all realistic configurations.

F511 is installed in the power supply frame from the back of the cabinet.

RC3502 Communication System

F511 Specifications (Continued)

Dimensions:	Width: 137.16 mm (9TE).
Input Voltage:	220 VAC, 50 Hz nominal.
Output Voltages:	+ 5.0 V $\pm 2\%$ / 40 A + 12 V $\pm 2\%$ / 4 A - 12 V $\pm 2\%$ / 4 A.
Heat Dissipation at Full Load:	390 kcal/h = 1633 kJoule/h.
Power Consumption at Full Load:	450 VA.
Efficiency:	70 %
Cable Assemblies:	Power cable: CBL065 / 2m included.
Technical no:	POW207, POW729, POW733.

F 5 2 0 S p e c i f i c a t i o n S h e e t

R C 3 5 6 4 - 2 0 W i n c h e s t e r C r a t e

Highlights:

- * 19" Crate for upto 3 RC3564-20 and upto 6 RC3563 SCSI Channel Adaptors

Description:

The F520 Crate is a standard 19" Crate, which may house upto 3 RC3564-20 Winchester Disks (48 Volt) and upto 6 RC3563 SCSI Channel Adaptors.

F540 Specification Sheet

Voice Input Option for RC3583

Highlights:

- * Complete Voice Programming Kit for RC3583 Announcer System
- * High Quality Microphone with stand
- * Mini Audio Mixer with Compressor for microphone or tape recorder input
- * Control Box with built-in Speaker, Volume Control, Power Supply and Telephone Set Connector

Description:

The RC3583 Announcer is a 4 channel voice output system primarily intended for use with Directory Assistance Systems.

F540 Voice Input Option is an extension to the RC3583 Announcer enabling an operator to enter new words and sentences to the RC3583 Announcer vocabulary.

F540 consists of:

- A piggy-back circuit board to be installed on the RC3583 Announcer main board giving the RC3583 3 voice output and one voice input channel,
- A self-contained control box with built-in speaker, control buttons and connector to telephone set,
- FOSTEX Audio Mixer with compression facility,
- AKG microphone type D80 with stand,
- 50 meter cable for interconnection between RC3583 and F540.

RC3502 Communication System

F540 Specifications (Continued)

Audio Interface:

Line Impedance:	600 ohm transformer coupled.
Signal Level:	+6 dbm
Control Signals:	EM control signalling with one input and one output via opto-couplers.
Modulation Method:	Delta demodulation.
Sample Rate:	32 Khz.

Physical and Environmental Specifications (Control Box):

Operating Temperature:	0 - 40 Degree Celcius.
Relative Humidity:	20% - 80% non-condensing.
Control Box Size:	300 x 200 x 100 mm.
Power Consumption:	110V / 220V +/-10%, 50 hz, 15VA max.
Heat Dissipation:	13 kcal/h = 54 kJoule/h
Cable Assemblies:	Power Cable: KBL048 included Signal Cables: 2 x KBL047 / 50m included
Prerequisites:	RC3583 Announcer System.
Technical no:	VCP201, VCI201.

RC3502-2 Specification Sheet

RC3502 Model 2

Highlights:

- * 16 Bit Processor with Stack Oriented Instruction Set designed for High Level Multiprogramming Language Support (Real Time Pascal)
- * 4 Mbyte Addressable Memory
- * Run Time Hardware and Software Error Detection for Reliable Operation
- * 128 Priority Interrupt Levels
- * 128 Register Sets and 128 Hardware Stacks for Ultra-fast Context Switching
- * Instruction Prefetch
- * Modular Power Supply
- * 19 inch Standard Crate (DIN 41494)

Description:

The RC3502 Model 2 is flexible, modular minicomputer System with Central Processing Unit mounted in 19 inch crate.

The system is designed for professional datacommunication.

RC3502 Communication System

RC3502 Model 2 Description (continued)

The RC3502 processing unit is built around a 16 bit Arithmetic Logic Unit supported by a prefetch unit, a control microprocessor and scheduling logic.

The processing Unit includes 128 priority interrupt levels with each interrupt level being assignable to a register set.

The instruction set is stack oriented and includes communicating parallel process support such as priority based process scheduling and interprocess synchronization.

A maximum of 4 Mbytes memory is addressable by the processor, which also features run time error detection, autodiagnosics, bus parity checking and power supply status monitoring.

The processing unit of the RC3502 system is installed in a 19 inch crate which complies with DIN 41494.

The processing unit occupies 3 of 19 available slots in the crate.

A maximum of 2 modular power supply units may be installed in a second 19 inch. crate, which is mounted back to back with the processor crate.

The RC3502 Model 2 is available in four basic versions:

RC3502-2 with one Power Supply Unit for 220V AC

RC3502D-2 without power supply, but with room for two 48V DC Power Supply Units.

RC3502-20 RC3502-2 with F505 Autoload PROM, F506 Identify Register and SW2001/2 Operating System included.

RC3502D-20 RC3502D-2 with with F505 Autoload PROM, F506 Identify Register, F521 POK Circuit and SW2001/2 Operating System included.

RC3502 Communication System

RC3502-2 Specifications (Continued)

Microprogram:	2K x 60 bit, including self diagnostic and extensive debugging facilities.		
Memory Addressing:	Total address space is 4 Mbytes memory. 1 Mbyte from address 80.0000 to address 9F.FFFF is reserved for intelligent controllers with dual port memory. Memory cycle parity check for full 4 Mbyte memory.		
Cycle Time:	Microprogram step: 217 nS.		
Non Interruptable Instruction time:	minimum:	1	us
	maximum:	20	us
	mean:	2.8	us
Error Control:	Parity check on memory data transfer. Errors and watch-dog functions handled by control microprocessor. During instuction execution the microprogram detects exceptions.		
Console:	Asynchronous 300 or 1200 baud.		
Power Consumption (CPU):	+ 5.0V +-5% / 10 A + 12V +-5% / 0.02A - 12V +-5% / 0.02A		
Heat Dissipation:	43 kcal/h = 180 kJoule/h.		
Operating Temperature:	0 - 40 Degree Celcius.		
Relative Humidity:	20% - 80% non-condensing.		

RC3502 Communication System

RC3502-2 Specifications (Continued)

Panel Width (CPU):	3 x 15.24 mm (9T).		
Crate Dimensions:	Width:	482.6 mm	
	Height:	235.9 mm	
	Depth:	345.0 mm	
Free Card Slots:	16 x 3T positions.		
Power Supply Crate Dimensions:	Width:	482.6 mm	
	Height:	235.9 mm	
	Depth:	240.0 mm.	
Power Supply Input (RC3502-2):	220 VAC, 50 Hz nominal.		
Output Voltages:	+ 5.0 V +-2% /	40 A	
	+ 12 V +-2% /	4 A	
	- 12 V +-2% /	4 A.	
Heat Dissipation at Full Load:	390 kcal/h = 1633 kJoule/h.		
Power Consumption at Full Load:	450 VA.		
Efficiency:	70 %		
Cable Assemblies:	Power cable: CBL065 / 2m included.		
Technical no (model dependent):	CPU215,	CPU216,	CPU217,
	IDR201,	POW207,	POW729,
	POW733,	CRA204,	CRA205,
	CRA215b.		

RC3514 Specification Sheet

64 Kb EPROM Memory

Highlights:

- * 64 Kbyte Erasable Programmable Read Only Memory
- * Software Supported In-System Programming
- * UV Erasable
- * Typical Access Time 500 nS.

Description:

RC3514 is a UV erasable, electrically programmable read only memory module for the RC3502 computer system.

The EPROMs on the module can be programmed while located on the printed circuit board, however, an external programming voltage is required.

The module connects to the backplane bus in the same way as a RAM memory module such as RC3519.

The EPROMs can be programmed by means of word instructions.

RC3502 Communication System

RC3514 Specifications (Continued)

EPROM Types:	TEXAS 2532 or equivalent or INTEL 2732/INTEL 2732A or equivalent.
Word Length:	16 data bits.
Capacity:	65536 bytes.
Access Time:	Read access time typ. 500 nS. Verify access time typ. 1.2 nS. Write time typ. 53.3 mS.
Width of Read Access:	1 word or 1 byte.
Width of Write Access:	1 word.
Operational Modes:	Read/verify/write.
Programming Time:	Approximately 30 minutes for the entire module.
Power Consumption:	+ 5.0 V +- 5% / 2.5 A max.
Heat Dissipation:	10 kcal/h = 42 kJoule/h.
Environment:	10 degree C to 35 degree C 20% to 80% relative humidity, non-condensing
External Programming Voltage:	+ 26 V DC +- 1V / 200 mA for INTEL 2732/TEXAS 2532 EPROMS + 22 V DC +- 0.2 V / 200 mA for INTEL 2732 EPROMs.

RC3516 Specification Sheet

1 Mbyte RAM Memory

Highlights:

- * 1 Mbyte RAM
- * One Bit Error Correction
- * 64 Kbyte Optional EPROM
- * Error Log
- * Multiple Bit Error Detection
- * Typical Access Time 720 nS.

Description:

RC3516 is a memory module for the RC3502 computer system holding 1 Mbytes of dynamic RAM with error detection and one bit correction facility.

An error log is provided for collecting information about detected errors.

Optionally up to 64 Kbyte EPROM can also be mounted.

RC3502 Communication System

RC3516 Specifications (continued)

Organization:	RAM:	1 Mbytes organized in 512 Kwords each with 16 data bits and 6 check bits.
	EPROM:	Max. 64 Kbytes organized in 32 Kwords each with 16 data bits, optional.
	Error Log:	12 bits wide, 16 locations deep FIFO (first in first out register).
Address Area:	RAM:	Startaddress modulus 64 Kbytes from 80.0000 to FE.0000. Reduced memory size if startaddress is greater than F8.0000, i.e. address is FE.FFFF.
	EPROM:	Startaddress modulus 64 Kbytes from 00.0000 to FE.0000; occupies 64 Kbytes, applicable size is from 4 Kbytes to 64 Kbytes. May be disabled by switch.
Access Types:	RAM:	Word and byte read Word and byte write
	EPROM:	Word and byte read
	Error Log:	Byte read
Typical Access Timing:	RAM read:	720 nS.
	RAM write:	350 nS.
	EPROM read:	550 nS.
	Error log read:	500 nS.
Power Consumption:	+5V/4.5A max.	
Heat Dissipation:	20 kcal/h = 81 kJoule/h.	
Environment:	10 degree C to 35 degree C 20% to 80% relative humidity, non-condensing	
Panel Width:	15.24 mm (3T).	
Technical no:	MEM206	

RC3517 Specification Sheet

1 Mbyte Enhanced RAM Memory

Highlights:

- * 1 Mbyte Dynamic RAM Memory
- * 128 Kbyte UV EPROM or 64 Kbyte EEPROM
- * Max. RAM Access Time 250 nSec.
- * Single Bit Error Correction
- * Multiple Bit Error Detection
- * Error Log

Description:

RC3517 is a high speed memory module for the RC3502 computer system holding 1 Mbytes of dynamic RAM with error detection and one bit correction facility.

Use of high speed memory technology enables this memory module to execute read or write access at high speed giving the RC3502 CPU a performance increase of 1.4 (measured) compared to older memory modules.

An error log is provided for collecting information about detected errors.

Optionally up to 128 Kbyte UV EPROM or 64 Kbyte EEPROM can also be mounted.

RC3502 Communication System

RC3517 Specifications (continued)

Organization:	RAM:	1 Mbytes using 256 K x 4 bit chips, organized as 8 bit data with 5 extra check bits for error detection and correction.
	PROM:	Max. 128 K x 8 bit UV EPROM or 64 K x 8 bit EEPROM in two 28 pin sockets.
	Error Log:	2 x 8 bit wide containing oldest erroneous syndrome bit pattern for left and right byte respectively.
Address Area:	RAM:	Startaddress set by straps on 1 Mbyte boundaries between 00.0000 and E0.0000.
	EPROM:	Startaddress E0.0000 or E2.0000 May be disabled by switch.
Access Types:	RAM:	Word and byte read Word and byte write
	EPROM:	Word and byte read Word and byte write
	Error Log:	Byte read
Max. Access Timing:	RAM access:	250 nS.
	Fast EPROM read:	205 nS.
Power Consumption:	+5.0 V +-5% / 4.8 A max.	
Environment:	10 degree C to 35 degree C	
	20% to 80% relative humidity, non-condensing	
Heat Dissipation:	21 kcal/h = 86 Kjoule/h	
Panel Width:	15.24 mm (3T).	
Technical no:	MEM207	

RC3519 Specification Sheet

3 Mbyte Enhanced RAM Memory

Highlights:

- * 3 Mbyte Dynamic RAM Memory
- * 128 Kbyte UV EPROM or 64 Kbyte EEPROM
- * Max. RAM Access Time 250 nSec.
- * Single Bit Error Correction
- * Multible Bit Error Detection
- * Error Log

Description:

RC3519 is a high speed memory module for the RC3502 computer system holding 3 Mbytes of dynamic RAM with error detection and one bit correction facility.

Use of high speed memory technology enables this memory module to execute read or write access at high speed giving the RC3502 CPU a performance increase of 1.4 (measured) compared to older memory modules.

An error log is provided for collecting information about detected errors.

Optionally up to 128 Kbyte UV EPROM or 64 Kbyte EEPROM can also be mounted.

RC3502 Communication System

RC3519 Specifications (continued)

Organization:	RAM:	3 Mbytes using 256 K x 4 bit chips, organized as 8 bit data with 5 extra check bits for error detection and correction.
	PROM:	Max. 128 K x 8 bit UV EPROM or 64 K x 8 bit EEPROM in two 28 pin sockets.
	Error Log:	2 x 8 bit wide containing oldest erroneous syndrome bit pattern for left and right byte respectively.
Address Area:	RAM:	Startaddress set by straps on 1 Mbyte boundaries between 00.0000 to E0.0000.
	EPROM:	Startaddress E0.0000 or E2.0000 May be disabled by switch.
Access Types:	RAM:	Word and byte read Word and byte write
	EPROM:	Word and byte read Word and byte write
	Error Log:	Byte read
Max. Access Timing:	RAM access:	250 nS.
	Fast EPROM read:	205 nS.
Power Consumption:	+5.0 V +-5% / 4.8 A max.	
Environment:	10 degree C to 35 degree C	
	20% to 80% relative humidity, non-condensing	
Heat Dissipation:	21 kcal/h = 86 kJoule/h	
Panel Width:	15.24 mm (3T).	
Technical no:	MEM209	

RC3521-2 Specification Sheet

8 Channel I/O Interface

Highlights:

- * 5 Megabit / Sec. Serial Data Transmission
- * Galvanic Isolation of External Devices

Description:

RC3521 is an 8-channel input/output interface for RC3502, used for interconnection to peripherals via cable consisting of 8 wires, providing galvanic isolation realized with magnetic insulators.

RC3502 Communication System

RC3521-2 Specifications (Continued)

Transmission Rate:	5 Mbits / Sec.
Transmission Mode:	Serial.
Cable Impedance:	100 ohm nominal.
Power Consumption:	+ 5V/2.1 A -12V/0.10A
Heat Dissipation:	10 kcal/h = 42 kJoule/h.
Environment:	10 degree C to 35 degree C 20% to 80% relative humidity, non-condensing
Panel Width:	15.24 mm (3T).
Technical no:	IOM202
Cable Assemblies (not included):	CO910 : CBL677 - 10 m. CO911 : CBL676 - 20 m. CO912 : CBL675 - 50 m. CO913 : CBL674 - 100 m.

RC3531 Specification Sheet

RC Micronet LAN Controller

Highlights:

- * Supports RcMicronet 1 Mbps LAN
- * On-board 16 bit microprocessor releaves RC3502 from protocolhandling.
- * 512 Kbyte Local Memory with Parity Error Detection for Data and Down-Line Loaded Firmware.
- * DMA-based data transport between RC3531 Local Memory and RC3502 Main Memory
- * Occupies 2 slots in a standard RC3502 Crate.
- * On-board Firmware supports Down-Line Loading of RC3531 and RC3502 via LAN.

Description:

RC3531 is an Intelligent RC3502 LAN Controller designed for 1 Mbps CSMA/CD Local Area Networks giving RC3502 access to the RcMicronet.

The RC3531 RcMicronet LAN Controller is a very powerfull controller based on VLSI design. An Intel 80186 Microprocessor with 512 Kbyte RAM Memory and DMA Channels towards both the LAN interface and the connecting RC3502 bus releaves the RC3502 CPU from tedious LAN Protocol Tasks.

In addition the RC3531 may be used as an Autoload Channel for RC3502.

RC3502 Communication System

RC3531 Specifications (Continued)

On-board Processors:	Intel 80186 (8 Mhz), Intel 82586.
On-board Memory:	512 Kbyte RAM with one parity bit. Upto 128 Kbyte UV EPROM.
LAN Interface:	RcMicronet (A 1 Mbps version of ISO8802-3). 15 Pole D-subminiature female connector.
Console Interface:	V.24 / V.28 Asynchronous, 9.600 bps, 8 data bits, no parity.
Power Consumption (excl. LAN Transceiver Power):	+ 5 V +-5% / 6.0 A max. + 12 V / 0.05 A max. - 12 V / 0.05 A max.
Max. Supplied LAN Transceiver Power:	+ 12 V / 0.50 A
Heat Dissipation:	27 kcal/h = 112 kJoule/h.
Environment:	10 degree C to 35 degree C 20% to 80% relative humidity, non-condensing
Panel Width:	30.48 mm (6T).
Technical No:	MFC201
Cable Assemblies:	
Asynch. Terminal:	TF502 : 25 m : CBL561
RcMicronet Dropcable:	MF124: 5 m : KBL620 MF125: 12 m : KBL625

RC3532 Specification Sheet

Ethernet LAN Controller

Highlights:

- * Supports Ethernet and Cheapernet 10 Mbps LAN
- * On-board 16 bit microprocessor releaves RC3502 from protocolhandling.
- * 512 Kbyte Local Memory with Parity Error Detection for Data and Down-Line Loaded Firmware.
- * DMA-based data transport between RC3532 Local Memory and RC3502 Main Memory
- * Occupies one slot in a standard RC3502 Crate.
- * On-board Firmware supports Down-Line Loading of RC3532 and RC3502 via LAN.

Description:

RC3532 is an Intelligent RC3502 LAN Controller designed for 10 Mbps CSMA/CD Local Area Networks giving RC3502 access to the RcMicronet.

The RC3532 Ethernet LAN Controller is a very powerfull controller based on VLSI design. An Intel 80186 Microprocessor with 512 Kbyte RAM Memory and DMA Channels towards both the LAN interface and the connecting RC3502 bus releaves the RC3502 CPU from tedious LAN Protocol Tasks.

In addition the RC3532 may be used as an Autoload Channel for RC3502.

RC3502 Communication System

RC3532 Specifications (Continued)

On-board Processors:	Intel 80186 (8 Mhz), Intel 82586.
On-board Memory:	512 Kbyte RAM with one parity bit. Upto 128 Kbyte UV EPROM.
LAN Interface:	Ethernet (ISO8802-3). 15 Pole D-subminiature female connector.
Console Interface:	V.24 / V.28 Asynchronous, 9.600 bps, 8 data bits, no parity.
Power Consumption (excl. LAN Transceiver Power):	+ 5 V +-5% / 5.5 A max. + 12 V / 0.05 A max. - 12 V / 0.05 A max.
Max. Supplied LAN Transceiver Power:	+ 12 V / 0.50 A
Heat Dissipation:	25 kcal/h = 103 kJoule/h.
Environment:	10 degree C to 35 degree C 20% to 80% relative humidity, non-condensing
Panel Width:	15.24 mm (3T).
Technical No:	MFC202
Cable Assemblies:	
Asynch. Terminal:	TF502 : 25 m : CBL561
Ethernet Dropcable:	F523S : 5 m : KBL025 F523M: 12 m : KBL026

RC3542 Specification Sheet

8 line Asynch. Multiplexor

Highlights:

- * 8 Full Duplex Communication Ports
- * Individual Software Specified Port Characteristics
- * Up to 19.2 Kbit/sec.
- * Full Error Detection
- * Character Oriented Processing Performed by the Controller increases RC3502 Performance

Description:

RC3542 is an 8 channel Intelligent Asynchronous Multiplexer for the RC3502 computer system supporting 8 full duplex asynchronous V.24/V.28 communication ports.

RC3542 connects directly to the RC3502 backplane bus.

RC3542 provides individual, software selectable data conversion and line characteristics such as baud rates, data size, modes of parity, and number of stopbits.

In addition the RC3542 Multiplexor supports the ALC protocol as used in the danish Alarm Transmission System.

RC3502 Communication System

RC3542 Specifications (Continued)

Asynchronous:	5-8 bits characters, break character generation, 1, 1.5 or 2 stopbits, false start bit detection, break character detection.
Baud Rates:	Software selectable bit/s: 50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600, and 19200.
Total Throughput Capacity (typical):	5000 characters / second.
Number of I/O Ports:	8, connected via individual connectors, BERG back panel round cable connector 2 x 5 positions.
I/O Port Interface:	CCITT V.24/V.28.
Power Consumption:	+ 5 V $\pm$ 5% / 4.8 A max. + 12 V / 0.50A max. - 12 V / 0.12A max.
Heat Dissipation:	27 kcal/h = 113 kJoule/h.
Environment:	10 degree C to 35 degree C 20% to 80% relative humidity, non-condensing
Panel Width:	15.24 mm (3T).
Technical No:	IMS211
Cable Assemblies:	Asynchronous terminal: F512L : 25 m : CBL726 F512M : 12 m : CBL719 V28 modem: F513L : 25 m : CBL728 F513M : 12 m : CBL724 F513S : 5 m : CBL727

RC3546 Specification Sheet

2 Channel HDLC Controller

Highlights:

- * CCITT X.25 Level 2, LAPB Protocol
- * CCITT X.75 Level 2, LAPB Protocol
- * CCITT 1980 and 1984 Versions Available
- * Detachable Line Adapters for V.24/V.28, V.35 or G.703 Co- and Contradirectional PCM selectable per port
- * Up to 64 Kbit/s Port Transmission Rate
- * 2 Full Duplex Ports

Description:

RC3546 is a 2 channel communications controller for the RC3502 series computer.

RC3546 realizes CCITT Protocols for X.25 level 2, LAPB. As an option also CCITT X.75-1980, CCITT X.25-1984, and CCITT X.75-1984 (all level 1 and 2) are available as F533.

Using a flexible pluch-in Line Adaptor mechanism the line interface may be selected individually per port.

RC3546 operates with line speeds upto 64 Kbps.

RC3546 supports down line load of RC3502.

RC3502 Communication System

RC3546 Specifications (Continued)

Protocol (standard):	CCITT X.25-1980 level 2, LAPB	
Protocols (optional):	F533	CCITT X.25-1984 level 2, LAPB
		CCITT X.75-1980 level 2, LAPB
		CCITT X.75-1984 level 2, LAPB
	RC3583	CCITT G.703 SS-7
Transmission Speed:	Up to 64 Kbit/sec. Transmission is synchronous. The clock must be supplied from modem or modem simulator.	
Number of Comm. Ports:	2.	
Cabling method:	Cables from modem connects to BERG connectors (2x10 positions) located on detachable line adapters.	
Port Interface:	Detachable line adapters.	
	4 types are available:	
	F191 for CCITT V.24/V.28 modems	
	F192 for CCITT V.35 modems	
	F194 for CCITT G.703 contra-directional interface.	
	F199 for CCITT G.703 co-directional interface.	
Power consumption:	+ 5.0 V +-5% / 6 A max. excl. line adaptors.	
Heat Dissipation:	26 kcal/h = 110 kJoule/h.	
Panel Width:	30.48 mm (6T) incl. line adaptors.	
Environment:	10 degree C to 35 degree C 20% to 80% relative humidity, non-condensing.	
Technical no:	COM204.	

RC3547 Specification Sheet

4 Channel HDLC Controller

Highlights:

- * CCITT X.25 and X.75 Level 2, LAPB Protocol available in both 1980 and 1984 versions.
- * CCITT V.24/V.28 or V.11 Line Interface individually selectable per channel.
- * 4 Full Duplex Ports supporting up to 9.600 bit/s
- * On-board 16 bit microprocessor releases RC3502 from protocolhandling.
- * 512 Kbyte Local Memory with Parity Error Detection for Data and Down-Line Loaded Firmware.
- * DMA-based data transport between RC3547 Local Memory and RC3502 Main Memory
- * Occupies one slot in a standard RC3502 Crate.

Description:

RC3547 is a 4 channel communications controller for the RC3502 series computer. RC3547 realizes CCITT 1980 and 1984 Protocols for X.25 and X.75 level 2, LAPB.

The RC3547 Communications Controller is a very powerfull controller based on VLSI design. An Intel 80186 Microprocessor with 512 Kbyte RAM Memory and DMA Channels towards both the Communication Line Interfaces and the connecting RC3502 bus releases the RC3502 CPU from tedious Protocol Tasks.

RC3502 Communication System

RC3547 Specifications (Continued)

Protocol:	CCITT X.25-1980 level 2, LAPB CCITT X.25-1984 level 2, LAPB CCITT X.75-1980 level 2, LAPB CCITT X.75-1984 level 2, LAPB
Transmission Speed:	Up to 9.600 bit/sec. Transmission is synchronous. The clock must be supplied from modem or modem simulator.
Number of Comm. Ports:	4.
Number of Indicators:	1 red RUN LED, 4 red XMIT LED's, and 4 red REC LED's.
On-board Processor:	Intel 80186 (8 Mhz)
On-board Memory:	512 Kbyte RAM with one parity bit. Up to 128 Kbyte UV EPROM.
Cabling method:	Cables from modem connects to BERG connectors (2x10 positions) located on the Controller Panel.
Port Interface:	Full duplex channel with V.28 and V.11 Interface selectable by replacement of one IC.
Power consumption:	+ 5.0 V $\pm 5\%$ / 5.7 A max. + 12 V $\pm 10\%$ / 0.10 A max. - 12 V $\pm 10\%$ / 0.08 A max.
Heat Dissipation:	26 kcal/h = 110 kJoule/h.
Panel Width:	15.24 mm (3T).
Environment:	10 degree C to 35 degree C 20% to 80% relative humidity, non-condensing.
Technical no:	COM205.
Cable Assemblies:	
V.28:	F526M : 15 m : CBL721
V.11:	F524M : 12 m : KBL027
Debug Console:	F525M : 12 m : KBL028

RC3563 Specification Sheet

SCSI Channel Adaptor

Highlights:

- * 8 Masters and/or Control Units
- * Upto 50 Kbyte Transfer rate
- * Allows disk sharing for upto 7 RC3502 Systems
- * Interfaces directly to 2 RC3521-2 I/O Channels.

Description:

The RC3563 Small Computer Systems Interface (SCSI) Channel Adaptor is a complete interface between the Input/Output Module RC3521-2 and a SCSI bus.

The RC3563 SCSI Channel Adaptor occupies one slot in a powered RC3502 or F520 Crate.

The RC3563 is used to connect RC3564 or RC3565 type disks to a RC3502 System.

One or more may be shared by upto 7 RC3502 Systems each equipped with an RC3521-2 Input/Output Channel and an RC3563 SCSI Channel Adaptor.

RC3502 Communication System

RC3563 Specifications (Continued)

Number of I/O Ports:	2 (via RC3521-2)
SCSI Interface:	The SCSI bus is a byte-wide multiple master bus in accordance with ANSI X.3 T9.2. The RC3563 Adaptor uses the "Single Ended Option".
Transfer Rate:	Up to 50 Kbyte/sec.
SCSI Bus length:	6 meter max.
I/O Channel length:	100 meter max.
Power Consumption:	+ 5 V +5% / 1.8 A - 12 V / 0.1 A
Heat Dissipation:	7 Kcal/h = 30 Kjoule/h.
Environment:	10 degree C to 35 degree C 20% to 80% relative humidity, non-condensing
Panel Width:	15.24 mm (3T).
Cable Assemblies:	Included.
Technical No:	SAI201, CBL730, CBL747.

RC3564-20 Specification Sheet

20 Mbyte Winchester Drive 48 VDC

Highlights:

- * 20 Mbyte Formatted
- * 85 mSec Average Seek Time
- * SCSI Interface
- * Automatic Power Down after 17 minutes of inactivity
- * Supports RC3502 Program Load

Description:

The RC3564 Winchester drive is a disc drive for the RC3502 High Speed Communication Controller.

The RC3564 may be used for remote controlled autoloading of up to two RC3502 Controllers.

Up to three RC3564 Winchester drives may be placed in an F520 Winchester crate, each of which may serve two RC3563 SCSI Channel Adaptors.

The RC3502 Controller is connected to the RC3563 SCSI Channel Adaptor via an RC3521-2 Input/Output Channel Interface.

RC3564 requires 48 VDC power Supply and is able to supply up to two RC3563 SCSI adaptors.

RC3502 Communication System

RC3564-20 Specifications (Continued)

SCSI Interface:	The SCSI bus is a byte-wide multiple master bus in accordance with ANSI X.3 T9.2. The RC3564 Winchester Disk Drive uses the "Single Ended Option".		
Transfer Rate:	50 Kbyte/sec via RC3521-2.		
Seek Time:	Min.	15 mSec.	
	Average	85 mSec	
	Max.	215 mSec.	
Capacity:	20 Mbyte formatted.		
Supply Voltage Range:	+35 V to + 65 V.		
Power Consumption:	+48 VDC 2 A max.		
Output Voltages:	+ 5 V +- 5% / 4.0 A max. -12 V +- 5% / 0.2 A max.		
Heat Dissipation:	28 Kcal/h = 120 Kjoule/h.		
Environment:	10 degree C to 35 degree C 20% to 80% relative humidity, non-condensing		
Panel Width:	106.7 mm (21T).		
Cable Assemblies:	4 terminator plugs (TEM201) included.		
Technical No:	WDD207, TEM201.		

RC3565-20 Specification Sheet

20 Mbyte Winchester Drive

Highlights:

- * 20 Mbyte Formatted
- * 85 mSec Average Seek Time
- * SCSI Interface
- * Automatic Power Down after 17 minutes of inactivity
- * Supports RC3502 Program Load

Description:

The RC3565 Winchester drive is a disc drive for the RC3502 High Speed Communication Controller.

The RC3565 may be used for remote controlled autoloading of up to seven RC3502 Controllers.

The RC3565 drive is placed in an RC3502 crate and occupies seven positions. The Winchester drive may be placed at any position in the crate, but it is recommended to place it at the outmost right, thereby leaving all 19 controller slots free for other purposes.

An RC3502 controller is connected to the RC3565 Winchester via an RC3521-2 Input/Output Channel Interface and an RC3563 SCSI Channel Adaptor.

RC3502 Communication System

RC3565-20 Specifications (Continued)

SCSI Interface:	The SCSI bus is a byte-wide multiple master bus in accordance with ANSI X.3 T9.2. The RC3565 Winchester Disk Drive uses the "Single Ended Option".		
Transfer Rate:	50 Kbyte/sec via RC3521-2.		
Seek Time:	Min.	15 mSec.	
	Average	85 mSec	
	Max.	215 mSec.	
Capacity:	20 Mbyte formatted.		
Power Consumption:	+ 5 V +- 5% / 3.7 A max.		
	+12 V +- 5% / 2.5 A max. during power-up.		
	+12 V +- 5% / 1.8 A max. during operation.		
Heat Dissipation:	22 Kcal/h = 92 Kjoule/h.		
Environment:	10 degree C to 35 degree C		
	20% to 80% relative humidity, non-condensing		
Panel Width:	106.7 mm (21T).		
Cable Assemblies:	4 terminator plugs (TEM201) included.		
Technical No:	WDD208, TEM201.		

RC3583 Specification Sheet

Announcer System

Highlights:

- * 4 Voice Output Channels for Computer Controlled Voice Reply systems.
- * Interfaces directly to ACD (Automatic Call Distribution system).
- * On-board microprocessor with 512 kbyte RAM memory for programs and voice data.
- * Voice Data input using the F540 Voice Input Option.

Description:

The RC3583 Announcer is a 4 channel voice output system primarily intended for use with Directory Assistance Systems. The system is based on an intelligent controller occupying two slots in an RC3502 crate. The controller contains 4 on-board audio channel interfaces typically connected to an Automatic Call Distribution system (ACD).

The RC3583 Announcer may be extended with the F540 Voice Input Option enabling an operator to enter new words and sentences to the RC3583 Announcer vocabulary.

RC3502 Communication System

RC3583 Specifications (Continued)

On board features:

Processor: Intel 80186 8 Mhz.

RAM Memory: 512 Kbyte with parity.

ROM: Upto 512 Kbytes EPROM or upto 16 Kbytes EEPROM.

DMA channels: 4 DMA channels for voice input/output and one DMA channel for data transfer between the on-board memory and RC3502 main memory.

Audio interface:

Impedance: 600 ohm transformer coupled.

Signal Level: +6 dbm.

Control Signals: EM control signalling with one input and one output via optocoublers.

Modulation Method: Delta modulation.

Sample Rate: 32 Khz.

Physical and environmental specifications:

Operating Temperature: 0 - 40 Degree Celcius.

Relative Humidity: 20% - 80% non condensing.

Size: 234 * 220 * 29.8 mm occupying 2 RC3502 slots.

Power Dissipation: 32.1 Watt max.
+5V +/-5%, 5.7A max.
+12V +/-10%, 100mA max.
-12V +/-10%, 80mA max.

RC3502 Communication System

Salgsnr.	modul	FCO-liste	
RC3563	SAI201	11-147	18-159
RC3564	WDD201	17-055	17-056
	WDD203	17-055	17-056
	WDD205	17-055	17-056
	WDD207	17-055	17-056
	WDD202	17-055	17-056
RC3565	WDD204	17-055	17-056
	WDD206	17-055	17-056
	WDD208	17-055	17-056
RC3581	COM204	-	
RC3583	VCO201	-	
F191	SLA203	-	
F192	SLA204	-	
F194	SLA205	-	
F199	SLA207	-	
F517	MOD204	-	
F522	MOD205	-	

RC3502 System Configuration

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1. INTRODUCTION

The intention with this manual is to offer a ready reference tool for selection and installation of components in the RC3502 computer system.

You won't find every performance parameter for every device here but you will find the key parameters, which are necessary to configure your system, install it and make a final check-out before putting it into operation.

If you need complete product information, please refer to appendix B of this manual, where you will find a complete list of reference documentation. The blockdiagram of the RC3502/2 processor system is the key-entrance to the configuration task. Appendix C provides information on power consumption for each sales no, heat dissipation and physical dimensions necessary for calculation of total Power consumption and ventilation requirements.

Section 3 contains a description of the RC3502/2 Cabinet System, how to grow from an empty cabinet to a number of processors in the same, and how to install cable assemblies in a cabinet.

Environmental requirements are in section 4 and how to make a final system check-out before putting your system in operation is in section 6.

RC3502 Communication System

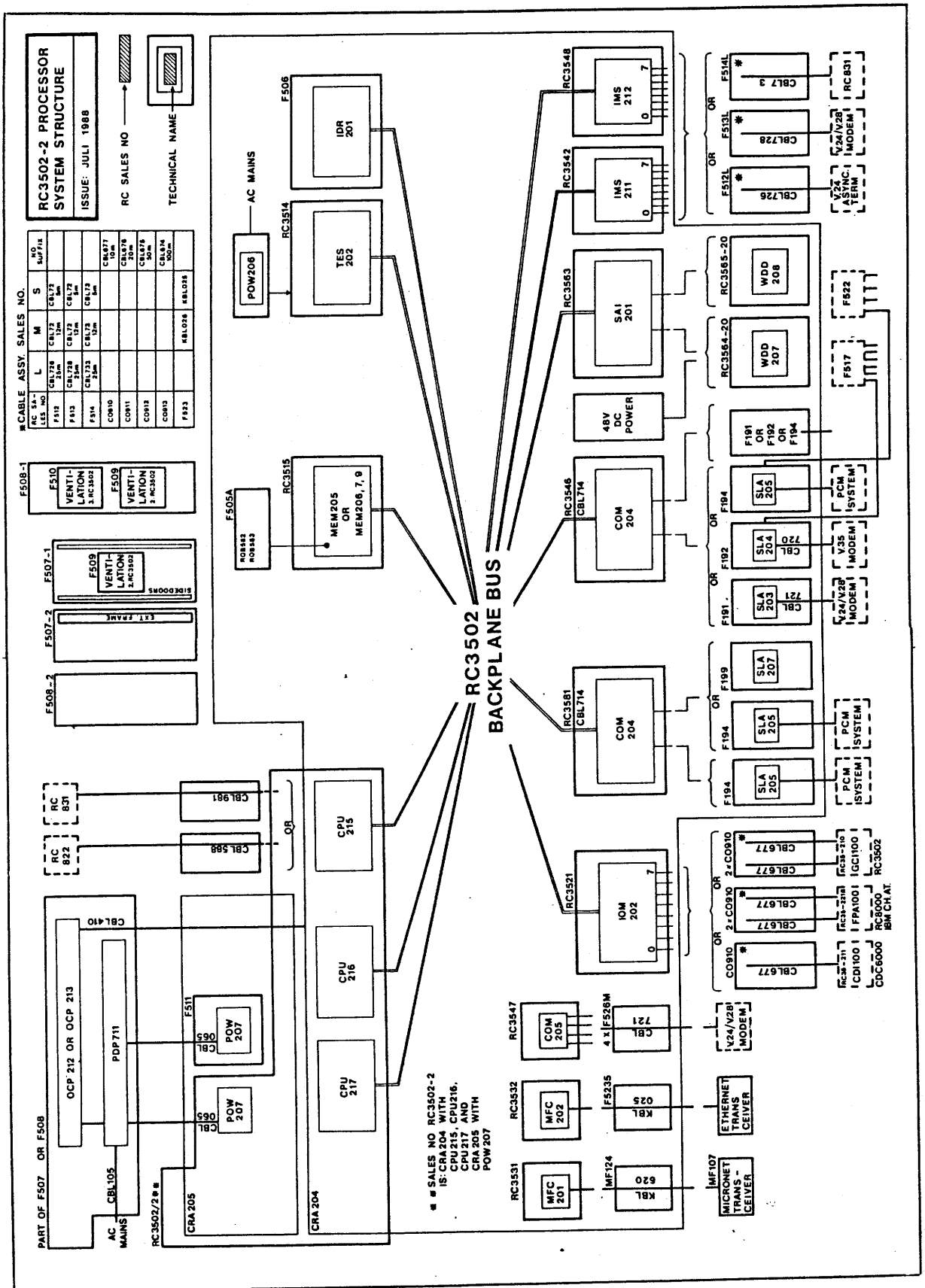


Fig. 1.1.

2. INSTALLATION PLANNING

The installation requires proper planning, and the next paragraphs are intended as a help in this work.

2.1 Power Supply Calculations

When type and number of functional units in the RC3502/2 crate is known the maximum consumption from the power supply may be calculated from the table in appendix C.

If the consumption exceeds the rated outputs for one POW207, an extra unit (F511) shall be added in the prewired crate.

2.2 Mains Power Supply

It is recommended that the mains power is supplied from a separate group in the main switchboard. A good quality earth connection in the switch board shall be supplied to each cabinet.

Fuse ratings are specified in section 4.

In planning the installation also remember wall outlets for modems and other auxilliary equipment.

2.3 Raised floor

The installation of raised computer floor has several advantages. The ventilation air is clean, cabling is easy and the cables are well protected; also future layout changes are easily accomplished. RC's installation departure will be able to assist in planning of a raised floor.

2.4 Static Electricity

The equipment function may be distorted by the discharge of static electricity. The remedy to reduce the risk of this is to select a suitable floor, to maintain a relative humidity greater than 40% and to make a good earth connection of the equipment.

2.5 Heat Dissipation

The heat dissipation from the equipment may be calculated from the figures in the datasheets or from the summarized data in appendix C.

2.6 Cable Installation

Guidelines for cabling are given in section 3 and 4.

3. CABINET CONFIGURATIONS AND CABLING

3.1 Cabinet Configurations

RC3502/2 may be configured in two cabinet versions, a medium cabinet F507 which accomodates 2 processors each with their power supply or a high cabinet F508 with 3 processors and power supplies.

The first RC3502/2 is delivered installed in one of the above cabinets. Additional processors and the necessary hardware for ventilation are supplied as add-on units. F509 with the second RC3502/2 and F510 with the third.

The drawings following, show how to start with the first processor and how to extend the configurations. If the consumption from one power supply exceeds the specified maximum outputs (+5V/40A, +12V/4A or -12V/4A) an extra power supply (F511) may be added to the prewired crate.

Several cabinets may be bolted together by means of the extension frame included in F507-2 and F508-2. Figure 3.6 illustrates the principle of cabling in the RC3502/2 cabinets.

Most of the cabling from controllers in the system is done from their front panel connectors. Cables are routed via the tray of the ventilation unit below the processor crate, through the opening to the left or right. A cable tray brings the cables along the sides of the cabinet to the bottom and eventually through the cut-out in the floor.

From RC3521/2 and RC3563 some of the cabling consist of an internal cable from the back og CRA204 to a I/O cable frame, back and down on the cabinet.

In case the cables are routed between the bottom frame of the cabinet and the floor, ventilation air to the cabinet is reduced. To minimize this effect, tie the cables into tightly packed bundles and route these close to the rear corners of the bottom frame.

RC3502 Communication System

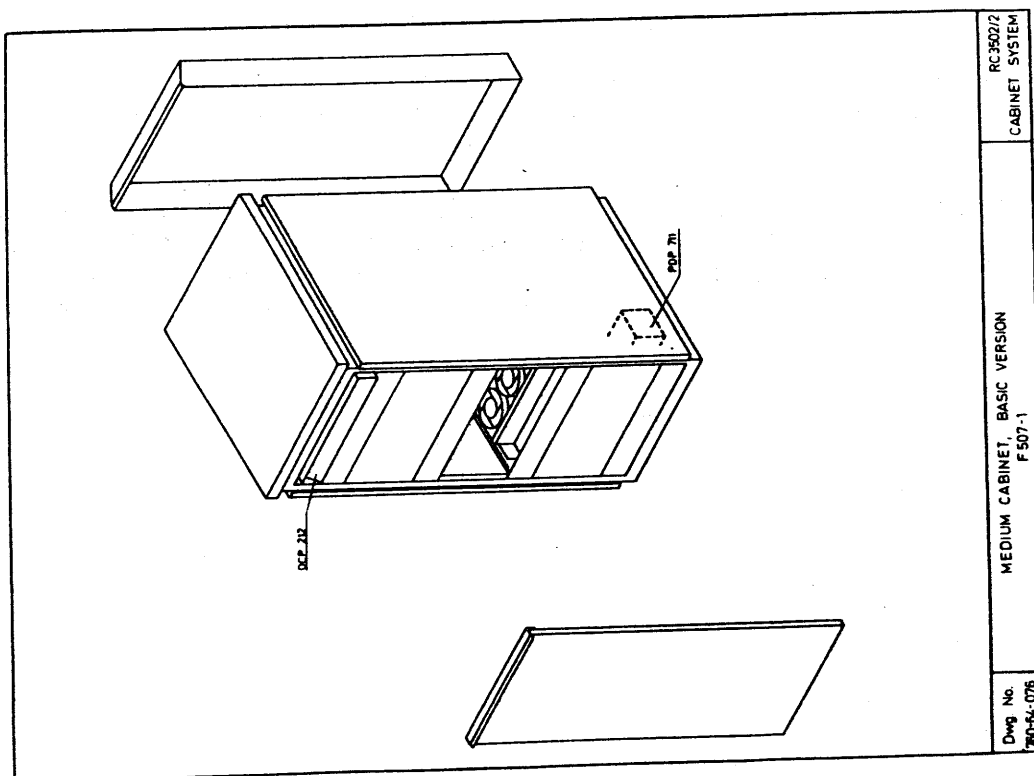
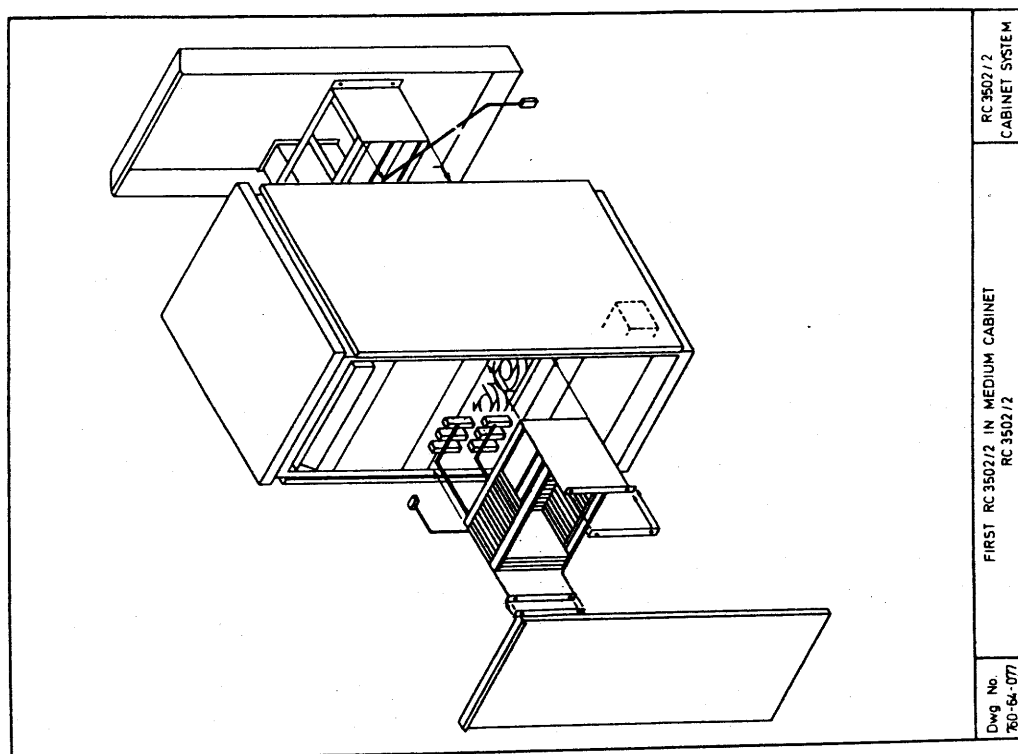


Fig. 3.1.

RC3502 Communication System

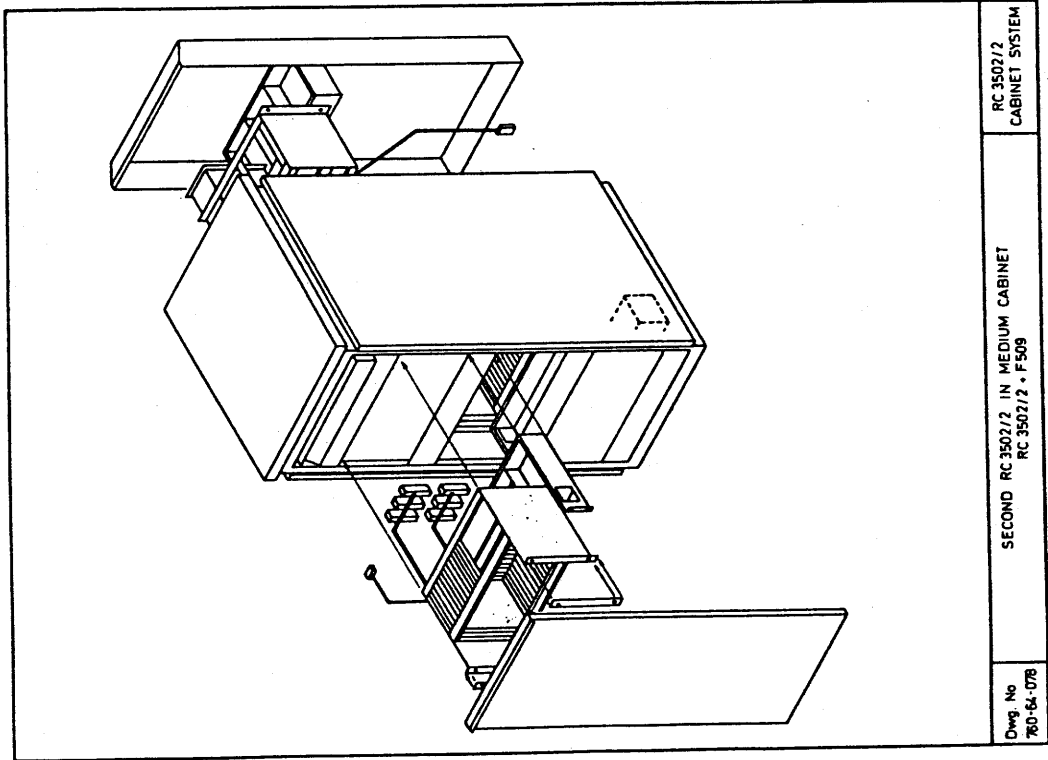
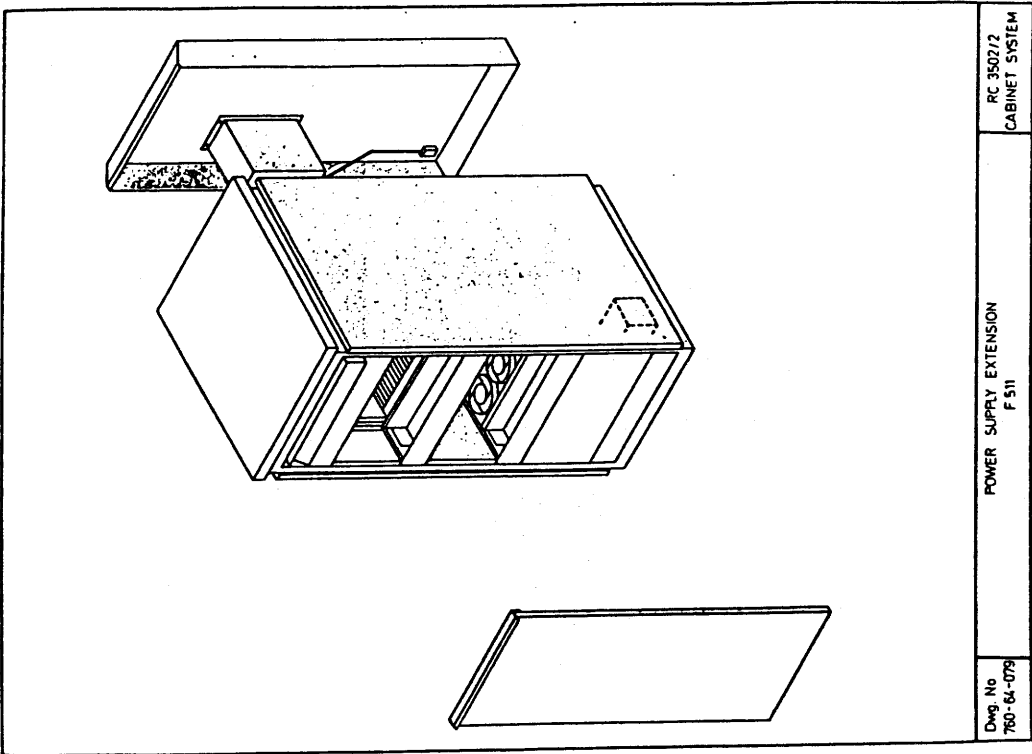


Fig. 3.2.

RC3502 Communication System

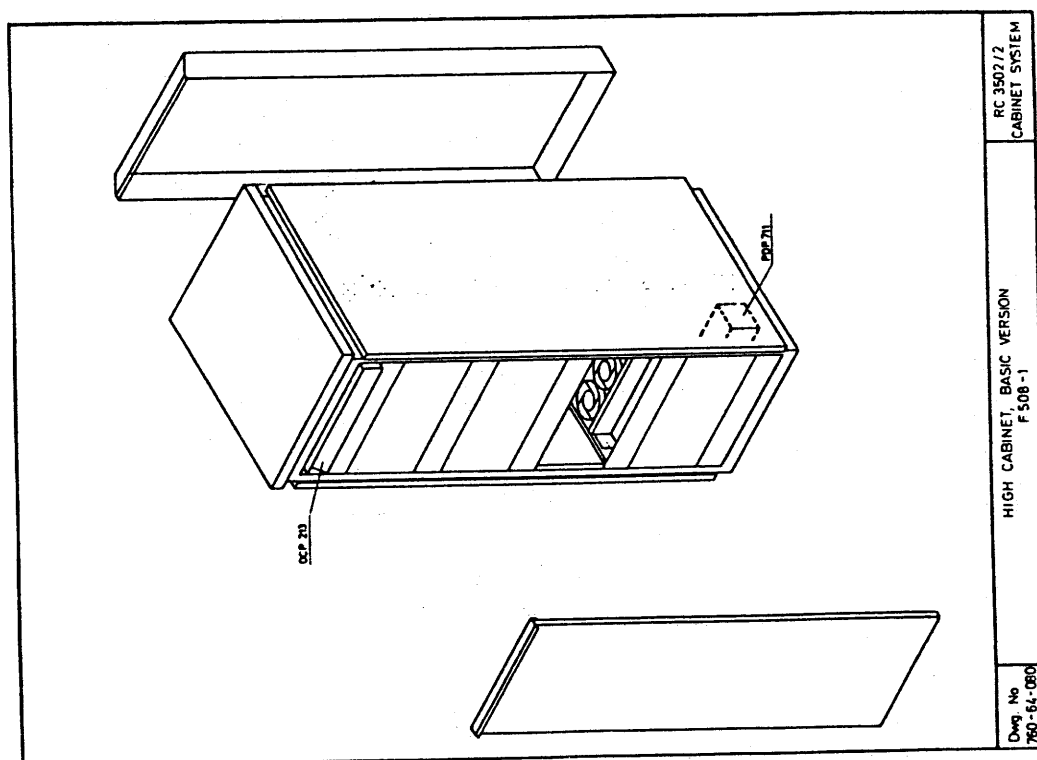
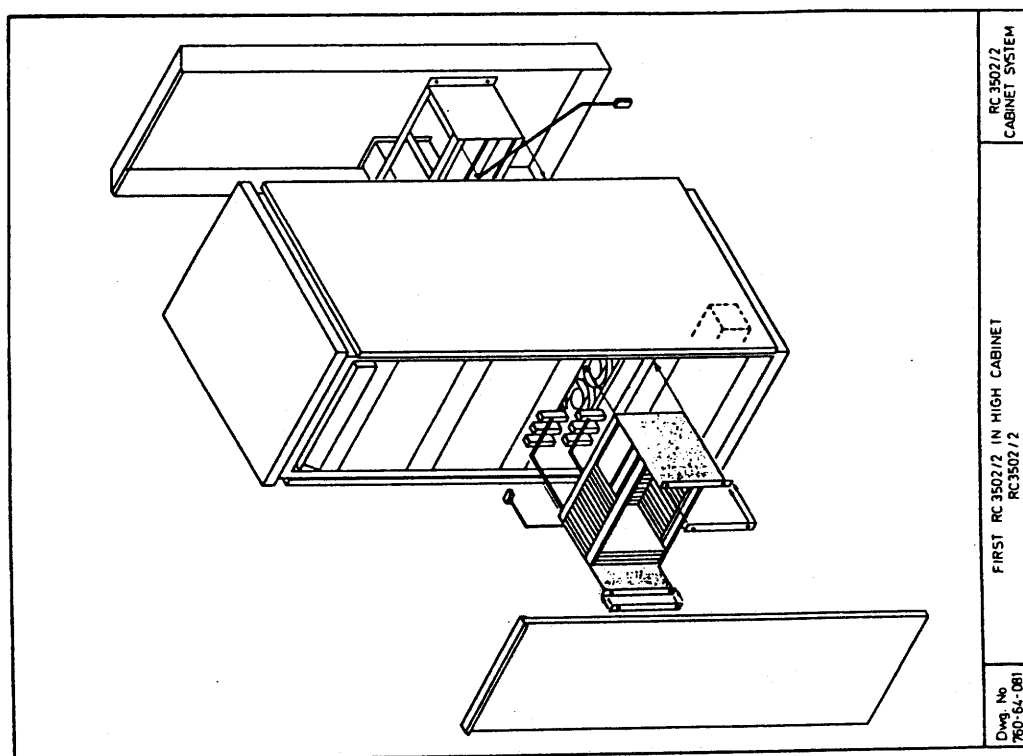


Fig. 3.3.

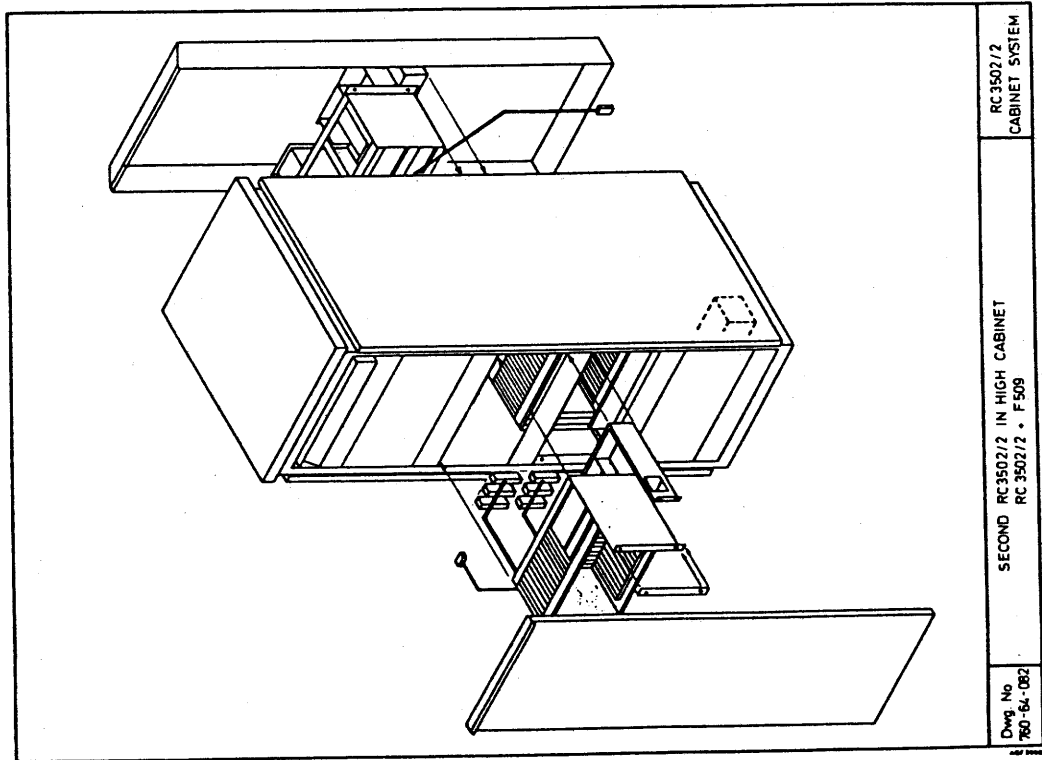
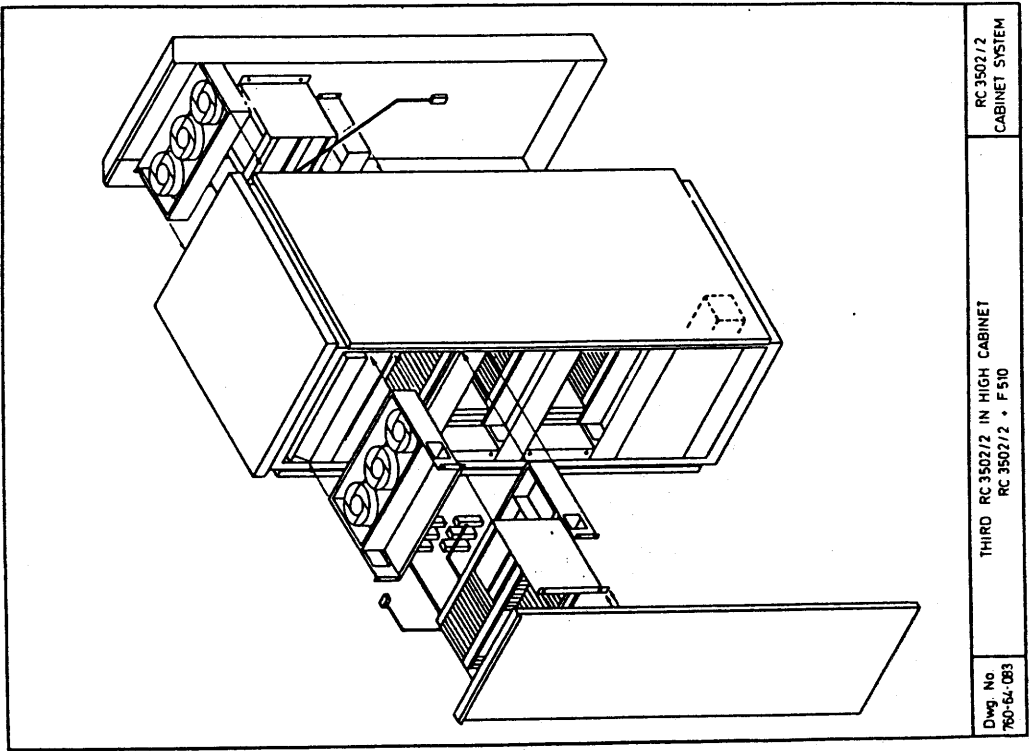


Fig. 3.4.

RC3502 Communication System

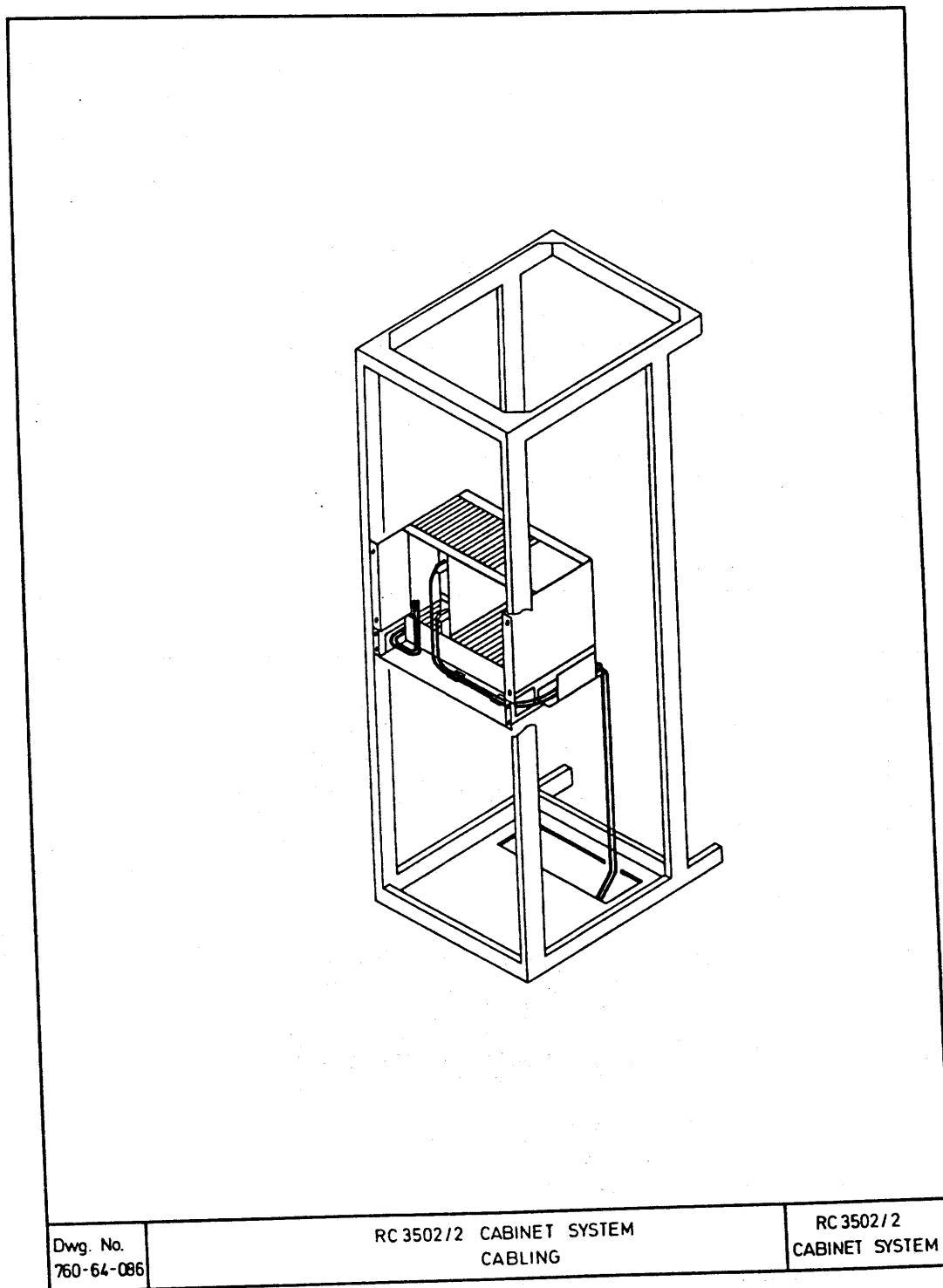


Fig. 3.5.

3.2 Crate Configuration

3.2.1 Strapping of modules

Before any module is installed in a crate, it must be strapped to the specific use. Straps to change the function of the module is factory preset, and should not be changed for normal use. The function of these could be selection of speed and type of EPROMS, disable parity, schedule mode, internal RAM size, internal interrupt numbers and the like. The setting is often made by wrap wire or made as a printed wire on the solder side.

Straps to set interruption level, device number and RC3502 memory address, must be set before installation. By convention there is a standard number for that kind of straps. Below is a table showing the possible standard values. The first number in a group of equal modules has the lowest number.

The following modules has increasing numbers until the max. no. has been reached.

Module	Group of interrupt numbers (HEX)	Dual port memory start address (HEX)	Max. No. of modules
IMS 2xx	08-0F	80.0000-82.C000	8
MFC20x	10-1F	-	16
COM205	20-2F	-	16
VCO201	30-37	-	8
COM204	48-4F	90.0000-96.8000	8
IOM202	50-6F	-	4
MBA201	70-77	98.0000-9E.0000	1

Fig. 3.6.

Memory modules is strapped to cover at least RAM start address hex C0.0000 and EPROM start address = hex E0.0000. (The boot EPROM must start at E0.0000).

No memory module should overlap in address.

Some modules may be installed in the crate, but uses only the back-plane for power, and therefore there is no interrupt level or memory start address on those. SAI201, WDD208, MOD204 and MOD205 are examples of this kind. On SAI201 an ID number should be set, and on WDD208, MOD204 and MOD205 no strapping is normally required.

Appendix A shows the standard strapping of most of the RC3502 modules.

RC3502 Communication System

3.2.2 Installation of modules

There exist several crates for RC3502 modules:

- | | |
|--------|--|
| CRA202 | Is a crate for the older version of RC3502, model 1. |
| CRA204 | Is the CPU-crate of RC3502/2 used in 220V systems. |
| CRA205 | Is the power supply crate of RC3502/2. |
| CRA212 | Is a crate for alarm system modems. |
| CRA213 | Is a crate for AMU072. |
| CRA215 | Is the CPU and power supply crate for RC3502/2 used in 48V DC systems. |
| CRA217 | Is a crate for max. 3 winchester disc drives (RC3564-20) and 6 controllers (RC3563) used in a 48V DC systems. |
| CRA218 | Is a crate for additional power supply. Used together with CRA215 in 48V DC systems. In the crate is also space for 10 modems. |

In the CPU-crate several different types of modules may be installed. The CPU modules must be placed at the first three positions, and because the CPU217 starts the DMA-chain it must be most right. In the backplane there are two chains: an interrupt chain and a DMA chain. Modules which do not use one or both of these passes the chain to the next module. The chains must be unbroken until the last module to use it.

If a module occupies more than one position, a CBL714 is placed in the empty position.

The closer the modules are placed to the CPU, the higher priority they have.

RC3502 Communication System

Most of the software used in RC3502, assumes a standard configuration. Interrupt levels and start addresses are shown in 3.2.1, and the order of the modules is shown below:

First pos.	CPU215
	CPU216
	CPU217
	all of MBA201
	all of IOM201
	all of IOM202
	all of COM204
	all of MFC20X
	all of COM205
	all of VCO201
	all of IMS2xx
	all of MEM2xx
	all of TES20x
	all of MOD204
	all of MOD205
	all of SAI201
	all of WDD208

CBL735 is placed in the position immediately after the last module, if this module is not a disc drive (WDD208).

In a group of equal modules, the order of which they are installed depend of the strapping. The lowest strap number is to the right, and increasing numbers towards the CPU.

MOD204, MOD205, SAI201, and WDD208 is also placed in a CPU-crate, either a 220V or a 48VDC system, uses only the backplane for getting power.

In the same crate as WDD208 is one or more RC3502 disc controllers (SAI201) used for this drive.

Before any module is installed it is planed where it should be placed. Internal cables from the back of IOM201, IOM202 and SAI201 must be inserted in the crate at the correct position by means of two M2.5 screws. The other end of the cable is placed at the I/O panel.

To force the air upwards, a cover is placed inside the crate where there are no internal cables. It has RC partnumber 25802052, and is fastened by means of 4 M2.5 screws. If it is too wide, it may be broken over a table edge.

POW207 and a possible additional power supply (F511) is placed in CRA204.

RC3502 Communication System

When all the modules has been installed, the empty positions on the front is covered by one or more of the front panels:

15 mm wide = 1 module RC-PN 29082199
45 mm wide = 3 modules RC-PN 29028276
137 mm wide = 9 modules RC-PN 29028291

All modules should be tightened by the front screws to improve the EMC quality.

Installation of RC3564-20 in F520.

The 48VDC winchester disc drive RC3564-20 (module WDD208) is to be installed in the crate F520 (module CRA217).

A maximum of 3 drives may be installed, and each of the drives is able to feed two controllers with power (RC3563 module SAI201). The power from the drive is delivered on a 3 position backplane. As in CRA204 unused positions are covered by front panels.

Installation of IDR201.

IDR201 is mounted on the back-side of the Back-Plane Bus (BPL) in the first position from right when looking from behind.

If a wrapwire is mounted from the first position C18 to the second position A18, and from the first position C31 to the second position A31, then these wires must be removed before mounting of IDR201.

RC3502 Communication System

a.) CRA seen from behind.

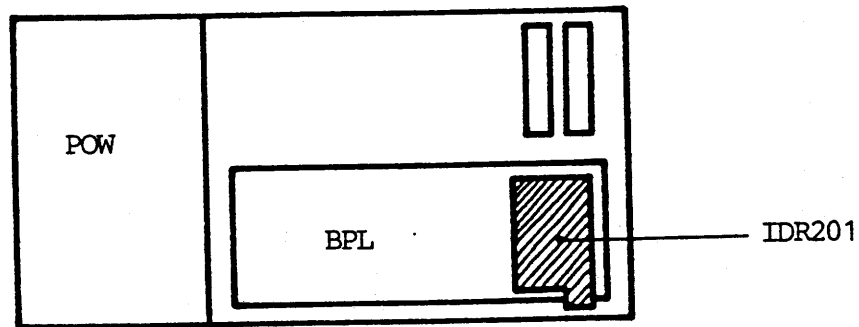


Fig. 3.7.

b.) BPL seen from top

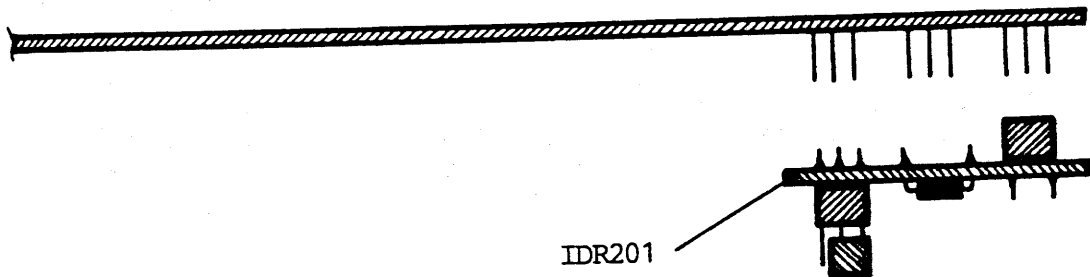


Fig. 3.8.

RC3502 Communication System

3.2.3 Cables from modules

Sales number	From module	Cable number	Cable length (m)	Cable in sales nr.	Comments
RC3502/2	CPU215	CBL312	12		Terminal cable to RC822,RC750,RC45
		CBL588	12		
		CBL981			
		CBL735	x	RC3502/2	Termination jack
RC3542	IMS2xx	CBL719	5	F512S	Terminal cable channel 0,1,2,3 is the first 4 of the upper jack channel 4,5,6,7 is the first 4 of the lower jack
		CBL726	25	F512L	
		CBL727	5	F513S	Modem cable
		CBL724	12	F513M	
		CBL728	25	F513L	
		CBL731	9	F514S	RC831
		CBL732	12	F514M	
		CBL733	25	F514L	
RC3563	SAI201	CBL730	1,5	RC3563	The SCSI bus is made as a pair of cables, (control and data). The upper 2 jack's has a 1:1 connection to the lower 2 jack's. All modules using the SCSI bus is connected together in a chain. The upper cable in the pair is connected to the upper of another module, and the lower to the lower. Both ends of the SCSI bus is terminated by TEM201.
		CBL747	1,5	RC3563	Internal cable Channel 0 on the 9 jack is the control channel, and Channel 1 is the data channel.

RC3502 Communication System

Sales number	From module	Cable number	Cable length (m)	Cable in sales nr.	Comments
RC3531	MFC201	KBL620	5	MF124	to micronet transceiver drop-cable (the upper jack is used)
		KBL625	12	MF125	
		CBL561	25	TF502	Debug cable (lower jack)
		CBL714	-	RC3531	Chain jack
RC3532	MFC202	KBL025	5	F523S	Ethernet transc. drop cable. the upper jack
		KBL026	12	F523M	
		CBL561	25	TF502	Debug cable (lower jack)
	MFC203	CBL730	1		
		CBL561	25	TF502	Debug cable
	MFC204	CBL561	25	TF502	Debug cable
RC3547	COM205	CBL721	15	F526M	V.24 Modem cable
		KBL028	12	F525M	Debug cable
		KBL027	12	F524M	X.21 DCE cable
F191	SLA203	CBL721	15	F191	V.24 modem cable
F192	SLA204	CBL720	15	F192	V.35 modem cable
RC3521/2	IOM202	CBL747	1,5	RC3521/2	Internal cable
		CBL677	10	CO910	I/O cable with 9 p cannon jacks
		CBL676	20	CO911	
		CBL675	50	CO912	
		CBL674	100	CO913	
		CBL410	1,5		
F507,		CBL105	12	F507	Mains power 220V/16A
F508				F508	
		CBL410	1,5	F507	OCP cable
		CBL065	1,5	F507, F508	Power to POW207

4. ENVIRONMENTAL REQUIREMENTS

4.1 Mains Supply

4.1.1 Mains Supply Voltage

220V +5%.

4.1.2 Mains Supply Frequency

50Hz + 5%.

4.1.3 Mains Power Consumption

The table below specifies the maximum consumptions for F507-1 Medium Cabinet and F508-1 High Cabinet with their maximum configurations installed. The recommended mains fuse ratings applies for this.

		F507 OR F508		F508
		1xRC3502/2	2xRC3502/2	3xRC3502/2
VENTILATION	VA	175	175	350
RC3502/2	VA	450	900	1350
F511 PSU EXT.	VA	450	900	1350
CONSUMPTION	VA	1075	1975	3050
REC. MAINS FUSEVA		10	10	16

4.1.4 Ground Connection

The mains supply outlet shall provide a good quality ground.

4.2 Climatic Conditions

4.2.1 Ambient Temperature to Cabinets

Measured 1 meter above ground level: +5 degree C to +35 degree C.

4.2.2 Relative Humidity

Non condensing: 30% to 70%.

4.3 Service Area

The drawing below specifies the required area for operation and service.

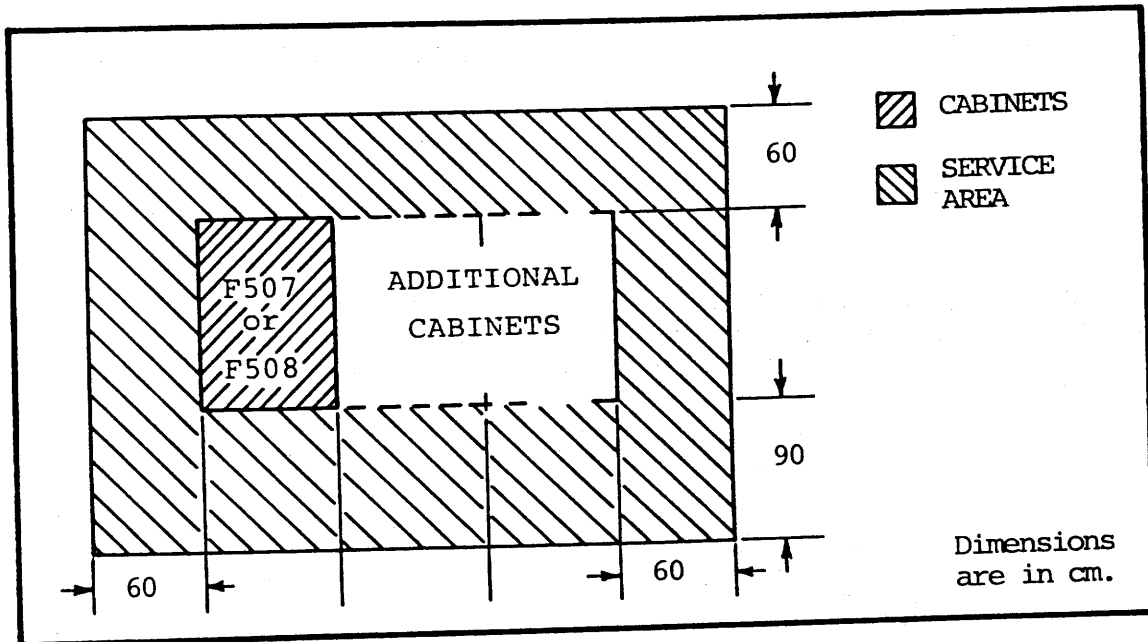


Fig. 4.1.

4.4 Acoustic Noise level

The acoustic noise level measured at a distance of 0,65 m for a high cabinet (F508-1) with its maximum configuration of 3 RC3502/2 and 4 ventilation units is as shown in the graph below.

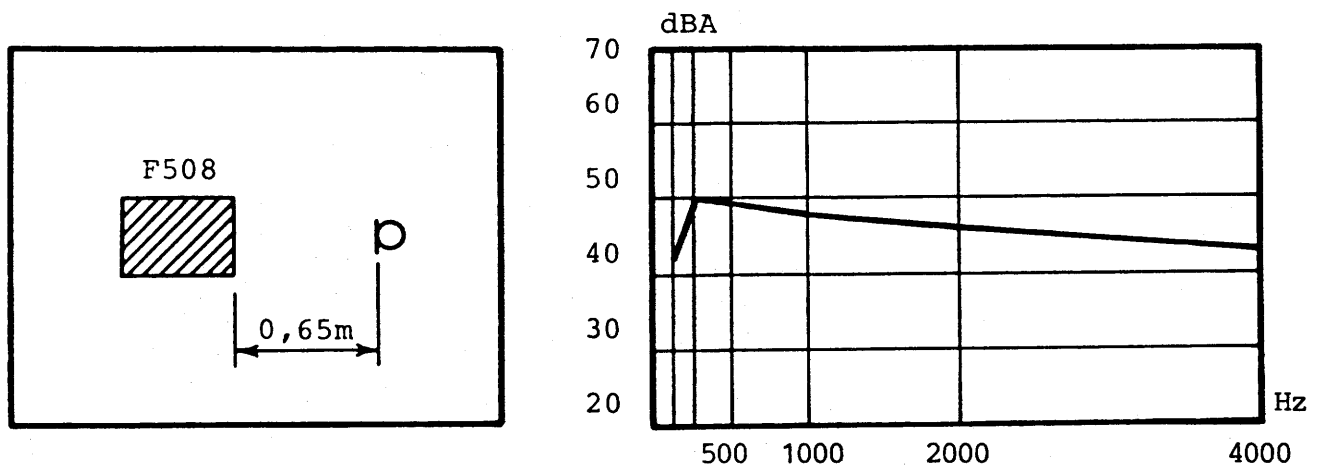


Fig. 4.2.

5. RC3502 D/2, 48 VDC VERSION

The 48VDC version is developed without cabinets and without power supply.

In the crate (CRA215) there is room for a PHILIPS DC-DC converter PE1050.

Extra power may be installed by use of the extension crate (CRA218). In this crate an additional converter (PE1050) may be installed.

There exist two different types of winchester disc drives used in a 48VDC system.

1. RC3564 is used in CRA217 where max 3 x RC3564 and 6 x RC3563 is installed.

The Drive converts 48VDC to generate + 5V + 12V and - 12V to itself and up to two RC3563.

2. RC3565 is installed in CRA215 with converter (Philips PE1050) and will receive power from this.

Beside the disc drive, there is room for up to 7 RC3563 and other modules.

6. SYSTEM CHECK OUT

6.1 A New Installation

It is recommended to use the following procedure to check out a new installation:

1. Before turning power on, all the strapping and the placing of the modules are checked, according to section 3.2 and the technical information.
2. After power on, +5V, +12V and -12V are checked:
+5V should be within the limits +4.8 - +5.2V
+12V should be within the limits +11.4 - +12.6V
-12V should be within the limits -12.6 - -11.4V

It is possible to measure these voltages on J1 on the Back-plane or on the console jack on CPU215.

0V = J1 - C32 or console pin 7
+5V = J1 - C30 or console pin 1
+12V = J1 - C29 or console pin 2
-12V = J1 - C4 or console pin 4

6.2 Test

This chapter is an example of a system test of a RC3502 additional information is found in the TOP35 documentation. The four data switches on CPU215 is set to the desired autoloader function according to RC3502/2 operating guide.

The mode switch is set to 4 (300 baud console) or 5 (1200 baud console), and a terminal is connected to CPU215.

Then push the autoloader button.

A message on the console will inform of RC3502 type, microprogram version and debugger program version.

Then the CPU will perform a self diagnostic test.

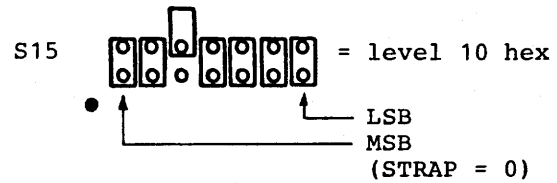
After a successful run of the selfdiagnostic tests, the CPU will be autoloader.

A TOP35 tsystem should be loaded. All units in the crate may be tested by use of TOP35.

A. Straps - Short Form

MFC201, 202, 203, 204

General: I/O level



1. MFC

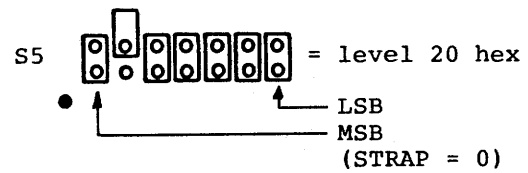


2. MFC



COM205

General: I/O level



1. COM205

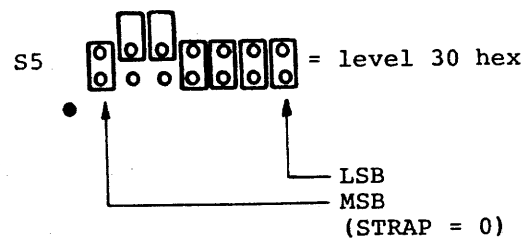


2. COM205



VCO201

General: I/O level



1. VCO



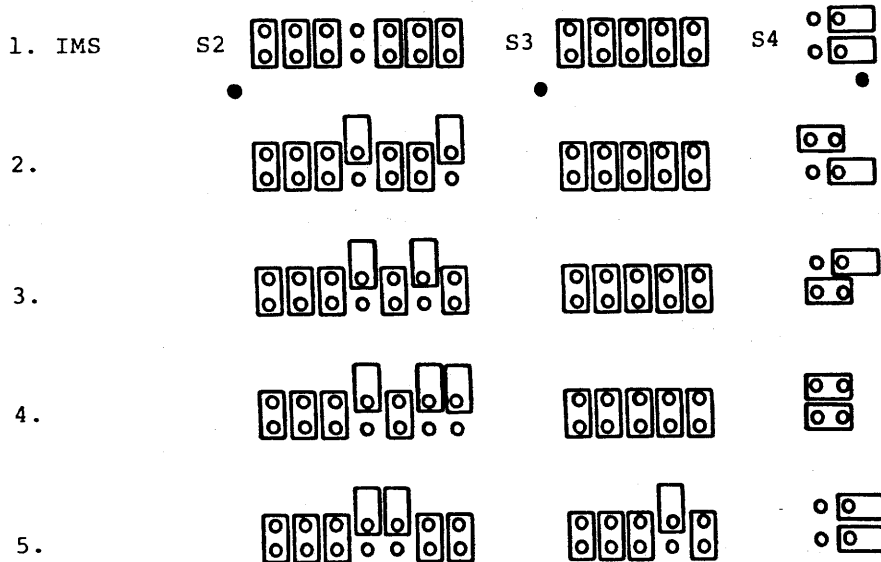
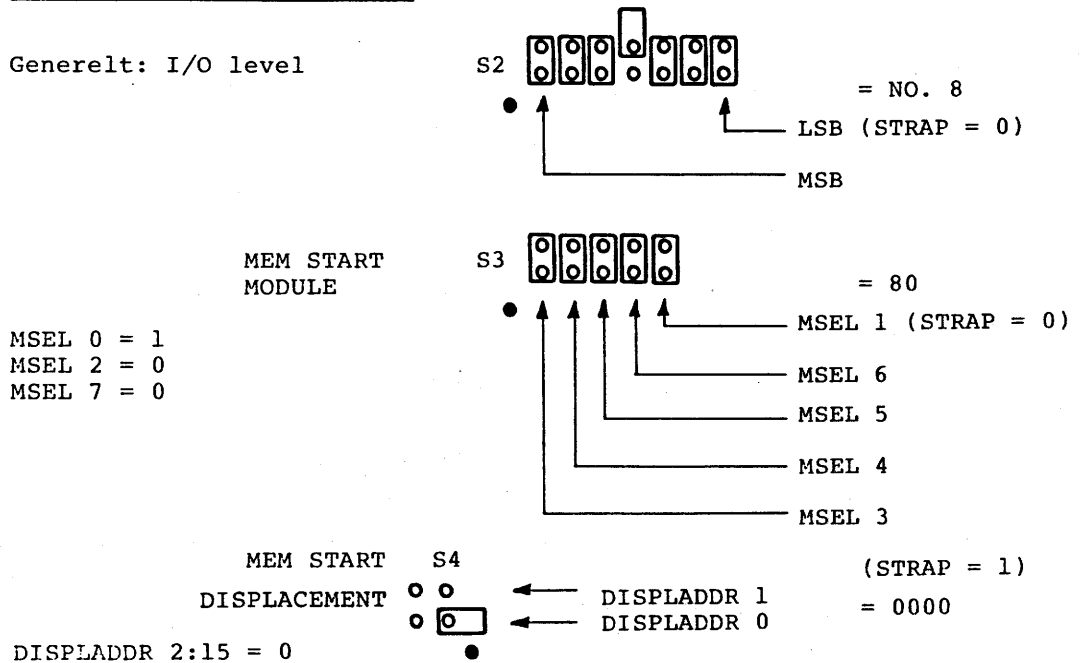
2. VCO



RC3502 Communication System

IMS208, 209, 210, 211, 212

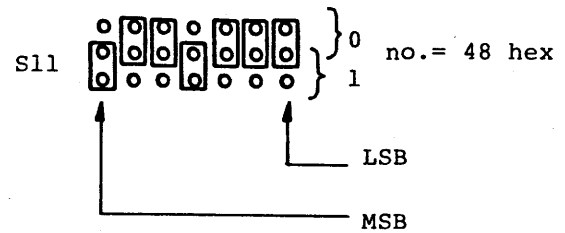
Generelt: I/O level



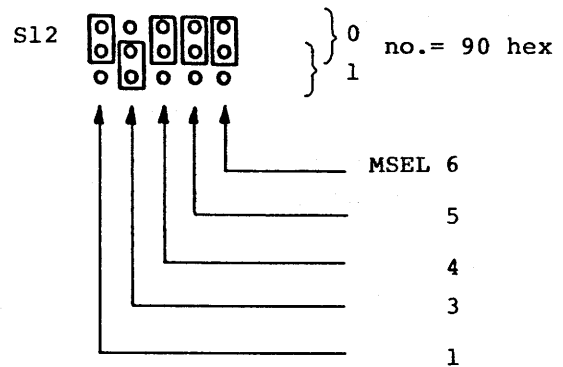
RC3502 Communication System

COM204

Generelt: I/O level

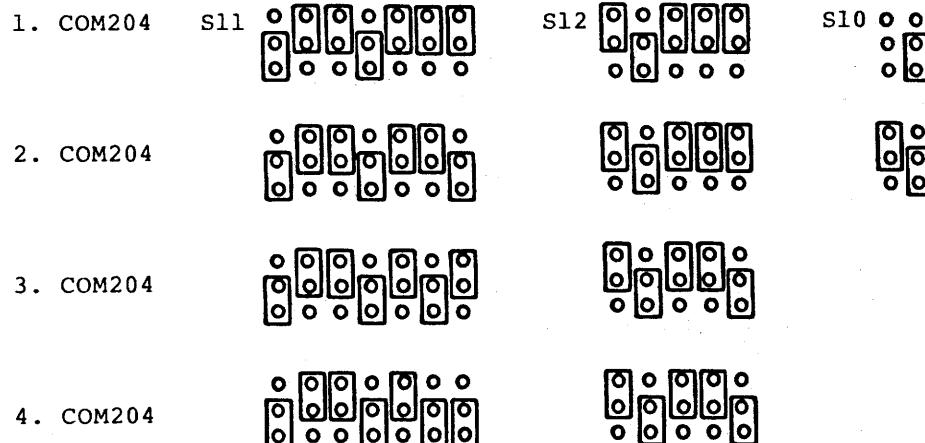


MEM START
MODULE



MSEL 0 = 1
2 = 0
7 = 0

MEM START
DISPLACEMENT



RC3502 Communication System

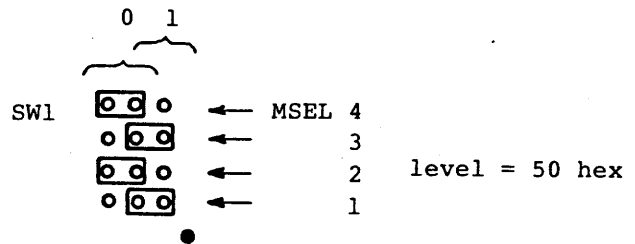
IOM202

Generelt: 1. I/O level

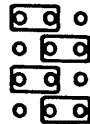
MSEL 5 = 0

6 = 0

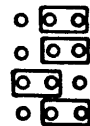
7 = 0



1. IOM



2. IOM



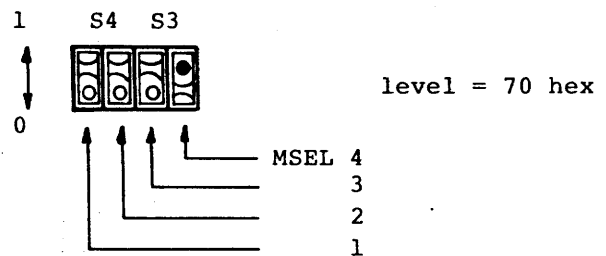
MBA201

Generelt: 1. I/O level

MSEL 5 = 0

6 = 0

7 = 0



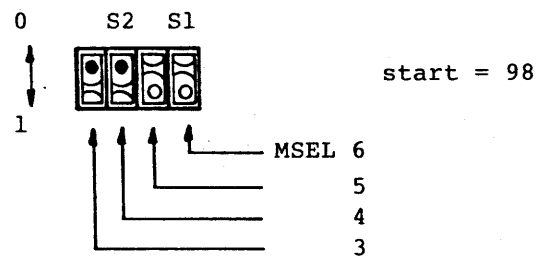
MEM START
MODULE

MSEL 0 = 1

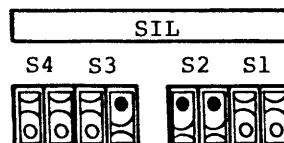
1 = 0 (STRAP)

2 = 0

7 = 0



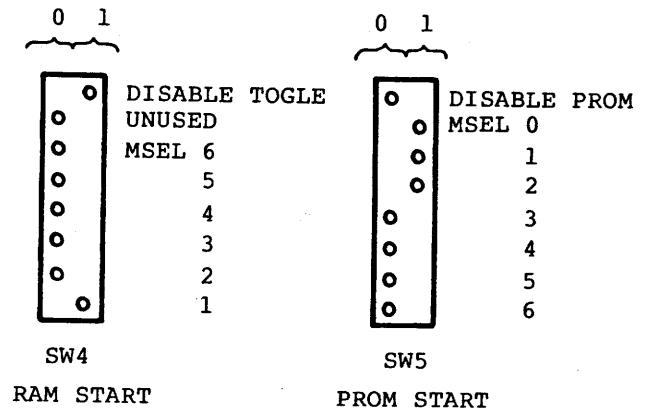
MBA201



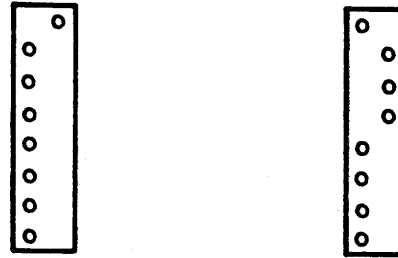
RC3502 Communication System

MEM205, 206

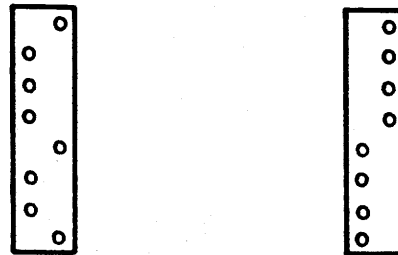
Generelt:



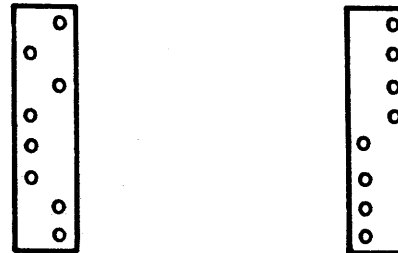
1. MEM205/206



2. MEM205



3. MEM206

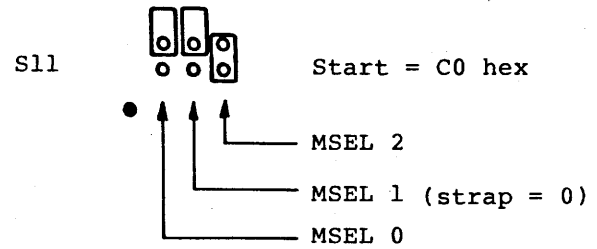


RC3502 Communication System

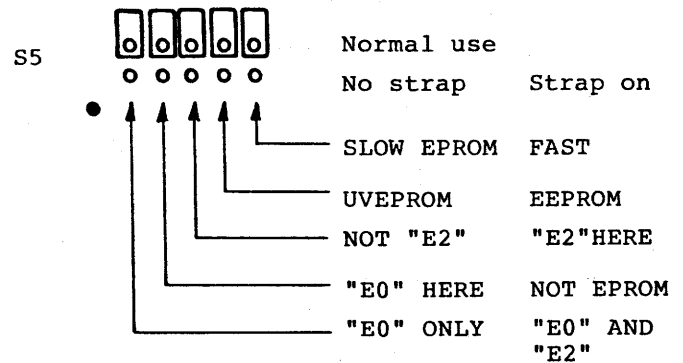
MEM207, 208, 209

Generelt:

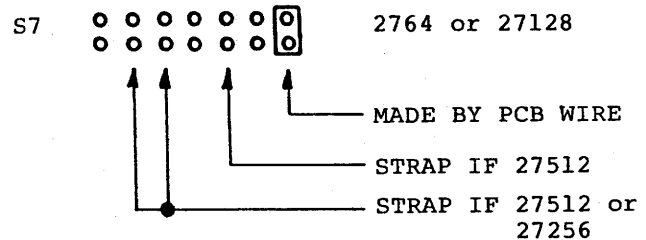
MEM START (RAM)



System strap



EPROM TYPE



1. MEM207
AND
MEM209

S11



S5



2. MEM207

S11



S5



B. Documentation References

Sales no of HW	Tech. No	Sales no. of Doch.	RCSL-No or Part No (P/N)
F191	SLA203	F606	
F192	SLA204	F606	
F194	SLA205	F606	
F199	SLA207	F617	
F511	POW207	F600	
F507	-	F600	
F508	-	F600	
F509	-	F600	
F510	-	F600	
F517	MOD204	-	99000861
F522	MOD205	F610	
RC3502/2	-	F600	
RC3514	TES202	-	99000532 99000533 99000534
RC3515	MEM205	DDM188	
RC3516	MEM206	F609	
RC3517	MEM207	F614	
RC3519	MEM209	F614	
RC3521-2	IOM202	F600	
RC3531	MFC201	F612	
RC3532	MFC202	F612	
RC3542	IMS211	F603	
RC3546	COM204	F606	
RC3547	COM205	F613	
RC3548	IMS212	F603	
RC3565-20	WDD204	DDM211	
RC3563	SAI201	DDM211	
RC3581	COM204	F606	
SW2001-2	-	SW2001-2-d	
SW2101-2	-	SW2101-2-d	
SW2201-2	-	SW2201-2-d	

C. PARAMETER SURVEY

SALES NO	TECH.NO	WIDTH in T = 5.08 mm	+5V A	+12V A	-12V A	HEAT Kcal per h.	DISSIP. KJoule per h.
F191	SLA203	-	0.5	0.03	0.03	3	13
F192	SLA204	-	0.6	0.03	0.03	4	16
F194	SLA205	-	0.6	-	-	3	13
F199	SLA207	-	0.5	-	-	2	9
F507		-	-	-	-	150	628
F508		-	-	-	-	300	1256
F509		-	-	-	-	-	-
F510		-	-	-	-	-	-
F511	POW207	27	output 40.0 max	output 4.0 max	output 4.0 max		
F517	MOD204	3	0.5	-	-	2	9
F520	CRA217	-	-	-	-	-	-
F522	MOD205	3	0.5	-	-	2	9
RC3502/2	-	9	10.0	0.02	0.02	43	180
RC3512	MEM204	3	2.5	0.50	0.05	17	72
RC3514	TES202	3	2.5	-	-	10	42
RC3515	MEM205	3	4.5	-	-	20	84
RC3516	MEM206	3	4.5	-	-	20	84
RC3517	MEM207	3	4.8	-	-	21	88
RC3519	MEM209	3	4.8	-	-	21	88
RC3521-2	IOM202	3	2.1	-	0.10	10	42
RC3531	MFC201	6	6.0	0.05	0.05	27	113
RC3532	MFC202	3	5.5	0.05	0.05	25	105
RC3542	IMS211	3	4.8	0.50	0.12	27	113
RC3546	COM204	6	6.0	-	-	26	110
RC3547	COM205	3	5.6	0.1	0.1	25	108
RC3548	IMS212	3	4.8	0.5	0.1	26	109
RC3563	SAI201	3	1.8	1.80	0.05	8	33
RC3565-20	WDD204	21	3.7	2.50	-	34	142
RC3581	COM204	6	6.0	-	-	26	110

RC3502 FCO Overview

Salgsnr.	modul	FCO-liste				
RC3502d-2	CPU215	11-123	11-137	11-148	11-154	
	CPU216	11-151				
	CPU217	11-115	11-125	11-145	11-153	11-155
	CPU215E	11-124	11-137	11-149	11-154	
	CPU216E	11-128	11-152			
RC3512	MEM204	11-058	11-084	11-106		
RC3514	TES202	11-085	11-097	11-107		
RC3515	MEM205	11-121	11-129	11-130	11-131	
RC3516	MEM206	-				
RC3517	MEM207	-				
RC3519	MEM209	-				
RC3521	IOM201	11-116	11-117	11-118		
	IOM202	-				
RC3531	MFC201	18-094				
RC3532	MFC202	18-094				
RC3542	IMS208	18-061	18-062	18-065	18-067	
	IMS209	11-132				
	IMS209E	11-132				
	IMS211	-				
RC3544	AMU408	18-063	18-064			
RC3545	AMU016	-				
RC3546	COM204	18-066	18-070	18-080	18-090	18-093
RC3547	COM205	18-157				
RC3548	IMS210	-				
	IMS212	-				

RC3502 Communication System

Salgsnr.	modul	FCO-liste
RC3563	SAI201	11-147
RC3564	WDD201	17-055, 17-056
	WDD203	17-055, 17-056
	WDD205	17-055, 17-056
	WDD207	17-055, 17-056
RC3565	WDD202	17-055, 17-056
	WDD204	17-055, 17-056
	WDD206	17-055, 17-056
	WDD208	17-055, 17-056
RC3581	COM204	-
RC3583	VCO201	-
F191	SLA203	-
F192	SLA204	-
F194	SLA205	-
F199	SLA207	-
F517	MOD204	-
F522	MOD205	-

RC3502 Specification Sheet

Controller Power Consumption

Module	Sales no	+5V Amp	+12V mA	-12V mA
COM204	RC3546	6.0	0	0
COM205	RC3547	5.6	100	100
CPU21x	RC3502	10.0	25	25
IDR201	F506	0.2	0	0
IMS2XX	RC3542	4.8	500	500
IQM20X	RC3521	2.0	0	50
MEM204	RC3512	2.5	500	10
MEM205	RC3515	4.5	0	0
MEM206	RC3516	4.5	0	0
MEM207	RC3517	4.8	0	0
MEM209	RC3519	4.8	0	0
MFC201	RC3531	6.0	50	50
MFC202	RC3532	5.5	50	50
MFC203	RC3562	6.5	50	50
MFC204	RC3549	5.5	50	50
MOD204	F517	0.5	0	0
MOD205	F522	0.3	0	0
SAI201	RC3563	1.8	0	0
SLA203	F191	0.5	25	25
SLA204	F192	0.5	25	25
SLA205	F194	0.6	0	0
SLA207	F199	0.6	0	0
TES202	RC3514	2.5	0	0
WDD202	-	3.7	2500	0
WDD204	RC3565	3.7	2500	0
WDD208	RC3565-20	3.7	2500	0

Reliability Prediction

CONCERNING RELIABILITY AND MTBF

The reliability of a product is defined as:

- the propability of the survival of the product in a given period, in a given environment.

The failure propability is often shown by the so-called bathtub curve:

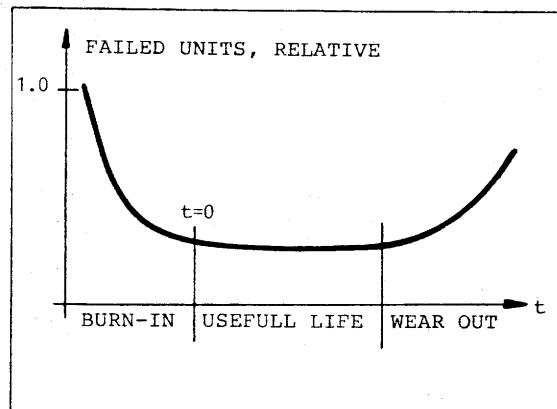


Fig. 1 The failure propability = $F(t)$

When assuming that a product is burned in and put into operation with a constant failure frequency in time $t=0$ the reliability function for the operation time can be expressed by:

$$R(t) = e^{-\lambda t}$$

For a product constructed by many single components the mean time between failures can be expressed by:

$$m = \frac{1}{\lambda} = \frac{\text{TOTAL OPERATION TIME}}{\text{No. OF FAILURES}} = \frac{T}{r}$$

which also is described as MTBF, Mean Time Between Failures.

As the prediction of a product's reliability is a statistical consideration the calculation of m is more probable by making more observations before dividing this size into the accumulated operation time T .

When observing many products in operation for a longer time, it is possible, on basis of this, to establish a practical observed MTBF, which of course is most safe for both the manufacturer and the user of the product.

Is this possible, it should (in almost all relations) be used as opposed to the other alternative, based on a calculation in which statistical information on the single components of the product form the basis.

The latter method is described as reliability prediction.

To each of the single components the failure frequency is dependent on conditions like:

- the construction and complexity of the component (technology)
- the quality of the component (money)
- loading/strength during operation (dissipated power)
- operational environment (temperature, mechanical influence a.o.)

Especially concerning highly integrated circuits (microprocessors, EPROM's, RAM's) a so-called learningfactor is comprised in the calculation, which gradually improves the longer the component has been in production.

As to most electronic components (not IC's though) the failure frequency is calculated by

$$\lambda p = \lambda b \quad (\pi_E \times \pi_A \times \pi_{S2} \times \pi_C \times \pi_Q)$$

in which all factors to the right of the equal-sign describe the conditions mentioned above. These factors, which are calculated on basis of a very large statistical material accumulated during many years, have been collected in a number of handbooks such as the American MILHDBk 217.

The advantage by using MILHDBk 217 is that the source is well defined and known. Referring to this no doubts remain as to the calculation models or table values.

The disadvantage by using MILHDBk 217 is that the table values are extremely conservative as the aim of publishing this handbook is to produce highly reliable equipment for military use (almost) regardless of costs.

The reliability calculations performed for the RC3502 units are based on a simplified calculation method from MILHDBk 217. The method is called parts count prediction and it does not consider the loading/strength relation for the components. The failure frequency for the single components is taken from ITT, and they are not as conservative as in MILHDBk 217.

A third Lambda source is published by RDF in France. As it is updated more frequent than MILHDBK 217 it is often used for products with civilian purposes.

RC3502 Communication System

Furthermore the factors comprised in the calculation models for new and complex IC's (which are frequently used in RC3502 products) are extremely pessimistic even when sources other than MILHDBk 217 are used. In this respect we are often referred to estimate some of the factors in the calculation model on the basis of the manufacturer's information and our own modest experience.

An example of the MTBF value demonstrated by using different calculation models and different Lamda sources in which one not is more authorized than the other, is shown in enclosure 1.

As it appears, the figures are very different, however it is clearly demonstrated that the ITT source is the most optimistic. At the time RC decided to use it, ITT claimed that the figures were traceable, which means that the practical component tendencies formed the basis.

As appears from the previous the results must be used very carefully in relation to comparison. You must be especially observant if your own given MTBF values are compared with the calculations of your competitors as a fair comparison only can be performed if calculation models and Lamda sources are the same. Only if it can be expected that the customer with basic knowledge can enter a discussion on component tendencies the theoretical calculations should be distributed. Alternatively the observed failure rates are applied.

ENCLOSURE 1

As an example of application of different calculation models and Lamda sources MTBF for a 3MB memory card is calculated below.

L_A shows the failure frequency for all components on the card except the RAM circuits, which are TI44C 256 - ION, 256K x 4 bit. The failure frequency for the latter appears as L_R .

L_A is calculated after the parts count method with ITT as Lamda source, is calculated as demonstrated in the table. 48 RAM's are comprised in the card.

Calculation model	Lamda source	L_R	$48 \times L_R$	L_A (*)	LTOT	MTBF (h)
Parts count reliability pred. 217E	ITT	360	17.280	34.900	52.180	19.200
As above	217E	2.890	138.720	34.900	173.620	5.760
As above	RDF	2.420	116.160	34.900	151.060	6.620
Parts stress analysis 217E	217E	4.000	192.000	34.900	226.900	4.410

(* All L_A values are calculated with ITT as source.

