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Title:

RC850 Terminal Systems
Hardware Module Structure
Outline and Document Reference

Keywords:

RC850, COI, CRT, DSU, FDI, IML, IOM, KBU, KEY, KTC, MIC, MON, PGR,
RGM, VIM, Hardware Modules, Firmware PROMs, Introduction.

Abstract:

The modular hardware structure of the RC850 terminals is introduced.
Break-down of item code information to hardware module identification.
Outline of modules and document references.

(32 printed pages)

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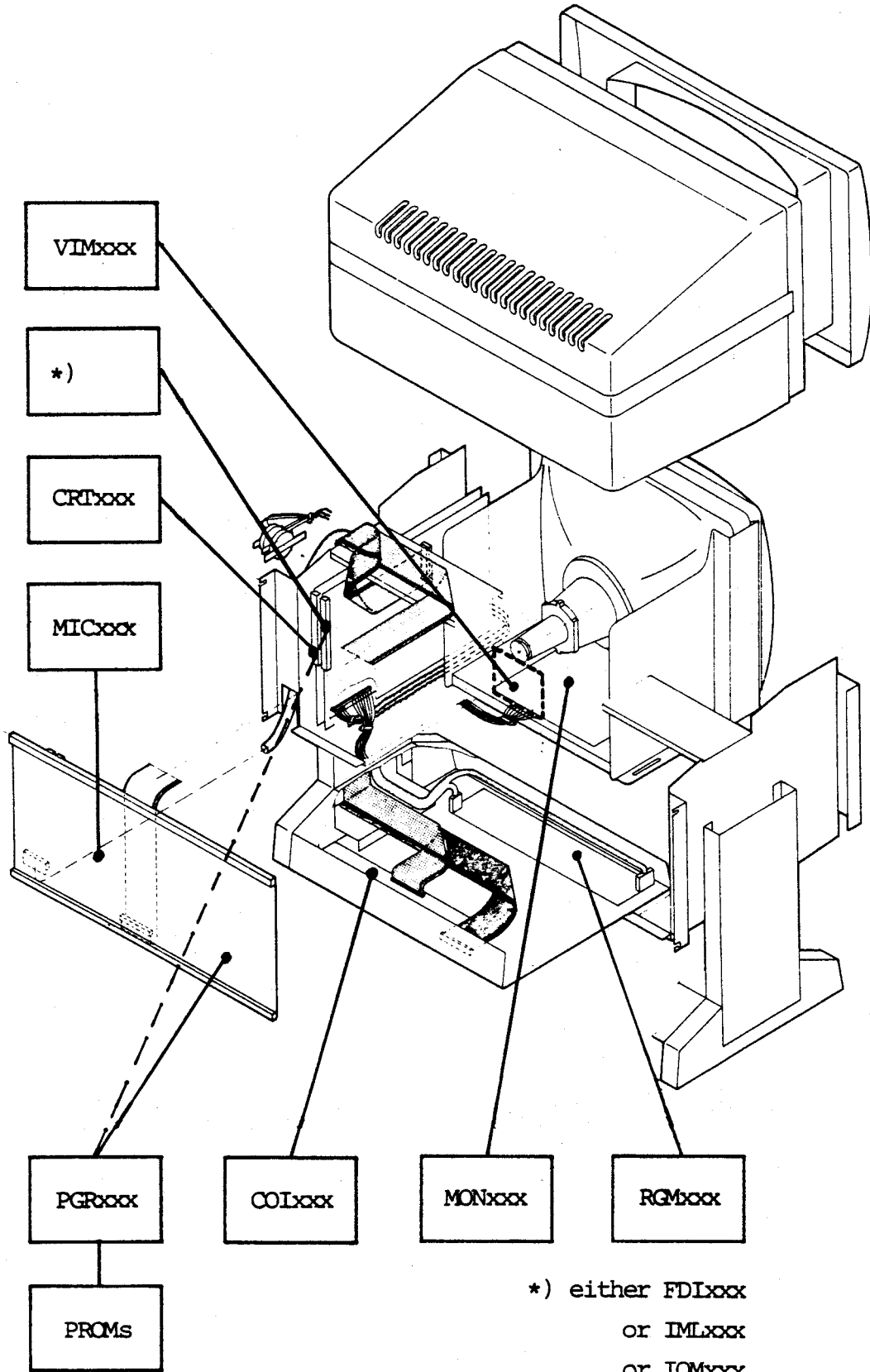
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1. INTRODUCTION

The construction of the RC850 terminals is based on a set of hardware modules.



*) either FDIxxx
or IMLxxx
or IOMxxx
or none

The main modules related to the display unit (DSUxxx) are:

COIxxx - Communication interface
CRTxxx - Display controller
FDIxxx - Flexible disc drive interface
IMLxxx - Image load
IOMxxx - I/O module
MICxxx - Microcomputerboard
MONxxx - Monitor
PGRxxx - Firmware PROMs
RGMxxx - Power supply
VIMxxx - Video module

The terminal's keyboard unit (KBUxxx) likewise is modular based, the main module related hereto being:

KEYxxx - Keytop replacements
KTCxxx - Keyboard controller

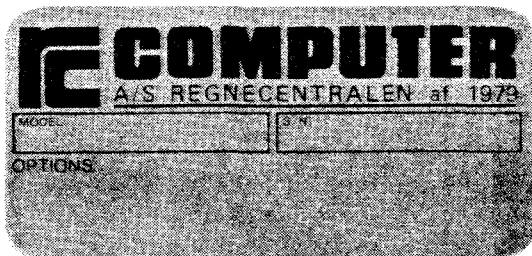
The specific module identification, consisting of <module name> and <module number>, is required to provide access to the technical documentation of the terminals. Document references are found in chapter 3.

Given a terminal, the identification of a specific module is enabled by the information on the terminal's serial number label(s).

2. MODULE IDENTIFICATION

2.

Information from the serial number label(s) is used in determining which specific modules the terminal comprises.



The label is (normally) found on the bottom surface of the tiltable part of the display unit.

The keyboard unit also is labelled on the bottom surface with a serial number label as the above.

If a label directly holds a module identification in the 'OPTIONS' field, such as FDIxxx and PGRxxx, the document reference can be looked up right away in chapter 3. Note that the modules FDI, IML and IOM mutually excludes one another.

The DSUxxx and KBUxxx numbers are used as entries in the tables following whereby the specific module identifications are found and can then be looked up in chapter 3.

DSU	COI	CRT	MIC	MON	RGM	VIM	PGR	'OPTION'
600							501	
601							502	
602							503	
603							504	
604							505	
605							513	
606		502					506	IOM501
607							508	
608							509	
609					502	503	510	FDI501
610	502	503	506	592	&	or	511	or
611					503	505	512	IML501
612							514	
613							515	
614							516	
615							517	
616							518	
617							519	
618							520	
619						504	[513]	IML501 or FDI501; PGRxxxx
620		502				504	506	IOM501
621	[503/4]	506	509	503				and COIxxx
622	503	504	507	503				
623	503	504	508	504				FDIxxx
624	504	505	509	505	502			and
625	504	505	509	506				PGRxxxx
626	503	505	509	505				
627	503	504	508	503				
628	503	505	509	506				

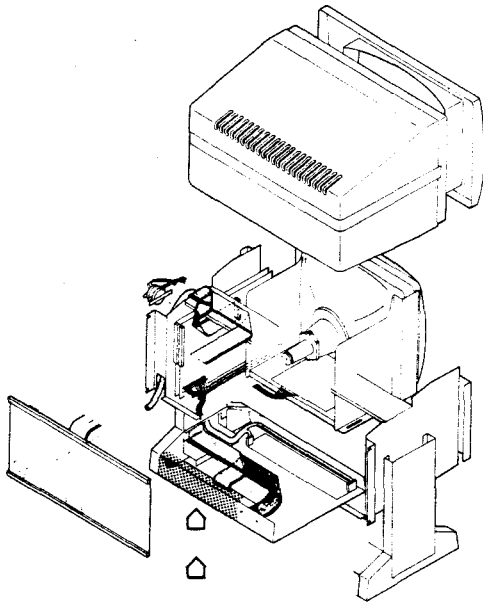
<u>KBU</u>	<u>KTC</u>	<u>'OPTION'</u>
516	406	KEYxxx
518	402	
519	405	KEYxxx
521	404	KEYxxx
523	408	
524	409	
525	410	
526	411	
527	405	KEYxxx
528	406	KEYxxx
529	404	KEYxxx
530	412	

3. OUTLINE AND DOCUMENT REFERENCE

3.

3.1 COI - Communication Interface

3.1



The COI-module is the interface between the microcomputerboard (MIC) and the external communication tasks. Line connections are provided for host system (LINE I), attachment of printer (LINE II (PRINTER)), keyboard (KEYB) and cluster control unit (CIRCUIT or COAX).

The DISKETTE I/O connection is not part of the COI-module, but refers to the FDI-module.

The following describes the connections of the COI503/504 modules: (COI502: see RCSL No 52-AA1066):

LINE I (J4)

1	FRAME GND
2	XMT DATA
3	REC DATA
4	REQUEST TO SEND
5	CLEAR TO SEND
6	DATA SET READY
7	LOGIC GND
8	DATA CAR DET
9	T(A)
10	I(A)
11	-,SELECT X.21
12	T(B)
13	-
14	C(B)
15	XMT CLOCK
16	S(B)
17	REC CLOCK

LINE II (PRINTER) (J3)

1	FRAME GND
2	XMT DATA
3	REC DATA
4	REQUEST TO SEND
5	CLEAR TO SEND
6	DATA SET READY
7	LOGIC GND
8	DATA CAR DET
9	-
10	-
11	-
12	-
13	-
14	-
15	-
16	-
17	-

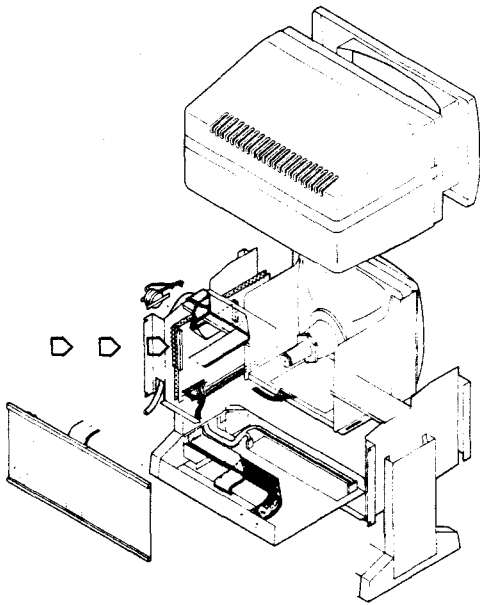
18 S(A)	18 -
19 R(B)	19 -
20 DATA TERM READY	20 DATA TERM READY
21 R(A)	21 -
22 CALLING INDCIATOR	22 CALLING INDICATOR
23 -	23 -
24 I(B)	24 -
25 C(A)	25 -

<u>KEYBOARD (J1)</u>	<u>CIRCUIT (J2)</u> or	<u>COAX (J2)</u>
1 -	1 Line 0	1 Line 0
2 TRM DATA	2 -	2 Line 1
3 0V	3 Line 1	
4 REC DATA		
5 +5V		

LINE I complies to V.24/V.28 and X.24/X.27 mixed on the different pins. X.24/X.27 is used for X.21 communication.

LINE II complies to V.24/V.28, ISO 2110.

<u>Documentation</u>	<u>Note</u>
COI502: see description in RCSL No 52-AA10544& 1066	CIRCUIT
COI503: RCSL No 30-M322	CIRCUIT
COI504: RCSL No 44-RT2027	COAX



The CRT-module is the interface between the microcomputerboard (MIC) and the display monitor (MON).

The module continuously displays the contents of the refresh memory, which is maintained as a copy of the display information bytes in the main memory, and so it releases the CPU of high repetitive operations involved in display controlling.

The VIM-module additionally was applied in terminals with DSU600-620.

The following describes the main components of the CRT-module:

Name	Use
CRT Address sequencer	Initialize display constants, cursor control.
DMA Function register	Selects which display part should be accessed, and starts the transfer.
Screen refresh memory	Memory for characters and attributes for every position on the display.
Shadow font RAM	Memory for a shadow pattern which is displayed together with the character pattern.
Character font ROM	Memory for 128 preloaded character patterns.

Character font RAM Memory for 256 loadable character patterns (optional).

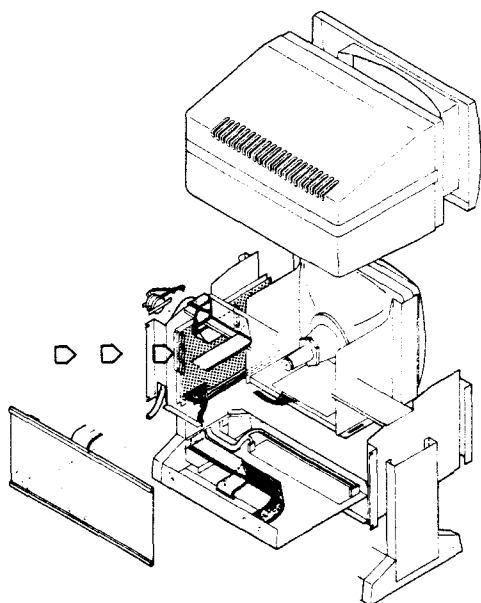
Attribute RAM Memory which converts the attribute bits to the possible light effects.

Display disable A flip-flop which when set turns the e-beam off.

<u>Documentation</u>	<u>Note</u>
CRT502: see description in RCSL No 52-AA1054	50 Hz
CRT503: see description in RCSL No 52-AA1054	50 Hz
CRT504/506: RCSL No 44-RT2046	50 Hz
CRT505: RCSL No 44-RT2041	60 Hz

3.3 FDI - Flexible Disc Drive Interface

3.3



The FDI-module is the interface between microcomputerboard (MIC) and the flexible disc drive. Not all of the terminals have this feature.

A cable (KBL511 or CBL960) leads from the FDI to the DISKETTE I/O connector on the terminals rear panel. The KBL511 may substitute CBL960.

The following describes the main components of the FDI-module:

<u>Name</u>	<u>Use</u>
Floppy disc controller	Interfaces the processor to the disc drives, supporting single and double density format and double sided recording. No. of drives supported depends on system software (max. = 4).
Data Separator	Extracts the clock signal from the serial bitstream from the drive.
Switches	Determination of which kind of drive to handle (5 1/4" or 8") in accordance with the system software.

DISKETTE I/O connection - signal allocation:

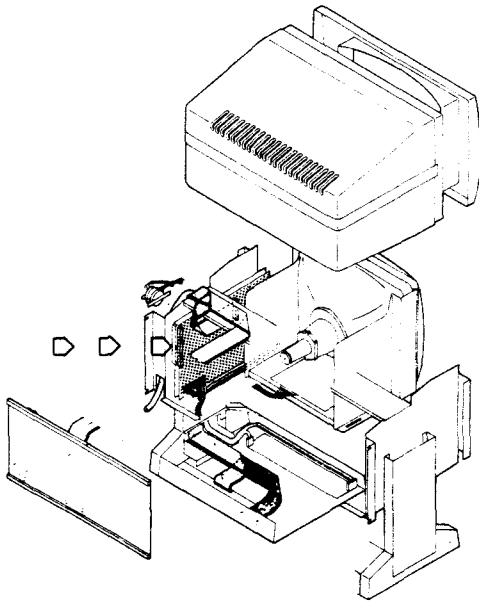
<u>Pin No</u>	<u>Signal</u>	<u>Direction</u>
1	-, TWO SIDED	from drive
2	NOT USED	
3	-, SIDE SELECT	to drive
4	-, LOW CURRENT	to drive
5	-, HEAD LOAD	to drive

6	-, INDEX	from drive
7	-, READY	from drive
8	-, MOTOR EN	to drive
9	-, DRIVE SELECT 0	to drive
10	-, DRIVE SELECT 1	to drive
11	-, DRIVE SELECT 2	to drive
12	-, DRIVE SELECT 3	to drive
13	-, DIRECTION SELECT	to drive
14	-, STEP	to drive
15	-, WRITE DATA	to drive
16	-, WRITE GATE	to drive
17	-, TRACK 0	from drive
18	-, WRITE PROT	from drive
19	-, READ DATA	from drive
20 to 37	SIGNAL RETURN (0 volt)	

Documentation

FDI501/502: RCSL No 44-RT2034

Available as a separate document package (DDM160).



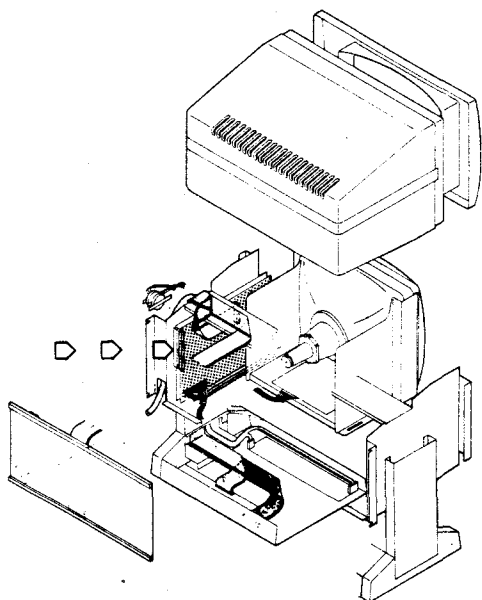
The IML-module holds the firmware PROMs not able to be accommodated on the MIC-module.

The IML-module was only applied in terminals with DSU 607-613 & 619, accommodating PGR550/551.

Documentation

- IML501: a) tech. manual: RCSL No 52-AA1058
b) other manuals: RCSL No 52-AA1057
RCSL No 52-AA1059

Available as a separate document package (DDM 162).



The IOM-module is a special purpose unit which was only applied in terminals with DSU 606 & 620.

The IOM-module serves as controller for the RC350x interface.

Documentation

IOM501: a) tech. manual: RCSL No 52-AA1044

b) other manuals: RCSL No 52-AA1043

RCSL No 52-AA1028

RCSL No 52-AA1050

Available as a separate document package (DDM 159).

National layouts for the KBU516 & 528 (KTC406), KBU519 & 527 (KTC405) and KBU519 & 529 (KTC404) are obtained by keytop replacements - in their basic versions these KBUs have a Danish layout.

Documentation

No specific documentation is issued - refer to the reference manuals of the terminal systems for description of national layouts (also see RCSL No 42-RT2029 for a general description).

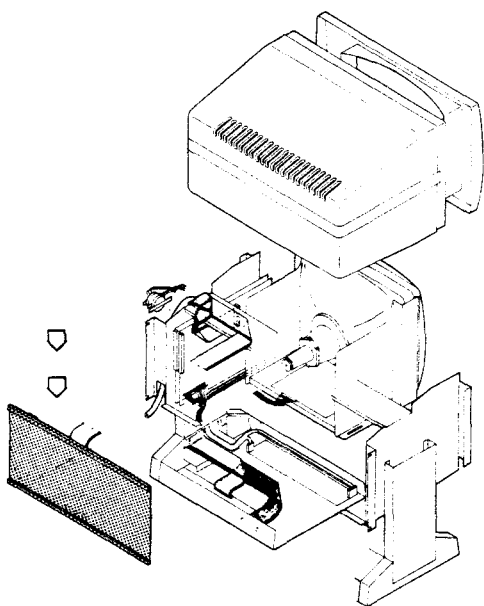
KEY	KTC404	KTC405	KTC406	Changing layout to
002	+	+	+	S
003	+	+	+	US-ASCII
004	+	+	+	D
005	+	+	+	UK-ASCII
006	-	+	-	DK-BIBLIOTEKSCENTRAL
007	+	+	+	US-ASCII/FRANCE
008	-	+	-	DK-OS (§)
009	-	+	-	DK-OS (ü)
010	-	+	-	Function keys with English text
011	+	-	-	DK-DSB (, [in numeric pad])
012	-	+	-	DK-OS (@)

Note: One or more KEYxxx replacements are specified as appropriate; for instance: Swedish national alphabetic layout along with function keys with English text engravings requires KEY002 and KEY010.

The KTC-module includes its own microprocessor for scanning of key closures and for conversions pertaining to the information exchange with the terminal's CPU.

Documentation	Note:
KTC402:	RC853
KTC404:	RC851 D.E.
KTC405:	RC852/855
KTC406:	1) RCSL No 44-RT2029 RC851 TTY
KTC408:	[General Description] ITT-UK
KTC409:	2) RCSL No 44-RT2045 ITT-D
KTC410:	[Schematic Diagram] ITT-F
KTC411:	ITT-DK
KTC412:	ITT-B

Specific national keyboard layouts applying to a given terminal system are found in the reference manual of the terminal system.



The MIC-module contains all central logic functions for operation of the terminal. Also the PGR-modules are contained on this board (cf. section 3.7).

The following describes the main components of the MIC-module:

Name	Use
CPU	4 MHz Z80A microprocessor
DMA controller	Direct Memory Access controller used for high speed data transfers directly between memory and peripherals such as CRT-controller, Floppy disc controller and CIRCUIT/COAX-SIO.
Counter/Timer Controller (CTC)	Generates Baud rate clocks for asynchronous communication controllers.
Serial I/O (SIO) Controller	Two dual channel SIO's are used. One is used for the keyboard and the CIRCUIT/COAX interfaces, the other for the asynchronous printer line and for the async./sync. communication line.
RAM memory	64 K byte main system memory.
NVM memory	Non volatile memory which holds information on baud rates, station numbers and other configuration parameters even if the power is switched off.

ROM memory Up to 56 K bytes Read Only Memory which contain the bootloader, selftest and in some versions a complete program image; see: section 3.7.

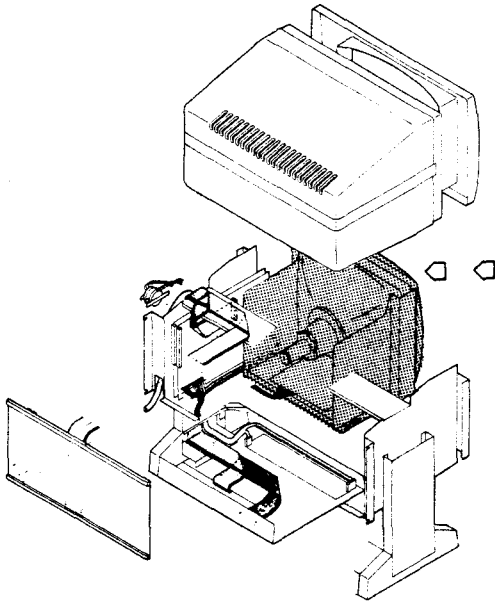
In terminals with DSU607-613 & 619 the IML-module was additionally applied in accommodating the firmware PROMs; see: section 3.4.

Documentation

MIC506: see description in RCSL No 52-AA1054

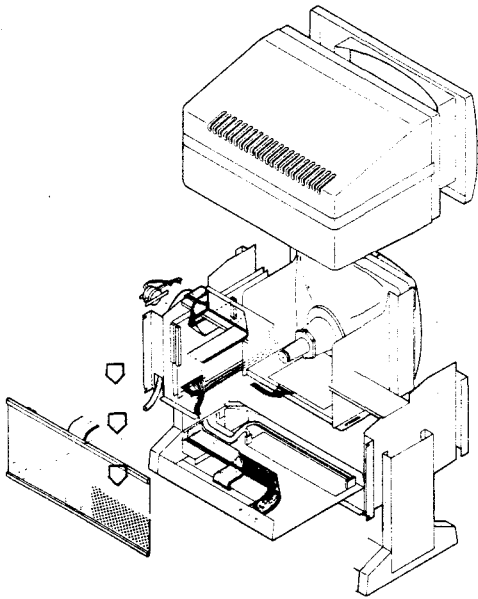
MIC507/508: RCSL No 44-RT2043

MIC509: RCSL No 44-RT2044



The MON-module is based on a 15" cathode ray tube monitor. A separate AC power supply module is incorporated with the monitor.

<u>Documentation</u>	<u>Note</u>
MON503: RCSL No 44-RT2050	green/gray, 50 Hz
MON504: RCSL No 0-R15322	amber, 50 Hz
MON505: Pending	green, 60 Hz
MON506: Pending	amber, 60 Hz
MON592: RCSL No 44-RT2051	green/black, 50 Hz



The PGR-modules contain the firm-ware PROMs of the terminal, i.e. bootstraploader (BOOT), conversion tables (CONV), selftest (TEST) and other dedicated software (SOFT).

The PGR-modules are accommodated on the MIC-module; in terminals with DSU607-613 & 619 also on the IML-module.

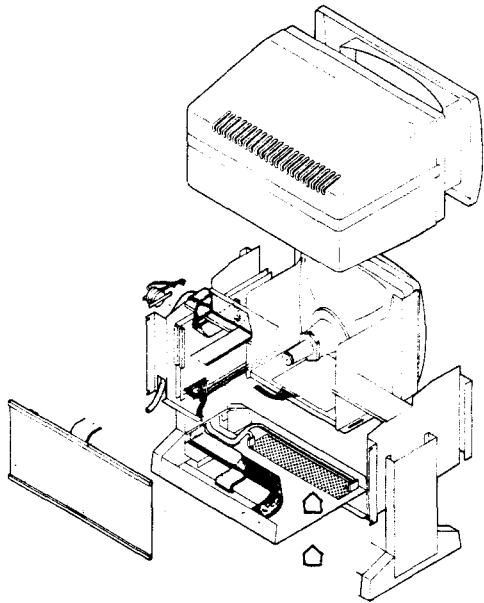
Documentation

No specific manuals are issued - refer to the reference manuals of the terminal system.

PGR	Use with	Terminal system	Nationality	Terminal			
				T	V	T	T
501		RC851 TTY	DK	+	+	-	+
502		RC851 TTY	D	+	+	-	+
503		RC851 TTY	UK-ASCII	+	+	-	+
504		RC851 TTY	US-ASCII	+	+	-	+
505		RC851 TTY	S	+	+	-	+
506		RC853		+	-	-	+
508		RC855	DK	+	+	-	-
509	MIC506	RC855	UK	+	+	-	-
510		RC855	D	+	+	-	-
511		RC855	S	+	+	-	-
512		RC855	US	+	+	-	-
513		RC852		+	-	-	-
514		RC855	DK-RP	+	+	-	-
515		RC855	DK-OS	+	+	-	-

PGR	Use with	Terminal		Nationality	B C T S				
		system			T	V	T	T	
516		RC851	D.E.	DK	+	+	-	+	ROA421 -Y22
517		RC851	D.E.	S	+	+	-	+	
518	MIC506	RC851	D.E.	US-ASCII	+	+	-	+	
519		RC851	D.E.	D	+	+	-	+	
520		RC851	D.E.	UK-ASCII	+	+	-	+	
521		RC851	D.E.	DK-DSB (TF156)	+	+	-	+	ROB 029
522		RC855		DK	+	+	+	-	
523		RC855		S	+	+	+	-	
524		RC855		US	+	+	+	-	
525		RC855		D	+	+	+	-	
526		RC855		UK	+	+	+	-	
527		RC855		DK-OS	+	+	+	-	
528		N/A							
529		N/A							
530		N/A							
531		N/A							
532		N/A							
533	MIC507/8/9	N/A							
534	&	ITT 3290		DK	+	+	+	-	
535	CRT504/6	ITT 3290		S	+	+	+	-	
536		ITT 3290		US	+	+	+	-	
537		ITT 3290		D	+	+	+	-	
538		ITT 3290		UK	+	+	+	-	
539		ITT 3290		F	+	+	+	-	
540		RC851	TTY	DK	+	+	-	+	
541		RC851	TTY	S	+	+	-	+	
543		RC851	TTY	D	+	+	-	+	
545		RC851	D.E.	DK	+	+	-	+	
546		RC851	D.E.	S	+	+	-	+	
547		RC851	D.E.	US-ASCII	+	+	-	+	
548		RC851	D.E.	D	+	+	-	+	
550	IML501	IBM 3270	BSC EMULATOR, PRIM.		-	-	-	+	
551	IML501	IBM 3270	BSC EMULATOR, SEC.		-	-	-	+	

PGR	Use with	Terminal		B C T S			
		system	Nationality	O	N	S	F
				T	V	T	T
552		ITT 3287-3	COAX EMULATOR	-	-	-	+
553	MIC507/8/9	IBM 3270	BSC EMULATOR, PRIM.	-	-	-	+
554	&	IBM 3270	BSC EMULATOR, SEC.	-	-	-	+
555	CRT504/6	ITT 3290	B	+	+	+	-
556		RC855	DK	+	+	+	-
557		RC855	S	+	+	+	-
558		RC855	US	+	+	+	-
559		RC855	D	+	+	+	-
560		RC855	UK	+	+	+	-
561		RC855	DK-OS	+	+	+	-
562		ITT 3290	DK	+	+	+	-
563	MIC507/8/9	ITT 3290	S	+	+	+	-
564	&	ITT 3290	US	+	+	+	-
565	CRT505	ITT 3290	D	+	+	+	-
566		ITT 3290	UK	+	+	+	-
567		ITT 3290	F	+	+	+	-
568		ITT 3290	B	+	+	+	-
569		IBM 3270	BSC EMULATOR, PRIM.	-	-	-	+
570		IBM 3270	BSC EMULATOR, SEC.	-	-	-	+
571		ITT 3287-3	COAX EMULATOR	-	-	-	+
572		RC851 D.E.	DK-DSB (TF156B)	+	+	-	+ R0B 374
573	MIC507/8/9	RC851 TTY	DK 5A0-	+	+	+	-
574	&	RC851 TTY	S	+	+	+	-
575	CRT504/6	RC851 TTY	US	+	+	+	-
576		RC851 TTY	D	+	+	+	-
577		RC851 TTY	UK	+	+	+	-
578	MIC507/8/9	TTY EMULATOR		-	-	-	+
579		RC851 TTY	D	+	+	+	- R0B407 (60Hz)
580	MIC507/8/9	RC851 TTY	S	+	+	+	-
581	&	RC851 TTY	US	+	+	+	-
582	CRT505	RC851 TTY	D	+	+	+	-
583		RC851 TTY	UK	+	+	+	-



The power supply contains an AC (Alternating Current) and a DC (Direct Current) part.

The AC part include ON/OFF switch, fuse, noise filter, voltage selector and transformer.

The RGM-module supplies DC power to the MIC-, CRT-, FDI-, and COI-module. The MON-module is powered directly from the AC mains supply and includes separate AC to DC converter and regulator.

The RGM-module converts the 2x15V AC supplied by the transformer into several DC voltages:

- 5V (6 A)
- 12V (300 mA)
- 5V (20 mA)
- 12V (250 mA)
- 25V (12 mA)

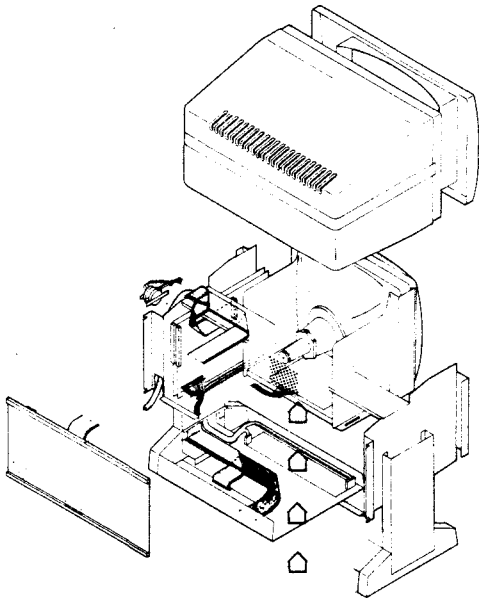
The 5V regulator is a switch mode regulator whereas the other voltages are produced by three thermal IC serial regulators.

In terminals with DSU600-618 the RGM503-module was additionally applied in powering the hight adjustment mechanism. On the later models the RGM502-module is the only power supply module.

Documentation

RGM502: RCSL No 0-A 13999

RGM503: see description in RCSL No 52-AA1054.



The VIM-module performs signal conditioning and pulse shaping for the monitor.

The VIM-module was only applied in terminals with DSU600-620. The functions have been incorporated with the CRT-module on the later models.

MON504 & VIM506 may substitute MON592 & VIM503. The complete replacement set required is MOA511, which includes KBL531 and some other mechanical parts.

Documentation

Note:

VIM502:	see description in RCSL No 52-AA1054	Not used
VIM503:	see description in RCSL No 52-AA1054	DSU600-618
VIM504:	} RCSL No 0-R13544	DSU619 & 620
VIM505:		Substitute for
		VIM503
VIM506:		MON504 & CRT502/503

A. REFERENCES

A.

See throughout chapter 3.

The documentation is available as a package, referred to as DLI022.

A.1 Additional References

A.1

RCSL No 30-M317:

RC850 - TOTEM - Test System, User's Guide

Jan Nielsen, March 1982

Abstract: This manual describes the test system and the test programs for the RC850 terminal. The test programs described in this manual are: The selftest (memory-test), the main memory refresh test, the DMA test, the CRT test, the SIO test and the keyboard test. Further test programs may be described in separate manuals.

RCSL No 30-M321:

RC850 - TOTEM - Test System, User's Guide, Part 2

Jan Nielsen, June 1982

Abstract: This manual describes further test programs for the RC850 terminal, which were not described in the first manual. These test programs are: the X.21 status signal test, the FDC-test, the FDD-test, the NVM-test and the flexible disc drive adjustment program.

RETURN LETTER

Title: RC850 Terminal Systems
Hardware Module Structure
Outline and Document Reference

RCSL No.: 42-i2297

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