UNION SWITCH & SIGNAL

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Solid State Code Transmitter (SSCT) Upgrade for GRS/ALSTOM Type B Size 2

Mechanical Code Transmitter

- Installation
- Operation

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Within the scope of the attached manual, it is impossible to take into account every eventuality that may arise with technical equipment in service. Please consult your local US&S Account Executive in the event of any irregularities with our product.

We expressly disclaim liability resulting from any improper handling or use of our equipment, even if these instructions contain no specific indication in this respect. We strongly recommend that only approved US&S spare parts be used as replacements.

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Revision History

Rev.	Date	Nature of Revision
Original	October 1997	Original Issue
	December 2000	Revision 1
2	March 2006	Incorporate ECN CRS-1407. Revised operating voltage range from “8 to 16 VDC” to “9 to 16 VDC.” Prepared and sent for FTR.

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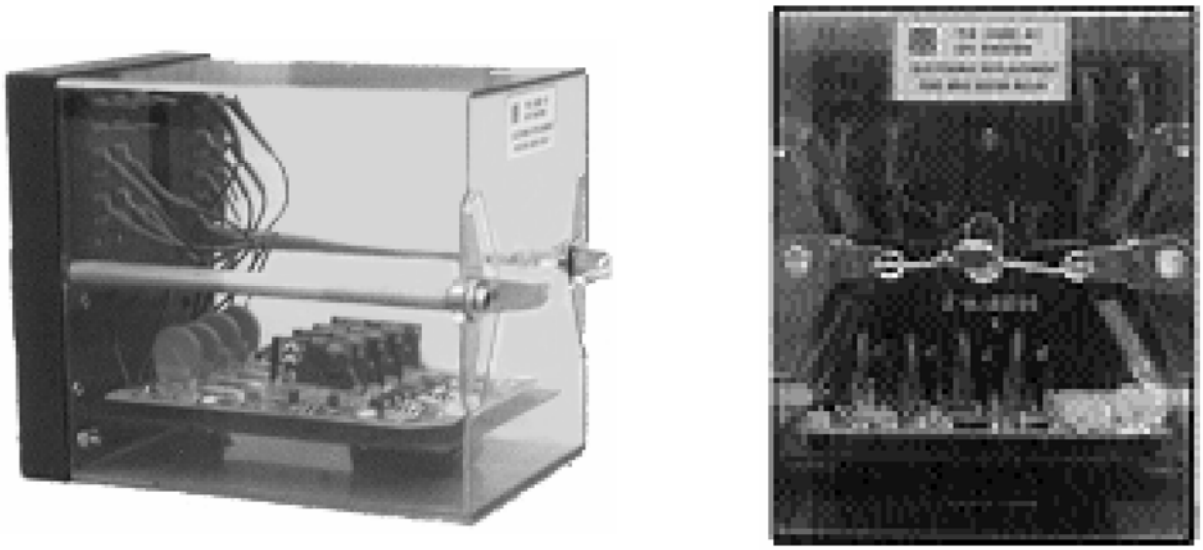
1 General Information

1.1 Introduction

This service manual provides description and installation information for Union Switch & Signal's Upgrade to the GRS/ALSTOM Type B Size 2 mechanical code transmitter (Figure 1-1). This upgrade provides a solid state option for customers with existing installations utilizing the GRS/ALSTOM mechanical code transmitter. Model numbers are determined by the nominal code rate and operating voltage of the code transmitter as outlined in Table 1-1. The US&S version of this code transmitter with a GRS/ALSTOM base, the Solid State Code Transmitter (SSCT) is covered in Service Manual 4568A.

1.2 Description

Since the SSCT is a direct plug-in replacement for the GRS/ALSTOM Type B Size 2 mechanical code transmitter, the physical size and positioning of the contact fingers are predetermined. Operation of this type of mechanical code transmitter is based on an oscillating armature on a vertical shaft, which has a natural frequency of oscillation. Motion is sustained by an electromagnetic circuit, which alternately attracts the oscillating armature in opposite directions. The oscillating armature alternately closes and opens opposing sets of contacts. In the neutral position of the pendulum, which also corresponds to its position with no voltage applied to the coil, neither set of contacts are closed. For nearly one-half of the oscillating armature motion, one set of contacts are closed and for the opposing range of motion a second set of contacts are closed. Available nominal code rates are 50, 75, 120, 180, 270, and 420 Codes Per Minute (CPM). Since the contacts are arranged as "break before make," both sets are alternately closed for less than 50% of the oscillation period. It is this fundamental operation that is duplicated electronically by the SSCT.



Side **Front**

Figure 1-1 - GRS/ALSTOM Type B Size 2 Mechanical Code Transmitter After Upgrade

Different types of contacts are provided for varying applications with broad classifications of low voltage and high voltage ratings. In order to ensure that units of different code rates or contact ratings are not interchanged, an indexing plate is used that matches a set of holes to a set of pins on the plug in base. Thus, the fundamental specification of the SSCT is determined. Unlike the mechanical counterpart, however, the high voltage version of the SSCT will be relegated to AC switching only. The low voltage version will be suitable for either AC or DC switching.

1.3 Specifications

Table 1-1 - Operating Specifications

Parameter	Value
Operating Range	9 to 16 VDC Reverse voltage protected.
Indications	Alternating LED's
Temperature Range	-40°C to + 70°C
Switch Rating	Low Voltage - AC or DC 2.5 amperes, 32 volts DC Max.* or 22 VRMS AC Max., 0.5 W ON resistance (Short circuit protected) Tranzorb transient protected at 34 volts peak. High Voltage - 2.5 amperes Peak 150 VRMS Max.* AC only, The voltage drop is 1.25 volts across an ON switch and is independent of load current (an external 10-ampere fuse is required for short circuit protection). MOV transient protected at 230 VRMS.
Number of Switches	Four arranged in opposing pairs
Dielectric Strength	2000 VRMS between all external isolated connections and case except across open switches which are limited by transorb or MOV protection.

*Maximum voltage is determined by a transorb to protect DC switches from excessive voltage spikes when operating code following relays; for the AC version a 230 VRMS MOV is similarly used anticipating 120 VRMS as the source voltage.

Table 1-2 - SSCT Code Specifications

US&S Model No.	Version Part Number	Code Rate	Voltage	Nominal Code Rate	Tolerance	Power Supply	On-Time Percentage
50 AC	N32000101	50	High	48	45-50	AC	49
50 DC	N32000105	50	Low	48	45-50	DC	49
50 AC/DC	N32000109	50	High/Low	48	45-50	AC/DC	49
75 AC	N32000102	75	High	72	68-76	AC	49
75 DC	N32000106	75	Low	72	68-76	DC	48
75 AC/DC	N32000110	75	High/Low	72	68-76	AC/DC	48
120 AC	N32000103	120	High	123	117-129	AC	49
120 DC	N32000107	120	Low	123	117-129	DC	47
120 AC/DC	N32000111	120	High/Low	123	117-129	AC/DC	47

US&S Model No.	Version Part Number	Code Rate	Voltage	Nominal Code Rate	Tolerance	Power Supply	On-Time Percentage
180 AC	N32000104	180	High	184	175-193	AC	49
180 DC	N32000108	180	Low	184	175-193	DC	45
180 AC/DC	N32000112	180	High/Low	184	175-193	AC/DC	45
270 AC	N32000113	270	High	276	268-284	AC	41
270 DC	N32000115	270	Low	276	268-284	DC	41
270 AC/DC	N32000117	270	High/Low	276	268-284	AC/DC	41
420 AC	N32000114	420	High	420	413-426	AC	39
420 DC	N32000116	420	Low	420	413-426	DC	39
420 AC/DC	N32000118	420	High/Low	420	413-426	AC/DC	39

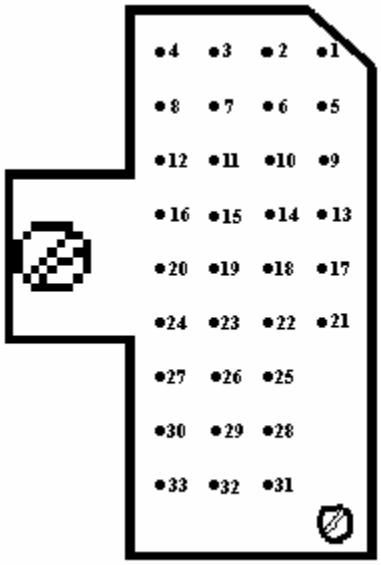


Figure 1-2 - Index Plate

Table 1-3 - SSCT Indexing

Model	High Voltage	Low Voltage	Hi/Low Voltage
50	**1, 3, 10, 25**	**1, 2, 5, 6**	**TBD**
75	**1, 2, 17, 19**	**1, 2, 5, 14**	**1, 4, 5, 7**
120	**1, 2, 17, 20**	**1, 2, 5, 15**	**TBD**
180	**1, 2, 17, 21**	**1, 2, 5, 16**	**TBD**
276	**1, 3, 9, 22**	**1, 3, 7, 8**	**TBD**
420	**TBD**	**TBD**	**TBD**

2 Installation and Operation

2.1 General

WARNING

To avoid personal injury or equipment damage, observe all electrical safety precautions when installing the SSCT. Power does not have to be turned off to perform this procedure.

2.2 Installation Procedure (Refer to Figures 1-1 and 2-1)

1. The SSCT is designed to directly replace the GRS/ALSTOM Type B Size 2 mechanical code transmitter. No wiring or circuitry changes are required.
2. Ensure that the correct SSCT model is available for installation. Verify that the drilling of the index plate is correct for the code rate and model type (AC or DC). See Section 1.3 and Table 1-1 for code rates and power options and Figure 1-2 and Table 1-2 for index patterns.
3. Unscrew the two retaining nuts and remove the old code transmitter unit. Save the retaining nuts for securing the SSCT.
4. Install the SSCT into the existing base, replace the retaining nuts and tighten securely.

2.3 Verify Operation

1. Verify that the newly installed SSCT is operating by observing that the two LED indicators are blinking in an alternating fashion.
2. Verify that the overall system, which the SSCT is a part of, is functioning properly.

2.4 Maintenance and Periodic Inspection

1. The SSCT is a maintenance-free unit.
2. There are no FRA requirements for periodic checking of solid state code transmitter units. Periodic verification of SSCT code rate operation is at the customer's discretion.
3. Malfunctioning SSCT units should be returned to Union Switch & Signal for warranty repair.

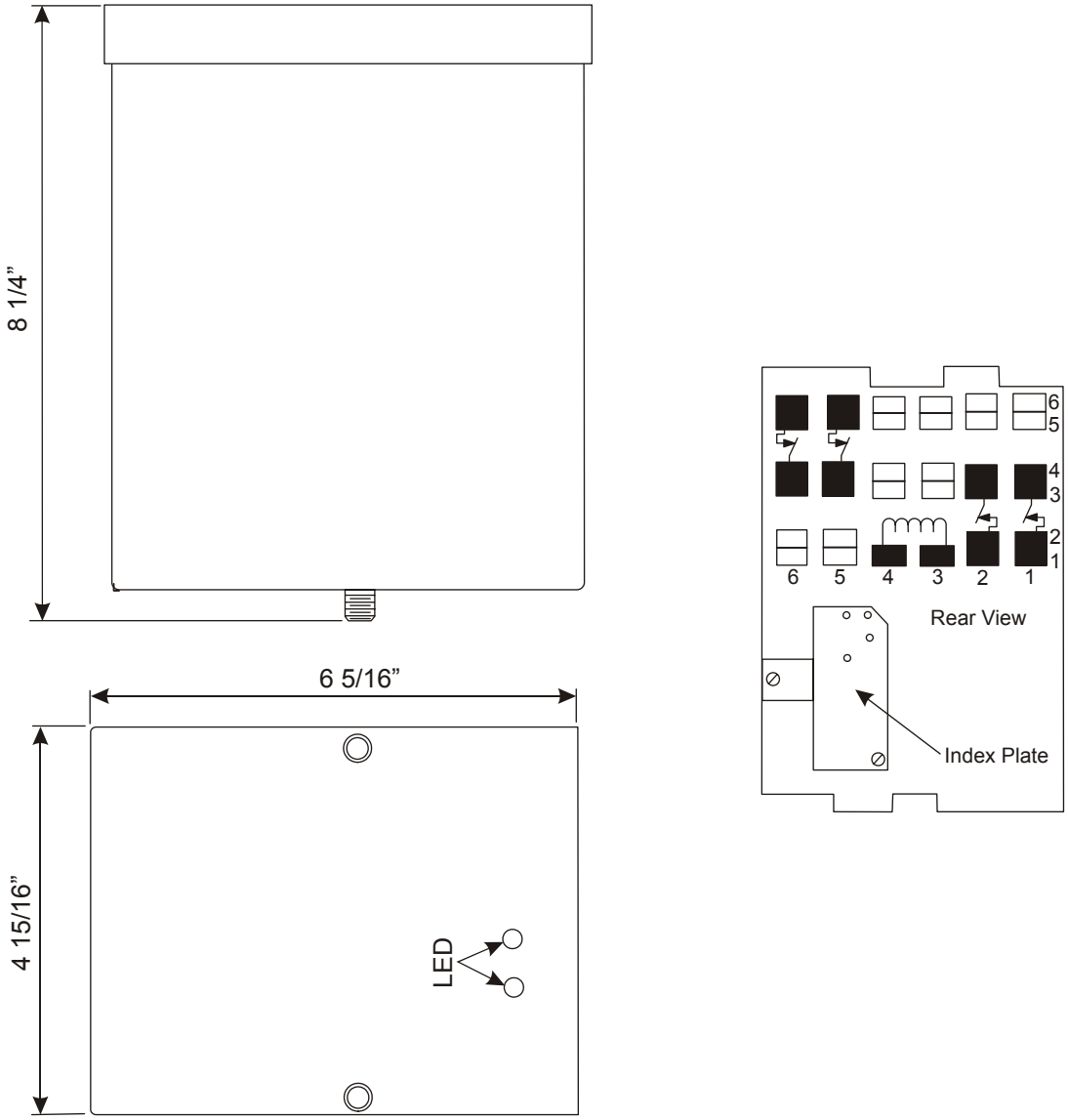


Figure 2-1 - Solid State Code Transmitter Basic Package

3 RAIL Team and Technical Support

The Rapid Action Information Link (RAIL) Team is comprised of experienced product and application engineers ready to assist and resolve technical issues concerning any US&S product.

Any questions regarding the contents of this service manual can be answered by contacting the RAIL Team via e-mail at ***railteam@switch.com*** or a toll-free call to 1-800-652-7276.