INSTALLATION MANUAL FOR SSC-1000 CONTROL SYSTEMS ON PART REVOLUTION CLUTCH MACHINES

IMPORTANT: PLEASE REVIEW THIS ENTIRE PUBLICATION BEFORE INSTALLING, OPERATING OR MAINTAINING THE SOLID-STATE CLUTCH/BRAKE CONTROL SYSTEM.

5795 Logistics Parkway • Rockford, Illinois 61109 • Toll Free 1-800-922-7533 (USA only) • Phone (815) 874-7891
Fax (815) 874-6144 • Web Site: www.rockfordsystems.com • E-Mail: customerservice@rockfordsystems.com
Manual No. KSL-212
TABLE OF CONTENTS

SSC-1000 Part Revolution Solid-State Control

Section 1—IN GENERAL ..............................................................3 - 10
Section 2—Introduction ...........................................................11 - 15
Section 3—INSTALLATION OF SSC-1000 CONTROL SYSTEM
Components ........................................................................16 - 33
    Literature Folder ..............................................................16
    Control Box ......................................................................16 - 19
    Dual Solenoid Air Valve and Muffler Assembly .................20
    Filter-Regulator-Gauge and Lubricator (FRL) Assembly ....20
    Air Pressure Switch ..........................................................21
    Check Valves for Counterbalance System ......................21
    Opti-CAM™ Assembly .....................................................21 - 23
    Sprocket Set .....................................................................23
    Chain ................................................................................23
    Palm Button Assembly .....................................................24 - 27
    Foot Switch (Optional) ......................................................27
    Supervisory Control Station .............................................28
    Lockout Air Valve .............................................................29 - 30
    Main Power Disconnect Switch........................................30
    Motor Starter .....................................................................31
    Custom or Special Control Box ........................................31
    Flywheel and Gear Covers ..............................................31
    Collateral Equipment .......................................................31
    Point-of-Operation Safeguards .........................................31
Other Installation Considerations .........................................31 - 33
Section 4—PROGRAMMING .....................................................34 - 49
Setup of Control System ......................................................34
Initial Setup Procedure .......................................................34
Programming Overview ......................................................35
    Brake Monitor ms ...........................................................36
    Clear Stroke .....................................................................37
    Clear Batch ......................................................................37
    Batch Preset .....................................................................38
    Timed-Inch ms ................................................................38
    Anti-tie-down ms ............................................................39
    PLS Output .......................................................................39
    PLS Delay ms ..................................................................40
    PLS On Time ms ............................................................40
    PLS Counter .....................................................................41
    User Inputs ........................................................................41 - 42
    Stop-Time Measurement Test ms ....................................43
    Reference Cycle .............................................................44
    Automatic Single Mode ...................................................45
    Automatic Single Timer sec ............................................45
    Inch/Top-Stop Mode ........................................................45A
    SPM Display Calibration % ..............................................45A
    Default Settings .............................................................45B
    Variable Continuous Top-Stop ........................................46 - 47
Optional Modes of Operation ................................................48 - 49
Section 5—OPERATING CONSIDERATIONS .........................50 - 51
Section 6—FAULT MESSAGES ..............................................52 - 54
Section 7—MAINTENANCE & INSPECTION .........................55 - 56
Section 8—METHODS OF SAFEGUARDING .........................57 - 58
RETURN MATERIALS REQUEST FORM ...............................59
ORDER FORM ......................................................................60

FIGURES

Figure 2.1 Block Diagram ..........................................................14
Figure 3.1 Opti-CAM™ & Tachometer Generator ..................22
Figure 3.2 Cam and Switch Settings .........................................22
Figure 3.3 Palm Button Assembly Installation ....................24
Figure 3.4 Illustration of Electrical System ...........................28
Figure 3.5 Illustration of Lockout Installation .........................29
Figure 4.1 Initial Setup Procedure Flowchart ........................34
Figure 4.2 Initial Information on Display ...............................34
Figure 4.3 Main Program Menu Flowchart .............................35
Figure 4.4 Brake Monitor Flowchart ......................................36
Figure 4.5 Clear Stroke Flowchart ..........................................37
Figure 4.6 Clear Batch Flowchart ............................................37
Figure 4.7 Batch Preset Flowchart ..........................................38
Figure 4.8 Timed Inch Flowchart ..........................................38
Figure 4.9 Anti-tie-down Flowchart ........................................39
Figure 4.10 PLS Output Timing Chart ....................................39
Figure 4.11 PLS Delay Flowchart ..........................................40
Figure 4.12 PLS On Time Flowchart ......................................40
Figure 4.13 PLS Counter Flowchart ........................................41
Figure 4.14 User Input Fault Messages Chart ........................41
Figure 4.15 Input # 1 - 4 Flowchart .......................................42
Figure 4.16 STM Test Flowchart ............................................43
Figure 4.17 Reference Cycle Flowchart ..................................44
Figure 4.18 ASingle Mode Flowchart ....................................45
Figure 4.19 ASingle Tmr Flowchart .......................................45
Figure 4.19A Inch/Top-Stop Mode Flowchart .........................45A
Figure 4.19B SPM Display Calibration Flowchart ..................45A
Figure 4.19C Default Settings Flowchart ...............................45B
Figure 4.20 Top-Stop Chart ....................................................46
Figure 4.21 Var SPM Low Lim Flowchart ...............................47
Figure 4.22 Var SPM High Lim Flowchart ..............................47
Figure 4.23 Var SPM Flowchart .............................................47
Figure 4.24 Optional Modes Setup Flowchart .........................48

TABLES

Table 3.1 OSHA Safety Distance Chart ................................25
Table 3.2 Lockout Air Valve Part No. Chart ............................30
Table 4.1 Quick Reference Table ...........................................49
Table 6.1 Fatal Fault Messages ............................................52 - 53
Table 6.2 General Fault Messages ........................................54

© 2017 Rockford Systems, LLC All rights reserved. Not to be reproduced in whole or in part without written permission. Litho in U.S.A.
SECTION 1—IN GENERAL
SSC-1000 Part Revolution Solid-State Control

Safety Precautions

“⚠️ DANGER” Danger is used to indicate the presence of a hazard which WILL cause SEVERE personal injury if the warning is ignored.

“⚠️” THIS SAFETY ALERT SYMBOL IDENTIFIES IMPORTANT SAFETY MESSAGES IN THIS MANUAL. WHEN YOU SEE THIS SYMBOL ⚠️, BE ALERT TO THE POSSIBILITY OF PERSONAL INJURY, AND CAREFULLY READ THE MESSAGE THAT Follows.

Efficient and safe machine operation depends on the development, implementation and enforcement of a safety program. This program requires, among other things, the proper selection of point-of-operation guards and safety devices for each particular job or operation and a thorough safety training program for all machine personnel. This program should include instruction on the proper operation of the machine, instruction on the point-of-operation guards and safety devices on the machine, and a regularly scheduled inspection and maintenance program. Rules and procedures covering each aspect of your safety program should be developed and published both in an operator’s safety manual, as well as in prominent places throughout the plant and on each machine. Some rules or instructions which must be conveyed to your personnel and incorporated into your program include:

⚠️ DANGER Never place your hands or any part of your body in this machine.

⚠️ DANGER Never operate this machine without proper eye, face and body protection.

⚠️ Never operate this machine unless you are fully trained and instructed and unless you have read the instruction manual.

⚠️ Never operate this machine if it is not working properly — stop operating and advise your supervisor immediately.

⚠️ Never use a foot switch to operate this machine unless a point-of-operation guard or device is provided and properly maintained.

⚠️ Never operate this machine unless two-hand trip, two-hand control or presence sensing device is installed at the proper safety distance. Consult your supervisor should you have any questions regarding the proper safety distance.

⚠️ Never tamper with, rewire or bypass any control or component on this machine.

A company’s safety program must involve everyone in the company, from top management to operators, since only as a group can any operational problems be identified and resolved. It is everyone’s responsibility to implement and communicate the information and material contained in catalogs and instruction manuals to all persons involved in machine operation. If a language barrier or insufficient education would prevent a person from reading and understanding various literature available, it should be translated, read or interpreted to the person, with assurance that it is understood.

FOR MAINTENANCE AND INSPECTION ALWAYS REFER TO THE OEM’s (ORIGINAL EQUIPMENT MANUFACTURER’S) MAINTENANCE MANUAL OR OWNER’S MANUAL. If you do not have an owner’s manual, please contact the original equipment manufacturer.

(Continued on next page.)
SECTION 1—IN GENERAL

SSC-1000 Part Revolution Solid-State Control

OSHA’s Act and Federal Regulations

Since the enclosed equipment can never overcome a mechanical deficiency, defect or malfunction in the machine itself, OSHA (Occupational Safety and Health Administration) has established certain safety regulations that the employers (users) must comply with so that the machines used in their plants, factories or facilities are thoroughly inspected and are in first-class operating condition before any of the enclosed equipment is installed.


Duties:
Sec. 5. (a) Each employer —
(1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees;
(2) shall comply with occupational safety and health standards promulgated under this Act.
(b) Each employee shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to this Act which are applicable to his own actions and conduct.

2. OSHA’s Code of Federal Regulations, Subpart O, that an employer (user) must comply with include:

Section 1910.211 Definitions
Section 1910.212 (a) General Requirements for all Machines
Section 1910.217 Mechanical Power Presses
Section 1910.219 (b)(1) Mechanical Power-Transmission Apparatus (Flywheel and Gear Covers)


4. OSHA’s Publications

These publications can be acquired by contacting:
US Department of Labor
Occupational Safety and Health Administration
Washington, DC 20210

ANSI Safety Standards for Machines

The most complete safety standards for machine tools are published in the ANSI (American National Standards Institute) B11 series. The following is a list of each ANSI B11 Standard available at the printing of this publication.

B11.1 Mechanical Power Presses
B11.2 Hydraulic Presses
B11.3 Power Press Brakes
B11.4 Shears
B11.5 Ironworkers
B11.6 Lathes
B11.7 Cold Headers and Cold Formers
B11.8 Drilling, Milling and Boring
B11.9 Grinding Machines
B11.10 Sawing Machines
B11.11 Gear Cutting Machines
B11.12 Roll Forming and Roll Bending
B11.13 Automatic Screw/Bar and Chucking
B11.14 Coil Slitting Machines
B11.15 Pipe, Tube and Shape Bending
B11.16 Metal Powder Compacting Presses
B11.17 Horizontal Hydraulic Extrusion Presses
B11.18 Coil Processing Systems
B11.20 Safety Requirements for Manufacturing Systems/Cells
B11.21 Lasers
B11.22 CNC Turning Machines
B11.23 Machining Centers
B11/TR1 Ergonomic Considerations for the Design, Installation and Use of Machine Tools
B11/TR2 Mist Control
B11/TR3 Hazard ID and Control
B11/TR4 Control Reliability

These standards can be purchased by contacting:

American National Standards Institute, Inc.
11 West 42nd Street
New York, New York 10036
(212) 642-4900

OR

AMT - The Association of Manufacturing Technology
7901 Westpark Drive
McLean, Virginia 22102-4269
(703) 827-5211

(Continued on next page.)
SECTION 1—IN GENERAL
SSC-1000 Part Revolution Solid-State Control

National Safety Council Safety Manuals and Data Sheets
Other good references for safety on machine tools are the National Safety Council’s Safety Manuals and Data Sheets. These manuals and data sheets are written by various committees including the Power Press, Forging and Fabricating Executive Committee. The following publications are available for all types of machines:

MANUALS
Safeguarding Concept Illustrations - 6th Edition
Forging Safety Manual

DATA SHEETS
Bench and Pedestal Grinding Wheel Operations 12304-0705
Boring Mills, Horizontal Metal 12304-0269
Boring Mills, Vertical 12304-0347
Coated Abrasives 12304-0452
Cold Shearing Billets and Bars in the Forging Industry 12304-0739
Degreasing (Liquid), Small Metal Parts 12304-0537
Dies, Setup and Removal of Forging Hammer 12304-0716
Drill Presses, Metalworking 12304-0335
Drills, Portable Reamer 12304-0497
Drop Hammers, Steam 12304-0720
Electrical Controls for Mechanical Power Presses 12304-0624
Forging Hammer Dies, Setup and Removal of 12304-0716
Forging Presses, Mechanical 12304-0728
Gear-Hobbing Machines 12304-0362
Handling Materials in the Forging Industry 12304-0551
Kick (Foot) Presses 12304-0363
Lathes, Engine 12304-0264
Milling Machines, Metalworking 12304-0364
Planers, Metal 12304-0383

Power Press (Mechanical) Point-of-Operation Safeguarding, Concepts of 12304-0710
Power Press Point-of-Operation Safeguarding: Type A and B Movable Barrier Devices 12304-0712
Power Press Point-of-Operation Safeguarding: Presence Sensing Devices 12304-0711
Power Presses (Mechanical), Inspection and Maintenance of 12304-0603
Power Presses (Mechanical), Removing Pieceparts from Dies in 12304-0534
Power Press, Setting Up and Removing Dies 12304-0211
Press Brakes 12304-0419
Robots 12304-0717
Saws, Metal (Cold Working) 12304-0584
Shapers, Metal 12304-0216
Shears, Alligator 12304-0213
Shears, Squaring, Metal 12304-0328
Upsetters, 12304-0721

These manuals and data sheets can be purchased by contacting:
National Safety Council
1121 Spring Lake Drive
Itasca, IL 60143-3201
1-800-621-7615 ext. 2199

For additional safety information and assistance in devising, implementing or revising your safety program, please contact the machine manufacturer, your state and local safety councils, insurance carriers, national trade associations and your state’s occupational safety and health administration.

Warranty, Disclaimer and Limitation of Liability

WARRANTY
Rockford Systems, LLC warrants that this product will be free from defects in material and workmanship for a period of 12 months from the date of shipment thereof. ROCKFORD SYSTEMS LLC’S OBLIGATION UNDER THIS WARRANTY IS EXPRESSLY AND EXCLUSIVELY LIMITED to repairing or replacing such products which are returned to it within the warranty period with shipping charges prepaid and which will be disclosed as defective upon examination by Rockford Systems, LLC. This warranty will not apply to any product which will have been subject to misuse, negligence, accident, restriction and use not in accordance with Rockford Systems, LLC’s instructions or which will have been altered or repaired by persons other than the authorized agent or employees of Rockford Systems, LLC. Rockford Systems, LLC’s warranties as to any component part is expressly limited to that of the manufacturer of the component part.

DISCLAIMER
The foregoing Warranty is made in lieu of all other warranties, expressed or implied, and of all other liabilities and obligations on the part of Rockford Systems, LLC, including any liability for negligence, strict liability, or otherwise, and any implied warranty of merchantability or fitness for a particular purpose is expressly disclaimed.

LIMITATION OF LIABILITY
Under no circumstances, including any claim of negligence, strict liability, or otherwise, shall Rockford Systems, LLC be liable for any incidental or consequential damages, or any loss or damage resulting from a defect in the product of Rockford Systems, LLC.
SECTION 1—IN GENERAL
SSC-1000 Part Revolution Solid-State Control

Operator Safety Precaution Pamphlet – attachment for anyone operating this machine

Accompanying this equipment is an 8-1/2” x 11” operator safety precaution pamphlet, Part No. KSC-000, for anyone operating the machine where this equipment will be installed. This precaution pamphlet is to be given to all operators, including setup people, maintenance personnel and supervisors.

This pamphlet should also be attached to the machine, readily accessible and visible to the operator. (A hole in the corner of this precaution pamphlet is provided for attaching purposes.) Additional copies of this precaution are available. Please call, write, fax, or use the order form found on a later page in this manual.

When a language barrier or insufficient education prevents a person from reading or understanding the contents of this operator safety precaution pamphlet, you should either translate this information or have it read or interpreted to the person. Make sure that the person understands the information. To order this pamphlet in Spanish, use Part No. KSC-000S; in French, use Part No. KSC-000F.

This precaution pamphlet must be reviewed daily.
Danger Sign(s) to be Mounted on Machine

Accompanying this equipment is a 5” x 6” polyethylene danger sign, Part No. KSC-054. This sign MUST BE PERMANENTLY MOUNTED IN A PROMINENT LOCATION on the machine where this equipment is installed. This sign must be in a LOCATION THAT IS EASILY VISIBLE to the operator, setup person, or other personnel who work on or around this machine. ALWAYS mount this sign with bolts or rivets when installing the enclosed equipment. If a foot switch is ordered, a 5” x 6” polyethylene danger sign, Part No. KSC-055 is provided. This sign must also be mounted according to the above instructions.

If any danger sign becomes destroyed or unreadable, the sign must be replaced immediately. Contact factory for replacement danger sign(s).

Never operate this machine unless the danger sign(s) is in place.

“Mechanical Power Press Safety” Booklet

A copy of Booklet No. MPPS (“Mechanical Power Press Safety”) is enclosed. This booklet is copied verbatim from the CFR (Code of Federal Regulations) and contains all relevant sections of the OSHA Regulations concerning power presses with which an employer (user) must comply. The enclosed equipment must be installed, used and maintained to meet these regulations. Specifically, any time a foot switch is used, a suitable point-of-operation safeguard or device must be used to prevent bodily injury. In addition, every press must be provided with a point-of-operation safeguard! Please review this booklet before installing the enclosed equipment. If you are unfamiliar with these detailed safety regulations, which include regulations on safeguarding the point of operation properly, you may want to attend our regularly scheduled machine safeguarding seminars. To obtain detailed information about these training seminars, please call, fax or write. Our address, telephone and fax numbers are on the front cover of this manual.

(Continued on next page.)
SECTION 1—IN GENERAL

SSC-1000 Part Revolution Solid-State Control

Danger and Warning Labels Provided on Control Box

The illustrated danger and warning labels are affixed to all control boxes provided. All personnel operating or working around the machine, where this control box is installed, must be required to read, understand and adhere to all dangers and warnings. If any of these labels become destroyed or unreadable, labels MUST be replaced. Contact factory immediately for replacement labels and do not operate machine until danger and warning labels are all in place.
SECTION 1—IN GENERAL

SSC-1000 Part Revolution Solid-State Control

FOR REPLACEMENT SIGNS
CALL, E-MAIL, OR FAX FACTORY OR USE ORDER FORM
ON BACK COVER.

Rockford Systems, LLC
5795 Logistics Parkway
Rockford, Illinois 61109
Toll Free: 1-800-922-7533 (USA only)
Phone: (815) 874-7891
Fax: (815) 874-6144
Web Site: www.rockfordsystems.com
E-Mail: customerservice@rockfordsystems.com

Photo 1.2
SSC-1000 Control Box

DANGER

CLOSING RAM AND DIE

You are exposed to moving machine parts that can crush, dismember, and cause death.

DO NOT operate this machine without safeguards in place.

NEVER place your hands or any part of your body in this machine.

FAILURE to obey will result in loss of fingers or limbs, or could cause death.

This sign does not cover all dangers that could happen while operating this machine.

Do not remove or cover this sign

Label No. KST-134

(Continued on next page.)
SECTION 1—IN GENERAL
SSC-1000 Part Revolution Solid-State Control

Press Components Identification
PART REVOLUTION OBI PRESS

Part Revolution OBI Press

Part Revolution Straight-Side Press

Rockford Systems, LLC
Call: 1-800-922-7533
SECTION 2—INTRODUCTION

SSC-1000 Part Revolution Solid-State Control

General Description of Components in the System

A complete control package for part revolution clutch machines includes the following:

1. Literature folder (see page 16) containing installation manuals, “Operator Safety Precaution” Pamphlet, danger sign(s), electrical control schematics, “Mechanical Power Press Safety” Booklet, and our latest catalog
2. Control box - standard (custom or special includes motor controls and/or disconnect switch) with danger and warning signs
3. Dual solenoid air valve assembly including exhaust muffler
4. Filter-regulator-gauge and lubricator assembly including connector and mounting bracket
5. Air pressure switch (two required if machine has air counterbalance)
6. Check valve for counterbalance system (if required)
7. Opti-CAM™ with DC tachometer generator, spring base, and 25’ cable
8. Sprocket set to drive Opti-CAM™ (if required)
9. Chain (10 feet with master link) (if required)
10. Palm button assembly (Includes two black palm buttons, two palm button guards, one red emergency-stop button, and mounting boxes. When the “continuous” mode of operation is included, one yellow top-stop button with mounting box is furnished.) If multiple operator stations are on a machine, more than one assembly is furnished.
11. Foot switch (optional) - If multiple operator stations are on a machine, more than one foot switch is furnished.
12. Supervisory control station (Required when multiple operator stations are used on the machine; one station is required for each operator.)
13. Other required components and safeguarding that may be necessary for machine (See packing list for details.)

Individual packages may vary in contents. However, a packing list is always enclosed showing exactly what material was shipped on this order. Please check the components actually received against this packing list immediately. In most cases, this control package system includes two-hand control which can be used as a point-of-operation safeguarding device provided the palm buttons are mounted correctly and at the proper safety distance (see formulas on pages 25 and 26 of this manual). If the optional foot switch is provided, a safeguard must always be used. Examples of safeguards include barrier guards, presence sensing devices, pullbacks, restraints, gates, or two-hand control. The hands or any other part of the body of an operator, maintenance person, setup person, etc., must never be put into the point-of-operation hazard for any reason, at any time.

These controls can neither cure nor overcome a malfunctioning machine. They cannot compensate for or prevent a mechanical defect or failure of a machine part. These controls cannot prevent a repeat or unintended stroke (cycle) resulting from a mechanical malfunction, defect or failure of the machine itself.

Preliminary Steps Before Installation

Before proceeding with the installation of the enclosed equipment, you should undertake the following preliminary steps.

1. Read and make sure you understand this entire Installation Manual.
2. Refer to the front cover, other line drawings and photos, then make a rough sketch of your installation to plan the location of the enclosed equipment on the machine.
3. This may be an opportunity to strip down the entire machine by removing all components, piping, wire, etc. Clean, paint and check the entire mechanical condition of the machine, including the clutch and brake, for proper adjustment and required replacement parts before proceeding with the installation of the furnished equipment.
Preliminary Steps Before Installation (continued)

4. Please make sure the machine is in first-class condition. Before starting any installation, it is essential that the machine is thoroughly inspected. Be sure that all mechanical components and all collateral equipment are in first-class operating condition. Your inspection should be done according to the machine manufacturer’s installation and maintenance instruction manual. Special attention must be given to the machine clutch and brake. The clutch and brake must be maintained in an operating condition which is within the specifications set by the machine manufacturer. If you have any doubts or questions concerning the condition of the machine, contact the machine manufacturer for assistance.

   Repair or replace all parts not operating properly before proceeding.

   Inspection and maintenance programs must be established and implemented to keep machines in first-class condition. Programs must include thorough inspections of each machine on a weekly basis and records kept of these inspections. Any part of the machine that is worn, damaged or is not operating properly must be replaced immediately or repaired before the machine is used.

5. Verify that the machine is in first-class condition and operating properly; shut off all power to the machine. Padlock the disconnecting means in the “off” position and do not actuate the machine again until the installation of all package components has been completed. Lockout/tagout energy isolation procedures must always be practiced and enforced.

6. If the machine has a mechanical-friction clutch (usually found on older presses and press brakes), an air cylinder is required to engage and disengage the clutch. Install the air cylinder in the most logical place to actuate the clutch. Please see the enclosed Installation Manual No. KSL-096 if an air cylinder was ordered. Note: On machines equipped with air-operated friction clutches, an air cylinder is not required.

Safeguard Interlocks and Other Types Of Interlocks

SAFGUARD INTERLOCKS

The machine will not operate or must not be operated until you either: (1) Electrically interlock or (2) Mechanically guard the machine’s point of operation with a safeguarding system or device.

When an electrically interlocked method of safeguarding the point of operation is chosen, connect the interlock to the safeguard interlock terminal 86 (marked with “★”) in the control box, as shown on the control wiring schematic.

Point-of-operation electrically interlocked safeguards, when opened, prevent or stop normal machine operation during operator cycling modes. Examples of these types of interlocks are barrier guard interlocks and gate device interlocks.

When a mechanical guard or device (nonelectrically interlocked) is chosen, the safeguard interlock terminal (marked with “★”) is not used. In order for the machine to operate with the use of a mechanical guard or device, the safeguard interlock terminal 86 (“★”) must be connected to (COM). Please see the wiring schematic.

   The mechanical guard or device must be properly installed, used and maintained and must always prevent all personnel from bodily injury.

   If the mechanical guard or device is not used, is removed, or is defeated, an electrically interlocked method of safeguarding must be used and connected to the safeguard interlock terminal 86 (marked with “★”).

   Never operate this machine without point-of-operation safeguarding.

Note: Additional equipment that can help safeguard machines includes indexing tables, electrically controlled sliding bolsters, and automatic feeding systems. These systems usually require additional control logic circuitry. Please contact the factory for a quotation itemizing the interface equipment necessary for these types of systems as well as others (see page 28). Please send complete schematics, including the hydraulic and pneumatic systems, of the particular system to be interfaced.
Safeguard Interlocks and Other Types Of Interlocks (continued)

OTHER ELECTRICAL INTERLOCKS

There are basically two types of electrical interlocks as applied to machine control circuitry:

• Interlocks for the purpose of personnel protection, as explained on page 12.
• Interlocks intended for the purpose of protecting the machine and its control components.

There are other locations for interlocks that, when opened, prevent all machine functions. Examples of these types of interlocks are safety block electrical cut-off systems, lubricating systems, die protection equipment, and tonnage monitoring systems.

Be sure to connect the various electrical interlocks to the proper terminals, in the control box, according to the machine wiring schematics. If your schematics do not include these electrical interlocks, please send this information to the factory and they can be added to your drawings. There is an additional charge for this service.

General Features of the SSC-1000 Control

• Redundant/cross-checking microprocessors from different manufacturers
• Redundant microprocessor logic power supplies
• Two (2) captive-contact solenoid relays
• 1 x 16-character LCD display/membrane keypad operator interface
• Time-based brake monitor
• Stop-time measurement (STM) test
• Regular, adjustable timed inch, and inch/top-stop
• Automatic continuous top stop
• Four (4) user programmable diagnostic inputs
• Seven-digit stroke counter and batch counter with preset
• Interface provided for light curtain(s)
• One (1) PLS output (N.O.) - time/counter based
• LCD display choices while in run mode: Mode-SPM, Stop Time, Stroke Counter, or Batch Counter
• Fused outputs (F1, F2, F3, and F4)
• Standard modes of operation:
  Two-hand inch (regular, adjustable, and inch/top-stop)
  Two-hand single stroke
  Foot-single stroke
  Continuous
  Automatic single stroke
• Optional modes of operation
  Foot maintained continuous
  Continuous-on-demand
  One-hand trip (use with light curtain only)
  Two-hand maintained continuous

(Continued on next page.)
SECTION 2—INTRODUCTION
SSC-1000 Part Revolution Solid-State Control

Theory of Operation
The SSC-1000 press control consists of three major components: the control module, the keypad display module, and the Opti-CAM™ assembly, which provides all press timing and motion detection. See the block diagram in Figure 2.1 below.

Figure 2.1
Block Diagram
SECTION 2—INTRODUCTION
SSC-1000 Part Revolution Solid-State Control

SSC-1000 Control Box

The SSC-1000 Press Control is a full-featured, dual-microprocessor based press control for part revolution mechanical power presses. This control system is designed to comply with current ANSI Standards B11.1, B11.3, B11.19, and OSHA Regulations 1910.217. It is a replacement for existing relay-based control systems, found in user’s plants or can be furnished for new or rebuilt presses.

The basic control consists of a multi-tap voltage control transformer, color-coded terminal strips, ground indicator light, selector switches, keypad/display, a master control relay, and the SSC-1000 control module assembly. As standard, this is furnished in a 20"W x 16"H x 8"D NEMA 12 enclosure. The master-control relay is used to provide a hard-wired emergency-stop function.

When this control box is to be wired to an existing main motor starter, the starter must have a 120 volt coil and in most cases, an auxiliary contact. If the starter does not have these components and they are not readily available, please contact Rockford Systems, LLC for a replacement magnetic starter.

The system uses redundant inputs from devices such as palm buttons, foot switches, and light curtain(s). The system output to the solenoid valve(s) is provided by two safety relays, with force-guided contacts, which are socketed to the printed circuit board. These output relays are independently controlled and cross-checked by the microprocessors. This allows control-reliable operation of the outputs in the event of a single control component failure. Each microprocessor also has its own logic power supply. This decreases the possibility of simultaneous control failure because of a fault within the power supply system. All inputs and outputs are optically isolated for electrical noise immunity. Timing and motion detection of the crankshaft is provided by the Opti-CAM™ unit. The operator provides setup information through the use of the keypad/display and messages are shown on the 16-character LCD display.

Overview of Sequence of Operation - Single Stroke

The redundant inputs are used by both processors to control the operation of the press. When the actuating means is depressed, and primary safeguard interlock conditions are met, the processors turn on their appropriate relays (K1 and K2). The dual solenoid valve is energized sending air to the clutch and brake. The crankshaft is engaged to the flywheel drive and the brake is released allowing the ram to move. Within the motion reference time window, the microprocessors must see a voltage signal from the DC tachometer in the Opti-CAM unit that represents motion or a motion fault is generated. If the actuating means is released prior to the holding angle, the press slide movement will stop. The stroke can be finished by depressing the actuating means again.

Once the cycle is started, the Opti-CAM provides inputs for holding and top-stop angles. When the holding/t-stop cams change state, the actuating means can be released at this point and the stroke will continue until the holding/t-stop cams change state again. The processors turn off their appropriate relays (K1 and K2). The dual solenoid valve is deenergized, exhausting air from the clutch and brake. The crankshaft is disengaged from the flywheel drive and the brake is applied stopping the ram.

The control starts a timer when the relays are deenergized. This timer stops when the motion from the tachometer in the Opti-CAM has stopped. This stop-time value is then compared against the brake stop-time set point. If the stop time exceeds this setting, a BRAKE FAULT message is displayed. The reason for the increased stop time should be investigated and corrected before operating the press again. (See page 36 for programming the brake monitor.)

(Continued on next page.)
SECTION 3—INSTALLATION OF COMPONENTS

SSC-1000 Part Revolution Solid-State Control

Installation of Control Package Components

LITERATURE FOLDER

Included with every shipment is a literature folder. This includes installation manuals, “Operator Safety Precaution” Pamphlet (Part No. KSC-000), danger sign(s) (below), electrical schematics, and a booklet entitled “Mechanical Power Press Safety” (MPPS). These publications must be available and fully understood by all appropriate personnel, before any retrofit installation begins. Please notify Rockford Systems, LLC immediately if there are any questions about the components received.

Danger Sign (Standard) - Part No. KSC-054

As illustrated on page 7, a 5” x 6” polyethylene danger sign is supplied. It is imperative that this sign be firmly attached to the machine in a location readily visible to all personnel. Suggested mounting instructions are shown on the reverse side of this sign.

This sign must be the first thing mounted to prevent any possibility that it might be overlooked. If this sign becomes destroyed or unreadable, it must be replaced immediately. Contact factory for replacement and do not operate the machine until the danger sign is in place.

Foot Switch Danger Sign - Part No. KSC-055

If a foot switch is ordered, a 5” x 6” polyethylene danger sign is furnished. This sign must be firmly attached to the machine in a location readily visible to all personnel.

CONTROL BOX WITH SSC-1000 CONTROL MODULE ASSEMBLY

The clutch/brake control box furnished for your machine may vary with the equipment furnished. The standard control box is furnished with the keypad/display on the front of the enclosure; however, if it is a custom control box with a starter and disconnect, the control box enclosure will be larger. The keypad/display, ground indicator light and off/program/run selector can also be furnished in a remote station. This option provides easier accessibility to the operator. Clutch/brake and motor controls can also be furnished in a floor standing control console.

(Continued on next page.)
SECTION 3—INSTALLATION OF COMPONENTS

Control Module Assembly
The solid-state control module assembly below, Part No. FTL-024, measures 7"W x 8"H x 4"D. It is mounted to the panel with four shock/vibration mounts and four 1/4-20 x 1/2" Allen-head bolts. The module case has four keyhole mounting slots that allow for easy removal, without removing the Allen-head mounting bolts, if replacement is required. To remove the module from the shock/vibration mounts, turn power off to the control. Remove all terminal strips from the left and right sides of the printed circuit board, (P1, P2, P3, P4, and P5). Loosen the four Allen-head bolts and lift up on the module. Pull the unit straight out.

There are red and green LEDs that allow for visual indication of control operation and the status of inputs and outputs. All LED names are indicated on the cover of the module next to each LED. See photo below. The five green power/status LEDs provide indication of proper operation and logic power to both CPUs (Central Processing Units).

Photo 3.3
Top View of Control Module with Cover
Control Module Assembly (continued)

If necessary, the cover of the module can be taken off by removing the eight screws on the corners and pulling the top straight off over the relays. The dual CPU circuit board is then exposed as shown in the photo below.

Photo 3.4
Top View of Control Module without Cover

The only user serviceable parts on the “dual CPU” board are the EPROM, the relays, and the fuses. Fuse F1 is the circuit protection for the CPU board. Fuse F2 is the circuit protection for the PLS output. Fuse F3 is circuit protection for the light curtain cycle relays. Fuse F4 is circuit protection of the K1 and K2 relays. If any changes to the circuit boards are required, instructions will be sent with the new parts. See page 56 for instructions on replacing the EPROM.
SECTION 3—INSTALLATION OF COMPONENTS

SSC-1000 Part Revolution Solid-State Control

The keypad/display can be furnished in a remote enclosure up to a maximum of 150’ from the SSC-1000 control module. Display modes during the machine run cycle are MODE - SPM, STOP TIME, STROKE COUNTER, or BATCH COUNTER. All programming is accessed by a key selector switch on the keypad/display unit.

If the keypad/display is supplied in a remote enclosure, please refer to the section on wiring (page 32) and the electrical schematic prints that came with the control box on the proper wiring connection.

**Mounting the Control Box**

Solidly mount the control box in an accessible location, either on or near the machine to be controlled. A convenient location will keep conduit runs to a minimum length.

Note: On inclinable (O.B.I.) presses, caution must be used to ensure that the control box location does not interfere with the ability to incline the press to its maximum position. On inclined presses, the length and flexibility of each individual conduit run must be carefully planned.

Although operation of this control will not be adversely affected by normal machine operation, excessive shock or vibration may require shock mounting in specific applications.

The key must be removed from the off/program/run selector switch after the control is programmed and before the machine is released to production. All keys must be supervisory controlled at all times.
SECTION 3—INSTALLATION OF COMPONENTS

SSC-1000 Part Revolution Solid-State Control

DUAL SOLENOID AIR VALVE AND MUFLER (if furnished, see enclosed Installation Manual No. KSL-036 or KSL-037)

A minimum of 30 to 40 PSI must be maintained at the valve for proper operation. Use pipe size at least as large as the valve ports. An accumulator (air surge tank) is recommended. The tank should be installed in the incoming air line directly ahead of the valve to assure sufficient air volume to the clutch and brake.

The exhaust air muffler must be kept clean at all times. Never operate the machine unless the muffler is clean. The muffler must be removed and cleaned on a regular basis. If the machine has a split clutch and brake, two valves may be required. Both valves must be dual monitored valves with an electrical output signal.

FILTER-REGULATOR-GAUGE AND LUBRICATOR ASSEMBLY (FRL) (if furnished, see enclosed Installation Manual No. KSL-208. Reference pages 29 and 30 for installation instructions on the lockout air valve.)

The filter cleans air that goes to the solenoid air valve (and air cylinder, if furnished). The regulator and gauge are used to adjust air pressure to the proper amount to engage the clutch and release the brake. The lubricator keeps the solenoid air valve, the clutch/brake, or the air cylinder (if required), properly lubricated.

The filter-regulator unit with one threaded pipe plug, lubricator, gauge, mounting bracket, and a connector or nipple are shipped together.

Unpack the filter-regulator unit and install the connector between the filter/regulator lubricator (see arrow for air flow direction). Tighten this assembly and position the two units with both bowls in alignment. Be sure to check air flow direction and the location of the dual valve to avoid excessive piping.

Choose an appropriate location on the machine for mounting this assembly. If possible, it should be accessible from floor level.

Install the pressure gauge in the threaded port opposite the mounting surface and plug the unused port. Attach the mounting bracket to the machine and then mount the FRL Assembly using the lock nut supplied.

The length of the air line run to the surge tank is not critical; however, the port and pipe sizes should be maintained.

Fill the lubricator with a good quality lubricant (see OEM’s specifications) to the level indicated by the maximum fill line on the transparent reservoir. Do not overfill. When the machine is cycled, the lubricator drip rate may be adjusted according to the Instruction Manual. Please check the machine owner’s manual for proper specifications for oil, if required. Some clutch and brake assemblies do not require lubrication.

The air filter must be kept clean at all times. Never operate the machine unless the air filter is clean.

The lubricator must not be filled while under pressure.

(Continued on next page.)
SECTION 3—INSTALLATION OF COMPONENTS
SSC-1000 Part Revolution Solid-State Control

PART NO. CTD-062 - AIR PRESSURE SWITCH (If furnished, see enclosed Installation Manual No. KSL-165)

The clutch/brake or cylinder air supply must be monitored by an air pressure switch on all part revolution power presses. If an air counterbalance is used, it must also be monitored by a separate air pressure switch. Please check the machine owner’s manual for the minimum suggested air pressure for these switches.

Mount these switches at any convenient location on the machine. Electrical and pneumatic connections to these switches are required; therefore, their location is determined by the installer. Flexible hose is often used for air connections. Since only pressure is being monitored, tubing size can be small and length is not critical. These switches are set to open the electrical circuit any time pressure falls below their preset level. They are normally set in the 30 to 40 PSI range to prevent unnecessary opening due to line pressure during the clutch engaging period. The minimum setting for the air counterbalance pressure may be in the 20 to 30 PSI range (see machine manufacturer’s recommendations).

CHECK VALVES FOR COUNTERBALANCE SYSTEMS (If furnished, see enclosed Installation Manual No. KSL-038)

If the machine is equipped with an air counterbalance system, a check valve is required by OSHA to prevent a sudden loss of air pressure to the system. This valve is available in various sizes. The size is determined by the pipe size of the incoming air supply to the air tank, which supplies the air to the counterbalance system. The valve should be installed in the air line just before the tank. When complete energy isolation is required, for maintenance on the machine or counterbalance system, be sure that air is released from the counterbalance, cylinders, tank, etc.

⚠️ Do not install this valve between the cylinders and tank.

PART NO. CMC-081 - OPTI-CAM™ WITH DC TACHOMETER GENERATOR

All control timing and motion detection is accomplished by the Opti-CAM unit. Designed in a 6" x 6" hinge cover enclosure, this compact unit has a 3/4" double-ended shaft with heavy-duty bearings. It can be mounted to an existing cam switch with a coupling, or by itself with or without a spring-loaded base. It has two redundant adjustable photoelectric “cams” for holding/single stroke top-stop angle, one additional adjustable photoelectric “cam” for continuous top-stop angle and single stroke permissive. The DC tachometer is used for motion detection and brake monitoring. Photo 3.12 shows the major components of the Opti-CAM unit.

Photo 3.10

Photo 3.11

Photo 3.12

Part No. CMS-081 - Opti-CAM, Base, and Cable Assembly

Photo 3.12

Double-Ended Shaft

Spring-Loaded Base

Adjusting Wrench

Cable Assembly

(Continued on next page.)
SECTION 3—INSTALLATION OF COMPONENTS
SSC-1000 Part Revolution Solid-State Control

OPTI-CAM™ AND DC TACHOMETER GENERATOR (continued)

Opti-CAM and DC Tachometer Generator Setup

Locate and mount the Opti-CAM unit and spring base (if used) to the press. Make sure the press stroke is at TDC (Top Dead Center). Couple the shaft to the press crankshaft either directly, or with a set of sprockets and chain, with the keyway up, facing the cover of the enclosure. The Opti-CAM must be driven CW (clockwise) from the left side (looking from the front), and CCW (counterclockwise) viewed from the right side.

After mounting the Opti-CAM with the keyway up, facing the cover of the enclosure (with the press stroke at TDC), set the cams and switches, with the supplied wrench, in the following order:

1. Determine the holding-angle setting and set both SS#1/SS#2 ON at this angle on the dial. (Factory setting is 170°.) The holding-angle setting is the point in the cycle where the actuating means can be released and the cycle continues until the single stroke top-stop angle is reached; a stop signal is given and the press stops near TDC. See Figure 3.2.

2. Determine the single stroke top-stop angle setting and set SS#1/SS#2 OFF at this angle on the dial. (Factory setting is 300°.) The single stroke top-stop angle setting is the point in the cycle that the dual solenoid valve is deenergized allowing the press to stop near TDC. See Figure 3.2.

3. If the SS#1/SS#2 dwell (OFF Angle setting minus ON Angle setting) is <180°, set S1 switch on the printed circuit board, shown in Figure 3.1, to <180° (Factory Setting). If SS#1/SS#2 dwell is >180°, set switch S1 to >180°.

4. The factory setting for Continuous Top-Stop (CTS) Cam ON is 300°. This will need to be changed based on the stopping ability of the press in the continuous mode of operation. If the continuous mode of operation will not be used, leave this setting at 300°. See Figure 3.2. If the press has a variable speed drive, set the CTS ON Angle to the earliest angle necessary to stop at TDC when the press is at its maximum speed. Next, set the Variable Speed Continuous Top-Stop table as described on page 46.

5. Do not change the CTS OFF Angle, which is set to 345° and S2 which is set to <180° (Factory Setting). This is the single stroke permissive angle. No adjustment should be necessary.

---

Figure 3.1
Top View of Opti-CAM with DC Tachometer Generator
(Cover Open)

Figure 3.2
Cam and Switch Settings
OPTI-CAM™ AND DC TACHOMETER GENERATOR (continued)

When installing a chain and sprocket, or coupling to the 3/4" shaft, start with the machine at TDC (Top Dead Center) and the keyway pointing up. Connect the chain or tighten the coupling.

Refer to the Wiring Section on page 32 or to the electrical schematic prints that came with the control box for proper wiring connection of the Opti-CAM™ to the terminal plate in the control box.

PART NO. CML-000 - SPROCKET ASSEMBLY (if furnished)

Two sprockets may be supplied with an identical number of teeth (usually 48). They are used to drive the Opti-CAM assembly. The standard set consists of one sprocket with the proper bore, keyway and set-screws to mount directly on the shaft extension of the resolver. The other sprocket is flat with a small rough bore. This sprocket is normally mounted on the end of the machine crankshaft by drilling and tapping two suitable mounting holes in the sprockets and crankshaft and using spacer blocks, if necessary, to provide clearance for the chain. These sprockets use a standard ANSI No. 35 roller chain and connecting links.

When installing the drive chain, it will be necessary to adjust the length in order to obtain proper action of the spring-loaded sub-base of the Opti-CAM assembly. The normal position of the two hinged plates, on the cam assembly, is approximately parallel with each other when the chain is installed. The spring is normally positioned between the two plates when the chain is pulling down (see Photo 3.14). When the chain is pulling up, the spring is above the top plate (see Photo 3.15).

If a chain and sprocket drive already exists on a particular machine, it may be modified to drive the Opti-CAM. It must always rotate exactly one revolution for each revolution of the machine crankshaft, therefore, the number of sprocket teeth must always match.

Note: If the press has a direct-coupling drive arrangement, the sprockets and spring-loaded base are not required.

PART NO. CMS-515 - ROLLER CHAIN (if furnished)

Photo 3.13

Photo 3.14

Photo 3.15

PART NO. CMS-515 - ROLLER CHAIN (if furnished)

Photo 3.16

10 feet of ANSI No. 35 chain is usually furnished with each part revolution control system. This chain is to be used with the supplied set of sprockets. A master link for coupling the chain is furnished and this is used to connect the chain once the exact length has been determined.

(Continued on next page.)
SECTION 3—INSTALLATION OF COMPONENTS

SSC-1000 Part Revolution Solid-State Control

PALM BUTTON ASSEMBLY (if furnished, see Installation Manual No. KSL-071 or KSL-073)

When the standard modes of operation of off, inch, single stroke, automatic single stroke, and continuous are furnished, the palm button assembly will consist of four buttons (two run/inch buttons with ring guards, one red emergency-stop button and one yellow top-stop button). Along with these buttons will be four mounting boxes (three double hub and one single hub). Prior-action push buttons for continuous are furnished separately. If the continuous mode is not furnished, then the yellow button, mounting box, and prior-action stations are not supplied. Optionally available are the Touchdown or chrome “light push” palm buttons. These may be furnished in place of the standard black run/inch palm buttons. The palm buttons can be assembled as shown in Figure 3.3 and mounted according to the requirements of the application. Nipples for connecting and running wire are not furnished.

⚠️ Install the palm “run” buttons in such a way that it requires the use of both hands to cycle the press.

Figure 3.3

Note: These operator controls are furnished when the “continuous” mode of operation is provided.

The two “run” palm buttons, on part revolution type machines, can be used to initiate a machine cycle and as a method of safeguarding the point of operation. In both instances, OSHA and ANSI have established certain requirements for these buttons. For your convenience we have reproduced the pertinent sections of OSHA Regulation 1910.217 as well as the safety distance formula for two-hand control from ANSI B11.1. The sections below cover two-hand control as an initiating means and two-hand control as a point-of-operation safeguard.

Please read and make sure you understand the following sections before proceeding with the mounting of the two “run” buttons.

OSHA 1910.217 (b)(7)(v) for two-hand control used as a method of INITIATING a press cycle only:

(v) Two-hand controls for single stroke shall conform to the following requirements:

(a) Each hand control shall be protected against unintended operation and arranged by design, construction, and/or separation so that the concurrent use of both hands is required to trip the press.

(b) The control system shall be designed to permit an adjustment, which will require concurrent pressure from both hands during the die closing portion of the stroke.

(c) The control system shall incorporate an antirepeat feature.

(d) The control system shall be designed to require release of all operators’ hand controls before an interrupted stroke can be resumed.

Note: The above description covers the use of two palm buttons as a method of initiating a press cycle. It does not provide any form of point-of-operation safeguarding. Some other properly applied and installed guard or device must be provided in accordance with OSHA 1910.217 Section (c) in this application.

(Continued on next page.)
SECTION 3—INSTALLATION OF COMPONENTS
SSC-1000 Part Revolution Solid-State Control

PALM BUTTON ASSEMBLY (continued)

OSHA 1910.217 for two-hand control used as a method of SAFEGUARDING the point of operation as follows:

(c)(3) Point-of-Operation Devices

(i) Point-of-operation devices shall protect the operator by:

(e) Requiring the application of both of the operator’s hands to machine operating controls and locating such controls at such a safety distance from the point of operation that the slide completes the downward travel or stops before the operator can reach into the point of operation with his hands;

(vii) The two-hand control device shall protect the operator as specified in paragraph (c)(3)(i)(e)(see above) of this section.

(a) When used in press operations requiring more than one operator, separate two-hand controls shall be provided for each operator, and shall be designed to require concurrent application of all operators’ controls to activate the slide. The removal of a hand from any control button shall cause the slide to stop.

(b) Each two-hand control shall meet the construction requirements of paragraph (b)(7)(v) of this section. (See paragraph (b)(7)(v) on previous page.)

(c) The safety distance \( D_s \) between each two-hand control device and the point of operation shall be greater than the distance determined by the following formula: (See Table 3.1.)

\[
D_s = 63 \text{ inches/second} \times T_s; \text{where:}
\]

\[
D_s = \text{minimum safety distance (inches)}
\]

\[
63 \text{ inches/second} = \text{hand speed constant; and}
\]

\[
T_s = \text{stopping time of the press measured at approximately 90° position of the crankshaft rotation (seconds)}.
\]

(d) Two-hand controls shall be fixed in position so that only a supervisor or safety engineer is capable of relocating the controls.

Chart for OSHA Formula Only

\[
T_s = \text{Stopping Time in Milliseconds}
\]

\[
D_s = \text{Safety Distance for Two-Hand Controls}
\]

<table>
<thead>
<tr>
<th>( T_s )</th>
<th>( D_s )</th>
<th>( T_s )</th>
<th>( D_s )</th>
<th>( T_s )</th>
<th>( D_s )</th>
<th>( T_s )</th>
<th>( D_s )</th>
<th>( T_s )</th>
<th>( D_s )</th>
</tr>
</thead>
<tbody>
<tr>
<td>.055—3-1/2”</td>
<td>.158—10”</td>
<td>.261—16-1/2”</td>
<td>.365—23”</td>
<td>.468—29-1/2”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.063—4”</td>
<td>.166—10-1/2”</td>
<td>.269—17”</td>
<td>.373—23-1/2”</td>
<td>.476—30”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.072—4-1/2”</td>
<td>.174—11”</td>
<td>.277—17-1/2”</td>
<td>.380—24”</td>
<td>.484—30-1/2”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.079—5”</td>
<td>.182—11-1/2”</td>
<td>.285—18”</td>
<td>.388—24-1/2”</td>
<td>.492—31”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.087—5-1/2”</td>
<td>.190—12”</td>
<td>.293—18-1/2”</td>
<td>.396—25”</td>
<td>.500—31-1/2”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.095—6”</td>
<td>.198—12-1/2”</td>
<td>.301—19”</td>
<td>.404—25-1/2”</td>
<td>.507—32”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.103—6-1/2”</td>
<td>.206—13”</td>
<td>.309—19-1/2”</td>
<td>.412—26”</td>
<td>.515—32-1/2”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.111—7”</td>
<td>.214—13-1/2”</td>
<td>.317—20”</td>
<td>.420—26-1/2”</td>
<td>.523—33”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.119—7-1/2”</td>
<td>.222—14”</td>
<td>.325—20-1/2”</td>
<td>.428—27”</td>
<td>.531—33-1/2”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.126—8”</td>
<td>.230—14-1/2”</td>
<td>.333—21”</td>
<td>.436—27-1/2”</td>
<td>.539—34”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.134—8-1/2”</td>
<td>.238—15”</td>
<td>.341—21-1/2”</td>
<td>.444—28”</td>
<td>.547—34-1/2”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.142—9”</td>
<td>.246—15-1/2”</td>
<td>.349—22”</td>
<td>.452—28-1/2”</td>
<td>.555—35”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.150—9-1/2”</td>
<td>.253—16”</td>
<td>.357—22-1/2”</td>
<td>.460—29”</td>
<td>.563—35-1/2”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.158—10”</td>
<td>.261—16-1/2”</td>
<td>.365—23”</td>
<td>.468—29-1/2”</td>
<td>.571—36”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Based on the 63 inches/second hand speed constant.

(Continued on next page.)
SECTION 3—INSTALLATION OF COMPONENTS

SSC-1000 Part Revolution Solid-State Control

PALM BUTTON ASSEMBLY (continued)

According to ANSI B11.1 - 1988, the total stopping time of the press (for two-hand control) should include the total response time of the control system and the time it takes the press to cease slide motion. The following formula should be used when calculating the safety distance:

\[ D_s = K (T_s + T_c + T_{bm}) \]

where:

- \( K \) = the hand speed constant = 63 inches/second.
- \( T_s \) = the stop time of the press measured from the final deenergized control element, usually the air valve.
- \( T_c \) = the response time of the control.

Note: \( T_s + T_c \) are usually measured by a portable or built-in stop-time measuring device.

\( T_{bm} \) = the additional time allowed by the brake monitor (brake performance monitor) before it detects stop time deterioration.

When the press stroke STOP command or stopping performance monitor (brake monitor) timer or angle setting is changed, because the machine is taking longer to stop, the safety distance should be recalculated. The safeguarding device should also be placed at a greater safety distance if the stopping time or distance has increased.

Note: When obtaining the stopping time using the ANSI formula, a stopping position of crankshaft rotation is not provided. (The OSHA formula uses 90°.) To calculate the safety distance, the stop signal should be given on the downstroke at a point that would provide the longest stopping time.

When applying the two palm “run” buttons to meet the requirements for a “point-of-operation safeguarding device,” make certain these buttons are located on the machine so they meet the minimum safety distance required by the OSHA or ANSI formulas.

Simply stated, safety distance is the mounting and location of the palm buttons at a distance where the operator cannot reach into the point-of-operation hazard before the ram has stopped or completed its downward travel.

To obtain the stopping time at 90° position of crankshaft rotation, either a built-in system (provided with the control system) or portable stop-time measurement unit can be used. (For a portable unit, please contact Rockford Systems, LLC)

WHEN USING PACKAGES THAT INCLUDE “TWO-HAND CONTINUOUS,” FOOT SWITCH SINGLE STROKE, OR “AUTOMATIC SINGLE STROKE” MODE(S) OF OPERATION:

A method of safeguarding the point of operation must be provided before using the continuous, foot switch single stroke, or automatic single stroke mode(s) of operation.

The machine must not be operated until you either: (1) Electrically interlock or (2) Mechanically guard the machine’s point of operation with a safeguarding system or device.

Install either the electrically interlocked method of safeguarding or the mechanical guard or device.

When an electrically interlocked method of safeguarding the point of operation is chosen, connect the interlock to the safeguard interlock terminal 86 (marked with “∗”) in the control box, as shown on the control wiring schematic.

In order for the machine to operate when using a mechanical guard or device (nonelectrically interlocked), the safeguard interlock terminal 86 (marked with “∗”) must be connected to (COM).

Note: When the mechanical guard or device is removed for other modes of operation, the safeguard interlock terminal 86 must be disconnected from (COM).

(Continued on next page.)
PALM BUTTON ASSEMBLY (continued)

Red Emergency-Stop Palm Button (Required)

The red emergency-stop button is used to stop the machine anywhere in its cycle. When the operator depresses the button, it should stop the hazardous motion of the machine immediately. This palm button assembly includes a double hub mounting box. It can be located between the two “run” palm buttons as part of the operator’s control station. (Please refer to page 24.) This button has a mechanical latch that must be reset after depressing the button. Note: More than one emergency-stop button may be furnished for additional control stations or for convenience.

Photo 3.17

Yellow Top-Stop Palm Button

The yellow top-stop button is used to stop the machine when it is in the “walk-away“ continuous mode of operation. When the operator depresses the button, almost anywhere in the stroke of the machine, it will stop or stop the machine at top dead center (TDC). This palm button assembly includes a double hub mounting box. It can be located between the two “run” palm buttons, along with the red emergency-stop button, as part of the operator’s control station. (Please refer to page 24.)

Photo 3.18

Continuous Prior-Action Pushbutton Stations [Part No. LLD-700 (continuous) and Part No. LLD-702 (auto)]

OSHA Regulation 1910.217 (b)(7) requires for continuous operation that:

“(viii) Those clutch/brake control systems which contain both single and continuous functions shall be designed so that completion of continuous circuits may be supervised by the employer. The initiation of continuous run shall require a prior action or decision by the operator in addition to the selection of ‘Continuous’ on the stroking selector, before actuation of the operating means will result in continuous stroking.”

These prior-action stations have a recessed push button that must be depressed and released by the operator before depressing the two palm buttons in order to initiate the continuous or automatic RUN type of press operation. This is sometimes referred to as “walk-away“ continuous.

Mount the remote stations on the machine so that it is convenient for the operator to depress and release these push buttons prior to depressing the two palm buttons. These buttons may be mounted as part of the operator’s control station. After releasing the button, the operator has a 5-second time period in which to depress the “run” buttons. If the operator should wait longer than this time setting, the prior action must be depressed and released again.

PART NO. CTD-011 - FOOT SWITCH (optional) (See enclosed Installation Manual No. KSL-001)

If a foot control is used, all personnel must be warned that it is NOT a point-of-operation safeguard. It is the responsibility of the employer (user) to always provide an appropriate guard and/or device to prevent bodily injury whenever a foot switch is used to initiate a machine cycle. (See OSHA 1910.217 paragraph (c) for safeguarding.)

When using a foot switch, please see page 12 for information on electrically interlocking or mechanically guarding the point of operation. When installing the optional foot switch, be sure that the wiring schematics are referenced for proper connections. Be sure to maintain the foot switch in first-class condition. It must always be wired properly and the protection on top, sides and front must always remain in place.

Never use a foot switch to operate this machine unless a point-of-operation guard or device is provided and properly maintained.

The mechanical guard or device must be properly installed, used and maintained. It must always prevent all personnel from bodily injury.

If the mechanical guard or device is not used, is removed or is defeated, an electrically interlocked method of safeguarding must be used and connected to the safeguard interlock terminal marked with “★”.

(Continued on next page.)
PART NO. LLD-701 - SUPERVISORY CONTROL STATION (Required for multiple operator stations)

When multiple operator stations are required, this supervisory control station is furnished separately for each operator station. Please refer to the electrical control schematics furnished with your order for proper wiring of each station. (Please see page 33 for further details.)

Photo 3.21

Figure 3.4 - Illustration of Electrical System on Part Revolution Power Press

Other components that could be interfaced to the control include:

- Interlocked Guard
- Light Curtain
- Radio Frequency
- Gate
- Air Blow Off
- Counter
- Indexing Table
- Sliding Bolster
- Die Protection
- Bar/Run Station
- Feed (System)
- Bumper Pin
- Flywheel Brake
- Tachometer
- Digital Shut-Height Indicator
- Brake Monitoring
- Hour Meter
- Material Feeding Equipment
- Straightener
- Reel Cradle
- Die Light
- Conveyor
- Motion Detector
- Bearing Heat Sensors
- Overload Protection
- Robot
- Programmable Limit Switch
- Lubrication System

The electrical or electronic schematics are required if Rockford Systems is to interface this equipment to the control.

(Continued on next page.)
**SECTION 3—INSTALLATION OF COMPONENTS**

**SSC-1000 Part Revolution Solid-State Control**

**Other Required Components** *(Not supplied as part of standard package unless specifically ordered)*

**LOCKOUT AIR VALVE**

The OSHA Regulation, under Subpart J, Section 1910.147, requires that all employers develop a complete hazardous energy control program. This regulation covers the servicing and maintenance of machines and equipment where the unexpected energization or start-up of the machines or equipment, or release of stored energy could cause injury to employees. The following should be included when establishing a program:

1. Use procedures for affixing lockout or tagout devices to energy isolating devices. Also, disable machines or equipment to prevent unexpected energization, start-up, or release of stored energy in order to prevent injury to employees.

2. After establishing a hazardous energy control program, periodic inspection of the energy control procedure must be done at least annually.

3. Training of employees to ensure that the purpose and function of the energy control program is understood.

4. When establishing procedures for shutdown:
   - Identify all energy sources.
   - Know the hazards of the energy to be controlled.
   - Determine the methods or means to control energy.

5. Hazardous energy sources associated with machinery are:
   - Electrical
   - Pneumatic
   - Hydraulic
   - Fluids and Gases
   - Mechanical

Illustration of where a Lockout Air Valve could be located in the air line on part revolution power presses is as follows:

**Figure 3.5 - Illustration of Lockout Valve Installation**

When ready to install a lockout valve (if supplied), remove plastic dust covers from the valve port connections. Avoid getting particles such as chips, sealing compounds or scale in the piping or in the valve. This can cause valve failure and damage. See page 30 for additional instructions on installing lockout valves.

(Continued on next page.)
SECTION 3—INSTALLATION OF COMPONENTS
SSC-1000 Part Revolution Solid-State Control

Other Required Components (continued)

ENERGY ISOLATION AIR VALVES

Three types of energy isolation air valves can be furnished:

Manual Valve

This valve is installed on the air line going to the machine. To exhaust air in the line, the handle is pushed in. This valve is available in pipe sizes 3/4” and 1”.

Manual Pilot Valve

This valve is used for air systems that are larger than those used with the manual valve. Pipe sizes are 1-1/2” and 2-1/2”.

Solenoid Pilot Valve

This valve has a remote electrical control which turns the air supply on or off. Pipe sizes range from 1/4” to 2-1/2”.

Note: When any of these valves are manually or electrically closed, the downstream air is automatically drained, providing there is not a check valve or obstruction of some kind in the air line.

Table 3.2

<table>
<thead>
<tr>
<th>VALUE TYPE</th>
<th>PART NUMBER</th>
<th>IN-OUT PORT</th>
<th>EXHAUST PORT</th>
<th>VALVE BODY WITHOUT MUFFLER</th>
<th>MUFFLER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual (Handle)</td>
<td>RCD-076</td>
<td>3/4”</td>
<td>1”</td>
<td>RCD-086</td>
<td>RCS-044</td>
</tr>
<tr>
<td>RCD-077</td>
<td></td>
<td>1”</td>
<td></td>
<td>RCD-087</td>
<td>RCS-044</td>
</tr>
<tr>
<td>Manual Pilot (Handle)</td>
<td>RCD-078</td>
<td>1-1/2”</td>
<td>1-1/2”</td>
<td>RCD-088</td>
<td>RCS-006</td>
</tr>
<tr>
<td>RCD-079</td>
<td></td>
<td>2-1/2”</td>
<td>2-1/2”</td>
<td>RCD-089</td>
<td>RCS-038</td>
</tr>
<tr>
<td>Solenoid Pilot (Handle &amp; Electric Solenoid)</td>
<td>RCD-080</td>
<td>1/4”</td>
<td>1/2”</td>
<td>RCD-090</td>
<td>RCS-042</td>
</tr>
<tr>
<td>RCD-081</td>
<td></td>
<td>3/4”</td>
<td>1”</td>
<td>RCD-091</td>
<td>RCS-005</td>
</tr>
<tr>
<td>RCD-082</td>
<td></td>
<td>1”</td>
<td>1”</td>
<td>RCD-092</td>
<td>RCS-006</td>
</tr>
<tr>
<td>RCD-083</td>
<td></td>
<td>1-1/2”</td>
<td>1-1/2”</td>
<td>RCD-093</td>
<td>RCS-006</td>
</tr>
<tr>
<td>RCD-084</td>
<td></td>
<td>2-1/2”</td>
<td>2-1/2”</td>
<td>RCD-094</td>
<td>RCS-038</td>
</tr>
</tbody>
</table>

Main Power Disconnect Switch

A main power disconnect switch may have been supplied in this control package shipment, either in a custom control box or separately. This switch is designed to disconnect the primary voltage to the press and lock it out. Please refer to the enclosed wiring schematics for proper wiring of this switch, if furnished separately.

OSHA Regulation 1910.217 (b)(8), ANSI Standards B11.1 and B11.3 require that:

1. A main power disconnect switch capable of being locked in the “Off” position shall be provided with every power press control system.

2. If the machine already has a main power disconnect switch, it must be checked for the “locking off” and lockout feature. Some switches use construction which can be easily altered mechanically to comply with this requirement. If this is not possible, or an electrical disconnect switch is not provided, then you must obtain and install a proper disconnect switch. (For proper disconnect switch, please contact Rockford Systems, LLC)
SECTION 3—INSTALLATION OF COMPONENTS
SSC-1000 Part Revolution Solid-State Control

Motor Starter
A reversing or nonreversing motor starter may have been supplied with this control package. The main purpose of this starter is to drop out the main drive motor and the hard-wired emergency-stop relay when a power failure occurs. Please refer to the enclosed wiring schematics for proper wiring of this starter. If an existing starter is used, a 120 VAC coil and auxiliary (main motor forward) contact are required.

OSHA Regulation 1910.217 (b)(8) and ANSI Standards B11.1 and B11.3 require that:

1. The motor start button shall be protected against accidental operation.

2. All mechanical power press controls shall incorporate a type of drive motor starter that disconnects the drive motor from the power source in the event of control voltage or power source failure. It shall also require operation of the motor start button to restart the motor when voltage conditions are restored to normal.

The above requirements are normally met by using a magnetic motor starter. This starter operates with a 120 VAC coil which is powered from the secondary of the control transformer on the control panel. Refer to the electrical schematics supplied to obtain details of how to wire the starter and associated motor start/stop push buttons.

For proper tie-in of the furnished clutch/brake controls, the starter requires an auxiliary normally open contact. (For proper starter, please contact Rockford Systems, LLC)

Custom or Special Control Box
In place of the standard clutch/brake control box, you may have ordered and received a custom or special control box. This box usually includes a magnetic motor starter and disconnect switch complying to the previous requirements. Be sure to wire in primary voltage and components to terminals as indicated on the enclosed wiring schematics. 120 volt electrical power to clutch/brake controls, operator controls, solenoids, etc., must be obtained from the furnished transformer with isolated secondary.

Flywheel and Gear Covers
According to OSHA 1910.219 and ANSI B15.1 for Mechanical Power-Transmission Apparatus, all rotating components including flywheels, gears, sprockets and chain, sheaves and belts, shaft ends, etc., must be covered if below a seven-foot level from floor or platform. Note: ANSI states it should be a nine-foot level. Adequate cover material and brackets must be fabricated to retain these components in event of shaft or wheel mounting failure.

Collateral Equipment
All collateral press room and plant equipment such as spring or air-slide counterbalances, die cushions, feeding equipment, and robots must be safeguarded if they create hazards to personnel.

Point-of-Operation Safeguards
OSHA Regulation 1910.217(c)(i) and (ii) require that: “It shall be the responsibility of the employer (user) to provide and ensure the usage of point-of-operation guards or properly applied and adjusted point-of-operation devices on every operation performed on a mechanical power press.”

Please refer to Section 8—Methods of Safeguarding, for examples of point-of-operation safeguards for power presses.

Other Installation Considerations

PIPING
A manual shut-off valve and lockout must be installed in the air line usually just before the filter-regulator-lubricator assembly to meet OSHA 1910.147 Lockout/Tagout requirements. However, a separate lockout valve could be furnished for each air-operated system on the machine such as counterbalance, die cushion, clutch/brake, air cylinder, and blow-off.

From the “lockout” valve, connect at the “In” threaded opening of the filter-regulator (as indicated by the cast-in arrows). Maintain an appropriate pipe size throughout.

Most approved pipe or hose can be used for the air system on the press. The main concern is to make sure the size is consistent throughout the system in order to avoid restriction. Be sure to use pipe size at the dual valve which is at least the same size as the valve ports. Keep runs as short as possible.

SECTION 3—INSTALLATION OF COMPONENTS

SSC-1000 Part Revolution Solid-State Control

Other Installation Considerations (continued)

The air components require clean air. Blow all lines clean of water, dirt, scale, etc., before making final connection. Drain water from filter bowl regularly. Should this bowl refill in a short period of time, it may indicate the need for a larger filter in the main air supply line. The air filter must be kept clean at all times. Never operate the machine unless the air filter is clean and water is drained.

WIRING

National Electrical Code practices, including NFPA-79, are usually followed for wiring the control system, especially color coding and the use of numbered wire markers on both ends of every wire. Color coding is Black for line voltage and control at line voltage, Red for 120 VAC control circuits, Blue for 24 VDC control circuits, White for current carrying ground (commonly referred to as the “Neutral”), and Green for any equipment grounding conductor. All terminal blocks in the control cabinet are color coded for easy identification.

1. Install and wire the main disconnect switch (unless one already exists or is furnished in a custom control) using black wire. Follow wiring instructions shown on the electrical schematics. Make sure this switch is capable of being locked in the “Off” position only.

2. Install and wire the motor starter (unless one already exists or is installed in a custom control box) using black wire for the power; red and white wires for the coil and interlock circuit; and blue for the motor forward connection to the SSC-1000 control module.

If an existing starter does not have a 120 VAC coil, a new 120 VAC coil must be obtained, installed and wired per the schematics provided before proceeding. An additional auxiliary normally open contact may also be required in the starter. (Do not run a separate 120 volt line to the motor for operating the clutch/brake controls.)

3. All necessary outputs from the SSC-1000 control module are wired from the green printed circuit board to the terminal block. All necessary inputs need to be wired to the green printed circuit board terminal strip P2 for installation.

4. Run two black power lines (any two lines) from the load side of the disconnect switch (or from the line side of the motor starter) to the control enclosure. Connect the two black wires to the proper terminals on the control transformer (see electrical schematic or transformer nameplate for proper connections for different primary voltages).

Note: If a custom control box with a disconnect has been provided, this step is not necessary.

5. Run a green ground wire from the incoming system ground to the control panel.

6. Wire the motor starter and start/stop control according to the connection schematics. Note: If a custom control box with a starter has been provided, this step is not necessary.

7. To wire the dual solenoid air valve, see the enclosed Installation Manual No. KSL-036 or KSL-037 and the wiring schematics. The exhaust air muffler must be kept clean at all times. Never operate the machine unless the muffler is clean.

Opti-CAM™ Assembly

The cable for the Opti-CAM is shielded. It can be run in conduit or sealtite, or run loose. This cable carries low voltage signals and should not be located near or in the same conduit or raceway with wires for higher voltages. The cable has a connector for easy installation and maintenance. 25’ of cable is supplied as standard and can be cut to length if required. Do not splice or interrupt signals. The cable should be wired directly into the SSC-1000 control module terminal strip P3, and blue terminals as shown in the schematic prints that were sent with the control box. Please contact Rockford Systems, LLC if a longer cable is required.

Keypad/Display - Remote

If the keypad/display is to be remotely mounted from the control box, an optional seven-conductor shielded cable can be run in conduit or sealtite with other low voltage signal conductors. This cable carries low voltage signals and should not be located near or in the same conduit or raceway with conductors for main power feeds or motor leads. 25’ of cable is supplied as standard and can be cut to length if required. Do not splice or interrupt signals. The cable should be wired directly into the SSC-1000 control module terminal strip P5, as shown in the schematic prints that were sent with the control box. Please contact Rockford Systems, LLC if a longer cable is required.
SECTION 3—INSTALLATION OF COMPONENTS

SSC-1000 Part Revolution Solid-State Control

WIRING (continued)

Air Pressure Switches
Run 1/2” nominal conduit from pressure switch(es) to the control box. Pull two red and two blue wires through conduit. Number per diagram and connect to terminals at both ends. These pressure switches always use the normally open contact which is held closed by normal air pressure. Loss of air pressure will open this contact and render the control inoperative. The “alarm” normally closed contact provides a signal to the user programmable diagnostic inputs.

Palm Button Assembly
These are normally wired as an assembly with the blue wires routed from the control box to the nearest palm button and then the others, as required, within the units. Wires between the two “run/inch” buttons are not connected back to the control box. If “Touchdown™” (proximity) palm buttons are furnished, please refer to the enclosed Installation Manual No. KSL-071 and the connection print.

If the palm button assembly is not bolted directly to the machine frame, then a separate green ground wire should be run from the control box to all palm buttons. Attach one end of the wire to each mounting box by a lug under one of the mounting bolts and the other end of the wire to the “GND” terminal in the control box to assure proper grounding.

These operator controls should be mounted in a convenient location, keeping ergonomics in mind. To comply with OSHA Regulations for “two-hand controls,” the “run/inch” buttons must be located according to the “minimum safety distance” requirements of each individual machine as defined by OSHA’s Code of Federal Regulations, Subpart O, 1910.217 (c)(3)(vii) (see page 25 of this manual). A stop-time measurement unit is necessary for checking stopping time before installation begins. After installation, the stopping time can be obtained from the built-in stop-time measurement testing mode (see page 43).

Supervisory Control Station (See page 28)
When two or more two-hand or foot switch operating stations are required on one machine, one supervisory control station is required at each operator station. This remote control station consists of one “station on” indicator light and a key-locked “off/on” selector switch in an enclosure. The “on” position allows the operator to use that station and the “off” position deactivates only that station. If all the supervisory control stations are in the “on” position, all two-hand palm buttons must be depressed within the timing period set in the Anti-Tie-Down (page 39) program in order to initiate a machine stroke. These supervisory control stations must be wired to prevent actuation of the clutch if all operating stations are turned off and controls are operational. See wiring schematics for proper wiring of these supervisory control stations.

Press Ground
The machine frame must always be firmly connected to ground in order to ensure that the control potential will never exceed 120 volts above ground. Run a green grounding wire from the control box to some convenient location directly on the machine frame. Connect one end solidly to the frame using a mounting bolt or other convenient means of attachment. Scrape any paint, rust, etc., from the area, to ensure an adequate ground connection. Connect the other end to the “GND” terminal in the control box.

Note: All exposed metal components, which may be touched by personnel during normal operation or adjustment, must be firmly grounded to the machine frame. The disconnect switch and motor starter should also be grounded if they are mounted separately.
SECTION 4—PROGRAMMING
SSC-1000 Part Revolution Solid-State Control

Setup of Control System

The flowchart in Figure 4.1 outlines the order and method of setting up and programming the SSC-1000 press control system on a part revolution press after installation. Refer to the LCD display on the control box or remote operator station.

Figure 4.1
Initial Setup Procedure Flowchart

<table>
<thead>
<tr>
<th>Step</th>
<th>Step Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Up Control</td>
<td>See Page 34</td>
</tr>
<tr>
<td>Program Brake Monitor</td>
<td>See Page 36</td>
</tr>
<tr>
<td>Run Reference Cycle Procedure</td>
<td>See Page 44</td>
</tr>
<tr>
<td>Adjust Opti-CAM Angles</td>
<td>See Page 22</td>
</tr>
<tr>
<td>Program User Inputs</td>
<td>See Pages 41-42</td>
</tr>
<tr>
<td>Program PLS Output</td>
<td>See Pages 39-41</td>
</tr>
<tr>
<td>Program Additional Settings</td>
<td>See Pages 37-40</td>
</tr>
<tr>
<td>Ready for Production</td>
<td>See Page 50</td>
</tr>
</tbody>
</table>

Initial Setup Procedure

After completing the installation of the control box and control components, the SSC-1000 press control system must be initially programmed in order to get the machine up and running. To do this, please follow the Initial Setup Procedure below.

1. Turn the main power disconnect switch for the control to the ON position and start the main motor. The following information is displayed on the LCD:

   VERSION X.XX
   (X.XX = current keypad/display firmware version)

   SYSTEM TEST
   (VERSION X.XX)
   (X.XX = current main CPU firmware version)

   SSC 1000

   SAFEGRD IN PLACE

2. After this information is displayed, press ENTER on the keypad if the answer is YES to the SAFEGRD IN PLACE question. The display message will indicate the position of the Program/Run selector switch as follows:

   Off
   if the selector switch is in the OFF position, the display message is OFF.

   SINGLE - SPM-000
   If the selector switch is in the RUN position, the display message is SINGLE - SPM-000.

   BRAKE MONITOR ms
   If the selector switch is in the PROG position, the display message is BRAKE MONITOR ms.

3. Turn the Program/Run selector switch to the PROG position. The display reads BRAKE MONITOR ms.

4. Change the brake monitor fault time setting from the factory setting of 50 ms, as outlined on page 36.

5. Run the reference cycle as outlined on page 44.

6. Adjust settings in the Opti-CAM™ unit as described on page 22.

7. Proceed to the Programming Overview on page 35.

Photo 4.1

(Continued on next page.)
**Programming Overview**

The following sections outline the programming of the SSC-1000 press control system on a part revolution press after installation of all components has been completed.

**MAIN PROGRAM MENU**

All programming is done by selecting **PROG** (Program) on the key selector switch as shown in Figure 4.3. Turn the keyed selector switch to the **PROG** position.

The LCD display will display one of the following program options from the list as shown. At the top of the list is **BRAKE MONITOR ms**. Pressing the ▼ and ▲ buttons on the keypad will scroll through the program options that can be modified. When the program option you want to edit is displayed, press **ENTER**. Once the required information is entered and the **ENTER** key is pressed again, the display returns to the main menu list. If incorrect information has been entered, return to the setting and reenter the correct information.

Each program option is described in detail on the following pages:

- **BRAKE MONITOR ms** ........................................................... 36
- **CLEAR STROKE** ................................................................. 37
- **CLEAR BATCH** ................................................................. 37
- **BATCH PRESET** ................................................................. 38
- **TIMED INCH ms** ............................................................... 38
- **ANTI-TIE-DOWN ms** .......................................................... 39
- **PLS DELAY ms** ................................................................. 39-40
- **PLS ON TIME ms** .............................................................. 39-40
- **PLS COUNTER** ................................................................. 39-41
- **INPUT #1** ........................................................................ 41-42
- **INPUT #2** ........................................................................ 41-42
- **INPUT #3** ........................................................................ 41-42
- **INPUT #4** ........................................................................ 41-42
- **STM TEST ms** ................................................................... 43
- **REFERENCE CYCLE** .......................................................... 44
- **ASINGLE MODE** ................................................................. 45
- **ASINGLE TMR sec** .............................................................. 45A
- **INCH/T-STOP MODE** ......................................................... 45A
- **SPM DISPLAY CALIBRATION %** ....................................... 45A
- **DEFAULT SETTINGS** .......................................................... 45B
- **VAR SPM LOW LIM** ......................................................... 46-47
- **VAR SPM HI LIM** .............................................................. 46-47
- **VAR SPM XXX = XXXXms** ............................................... 46-47

---

(Continued on next page.)
**BRAKE MONITOR ms**

Select the **PROG** position on the Program/Run selector switch. Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press **ENTER** when the LCD displays **BRAKE MONITOR ms**.

The display now reads: **XXX**

Where **XXX** = a number between 001 and 999 ms.

Press the ▼ and ▲ buttons on the keypad to increase or decrease the brake monitor fault set point. Pressing and holding the arrow keys will change the numbers at a rapid rate. Press **ENTER** to program the brake monitor fault set point to the displayed time and return to the main menu level. The LCD displays **BRAKE MONITOR ms** again.

If this is part of the **Initial Setup Procedure**, please return to step 5 on page 34.

**Function**

The brake monitor fault set point is automatically compared to the actual stopping time of the press to detect any increase. If the stop time exceeds the brake fault set point, the message **BRAKE FAULT** is displayed. This fault message must be cleared by pressing the **ENTER** key. After clearing the message, the machine can be cycled again. If the **BRAKE FAULT** message is displayed again, the machine should be turned off and checked to determine the reason for the excessive stopping time. If the stop time is greater than one (1) second. One second is the maximum stopping time.

Before programming the brake monitor fault set point, take several readings of the stopping time (in the hand single stroke mode of operation), on the upstroke of the press (stopping at TDC). The highest reading should be used to establish the fault set point. To calculate the fault set point, multiply the highest stop time reading by 1.1 (110%). Enter this calculated brake fault set point value as described above.

In most cases, the factory setting of the fault set point at 50 ms is too low and needs to be increased according to each individual machine’s stopping ability.

The brake monitor fault set point is normally programmed prior to running the press in a production mode of operation.

**Establishing the Brake Monitor Fault Set Point**

Select the **RUN** position on the Program/Run selector switch, the **SINGLE** position on the Stroke selector switch, and the **HAND** position on the Control selector switch. Cycle the press one time. If **BRAKE FAULT** is displayed, press **ENTER** to clear the message. Press the ▼ and ▲ buttons on the keypad to find the stopping time. Program the brake fault set point 100 ms higher than the stop time reading.

---

**Figure 4.4**

**BRAKE MONITOR Programming Flowchart**

```
**BRAKE MONITOR ms**

**SELECTED THE PROGRAM MENU**

**ITEM BRAKE MONITOR ms**

**XXX**

**= Current Brake Monitor Fault Set Point**

**PRESS THE DOWN AND UP ARROWS TO DECREASE OR INCREASE THE CURRENT SET POINT**

**PRESS **ENTER** TO PROGRAM THE BRAKE MONITOR FAULT SET POINT AND RETURN TO MAIN MENU**

**MAIN MENU**

Setting Type: Time - ms (milliseconds)

Range: 000 - 999 ms

Factory Setting: 50 ms
```

Select the **PROG** position on the Program/Run selector switch. Press **ENTER** when **BRAKE MONITOR ms** is displayed. Press the ▼ and ▲ buttons on the keypad until the time displayed is 100 ms higher than the stop time reading. Press **ENTER** to program this time. Return the Program/Run selector switch to the **RUN** position. Run ten tests noting each stopping time. The highest reading should be used to establish the fault set point. To calculate the fault set point, multiply the highest stop time reading by 1.1 (110%). Enter this calculated brake fault set point value as described previously.

---

(Continued on next page.)
CLEAR STROKE
Select the PROG position on the Program/Run selector switch.
Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press ENTER when the LCD displays CLEAR STROKE.
The display now reads: UP ARROW CONFIRM
Press the ▲ button on the keypad to clear the stroke counter, or press the ENTER button to abort the clear and return to the main menu level. The LCD again displays CLEAR STROKE.
Function
The 7-digit stroke counter is used to count strokes in the single or continuous modes of operation only and can be displayed when the Program/Run selector switch is in the RUN position.

CLEAR BATCH
Select the PROG position on the Program/Run selector switch.
Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press ENTER when the LCD displays CLEAR BATCH.
The display now reads: UP ARROW CONFIRM
Press the ▲ button on the keypad to clear the batch counter, or press the ENTER button to abort the clear and return to the main menu level. The LCD again displays CLEAR BATCH.
Function
The 7-digit batch counter is used to count strokes in the single or continuous modes of operation only and can be displayed when the Program/Run selector switch is in the RUN position.

Figure 4.5
CLEAR STROKE Programming Flowchart

Figure 4.6
CLEAR BATCH Programming Flowchart

(Continued on next page.)
**SECTION 4—PROGRAMMING**  
**SSC-1000 Part Revolution Solid-State Control**

**BATCH PRESET**  
Select the PROG position on the Program/Run selector switch. Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press ENTER when the LCD displays BATCH PRESET.  
The display now reads: XXXXXXX  
Where XXXXXXX = a number between 0 and 9999999.  
Press the ▼ and ▲ buttons on the keypad to increase or decrease the batch preset. Pressing and holding the arrow keys will change the numbers at a rapid rate. Press ENTER to program the batch preset to the displayed number and return to the main menu level. The LCD displays BATCH PRESET again.  

**Function**  
The press will cycle until it reaches this batch preset count. When the batch counter reaches this preset number, the machine stops and the message PRESET REACHED is displayed. Press ENTER to clear both the message and the batch counter. Entering 0 will disable the BATCH PRESET.

**TIMED INCH ms**  
Select the PROG position on the Program/Run selector switch. Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press ENTER when the LCD displays TIMED INCH ms.  
The display now reads: XXX  
Where XXX = a number between 0 and 999 ms.  
Press the ▼ and ▲ buttons on the keypad to increase or decrease the TIMED INCH timer. Pressing and holding the arrow keys will change the numbers at a rapid rate. Press ENTER to program the TIMED INCH timer to the displayed time and return to the main menu level. The LCD again displays TIMED INCH ms.  

**Function**  
Entering 0 will disable the TIMED INCH feature.

---

**Figure 4.7**  
**BATCH PRESET Programming Flowchart**

**Figure 4.8**  
**TIMED INCH Programming Flowchart**

---

(Continued on next page.)
ANTI-TIE-DOWN ms
Select the PROG position on the Program/Run selector switch. Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press ENTER when the LCD displays ANTI-TIE-DOWN ms.

The display now reads: XXXX
Where XXXX = a number between 100 and 7000 ms (.1 to 7 Seconds)
Press the ▼ and ▲ buttons on the keypad to increase or decrease the ANTI-TIE-DOWN timer. Pressing and holding the arrow keys will change the numbers at a rapid rate. Press ENTER to program the ANTI-TIE-DOWN timer to the displayed time and return to the main menu level. The LCD again displays ANTI-TIE-DOWN ms.

Function
When beginning a machine stroke, all actuating means [palm buttons or foot switch(es)] must be operated concurrently. This means that the operator(s) must depress all actuating means within the set time in order to start the machine stroke. As soon as any one of the actuating means is operated, the timer starts. The time for this setting depends on the number of operators. The range of 100 - 7000 ms allows enough time for single or multiple operators to operate all actuating means. The typical setting for one operator is 250 ms or 1/4 of a second (factory setting).

PLS (PROGRAMMABLE LIMIT SWITCH) OUTPUT
The SSC-1000 has one (1) normally open PLS relay output. This relay contact is rated for 10A at 120VAC. Two programmable timers and one programmable counter are used to control the PLS output. Figure 4.10 shows how the timers are used to turn the output ON and OFF.

Programmable Timers
TIMER 1: The output will turn ON when the SS#1/SS#2 cams turn ON, (Holding Angle), and when there is no PLS ON TIME value. To delay the ON angle, program the PLS DELAY timer to a value other than 0000. The output will then turn ON after the PLS DELAY timer expires.

TIMER 2: To change the ON duration of the output, program the PLS ON TIME to a value other than 000. This is the time that the output will stay ON. When the timer expires the PLS output will go OFF. 0000 disables the PLS output.

Programmable Counter
Program the PLS COUNTER if the outputs need to be turned ON every X number of cycles (maximum is 9999). Program the PLS COUNTER to 0000 if the PLS output needs to turn ON every cycle.

Figure 4.9
ANTI-TIE-DOWN Programming Flowchart

Figure 4.10
PLS Output Timing Chart

(Continued on next page.)
PLS (Programmable Limit Switch) OUTPUT (continued)

PLS DELAY ms (Programmable Timer 1)
Select the PROG position on the Program/Run selector switch.
Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press ENTER when the LCD displays PLS DELAY ms.
The display now reads: XXXX
Where XXXX = a number between 0 and 9999 ms.
Press the ▼ and ▲ buttons on the keypad to increase or decrease the PLS DELAY timer. Pressing and holding the arrow keys will change the numbers at a rapid rate. Press ENTER to program the PLS DELAY timer to the displayed time and return to the main menu level. The LCD again displays PLS DELAY ms.

Function
The PLS output will come ON when the SS#1/SS#2 cams turn ON (Holding Angle), and when there is no PLS ON TIME value. The PLS DELAY timer starts timing at the SS#1/SS#2 cam angle.
When the PLS DELAY timer expires, the output will turn ON.

PLS ON TIME ms (Programmable Timer 2)
Select the PROG position on the Program/Run selector switch.
Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press ENTER when the LCD displays PLS ON TIME ms.
The display now reads: XXXX
Where XXXX = a number between 0 and 9999 ms.
Press the ▼ and ▲ buttons on the keypad to increase or decrease the PLS ON TIME timer. Pressing and holding the arrow keys will change the numbers at a rapid rate. Press ENTER to program the PLS ON TIME timer to the displayed time and return to the main menu level. The LCD again displays PLS ON TIME ms.

Function
Once the PLS (Programmable Limit Switch) output is ON, the PLS ON TIME defines the duration to keep the output ON. When the PLS ON TIME timer expires, the output will turn OFF. A PLS ON TIME of 0000 disables the PLS output.
PLS COUNTER (Programmable Counter)

Select the PROG position on the Program/Run selector switch.

Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press ENTER when the LCD displays PLS COUNTER.

The display now reads: XXXX

Where XXXX = a number between 0 and 9999

Press the ▼ and ▲ buttons on the keypad to increase or decrease the PLS COUNTER. Pressing and holding the arrow keys will change the value at a rapid rate. Press ENTER to program the PLS COUNTER to the displayed value and return to the main menu level. The LCD again displays PLS COUNTER.

Function

The PLS can be programmed to turn ON every cycle or at various intervals of cycles. The PLS COUNTER defines the number of cycles to count before turning the output ON. To disable the counted output and have the PLS output turn ON every cycle, program the PLS COUNTER to 0000.

USER INPUTS

The SSC-1000 has four (4) programmable user inputs. These inputs are 24VDC sinking (NPN) type. There are three (3) parameters that can be programmed for each input.

Programmable Parameters

1. FAULT MESSAGE: When the input is activated, a fault message is displayed. This fault message is assigned to the input according to its function. Figure 4.14 shows a list of fault messages that can be assigned to each input. Select any message for each input.

2. LOGIC: This setting is used to change the logic that activates the input. The programming choices are NO (Normally Open), NC (Normally Closed), and OFF (Disabled). Select one of the messages for each input.

3. STOP TYPE: When the input is activated or goes true, the press cycle will stop in one of two ways. E-STOP or Emergency Stop will immediately stop the cycle in progress. T-STOP or Top Stop will stop the cycle in progress at TDC. Select which type of stop is required for each input.

![Figure 4.13 PLS COUNTER Programming Flowchart](image)

**Figure 4.13 PLS COUNTER Programming Flowchart**

- **Setting Type:** Counter
- **Range:** 0000 - 9999
- **Factory Setting:** 0000

![Figure 4.14 User Input Fault Messages Chart](image)

**Figure 4.14 User Input Fault Messages Chart**

- C/B AIR FLT.................................CLUTCH/BRAKE AIR FAULT
- CNTR BAL AIR FLT.........................COUNTERBALANCE AIR FAULT
- DUAL SOL FLT..............................DUAL SOLENOID FAULT
- LUBE FLT........................................LUBE FAULT
- HIGH LUBE FLT.............................HIGH LUBE FAULT
- LOW LUBE FLT..............................LOW LUBE FAULT
- LOW LUBE LEVEL.........................LOW LUBE LEVEL
- MAIN MTR OL FLT.........................MAIN MOTOR OVERLOAD FAULT
- RAM MTR OL FLT...........................RAM MOTOR OVERLOAD FAULT
- LUBE MTR OL FLT..........................LUBE MOTOR OVERLOAD FAULT
- AUX MTR OL FLT...........................AUXILIARY MOTOR OVERLOAD FAULT
- GUARD OPEN FLT............................GUARD OPEN FAULT
- REAR GUARD FLT...........................REAR GUARD FAULT
- LEFT GUARD FLT............................LEFT GUARD FAULT
- RIGHT GUARD FLT...........................RIGHT GUARD FAULT
- FEEDER FLT....................................FEEDER FAULT
- LOAD MONITOR FLT.......................LOAD MONITOR FAULT
- SAFETY BLK FLT............................SAFETY BLOCK FAULT
- DIE PROTECT FLT............................DIE PROTECTION FAULT
- STOCK BUCKLE..............................STOCK BUCKLE
- END OF STOCK..............................END OF STOCK
- CLUTCH VALVE FLT.......................CLUTCH VALVE FAULT
- BRAKE VALVE FLT..........................BRAKE VALVE FAULT

(Continued on next page.)
USER INPUTS (continued)

INPUT #1 (2, 3, 4)
Select the PROG position on the Program/Run selector switch.
Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press ENTER when the LCD displays INPUT # 1. Programming is the same for all four inputs.
The display now reads: X FLT
Where X FLT is a fault message from the list on page 41.
Press the ▼ and ▲ buttons on the keypad to scroll through the list of fault messages. Press ENTER to program the fault message displayed.
The display now reads one of the following:
OFF (Disabled)
N.O. (Normally Open)
N.C. (Normally Closed)
Press the ▼ and ▲ buttons on the keypad to change the logic options. Press ENTER to program the input logic displayed.
Next, the LCD displays one of the following:
E-STOP (Emergency Stop)
T-STOP (Top Stop)
Press the ▼ and ▲ buttons on the keypad to change the stop type.
Press ENTER to program the input logic displayed and return to the main menu level. The LCD displays INPUT #1.

Function
The user inputs can be programmed to monitor and diagnose common problems with auxiliary equipment on the press. Examples are main clutch/brake air pressure, dual solenoid pressure switch, lube system pressure or level switches, motor overloads, load monitors, stock buckle, and end of stock sensors. Refer to the wiring diagram sheet 2 for information on wiring the inputs to the proper terminals.
STM TEST [Make sure the press is at TDC (Top Dead Center) before proceeding with the STM TEST!]

Select the PROG position on the Program/Run selector switch. Select the SINGLE position on the Stroke selector switch.

Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press ENTER when the LCD displays STM TEST.

The display now reads: XXXX

Where XXXX = a number between 0 and 0999 ms.

This value is calculated by the control during the press setup reference cycle. It is only an approximate starting point for testing at 90°. Change accordingly.

Press the ▼ and ▲ buttons on the keypad to increase or decrease the STM TEST timer. Pressing and holding the arrow keys will change the time at a rapid rate. Press ENTER to program the STM TEST timer to the displayed time.

The display now reads: CYCLE PRESS!

Press and hold the two palm buttons to initiate the STM TEST. Hold both palm buttons until the timer expires and the machine stops.

The display now reads: ST- XXX SD- XXX.X

Where ST - XXX = the stop time and SD - XXX.X = the calculated safety distance in inches per the OSHA formula.

Return the Program/Run selector switch to the RUN position and press ENTER. Press and hold both palm buttons until the press stops at TDC.

Return the Program/Run selector switch to the PROG position. Press ENTER twice. CYCLE PRESS will be displayed. Repeat as required.

If one or both palm buttons are released before the timer expires, during the STM test, the display will read OPERATOR RELEASE.

Press ENTER to clear the STM TEST results or the OPERATOR RELEASE message and return to the main menu level. The LCD again displays STM TEST.

Return the Program/Run selector switch to the RUN position. Press ENTER and the display will read: SINGLE - SPM 000. Press and hold both palm buttons until the press stops at TDC.

Return the Program/Run selector switch to the PROG position. Press ENTER twice. CYCLE PRESS will be displayed. Repeat test as required. (See Function section.)

To return to the main menu, press ENTER and STM TEST ms will be displayed.

---

**Figure 4.16**

STM TEST Programming Flowchart

<table>
<thead>
<tr>
<th>Input</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>XXXX = Current STM TEST timer value</td>
<td></td>
</tr>
<tr>
<td>▼ ▲ Press the DOWN and UP arrows to decrease or increase the current timer</td>
<td></td>
</tr>
<tr>
<td>ENTER</td>
<td>Start the STM TEST</td>
</tr>
<tr>
<td>CYCLE PRESS!</td>
<td>With the press at TDC, press both palm buttons to cycle press.</td>
</tr>
<tr>
<td>ST - XXX SD - XXX.X</td>
<td>Test Results Displayed</td>
</tr>
<tr>
<td>ENTER</td>
<td>Clear the results and return to Main Menu</td>
</tr>
<tr>
<td>MAIN MENU</td>
<td>Return press to TDC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Setting Type:</th>
<th>Time - ms (milliseconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range:</td>
<td>0000 - 0999 ms</td>
</tr>
<tr>
<td>Factory Setting:</td>
<td>Calculated - Ref. Cycle</td>
</tr>
</tbody>
</table>

**Function**

The STM TEST is used to establish the safety distance for safeguarding devices such as two-hand control and presence sensing devices. Do at least ten STM tests. Use the highest reading to calculate safety distance using the OSHA or ANSI safety distance formula (see pages 25 and 26). If a presence sensing device (light curtain) is used to safeguard the machine, the reaction time of the device must also be used in the OSHA or ANSI safety distance formula. If “Touchdown” palm buttons are used, their reaction time must be added to the stopping time used in the OSHA or ANSI safety distance formula.

(Continued on next page.)
REFERENCE CYCLE [Make sure the press is at TDC (Top Dead Center) before proceeding with the Reference Cycle!]

Select the PROG position on the Program/Run selector switch.

Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press ENTER when the LCD displays REFERENCE CYCLE.

The display now reads: CYCLE PRESS!

Press and hold both palm buttons to initiate the REFERENCE CYCLE. Hold the palm buttons for a complete revolution and until the machine stops.

The display now reads: REF MS = XXXX
Where XXXX = the measured motion reference time.

Once the motion reference time has been established, press ENTER on the keypad and REFERENCE CYCLE will be displayed from the main menu level. If this is part of the Initial Setup Procedure, please return to step 6 on page 34.

If one or both palm buttons are released before a reference time has been measured, the display will read OPERATOR RELEASE. Press ENTER on the keypad and REFERENCE CYCLE will be displayed from the main menu level.

The press must be returned to TDC.

Turn the Program/Run selector switch to the RUN position and the Stroke selector switch to the SINGLE position. Press and hold both palm buttons until the machine stops. Return the Program/Run selector switch to PROG.

Press ENTER when the LCD again displays REFERENCE CYCLE and repeat the REFERENCE CYCLE procedure described above.

Function

The REFERENCE CYCLE is used to establish the motion reference time and to calculate a starting time for the STM TEST. The motion reference time is used to sense motion at the start of a cycle. Once the control energizes the dual solenoid valve relays, it will start a timer and wait for the motion to get above 4 SPM. If the motion reference timer expires prior to sensing 4 SPM, the MOTION LATE FLT is displayed.

Figure 4.17
REFERENCE CYCLE Programming Flowchart

Setting Type: Time - ms (milliseconds)
Range: 0000 - 9999 ms
Factory Setting: Calculated - Ref. Cycle

(Continued on next page.)
ASINGLE MODE (Automatic Single Stroke)

Select the PROG position on the Program/Run selector switch. Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press ENTER when the LCD displays ASINGLE MODE.

The display now reads one of the following:

**AUTO/SINGLE OFF**

**AUTO/SINGLE ON**

Press the ▼ and ▲ buttons on the keypad to change the mode options. Press ENTER to turn on or turn off ASINGLE MODE and return to the main menu level. The LCD again displays ASINGLE MODE.

**Function**

The ASINGLE or Automatic Single Stroke Mode of operation is used when a continuous stroke operation is desired but the press is faster than the material feeding equipment. When this mode is ON, each press cycle can be initiated by the material or material feeding equipment. This mode requires a prior action and the ASINGLE timer for the ASINGLE input. See ASINGLE TMR programming description. Refer to the wiring diagram sheet 2 for information on wiring the ASINGLE inputs.

**ASINGLE TMR Sec**

Select the PROG position on the Program/Run selector switch. Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press ENTER when the LCD displays ASINGLE TMR sec.

The display now reads: XXX

Where XXX = a number between 005 and 120 sec.

Press the ▼ and ▲ buttons on the keypad to change the timer value. Pressing and holding the arrow keys will change the time at a rapid rate. Press ENTER to program the ASINGLE TMR timer to the displayed time and return to the main menu level. The LCD again displays ASINGLE TMR sec.

**Function**

If the timer expires between successive inputs, the press will not operate. The prior-action push button must be reinitiated and the palm buttons reactivated. Refer to the wiring diagram sheet 2 for information on wiring the ASINGLE inputs. See ASINGLE MODE description above for more information.
SECTION 4—PROGRAMMING
SSC-1000 Part Revolution Solid-State Control

INCH/TSTOP MODE (Inch Top Stop)
Select the PROG position on the Program/Run selector switch.
Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press ENTER when the LCD displays INCH/TSTOP MODE.
The display now reads one of the following:

INCH/TSTOP OFF
INCH/TSTOP ON

Press the ▼ and ▲ buttons on the keypad to change the mode options. Press ENTER to turn on or turn off INCH/TSTOP MODE and return to the main menu level. The LCD again displays INCH/TSTOP MODE.

Function
When the INCH/TSTOP MODE is turned on, the press will top stop on every stroke in the inch mode of operation when the palm buttons remain depressed. Enabling INCH/TSTOP disables any programmed timed inch. Disabling INCH/TSTOP allows the press to stroke continuously while the palm buttons remain depressed.
Note: Production must not be performed in any INCH mode of operation.

SPM DISP CALIB % (SPM Display Calibration)
Select the PROG position on the Program/Run selector switch.
Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press ENTER when the LCD displays SPM DISP CALIB %.
The display now reads: XXX
Where XXX = a number between 75 and 125 percent.
Press the ▼ and ▲ buttons on the keypad to change the percentage value. Pressing and holding the arrow keys will change the percentage at a rapid rate. Press ENTER to program the SPM DISP CALIB percentage displayed and return to the main menu level. The LCD again displays SPM DISP CALIB.

Function
The SPM DISP CALIB % can be programmed to increase or decrease the SPM on the display to read the desired strokes per minute. This is used to calibrate the SPM display to the actual crankshaft SPM.

(Continued on next page.)

Figure 4.19A
INCH/TSTOP MODE Programming Flowchart

Figure 4.19B
SPM DISP CALIB % Programming Flowchart
DEFAULT SETTINGS

Select the PROG position on the Program/Run selector switch. Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press ENTER when the LCD displays DEFAULT SETTINGS. The display now reads: UP ARROW CONFIRM

Press the ▲ button on the keypad to reset the control to factory default settings, or press ENTER to abort the reset and return to the main menu level. The LCD again displays DEFAULT SETTINGS.

Function

DEFAULT SETTINGS clears all programmed settings and resets them to the original factory settings. Please see page 49 for Table 4.1 which is a Quick Reference Table for Factory Settings and Valid Ranges.
SECTION 4—PROGRAMMING

SSC-1000 Part Revolution Solid-State Control

VARIABLE SPEED CONTINUOUS TOP STOP

The variable speed continuous top-stop (CTS) table is used by the control to stop the press at approximately TDC automatically when the top-stop palm button is activated with the press operating at various speeds in the continuous mode of operation. This is accomplished by programming a timer value, to be added to the CTS ON point for each of the 4 SPM steps, within the SPM range the press operates in. When a T-STOP is requested by pressing the yellow palm button or a user input is tripped, the control measures the current press SPM and looks up the appropriate timer value and adds it to the CTS cam ON point. When the timer expires, a signal is provided to stop the press.

The table is programmed by entering a LOW SPM limit and a HIGH SPM limit. Once entered, the control will calculate 3 even SPM values between the low and high settings for a total of 5 steps. See example timing chart in Figure 4.20.

The CTS cam in the Opti-CAM™ unit should be set to come ON at the lowest angle necessary to top stop the press at the highest speed limit. The timer values will be higher at lower SPM values. The timer values will be lower at higher SPM values. The table must be programmed in this way. If the numbers are not in order, the VAR SPM TIME ERR fault will be displayed. If the values of the LOW LIM and HIGH LIM are not separated by at least 10 SPM, the VAR SPM TIME ERR fault will be displayed.

ESTABLISHING TIMER VALUES

The four (4) programmable timer values are set through trial and error. The following procedure explains how to do this.

1. With the machine running at the highest variable speed limit, set the CTS CAM (as described on page 22) to stop the machine at TDC (Top Dead Center).

2. After programming the VAR SPM LOW LIM and the VAR SPM HIGH LIM correctly (as described on page 47) go to the lowest VAR SPM XXX program (see page 47). Using the example shown in Figure 4.20, set the VAR SPM timer value to the desired time using the buttons on the keypad.

3. Next, put the PROG/RUN selector switch in the RUN position, the Stroke selector switch in the CONT position, and the Control selector switch in the HAND position. Press the continuous prior-action push button and then press both palm buttons. When the press is running in continuous, press the yellow top-stop button. If the press stops at TDC, proceed to the next programmed VAR SPM XXX value.

4. If the press stops short of TDC, add time to the timer value. If the press stops over TDC, subtract time from the timer value. Please refer to Figure 4.20. See VAR SPM XXX=XXXX ms on page 47 for the programming procedure.

5. Repeat this procedure until the press stops at TDC at the programmed time value. Proceed to the next programmed VAR SPM XXX value and follow the above procedure.

Remember the timer values will be higher at lower SPM values and they will be lower at higher SPM values.

---

**Figure 4.20 - Top-Stop Chart**

Program Settings
- 20 SPM = 150 ms (LOW LIM)
- 40 SPM = 125 ms
- 60 SPM = 100 ms
- 80 SPM = 75 ms
- 100 SPM = HIGH LIM

---

(Continued on next page.)

Rockford Systems, LLC
Call: 1-800-922-7533
VAR SPM LOW LIM
Select the PROG position on the Program/Run selector switch. Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press ENTER when the LCD displays VAR SPM LOW LIM. The display now reads: XXX Where XXX = the current low SPM press speed.

Press the ▼ and ▲ buttons on the keypad to increase or decrease the VAR SPM LOW LIM. Pressing and holding the arrow keys will change the numbers at a rapid rate. Press ENTER to program the VAR SPM LOW LIM to the displayed number and return to the main menu level.

Function: To calculate the variable speed continuous top-stop table, the lowest SPM that the press will operate at needs to be programmed. The control will calculate the start of the table at this speed. At this lowest SPM, the highest CTS (Continuous Top Stop) delay is programmed.

VAR SPM HIGH LIM
Select the PROG position on the Program/Run selector switch. Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press ENTER when the LCD displays VAR SPM HIGH LIM. The display now reads: XXX Where XXX = the current high SPM press speed.

Press the ▼ and ▲ buttons on the keypad to increase or decrease the VAR SPM HIGH LIM. Pressing and holding the arrow keys will change the numbers at a rapid rate. Press ENTER when the LCD displays VAR SPM HIGH LIM.

Function: To calculate the variable speed continuous top-stop table, the highest SPM that the press will operate at needs to be programmed. The control will calculate the end of the table at this speed. At this highest SPM, there is no CTS (Continuous Top Stop) delay programmed.

VAR SPM XXX=XXXX ms
Press the ▼ and ▲ buttons on the keypad to scroll through the program options. Press ENTER when the LCD displays VAR SPM XXX=XXXX ms at the SPM desired to be changed.

The display now reads: XXX Where XXX = the current SPM delay timer.

Press the ▼ and ▲ buttons on the keypad to increase or decrease the VAR SPM XXX=XXXX ms. Pressing and holding the arrow keys will change the numbers at a rapid rate.

Function: There are four (4) programmable timers starting at the VAR SPM LOW LIM with three (3) SPM values evenly calculated by the control between the low limit and the high limit. Program the low and high SPM limits. Then through trial and error (see page 46), find the timer value that top stops the press at TDC at each SPM value calculated. This is for continuous only. To disable the variable speed top-stop table, simply program the low and high SPM limits to 000.
OPTIONAL MODES SETUP

There are four optional operating modes that can be configured using the options menu. To access the options menu, refer to the following programming descriptions and flowchart. The optional modes are:

FOOT OR TWO-HAND MAINTAINED CONTINUOUS

This mode allows the machine to be operated continuously with the foot switch or palm buttons as the initiating means. This mode requires the prior-action push button to be depressed prior to actuating the foot switch or palm buttons. The machine will stroke in continuous as long as the foot switch or palm buttons are held depressed by the operator. If the foot switch or palm buttons are released on the downstroke, the machine will stop immediately. If the foot switch or palm buttons are released on the upstroke, the machine will top stop. To run in this mode, the Stroke selector switch needs to be in CONT, the Control selector switch needs to be in FOOT if using Foot Maintained Continuous, or in HAND if using Two-Hand Maintained Continuous. The Light Curtain selector switch can be in the ON or OFF position. (See page 12 for interlock information.)

CONTINUOUS-ON-DEMAND

This mode is used when a press is required to operate in continuous until a stop/start signal is given to stop. At this point, the press can be restarted in continuous by the same stop/start input signal. This mode is similar to Auto Single mode. It also uses the A SINGLE TIMER value for successive input timing. If the timer expires between successive inputs, the press will not operate. The continuous prior-action push button must be reinitiated and the palm buttons reactivated. To run in this mode, the Stroke selector switch needs to be in CONT, the Control selector switch needs to be in HAND. The LIGHT CURTAIN selector switch can be ON or OFF. (See page 12 for interlock information.)

ONE-HAND TRIP OR FOOT TRIP (LIGHT CURTAIN ONLY)

This mode, when used in conjunction with light curtains as the point-of-operation safeguard, can trip the press cycle with the foot switch or a single push button or with a foot switch. For ergonomic and productivity reasons, the operator can clear the light curtain sensing field and initiate a cycle with only the touch of an ergonomic palm button or with a foot switch. If the operator reaches through the light curtain during the hazardous portion or downstroke of the cycle, the press will stop. This mode requires the light curtain ON and functioning. To run in this mode, the Stroke selector switch needs to be in SINGLE, the Control selector switch needs to be in FOOT, regardless of what the initiating means is, and the LIGHT CURTAIN selector switch needs to be ON. To program all additional modes, follow the procedure on the next page. Only one optional mode can be enabled or turned on at one time. If one option is on and another optional mode is enabled, the first mode will disable or turn off automatically.

(Continued on next page.)
OPTIONS EDIT

Turn the main power disconnect off. Turn the PROG/RUN key selector switch on the keypad/display to OFF. Hold the ENTER button on the keypad and turn the main power disconnect ON. Hold the ENTER button down until the display reads OPTIONS EDIT. Release the ENTER button.

The display now reads: FOOT M/CONT OFF

Press the ▼ and ▲ buttons on the keypad to scroll through the optional modes. When the desired optional mode is displayed, press ENTER to toggle between ON and OFF. To program the optional mode, turn the power OFF.

Turn main power disconnect ON and run in the new mode.

---

QUICK REFERENCE TABLE - FACTORY SETTINGS AND VALID RANGES

<table>
<thead>
<tr>
<th>Program Setting</th>
<th>Valid Entry Range</th>
<th>Factory Preset Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake monitor fault set point</td>
<td>000 - 999 ms</td>
<td>50 ms</td>
</tr>
<tr>
<td>Clear stroke</td>
<td>Clear / Abort</td>
<td>—</td>
</tr>
<tr>
<td>Clear batch</td>
<td>Clear / Abort</td>
<td>—</td>
</tr>
<tr>
<td>Batch preset</td>
<td>00000000 - 9999999</td>
<td>0000000</td>
</tr>
<tr>
<td>Timed-inch (0 disables timed inch.)</td>
<td>000 - 999 ms</td>
<td>000 ms</td>
</tr>
<tr>
<td>Anti-tie-down timer</td>
<td>100 - 7000 ms</td>
<td>250 ms</td>
</tr>
<tr>
<td>PLS (Programmable Limit Switch) delay</td>
<td>00000 - 9999 ms</td>
<td>00000 ms</td>
</tr>
<tr>
<td>PLS ON time</td>
<td>00000 - 9999 ms</td>
<td>00000 ms</td>
</tr>
<tr>
<td>PLS counter</td>
<td>00000 - 9999</td>
<td>0000</td>
</tr>
<tr>
<td>User inputs</td>
<td>Input #1 - #4</td>
<td>C/B Air Fit / Off / E-Stop</td>
</tr>
<tr>
<td>STM test timer</td>
<td>00000 - 0999 ms</td>
<td>Calculated-Ref. Cycle</td>
</tr>
<tr>
<td>Automatic single-stroke mode</td>
<td>Off / On</td>
<td>Off</td>
</tr>
<tr>
<td>Auto single timer</td>
<td>005 - 120 sec.</td>
<td>005 sec.</td>
</tr>
<tr>
<td>Inch/top-stop mode</td>
<td>Off / On</td>
<td>Off</td>
</tr>
<tr>
<td>SPM display calibration</td>
<td>75 - 125%</td>
<td>100%</td>
</tr>
<tr>
<td>Default settings</td>
<td>Reset / Abort</td>
<td>—</td>
</tr>
<tr>
<td>Variable speed continuous top stop</td>
<td>000 - 500 spm / 000 - 999 ms</td>
<td>000 SPM = 000 ms 000 SPM = 000 ms 000 SPM = 000 ms 000 SPM = 000 ms 000 SPM = 000 ms</td>
</tr>
<tr>
<td>High Lim 000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Lim 000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Optional Modes:
FOOT M/CONT OFF (ON)
CONT/DEMAND OFF (ON)
FOOT TRIP OFF (ON)
HAND M/CONT OFF (ON))

(Continued on next page.)
SECTION 5—OPERATING CONSIDERATIONS
SSC-1000 Part Revolution Solid-State Control

SSC-1000 Operation Checklist

1. Is all wiring to the machine, the solid-state control module (black box), and keypad/display correct when verified with the drawings sent with the solid-state control? ............................................................... Y or N

2. Does the connection between the Opti-CAM™ cable and the green “P3” connector exist, as referenced in the wiring diagram? (See Sheet No. 2 of the schematics.) ............................................................... Y or N

3. Does the Opti-CAM™ cable have any splices? .............................................................................................................. Y or N

4. When powering up the solid-state control module, do the five (green) LED’s (Power and CPU status) on the front of the black control box turn on? ....................................................................... Y or N

5. Does the “Power-On” screen display the message: “SAFEGRD IN PLACE” when the main power disconnect switch is turned on? Y or N

6. With no slide motion, check the “SPM” reading on the display. Visually verify that the “SPM” is displaying “000” with no flickering of the numbers? ............................................................... Y or N
(If numbers are flickering, please consult factory.)

7. Was the INITIAL SETUP PROCEDURE performed at TDC (Top Dead Center) of crankshaft rotation (see page 34 of this Installation Manual)? ................................................................................ Y or N
(The shaft extension of the Opti-Cam must have the keyway up and perpendicular to the cover on the assembly when setting the Opti-Cam.)

8. The Opti-Cam assembly was shipped with the Cams adjusted for clockwise (CW) rotation (when the sprocket is attached to the left shaft extension). If the sprocket is attached to the right shaft extension, the shaft extension must rotate in a counter-clockwise (CCW) rotation. Does the above checkout? Y or N

9. In normal run modes, such as SINGLE or CONTINUOUS, does the machine make cycles without any faults appearing on the display? Y or N

Production Mode Of Operation

During production, with the machine in the selected run mode of operation, the screen can display information. This information can be displayed by pressing the ▼ and ▲ buttons on the keypad. The display options are as follows:

1. MODE- SPM
2. STOP TIME
3. STROKE COUNTER
4. BATCH COUNTER

Machine Shut Down

When the machine is ready to be shut down, follow this sequence:

1. Shut off the main motor starter.
2. Turn off the main power disconnect switch.
SECTION 5—OPERATING CONSIDERATIONS
SSC-1000 Part Revolution Solid-State Control

Electrical Troubleshooting

All troubleshooting, as well as installation, must be performed by qualified and properly trained personnel. Also, when a defective component is found, do not operate the machine until that component has been replaced with an exact replacement part.

1. This procedure is written as a general guide for troubleshooting most part revolution control systems. In all cases, please refer to the individual control wiring schematic for particular test points and terminal numbers.

2. Each control system may be slightly different depending on the various functions provided. Be sure to follow the schematic and select the proper modes of operation when troubleshooting.

Troubleshooting Outline

Use the control drawing schematic in conjunction with the following troubleshooting outline:

1. No Ground Light Illumination - Possible Causes:
   - **No Ground Connection**
     If the ground connection checks OK, the ground light should be on.
     If it is still not on, replace the light.
   - **No Voltage**
     No line voltage - check the line voltage on the transformer primary.
     No control voltage - check transformer primary connections (wiring) and the secondary for 120 VAC.
     Fuse blown - replace with the proper size and amperage per the control drawing.
     Using an ohm meter, locate the reason for the blown fuse before reapplying power.

2. Motor Does Not Start - Possible Causes:
   - Open electrical interlocks. The circuit can be arranged to accommodate machine protective electrical interlocks, overload interlocks, and safety block interlocks. These interlocks are strategically located to prevent machine operation when open. Please refer to the schematic for the location of the various miscellaneous interlocks.
     - **Motor starter does not energize.**
       Motor starter operating coil is not 120 VAC.
       Motor overload tripped, no heaters or improperly rated heaters or overloads.
       Motor start/stop push buttons improperly wired or defective.
   - **Motor starter contact defective.**
     Motor should start if the above checks OK. If the motor fails to continue to run when the start button is released, check the motor starter holding contact for proper wiring and function.

3. Machine Will Not Stroke - Possible Causes:
   - **Clutch Actuator**
     Air supply is off.
     Insufficient air pressure.
   - **Dual Solenoid Air Valve**
     Check for proper installation and wiring.
     Open solenoid coils.
     Check fuse F4.

4. Light Curtain Not Functioning - Possible Cause:
   - **Faulty Fuse F3**

5. PLS Not Functioning - Possible Cause:
   - **Faulty Fuse F2**

(Continued on next page.)
### SECTION 6—FAULT MESSAGES

**SSC-1000 Part Revolution Solid-State Control**

**FATAL FAULT MESSAGES FOR SSC-1000**

Fatal fault messages can NOT be cleared. An E-STOP is required for the press to recover. The problem should be fixed and then power restored to the machine.

<table>
<thead>
<tr>
<th>Message</th>
<th>Cause</th>
<th>Action To Take</th>
</tr>
</thead>
<tbody>
<tr>
<td>NV-RAM FAULT</td>
<td>CPU #1 had trouble reading or writing the nonvolatile (NV) RAM memory and could not repair the data. The battery socket or RAM chip could be inoperative.</td>
<td>Turn the main power off and back on. All variables are reset to factory default and will need to be reprogrammed. If the problem still exists, consult factory.</td>
</tr>
<tr>
<td>K1 ON FLT</td>
<td>Relay K1 did NOT turn ON after the cycle was initiated. If ram adjust is provided, make sure the selector switch is in the “off” position.</td>
<td>Verify that the SOL. RELAY #1 LED turns on and that the SOL. RELAY #1 relay also turns on. If the LED turns on but the relay does not energize, reseat the relay. Check 24VDC power supply. If the problem still exists, consult factory.</td>
</tr>
<tr>
<td>K2 ON FLT</td>
<td>Relay K2 did NOT turn ON after the cycle was initiated. If ram adjust is provided, make sure the selector switch is in the “off” position.</td>
<td>Verify that the SOL. RELAY #2 LED turns on and that the SOL. RELAY #2 relay also turns on. If the LED turns on but the relay does not energize, reseat the relay. Check 24VDC power supply. If the problem still exists, consult factory.</td>
</tr>
<tr>
<td>K1 OFF FLT</td>
<td>Relay K1 did NOT turn OFF after the cycle was stopped.</td>
<td>Verify that the SOL. RELAY #1 LED turns off and that the SOL. RELAY #1 relay also turns off. If the LED turns off but the relay does not release, reseat the relay. If the problem still exists, consult factory.</td>
</tr>
<tr>
<td>K2 OFF FLT</td>
<td>Relay K2 did NOT turn OFF after the cycle was stopped.</td>
<td>Verify that the SOL. RELAY #2 LED turns off and that the SOL. RELAY #2 relay also turns off. If the LED turns off but the relay does not release, reseat the relay. If the problem still exists, consult factory.</td>
</tr>
<tr>
<td>MOTION LATE FLT</td>
<td>The control detected motion too late at the beginning of the cycle. Check for SPM on the display during a cycle. Repeat the REFERENCE CYCLE procedure on page 44.</td>
<td>Check for correct wiring to the Opti-CAM and terminals on the SSC-1000 control module. Verify that the chain or coupling for the Opti-CAM is connected and tight. Verify the motor is running and that the flywheel is turning. Check fuse F4. If necessary, repeat the REFERENCE CYCLE procedure described on page 44.</td>
</tr>
<tr>
<td>MOTION DROP FLT</td>
<td>The control detected a loss of motion during a cycle.</td>
<td>Check for correct wiring to the Opti-CAM and terminals on the SSC-1000 control module. Verify that the chain or coupling for the Opti-CAM is connected and tight. Verify the motor is running and that the flywheel is turning. If necessary, repeat the REFERENCE CYCLE procedure described on page 44.</td>
</tr>
<tr>
<td>MOTION NO RUN</td>
<td>The control detected motion prior to starting a press cycle.</td>
<td>Check for correct wiring to the Opti-CAM and terminals on the SSC-1000 control module. Verify that the chain or coupling for the Opti-CAM is connected and tight. Check that the SPM display is 000 when the crankshaft is at rest, or prior to starting a press cycle.</td>
</tr>
</tbody>
</table>

CPU = Central Processing Unit  
LED = Light Emitting Diode

(Continued on next page.)
### SECTION 6—FAULT MESSAGES

**SSC-1000 Part Revolution Solid-State Control**

#### FATAL FAULT MESSAGES FOR SSC-1000

<table>
<thead>
<tr>
<th>Message</th>
<th>Cause</th>
<th>Action To Take</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEYPAD FLT</td>
<td>KEYPAD failure.</td>
<td>Check for correct wiring to the keypad and terminals.</td>
</tr>
<tr>
<td>RUN/INCH PB FLT</td>
<td>RUN/INCH palm button failure.</td>
<td>Check for correct wiring to the palm buttons and terminals.</td>
</tr>
<tr>
<td>FOOT SW FLT</td>
<td>FOOT SWITCH failure.</td>
<td>Check for correct wiring to the foot switch and terminals.</td>
</tr>
<tr>
<td>LC CYCLE FLT</td>
<td>The light curtain was cycled for test purposes during single stroke and did not return to the proper state for the next stroke.</td>
<td>Check for correct wiring to the light curtain and terminals. Check fuse F3.</td>
</tr>
<tr>
<td>AUX CPU FLT</td>
<td>CPU #2 fault.</td>
<td>Internal circuitry failure, consult factory.</td>
</tr>
<tr>
<td>OPTI-CAM FLT-4</td>
<td>SS#1 or SS#2 cam did not turn on during the press cycle in the single stroke mode of operation.</td>
<td>Check input LEDs for status on inputs from Opti-CAM during the press cycle. SS#1 should be OFF at TDC, should come ON at holding angle, and go back OFF at top-stop angle. SS#2 should be ON at TDC, should be OFF at holding angle, and go back ON at top-stop angle. Check wiring and connection to the Opti-CAM unit. Check 24VDC power supply.</td>
</tr>
<tr>
<td>OPTI-CAM FLT-3</td>
<td>In the single stroke mode of operation, SS#1 and SS#2 cam were in the same state (both ON or both OFF) for more than 1/2 second during the press cycle.</td>
<td>Check input LEDs for status on inputs from Opti-CAM during the press cycle. SS#1 should be OFF at TDC, should come ON at holding angle, and go back OFF at top-stop angle. SS#2 should be ON at TDC, should be OFF at holding angle, and go back ON at top-stop angle. There should be very little overlap or underlap in the cams. Check wiring and connection to the Opti-CAM unit. Check 24VDC power supply.</td>
</tr>
<tr>
<td>OPTI-CAM FLT-2</td>
<td>SS#1 and SS#2 cam are switching more than once per revolution or the CTS cam is not functioning.</td>
<td>Check input LEDs for status on inputs from Opti-CAM during the press cycle. Check wiring and connection to the Opti-CAM unit. Check 24VDC power supply.</td>
</tr>
<tr>
<td>OPTI-CAM FLT-1</td>
<td>The control did not detect the CTS cam in the last 15 seconds of cycling.</td>
<td>Check input LEDs for status on inputs from Opti-CAM during the press cycle. Check wiring and connection to the Opti-CAM unit. Check 24VDC power supply.</td>
</tr>
<tr>
<td>OPTI-CAM FLT-17</td>
<td>In the single stroke mode of operation, the control did not detect the CTS cam for four (4) consecutive strokes.</td>
<td>Check input LEDs for status on inputs from Opti-CAM during the press cycle. Check wiring and connection to the Opti-CAM unit. Check 24VDC power supply.</td>
</tr>
</tbody>
</table>

(Continued on next page.)
### SECTION 6—FAULT MESSAGES

**SSC-1000 Part Revolution Solid-State Control**

**GENERAL FAULT MESSAGES FOR SSC-1000**

GENERAL FAULT MESSAGES can be cleared by touching **ENTER** on the **KEYPAD/DISPLAY**.

<table>
<thead>
<tr>
<th>Message</th>
<th>Cause/Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAND MODE ONLY</td>
<td>The initiating means is in the foot mode. This selection must be in the hand mode to allow the requested mode of operation.</td>
</tr>
<tr>
<td>NO INTERLOCKS</td>
<td>The selected operation requires different interlocks to function. The required interlocks are not currently available. (See interlock information on page 12.)</td>
</tr>
<tr>
<td>PRESS NOT AT TOP</td>
<td>A press stroke was initiated when the machine was not at top. Turn the Stroke Selector switch to the INCH mode of operation. Inch the machine beyond the CTS off angle which is factory set at 345°. Select the mode of operation required.</td>
</tr>
<tr>
<td>BRAKE FAULT</td>
<td>The press stopping time exceeded the BRAKE MONITOR FAULT set point. While this message is displayed, the machine will not run. Press ENTER to clear this message. If this message continues to appear, the machine should be turned off and checked to determine the reason for the excessive stopping time. If the stop time is 999 ms after a brake fault, the stop time is greater than one (1) second. One second is the maximum stopping time.</td>
</tr>
<tr>
<td>NO MOTION DETECT</td>
<td>There was a REFERENCE CYCLE motion fault. This means no motion was detected within the required time after a cycle was initiated by the control. Repeat REFERENCE CYCLE. Check Opti-CAM tachometer belt/wiring.</td>
</tr>
<tr>
<td>MAIN MTR REVERSE</td>
<td>The main motor selector switch is in the reverse position. The control only allows inch when the motor is in the reverse position.</td>
</tr>
<tr>
<td>OPERATOR RELEASE</td>
<td>During a Stop-Time Measurement (STM) test or REFERENCE CYCLE, the initiating means were released before the test time was reached. Turn the PROG/RUN switch to the RUN position and inch the machine to TDC. Turn the PROG/RUN switch to PROG and run another test or REFERENCE CYCLE.</td>
</tr>
<tr>
<td>PRESET REACHED</td>
<td>The BATCH PRESET count was reached. Press ENTER to clear both the message and the batch counter.</td>
</tr>
<tr>
<td>VAR SPM LO ≥ HI</td>
<td>The LOW LIM value entered was higher than the HIGH LIM value. Reenter the proper values.</td>
</tr>
<tr>
<td>VAR SPM VEL ERR</td>
<td>TABLE CALCULATION FAULT. The values for the LOW LIM and HIGH LIM are not separated by at least 10 SPM. Reenter these values.</td>
</tr>
<tr>
<td>VAR SPM TIME ERR</td>
<td>The time values are not in the proper order. Reenter these values in the correct order. Time values should decrease as SPM increases.</td>
</tr>
<tr>
<td>DO REFERENCE CYCLE</td>
<td>The motion reference time is not established. Run REFERENCE CYCLE (Page 44).</td>
</tr>
</tbody>
</table>

(Continued on next page.)
SECTION 7—MAINTENANCE AND INSPECTION
SSC-1000 Part Revolution Solid-State Control

A part revolution mechanical power press consists of engaging parts, springs, air components and other mechanical equipment. Because of this inherent design, machine parts will ultimately wear, get out of adjustment or break, which could cause a malfunction and/or mechanical failure. This control system can never cure nor overcome a misadjusted, worn, broken or malfunctioning part or mechanical failure. Inspect all parts for adjustment, excessive wear, looseness or breakage. Do not operate this machine until all parts are adjusted, repaired, or replaced. Visual inspections and examinations of the entire machine must be made at least once per shift by qualified personnel.

Machines must always be inspected and tested on a weekly basis to determine the condition of the clutch/brake mechanism and antirepeat feature. Necessary maintenance and repair must be done before the machine is operated again, and the employer must maintain records of both the inspections and the maintenance work performed.

After any maintenance, always operate the machine numerous times in all modes before allowing the operator to start production. Always make sure all point-of-operation safeguarding is in place, adjusted and operating properly for the job and the operator.

OSHA Regulations for Inspections

OSHA 1910.217 Section (e)(1) Inspection and Maintenance Records
(i) It shall be the responsibility of the employer to establish and follow a program of periodic and regular inspections of his power presses to insure that all parts, auxiliary equipment, and safeguards are in a safe operating condition and adjustment. The employer shall maintain a certification record of inspections which includes the date of inspection, the signature of the person who performed the inspection, and the serial number, or other identifier, of the power press that was inspected.

(ii) Each press shall be inspected and tested no less than weekly to determine the condition of the clutch/brake mechanism-antirepeat feature and single stroke mechanism. Necessary maintenance or repair or both shall be performed and completed before the press is operated. These requirements do not apply to those presses which comply with paragraphs (b)(13) Control Reliability and (b)(14) Brake Monitoring of this section. The employer shall maintain a certification record of inspections, tests, and maintenance work which includes the date of the inspection, test or maintenance; the signature of the person who performed the inspection, test or maintenance; and the serial number or other identifier of the press that was inspected, tested, or maintained.

(e)(3) Training of Maintenance Personnel - It shall be the responsibility of the employer to insure the original and continuing competence of personnel caring for, inspecting, and maintaining power presses.

OSHA Regulations for Operator Training

OSHA 1910.217 Section (f)(2) Instruction to Operators

The employer shall train and instruct the operator in the safe method of work before starting work on any operation covered by this section. The employer shall insure by adequate supervision that correct operating procedures are being followed.

Electrical Controls

Switch the main power disconnect to the “Off” position and lockout before inspecting or maintaining electrical controls. Make a periodic inspection of the control box and electrical machine components for loose or broken wires. Relays and switches must be examined for burned or worn contacts. Look for loose or broken conduit and cable fittings. The control box and other components must be kept closed and locked. Keys must be removed to prevent tampering and prevent exposure to the dirt, chips and oil present in most shops.

Air System

1. Turn the air pressure off and lockout before maintaining any air component.

2. Inspection of the entire air system is dependent on the frequency of machine operation and the cleanliness of the plant air lines. Both free moisture and solids are removed automatically by the air filter. Drain the filter whenever the water level in the sump reaches the lower baffle. To remove the filter element for cleaning, shut air line down and exhaust secondary pressure. See Filter-Regulator Installation Manual No. KSL-208 and page 20 of this manual.
SECTION 7—MAINTENANCE AND INSPECTION
SSC-1000 Part Revolution Solid-State Control

Air System (continued)


4. The dual air solenoid valve must be protected from foreign material and relies on the performance of the air filter. The exhaust muffler must be removed regularly and cleaned so an unrestricted flow of exhaust air is obtained. Refer to Installation Manual Nos. KSL-036 or KSL-037 and page 19 of this manual.

The maintenance and inspection sections in this manual cannot be all-inclusive. Always refer to the original equipment manufacturer’s maintenance manuals or the machine owner’s manual. If you do not have an owner’s manual, contact the machine manufacturer.

Care of Keypad/Display

To clean the keypad/display, use a clean soft cloth with soap and warm water. Do not use oily rags, solvents, or ammonia-based glass cleaner.

Replacement of the “U4” EPROM

1. Shut off power to the main motor. Turn the main disconnect switch to the OFF position and lock it out. Open the door of the control enclosure. Remove the eight screws on the cover of the SSC-1000 Control Module (See Photo 3.4 on page 18). When they are removed, pull the cover straight off over the relays and transformers.

2. Locate the “U4” main EPROM (see Photo 3.4 on page 18 and Photo 7.1 below). It is located below the K2 Solenoid Relay on the “dual CPU” (Control Processing Unit) board.

3. Carefully remove the existing EPROM by pulling it straight out of the socket. Be careful not to bend the legs. Set aside the EPROM that was removed.

4. Prior to inserting the new EPROM, match the small notch in the top of the EPROM to the notch in the socket. Verify that the notch in the EPROM and the socket are lined up. Very carefully insert the new “U4” EPROM into the socket. Be careful not to bend any legs on the EPROM while pushing it into the socket. Make sure all the legs on the EPROM are properly seated into the socket. The legs must not be bent under or over the socket.

5. Replace the cover on the SSC-1000 Control Module. Close the control enclosure door.

6. Turn the disconnect switch to the ON position. The Initial Setup Procedure must be completed before proceeding. Please see page 34 of this manual.

(Continued on next page.)
OSHA 1910.217 Section (c) under General Requirements states:

(i) It shall be the responsibility of the employer to provide and insure the usage of “point-of-operation guards” or properly applied and adjusted point-of-operation devices on every operation performed on a mechanical power press.

This means that for every mechanical power press that is being used in United States industry, there must be protection for the operator by a guard or a device (safeguard). This protection may also be accomplished by the use of a combination of guards and devices.

When updating a power press, the most important decision is the selection of the proper guard or device. The following are methods of safeguarding part revolution power presses.

**Barrier Guards on Power Presses**

OSHA 1910.217 Section (c), General Requirements, (c)(2) Point of Operation Guards and Table 0-10 (Ref. enclosed MPPS, pages 19 - 20)

---

**Two-Hand Control on Power Presses**

OSHA 1910.217 Section (c)(3)(vii) Two-Hand Control (Ref. MPPS, pages 15 and 16)

---

**Light Curtain Presence Sensing Devices on Power Presses**

Light Curtain or Radio Frequency
OSHA 1910.217 Section (c)(3)(iii)(a) Presence Sensing (Ref. enclosed MPPS, pages 16 - 17)

---

**Pullback (Pull-out) on Power Presses**

OSHA 1910.217 Section (c)(3)(iv)(b) Pull-out (Ref. MPPS, page 18)
SECTION 8—METHODS OF SAFEGUARDING PRESSES

SSC-1000 Part Revolution Solid-State Control

Restraint (Holdout) on Power Presses

OSHA 1910.217 Section (c)(3)(vi)
Restraint or Holdout
(Ref. MPPS, page 18)

Type “A” or “B” Gate on Power Presses

OSHA 1910.217 Section (c)(3)(ii)(c)
Gate or Movable Barrier Device
(Ref. MPPS, page 18)

Auxiliary Safeguarding on Power Presses

Auxiliary safeguarding is additional protection from injuries for all personnel in the machine area. It is used in conjunction with primary safeguarding devices. Auxiliary safeguarding also involves the guarding of other components or hazardous openings on machines.

Auxiliary safeguards include such items as point-of-operation side end barriers when light curtains are used, pressure sensitive floor mats, workpiece tables or horizontal light curtains. Light curtains can be used horizontally to prevent an operator or other persons from standing between the vertical plane of light and the point-of-operation hazard.

Danger signs, used for warning, can be mounted on the machine in a position that is readily visible to the operator, setup person or other personnel. Hand tools can be used as auxiliary safeguarding. They are often used when feeding and retrieving small pieceparts. Hand tools themselves are NOT a point-of-operation safeguarding device.

OSHA 1910.217 Section (c) (Ref. MPPS, page 13)
(4) Hand feeding tools. Hand feeding tools are intended for placing and removing material in and from the press. Hand feeding tools are not a point-of-operation guard or protection device and shall not be used in lieu of the guards or devices required.

Other Safety Considerations

Other areas of machine safety must be considered in order to comply to the OSHA Regulations and ANSI Standards as we know them. This includes, but is not limited to, items such as a main power disconnect switch, which must be provided for each machine, and a magnetic type motor starter for the main drive motor and slide adjust motor. Mechanical power-transmission apparatus of the machine, such as rotating flywheels, gears, sprockets, chains, and shafts, must be covered in accordance with OSHA 1910.219. As with all machinery, best safety practices must be a continuing program. The operator, die setter and all personnel must be fully trained and instructed on all safety procedures and have full knowledge of the safeguarding device being used.

Note: The preceding point-of-operation safeguarding options are explained in OSHA’s 1910.217 Standard for Mechanical Power Presses, ANSI’s B11.1 booklet entitled “Safety Requirements for the Construction, Care and Use of Mechanical Power Presses.” Also see the enclosed Rockford Systems’ booklet entitled “Mechanical Power Press Safety” (MPPS).

When using the devices described, for point-of-operation protection, sides and rear of hazardous area must be guarded to protect the operator and other employees in the machine area (OSHA Section 1910.212).

(Continued on next page.)

Rockford Systems, LLC
Call: 1-800-922-7533
RETURN MATERIALS AUTHORIZATION REQUEST FORM
SSC-1000 Part Revolution Solid-State Control

To return material for any reason contact the sales department in our organization at 1-800-922-7533 for an R.M.A. Number. All returned materials shipments must be prepaid. Complete this form and send with material to 5795 Logistics Parkway, Rockford, IL 61109. Make sure the R.M.A. Number is plainly identified on the outside of the shipping container.

Company  

Address  

City __________________________________________ State ___________________________ Zip ________________  

Phone ___________________________ Fax ___________________________  

Contact Name ___________________________ Representative ___________________________  

Items Authorized To Return on R.M.A. No. ___________________________ Original Invoice No. __________ Date __________  

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Serial No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Service Requested  □ Full Credit  □ 25% Restocking  □ Repair & Return  □ Warranty Replacement  

Reason for return (describe in detail):

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

Return Materials Authorized by ___________________________ Date ___________________________  

(Continued on next page.)
ORDER FORM FOR SIGNS AND LITERATURE
SSC-1000 Part Revolution Solid-State Control

This instruction manual references signs and literature available for your machines. This order form is for your convenience to order additional signs and/or literature as needed. (This order form is part of your installation manual so please make a copy of it when ordering.)

Company  
Address  
City State Zip  
Phone Fax  
Name  
Purchase Order No. Date  

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>Quantity Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSL-212</td>
<td>Installation Manual SSC-1000 for Part Revolution Presses</td>
<td></td>
</tr>
<tr>
<td>KSC-000</td>
<td>Precaution Pamphlet (English)</td>
<td></td>
</tr>
<tr>
<td>KSC-000S</td>
<td>Precaution Pamphlet (Spanish)</td>
<td></td>
</tr>
<tr>
<td>KSC-000F</td>
<td>Precaution Pamphlet (French)</td>
<td></td>
</tr>
<tr>
<td>KST-134</td>
<td>Danger Label 4-3/8&quot; x 8&quot;</td>
<td></td>
</tr>
<tr>
<td>KST-135</td>
<td>Danger Label 5&quot; x 5-1/2&quot;</td>
<td></td>
</tr>
<tr>
<td>KST-247</td>
<td>Keypad/Display Label</td>
<td></td>
</tr>
<tr>
<td>KSS-027</td>
<td>Danger (High Voltage) Label 2-1/2&quot; x 4-1/4&quot;</td>
<td></td>
</tr>
<tr>
<td>KST-152</td>
<td>Warning (Hazardous Voltage) Label 1-1/2&quot; x 2-1/2&quot;</td>
<td></td>
</tr>
<tr>
<td>KSC-054</td>
<td>Danger Sign 5&quot; x 6&quot; (English)</td>
<td></td>
</tr>
<tr>
<td>KSC-054S</td>
<td>Danger Sign 5&quot; x 6&quot; (Spanish)</td>
<td></td>
</tr>
<tr>
<td>KSC-054F</td>
<td>Danger Sign 5&quot; x 6&quot; (French)</td>
<td></td>
</tr>
<tr>
<td>KSC-055</td>
<td>Danger Sign (Foot Switch) 5&quot; x 6&quot; (English)</td>
<td></td>
</tr>
<tr>
<td>KSC-055S</td>
<td>Danger Sign (Foot Switch) 5&quot; x 6&quot; (Spanish)</td>
<td></td>
</tr>
<tr>
<td>KSC-055F</td>
<td>Danger Sign (Foot Switch) 5&quot; x 6&quot; (French)</td>
<td></td>
</tr>
<tr>
<td>KSL-051</td>
<td>Booklet - “Mechanical Power Press Safety” (MPPS)</td>
<td></td>
</tr>
<tr>
<td>FAB</td>
<td>Catalog - “Safeguarding Fabricating Machines”</td>
<td></td>
</tr>
<tr>
<td>SFM</td>
<td>Catalog - “Shields for Machinery”</td>
<td></td>
</tr>
</tbody>
</table>

For prices and delivery, please use address, phone or fax number listed on the front cover of this manual.

Your Signature Date