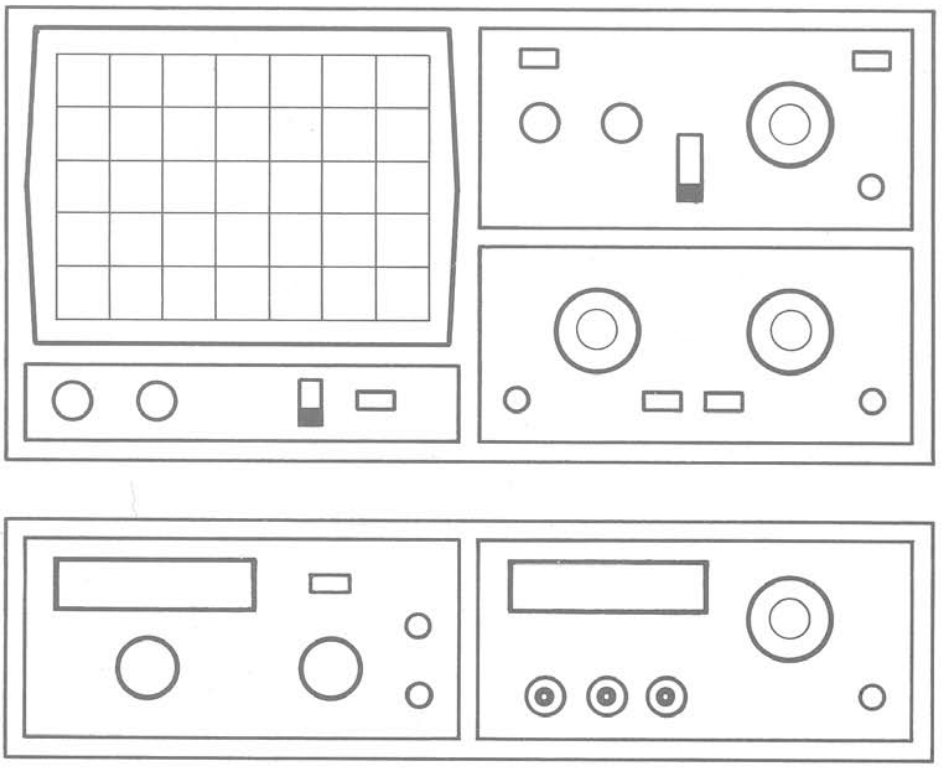
HAMEG
Instruments

MANUAL

Graphic Printer
HM 8148



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Circuit Diagrams

Components Location

Parts List

Graphic Printer HM 8148

Transport

Immediately after being unpacked, the unit should be controlled for visible damage. If any damage has occurred during transport, the shipping agent (railway, post office or shipping company) must be informed and inspection of the unit arranged for. The unit may not be used under any circumstances.

Safety

This unit has been manufactured and tested in compliance with the guidelines stipulated in the West German VDE Standard No. 0411, Parts 1 and 1a ("Protective measures for electronic measuring instruments"). In accordance with Safety Class I as defined in this standard, all housing and chassis parts are connected to the grounded wire of the power cord.
If the unit is connected to a Class II oscilloscope, then this will result in the oscilloscope also being operated under Class I safety conditions.
Unless used with a protective insulating transformer, this unit may only be connected to properly designed and installed grounding outlets.

Warning

It is not permissible to interrupt the grounded wire either inside or outside of the unit.
The unit may not be opened or shut unless it has first been isolated from all external voltages.
If it should be absolutely essential to carry out measurements, troubleshooting or adjustments on the opened unit while it is being operated, then this work must be performed by a qualified technician who is familiar with the associated risks.

Operating conditions

The permissible ambient temperature range for operation is +10° C to +40° C; for transport and storage only, temperatures between −40° C and +70° C are permissible. Any location may be chosen for operation as long as the ventilation openings are not covered.

Warranty

Each unit is subjected to continuous operation over a period of 10 hours, followed by complete testing of all functions and performance, prior to leaving the factory. It is nevertheless possible for premature component failure to occur.
For this reason, a **2-year functional warranty** is granted on all HAMEG equipment. This warranty is voided if any changes are made on the unit.
The warranty does not cover damage caused during transport.
To prevent damage from occurring during transport, we recommend shipping the unit only in its original packaging.

To facilitate speedy processing, it is advisable to attach a note to the unit listing the problem, your name and full telephone number (including prefix(es)), in addition to the usual shipping documentation.

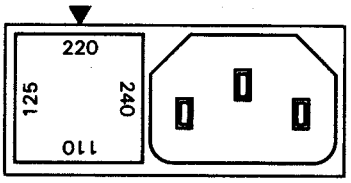
Maintenance

This unit requires no maintenance.
The outside of the unit should be regularly cleaned with a fine brush to remove dust. Stubborn dirt can be removed by going over it with a moistened cloth (water + 1% mild detergent). Care must be taken to prevent any liquid from penetrating into the unit.

The unit must be switched off before opening the paper drawer!

Switching over the mains/line voltage

The instrument is set for 220V (240V U.K.) line voltage on delivery. It can be switched over to other voltages at the fuse holder combined with the 3-pole appliance inlet at the rear of the instrument. Firstly the fuse holder printed with the voltage values is removed using a small screw driver and - if required - provided with another fuse. Refer to the table below for the prescribed value of the fuse. Then replace the fuse holder so that the impressed white triangle points to the desired voltage. Here pay attention that the cover plate is also correctly engaged. The use of repaired fuses or short circuiting the fuse holder is not allowed. Damage arising because of this is not covered by the guarantee.



Fuse type: Size **5 x 20 mm**; 250 V~, C;
IEC 127, Sheet III; DIN 41 662 (possibly DIN 41 571 sheet 3).
Cutoff: **medium (M)**.

Line voltage	**Fuse rating**
110 V ~ ±10%	**M1.6 A**
125 V ~ ±10%	**M1.6 A**
220 V ~ ±10%	**M0.8 A**
240 V ~ ±10%	**M0.8 A**

Specifications

Operating Modes

ONLINE MANUAL	"Hardcopy" (by pressing PRINT button)
ONLINE TIMER	"Hardcopy" (timer-controlled)
ONLINE AUTOM.	"Hardcopy" (controlled by trigger event)
PRINTER SET	Setting of printer parameters
CLOCK SET	Setting of time of day (hours/minutes)
DATE SET	Setting of calendar date
TIMER SET	Setting of timer parameters
IEEE (optional)	Setting of IEEE parameters

Printer data

Printing system	Thermal
Dots per line	256
Dot density	2.86 dots/mm (72.64 dots/inch)
Dot size	0.42 mm x 0.32 mm (0.02" x 0.01")
Paper width	112 mm (4.41")
Printing width	89.6 mm (3.53")
Printout speed	3000 lines of dots/min.
Printhead life	30 million lines of dots

Paper

Dimensions	112 mm wide (printing width 89 mm), paper roll diameter 29 mm
Coloring	White; turns black with heat application

Interfaces

Standard	HAMEG System interface
Optional	IEEE - 488

Miscellaneous

Battery backup	Ensures that all parameters will remain stored in memory when printer is powered down
Realtime clock	For display of time of day (hours/minutes)
Display	4-digit, 7-Segment LED display
Electrical information	Complies with safety requirements of VDE 0411 Class I
Power supply	110, 125, 220, or 240 V AC Permissible voltage fluctuation: ±10%
AC line frequency range	50 to 60 Hz
Power consumption	Less than 30 watts typical; approx. 130 watts for solid black printing
Weight	Approx. 6 kg
Color	"Techno brown"
Case dimensions	285 x 75 x 365 mm (width x height x depth) (11.22" x 2.95" x 14.37")

Standard accessories

1 HO 74 interface adapter for HM 205-2, 1 connection cable: printer - scope,
1 roll of thermal paper, power cord, footrest, operating instructions

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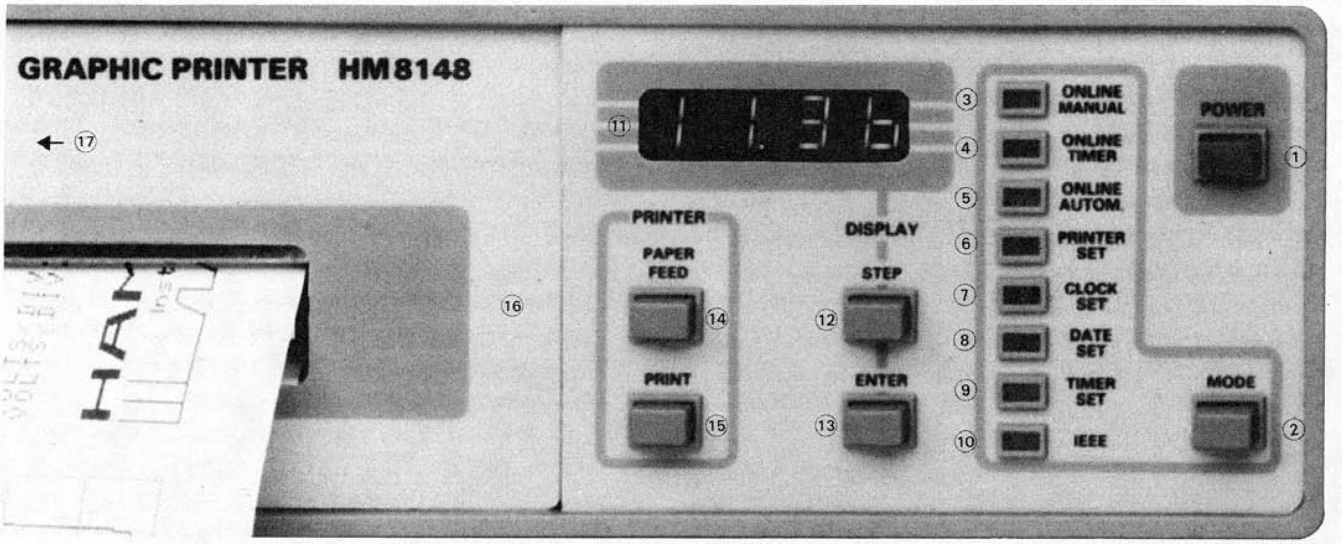
Introduction

The HM 8148 Graphics Printer allows very fast printout (less than 15 seconds) of data stored in the memory of digital storage oscilloscopes HM 205-2 or HM 208.
Each printout provides effective, good-quality documentation of scope screen contents, supplemented with time of day, date and information on certain scope settings.

All parameters are entered using a user-friendly, menu-driven routine that virtually excludes any possibility of mistakes. Moreover, this unit permits automatic capture of measurement data, either timer-controlled using the built-in realtime clock or in response to a given trigger event registered on the oscilloscope.

The contents of the oscilloscope memory are transferred to the HM 8148 via the HAMEG interface and a 26-way ribbon cable with 2 connectors that is supplied as a standard accessory along with the HM 8148.
A second ribbon cable with one standard connector and one connector for attachment inside the HM 205-1 oscilloscope, also supplied as a standard accessory, must be installed in the oscilloscope (if used) to implement the HAMEG interface. The procedure to be followed is explained in the section "Installation of the HO 74 interface adaptor".
If an HM 208 oscilloscope is to be retrofitted with a HAMEG interface, this must be done by HAMEG or one of its foreign distributors. It is not possible to connect both the IEEE - 488 and the HAMEG interface to the HM 208 at the same time.

Controls and indicators



① **POWER SWITCH**
(Power input located on rear panel of unit)
② **MODE**
Press to change the operating mode
③ **ONLINE MANUAL**
Indicator for "Mode 1"; manually controlled printout
④ **ONLINE TIMER**
Indicator for "Mode 2"; timer-controlled printout
⑤ **ONLINE AUTOM.**
Indicator for "Mode 3"; trigger controlled printout
⑥ **PRINTER SET**
Indicator for "Mode 4"; for entry of printer parameters
⑦ **CLOCK SET**
Indicator for "Mode 5"; for entry of current time of day
⑧ **DATE SET**
Indicator for "Mode 6"; for entry of date
⑨ **TIMER SET**
Indicator for "Mode 7"; for entry of timer parameters
⑩ **IEEE** (optional)
Indicator for "Mode 8"; for entry of IEEE-488 parameters
⑪ **DISPLAY**
4-digit LED display
⑫ **STEP**
Press to increment the displayed value by one
⑬ **ENTER**
Press to enter the displayed value
and activate the next digit
⑭ **PAPER FEED**
Press to advance paper
⑮ **PRINT**
Press to print out oscilloscope screen contents
⑯ **DRAWER**
Holds paper roll
⑰ **PAPER RELEASE LEVER**
Lower position: for printing.
Upper position: for changing paper

Makeready and self-test

After the supplied ribbon cable has been used to connect the oscilloscope to the Graphic Printer, the oscilloscope must be operated in storage mode.

If using an HM 205-2, it does not make any difference whether channel I, channel II or dual mode is used.

If an HM 208 is connected, then it must be set to "DUAL" mode. Otherwise the printout obtained will not be identical with the image displayed on the CRT screen.

Power up the Graphic Printer by pressing the red power button. A self-test routine is automatically initiated, the results of which are printed out and/or displayed. The following error messages can occur:

" ERR0 " - Battery voltage is too low
" ERR1 " - Paper drawer is not shut
" ERR2 " - No paper
" ERR3 " - RAM fault (U204)
" ERR4 " - RAM fault (U205)
" ERR5 " - EPROM fault (U205)
" ERR6 " - EPROM fault (U206)
" ERR7 " - Clock fault (U301)
" ERR0. " - PIO fault (U910)
" ERR1. " - PIO fault (U801)
" ERR2. " - Printer interface is not connected
" ERR3. " - Oscilloscope is not connected
" ERR4. " - Oscilloscope is not switched on
" ERR6. " - Paper lever in wrong position

If the self-test routine is completed without locating any faults or errors, then the following message appears:

NO ERRORS FOUND !
ROM - VERSION: (e.g.: 0.0 (01.08.87))
SELFTEST PASSED !

The unit is now ready for operation. Its initial (default) settings are as follows:

Mode 1 = ONLINE MANUAL
Current time of day / month / year
Zoom range: division 0 to 9 (no zoom) for both channels
Evaluation procedure mode 0 (linear approximation) for both channels
No timer parameters

Note: In order for the printout to be identical with the image displayed in the oscilloscope screen, the horizontal position control on the oscilloscope must be adjusted so that the trace begins at the lefthand edge of the graticule. Portions of traces displayed to the right of the righthand edge of the graticule will not be printed out.

Operating modes

1: ONLINE MANUAL

When the **PRINT** button is depressed, the contents of the oscilloscope's memory at that instant in time are transferred to the printer, regardless of which mode it is being operated in (REFRESH, SINGLE or HOLD mode). After the memory contents have been transferred (when the transfer takes place a brief change in the screen image will be noted), the transferred data are printed out as a waveform.

Note: In this mode the printer does not send a reset signal to the scope, and consequently the oscilloscope is also not armed for another trigger event if it is in SINGLE mode.

HM 208

The HM 208 must always be operated in DUAL mode to ensure correct printout by the Graphic Printer.
This is possible in oscilloscope modes **ROLL** and **REFRESH**, but not in **XY** mode.

2: ONLINE TIMER

If the Graphic Printer is in this operating mode, then data are transferred from the oscilloscope at a pre-programmed point in time.
When the preprogrammed starting time is reached, the image displayed in the oscilloscope screen at that moment in time is automatically printed out. It is possible to obtain repeated, cyclic printouts by specifying a time interval (e.g. every hour).
If the oscilloscope is set to SINGLE or HOLD, then it is not possible to update the contents of its digital waveform memory. Consequently, it is not advisable to use these oscilloscope modes with this printer mode.
The Graphic Printer may be powered down between two printout cycle times without causing any problems.
Note: The starting time must be within the current month, i.e. it may not be later than on the last day of this month.
The maximum interval between printouts which may be entered is 24 hours.

3: ONLINE AUTOMATIC

In this Graphic Printer mode, data transfer is triggered by the oscilloscope itself; for this to work, the scope must be set to SINGLE mode and the RESET button pressed (so that the RESET LED lights up).
If the oscilloscope input signal now exceeds the trigger threshold, then the input waveform at that moment in time is sampled and stored in memory. Once this has been performed, a signal is sent to the printer, which initiates data transfer and subsequently sends a reset signal to the oscilloscope. This clears the oscilloscope so

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that it will be ready for a new trigger event. The data received by the Graphic Printer are immediately printed out.
This mode permits automatic continuous monitoring of test signals.

4: PRINTER SET

If the MODE button is used to select the PRINTER SET mode, then the time of day disappears from the display. Instead, 4 digits appear which indicate the so-called "zoom range". This refers to the time divisions in the oscilloscope screen graticule. The numbers 0 - 9 are assigned to the divisions from left to right, i.e. along the X-axis, "0" indicating the range from the left-hand border of the screen to the first vertical bar, "1" the range between the first and second vertical bars, and so on up to "9".

The first two digits stand for the range to be printed for Channel I, and the second two for the range to be printed for Channel 2.

Example: 0900
Printout:
For Channel I, the entire range from division 0 up to and including division 9
For Channel II, approx. 100 stored sampling points values spanning the range from the beginning of division 0 to the end of division 0, with a magnification of 10.
This value is factory-preset to 0909, i.e. for full printout of both channels over the entire range.

If it is desired to change any of these values, press the ENTER button after they appear in the display; a dot will appear to the right of the first digit. The STEP button can now be used to change its value. Each press of the button causes it to be incremented by one. To proceed to the next digit, press the ENTER button again and make changes with the STEP button, and so on until the 4th digit (last one on the right) has been assigned the desired value.
When ENTER is pressed for the fifth time, the first two digits go blank and two new digits appear on the right-hand side of the display. These define the evaluation procedure to be used when printing out. The dot is now to the right of the first of these digits; it refers to Channel I and can be assigned the value 0 or 1.
Pressing ENTER for the 6th time advances the dot to the second of the two displayed digits, which refers to the evaluation procedure to be used for Channel II.

Printout: 0 - linear approximation
1 - minimum/maximum evaluation
When ENTER is now pressed a 7th time, the 4 digits corresponding to the zoom ranges reappear.
The PRINTER SET mode may be left at any time by using the MODE button.

5: CLOCK SET

When this mode is selected, the current time of day is displayed and may be changed using the ENTER and STEP buttons as described above for mode no. 4. The clock uses a 24-hour system (i.e. '1735' = 5:35 p.m.).
The printer's realtime clock may be programmed to be accurate to the second. To do so, preset the clock to a time slightly ahead of the current time (e.g. one minute ahead). Wait until the set time is reached, and then immediately press the MODE button to exit the CLOCK SET mode.

6: DATE SET

The DATE SET mode is used to display and change the date (day, month and year). When this mode is selected, four digits first appear: the first two digits are for the day of the month, and the third and fourth digits for the month of the year.
To change the displayed values, press ENTER. A dot will appear on the left side of the 1st digit. By pressing the STEP button, this digit may be assigned the value 0, 1, 2 or 3 (tenth).
The 2nd digit corresponds to the ones in the day of the month, and can be set to any value between 0 and 9.
Impossible values (e.g. 3207) cannot be entered, since the dot cannot be advanced by pressing ENTER, nor can the DATE SET mode be exited by pressing the MODE button.
When ENTER is pressed for the third time the dot advances to the 3rd digit, which corresponds to the tenth in the month; this can only be set to 0 or 1.
Pressing ENTER a fourth time advances the dot to the digit furthest to the right. This digit represents the ones in the month and can be set to any value between 0 and 9 by pressing STEP.
The next step is to enter the year (e.g. 1988). Pressing ENTER again causes the entered year to be displayed. The digits 19 in the first two fields are permanently entered and may not be changed; the dot thus appears next to the 3rd digit. Both this digit and the following one may be set to any value between 0 and 9.
After entering the year, push MODE to revert the display of day and month, whereby a leap-year check is made.
If the DATE SET is plausible, this mode can now be exited by pressing MODE again.

7: TIMER SET

Once the Graphic Printer has been set to TIMER SET mode, the starting time, date and time interval may be entered, in that order, for subsequent data transfer from the oscilloscope and automatic printout.
The values entered in TIMER SET mode are only relevant for operation in ONLINE TIMER mode.
The four digits which initially appear represent the starting time; this may be changed using the ENTER and STEP buttons as described above.

When ENTER is pressed for the 5th time, the starting date is displayed; for example, 0110 stands for October 1. The dot appears to the right of the first digit. The first and second digits may be changed with ENTER and STEP as described above.

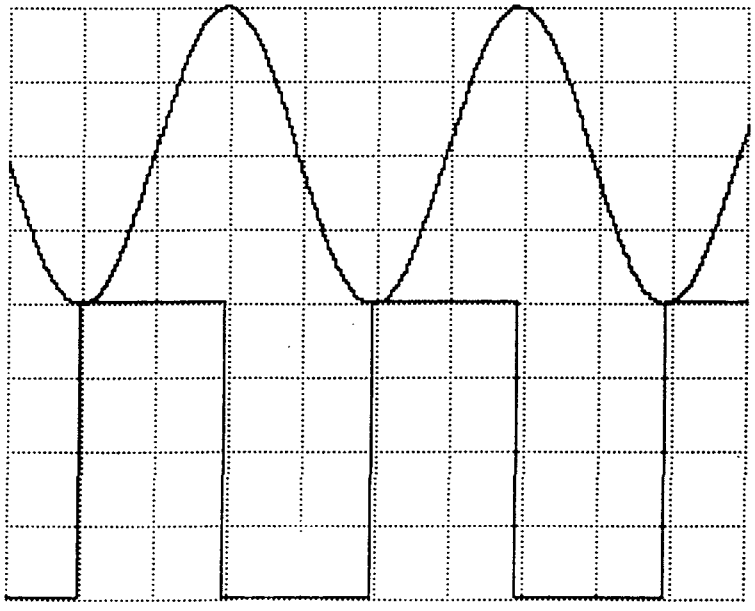
Since the month must be identical with that entered in DATE SET, it may not be changed.
Consequently, when ENTER is pressed for the 7th time the entered time interval is displayed. If this value is 0000 then no time interval is entered and with the printer in ONLINE TIMER mode hardcopy is printed out only when the starting time is reached.
If STEP is pressed once, the value 1000 appears (with the dot to the right of the 1), and pressing ENTER advances the dot to the right of the first zero. STEP may now be used to set the ones of the hour. The minutes are set in the same way.
If the time interval is set to 1253, for example, the first printout is performed when the starting time on the starting day (in the current month) is reached. Thereafter a new printout will be made automatically every 12 hours and 53 minutes.

Signal evaluation

As described above in connection with mode 4, two different signal evaluation procedures are possible.
In the procedure indicated by "0", a linear approximation is carried out, i.e. when the oscilloscope data (1024 data points on the X-axis) are compressed for representation using the actual number of available dots for printing (a total of 280), an approximated linear mapping is performed. That means that the average is calculated for each group of 4 consecutive points and this calculated value assigned to one printer point.
In order to prevent any spikes (high or low) being dropped in this way, it is necessary to choose evaluation procedure "1". In this procedure, the set of scope data is divided up into a number of intervals of equal size. Each of them is then checked to determine its minimum and maximum, and both of these values are printed out, thus preventing any spikes from being lost. In the case of continuous smooth waveforms, this procedure results in stepped plots.
If use of the zoom function results in a situation in which the number of oscilloscope data points along the X-axis is less than the number of printing dots (280), then the gaps are filled in by means of linear interpolation.
Each hardcopy printout contains the following additional information:

Date, time of day, and space for remarks
Signal parameters: CH 1 - VOLTS / DIV :
CH 2 - VOLTS / DIV :
Timebase - SEC/DIV :
Printer parameters: Zoom range (CH 1) : 0 - 9
Zoom range (CH 2) : 0 - 9
Evaluation (CH 1) : 0 - 1
Evaluation (CH 2) : 0 - 1

When the Graphic Printer is used with an HM 205-2, if the scope is operated in dual-channel mode the printer automatically recognizes the respective positions of the two channels on the Y-axis, i.e. which channel is to be printed on top and which on the bottom, provided that their Y-positions are not the same, and prints out the corresponding parameters in the same order.
As already mentioned, when using the Graphics Printer with an HM 208 the oscilloscope must always be operated in DUAL mode. No assignment of parameters is therefore performed.



DATE: 20.01.1988
TIME: 14:51

SIGNALPARAMETER:

CH1 - VOLTS/DIV:
CH2 - VOLTS/DIV:
TIMEBASE-SEC/DIV:

PRINTERPARAMETER:

ZOOMRANGE - CH1:0-9
ZOOMRANGE - CH2:0-9
EVALUATION - CH1:0
EVALUATION - CH2:0

REMARKS:

HAMEG
Instruments

Test log

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Autoset

The autoset function is used to reset all parameters to their default values. To perform, hold the MODE button depressed while powering up the printer by pressing the POWER button. Following an initialization phase lasting approx. 6 seconds, the printer settings are automatically reset to the following values:

Mode:	ONLINE MANUAL
Time, date, year:	0000
Zoom range:	0909
Starting time:	0000
Time interval:	0000
Evaluation type:	00

Rotary switch

If the printing assembly drawer is opened a rotary switch comes into view; this switch should normally be in its "0" position. It is for service purposes and may be used by trained technicians only.

Printing assembly drawer

Before opening or closing the printing assembly drawer the Graphic Printer must be switched off.

Changing the three alkaline-cell batteries

If the voltage of the back-up batteries is too low the self-test routine performed when the printer is powered up will display the error message " ERR0 ".

To replace the batteries, first disconnect the printer from its external power source. Then - and only then - remove the printer case by taking off the rear cover and pulling off the housing shell towards the back. The battery compartment is then easily accessible.

After replacing the batteries and reassembling the printer, the unit is automatically re-initialized upon power-up. The initialization process takes approx. 6 seconds.

Mean service life of the batteries: approx. 3 years.

Important!

Use only alkaline battery types.

Batteries with the following designations are suitable:

Mignon (AA - LR6, AM3)

Loading a new paper roll

If a red streak appears on the paper during printout, then a new roll of thermal paper must be loaded immediately. This indicates that the paper roll has been used up.

Attention: Thermal printing paper is coated on one side only. The heat-sensitive side is on the outside of the roll and must be facing towards the print head (see diagram).

Procedure:

Switch off the printer.

Place the paper release lever in its upper position.

Pull out the printing assembly drawer.

Remove any paper left over from the previous roll.

Load a new roll of paper (30 mm in dia., 112 mm wide).

Cut off diagonally the protruding free end of the roll (making sure that no adhesive residues are left on the paper).

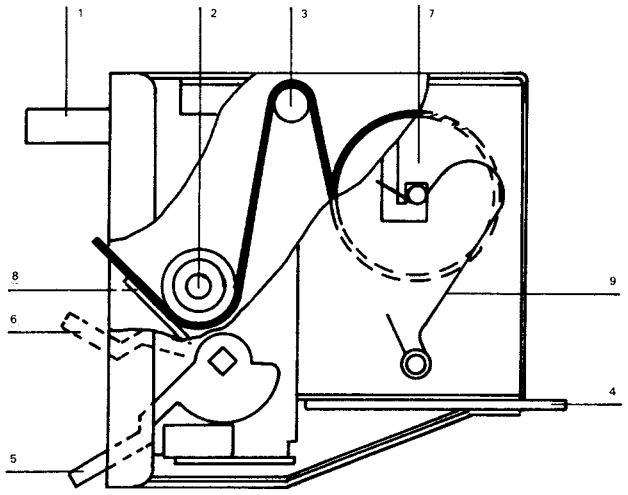
Insert the paper and slide it through until it emerges in front.

Pull out approx. 10 cm of paper and straighten it.

Close the drawer.

Return the paper release lever to its lower position.

After being powered up, the printer is ready for operation as soon as the "NO ERRORS" message is displayed.



Installation of interface adaptor HO 74

The function of the adaptor is to connect the digital storage memory of the HM 205-2 oscilloscope to external devices, such as the Graphic Printer, XY recorder interface HO 75 and IEEE interface HO 77.

Only one device or interface may be connected to the HM 205-2.

The interface adaptor HO 74 is supplied with the Graphic Printer and is installed as follows:

Disconnect the power cord before opening the HM 205-2.

Place the oscilloscope with the front side facing down on a soft surface. Remove the back cover and carefully pull the case off towards the back.

Place the scope rightside up again, so that its back is facing towards you.

Slide the 26-way ribbon cable with its connector above the vertically positioned Z board through the cutout for the CRT neck in the rear chassis.

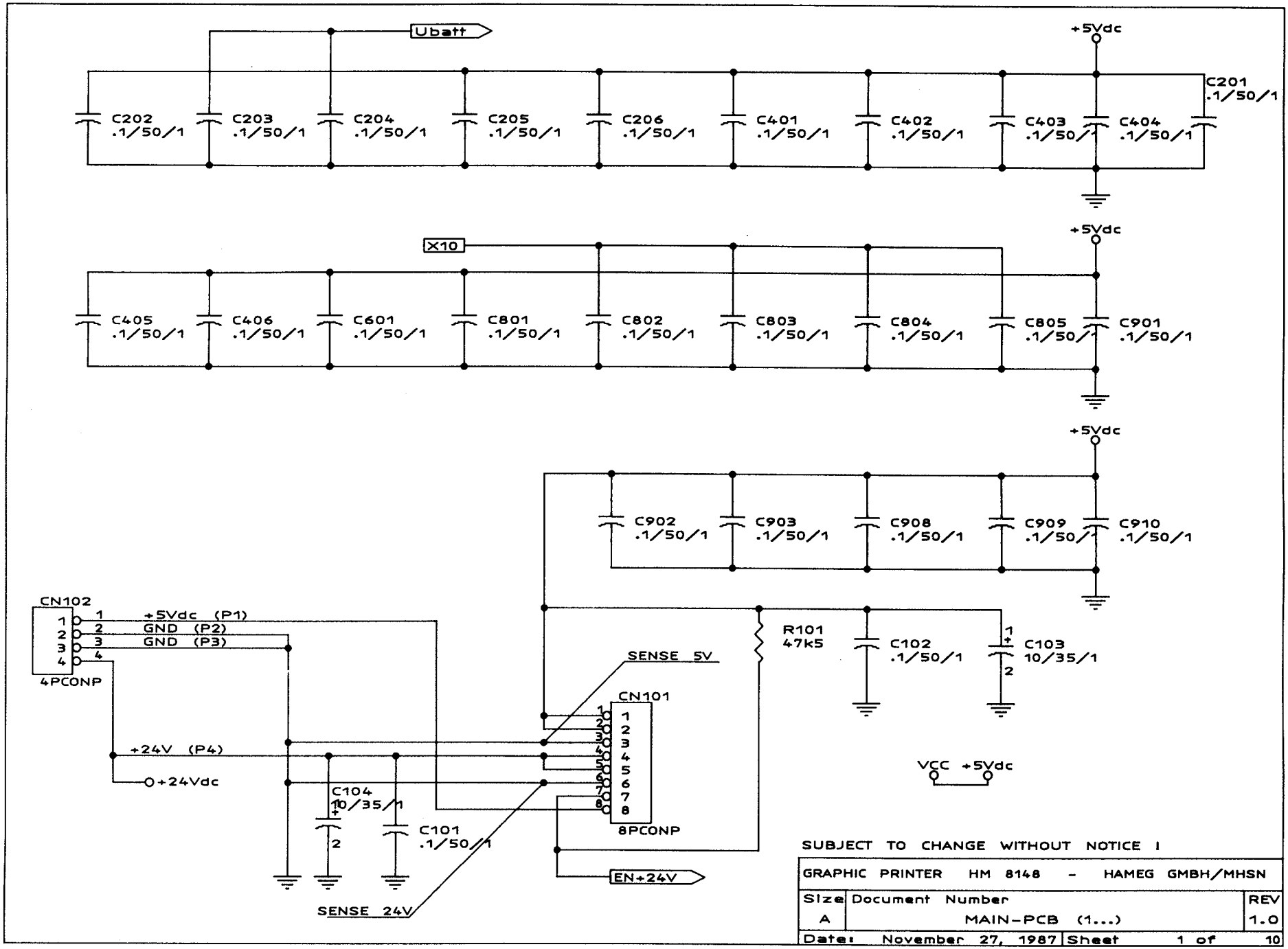
Attach the connector to the unused connector socket on the storage board.

Insert the connector on the other end of the ribbon cable through the space between the Z board and the attachment angle. Then insert the connector through the rectangular opening in the angle and fasten using the supplied screws and nuts.

Remove the area in the rear cover designated with *W*, Z and Y.

Place the scope face down again on a soft surface.

Carefully slide the case back on and fasten the rear panel in place.



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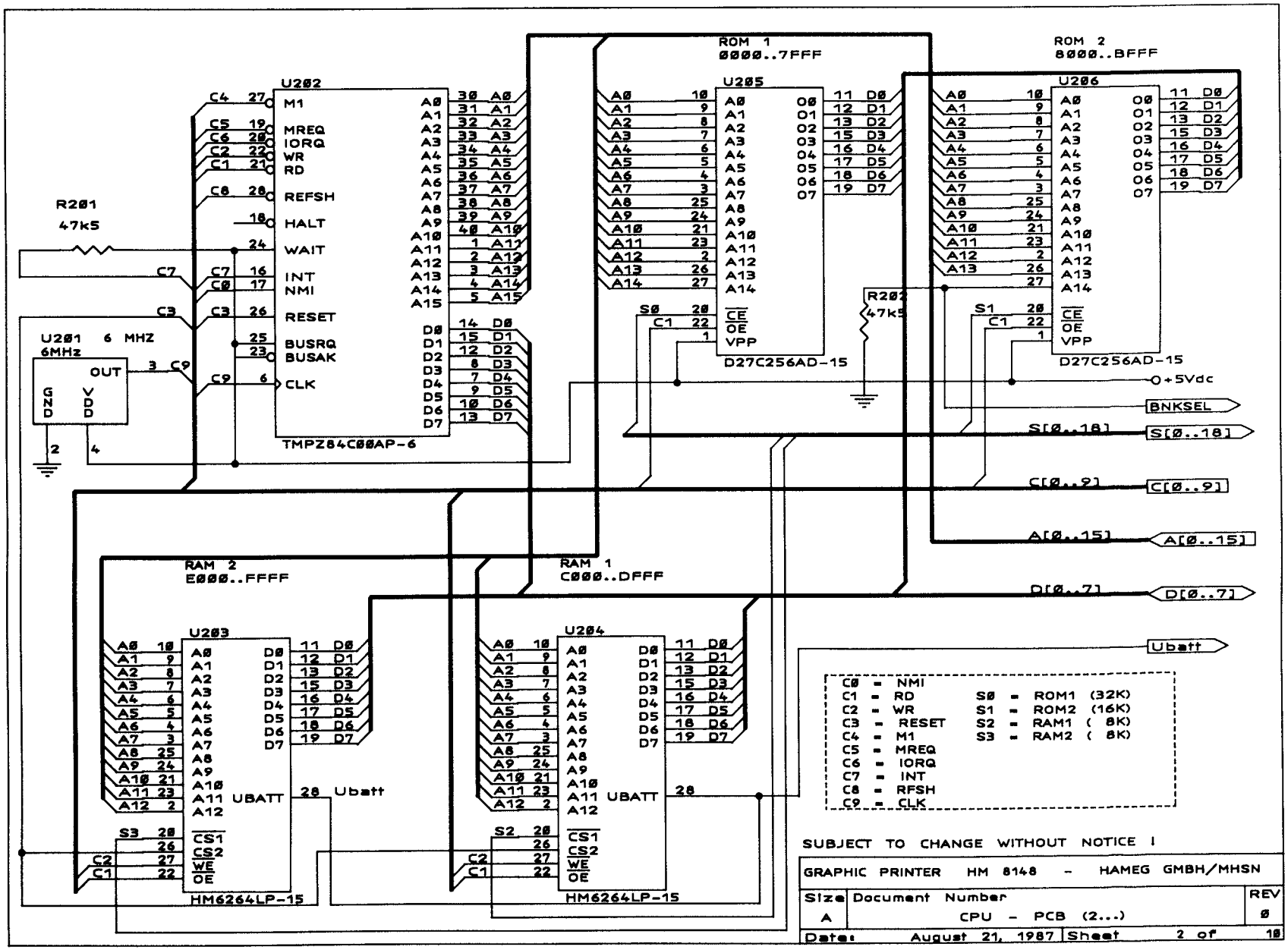
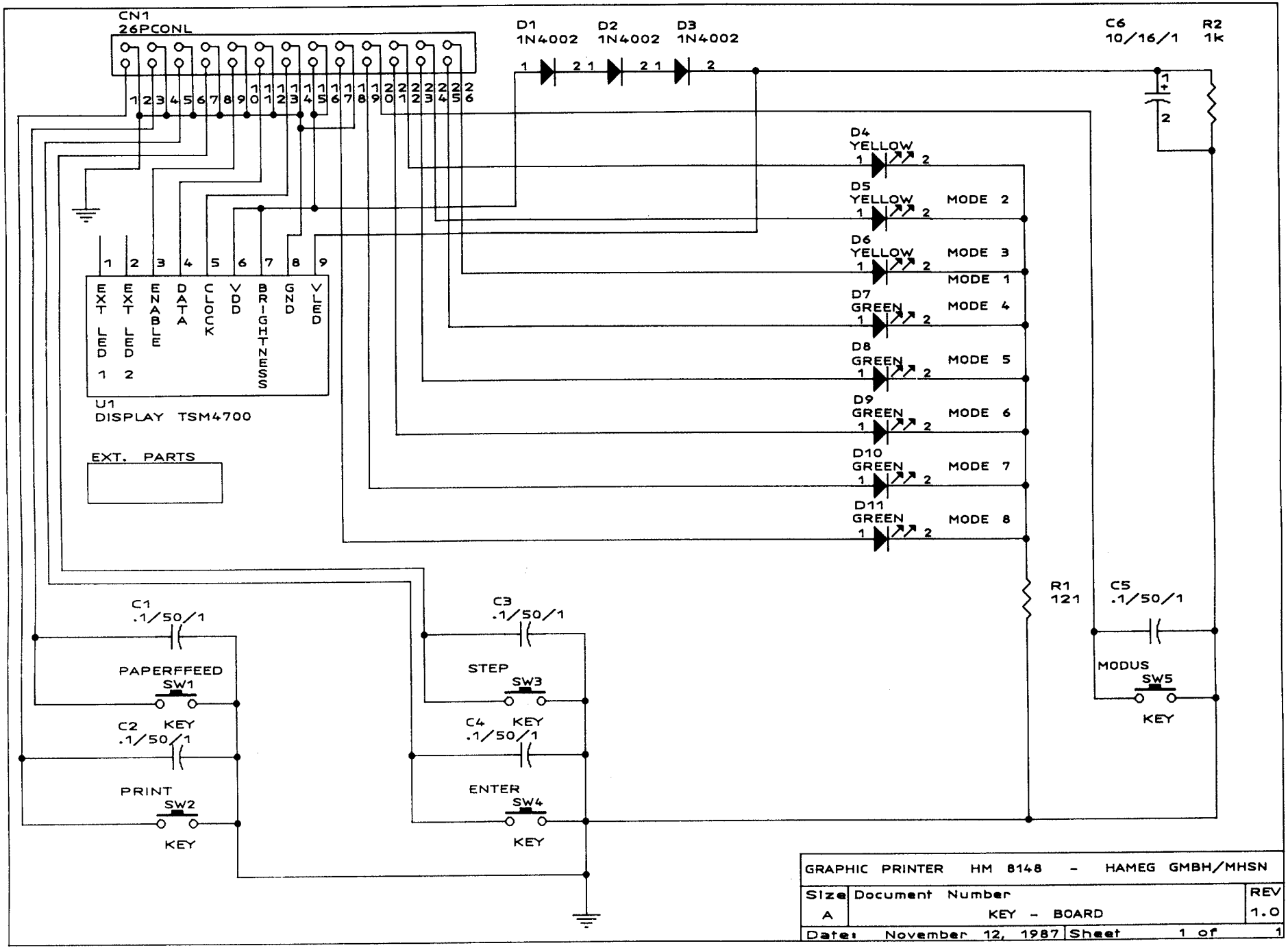
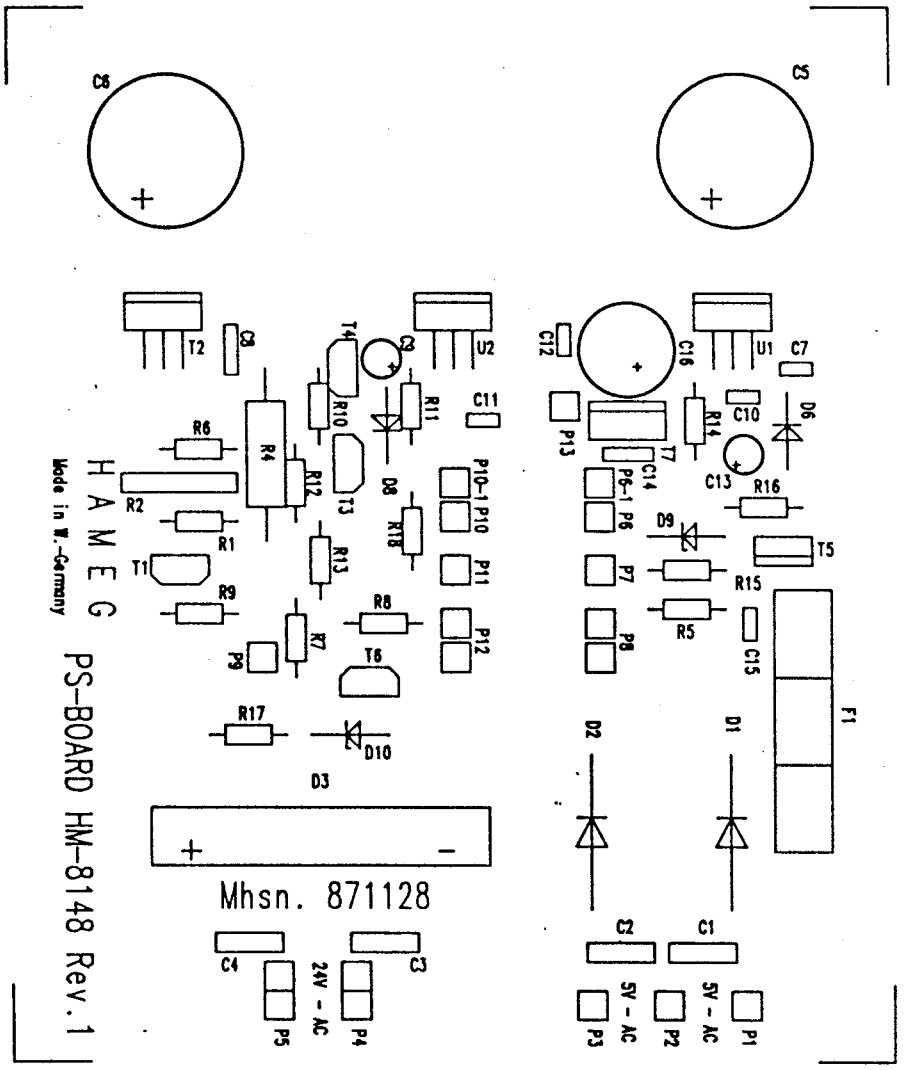
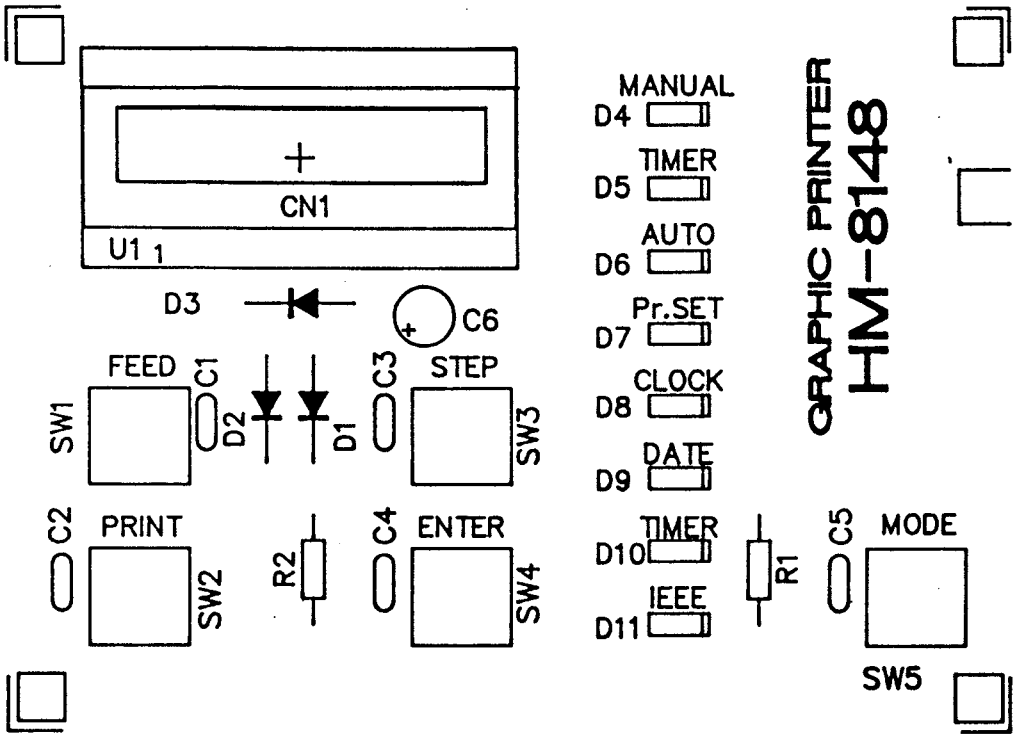
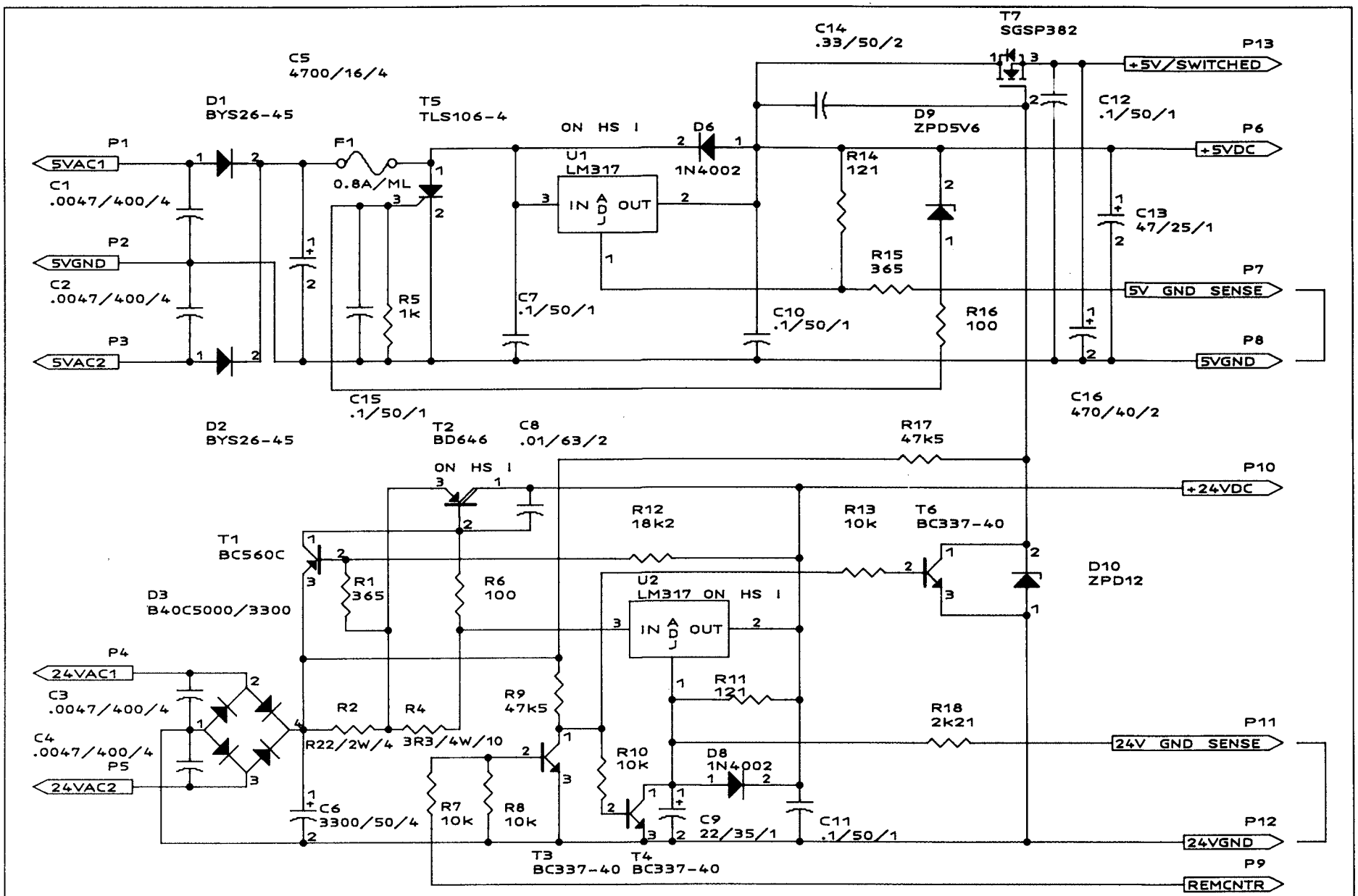
GRAPHIC PRINTER HM 8148 - HAMEG GMBH/MHSN		
Size A	Document Number MAIN-PCB (1...)	REV 1.0
Date: November 27, 1987	Sheet 1 of 10	


U202
TMPZ84C00AP-6
M1
MREQ
IORQ
WR
RD
REFSH
HALT
WAIT
INT
NMI
RESET
BUSRQ
BUSAK
CLK
R201
47k5
U201 6 MHZ
6MHz
OUT
GND
VDD
ROM 1
0000..7FFF
U205
D27C256AD-15
R202
47k5
ROM 2
8000..BFFF
U206
D27C256AD-15
+5Vdc
BNKSEL
S[0..18]
C[0..9]
A[0..15]
D[0..7]
RAM 2
E000..FFFF
U203
HM6264LP-15
RAM 1
C000..DFFF
U204
HM6264LP-15
UBATT
Ubatt
C0 = NMI
C1 = RD
C2 = WR
C3 = RESET
C4 = M1
C5 = MREQ
C6 = IORQ
C7 = INT
C8 = RFSH
C9 = CLK
S0 = ROM1 (32K)
S1 = ROM2 (16K)
S2 = RAM1 (8K)
S3 = RAM2 (8K)
SUBJECT TO CHANGE WITHOUT NOTICE !
GRAPHIC PRINTER HM 8148 - HAMEG GMBH/MHSN
Size A
Document Number
CPU - PCB (2...)
REV 0
Date: August 21, 1987
Sheet 2 of 18


CN1
26PCONL
D1
1N4002
D2
1N4002
D3
1N4002
C6
10/16/1
R2
1k
D4
YELLOW
D5
YELLOW
MODE 2
D6
YELLOW
MODE 3
MODE 1
D7
GREEN
MODE 4
D8
GREEN
MODE 5
D9
GREEN
MODE 6
D10
GREEN
MODE 7
D11
GREEN
MODE 8
EXT LED 1
EXT LED 2
ENABLE
DATA
CLOCK
VDD
BRIGHTNESS
GND
VLED
U1
DISPLAY TSM4700
EXT. PARTS
R1
121
C5
.1/50/1
MODUS
SW5
KEY
C1
.1/50/1
PAPERFFEED
SW1
C2
.1/50/1
KEY
PRINT
SW2
KEY
C3
.1/50/1
STEP
SW3
C4
.1/50/1
KEY
ENTER
SW4
KEY
GRAPHIC PRINTER HM 8148 - HAMEG GMBH/MHSN
Size A
Document Number
KEY - BOARD
REV 1.0
Date: November 12, 1987
Sheet 1 of 1


C6
C5
T2
C8
T4
C9
U2
C12
C16
U1
C7
R6
R4
R10
R11
C11
R14
C10
D6
P13
T7
C14
C13
R16
R2
R12
T3
D8
P10-1
P10
P6-1
P6
D9
T5
R1
R18
T1
R13
P11
P7
R15
R9
R8
R5
C15
P8
P12
P9
T6
F1
R17
D10
D2
D1
D3
Mhsn. 871128
C2
C1
C4
C3
24V - AC
5V - AC
5V - AC
P5
P4
P3
P2
P1
HAMEG
Made in W.-Germany
PS-BOARD HM-8148 Rev.1


CN1
U1 1
D3
C6
FEED
C1
STEP
SW1
D2
D1
C3
SW3
C2
PRINT
R2
C4
ENTER
SW2
SW4
MANUAL
D4
TIMER
D5
AUTO
D6
Pr.SET
D7
CLOCK
D8
DATE
D9
TIMER
D10
IEEE
D11
R1
C5
MODE
SW5
GRAPHIC PRINTER
HM-8148

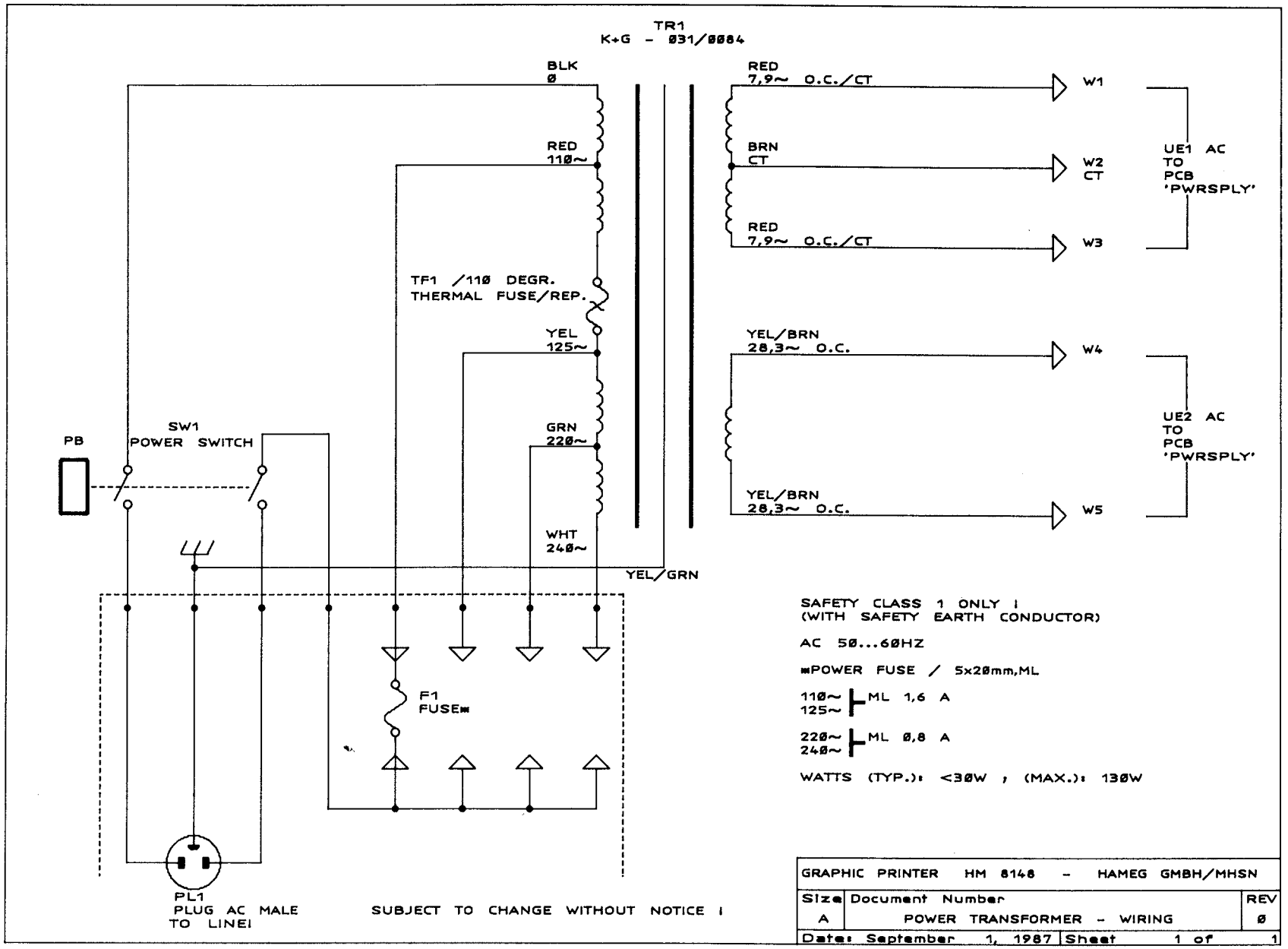


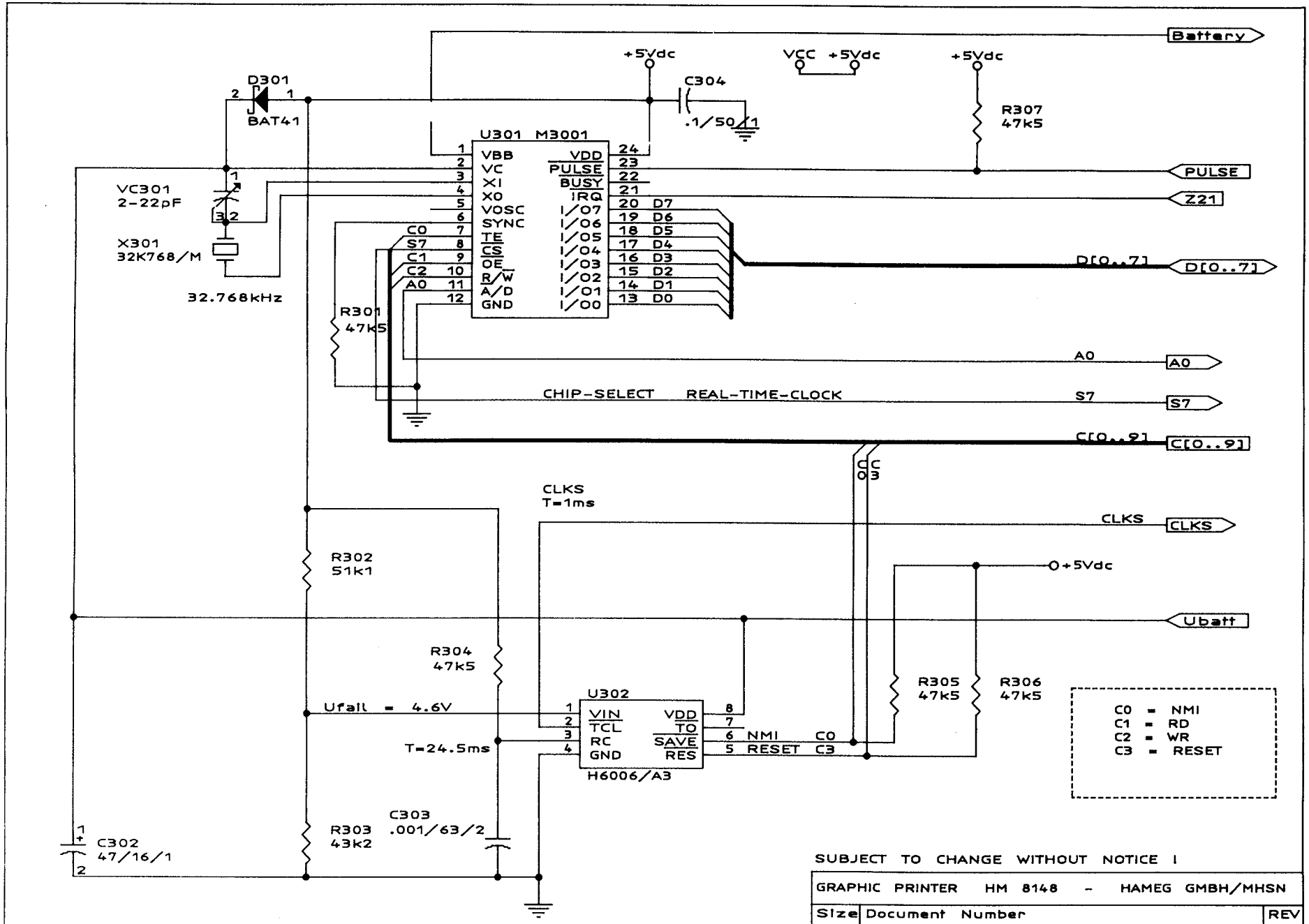
ON HS 1 == MOUNTED ON HEAT SINK 1

SUBJECT TO CHANGE WITHOUT NOTICE !

EXT.PARTS

GRAPHIC PRINTER HM 8148 - HAMEG GMBH/MHSN		
Size A	Document Number PS - BOARD	REV 1.0
Date: November 26, 1987	Sheet 1 of 1	


TR1
K+G - 031/0084
BLK
0
RED
110~
TF1 /110 DEGR.
THERMAL FUSE/REP.
YEL
125~
GRN
220~
WHT
240~
YEL/GRN
RED
7,9~ O.C./CT
W1
BRN
CT
W2
CT
RED
7,9~ O.C./CT
W3
UE1 AC
TO
PCB
'PWRSPLY'
YEL/BRN
28,3~ O.C.
W4
YEL/BRN
28,3~ O.C.
W5
UE2 AC
TO
PCB
'PWRSPLY'
PB
SW1
POWER SWITCH
F1
FUSE*
PL1
PLUG AC MALE
TO LINE!
SUBJECT TO CHANGE WITHOUT NOTICE !
SAFETY CLASS 1 ONLY !
(WITH SAFETY EARTH CONDUCTOR)
AC 50...60HZ
*POWER FUSE / 5x20mm,ML
110~
125~
ML 1,6 A
220~
240~
ML 0,8 A
WATTS (TYP.): <30W ; (MAX.): 130W
GRAPHIC PRINTER HM 8148 - HAMEG GMBH/MHSN
Size
A
Document Number
POWER TRANSFORMER - WIRING
REV
0
Date: September 1, 1987
Sheet 1 of 1



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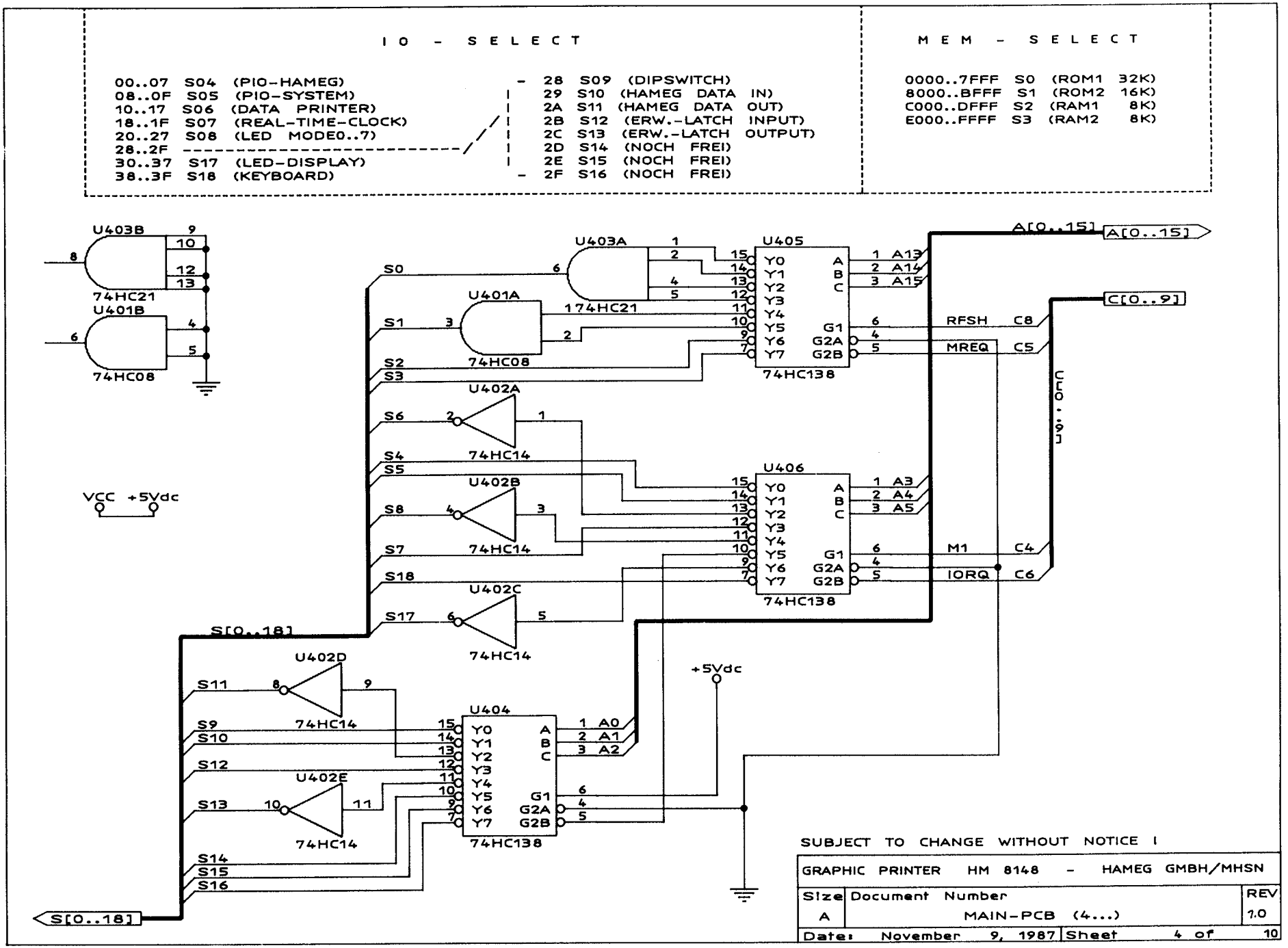
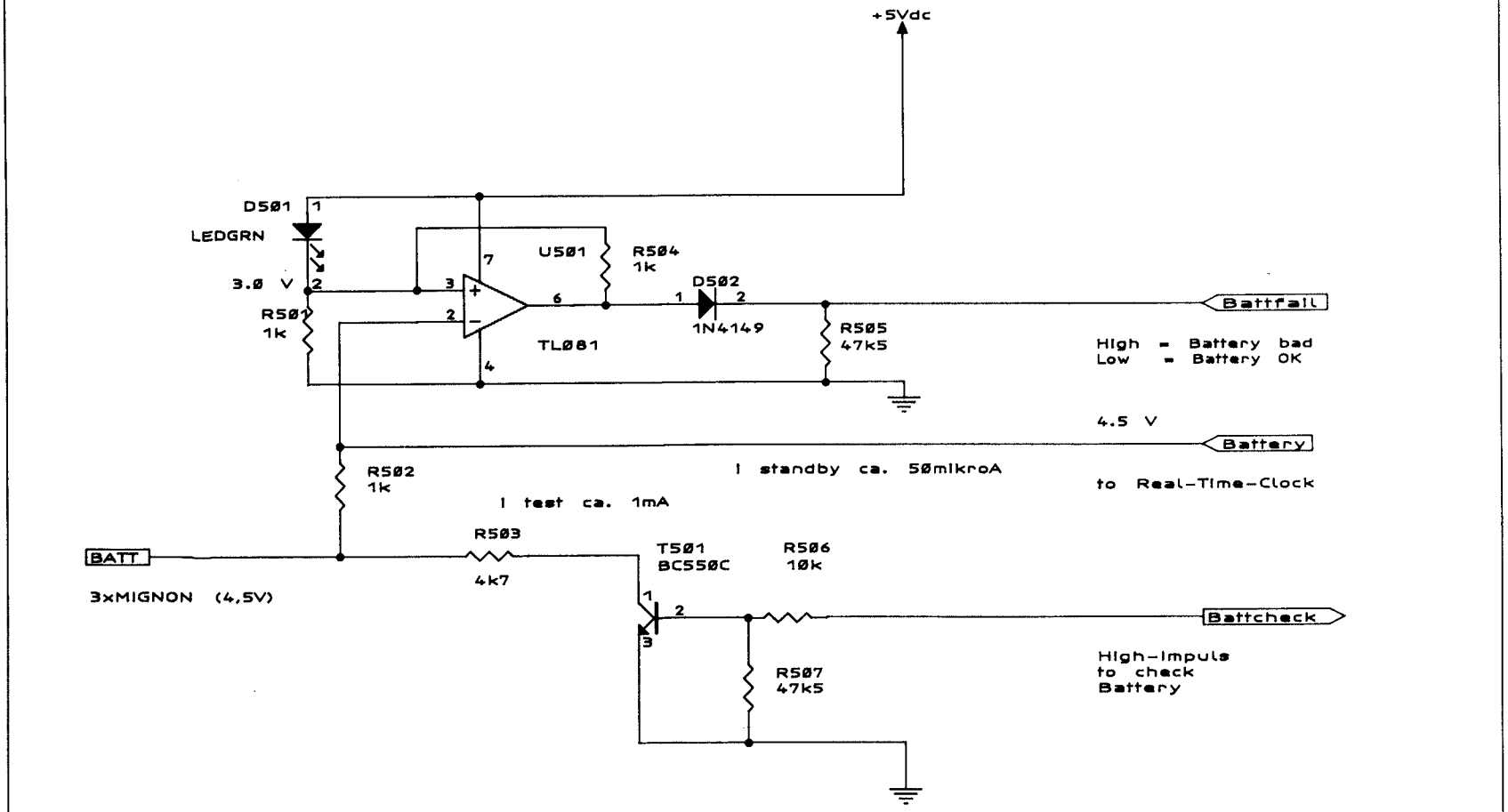
GRAPHIC PRINTER HM 8148 - HAMEG GMBH/MHSN		
Size A	Document Number MAIN-PCB (3...)	REV 1.0
Date: November 19, 1987	Sheet 3 of 10	


I O - S E L E C T
00..07 S04 (PIO-HAMEG)
08..0F S05 (PIO-SYSTEM)
10..17 S06 (DATA PRINTER)
18..1F S07 (REAL-TIME-CLOCK)
20..27 S08 (LED MODE0..7)
28..2F
30..37 S17 (LED-DISPLAY)
38..3F S18 (KEYBOARD)
28 S09 (DIPSWITCH)
29 S10 (HAMEG DATA IN)
2A S11 (HAMEG DATA OUT)
2B S12 (ERW.-LATCH INPUT)
2C S13 (ERW.-LATCH OUTPUT)
2D S14 (NOCH FREI)
2E S15 (NOCH FREI)
2F S16 (NOCH FREI)
M E M - S E L E C T
0000..7FFF S0 (ROM1 32K)
8000..BFFF S1 (ROM2 16K)
C000..DFFF S2 (RAM1 8K)
E000..FFFF S3 (RAM2 8K)
U403B
74HC21
U401B
74HC08
U403A
174HC21
U401A
74HC08
U405
74HC138
A[0..15]
C[0..9]
RFSH
MREQ
U402A
74HC14
U402B
74HC14
U406
74HC138
M1
IORQ
VCC +5Vdc
S[0..18]
U402C
74HC14
U402D
74HC14
U402E
74HC14
U404
74HC138
+5Vdc
SUBJECT TO CHANGE WITHOUT NOTICE !
GRAPHIC PRINTER HM 8148 - HAMEG GMBH/MHSN
Size A
Document Number MAIN-PCB (4...)
REV 1.0
Date: November 9, 1987
Sheet 4 of 10



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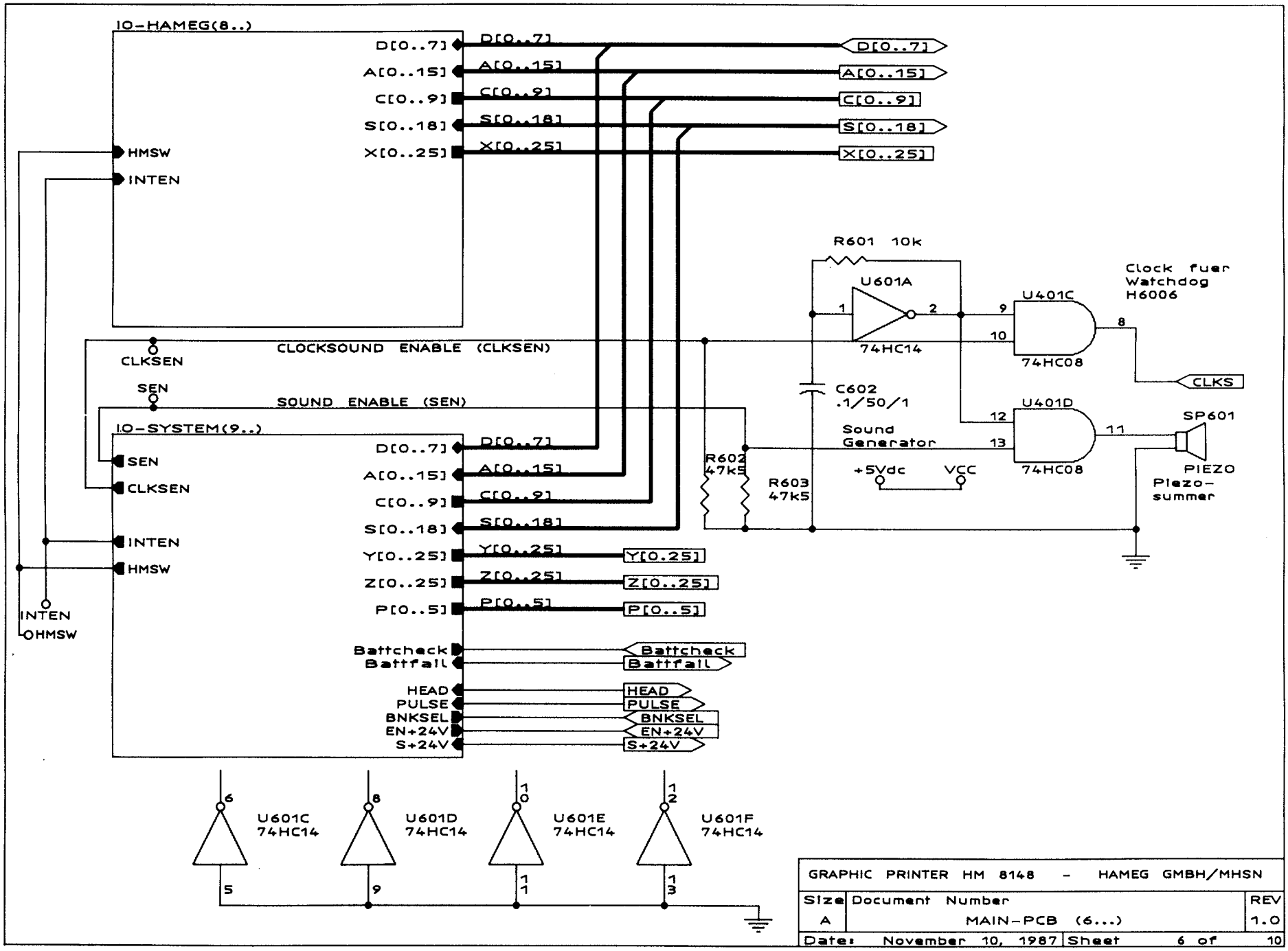
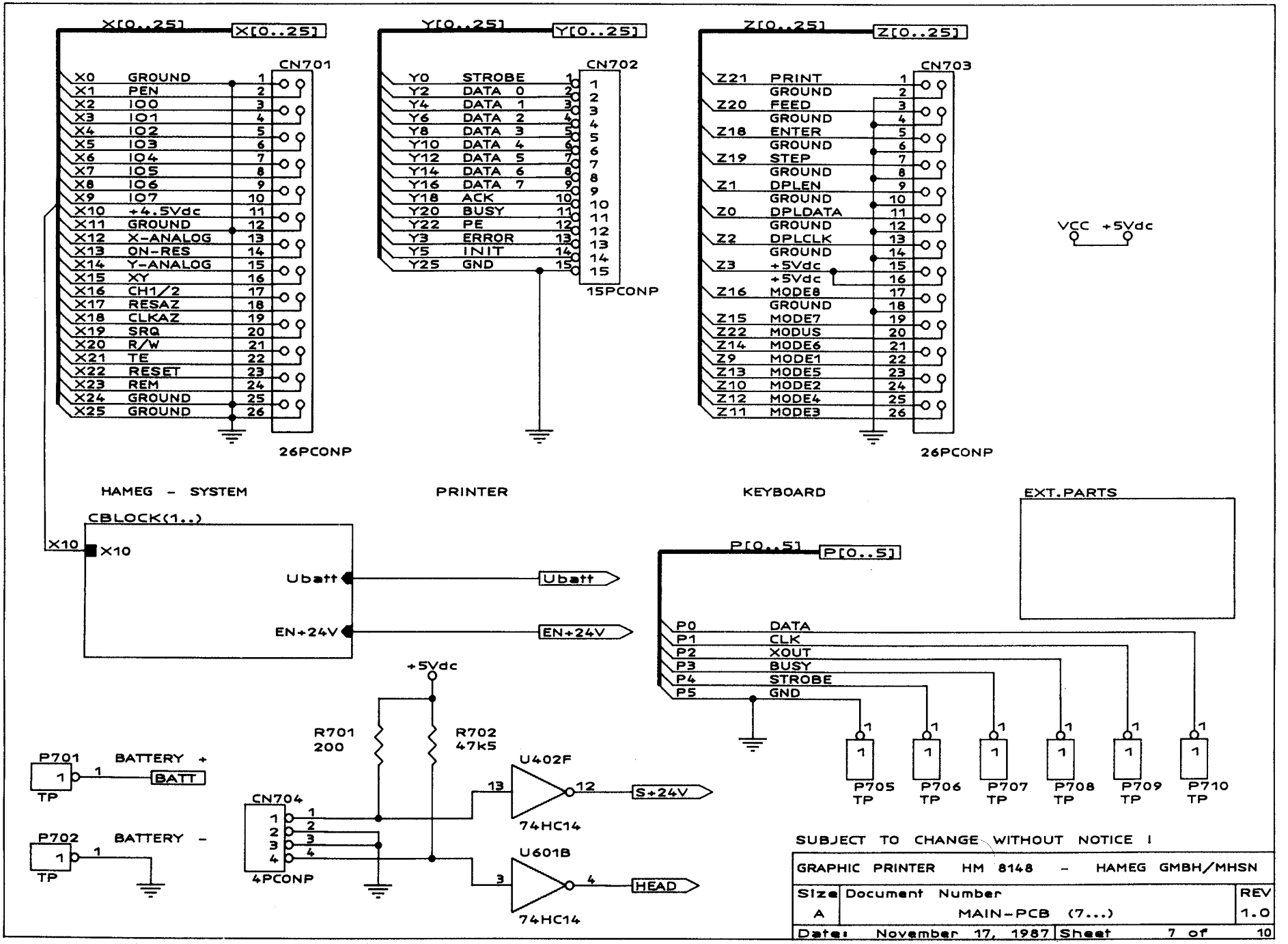
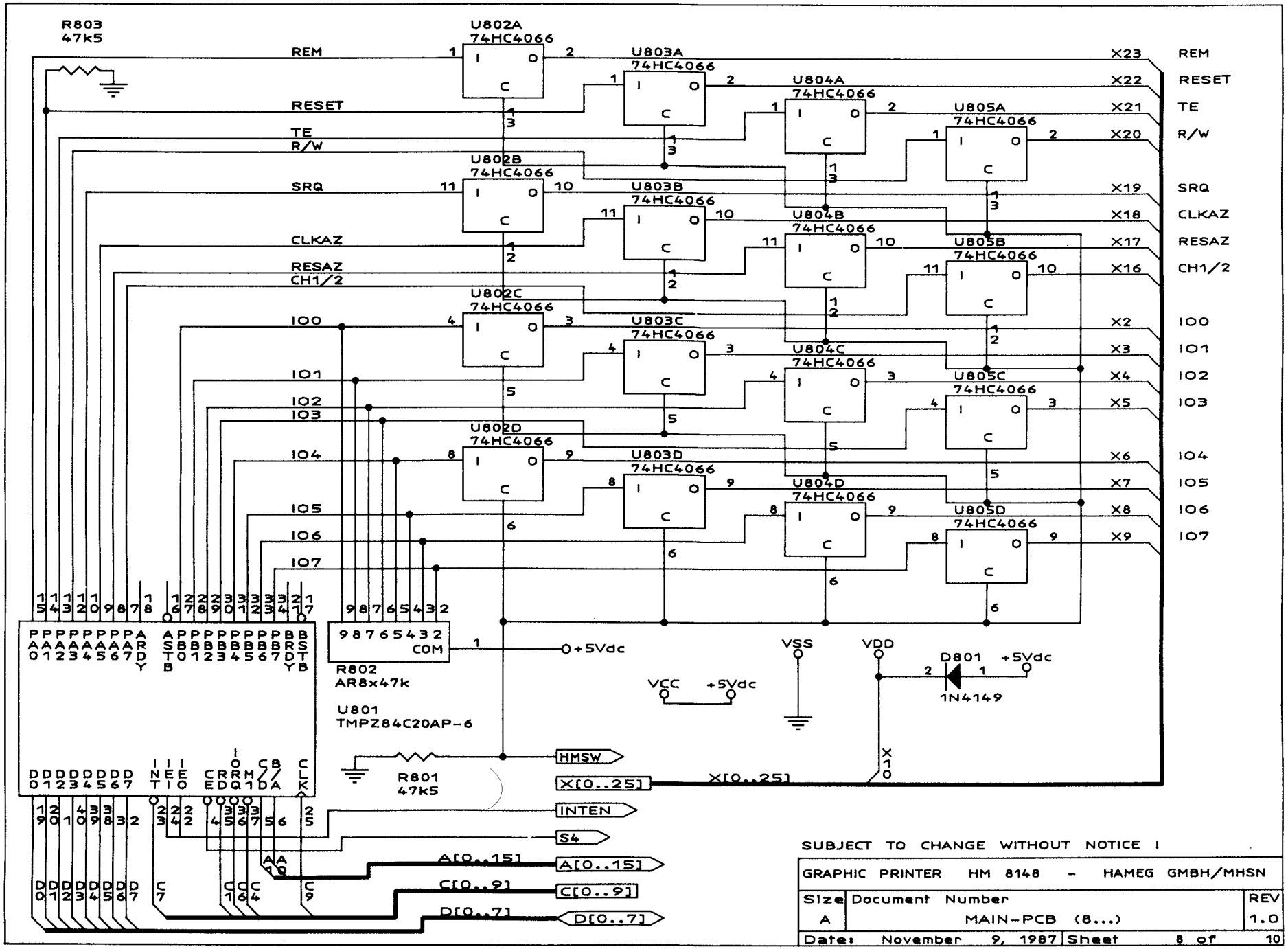
GRAPHIC PRINTER HM 8148 - HAMEG GMBH/MHSN		
Size: A	Document Number: BATTERY-CHECK - PCB (5...)	REV: 0
Date: August 21, 1987	Sheet 5 of 10	

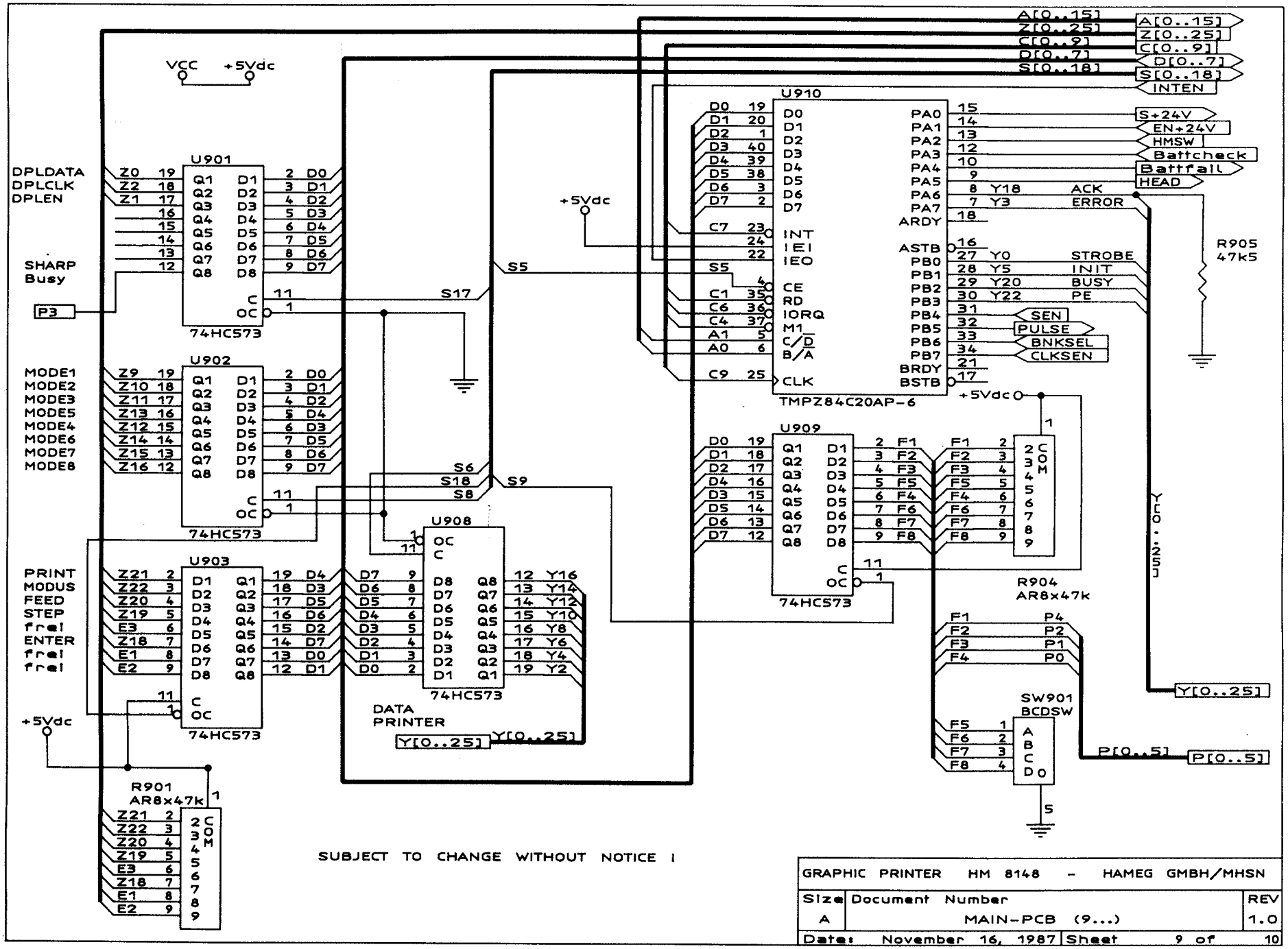

IO-HAMEG(8..)
D[0..7]
A[0..15]
C[0..9]
S[0..18]
X[0..25]
HMSW
INTEN
CLKSEN
CLOCKSOUND ENABLE (CLKSEN)
SEN
SOUND ENABLE (SEN)
IO-SYSTEM(9..)
Y[0..25]
Z[0..25]
P[0..5]
Battcheck
Battfail
HEAD
PULSE
BNKSEL
EN+24V
S+24V
R601 10k
U601A
74HC14
U401C
74HC08
Clock fuer Watchdog H6006
CLKS
C602 .1/50/1
U401D
SP601
PIEZO
Piezo-summer
Sound Generator
+5Vdc
VCC
R602 47k5
R603 47k5
U601C 74HC14
U601D 74HC14
U601E 74HC14
U601F 74HC14
GRAPHIC PRINTER HM 8148 - HAMEG GMBH/MHSN
Size A
Document Number MAIN-PCB (6...)
REV 1.0
Date: November 10, 1987
Sheet 6 of 10

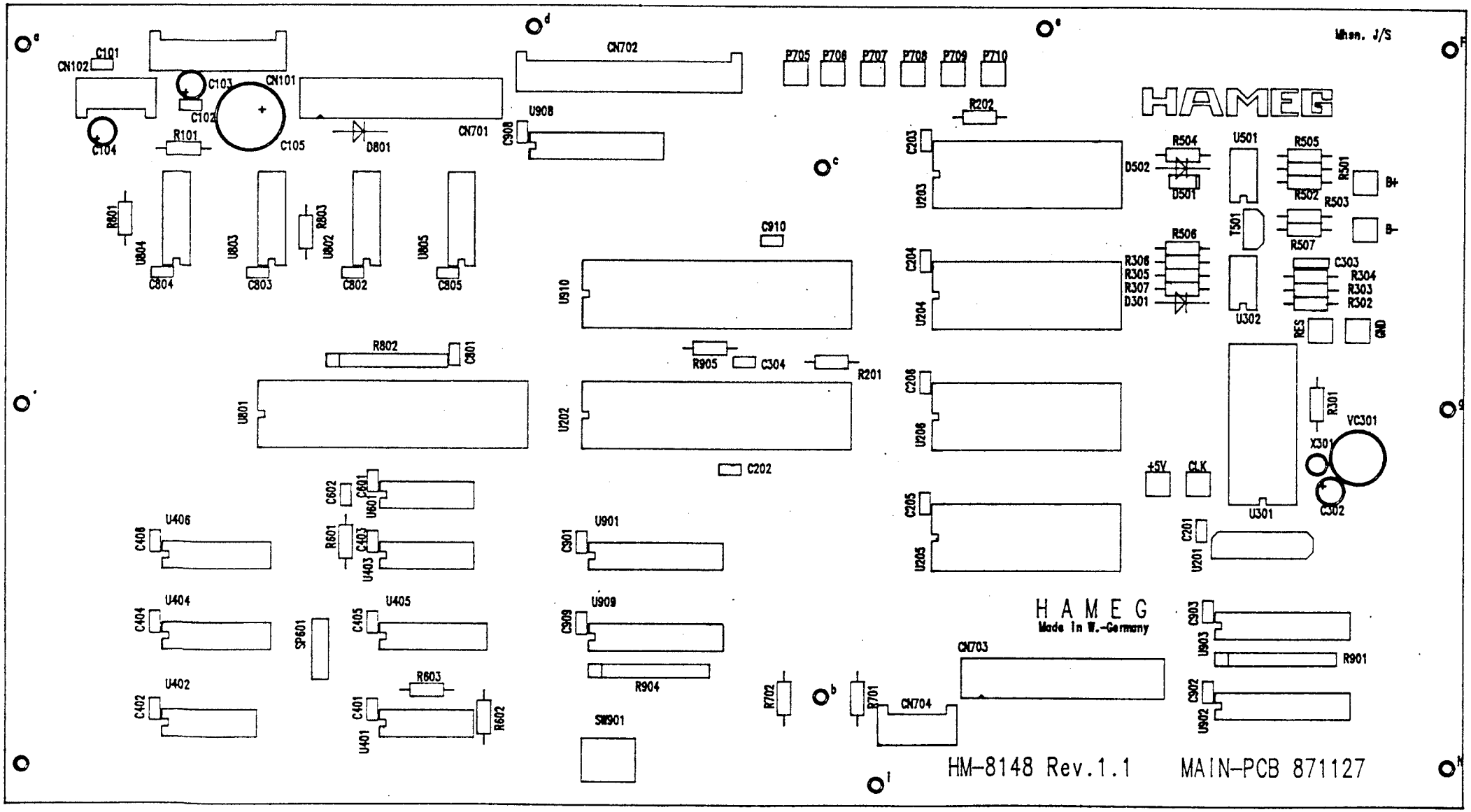

X[0..25]
X[0..25]
CN701
X0 GROUND 1
X1 PEN 2
X2 IO0 3
X3 IO1 4
X4 IO2 5
X5 IO3 6
X6 IO4 7
X7 IO5 8
X8 IO6 9
X9 IO7 10
X10 +4.5Vdc 11
X11 GROUND 12
X12 X-ANALOG 13
X13 ON-RES 14
X14 Y-ANALOG 15
X15 XY 16
X16 CH1/2 17
X17 RESAZ 18
X18 CLKAZ 19
X19 SRQ 20
X20 R/W 21
X21 TE 22
X22 RESET 23
X23 REM 24
X24 GROUND 25
X25 GROUND 26
26PCONP
Y[0..25]
Y[0..25]
CN702
Y0 STROBE 1
Y2 DATA 0 2
Y4 DATA 1 3
Y6 DATA 2 4
Y8 DATA 3 5
Y10 DATA 4 6
Y12 DATA 5 7
Y14 DATA 6 8
Y16 DATA 7 9
Y18 ACK 10
Y20 BUSY 11
Y22 PE 12
Y3 ERROR 13
Y5 INIT 14
Y25 GND 15
15PCONP
Z[0..25]
Z[0..25]
CN703
Z21 PRINT 1
GROUND 2
Z20 FEED 3
GROUND 4
Z18 ENTER 5
GROUND 6
Z19 STEP 7
GROUND 8
Z1 DPLEN 9
GROUND 10
Z0 DPLDATA 11
GROUND 12
Z2 DPLCLK 13
GROUND 14
Z3 +5Vdc 15
+5Vdc 16
Z16 MODE8 17
GROUND 18
Z15 MODE7 19
Z22 MODUS 20
Z14 MODE6 21
Z9 MODE1 22
Z13 MODE5 23
Z10 MODE2 24
Z12 MODE4 25
Z11 MODE3 26
26PCONP
VCC +5Vdc
HAMEG - SYSTEM
PRINTER
KEYBOARD
EXT.PARTS
CBLOCK(1..)
X10
X10
Ubatt
Ubatt
EN+24V
EN+24V
P[0..5]
P[0..5]
P0 DATA
P1 CLK
P2 XOUT
P3 BUSY
P4 STROBE
P5 GND
P705 TP
P706 TP
P707 TP
P708 TP
P709 TP
P710 TP
+5Vdc
R701 200
R702 47k5
U402F
74HC14
S+24V
U601B
74HC14
HEAD
CN704
4PCONP
P701 BATTERY +
BATT
TP
P702 BATTERY -
TP
SUBJECT TO CHANGE WITHOUT NOTICE !
GRAPHIC PRINTER HM 8148 - HAMEG GMBH/MHSN
Size A
Document Number MAIN-PCB (7...)
REV 1.0
Date: November 17, 1987
Sheet 7 of 10



SUBJECT TO CHANGE WITHOUT NOTICE !

GRAPHIC PRINTER HM 8148 - HAMEG GMBH/MHSN		
Size A	Document Number MAIN-PCB (8...)	REV 1.0
Date: November 9, 1987	Sheet 8 of 10	


VCC +5Vdc
U901
U902
U903
U908
U909
U910
74HC573
TMPZ84C20AP-6
DPLDATA
DPLCLK
DPLEN
SHARP Busy
P3
MODE1
MODE2
MODE3
MODE5
MODE4
MODE6
MODE7
MODE8
PRINT MODUS
FEED
STEP frei
ENTER frei
frei
+5Vdc
S17
S5
S6
S18
S8
S9
DATA PRINTER
Y[0..25]
A[0..15]
Z[0..25]
C[0..9]
D[0..7]
S[0..18]
INTEN
S+24V
EN+24V
HMSW
Battcheck
Battfail
HEAD
ACK
ERROR
STROBE
INIT
BUSY
PE
SEN
PULSE
BNKSEL
CLKSEN
R905 47k5
R904 AR8x47k
R901 AR8x47k
SW901 BCDSW
P[0..5]
SUBJECT TO CHANGE WITHOUT NOTICE !
GRAPHIC PRINTER HM 8148 - HAMEG GMBH/MHSN
Size A
Document Number MAIN-PCB (9...)
REV 1.0
Date: November 16, 1987
Sheet 9 of 10


HAMEG
HAMEG
Made in W.-Germany
HM-8148 Rev.1.1 MAIN-PCB 871127
CN101
CN102
CN701
CN702
CN703
CN704
C101
C102
C103
C104
C105
R101
D801
U908
C908
P705
P706
P707
P708
P709
P710
R202
C203
U203
D502
D501
R504
U501
R505
R501
R502
R503
B+
B-
T501
R507
R506
C204
U204
R308
R305
R307
D301
C303
R304
R303
R302
U302
RES
GND
C206
U206
C205
U205
R301
VC301
X301
C302
+5V
CLK
U301
C201
U201
C910
U910
R905
C304
R201
U202
C202
R802
C801
U801
C602
C601
U601
R601
C403
U403
U406
C406
U404
C404
U405
C405
SP601
R603
C401
U401
R602
U402
C402
U901
C901
U909
C909
R904
SW901
R702
R701
C303
U303
R901
C302
U302
R801
U804
C804
U803
C803
R803
U802
C802
U805
C805

HAMEG

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Calibrators

Signal Generators

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