

OPERATING INSTRUCTIONS



MHM SCREEN PRINTING MACHINE SYNCHROPRINT 3000 with automatic screen positioning English ©2012-2016 Machines Highest Mechatronic GmbH, Erl, Austria



Preface

Dear Customer,

Congratulations and thank you for choosing the MHM Synchroprint 3000 Screen Printing Machine. This machine is designed to provide the highest standards of performance and reliability throughout its normal operating life. Highly innovative and precise MHM technology provides a combination of the finest build quality along with optimal safety. We trust these Operating Instructions will assist you in becoming familiar with the safe and efficient operation of the Synchroprint 3000.

Important note:

Due to our policy of continuous improvement we reserve the right to change specifications without prior notice. Therefore certain individual fittings and components may differ slightly from the model detailed in this document. For any further questions regarding your Synchroprint 3000, please contact the MHM service team.

Wishing you every success with your future production...

MHM Siebdruckmaschinen GmbH KG

Important advice regarding these Operating Instructions

These Operating Instructions form an integral part of the Synchroprint 3000 and must be made available to all authorised personnel at all times. No particular sections or pages should be removed from these Operating Instructions, and any missing sections or pages should be replaced immediately, particularly in relation to section *"I. Safety Instructions"*.

These Operating Instructions are subject to international copyright and may not be reproduced and/or revised without our prior written approval.

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1. Safety Instructions

This section describes the safety instructions for the correct and safe operation of the Synchroprint 3000. In addition, this section also contains references to the European rules and regulations concerning the guarantee of industrial safety along with safety at the workplace. These rules and regulations provide the basis for these operating instructions.

These Operating Instructions include:

- 1. General safety instructions.
- 2. Special safety instructions, if they are relevant to a specific section, at the beginning of that respective section.
- 3. Special safety instructions, if they are important for detailed sequences of operation, before the description of that respective sequence of operation.
- 4. Indications to read such instructions included in the respective section.

1.1. General Information

The Synchroprint 3000 is built in accordance to all appropriate safety regulations. Owing to its complex design, the Synchroprint 3000 must only be operated and maintained by suitably skilled staff.

If all operating instructions and safety requirements are observed and followed correctly, the Synchroprint 3000 does not present any risks for occupational health. With correct and proper operation the Synchroprint 3000 will cause no material damage of any kind.

Installation, operation or maintenance of the Synchroprint 3000 by persons who have not been suitably trained, introduced or acquainted with the system and informed regarding the possible dangers may result in:

- 1. Failure of essential functions of the Synchroprint 3000.
- 2. Danger to persons through electrical or mechanical actions.
- 3. Material damage to the Synchroprint 3000.



Every person instructed to perform any operation on the Synchroprint 3000 must be suitably trained and be aware of the dangers that may result from operating errors.

He/she should:

- 1. Be physically and mentally capable of coping with the respective tasks.
- 2. Be suitably instructed in operating the Synchroprint 3000.
- 3. Be familiar with the Operating Instructions, in particular the general safety instructions in the individual sections, and have read and understood them.
- 4. Be aware of any additional general safety regulations of any local authorities/associations.
- 5. Be aware of the principles of industrial hygiene and be able to demonstrate them.
- 6. Be aware of the contents of suppliers' safety instructions, should they affect his/her area of responsibility.
- 7. Be aware of any relevant safety devices at the workplace and be able to use them.
- 8. Be informed regarding the prevention of environmental damage in respect of his/her area of responsibility.
- 9. Be informed regarding the prevention of material damage in respect of his/her area of responsibility.

1.2. Safety Instructions for the Operating Staff

- 1. All cabinets and covers on the Synchroprint 3000 must always be kept closed. Open cabinets and covers are extremely dangerous as live electrical components are accessible.
- 2. On every occasion, the operator should check the correct functioning of the safety devices (Emergency STOP), before commencing use of the Synchroprint 3000.
- 3. All working spaces, passageways, escape and emergency routes and exits must be kept clear.
- 4. No tools or other objects must be kept or left in the area of the machine.
- 5. No modifications to any part of the machine or its assembly system that may adversely affect safety must be carried out without the prior approval of MHM.
- 6. Any modifications or changes to the Synchroprint 3000's settings should only be carried out by an MHM authorized/approved technician.
- 7. Program modifications in the control program and changes of settings which may affect the Synchroprint 3000's operation should only be carried out by an MHM authorized/approved technician.
- 8. Mechanical or electrical failures must only be repaired by an MHM authorized/approved technician.
- 9. All accessories for service and maintenance work (e.g. cleaning agents) must be collected in suitable containers and disposed of according to any relevant regulations.
- 10. Always wear protective gloves and safety goggles during cleaning work, in particular when using solvents!
- 11. Any remains of potentially harmful substances should be disposed of according to the legal requirements of the country or state in which the Synchroprint 3000 is operated.



1.3. Description of Key Words and Symbols in the Operating Instructions

In these operating instructions classified key words and symbols are used to identify dangers and items that require special attention. Particular attention is to be paid to the sections marked in this manner, because they contribute to personal safety as well as the prevention of damage to the Synchroprint 3000.

Symbol	Key word	Meaning
DANGER	DANGER	This symbol indicates possible risk to life.
	CAUTION	This symbol indicates danger of damage to property and/or environment.
1 NOTE	NOTE	This symbol indicates useful additional information and operating suggestions.



1.4. Additional Risks

Even though the Synchroprint 3000 has been designed and built according to the most stringent safety criteria, as with all machinery we have to anticipate certain additional risks, which are detailed below:

Danger	Description	Behaviour/Action
Mechanical threats: Crushing	Crushing of parts of the body - in particular arms and hands.	Be aware of moving parts whilst operating the machine. Wear protective clothing at all times.
Mechanical threats: Getting caught or trapped	Danger through moving parts (linear or rotary drive systems).	Danger in reaching into, under or over the machine. Only reach into the machine from the indicated points. Wear suitably fitting clothing, particularly in the area of the arms.
Mechanical threats: Slipping, stumbling and falling	Danger of falling (e.g. obstacles on the floor).	The floor area around the machine must be kept free from any obstacles.
Electrical threats: Indirect contact (in case of defect)	Danger of life-threatening electrical shock by indirect contact with defective parts carrying voltage (in particular in case of defective insulation).	Switch off the machine with the main switch and EMERGENCY STOP facilities. Isolate the mains supply.
Danger through contact with or inhaling of substances	Danger through contact with or inhaling substances or materials with harmful or toxic effects.	Observe the safety instructions for handling such substances.



1.5. Qualification of Operating and Service Staff

All procedures should only be carried out by properly trained and suitably qualified personnel.

'Qualified personnel' refers to people who are able to carry out the required procedures and be able to recognize as well as prevent potential risks, as a result of their training and experience. Such personnel should have a good knowledge of any relevant standards, regulations, rules of accident prevention and internal conditions etc.

If casual workers are employed for assistance work (e.g. cleaning tasks) they must be particularly informed regarding existing and potential dangers and instructed accordingly.

1.6. Other Valid Rules and Regulations:

Regulations for accident prevention (UVV), in particular

- BGV A 1
- BGV A 2
- BGV A 8
- VBG 5

Rules and regulations

- DIN-EN 775
- DIN EN 842
- DIN 4844
- EN-292 T1 and T2
- EN 60204-1, VDE 0100
- VDE 0165
- VDE 0550 T5 (IEC 939)
- EN 50081-1-1,-2 (VDE 0839 T81-1-2)
- EN 50082-1-1,-2 (VDE 0839 T82-1-2)
- EG directive 89/392/EWG
- EG directive 89/336/EWG
- EG directive 73/23/EWG
- EG directive 92/58/EWG
- EG directive 89/686/EWG
- EG directive 89/655/EWG
- EG directive 75/442/EWG /

General provisions Electrical equipment and resources Workplace safety identifications Power-driven tools

Industrial robots, safety

Optical caution signals, general requirements Definition of warning symbols Machine safety Electrical machine equipment

EMV directive EMV directive

Machine directive

EMV directive

Electrical resources and low voltage

Workplace safety identification

Personal protection equipment

Directive for machine operators

Directive for the disposal and prevention of waste



2. Technical Data

This section details the Synchroprint 3000 technical specifications.



NB: As our policy is one of continuous improvement, we reserve the right to change specifications without prior notice.

2.1. Dimensions



2.2. Specifications

Model/Type	SP 8	SP 10	SP 12	SP 14
Number of pallets	8	10	12	14
Max. No. of print stations	6	8	10	12
Max. print area (standard format)	50 x 70cm	50 x 70cm	50 x 70cm	50 x 70cm
	20" x 28"	20" x 28"	20" x 28"	20" x 28"
Max. print area (large format)***	70 x 100cm	70 x 100cm	70 x 100cm	70 x 100cm
	28" x 39"	28" x 39"	28" x 39"	28" x 39"
Max. diameter (std' format) (cm/inch)	460/181"	505/199"	550/217"	600/236"
(Lg' format) (cm/inch)	575/226"	620/244"	680/268"	735/289"
Machine height (cm/inch)	185/72,8"	185/72,8"	185/72,8"	185/72,8"
	1800 kg	2150 kg	2300 kg	2650 kg
Machine weight*	3970 lbs	4740 lbs	5070 lbs	5840 lbs
Air consumption (I/min.)	500	550	600	650
Minimum air pressure	8 bar / 116 p.s.i. (filtered, dry air only)			only)
Drive systems	AC-Servo-Drive Index / Electric Squeegee Drive			egee Drive
Electrical Supply (volts)	3 x 210/380/440V, 50/60 Hz (+/- 5%)			- 5%)
Power requirement - Servo Indexer	2.5 kW			
Power requirement - Squeegee drive	0.6 kW (each)			
Registration accuracy	+/- 0.02 mm / +/- 0.00078"			"
Recommended frame/screen profile	40 x 40 mm / 1.57 x 1.57"			
	75 x 110 cm / 30 x 42"			
Max. frame/screen size (O.D.)	Large format 95 x 140 cm / 37 x 55"			
Production capacity (pieces / h)**		10	00	

Model/Type	SP 16	SP 18	SP 20
Number of pallets	16	18	20
Max. No. of print stations	14	16	18
Max. print area (standard format only)	50 x 70cm	50 x 70cm	50 x 70cm
	20" x 28"	20" x 28"	20" x 28"
Max. diameter (cm/inch)	640/252"	690/271"	730/287"
Machine height (cm/inch)	185/72,8"	185/72,8"	205/81"
	3000 kg	3350 kg	3650 kg
Machine weight*	6615 lbs	7386 lbs	8047 lbs
Air consumption (I/min.)	700	750	800
Minimum air pressure	8 bar / 116 p.s.i. (filtered, dry air only)		
Drive systems	AC-Servo-Drive Index / Electric Squeegee Drive		
Electrical supply (volts)	3 x 210/380/440V, 50/60 Hz (+/- 5%)		
Power requirement - Servo Indexer	2.5 kW		
Power requirement - Squeegee drive	0.6 kW (each)		
Registration accuracy	+/- 0.02 mm / +/- 0.00078"		
Recommended frame/screen profile	40 x 40 mm / 1.57 x 1.57"		
	75 x 110 cm / 30 x 42"		
Max. frame/screen size (O.D.)	Large format 95 x 140 cm / 37 x 55"		
Production capacity (pieces / h)**	900	800	700

* Total weight (unpacked) with max. number of print stations ** Single print stroke and medium length of stroke

*** ... Special formats available upon request

3. Transportation

This section provides an overview of the proper transportation of the Synchroprint 3000.

3.1. General Notes with Regard to Transportation and Danger Warnings

Upon delivery of the Synchroprint 3000 the consignment must be examined for external damage immediately. In the case of any damages, they must be documented and reported to MHM Siebdruckmaschinen GmbH KG within 24 hours.

The following instructions must be observed thoroughly in order to avoid potentially fatal injuries or serious damage to the Synchroprint 3000 during transportation:

- 1. Never stand or walk under hanging loads!
- 2. Transportation must be carried out by qualified staff observing all safety instructions.
- 3. The Synchroprint 3000 must only be lifted at the dedicated lifting points.
- 4. Only the lifting/handling devices and equipment indicated in this document must be used for the movement of the Synchroprint 3000. Non-compliance may lead to serious damage of the Synchroprint 3000 and result in cancellation of the warranty.

3.2. Packaging

The Synchroprint 3000 will be packed and delivered in 2-4 wooden crates. The exact number, weight and dimensions will vary slightly according to each model/type of machine. The maximum crate size is 315 x 215 x 223 cm. (Contact customer service for more information about individual orders).

3.3. Removal of the Synchroprint 3000 from the packaging

The Synchroprint 3000 is to be unloaded by the customer. A forklift truck with adequate fork length and lifting capacity will be required. The Synchroprint 3000 must be lifted carefully and only at the dedicated lifting points at the middle of the base unit.

Lifting the Synchroprint 3000 at/by any other point, especially the turntables, may result in serious damage. Be sure to maintain an adequate and safe distance during lifting.

4. Assembly

This section describes the external supply/connection ports of the Synchroprint 3000 and the points to be observed during assembly.

4.1. General Assembly Instructions

The Synchroprint 3000 must only be installed/assembled by an authorized MHM service technician, or by an authorized service technician from an official MHM dealer/agent. Any assembly/installation by any third party not listed above will result in immediate cancellation of the warranty.

(The customer should have a minimum of two persons available to assist the technician with the installation and assembly of the machine).

4.2. Positioning of the Synchroprint 3000

In order to ensure safe and correct assembly and smooth operation of the Synchroprint 3000, a **minimum distance of 1metre** should be maintained between the Synchroprint 3000 and any adjacent structures (walls, columns, etc.) and/or other machinery. The dimensions of each particular model are listed in section *"2. Technical Data"*.

4.3. Ambient Conditions

For the electrical equipment on the Synchroprint 3000, ambient conditions according to standard IEC 60204 "Electrical Equipment of Industrial Machines" should be observed.

The following points should be observed in order to achieve efficient running and an optimum level of production with the Synchroprint 3000:

- 1. The premises, where the Synchroprint is to be operated, must be kept clean, dry and wellaired.
- 2. The ambient temperature must not fall below $+5^{\circ}$ C or exceed $+45^{\circ}$ C.
- 3. Relative air humidity must not exceed 80 %.
- 4. The mains supply must not exceed or fall below a tolerance of +/- 5 % of the required voltage for the Synchroprint 3000. If this voltage stability cannot be guaranteed, the customer must install a constant-voltage regulator to protect the Synchroprint 3000 against such fluctuations.
- 5. The compressed air must be clean, filtered and dry.
- 6. Compressed air supply must be sufficient in terms of pressure, volume and consistency.
- 7. Electricity supply should be sufficient with adequate fuse protection.

4.4. External supply/Connection ports

Connections for compressed air and mains electricity are located on the base unit of the Synchroprint 3000 as standard. Overhead supply connections may be ordered optionally but only at time of order, to enable supplies to enter the machine from above, through the centre column.

A step/cover plate must be placed securely over any supply lines crossing the floor.

4.4.1. Electrical Connections

Please observe the general safety regulations for electrical connections when connecting the mains supply to the Synchroprint 3000. Avoid any contact with live components.

The electrical requirements are as follows:

\mathbf{I}	
Description	Requirement/Value
Supply voltage	3x 210/380/440 V
Supply frequency	50/60 Hz ± 5 %
Connection power	2.5 kW + (0.6 kW x "number of print heads")
	(= "power for indexer main drive" + "power per print head" x
	"number of print heads")

All flash cure units must be supplied through a separate/independent connection. Please observe the precise technical data from the flash cure unit specification sheet.

4.4.2. Compressed Air Requirements

Type of machine	SP 8	SP 10	SP 12	SP 14	SP 16	SP 18	SP 20
Air consumption (I/min.)	500	550	600	650	700	750	800
Minimum air pressure	8 bar / 116 psi (filtered, dry air only)						

5. Commissioning the Synchroprint 3000.

Initial start-up of the Synchroprint 3000 should only be carried out by an authorised MHM service engineer or by an approved technician from an official MHM dealer/agent.

After the initial start-up of the machine, commissioning is to be completed in the presence of the authorized technician along with any persons authorized on the part of the customer. During this initial start-up and commissioning, all tasks carried out by the MHM service engineer or the technicians of an authorized dealer are recorded.

Any defects or complaints must be brought to the attention of the authorized technician, documented in writing and recorded immediately on the service technician's installation/jobsheet.

This installation/jobsheet must be clearly signed by both parties, stating the date and location of the Synchroprint 3000 and will be legally binding hereon after.

All further start-ups of the Synchroprint 3000 by the customer or its authorized staff should be done in accordance with the following procedures:

5.1. Start-up Instructions

- 1. Prior to each start-up, any possible defects are to be rectified by an MHM authorized/approved technician.
- 2. The machine must only be operated by qualified personnel with a clear knowledge and observation of all safety instructions.
- 3. Ensure that only authorized staff are permitted within the area of the Synchroprint 3000 and that no persons are endangered upon starting up the machine.
- 4. Before putting the machine into operation, all electrical connections and air-supply levels must be checked and the correct supply restored if necessary.
- 5. All safety facilities/devices must be checked prior to starting up the machine.
- 6. Make sure that all tools and foreign parts have been removed from the machine prior to start-up.
- 7. Ensure that the operators are aware of the function and position of all safety devices/facilities.

6. Design and Operation

This section describes design and operation and indicates the individual assemblies.

6.1. Overview Machine Parts

6.2. Danger Zones

Danger zones are the areas of the machine, which represent a risk for persons due to mechanical motion/movements during operation of the Synchroprint 3000. This includes all areas of the machine where rotary motions, pressure movements and/or any other movements take place.

MHM strongly recommend marking this zone with a color floor marking indicating the danger and the respective accident prevention regulations of the operator's particular country (e.g. red/white or yellow/black stripes).

If any work is to be carried out on the Synchroprint 3000 that requires entering, leaning into or placing one's hands into any one of these safety areas, one of the following conditions must be met:

- 1. The main control switch has been switched OFF.
- 2. The EMERGENCY STOP push button has been firmly pressed and locked in.
- 3. One of the safety barriers has been pushed and locked in.

If a completely inactive machine is required, the main power switch must be in the 'OFF' position.

6.3. Safety Devices

The safety devices serve as emergency stop facilities to avoid accidents and to guarantee safe operation of the machine. The Synchroprint 3000 has the following safety devices:

Safety device	Description			
EMERGENCY STOP	Push button located at the main control panel. In case of emergency,			
(push button)	pressing the EMERGENCY STOP will stop all movements of the			
	machine. The function of the push button is cancelled by unlocking			
	the switch (turning it to the right).			
Safety bars	Yellow/black bars located at the right and the left of the 'load/unload'			
	area. Pressing any one of these bars will result in an immediate			
	EMERGENCY STOP of the machine. The location of these bars			
	ensures that the EMERGENCY STOP function is activated			
	automatically should a person become trapped between print station			
	and pallet.			
Safety barrier	Yellow/black barriers located between the print stations which serve			
	to cordon off the danger zone. As soon as they are opened by a			
	person passing through, an immediate EMERGENCY STOP is			
	activated.			

These safety devices must not be used to switch off the machine under normal operation. Any EMERGENCY STOP presents an exceptional loading to the servo-motor and transmission etc. Excessive use will result in damage to the machine along with subsequent cancellation of the warranty.

6.4. 'Load/Un-load' stations

The Synchroprint 3000 has a load and unload station for a total of two operators. This is where the textiles to be printed on are applied to the pallets and removed from them at the end of the printing process.

6.5. 'No shirt'/skip pallet buttons

These buttons are located on the first and the last print stations, or at the left and right of the main control panel. Pressing the 'No shirt'/skip pallet button indicates an incorrect loading of goods and consequently the respective pallet/garment will not be printed on. This will not interrupt the production process.

6.6. Main power switch

The main power switch disconnects the machine from the main supply voltage immediately.

6.7. Main control panel

The main control panel includes the following features:

Machine feature	Description			
Main control	The main control is used to control the main operating features of the			
"CONTEC"	Synchroprint 3000. The buttons will operate various individual			
	functions of the machine. You will find a detailed description of all			
	the functions in section '7. Control of the machine'.			
EMERGENCY STOP	The EMERGENCY STOP push button is part of the safety facility.			
(push button)	See section '6.3. Safety Devices'.			
Centralised 'off contact'	The centralized 'off contact' adjustment is used to adjust the height			
adjustment	of the screen above the pallets during the printing process for all print			
	stations simultaneously. This adjustment is infinitely variable			
	between 0-10 mm.			

6.8. Print Stations

The print stations are used for printing individual colours on to textiles/garments. The Synchroprint 3000 may be ordered with a maximum of up to 18 print stations. The following sections include a detailed description of the individual components.

6.8.2. Squeegee Arm Motor

The squeegee/print arm motor is used to drive the squeegee carriage back and forth, controlled precisely by the frequency converter.

6.8.3. Frequency Converter

The frequency converter controls the squeegee drive motor. The motor and frequency converter have already been adjusted by MHM, and no further adjustment should be necessary.

6.8.4. Squeegee/print arm

The squeegee carriage, squeegee stroke length adjustment, control keypad and control knobs for the squeegee carriage speed & pressure are all located on the squeegee arm.

6.8.5. Squeegee stroke length adjustment

The squeegee stroke length adjustment may be used to adjust the precise travel of the squeegee carriage. There are individual sensors on each print station to adjust the front and rear positions. Minimising the travel of the squeegee carriage helps to reduce printing times and increase production.

6.8.6. Squeegee/print arm lock-down

Pressing the squeegee/print arm lock raises the entire squeegee/print upwards, providing unobstructed access to the screens.

6.8.7. Squeegee carriage speed and pressure controls

- 1... Adjustment for squeegee carriage speed forwards
- 2... Adjustment for squeegee carriage speed backwards
- 3... Adjustment for squeegee pressure (with clear display gauge)

6.8.8. Control Keypad

The control keypad is used to operate various functions without having to return to the main control panel.

6.8.9. Squeegee Carriage

The squeegee carriage is equipped for two squeegees. Pulling the black 'quick release' knob (*pic. opposite*) will release the respective squeegee. Make sure that these locking knobs engage fully when loading the squeegee. The maximum permitted squeegee width must be observed.

Squeegee height may be adjusted individually by the handwheels (*pic.* 1 + 2). Squeegee angle may also be adjusted individually by the sliding levers (*pic.* 3). Squeegee pressure may be adjusted by an adjusting knob located on the squeegee arm (*see section 6.8.7 Squeegee carriage speed and pressure controls*).

6.9. Additional equipment

6.9.1. Flash Cure Units

Flash cure units may be installed into either an empty station or a print station. The flash cure unit must be powered by a separate supply, which should comply with the electrical data supplied by the manufacturer (*see data sheet for flash cure units*). When installing into an empty station the unit is controlled through a data lead which connects to a socket located at the rear of the station. When installing into a print station this socket is located at the rear of the squeegee/print arm.

When connecting the flash cure unit make absolutely sure to keep the all cables away from any moving parts (especially the turntable/moving pallets etc). Failure to do so may result in damage to the cable along with serious electrical damage to the flash cure unit and machinery.

Procedure for the installation of a flash cure unit into a print station

Move the squeegee carriage back to its furthest rear stop position before installing the flash cure unit into the print station. Subsequently, the electrical supply and data lead should be connected. An empty/blank screen frame (without mesh) should be loaded in the position of a normal screen in order to push and hold the screen holders away from the heated area to prevent any damage.

The pallets are only warranted to withstand temperatures of up to a maximum of 150° C. Exceeding this temperature will result in cancellation of the warranty for the pallets.

7. Control of the Machine

This section explains the control features of the machine, each button on both the main control panel and printhead will be explained.

The revolutionary automatic "GOTO" screen micro-registration technology with memory introduced here and the multitude of adjustments available to control ink deposit have placed the SYNCHROPRINT 3000 as an industry breakthrough. All adjustments are tool free.

The SYNCHROPRINT 3000 can be cycled either clockwise or counterclockwise. It can be single, double or triple indexed. Print pressure, angle and speed can be set independently of flood pressure, angle and speed. The length of the print stroke is easily manipulated to optimise the available print area. The squeegees can all be brought to the fore position for cleaning and removal with the push of a single button. Turntables be half cycled for easy access to the print pallets and screens, and includes a special key which releases the pneumatically held print pallets for adjustment or removal.

7.1. MAIN CONTROL PANEL

STAND BY

9. Standby ~ This mode blocks the computer from receiving input signals (see Security/Safety System section).

10. Start ~ Used to start functions when used in conjunction with keys having a green slash in the upper left corner. Restarts manual and automatic print cycles. Resets or clears the computer after the security lines have been activated.

11. Stop ~ Will stop the machine from completing its print cycle (see Production Interrupt/Resume section).

12. On/Off ~ Controls power to the display screen and the control keys.

13. Squeegee Return ~ Returns squeegees to start position and/or changes the squeegee start position.

14. Adjust Mode ~ Prompts computer to accept adjustments, movements and/or changes in programming (see Adjust Mode section). Stops machine after a complete cycle.

15. Manual Mode ~ Allows machine to cycle one time per activation (see Manual Mode section).

16. Automatic Mode ~ This allows machine to cycle until deactivated (see Automatic Start/End section).

17. Service Mode ~ MHM service technicians only.

18. Press carriage Lift and Lower Key ~ Moves press carriage up or down

19. Unlock All Screens ~ Releases screens for removal.

20. Change Pallets ~ Releases pallets at the load and unload stations. Press start and it locks, indexes and unlocks next pallets.

21. F4 ~ Future option.

22. To Position Drive ~ Moves Screens that are not set to the last position (see To Position Drive section).

23. Reference Drive ~ Allows computer to read the location of all printhead drive bars (see Reference Drive section).

CLEAN

24. Clean Position ~ Shift pallets for easy access to the screens for cleaning and/or repair (see Clean Position section).

25. F5 ~ Future option.

26. Start/End ~ Used to start or end the printing sequence (see Automatic Start/End.

ample ~ Used to print sample (see Automatic Print Sample section).

28. F6 ~ Preflood On/Off ~ Used to determine at the end of a print run whether the screens remain flooded or unflooded. For use with either plastisol or waterbased inks.

29. Index Right ~ Designates right direction for index.

30. Index Left ~ Designates left direction for index.

LED READOUT 31. Print Station Indicator ~ Indicates print station location.

32. Print Station Key ~ Used to indicate which station you wish to program or adjust (see Print Station Program and/or Screen Placement and Alignment section).

33. Squeegee Quick Set ~ Programs print station at one print stroke and one flood stroke (see print Station Programming section).

34. Adjust Screen Key ~ Used to activate screen adjustment mode and special alignment drive from main panel (see Screen Placement and Alignment sections).

35. Screen Adjustment Keys ~ Moves screen in direction of arrow (see Screen Placement and Alignment section).

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36. Rotation Controls ~ To select direction of rotation for operating modes.

37. Index Controls ~ To select single, double or triple index.

38. Program Save ~ Saves program in memory (see Program Save section).

39. Program Retrieve ~ Retrieves program stored in memory (see Program Retrieve section).

40. Pieces Total ~ Counts the number of prints (see Count Features section).

41. Pieces Remain ~ Adds for misprints (see Count Features section)

42. Pieces Down ~ Counts down the number of prints (see Count Features section).

7.2. PRINT STATION KEYPAD

1. Screen Adjustment Keys ~ Moves screen in the direction of arrow (see Screen Placement and Alignment section).

2. Adjust Mode ~ Prompts computer to accept adjustments, movements or changes in programming (see Adjustment Mode section). Must be pressed simultaneously with keys having a green slash.

3. Squeegee Forward/Back ~ Changes position of squeegee carriage.

4. Index Right ~ Designates right direction for index.

5. Index Left ~ Designates left direction for index.

6. Go To Drive ~ Drives all screens to the same position (see Go To Drive section).

7. Reference Drive ~ Allows computer to read the location of an individual printhead drive bar (see Reference Drive section).

8. Press carriage Lift and Lower Key ~ Moves press carriage up or down.

9. Locks/Unlocks Screens ~ L.E.D. indicates lock status. Red light is locked – green light is unlocked. When screens are locked, micro-registration keys are deactivated preventing any screen adjustment.

10. Set ~ Used to enter programming instructions (see To Position Drive section)

11. ~ Squeegee Speed inward. Regulates Speed of Squeegee Carriage in inward travel within a scale of 0-9 indicated by a digital display.

12. ~ Squeegee Speed outward. Regulates Speed of Squeegee Carriage in outward travel within a scale of 0-9 indicated by a digital display.

7.3. SECURITY / SAFETY SYSTEM

The SYNCHROPRINT 3000 has a very advanced security/safety system. This system has been designed to protect the operators in their daily operations.

There is a security line at each print station and safety bars at each open station. The **emergency stop push** button is also linked to this same system. If any of these are activated, the servo drive unit will not respond to any indexing commands. If an attempt is made to index while a security line is activated, the computer will default until the security line is cleared. The computer display will show security line activated. The security line must be moved to the closed position to continue. To clear the display screen, press **start** on the main control panel. If the pallets were bumped or moved manually while the security line was activated, the computer will ask to search for zero. Press start to continue.

(CAUTION: This will activate pallets to move).

For your additional safety, a **standby** mode is activated by pressing the **standby** button on the main control panel. This will lock out all computer input signals, making it impossible for any press function or accidental adjustment. To resume operations, press **standby**.

Safety is a main concern at MHM; therefore, we suggest that a safety program be implemented to assure proper training of individuals working in and around any moving equipment, and should include both visual as well as verbal employee communication.

7.4. ADJUST MODE

The **adjust** mode is used for all of the adjustments~screen alignment, print station programming, **go to** drive, **program retrieve**, **reference drive**, **clean** position, off contact, etc. The computer will not accept adjustment inputs while in **automatic**, **manual** or **service** modes. The adjust mode raises the press carriage to its highest level for easy service and/or cleaning.

CAUTION : The **adjust** mode will prompt the computer to accept any adjustment input. This leaves it vulnerable to accidental adjustments.~ If you are servicing, cleaning or just waiting for the next activity, it is recommended that you place the machine in **standby**. This will lock out all inputs until you are ready (see Security/Safety System section).

7.5. REFERENCE DRIVE

The reference drive allows the computer to know where the screens are located in reference to the start position of the drive unit. Once this is established, the computer can calculate the printhead movements so that this can be utilised to achieve repeatability and storage of this information in memory. If the main power is cut off (main power control, power failure, etc.), the computer will lose this reference drive information. This will not, however, effect the information stored in the program save memory (see Program Save section).

If you lose main power during a production run, it will not change the screen registration. Although, if you need to adjust a screen, it will be impossible to move the screen to the right or to the back without first completing a reference drive. (CAUTION : Print arms should be lifted up from printhead during reference drive). This can be achieved by placing machine in **adjust** mode (see Adjust Mode section). Then, secondly, press the **reference drive** key on the main control panel. This will reference all printheads. If you wish to only reference one screen, press the **adjustment** key and the **reference** key simultaneously on the printhead keypad.

CAUTION : Operating the program **save**, program **retrieve** or **go to** drive functions without this computer reference will result in programming malfunctions. It is recommended that a reference drive be done prior to each set-up and/or attempt is made to retrieve an existing program.

7.6. SCREEN PLACEMENT AND ALIGNMENT

Screen placement should only be carried out after all printhead drives have been completed (i.e. Reference Drive, Program Retrieve and/or Goto Drive).

Firstly, check to ensure the printhead is in the unlocked status. To unlock a printhead, press **unlock/lock** key on station keypad. The screen can now be placed in the printhead by inserting the screen bushings at the rear of the screen into the locating pins mounted on the rear screen carrier (or pinlock corners for roller frame).

The next stage is to align the front screen bushings into position on the front screen carrier. If the screen is shorter than the distance between front and rear screen carrier, simply move the front screen carrier forward using the manual **screen adjust** key until the screen is located both front and rear screen carrier has been pushed back. If the screen is to long, push the screen forward by hand into the rear screen carrier until the front of the screen can be lifted into position. The air pressure from the rear screen carrier will hold the screen in place.

To adjust the screen once located in the printhead use the screen adjust keys.

<u>N.B.</u> To adjust the screens ensure the following checks are made :

- 1. Machine is in "adjust" mode
- 2. Printhead is in "unlocked" status
- 3. Reference Drive has been completed since the last time the machine was electrically isolated

7.7. KEYPAD MOVEMENTS

To use the screen adjustment keys on the main control panel :

- 1. Machine must be in **adjust** mode.
- 2. Press adjust screen key
- 3. Designate print station by pressing the appropriate **print station** key.
- 4. Adjust Screen.

Once you have positioned the screen, press the **unlock/lock** key. Now check screen to assure correct placement. If not correct, press **unlock/lock** key readjust, then lock and recheck.

SPECIAL ALIGNMENT DRIVE ~ The Special Alignment Drive enables you to reposition an entire design, without re-registering the screens. To use the Special Alignment Drive:

- 1. Machine must be in **adjust** mode.
- 2. Press the **adjust screen** key twice.
- 3. Position reference screen to new location.
- 4. Press the **GOTO** key (see GOTO drive section) on the same printhead as your reference screen. This will drive all the screens the same distance and direction you moved your reference screen.

CAUTION: It is recommended that you always save your programs after each set-up and before this special alignment drive.

7.8. TO POSITION DRIVE

The to position drive will move screens that are accidentally moved, back to their "SET" position. If a screen is moved by mistake (during production) and you realise this prior to cycling the machine, pressing the **set** key or any function that automatically sets the printhead (**go to** drive, **reference** drive, squeegee cycle, etc.). You can use the to position drive to move the screen back to its last set position in the computer memory. Just press the **to position** drive key. This will move all screens that have not been set back to their last set position. If you have adjusted several screens and only one was moved by mistake, set the correct screens by pressing the **set** key on their printhead keypad. Then, press the **to position** drive key to move the one back to its original "SET" position.

7.9. GO TO DRIVE

The go to drive moves all the printhead drive bars to the same alignment position as your reference printhead. If your screens have been exposed using a pre-registration system, the go to drive will align the screens to within the tolerances of your system.

To use the go to drive :

- 1. Do a **reference** drive (see Reference Drive section).
- 2. Align your reference screen in the printhead you choose for your print order (see Screen Placement and Alignment section).
- 3. Press the **go to** drive key on the reference print station keypad. This will drive all other printheads to the reference position.
- 4. Place the remaining screens in their appropriate print order positions.
- 5. Check screen alignment and adjust if necessary.

CAUTION : This drive will move the printhead positions at anytime the **go to** key is pressed (while in adjust mode). Always use your **program save** function once you have completed your setup. This will allow you to retrieve your program in the event of an accidental drive.

7.10.SQUEEGEE ADJUSTMENTS

Squeegee adjustments are abundant on the SYNCHROPRINT 3000. These adjustments control print and flood speeds, angles, pressure and print length.

7.11.PRINT AND FLOOD SPEED

These adjustments are made using the +/ - keys located on the printhead keypad. A digital display indicates the speeds on a range of 0-9. Direction arrows are printed on the keypad to determine whether print or flood speed is being adjusted.

7.12.SQUEEGEE ANGLE

The squeegee angles are adjusted by moving the two levers located on the left and right side of the squeegee carriage. The angles can be adjusted in five-degree increments which are indicated on the legend behind the levers. The left hand lever controls the front squeegee, the right hand controls the rear.

7.13.SQUEEGEE PRESSURE

The squeegee pressure is controlled by two pressure valves located on either side of the squeegee arm. The right hand valve controls the front squeegee pressure, the left hand valve controls the rear. The two gauges on the front of the squeegee arm indicate in P.S.I. how much downward pressure is being applied.

7.14.SQUEEGEE HEIGHT ADJUSTMENT

The squeegee height is controlled by the knurled wheels located on the right hand side of the squeegee carriage. The upper wheel controls the rear squeegee, rotating this wheel clockwise raises the rear squeegee, anti-clockwise lowers the squeegee. The lower wheel controls the front squeegee, rotating this wheel clockwise lowers the front squeegee, anti-clockwise raises the squeegee. These adjustments are indicated on legends located above each wheel.

7.15.PRINT and FLOOD STROKE TRAVEL

The distance the squeegee carriage will travel front and rear is adjusted by the limit bars located either side of the squeegee arm. The right hand bar adjusts the rear travel, the left hand bar adjusts the front. The bars simply slide along the length of the squeegee arm and the squeegee carriage will stop when it reaches one of these bars.

7.16.PRINT STATION PROGRAMMING

Each print station must be programmed to be on or off during the print cycle. To program the print stations, press the key next to the desired print station on the computer display. If it is programmed correctly, re-set. If you would like to change the programming, use the numerals at the top of the main control panel to input the number of squeegee and flood strokes you require. A squeegee stroke is the pass or number of passes the squeegee carriage makes while the print station is down. The flood stroke is the pass or passes the squeegee carriage makes while the print station is up.

Examples :

- 1. 1 squeegee stroke, 1 flood stroke ~ will print while the print station is down and then flood while the print station is up.
- 2. 2 squeegee stroke, 0 flood stroke ~ will flood and print while the print station is down.
- 3. 3 squeegee stroke, 1 flood stroke ~ will print, flood and print while the print station is down and then flood while the print station is up.
- 4. 0 squeegee stroke, 0 flood stroke ~ will deactivate the print station.

CAUTION : The sum of your squeegee strokes and flood strokes must always be an even number, otherwise your flood and print angles will transpose every other cycle.

7.17.AUTOMATIC PRINT SAMPLE

The automatic print sample function enables you to print one substrate without using waste pieces or manually turning each print station on and off. To use this function :

- 1. Start in adjust mode.
- 2. Place substrate on load station.
- 3. Press **automatic** mode key
- 4. Press sample key
- 5. Press **start** key . (CAUTION: This moves pallets)

This will print your substrate automatically and return it to the unload station.

CAUTION: This will automatically turn on and off all print stations programmed. Check to be sure only the correct stations are activated.

7.18.SPECIAL AUTOMATIC PRINT SAMPLE

The special automatic print sample function enables you to print one ore more substrate without using waste pieces or manually turning each print station on and off. To use this function :

- 1. Start in adjust mode. Press button "PIECES DOWN"
- 2. Select the number of samples + SET
- 3. Place substrate on load station
- 4. Press **automatic** mode key
- 5. Press **start** at START/END button
- 6. Press **start** key (CAUTION: This moves pallets)

This will print your substrates automatically and return it to the unload station.

CAUTION: This will automatically turn on and off all print stations programmed. Check to be sure only the correct stations are activated.

7.19.AUTOMATIC / START

The automatic/start function enables you to start your automatic cycle without using waste pieces or manually turning on each print station.

To start the automatic/start function :

- 1. Load your first substrate on the load station.
- 2. Press the **automatic** mode key.
- 3. Press the **start** side of the start/end key.
- 4. Press **start** key.
- 5. The machine will cycle. Continue to load substrate.

If you need to stop prior to completing this function, step on **the foot-pedal** or press the **stop** key. To resume, release the **foot-pedal** or press the **start** key (see Production Interrupt/Resume section). If you stop by pressing the **adjust** or **automatic** mode keys the auto/start function will be discontinued.

CAUTION: Releasing the **foot-pedal** will automatically start cycle.

7.20.MANUAL / START

Works like automatic/start function except each cycle must be prompted by pressing the **start** key or **foot-pedal**.

7.21.AUTOMATIC / END

The automatic/end function enables you to print your last substrate without using waste pieces or manually turning off each print station.

To start the automatic/end function :

- 1. Press the end key.
- 2. You will then hear two beeps confirming the function's start position.
- 3. Place last substrate on load station.
- 4. The computer will then automatically turn off each print station after it prints the last piece, returning it to the unload station.

If you need to stop prior to completing this function, step on the foot-**pedal** or press the **stop** key. To resume, release the **foot-pedal** or **press** the **start** key (see Production Interrupt/Resume section). If you stop by pressing the **adjust** or **automatic** mode keys the auto/end function will be discontinued.

CAUTION: Releasing the **foot-pedal** will automatically start cycle.

7.22.MANUAL / END

Works like automatic/end function except each cycle must be prompted by pressing the **start** key or **foot pedal**.

7.23.PRODUCTION INTERRUPT / RESUME

You can stop the automatic cycle by :

- 1. Press **adjust** mode key ~ Cycle will complete. Press carriage will raise to adjust mode. To resume, press **automatic** mode key, then press the **start** key.
- 2. Press **foot-pedal** ~ Cycle will complete. To resume, release **foot-pedal**. (CAUTION : Releasing **foot pedal** automatically starts cycle.)
- 3. Press **stop** ~ Stops in mid cycle. To resume, press **start**.
- 4. Press automatic mode key ~ Cycle will complete. To resume, press start.
- 5. Press **emergency stop** ~ Stops cycle immediately. (for emergency situations only.)

7.24.FOOT - PEDAL

The **foot-pedal** has several operational benefits.

First; if you are operating in automatic, auto/start or auto/end, the **foot-pedal** will stop the machine after completing its cycle while being pressed. Releasing the **foot-pedal** will resume the automatic function.

Secondly; if you are operating in manual, manual/start or the **foot-pedal** will start each cycle when pressed.

CAUTION : Remember, the automatic cycles will resume as soon as the **foot-pedal** is released. Make sure all personnel are out of the cycle range before starting automatic functions.

7.25.PROGRAM SAVE

The program save function calculates and stores in memory the exact position of each screen and the print station programming (squeegee/flood stroke and speed). This protects you from accidental screen movements (inadvertent go to drives, reference drives, etc.) or reference loss because of power outages. This also enables you to set up repeat jobs (using same screens) without reregistering. The computer's memory drives the screens back to the same print location.

To save a program:

- 1. You must be in the adjust mode.
- 2. Press the **program save** PGM- save key on the main panel.
- 3. The computer display will ask what number you wish to save the program under. Enter the number using the numeral keys.
- 4. If a program has already been stored under that number, the computer display will ask if you wish to continue. Press **start** to continue or F3 (ESC) to escape.
- 5. Press set.

7.26.PROGRAM RETRIEVE

To retrieve a program stored in the program save memory :

- 1. Do a reference drive (see Reference Drive section).
- 2. Press the **program retrieve** PGM-key on the main control panel.
- 3. Enter number of the program to be retrieved (using numerals on main control panel).
- 4. Press set (on main panel).

This will start a program drive of the printheads.

7.27.TIME DELAY FEATURED

The time delay enables you to pause between print cycles. The time up key will add a delay to the cycle while press carriage is in the up position. The time down key will add a delay to the cycle while the press carriage is in the down position.

To enter time delay :

- 1. Start in **adjust** mode.
- 2. Press **time up** or **time down** key. The computer display will ask you to input the number of seconds you wish to delay.
- 3. Using the numeral keys enter delay time.
- 4. Press set key.

To delete time delay :

- 1. Start in adjust mode.
- 2. Press **time up** or **time down** key. The computer display will ask you to input the delay time or press **delete** key.
- 3. Press delete key
- 4. Press set key.

7.28.COUNT FEATURES

Pieces Total ~ This feature will count the number of pieces you have produced. To set the counter or check current count :

- 1. Start in adjust mode.
- 2. Press **pieces total** key. The computer display will bring up the number produced.
- 3. To clear the counter press **delete** key. To continue the count press **set** key.

PIECES DOWN ~ This feature will count down the number of pieces of your order. It will also automatically initiate the automatic end sequence (see Automatic End section). To start the pieces down feature :

- 1. Start in adjust mode.
- 2. Press pieces down key. The computer display will ask you to enter the number of pieces.
- 3. Using the numeral keys, enter the production amount.
- 4. Press set key.

Pieces Remain ~ If you have a misprint, press the **pieces remain** key to adjust the count. This will add a number to the pieces down count and subtract a number from the pieces total count.

7.29. CLEAN POSITION

The clean position shifts the pallets for easy access to screens for cleaning and/or repair.

To place the machine in the clean position :

- 1. Start in **adjust** mode.
- 2. Press **clean**. The computer display will then ask you to press **start** to continue or F3 (ESC) to escape.
- 3. Press start. (CAUTION: This will index pallets.)

To return press clean.

To place the machine in clean position from the printhead keypad :

- 1. Start in adjust mode.
- 2. Press the **adjust** key and **clean** key simultaneously. (CAUTION : This will index pallets.)

To return press and hold **adjust-key** and press **clean** twice.

7.30.OPERATIONAL OUTLINE

7.30.1. INITIAL START UP

- 1. Check for correct air pressure.
- 2. Turn on main power.
- 3. Check all security lines and the emergency stop button (see Security/Safety System section).
- 4. Press on/off key.
- 5. The computer will now initialise print stations.
- 6. Computer display will ask to search for zero. Press start. (CAUTION : This will move pallets.)
- 7. Computer display will read adjust mode when finished.
- 8. Do a reference drive (see Reference Drive section).

7.30.2. SET UP

- 1. Place your reference screen in the printhead you have chosen for your print order (see Screen Placement and Alignment section).
- 2. Press unlock/lock key
- 3. Use the screen adjustment keys to move the screen into position.
- 4. Once the screen is in position, press the **unlock/lock** key on the printhead keypad.
- 5. Press the **go to** drive key (see Go To Drive section) on the same printhead keypad. This will move all the other printhead drive bars/screens to the same alignment position.
- 6. Now place the other screens into the printhead you have chosen for your print order.

If your screen has been exposed using a pre-register system, little or no further adjustments may be necessary.

- 1. Adjust all squeegees to desired angle, pressure, speed and distance (see Squeegee Adjustment section).
- 2. Enter print station programming information (see Print Station Programming section).

7.30.3. PRINT SAMPLE

(see Print Sample section).

7.30.4. SAVE PROGRAM

(see Program Save section).

7.30.5. START PRODUCTION

- 1. Start in adjust mode.
- 2. Load first substrate on load station.
- 3. Set counter if desired (see Count Functions).
- 4. Start Auto/Start function (see Automatic/Start section.
- 5. Continue to load substrates.

7.30.6. **PRODUCTION INTERRUPT**

(see Production Interrupt section).

7.30.7. END PRODUCTION

(see Production/End section).

7.31.BEFORE CALLING FOR SERVICE

No power

Check circuit box. Is main power control on ?

Screen adjustment keys do not function

Is screen locked ? Has main power been off ? If so, you have lost computer reference (see Reference Drive section).

Program retrieve is not working correctly

Has main power been off? If so, you have lost computer reference (see Reference drive section). Are the screens in the same print stations as when you saved the program ? (see Program Retrieve section).

Power is on, no response to controls

Check display screen. Is security line broken ? (see Security Line section). Is machine in standby mode ?

Squeegee's carriage not functioning

Is that print station programmed ? (see Print Station Programming section). Check squeegee limit adjustment (see Squeegee Adjustment section).

CAUTION: For maximum production and safe operation of your SYNCHROPRINT machine, please read the Important Safeguards and the Safety and Precautions section and apply them properly.

7.32.ERROR CODES

7.32.1. Station :

"Overcurrent on drive unit!"

The station has tried to drive with a squeegee arm, the maximum motor current has been exceeded. Possible short circuit on motor or station defective.

"RAM- error! Change station!" The station RAM is defective. Station must be changed.	0x00000002
"Overtemperature station!" The station ventilator has overheated.	0x00000004
"Valve malfunction!" Magnet valve defective.	0x0000010

"Initiator missed position!"

One of the two initiators was activated and disconnected again. Possibly check the connection of the initiators to the station.

"Stepper control lost or overtemperature!"

The STEP board has registered overtemperature or the connecting cable to the stepper has been loosened.

"No SPS Program loaded on the station!"

No SPS program was found on this station. Please go to service menu under system update and send the SPS program to the station.

"Drive Timeout!"

The squeegee has taken too long to reach the initiator. Initiator possibly defective.

"Motor e-control error. Check motorsupply!"

An attempt was made to drive with the squeegee. The motor did not move. The supply (60V) to the station has been interrupted or the motor is not connected.

0--0000000

0x00000001

0x00000020

0x00000040

0x0000080

0x00000100

"Both initiators activated!"

Both initiators were activated at the same time.

"Error test Y-axis!"

This error occurs when the Y-axis is testing in the pre-installation.

"Reference drive timeout check Y2-axis!"

An error occurred during the reference drive of the Y2-axis. The axis could not reach the initiator within a certain time.

"Reference drive timeout check Y1-axis!"

An error occurred during the reference drive of the Y1-axis. The axis could not reach the initiator within a certain time.

"Reference drive timeout check X-axis!"

An error occurred during the reference drive of the X-axis. The axis could not reach the initiator within a certain time.

"Reference drive can't leave INIT Y2-axis!"

An error occurred during the reference drive of the Y2-axis. The axis could not leave the initiator.

"Reference drive can't leave INIT Y1-axis!"

An error occurred during the reference drive of the Y1-axis. The axis could not leave the initiator.

"Reference drive can't leave INIT X-axis!"

An error occurred during the reference drive of the X-axis. The axis could not leave the initiator.

"Timeout EPROM write!"

An error occurred during writing in the station EPROM. Change station.

"Timeout EPROM read!"

An error occurred during reading of station EPROM. Change station.

"Dryer has no power or is out of order!"

The dryer has apparently been disconnected or the cable between dryer and station has been

"Dryer timeout!"

disconnected.

0x00200000 The dryer has not sent a message within a minute. Dryer or cable between station and dryer defective or dryer has been disconnected during operation.

"Station has to be serviced. Call MHM!"

This station has over 1 million squeegee strokes. The motor must be serviced. The number of squeegee stroke can be put back with DEL in the service menu under the menu point "movecounts".

0x00100000

0x8000000

0x00000400

0x00000800

0x00001000

0x00002000

0x00004000

0x00008000

0x00010000

0x00020000

0x00040000

7.32.2. Baumüller

"No center initiator (indexer)!"

Initial position not reached. Check the increments per index and center, left and right initiators. Also during automatic creep speed (MOVE SLOW).

"Position error ! Check servo values!"

The target position was not reached in the required tolerance, the static brake fault is too great. Check Baumüller parameters (impulses per index).

"Wrong adjust OFF-contact!"

Lift up and lift down sensors have been activated simultaneously.

"Security line is activated!"

When emergency is pressed, the contactor is disabled as with "Baumüller Disable". The error message should appear when the three phases are not being transmitted through the power unit and the 24 V Omega exit point is on! There should be no error message with "Baumüller Disable"! The input unit has not sent the operational signal, Check line voltage on input unit.

"Lift up timeout!"

Lift up sensor not reached.

"Pallets not locked!"

The pallets are not locked. Check main switch.

"Position error (indexer blocked)!"

During rotation the variation between the specified position and the actual position (dynamic brake fault) was too great. This may also be caused by brake or accelerating ramps that are too steep (engine torque is too small). Check Baumüller parameters. The beds may also be obstructed. This entails an emergency stop. The contactor must be disconnected as with Baumüller disable.

"Lift down timeout!"

Lift down sensor not reached.

"Malfunction on valves!"

Monitoring of one or more power transistors has not functioned, possibly due to a short circuit or earth fault owing to a defect in the transistor.

"Controller malfunction!"

version!

The controller is defective. Change the controller or the Eproms!

"Last command not executable!"

"Intermediate circuit voltage too high!"

The intermediate circuit voltage has exceeded a value of 800 V +/-1%. Check ballast resistor.

0x00000001

0x00000002

0x0000008

0x00000004

0x00000040

0x00000010

0x00000020

0x0000080

0x00000100

0x00000200

0x00000400 Baumüller has received an unknown command from the primary control system. Check software

"Current too high!"

At least one of the phase currents of the power unit has exceeded the value of double the peak current of the power unit. The setting of the current regulator should be checked.

"Fault current!"

A fault current which has exceeded a certain amount has been ascertained in the power unit. The motor cables should be checked for an earth fault.

"Temperature too high!"

The temperature has exceeded 85°C. The fault can only be acknowledged when the temperature has fallen below 85°C.

"Disturbance inverse rectifier!"

The power unit has failed to send the operational signal, even though there are no other disturbance messages from the power unit.

"Break off resolver line!"

The measuring signals from the resolver are of no use for the evaluation. Check the transmitter cables on the motor and machine.

"1st control!"

The calculated 1st control value of the motor model is larger than 100 %. Leave the driving mechanism locked until the 1st value has levelled off to below 100 %.

"Motor temperature too high!"

This fault may occur when motor temperature recording is interrupted during operation. Let the motor cool down until the motor temperature has fallen below the limit. Check transmitter cables.

"Speed too high!"

The resolver evaluation has calculated an actual value of revolutions per minute which is greater than 115 % of the pre-set nominal speed. This fault may also occur when the resolver cables are obstructed during operation. Check resolver cabled and motor-controller settings.

"Sign-error or missing actual valve!"

A change in the actual value did not come as expected, or it came with a sign-error. Check transmitter cables.

"Set-value/actual value controlling!"

The actual signal has exceeded the limit by more than 200 ms. Check setting of speed regulator.

"Pallets not unlocked!"

The unlocking mechanism does not function. Check initiator!

"Flood ready not got!"

The primary control system has not released the sinking mechanism in automatic mode (troubleshooting squeegee stations was already activated!).

0x00004000

0x00002000

0x00020000

0x00010000

0x00080000

0x00040000

0x00200000

0x00400000

0x00800000

0x00100000

0x00001000

7.32.3. Primary control system :

There are 4 different types of errors on the primary control system :

- 1. System errors (errors which occur on the control system. e.g. accu defective).
- 2. Wait for servo answer timeout = servo did not answer a command.
- 3. Wait for station answer timeout = station did not answer a command.
- 4. Fatal errors are system own error codes. They can only be evaluated by Contec.

System errors:

The following error message is displayed on the primary control system : "System error : 0xYYYYYYYYY"

"Eprom write error!"	0x10000000
"Eprom read error!"	0x20000000
"System parameter destroyed!"	0x00080000

"Dryer can not be before station 1!"

A dryer has been connected to station 1 using the "left" connector. This is not possible, please connect the dryer using the "middle" connector.

"Dryer can not be after last station!"

A dryer has been connected to the last station using the "right" connector. This is not possible, please connect the dryer using the "middle" connector!"

"Connect dryer to station before!"

A dryer has been connected to the last station using the "left" connector, although there is a station before. This is not possible, please connect the dryer using the "middle" connector.

"Wait for servo answer timeout":

This error message occurs when the primary control system has sent a command to BUM, but has not received an answer from BUM in the appropriate time (timeout). The following error message appears on the control system :

"Wait for servo answer timeout : XX YY"

0x00000004

0x0000002

8. Maintenance of the Synchroprint 3000

The Synchroprint 3000 has been designed to operate 'maintenance-free' as far as possible. Only a few important service measures are necessary by the operator.

Task	Frequency	Comment/Action
Wipe clean the sealing	Weekly	The sealing band on the underside of the linear
band on the underside of		profiles must be wiped clean thoroughly and
all the linear profiles		lubricated with an oil-soaked cloth.

Task	Frequency	Comment/Action
Lubrication	Every 2 weeks	The machine must be lubricated via the grease nipple
	for the first 6	located on the centre shaft. MHM recommends "Berner
	months, then	Heavy-Duty Multi-Purpose Grease" or a comparable grease
	quarterly	with the following technical specifications:
	thereafter	 Water-repellent, lithium grease
		 Minimum melting point of approx. +195° C
		 Effective lubrication range from -20° C to +120° C
Cleaning	Daily	Remove all residues from the Synchroprint 3000 remaining
		from production materials such as inks and adhesives etc.
		Clean, tidy and sweep the printshop area.
Cleaning	Weekly	Wash off all anodized parts of the Synchroprint 3000 with
		an appropriate cleaner. Clean all inspection glasses and
		displays. Clean or replace the protective foil on the touch
		screen.

Task	Frequency	Comment/Action
Check	Daily	The inspection glass of the water separator/trap must be
inspection glass		checked for condensed water. The level must not exceed
on water		the red mark; otherwise the automatic relief aperture may
separator/trap		become clogged or defective.
Clean	Monthly	The entire water separator/trap is attached to the pressure
automatic relief		regulator with a bayonet lock. Take off the water
aperture		separator/trap and clean the automatic relief aperture.

9. Warranty

This section details the terms and conditions of the warranty which must be observed <u>in addition</u> to MHM's general terms and conditions of business.

Warranty and liability claims for personal injury and material damage are **<u>excluded</u>** if they can be attributed to or are a result of one or several of the following:

- Improper use of the Synchroprint 3000.
- Incorrect assembly, operation or maintenance of the Synchroprint 3000 by the operator.
- Operation of the machine with defective safety devices and/or safety devices which are missing/removed or not in correct working order.
- Failure to comply with the safety instructions in this document with regard to transportation, assembly, start-up, installation, operation, control and maintenance of the Synchroprint 3000.
- Failure to comply with the Operating Instructions.
- Unauthorised modifications to the Synchroprint 3000 (e.g. disassembly of original MHM components and/or use of any non-original MHM components)
- Unauthorised modifications to any part of the drive or control systems (e.g. change of control components or frequency converters).
- Lack of monitoring and maintenance of machine parts/components subject to wear and tear.
- Repair measures, maintenance or service work carried out by unauthorised persons.
- Use of lubricants other than those recommended by MHM.
- Operation of the machine under technical conditions other than those specified by MHM (e.g. excessive power supply voltage and/or excessive air pressure).
- Damage by any foreign object and/or force majeure.
- Omission of specified maintenance, service measures and procedures.
- Operation of the Synchroprint 3000 by untrained personnel.