

PROCUREMENT SPECIFICATIONS

for the

MSDI CS22A SOLID STATE SKIPLINE CONTROLLER

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1 MECHANICAL:

1.1 The skipline controller shall be housed a cast aluminum cabinet. The size of the cabinet shall not exceed 7 inches wide by 5 inches high by 3 inches deep excluding panel switch toggles and the connector. The cabinet shall be mounted by means of two handwheel knobs to a mounting yoke provided. Finish shall be non-glare, weather resistant black epoxy paint. The control panel markings shall be protected by a non-glare plastic overlay that is resistant to water and normal paint thinning solvents.

1.2 The controller panel shall be equipped with a liquid crystal display (LCD) panel of at least 16 characters by two lines. The LCD shall display the CYCLE and PAINT length settings. In addition, the LCD shall indicate the current vehicle speed and the current paint cycle status. The LCD shall also have an indicator to show that pulses are being received from the vehicle motion sensor (encoder). There shall be provisions for the operator to adjust the display contrast for easiest reading. The LCD display shall be illuminated from the rear by an array of light emitting diodes.

1.3 All connections to the controller shall be contained in an MS type circular connector and all operator activated toggle switches on the control panel shall be heavy duty MS type switches meeting MIL-S-83731, with internal silicone seals to seal out contaminants. All contacts shall be silver to silver.

1.4 The controller shall generate the required output patterns without the use of gears, cams, clutches or pulleys. Except for operator activated switches, there shall be no moving parts in the controller. There shall be no internal switches.

2 ELECTRICAL

- 2.1 The skip line controller shall be an all solid-state microprocessor based control unit utilizing the Zilog or Hitachi Z80 series microprocessor.
- 2.2 Calibration and configuration of the controller shall be programmable from the front panel by means of panel mounted pushbuttons, using the LCD display to indicate the parameters being adjusted and their current values. The parameters shall be selected through simple menu selections. It shall not be necessary to disassemble the controller to perform calibration or adjustments.
- 2.3 All programmed and accumulated data shall be stored in a non-volatile memory when power is turned off and shall be automatically recalled when power is turned on. This memory shall retain the stored data even if main power is removed or if the controller is removed from the vehicle. This memory shall not use a battery to retain data.
- 2.4 The controller shall be capable of controlling up to four (4) guns on two paintlines with a paint gun and a glass beads gun or dispenser on each paintline. The controller shall work correctly with any number of guns up to four.
- 2.5 The controller shall be programmable to either English or metric units of measure. For metric programming, substitute "meters" for "feet" in all specifications in this document. Changing from English to metric and vice versa shall not require recalibration, and shall automatically convert all accumulated data from the prior units to the currently selected units. Changing units of measure shall be possible even while painting without disturbing the patterns.
- 2.6 The controller shall operate entirely on 12 volts DC, negative ground, with acceptable power input range of from 11 to 18 volts. Current draw to be less than 1 ampere exclusive of solenoids.
- 2.7 The controller shall provide filtering as necessary to prevent improper operation due to strobes, arrowboards, flashers, 2-way radio equipment, overhead power lines, etc.
- 2.8 The controller shall provide 12 volt operating power as necessary to the vehicle motion sensor (sender). External vehicle power to this sender shall not be necessary. The controller shall operate with any of: fifth wheel encoder (any of optical, Hall-device magnetic or self-generating magnetic encoder), drive shaft or U-joint magnetic wrapper sender, or transmission mounted sender provided that the sender provides accurate, consistent pulses of at least 5 volts amplitude at a rate of from 0.26 pulses per foot of travel to 15 pulses per foot of travel (0.78 to 50 pulses per meter).
- 2.9 Calibration of the controller to the actual pulse rate of the pickup shall be easily performed by driving the vehicle over a measured course and pressing a switch. All necessary calculations shall be performed internally within the controller. It shall not be necessary to refer to charts or solve equations to set the calibration. A means of manually

overriding or "fine-tuning" the calibration shall be provided.

2.10 The controller outputs shall supply a maximum current of 2 amperes per gun solenoid. The controller shall have automatically resetting overcurrent protection that will remove power from a shorted solenoid before any damage occurs either to the controller or to the external controller wiring. Shorted gun circuits shall be displayed on the LCD panel by name for operator's information. Open gun circuits shall likewise be indicated on the LCD panel. Suppressors shall be provided to absorb inductive kick from the solenoids.

3 FUNCTIONAL

3.1 The controller shall include the following panel switches:
Paint gun Skip-Off-Solid switches (2),
Beads On-Off switch (1),
Reset-Run-Hold switch for intersections and pattern matching (1),
Advance/Retard switch for pattern matching (1),
Menu selection pushbuttons (4).

3.2 The controller shall be capable of painting patterns from 1.0 feet to 999.9 feet, adjustable in 0.1 foot increments. Cycle and Paint lengths shall be adjustable while painting. (0.3 m to 304 m in .0304 m increments).

3.3 The controller shall provide two integral footage counters to indicate the length of paint painted on each line, one footage counter for the sum of both lines and one counter for the total job travel. These indicators shall appear on the LCD display upon operator command and shall be individually resettable to zero, except for the summation counter. These counters shall be stored in the non-volatile memory so that the accumulated readings will not be lost when the controller is turned off or removed from the vehicle.

3.4 The controller shall be accurate to 0.1 feet at speeds of up to 15 MPH with an encoder providing 10 pulses per foot.

3.5 There shall be provision for advance/retard to allow matching of previous lines. Such advance/retard shall operate at a fixed rate of one foot per second regardless of the vehicle speed.

3.6 There shall be a provision to allow repeated advances or retards to modify the cycle and/or paint length to automatically adjust the controller to match previously painted lines. This system may be enabled or disabled by the operator at any time.

3.7 There shall be a provision to set the paint and cycle values of a previously painted skipline into the controller while actually repainting the old skipline (on-the-fly measurement). This system may be enabled or disabled at any time.

3.8 There shall be a provision to allow the operator to automatically paint a full length skipline when one of the paint switches is moved to the SKIP position, without requiring a separate RESET operation.

3.9 There shall be a provision for instant reset of the skip cycle to begin a full length paint line. There shall be a provision, under operator control, for the instant reset to begin a full length skip rather than a full length paint line. Such reset operation shall not interrupt any solid lines that are being painted simultaneously.

3.10 There shall be provision for an "instant off", stopping all paint and bead guns.

3.11 The controller shall provide adjustable timers to provide accurate line lengths and line registration. The timer values shall be stored in the non-volatile memory for automatic recall.

3.12 Four gun timers shall be adjustable from 0 to .5 seconds in .002 second increments. There shall be separate timers for the beginning and end of the paint lines and the beginning and end of the bead lines.

3.13 One bead gun spacing delay shall be provided to assure full bead coverage at any speed. It shall be adjustable from 0 to 4.0 feet in 0.1 foot increments. The spacing delay shall be the same for both the leading and the trailing end of the line. The bead gun spacing delay shall be automatically disabled if the vehicle is stationary to allow testing the bead guns for proper operation.

3.14 There shall be a provision to test the front panel switches to assure proper operation, and also a provision to restore all settable parameters to the original factory configuration.