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INTEGRATED RADIOTELEX SYSTEM
KEYBOARD PROCESSOR H1249
REFERANCE MANUAL

A/S S. P. RADIO · AALBORG · DENMARK

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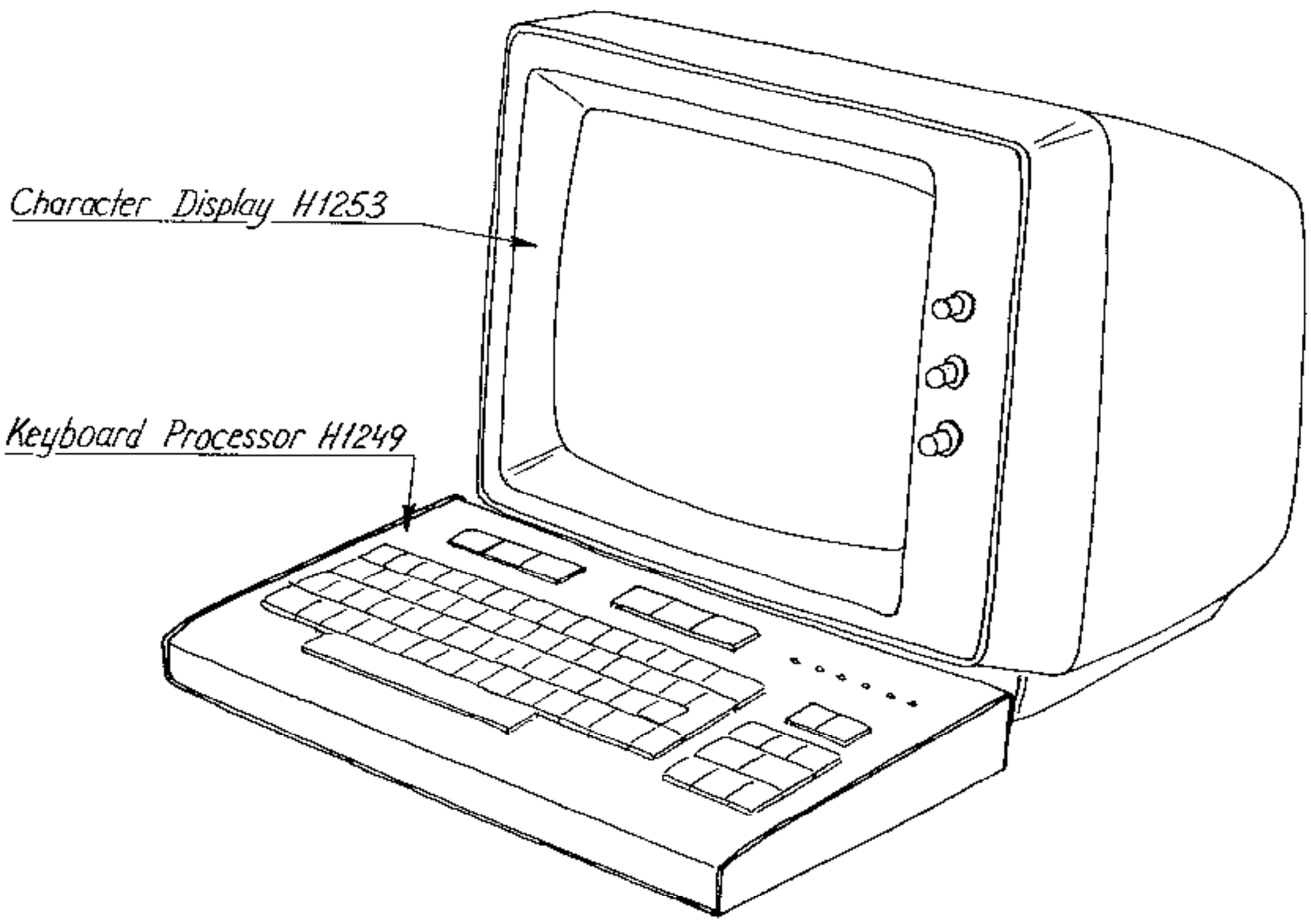
SYSTEM SPECIFICATIONS

Alphabet:	Extended Baudot alphabet with cursor control and soft-keys.
Console Interface:	CCITT Rec. V.24/V.28 (RS-232C) 7/8-level, serial start-stop data ITA-5 code, 75 to 9600 Baud (ASCII). 25-pole type D-connector male.
Video Monitor Interface:	Composite video signal, 75 ohm coaxial 300 mV negative sync., 800 mV positive video (200 mV positive video during stand-by mode). 75 ohm type BNC-connector male.
Scanning frequency:	Horizontal, 18.xx / 18.yy kHz Vertical, 56 Hz / 50 Hz.
Video bandwidth:	30 Hz to 16 MHz.
Morse key input:	3.5 mm Jack-connector.
Power supply:	9-14 Vdc (max. 15 Vdc) positive, 5.4 W.
Dimensions:	430(W) x 42(H) x 193(D) mm (incl. mounting bracket.
Cable length:	Console Interface, 1.80 meter Video Monitor Interface, 0.70 meter.

INTRODUCTION

This manual provides instruction for configuring, installing and general operation of Keyboard Processor H1249. Automatic self test routines and general service informations are covered by the last part of the manual.

For the detailed operation instructions, please refer to the Guide to Operations for SAILOR integrated radiotelex system.



DESCRIPTION

Keyboard Processor H1249 together with Nec Character Display H1253 provides a dedicated video display terminal system for operation of the Radiotelex Modem H1240.

To facilitate operation of the system, the Keyboard Processor H1249 includes a standard Baudot-alphabet keyboard with additional cursor control and soft-key operation of all system commands.

The Keyboard Processor is powered from the Radiotelex Modem via the prepared console interface cable.

CONFIGURATION

Before installation of the Keyboard Processor, system configuration should take place.

The Keyboard Processor is factory configured to standard settings as indicated below. To change these settings, proceed as follows:

Remove the eight screws located on the periphery of the Keyboard Processor buttom plate.

Carefully disassemble the Keyboard Processor by tilting the top cover backwards. The internal cable connecting the keyboard pcb with the display pcb should remain connected.

The configuration strapping may now be altered according to figure 1, Table 1 and Table 2 (spare straps located at WS on the pc-board:

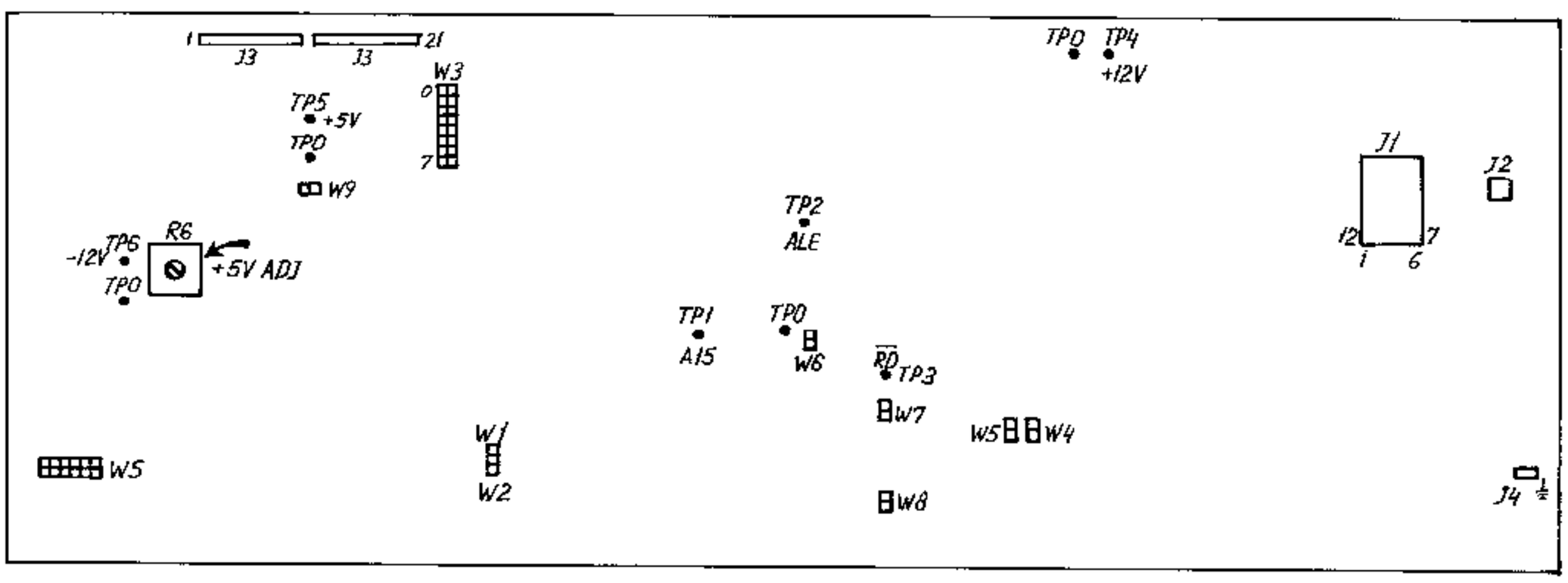


Figure 1. Configuration Strap Locations

Jumper	Pos.	Function
W1 *	Out	Reserved
W2 *	In	Reserved
W3-0	Baud rate, see Table 2	
W3-1	Baud rate, see Table 2	
W3-2	Baud rate, see Table 2	
W3-3	Baud rate, see Table 2	
W3-4	Out	8 data bits
	In	7 data bits
W3-5	Out	2 stop bits
	In	1 stop bit
W3-6	Out	Soft-keys On
	In	Soft keys Off
W3-7	Out	56Hz Frame freq.
	In	50Hz Frame freq.
W4 *	Out	Reserved
W5 *	Out	Reserved
W6 *	Out	Reserved
W7 *	Out	Reserved
W8 *	Out	Reserved
W9 *	In	+5V Supply

Table 1. Configuration Strapping

* Factory Installed Jumpers

Jumper W3 -				Baud Rate
0	1	2	3	
In	In	In	In	75
Out	In	In	In	110
In	Out	In	In	134.5
Out	Out	In	In	150
In	In	Out	In	200
Out	In	Out	In	300
In	Out	Out	In	600
Out	Out	Out	In	1200
In	In	In	Out	1800
Out	In	In	Out	2000
In	Out	In	Out	2400
Out	Out	In	Out	3600
In	In	Out	Out	4800
Out	In	Out	Out	7200
In	Out	Out	Out	* 9600
Out	Out	Out	Out	-

Table 2. Baud Rate settings

* Factory Installed Jumpers

NOTE

The following combination is illegal and will be rejected by the Keyboard Processor

8-level, 2 stop bits, 75 baud.

After configuration strapping, the Keyboard Processor should be assembled. Care should be exercisted to align the cables from the unit through the U-shaped cabinet cut-out.

INSTALLATION

The Keyboard Processor H1249 may be fastened to e.g. a table by means of the enclosed mounting bracket, using the 5 mm screws, separated 409 mm from each other.

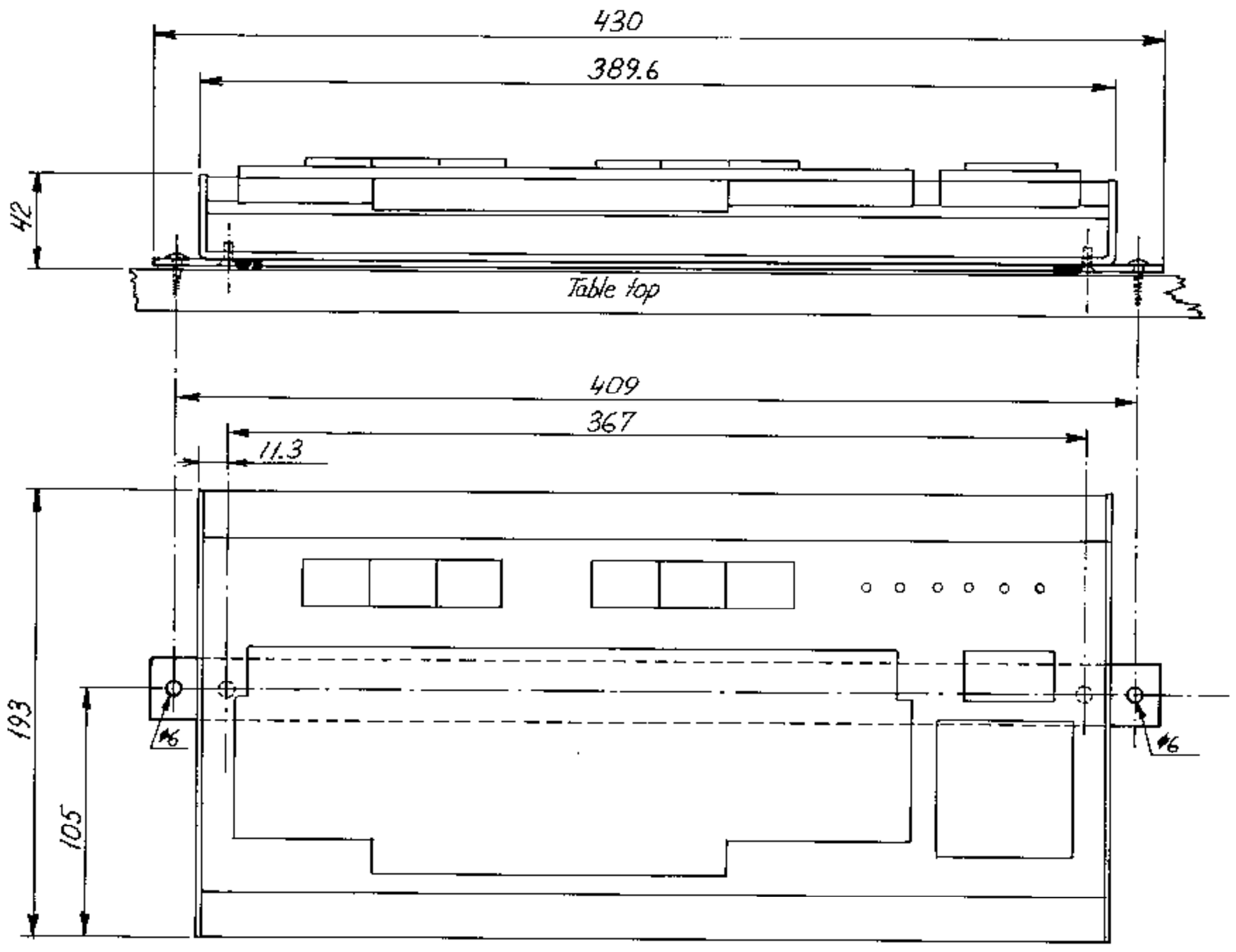


Figure 2. Physical Dimensions in mm.

The Keyboard Processor is powered from the Radiotelex Modem by means of a prepared console interface cable.

The cable connector is a 25-pole, male type D-connector with integrated RF-decoupling components. Pin assignments and signal names are listed in Table 3:

Pin	Name	Signal	Direction
1	FG	Frame Ground	I/O
2	TXD	Transmitted Data	Output
3	RXD	Received Data	Input
4	RTS	Request to Send (DIRC)	Output
7	SG	Signal Ground	I/O
11	+12	+12V Power	Input
14	CW	Morse Key	Input

Table 3. Console Interface Cable.

Frame ground is connected to the outer metal screen of the D-connector for improved RF-ground connection.

NOTE

When connecting the Keyboard Processor to the Radiotelex Modem, the +12V strap W17 in the modem should be installed.

Video display information is connected via a 75 ohm coaxial cable to the Nec Character Display H1253. When extending this cable, only double screened 75 ohm matched coaxial cables should be used.

A 3.5 mm jack-input located on the right side of the Keyboard Processor, supports the CW or morse-key mode of the system.

An external morse key may be connected to this input by means of the enclosed jack-connector, using the outer conductor as ground terminal.

NOTE

Short-circuiting the two poles in the jack-connector forces the Radiotelex Modem to enter the Information Sending Station mode during normal ARQ operation.

OPERATION

AUTOMATIC SYSTEM TEST

Immediately after power has been switched to the system, a number of automatic test routines are performed.

Under normal conditions the self test programmes are terminated without any error detections, and the system automatically reverts to the stand-by condition.

The Keyboard Processor includes its own test sequence, initiated simultaneously. with the modem test.

If a Keyboard Processor H1249 fault is detected, one of the following LEDs will turn on steadily:

Error out	EPROM 1 checksum error
Error in	Static RAM test error

The test sequence is automatically terminated and the Keyboard Processor H1249 reverts to stand-by condition.

If a key is pressed during the self-test cycle, the system offers the operator to run a keyboard test.

NOTE

After every power failure or intentionally power on/off switching, the system will return to the automatic test sequence as described above, followed by the data entry request.

Display Format

The display of the dedicated video display terminal is divided into four areas as shown in Figure 3.

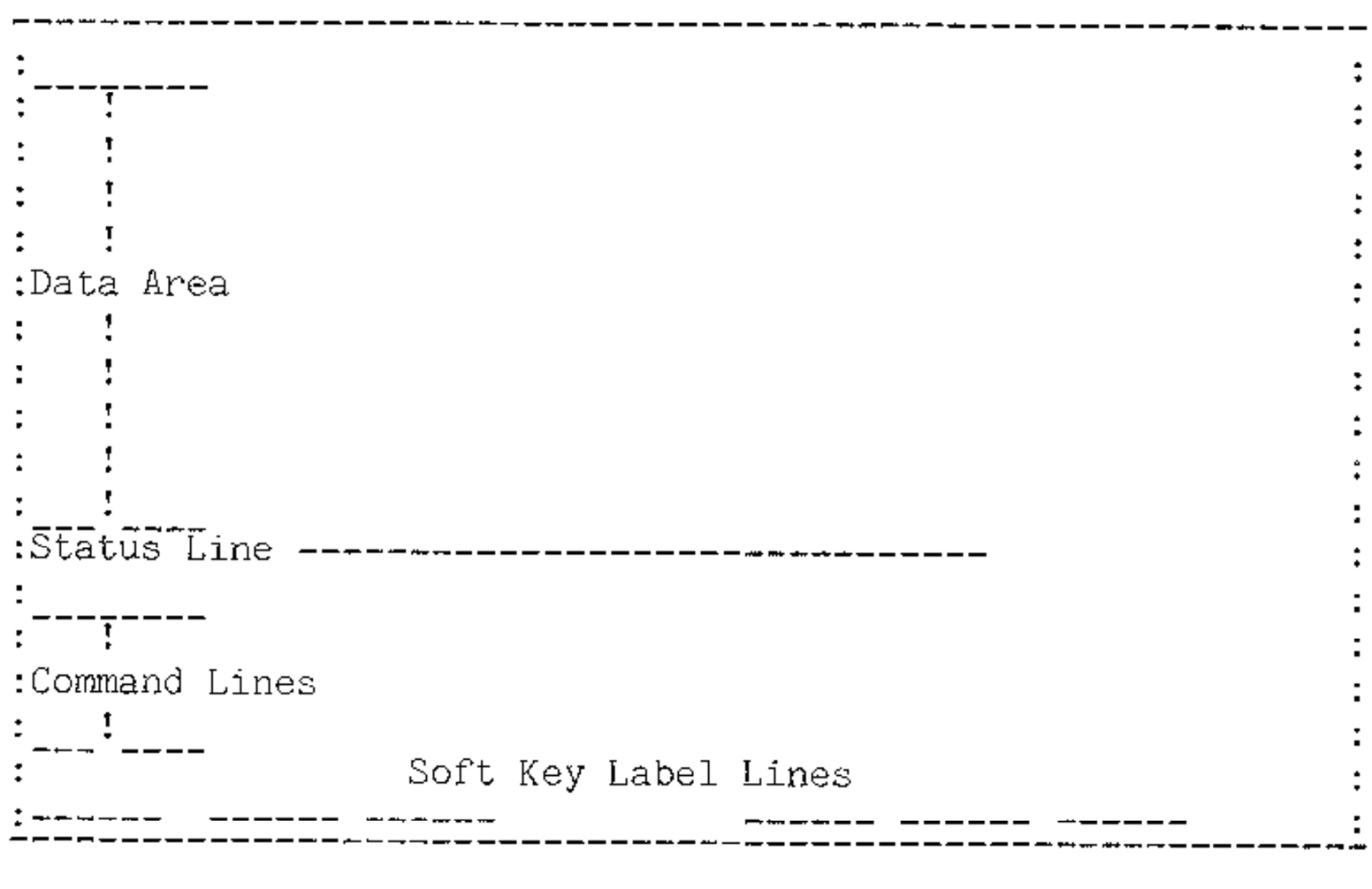


Figure 3. Video Monitor Display

The status line displays system status and explanatory messages.

The command area consists of a line that wraps across three screen lines. Entered commands are interrogation responses are displayed in this line.

A blinking underline cursor is present in the top left-hand corner of the command line, just under the status line. The cursor indicates the current character position on the line.

Six Led indicators are located in the Keyboard Processor. The interpretation of these indicators are as follows:

Lock - The system is locked to another station, i.e. the system has established an ARQ connection, receives an FEC message, or receives a "Free" signal.

Track - The receive filters are tracking the incoming signal.

Data In - The system is receiving data (Information receiving mode).

Data Out - The system is transmitting data (Information transmitting mode). The Data Out indicator will blink when the output buffer is empty, i.e. the message has been transmitted.

Error In - Error in received data.

Error Out - Error in transmitted data. When both Error In and Error Out simultaneously are turned on, rephasing is in progress.

Directed Syntax Softkeys

Six unmarked keys at the top of the keyboard are labeled by the softkey label line just below the command line on the video monitor. These first-level softkeys (see Figure 4) indicate the complete set of allowable entries and they change with each key stroke to reflect the next expected keyword or data in a command. If the user enters only that information prompted by the softkeys, the syntax will always be correct. Conversely, any entry not shown in the softkey labels will result in a syntactical error.

NOTE

It is also possible to type the command from the keyboard. This provides an alternative to the softkeys for the touch typist.

Figure 4. Typist First-Level Softkeys

As each softkey is pressed, the cursor moves to the right providing reference for the inputs.

If an error is made on the input, the cursor can be backspaced to the point of error. As the cursor moves back, the softkey label line information changes presenting the syntax choices available. If the cursor is backspaced to one of the keywords, the keyword can be replaced by pressing another softkey.

The first-level softkeys -xxxxx- do not cause commands directly but leads to second-level softkey groups, specified by the first-level headings.

E.g. pressing the first-level key labeled -CALL- initiates the softkey group for call commands.

Activation of the -ETC- softkey causes the softkey labels to change to next equal-level command page, or for want hereof to the first-level softkey labels.

All commands entered by softkeys and/or normal keyboard entries should be followed by a carriage return, in order to execute the entered command or string of commands.

When entering single commands, the carriage return should as a general rule first be used when all softkey labels on the video monitor have been cleared, i.e. the complete command has been entered. Some commands may have optional entries following the standard command (e.g. a password may be added to the Remote command). In these cases, you may select to add these optional entries, or terminate the command by using the carriage return before the optional softkey labels have been cleared on the video monitor.

When entering a string of commands, e.g. entering consecutive commands after the communication link has been established, the execution of entered commands is commenced when carriage return is inserted. Due to the optional length of the command strings, all relevant softkey labels will be invariable until the carriage return terminates the consecutive command entries.

Some softkey commands require additional keyboard entries, e.g. coast station selcall codes, names of stored messages and subscriber telex numbers. When these keyboard entries are required or optional selectable, one or more softkey labels will be shown in brackets.

By activating a bracket-surrounded softkey, an abbreviated explanatory message specifying the relevant keyboard entry format will be displayed on the video monitor status line for a period of approx. 5 seconds. The explanatory message display time may be prolonged by continuously reactivation of the relevant softkey.

SERVICE

FAULT DIAGNOSIS

If a malfunction in a system has been traced down to the Keyboard Processor H1249, a simple fault diagnosis may be carried out by the operator as follows:

Trouble	Probable Cause
No "Bell" sound during Power-On switching.	No supply voltage to the H1249, inspect correct setting of strap W17 in the Radiotelex Modem and cable connection between Radiotelex Modem and Keyboard Processor.
After Power-On switching the "Error out" or "Error in" lamp turns steady on.	EPROM checksum error or static Ram error. Component change has to be performed, please refer to next part of the service section.
LED indicator walk test fails.	LED error or display pc-board error. Pc-board(s) has to be changed. Please refer to next part of the service section.
Walk test OK but no picture on the Video Monitor.	Video coaxial cable fault or Video Monitor fault. Inspect video cable and Monitor connection. Assure that the Video Monitor is connected to mains and turned On.
Unstable video picture.	Wrong adjustment of the video monitor. Line and Frame freq. should be adjusted on the rear side of the Video Monitor. If the picture is moving slowly forth and back, the frame frequency should be changed, ref. Table 1, or the Video Monitor should be relocated from the disturbing magnetic source (e.g. mains transformers).
Video picture distorted.	Incorrect extender video cable impedance. Install new 75 ohm coaxial cable.
No display of initial time/date entry after Power-On.	Wrong Data format setting. Reconfigure the H1249.
Softkey lables missing after time/date entry.	Incorrect system generation set-up in the Radiotelex Modem. Verify that consol selection is set for "T+T".

When typing characters on the keyboard, some entries are missing.

After Power-On switching an arbitrary key should be activated during the LED walk test. Perform the keyboard test when requested by the system to detect any keyboard-switch faults.

Inspect the keyboard PCB for solder errors.

If a malfunction cannot be located and eliminated with the aid of above table, the Keyboard Processor H1249 should be examined by qualified service personnel.

DISASSEMBLY AND REASSEMBLY PROCEDURES

a. Remove the eight screws located on the periphery of the Keyboard Processor bottum plate.

b. Carefully disassemble the Keyboard Processor by tilting the top-cover backwards.

c. Unplug the 2 cable connections between the display PCB and the keyboard PCB by carefully releasing the cables from the display PCB connectors, using a screwdriver keyed-in between the cables and the display PCB as a lifting bar.

d. When removing the display PCB, unscrew the two cable reliefs, unplug the two cables and unscrew all 14 square nuts holding the display PCB.

e. When removing the keyboard PCB, unscrew all 13 square nuts holding the keyboard PCB.

f. To reinstall the PC-Boards and reassemble the Keyboard Processor, reverse the preceeding steps.

NOTE

In order not to destroy the welded screws inside the keyboard top cover, a maximum torque of 5.5 Kgcm should not be exceeded when the keyboard PCB is reinstalled (the 13 square nuts).

CIRCUIT DESCRIPTION

The following part of the manual will give a brief description of the circuit principles in the H1249, referring to the circuit schematics and component lists, included at the back of this manual.

KEYBOARD ASSY, DRAWING NO. 93-100010 (Diagram)

The keyboard assy includes the LED-indicators, the keyboard switches with scanning logic and the four hardware wired special function keys.

The LED anodes are permanently connected to +5 V. The catodes of the LED's are connected to 0/5 V driving circuits on the display pc-board via current limiting resistors R4 to R9.

The keyboard switches are organized as a matrix, where U1 converts the 4 lower address lines from the CPU to open-collector 1 out of 10 column-lines. The feed-back signals are converted from 9 row-lines to 4 BCD-lines in the priority en-coder U2. The converted feed-back signals are, together with the 4 hardwired spe-cial function switches routed to a data latch on the display PCB.

During idle scanning all column-lines will remain at a low state and all row-lines remain at a high state.

When a key is activated, the relevant-column line will be pulled up to +5 V, pulsing down to 0 V. The corresponding row-line will pulse down to 0 V as the column-line above. The remaining columns will stay low and remaining rows stay high.

DISPLAY PROCESSOR ASSY, DRAWING NO. 93-100011 (Diagram)

The Display Processor Assy includes the processor circuits for conversion of the standard RS-232C input/output signal to the display format, the video generation circuits, the screen RAM buffer, the character generation, the watch-dog circuit and the switch-mode power supply circuit.

Circuit Schematic page 1 of 4.

The switch-mode power supply circuit is realized as a standard variable duty cycle step-down converter transforming a 9-14 Vdc positive input signal to +5 Vdc for the TTL and processor circuits and +/-12 Vdc for the RS-232C driver/receiver and the video output circuit.

The power supply is protected against over voltages by means of an 18 Vdc vari-stor R1. The normal switch frequency is approx. 50 kHz with a duty cycle of approx. 50%, depending on the supply voltage used.

A secondary winding on the step-down coil generates the -12 Vdc for the RS-232C driver.

For test purposes, jumper W9 may be removed (in order to protect the IC-circuits against over voltage during tests), and a load of approx. 15 ohm/2W should be inserted between TP5 and TP02 in order to load the switching circuits.

The video output circuit shown in the lower left part of the schematic receives data on TTL-level from the video logic. During normal operation FVD-inverted, STBY, and SYNC are OV, and HVD-inverted is switching between O V and +5V for video generation, resulting in a video white level of 8.2V (VR7) and a video black level of 2.4V (VR5) at the Q6 base.

During sync generation the video black level will be clamped-down to OV.

When displaying reverse video blocks, the video white level is reduced by the FVD-inverted signal to 6.8V (VR4).

A special software timer reduces the video white level during standby conditions to 3.9V (VR6). This standby condition is activated approx. 5 minutes after the last keyboard entry or data reception. Immediately after a new keyboard entry of data reception, the standby video level is reset.

The watchdog circuit ensures correct operation of the processor software. During power-on switching comparator U10 and VR3 generates a reset to the processor for correct start of the system. During normal operation the processor issues a WATCHD reset signal every 10msec. resetting the watchdog oscillator formed by U10 and C9-R18-R19-R20.

If a programme failure occurs this oscillator will start generating a reset to the processor every 150msec. An auxiliary oscillator formed by U10 and R12-R13 ensures that a constant WATCHD reset signal from the processor (fault condition) also results in generation of a reset signal for the processor.

Circuit Schematic page 2 of 4.

The CPU used in the system is an 8-bit 10MHz 8085 processor with multiplexed data bits and lower address bits.

The clock frequency is derived from a 9.216MHz crystal connected directly to the internal oscillator circuits within the CPU. A CLK output from the CPU gives a divided-by-two signal for periferal circuits, the WAIT circuit U2 and the divide-by-five circuit U3. The output signal from U3 is used by the USART U19 to generate the correct Baud rate for the RS-232C interface.

The data bits and lower address bits are demultiplexed in U4 by means of the ALE signal from the CPU, and the resulting 8 data bits and 16 address bits are distributed to various circuits in the system.

The chip-select lines are decoded in U5. A special WAIT circuit, formed by U2, generates one wait-state every time address line A15 is exercised, whereby all circuits controlled by the upper four chip-select lines from U5 will be handled with one wait-state in the read/write cycle.

An advanced READ circuit, formed by U33, issues the read command upon decoding of the internal machine status S1 and the trailing slope of the ALE signal. The advanced read command is reset by the trailing slope of the standard read signal.

When loading the display data from the RAM circuit U17 to the row buffers in the CRT controller U22, a special write signal for U22 is generated when the SOD output from the CRT is activated. When loading display data from the RAM, the transfer is executed by using POP instructions simultaneous with a SOD "1" output. This output is gated together with the RAM chip-select (U6) and the read command to the RAM (reading data from RAM during POP instructions), whereby the BS-signal and the BWR-signal for U22 is generated, loading data into the CRT controller row buffer.

For a detailed understanding of this procedure, please refer to data sheets for the relevant CRT controller.

System configuration settings and keyboard entry data are loaded into the processor by latches U12 and U14, and LED informations to the keyboard PCB stored in the latch U13.

Generation of the "Bell" sound is performed by a 2500Hz oscillator U15, gated to the loudspeaker by U11-Q3-Q5. A delay circuit formed by C19-R35 generates the sound decay similar to a real bell.

Circuit Schematic page 3 of 4.

The system programme memory is stored in EPROM U16 (8K Byte) and the workspace memory and stack-pointer for the processor in the RAM U17 together with the display data (2K Byte).

Serial data to and from the Keyboard Processor is converted in the USART U18, deriving the Baud-rate clock from the programmable timer U19 timer-0. RS-232C drivers and receivers are formed by U20 and U21 with associated RF-decoupling networks.

Display data conversion and generation of frame- and line sync signals are performed by a special CRT controller U22. For detailed informations on this circuit, please refer to relevant manufacturers data sheets.

The clock frequency for the video circuits is generated by a 16.038 MHz oscillator U7-Y2. This frequency, denoted the dot-frequency, is routed to the serial shift register U24 for video data output shifting to U29-U30 for video data synchronization, and to U25 for character clock generation.

In U25 the dot-frequency is divided by 9 to generate the character clock. This clock signal is routed to the CRT controller U22, to U30-U28 for video control synchronization, to shift register U24 for parallel-loading serial-shifting of video data, and to timer U19 and divider U26 for generation of line sync generation.

For each character clock, the CRT controller U22 issues the relevant video character in ASCII format to the character PROM U23 together with scan-line addressing. In U23 this information is converted to a 8-bit parallel word, defining the 8 dot informations for the relevant character in the current scan line.

This information is then converted to serial format in U24 and shifted out as 9 dots by the dot-frequency.

Video blanking and reversing control informations are generated by U22, latched by U28 and combined with the video data informations in U31-U32 to form the 2 video control informations for the output driver.

Video sync signals are generated by the CRT controller U22 as a HRTC signal for line sync and a GPA1 for frame sync.

The HRTC signal is used as gate-input for the programmable timer U19 timer-1. The character clock signal is used as clock for this timer, generating a programmable line sync delay after issue of the HRTC signal. U26 generates a defined sync duration for the line sync signal.

The frame sync signal is derived from timer-2 in U19, gated by the GPA1 signal and clocked by the line sync signal, whereby a programmable frame sync delay is generated. U27 generates a defined frame sync duration.

The 2 sync signals are added together and routed to the video output stage via the synchronizer U29.

Circuit Schematic page 4 of 4.

This circuit schematic shows all supply lines to the various IC-circuits in the Keyboard Processor.

	TITEL	STYKLISTE
	DISPLAY PROCESSOR KEYBOARD ASSY	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
1	TT37-100010	PRINTED WIRING BOARD	T&T	R
2	TT93-100010	ELECTRICAL CIRCUIT SCHEMATIC	T&T	R
3		COMPONENT LOCATION DRAWING	T&T	R
C1	MD015E104ZAA	CAPACITOR, CER 100n/50V	AVX	9
C2	MD015E104ZAA	CAPACITOR, CER 100n/50V	AVX	
C3	MD015E104ZAA	CAPACITOR, CER 100n/50V	AVX	
C4	MD015E104ZAA	CAPACITOR, CER 100n/50V	AVX	
C5	MD015E104ZAA	CAPACITOR, CER 100n/50V	AVX	
C6	MD015E104zaa	CAPACITOR, CER 100n/50V	AVX	
C7	MD015E104ZAA	CAPACITOR, CER 100n/50V	AVX	
C8	MD015E104ZAA	CAPACITOR, CER 100n/50V	AVX	
C9	MD015E104ZAA	CAPACITOR, CER 100n/50V	AVX	
DS1	ESBG 3431	DIODE LED, GREEN	STA	4
DS2	ESBG 3431	DIODE LED, GREEN	STA	
DS3	ESBG 3431	DIODE LED, GREEN	STA	
DS4	ESBG 3431	DIODE LED, GREEN	STA	
DS5	ESBR 3431	DIODE LED, RED	STA	2
DS6	ESBR 3431	DIODE LED, RED	STA	
MP 1	4892799900	SWITCH-TOP, BAUDOT TYPE - 1	RAFI	1
R1	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	3
R2	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R3	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R4	SFR 25	RESISTOR, FILM 240R/0.25 J	PHI	4
R5	SFR 25	RESISTOR, FILM 240R/0.25 J	PHI	
R6	SFR 25	RESISTOR, FILM 240R/0.25 J	PHI	
R7	SFR 25	RESISTOR, FILM 240R/0.25 J	PHI	
R8	SFR 25	RESISTOR, FILM 1K8/0.25 J	PHI	2
R9	SFR 25	RESISTOR, FILM 1K8/0.25 J	PHI	
RS1	MSP10A01-103G	RESISTOR, SIL 9x10K	DALE	1
S1-S73	4892710805	KEYBOARD SWITCH	RAFI	73
U1	74LS145	INTEGRATED CKT, 74LS145	TI	1
U2	74LS147	INTEGRATED CKT, 74LS147	TI	1
W1	3003710-2,54-2	19-POLE CABLE/CONNECTOR	ADAP	2

REV STATUS	LTR	A										NEXT ASSY			
OF SHEETS												USED ON			

APPROVAL	DATE	REV APPROVAL AND DATE	CODE IDENT	PL 91-100010
PT	840213		REV A	SHEET 1 of 1

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	TITEL	STYKLISTE
	TT-1601A KEYBOARD-PROCESSOR	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
A1	TT60-100010	KEYBOARD ASSEMBLY	T&T	1
A2	TT60-100011	DISPLAY PROCESSOR ASSEMBLY	T&T	1
H1	1813 M3-A4	SQUARE NUT, M3	HFC	10
H2	9025 M3-N	SQUARE NUT, M3	HFC	22
H3	170-754	FLEXIFORM	RUD	0.1
H4	307707	DISTANCE TUBE, 7mm	RAD	13
H5	9101 M3x8 UHMX	SCREW, M3x8	HFC	12
H6	1834 M3-A4	WASHER, M3	HFC	13
H7	309110	CABINET FEET	RAD	4
H8	307788	STAY NUT, 5mm	RAD	4
H9	303620	CABLE RELIEF	RAD	4
J1	110-338	CONNECTOR, JACK, 3.5mm	RUD	1
MP1	TT41-100045	KEYBOARD PROCESSOR CABINET	T&T	1
MP2	TT41-100054	INSULATING PLATE	ELEK	1
P1	65039-035	CONNECTOR, 1x2-POLE	BERG	1
PX	47111-001	TERMINAL CRIMP	BERG	2
W1	TT37-100084	CABLE ASSEMBLY, RS-232C	T&T	1
W2	TT37-100086	CABLE ASSEMBLY, 75 OHM VIDEO	T&T	1

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REV STATUS	LTR A	NEXT ASSY		
OF SHEETS		USED ON	H1249	
APPROVAL PT	DATE 840213	REV. APPROVAL AND DATE	CODE IDENT	PL 91-100045
			REV A	SHEET 1 of 1

	TITEL	STYKLISTE
	DISPLAY PROCESSOR PROCESSOR ASSY	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
1	TT37-100011	PRINTED WIRING BOARD	T&T	R
2	TT93-100011	ELECTRICAL CIRCUIT SCHEMATIC	T&T	R
3		COMPONENT LOCATION DRAWING	T&T	R
C1	16 TW 220 MS	CAPACITOR, ELCT 220u/16V	RUB	3
C2	MD015E104ZAA	CAPACITOR, CER 100n/50V	AVX	39
C3	MD015E104ZAA	CAPACITOR, CER 100n/50V	AVX	
C4	C-400-33p	CAPACITOR, CER 33p/63V	PHJ	1
C5	MD015E104ZAA	CAPACITOR, CER 100n/50V	AVX	
C6	10 TW 330 MS	CAPACITOR, ELCT 330u/10V	RUB	1
C7	25 TW 47 MS	CAPACITOR, ELCT 47u/25V	RUB	1
C8	16 TW 100 MS	CAPACITOR, ELCT 100u/16V	RUB	1
C9	2222 344 15334	CAPACITOR, PLST 330n/63V	PHI	1
C10	SR215E104ZAA	CAPACITOR, CER 100n/50V	AVX	2
C11	SR215E103KAA	CAPACITOR, CER 10n/63V	AVX	3
C12	2222 629 19472	CAPACITOR, CER 4n7/63V	PHI	2
C13	SR215E104ZAA	CAPACITOR, CER 100n/50V	AVX	
C14	SR215E103KAA	CAPACITOR, CER 10n/63V	AVX	
C15	2222 629 19472	CAPACITOR, CER 4n7/63V	PHI	
C16	C-400-1n	CAPACITOR, CER 1n/63V	PHI	2
C17	C-400-330p	CAPACITOR, CER 330p/63V	PHI	1
C18		Not used		
C19	TW-L 2,2uF	CAPACITOR, ELCT 2u2/50V-L	RUB	1
C20	2222 4244 1003	CAPACITOR, PLST 10n/63V	PHI	1
C21	SR215E103KAA	CAPACITOR, CER 10n/63V	AVX	
C22	C-400-22p	CAPACITOR, CER 22p/63V	PHI	1
C23	C-400-1n	CAPACITOR, CER 1n/63V	PHI	
C24	MD015E104ZAA	CAPACITOR, CER 100n/50V	AVX	
C25	16 TW 220 MS	CAPACITOR, ELCT 220u/16V	RUB	
C26	16 TW 220 MS	CAPACITOR, ELCT 220u/16V	RUB	
C27	35 TW 330 MS	CAPACITOR, ELCT 330u/35V	RUB	1
CX(31)	MD015E104ZAA	CAPACITOR, CER 100n/50V	AVX	
CR1	1N4007	DIODE, SI 1N4007	MOT	2
CR2	1N4935	DIODE, SI 1N4935	MOT	2
CR3	1N4935	DIODE, SI 1N4935	MOT	2
CR4		Not used		
CR5	1N4148	DIODE, SI 1N4148	PHI	7

REV STATUS OF SHEETS	LTR	A	NEXT ASSY		USED ON	H1249

APPROVAL	DATE	REV APPROVAL AND DATE	CODE IDENT	PL 91-100011
PT	840213		REV A	SHEET 1 of 6

	TITEL	STYKLISTE
	DISPLAY PROCESSOR PROCESSOR ASSY	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
CR6	1N4148	DIODE, SI 1N4148	PHI	
CR7	1N4148	DIODE, SI 1N4148	PHI	
CR8	1N4148	DIODE, SI 1N4148	PHI	
CR9	1N4148	DIODE, SI 1N4148	PHI	
CR10	1N4148	DIODE, SI 1N4148	PHI	
CR11	1N4148	DIODE, SI 1N4148	PHI	
DS1	AD 0198 Z25	LOUDSPEAKER 1.25"	PHI	1
F1	480518	FUSE, 1A mT	RAD	1
H1	5965	FUSE SOCKET	COP	2
H2	FK 209 SO32	HEAT SINK - SOT32	SHUR	1
H3	1358	TEST POINT	COP	11
H4	307788	STAY NUT, 5mm	RAD	1
H5	1813 M3-A2	SQUARE NUT, M3	HFC	1
H6		Not used		
H7		Not used		
H8	303004	INSULATING WASHER	RAD	1
H9	9102 3x10 PHMX	SCREW, M3x10	HFC	1
H10	9102 3x5 PHMX	SCREW, M3x5	HFC	1
J1	76351-172	CONNECTOR, 6X2 POLE	BERG	6/36
J2	RSP 7103A3-1	CRIMP TERMINAL	MOLX	1
J3	510AG91D	CONNECTOR PCB, 2x10-POLE	AUG	2
J4	75168-113-36	CONNECTOR PCB, 2-POLE	AUG	2/36
JW	75160-102-36	WRAP POST	BERG	15/36
JW	75844-102-36	WRAP POST	BERG	14/36
L1	B65807-N160-A48	CORE, FERRIT RM6	SIE	1
L1	B65808-A1004-D1	COIL SECTION 100u RM6	SIE	1
L1	B65808-C2002	CORE CLAMPS RM6	SIE	2
L2	1585-25u-I	COIL, 25u/1.5A	FER	2
L3	1585-25u-I	COIL, 25u/1.5A	FER	
L4	IM2, 68u	COIL, 68u IM2	DALE	9
L5	IM2, 68u	COIL, 68u IM2	DALE	
L6	IM2, 68u	COIL, 68u IM2	DALE	
L7	IM2, 68u	COIL, 68u IM2	DALE	
L8	IM2, 68u	COIL, 68u IM2	DALE	
L9	IM2, 68u	COIL, 68u IM2	DALE	
L10	IM2, 68u	COIL, 68u IM2	DALE	

REV STATUS	LTR A	NEXT ASSY		
OF SHEETS		USED ON	H1240	
APPROVAL PT	DATE 840213	REV APPROVAL AND DATE	CODE IDENT	PL 91-100011
			REV A	SHEET 2 of 6

H1249 REFERANCE MANUAL

	TITEL	STYKLISTE
	DISPLAY PROCESSOR PROCESSOR ASSY	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
L11	IM2, 10u	COIL, 10u IM2	DALE	1
L12	IM2, 68u	COIL, 68u IM2	DALE	
L13	IM2, 68u	COIL, 68u IM2	DALE	
Q1	BD436	TRANSISTOR, PNP BD436	PHI	1
Q2		Not used		
Q3	BC547	TRANSISTOR, NPN BC547	PHI	2
Q4	BC547	TRANSISTOR, NPN BC547	PHI	
Q5	MPSA-14	TRANSISTOR DARLINGTON, NPN MPSA-14	MOT	1
Q6	2N2369A	TRANSISTOR, NPN 2N2369A	PHI	1
R1	Q69-X3447	RESISTOR, SIOV 18V/.02 W	SIE	1
R2	SFR 25	RESISTOR, FILM 180R/0.25 J	PHI	1
R3	SFR 25	RESISTOR, FILM 1M/0.25 J	PHI	1
R4	SFR 25	RESISTOR, FILM 1K/0.25 J	PHI	5
R5	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	7
R6	8038EKP502E1	RESISTOR, VAR 5K/0.50 K	PHI	1
R7	SFR 25	RESISTOR, FILM 6K8/0.25 J	PHI	1
R8	SFR 25	RESISTOR, FILM 27K/0.25 J	PHI	2
R9	SFR 25	RESISTOR, FILM 22R/0.25 J	PHI	1
R10		Not used		
R11	SFR 25	RESISTOR, FILM 100K/0.25 J	PHI	2
R12	SFR 25	RESISTOR, FILM 39K/0.25 J	PHI	1
R13	SFR 25	RESISTOR, FILM 33K/0.25 J	PHI	1
R14	SFR 25	RESISTOR, FILM 5K1/0.25 J	PHI	1
R15	SFR 25	RESISTOR, FILM 560R/0.25 J	PHI	1
R16	SFR 25	RESISTOR, FILM 91R/0.25 J	PHI	1
R17	SFR 25	RESISTOR, FILM 1K/0.25 J	PHI	
R18	SFR 25	RESISTOR, FILM 27K/0.25 J	PHI	
R19	SFR 25	RESISTOR, FILM 300K/0.25 J	PHI	1
R20	SFR 25	RESISTOR, FILM 56K/0.25 J	PHI	1
R21	SFR 25	RESISTOR, FILM 3K9/0.25 J	PHI	2
R22	SFR 25	RESISTOR, FILM 100K/0.25 J	PHI	
R23	SFR 25	RESISTOR, FILM 5K6/0.25 J	PHI	1
R24	SFR 25	RESISTOR, FILM 1K8/0.25 J	PHI	1
R25	SFR 25	RESISTOR, FILM 4K7/0.25 J	PHI	2

REV STATUS	LTR A	NEXT ASSY	
OF SHEETS		USED ON	H1249

APPROVAL	DATE	REV APPROVAL AND DATE	CODE IDENT	PL 91-10001
PT	840213		REV A	SHEET 3 of 6

	TITEL	STYKLISTE
	DISPLAY PROCESSOR PROCESSOR ASSY	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
R26	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R27	SFR 25	RESISTOR, FILM 4K7/0.25 J	PHI	
R28	SFR 25	RESISTOR, FILM 200R/0.25 J	PHI	3
R29	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R30	SFR 25	RESISTOR, FILM 200R/0.25 J	PHI	
R31	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R32	SFR 25	RESISTOR, FILM 200R/0.25 J	PHI	
R33	SFR 25	RESISTOR, FILM 330R/0.25 J	PHI	4
R34	SFR 25	RESISTOR, FILM 12R/0.25 J	PHI	1
R35	SFR 25	RESISTOR, FILM 62K/0.25 J	PHI	1
R36	PR 37	RESISTOR, CARB 10R/1.0 J	PHI	1
R37	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R38	SFR 25	RESISTOR, FILM 430R/0.25 J	PHI	1
R39	SFR 25	RESISTOR, FILM 20K/0.25 J	PHI	2
R40	SFR 25	RESISTOR, FILM 20K/0.25 J	PHI	
R41	SFR 25	RESISTOR, FILM 330R/0.25 J	PHI	
R42	SFR 25	RESISTOR, FILM 330R/0.25 J	PHI	
R43	SFR 25	RESISTOR, FILM 68R/0.25 J	PHI	1
R44	PR 37	RESISTOR, CARB 330R/1.0 J	PHI	2
R45	SFR 25	RESISTOR, FILM 3K9/0.25 J	PHI	
R46	PR 37	RESISTOR, CARB 330R/1.0 J	PHI	
R47	SFR 25	RESISTOR, FILM 330R/0.25 J	PHI	
R48	SFR 25	RESISTOR, FILM 1K/0.25 J	PHI	
R49	SFR 25	RESISTOR, FILM 1K/0.25 J	PHI	
R50	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R51	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R52	SFR 25	RESISTOR, FILM 1K/0.25 J	PHI	
RS1	MSP10A01-103G	RESISTOR, SIL 9x10K	DALE	2
RS2	MSP10A01-103G	RESISTOR, SIL 9x10K	DALE	
U1	8085 AH-2	INTEGRATED CKT, 8085AH-2	SIE	1
U2	74LS74	INTEGRATED CKT, 74LS74	TI	2
U3	74LS290	INTEGRATED CKT, 74LS290	TI	1
U4	74LS373	INTEGRATED CKT, 74LS373	TI	3
U5	74LS138	INTEGRATED CKT, 74LS138	TI	1
U6	74LS32	INTEGRATED CKT, 74LS32	TI	2
U7	74LS04	INTEGRATED CKT, 74LS04	TI	1
U8	74LS08	INTEGRATED CKT, 74LS08	TI	1
U9	LM723	INTEGRATED CKT, LM723	TI	1

REV STATUS	LTR A	NEXT ASSY		
OF SHEETS		USED ON	H1249	

APPROVAL	DATE	REV APPROVAL AND DATE	CODE IDENT	PL 91-100011
PT	840213		REV A	SHEET 4 of 6

	TITEL	STYKLISTE
	DISPLAY PROCESSOR PROCESSOR ASSY	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
U10	LM723	INTEGRATED CKT, LM339	TI	1
U11	7406	INTEGRATED CKT, 7406	TI	1
U12	74LS373	INTEGRATED CKT, 74LS373	TI	
U13	74LS377	INTEGRATED CKT, 74LS377	TI	1
U14	74LS373	INTEGRATED CKT, 74LS373	TI	
U15	NE555	INTEGRATED CKT, NE555	TI	1
U16	MBM2764-30Z	INTEGRATED CKT, MBM2764-30Z	FUJ	1
U17	MK4802	INTEGRATED CKT, MK4802	FUJ	1
U18	8251A	INTEGRATED CKT, 8251A	SIE	1
U19	8253-5	INTEGRATED CKT, 8253-5	SIE	1
U20	75188	INTEGRATED CKT, 75188	TI	1
U21	75189A	INTEGRATED CKT, 75189A	TI	1
U22	8276	INTEGRATED CKT, 8276	SIE	1
U23	MBM2716HZ	INTEGRATED CKT, MBM2716HZ	FUJ	1
U24	74LS166	INTEGRATED CKT, 74LS166	TI	1
U25	74LS163	INTEGRATED CKT, 74LS163	TI	3
U26	74LS163	INTEGRATED CKT, 74LS163	TI	
U27	74LS163	INTEGRATED CKT, 74LS163	TI	
U28	74LS175	INTEGRATED CKT, 74LS175	TI	2
U29	74LS175	INTEGRATED CKT, 74LS175	TI	
U30	74LS32	INTEGRATED CKT, 74LS32	TI	
U31	74LS00	INTEGRATED CKT, 74LS00	TI	1
U32	74LS86	INTEGRATED CKT, 74LS86	TI	1
U33	74LS74	INTEGRATED CKT, 74LS74	TI	
VR1	BZV85C5V6	DIODE, SD ZENER, 5,6V/1W	PHI	1
VR2		Not used		
VR3	BZX79C3V9	DIODE, SD ZENER, 3,9V	PHI	2
VR4	BZX79C6V8	DIODE, SD ZENER, 6,8V	PHI	1
VR5	BZX79C2V4	DIODE, SD ZENER, 2,4V	PHI	1
VR6	BZX79C3V9	DIODE, SD ZENER, 3,9V	PHI	
VR7	BZX79C8V2	DIODE, SD ZENER, 8,2V	PHI	1
WX	76264-101	MINI-MATE-2600 0.1"	BERG	10
X16	DIL B28P108	SOCKET, 28-PIN	BURN	2
X17	DIL B28P108	SOCKET, 28-PIN	BURN	
X20	DIL B14P108	SOCKET, 14-PIN	BURN	2
X21	DIL B14P108	SOCKET, 14-PIN	BURN	
X23	DIL B24P108	SOCKET, 24-PIN	BURN	1

REV STATUS	LTR A	NEXT ASSY		
OF SHEETS		USED ON	91249	
APPROVAL	DATE	REV APPROVAL AND DATE	CODE IDENT	PL 91-100011
PT	840213		REV A	SHEET 5 of 6

	TITEL	STYKLISTE
	DISPLAY PROCESSOR PROCESSOR ASSY	PARTS LIST

REF DES FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
Y1	9.1216 MHz	CRYSTAL UNIT, QUARTZ 9.216 MHz	PIE	1
Y2	16.038 MHz	CRYSTAL UNIT, QUARTZ 16.038 MHz	PIE	1

REV STATUS	LTR A	NEXT ASSY		
OF SHEETS		USED ON	HI249	
APPROVAL DATE PT 840213	REV APPROVAL AND DATE	CODE IDENT	PL 91-100011	
		REV A	SHEET 6 of 6	

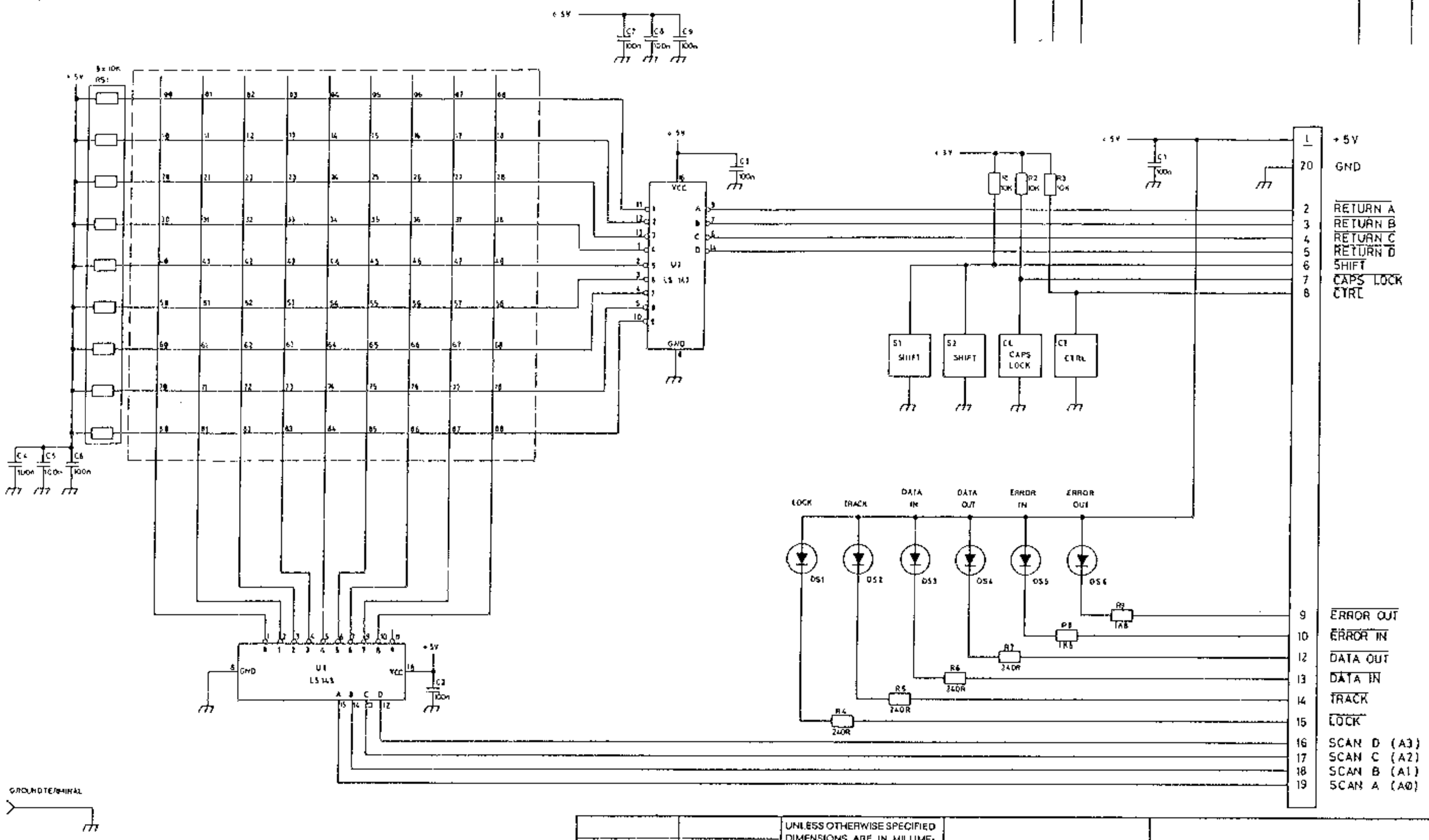
	TITEL	STYKLISTE
	CABLE ASSEMBLY CONSOLE RS-232C	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
1	TT37-100084	CABLE ASSEMBLY DRAWING	T&T	R
2	TT37-100053	PRINTED WIRING BOARD	T&T	1
C1	2222 629 19472	CAPACITOR, CER 4n7/100V	PHI	4
C3	2222 629 19472	CAPACITOR, CER 4n7/100V	PHI	
C4	2222 629 19472	CAPACITOR, CER 4n7/100V	PHI	
C5	2222 629 19472	CAPACITOR, CER 4n7/100V	PHI	
H1	205718-1	CONNECTOR HOUSING, 25-POLE	AMP	1
H2	8630-05	4-40 MOUNTING SCREW	SOU	2
P1	DB-25P-064	CONNECTOR, 25-POLE, MALE	SOU	1
P2	65043-031	CONNECTOR, 12-POLE, FEMALE	BERG	1
PX	47711/001	TERMINAL, CRIMP	BERG	5
R1	SFR 25	RESISTOR, FILM OR	PHI	4
R4	SFR 25	RESISTOR, FILM OR	PHI	
R6	SFR 25	RESISTOR, FILM OR	PHI	
R7	SFR 25	RESISTOR, FILM OR	PHI	
W1	829252	CABLE, 6 x 0.4mm	RAD	2.0
	122-120	CABLE FLEX, 1/4" BLACK	RUD	0.3
	122-200	CABLE FLEX, 1/4" BLACK	RUD	0.3

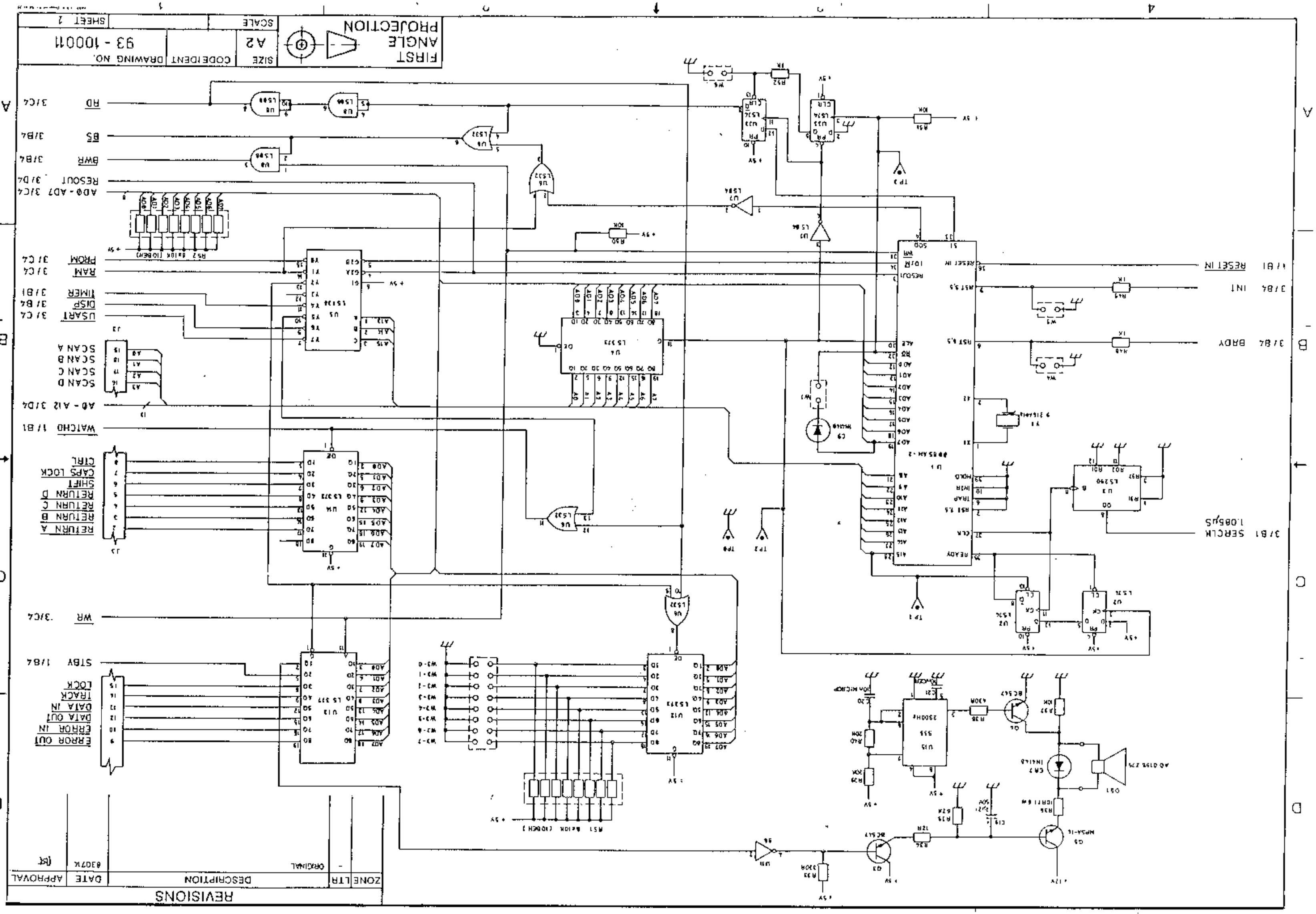
H1249 REFERANCE MANUAL

REV STATUS	LTR A	NEXT ASSY		
OF SHEETS		USED ON	H1240	
APPROVAL PT	DATE 840213	REV APPROVAL AND DATE	CODE IDENT	PL 91-100084
			REV A	SHEET 1 of 1

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVAL
	-	ORIGINAL	830413	PS
	-	REVISED	830712	PC
	-	REVISED	831013	



NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETRES AND TOLERANCES ARE IN ACCORDANCE WITH BS 2075	DR. Kirkland 830413	TITLE H1249 KEYBOARD ASSY
APPLICATION		ANGLES	CH.	
		LIN. DIM.	AP.	
		MATERIAL	AP.	
			FIRST ANGLE PROJECTION	SIZE A2 / CODE IDENT / DRAWING NO. 93 - 100010
				SCALE / SHEET 1 OF 1


FIRST ANGLE PROJECTION
SIZE A2
DRAWING NO. 93 - 10001
SHEET 2
RD 3/C4
BS 3/B4
BWR 3/B4
RESOUT 3/D4
AD0 - AD7 3/C4
PROM 3/C4
RAM 3/C4
TIMER 3/B1
USART 3/C4
DISP 3/B4
SCAN A
SCAN B
SCAN C
SCAN D
A0 - A12 3/D4
WATCHD 1/B1
RETURN A
RETURN B
RETURN C
RETURN D
SHIFT
CAPS LOCK
CTRL
WR 3/C4
STBY 1/B4
ERROR OUT
ERROR IN
DATA OUT
DATA IN
TRACK
LOCK
RESET IN 1/B1
INT 3/B4
BRDY 3/B4
SERCLK 3/B1
1.085µS
REVISIONS
ZONE LTR DESCRIPTION DATE APPROVAL
- ORIGINAL 83073k

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVAL
	-	ORIGINAL	830926	

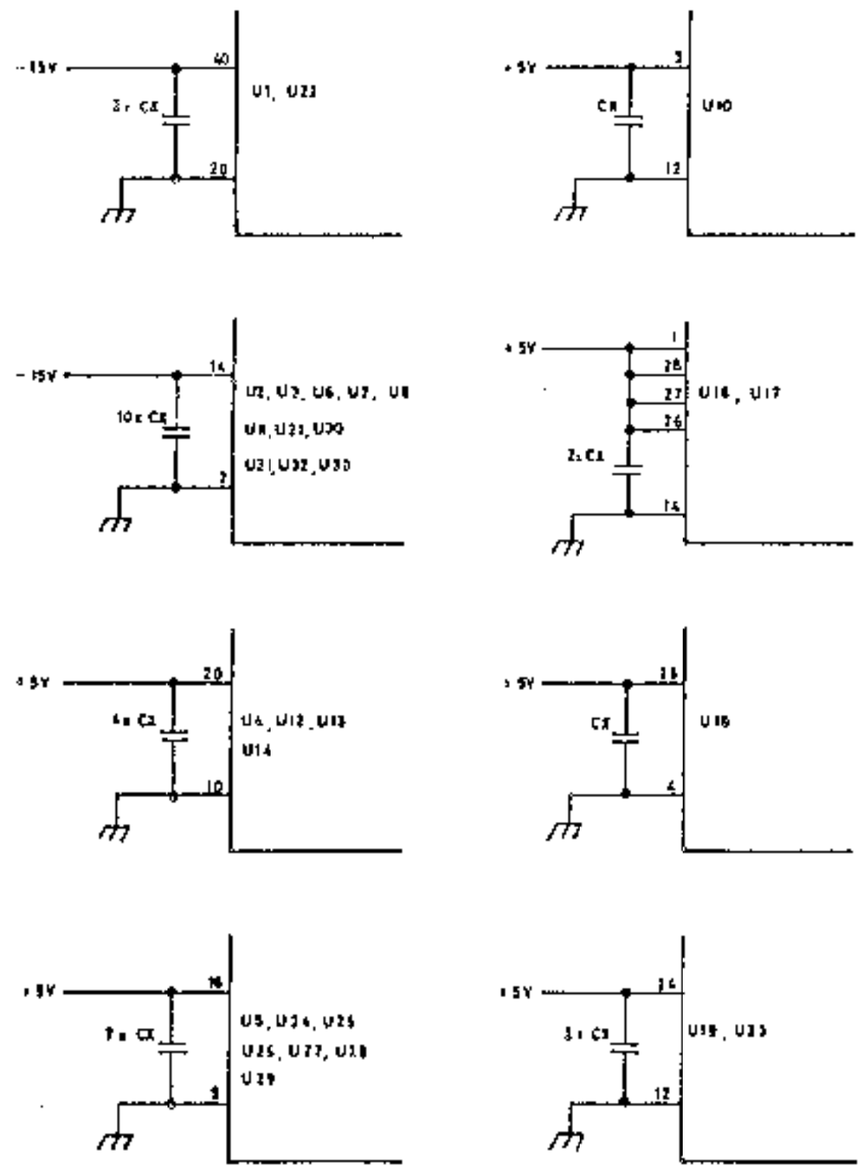
+12V J1-1
12V RTN J1-6
+5V ADJ.
+12V
-12V
+5V
GND
WATCHD 2/B1
RESET IN 2/B4
VIDEO OUT J2
3/B1 FVD
3/B1 HVD
2/D1 STBV
3/B1 SYNC

NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETRES AND TOLERANCES ARE IN ACCORDANCE WITH DS 2075	
APPLICATION		ANGLES LIN. DIM. MATERIAL	FIRST ANGLE PROJECTION

DR. Kirsten	83 09 26	TITLE: H1249 DISPLAY PROCESSOR
CH.		
AP.		
AP.		

SIZE	CODE IDENT	DRAWING NO.
A2		93 - 100011
SCALE		SHEET 1 OF 4

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVAL
		ORIGINAL	830927	



FIRST ANGLE PROJECTION	SIZE A2	CODE IDENT	DRAWING NO. 93 - 100011
	SCALE		SHEET 4

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVAL
	-	ORIGINAL	830927	

2/A1 RESOUT
2/B1 A0 - A12

2/B1 PROM
2/C1 WR
2/B4 USART
2/A1 RD
2/A1 AD0 - 7
2/B1 RAM

2/A1 A0
2/A1 BWR
2/B1 DISP
2/A1 BS
2/B4 BRDY
2/B4 INT

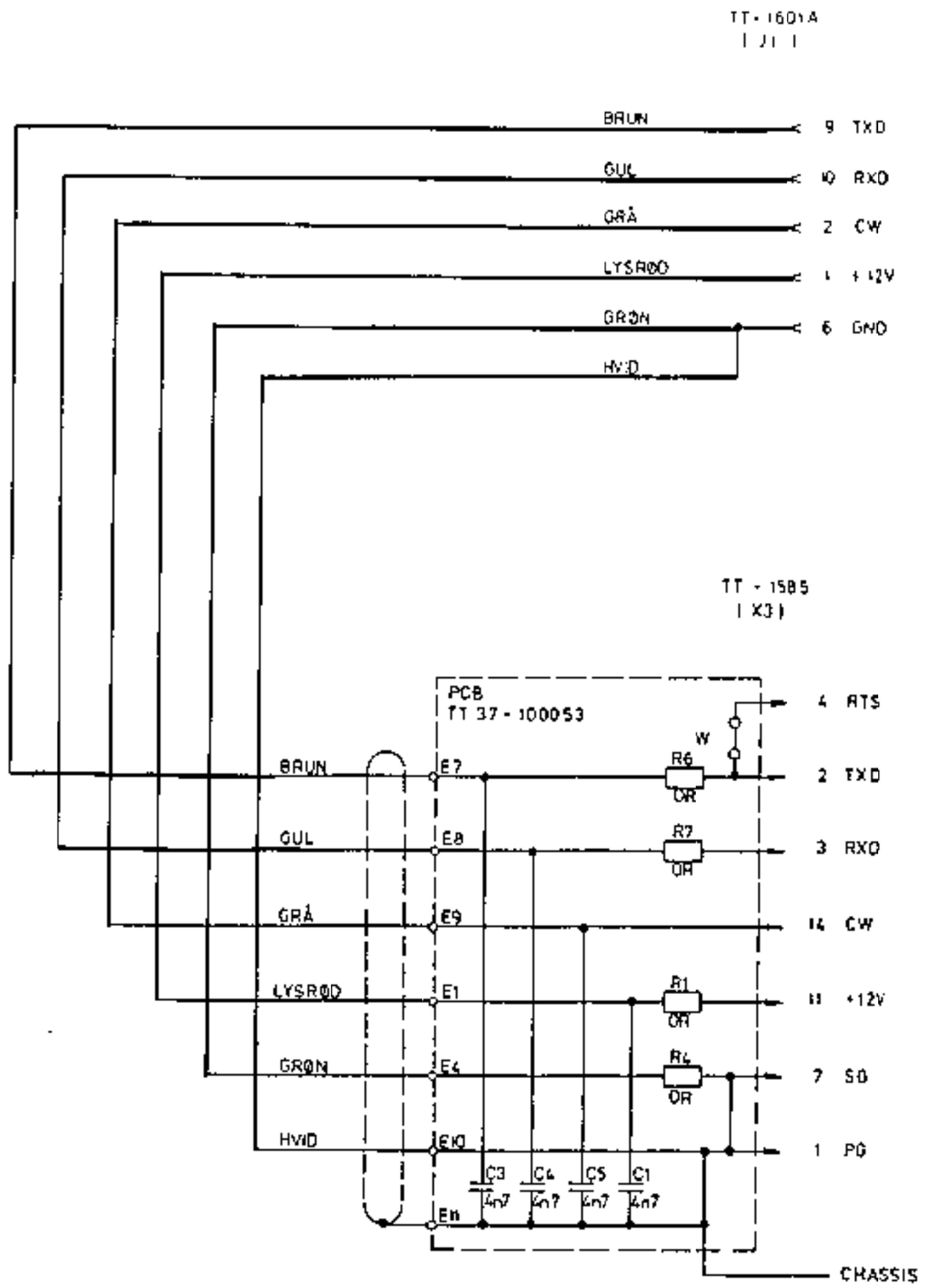
MORSE KEY
J1 - 2
J1 - 3 RTS
J1 - 4 CTS
J1 - 5
J1 - 7 DTR
J1 - 8 RLSD
J1 - 9 TXD
J1 - 10 RXD
J1 - 11 SG

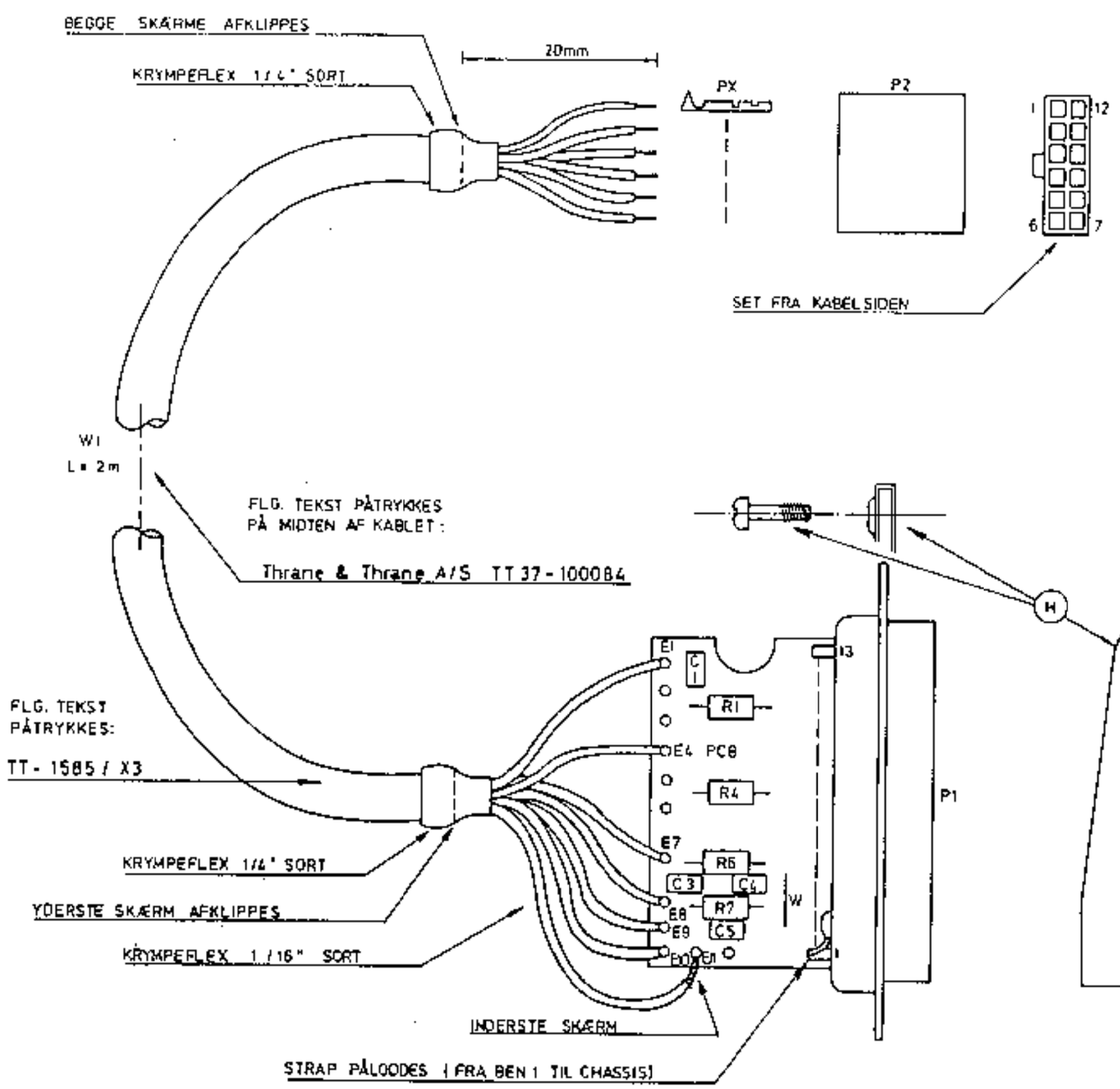
SERCLK (1MHz) 2/C4
TIMER 2/B1
HVD 1/B4
FVD 1/B4
SYNC 1/B4

FIRST ANGLE PROJECTION	SIZE	CODE IDENT	DRAWING NO.
	A2		93 - 100011
	SCALE		SHEET 3

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVAL
	-	ORIGINAL	831011	

WIRING DIAGRAM.





		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETRES AND TOLERANCES ARE IN ACCORDANCE WITH DS 2075		
		ANGLES	DR. Kirsten 831011	TITLE H1249 CABLE ASSEMBLY
		LIN. DIM.	CH.	
			AP.	
		MATERIAL	AP.	
NEXT ASSY	USED ON		FIRST ANGLE PROJECTION	SIZE A2 / CODE IDENT / DRAWING NO. 37 - 100084
APPLICATION				SCALE 2:1 / SHEET 1 OF