

# **SMC1 INSTALLATION & MAINTENANCE MANUAL**

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**BRADSHAW  
COMMUNICATION  
SYSTEMS**

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## **MODEL SMC1 STOW MOTOR CONTROL SYSTEM INSTALLATION & MAINTENANCE MANUAL**

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## INTRODUCTION

### A. MANUAL PURPOSE

This manual contains installation and maintenance instructions for the Bradshaw Communication Systems SMC1 Stow Motor Control System. The instructions herein are provided for personnel responsible for installing and maintaining the SMC1 system. A nameplate label located inside of the SMC1 identifies the units' model number, part number, revision, and serial number. The serial number is used by Bradshaw Communication Systems (BCS) to identify the units' particular configuration of options.

This manual does not provide information pertaining to the operation of the SMC1 system. Information pertaining to operation of the SMC1 system is found only in the SMC1 Operators Manual. It is required that a installation and/or service technician have a thorough understanding of the operation of the SMC1 system prior to any attempts to install or service the unit. Any required internal repairs to the SMC1 system should be referred to qualified service personnel.

### B. MANUAL ORGANIZATION

This manual is organized into the following three sections:

“Introduction” – This section provides manual purpose, manual organization, required installation/setup equipment, unit specifications, and customer support information.

“SMC1 System Installation” – This section provides safety precautions, typical system configuration, SMC1 Motor Controller and Rack Mount Remote Unit Mounting, and interface wiring information.

“SMC1 System Maintenance” – This section provides information pertaining to preventative maintenance and troubleshooting of the SMC1 system.

### C. REQUIRED INSTALLATION / SETUP TOOLS & EQUIPMENT

1 EACH	Medium Phillips Screwdriver
1 EACH	Medium Flat-blade Screwdriver
1 EACH	Adjustable Wrench
1 EACH	Socket Wrench Set
1 EACH	Multi-meter(capable of alternating current voltage and resistance measurements)
MISC.	Multi-meter Test Leads

### D. SMC1 STOW MOTOR CONTROL UNIT SPECIFICATIONS

Dimensions:	14.5" (36.8cm) high x 13" (33cm) wide x 8.3" (21.1cm) deep
Weight:	30 LBS (13.6 Kg)
Power Requirements:	3 Phase Power - Voltage & Current Dependent on Motor Sizes
Environmental:	-40° to 50°Celsius (-40° to 122° Fahrenheit) Operational 100% Relative Humidity
Enclosure:	Wall Mounted Weatherproof NEMA 4X Enclosure with Hinged Cover and Screw Release Latches.
Enclosure Finish:	Fiberglass Polyester
Enclosure Color:	Light Gray

### E. SMC1 RACK MOUNT REMOTE UNIT


Dimensions:	ANSI/EIA 1 Rack Height 1.719" (4.37cm) high x 19.0" (48.26cm) wide x 3.0" (7.62cm) deep
Weight:	10 LBS (4.54 Kg)
Power Requirements:	5 VDC - Supplied by SMC1 Motor Control Unit
Environmental:	0° to 50°Celsius (32° to 122° Fahrenheit) Operational 85% Relative Humidity (Non-Condensing)

### F. CUSTOMER SUPPORT

Customer support, replacement parts, and repair are available 8AM – 5PM EST M-F by contacting Bradshaw Communication Systems at 770-844-9704 or by fax at 770-886-0205. Additional support may be obtained from our website at <http://www.bcstech.com>

# SMC1 INSTALLATION

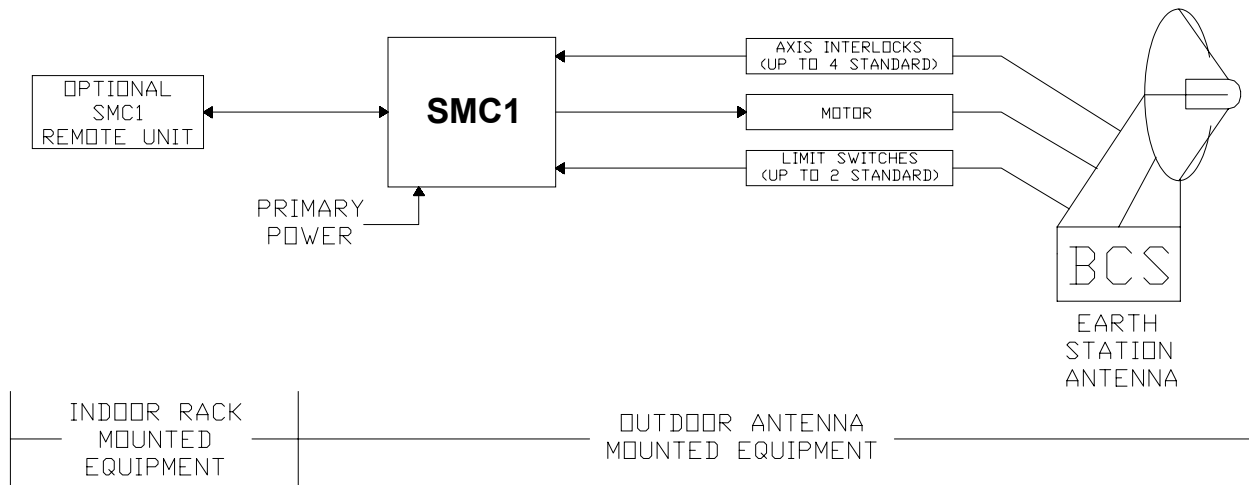
## A. SAFETY PRECAUTIONS

	<b>Lethal voltages are present inside the SMC1. Limit switches and other interlocks will disable the system, but do not disconnect the SMC1 from primary power. Refer all troubleshooting and repair to qualified service personnel. The SMC1 contains no operator serviceable parts.</b>
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## B. INTRODUCTION

### Typical System Configuration

The SMC1 Stow Motor Control System provides high power three-phase motor control and limit/interlock switch monitoring for earth station antennas requiring single axis stow capabilities. The earth station antennas are most commonly parabolic reflectors with a single steerable axis of motorization. When combined with the optional Stow Motor Control Remote Panel, the SMC1 allows for both local (at the antenna) and remote (at a remote indoor rack location) control and monitoring of an earth station antenna stow axis. For systems not requiring rack mounted remote control, the SMC1 may be ordered and used without the remote control option, still providing complete local axis control at the front of the antenna mounted SMC1 unit. A typical system configuration is shown in Figure 1 and details interconnection of the SMC1 with the other required system components that comprise a complete stow control system. Note that the addition of the motor and limit/interlock switches are all that is required to allow local stow control of the earth station antenna.



TYPICAL SYSTEM CONFIGURATION  
FIGURE 1

The SMC1 is the main system component and contains the control logic electronics to generate motor drive commands. Motor drive commands are produced in response to inputs from front panel controls and the optional SMC1 Rack Mount Remote Control Unit, and are dependent upon limit/interlock switch/s conditions.

Interlock switch feedback disables all axis movement while limit switch feedback disables specific directional movement once a specific limit switch has been reached. Indication is provided on the SMC1 front panel showing interlock status when antenna movement is attempted and interlocks are still present.

The optional SMC Remote Unit is generally rack mounted and located in the control room area, while the SMC1, limit switch/s, interlock switch/s, and motor are generally located on the earth station antenna structure. Limit and interlock switch/s, motor, and system cabling are generally customer provided unless BCS has been contracted to supply these system components.

**C. SMC1 MOUNTING**

The SMC1 design provides for mounting the unit via four tabs. Two tabs at the top of the unit and two at the bottom are provided. These tabs are provided loose inside the SMC1 and alternately may not be installed to allow rear mounting using the SMC1 enclosure's four captive 10-32 threaded inserts. Standard ¼ inch hardware may be used for mounting through the mounting tabs to the appropriate mounting location. Due to the variety of antennae the SMC1 may be used with, mounting specific instructions cannot be provided. For further unit mounting and dimensional data assistance, please contact Bradshaw Communication Systems.

**D. INTERFACE WIRING CHARTS**

**1. Termination Notes**

NOTE 1: Limit and interlock switch contacts must be closed for a non-limit/interlock condition. All limit switch contacts must be isolated.

NOTE 2: Jumper wires may be installed on Printed Wiring Assembly TB1 to "jumper" any unused Limit or Interlock connections. The switches must be normally closed and may be connected in series to provide multiple interlock points as required.

NOTE 3: Input power MUST be protected by means of a customer furnished 30 amp maximum branch circuit, ground fault, or inverse time circuit protection device.

**2. SMC1 to Stow Motor**

**Stow Motor Cable**

FROM SMC1 Main Terminal Block (Screw Clamp Terminals)			TO STOW MOTOR (Wire Leads)			
TERMINATION	TYPE	NOTES	TERMINATION	TYPE	NOTES	FUNCTION
MAIN TB – T1	Stripped Wire		Stow Motor L1	Wire-Nut		Stow Motor Phase A
MAIN TB – T2	Stripped Wire		Stow Motor L2	Wire-Nut		Stow Motor Phase B
MAIN TB – T3	Stripped Wire		Stow Motor L3	Wire-Nut		Stow Motor Phase C
GROUND BAR	Stripped Wire		Stow Motor CASE	#10 Ring Terminal		Stow Motor Safety Ground

**3. SMC1 to Stow Axis Limit Switch/s**

**Stow Axis Limit Switch/s Cable/s**

FROM SMC1 CTL PWA (Pluggable Terminal Block)			TO STOW AXIS LIMIT SWITCH/S (#6 Screws)			
TERMINATION	TYPE	NOTES	TERMINATION	TYPE	NOTES	FUNCTION
PWA TB1-12	Stripped Wire	NOTES 1 & 2	UP N.C.	#6 Ring Terminal	NOTES 1 & 2	UP Status
PWA TB1-11	Stripped Wire	NOTES 1 & 2	UP COMMON	#6 Ring Terminal	NOTES 1 & 2	UP Return
PWA TB1-10	Stripped Wire	NOTES 1 & 2	DOWN N.C.	#6 Ring Terminal	NOTES 1 & 2	DOWN Status
PWA TB1-9	Stripped Wire	NOTES 1 & 2	DOWN COMMON	#6 Ring Terminal	NOTES 1 & 2	DOWN Return

4. SMC1 to Stow Axis Interlock Switch/s

**Stow Axis Interlock Switch/s Cable/s**

FROM SMC1 CTL PWA (Pluggable Terminal Block) TO STOW AXIS INTLK SWITCH/S (#6 Screws)

TERMINATION	TYPE	NOTES	TERMINATION	TYPE	NOTES	FUNCTION
PWA TB1-8	Stripped Wire	NOTES 1 & 2	INTERLOCK #1 N.C.	#6 Ring Terminal	NOTES 1 & 2	Interlock #1 Status
PWA TB1-7	Stripped Wire	NOTES 1 & 2	INTERLOCK #1 COMMON	#6 Ring Terminal	NOTES 1 & 2	Interlock #1 Return
PWA TB1-6	Stripped Wire	NOTES 1 & 2	INTERLOCK #2 N.C.	#6 Ring Terminal	NOTES 1 & 2	Interlock #2 Status
PWA TB1-5	Stripped Wire	NOTES 1 & 2	INTERLOCK #2 COMMON	#6 Ring Terminal	NOTES 1 & 2	Interlock #2 Return
PWA TB1-4	Stripped Wire	NOTES 1 & 2	INTERLOCK #3 N.C.	#6 Ring Terminal	NOTES 1 & 2	Interlock #3 Status
PWA TB1-3	Stripped Wire	NOTES 1 & 2	INTERLOCK #3 COMMON	#6 Ring Terminal	NOTES 1 & 2	Interlock #3 Return
PWA TB1-2	Stripped Wire	NOTES 1 & 2	INTERLOCK #4 N.C.	#6 Ring Terminal	NOTES 1 & 2	Interlock #4 Status
PWA TB1-1	Stripped Wire	NOTES 1 & 2	INTERLOCK #4 COMMON	#6 Ring Terminal	NOTES 1 & 2	Interlock #4 Return

5. SMC1 to SMC1 Rack Mount Remote Unit (Optional)

**SMC1 Rack Mount Remote Unit Interface Cable**

FROM SMC1 CTL PWA (Pluggable Terminal Block) TO SMC1 Remote Unit (Terminal Block)

TERMINATION	TYPE	NOTES	TERMINATION	TYPE	NOTES	FUNCTION
PWA TB2-1	Stripped Wire		TB1-1	Stripped Wire		Remote Enable Command
PWA TB2-2	Stripped Wire		TB1-2	Stripped Wire		Remote Up/Dn Command
PWA TB2-3	Stripped Wire		TB1-3	Stripped Wire		Signal Return
PWA TB2-4	Stripped Wire		TB1-4	Stripped Wire		Power Status Indicator
PWA TB2-5	Stripped Wire		TB1-5	Stripped Wire		Interlock Status Indicator (+)
PWA TB2-6	Stripped Wire		TB1-6	Stripped Wire		Interlock Status Indicator (-)
PWA TB2-7	Stripped Wire		TB1-7	Stripped Wire		Up Limit Status Indicator
PWA TB2-8	Stripped Wire		TB1-8	Stripped Wire		Dn Limit Status Indicator
PWA TB2-9	Stripped Wire		TB1-9	Stripped Wire		Remote Enabled Status Indicator
PWA TB2-10	Stripped Wire		TB1-10	Stripped Wire		Remote Enabled Status Common

6. SMC1 to Primary Input Power

**Primary Input Power Cable**

FROM SMC1 Main Terminal Block (Screw Clamp Terminals)			TO PRIMARY INPUT POWER			
TERMINATION	TYPE	NOTES	TERMINATION	TYPE	NOTES	FUNCTION
MAIN TB – L1	Stripped Wire		PHASE A		NOTE 3	Phase A
MAIN TB – L2	Stripped Wire		PHASE B		NOTE 3	Phase B
MAIN TB – L3	Stripped Wire		PHASE C		NOTE 3	Phase C
GROUND BAR	Stripped Wire		SAFETY GROUND			Safety Ground

**E. INSTALLATION INSTRUCTIONS**

**1. Wiring/Pre Power-up Verification**

Prior to application of power, verify the following:

- a. Proper input voltage and wiring.
- b. Use a multi-meter on ohm scale to verify high impedance between each motor connection and safety ground. This step is crucial to avoid damage to the SMC1. Ensure power is removed prior to performance of this step.
- c. Check continuity of all wiring to ensure proper wiring per the installation wiring charts.

**2. Motor Phasing, Limit/Interlock Switch Testing, and Remote Control Verification**

- a. Verify the stow axis Interlocks are cleared.
- b. Verify the up and/or down limit switches are not activated.
- c. Turn ON the motor starter/protector located inside the SMC1 Stow Motor Control Unit. Close and secure the SMC1 cover.
- d. Apply power to the SMC1 Stow Motor Control Unit.
- e. Select the UP direction from the SMC1 front panel.
- f. Insert the supplied enable key, rotate, and maintain the key clockwise. The antenna should move in the UP direction. If the antenna moves in the DOWN direction, release the key, turn off all power to the SMC1 and switch any two motor phase wires to change phasing to obtain the proper direction of rotation.
- g. Once proper motor direction phasing has been verified, command the UP direction again and manually activate the UP Limit Switch. Verify antenna motion is stopped in the UP direction. Verify that axis movement in the DOWN direction is still functional even though the UP Limit Switch is still manually activated.
- h. Command the UP direction again and manually activate an Interlock Switch. Verify antenna motion is stopped in the UP direction. Verify that axis movement in the DOWN direction is also disabled. Repeat this step for each Interlock Switch installed in the system.
- i. Repeat steps “e” through “h” for the DOWN direction.

- j. After all limit switch functionality has been checked by manually activating the various limit switches, verify proper limit switch operation and mechanical adjustment by commanding the antenna into each limit. The SMC1 should be able to drive out of each limit, but not further into the limit.
- k. If the optional SMC1 Rack Mount Remote Unit has been installed, select the REMOTE position from the SMC1 front panel. Verify control of the antenna stow axis is now present at the SMC1 Rack Mount Remote Unit as demonstrated previously while using the controls on the SMC1 Stow Motor Control Unit front panel. Additionally, verify the functionality of each of the five status and fault indicators as detailed below:

Indicator LED	Color	Functionality
POWER	Green	Illuminates when the remote unit is connected and proper power is present
LOCAL CONTROL	Red	Illuminates when the SMC1 front panel switch set to either UP or DOWN
INTERLOCK	Red	Illuminates when either direction is commanded and any interlock is activated
UP LIMIT	Red	Illuminates when the UP limit has been reached
DOWN LIMIT	Red	Illuminates when the DOWN limit has been reached

## SMC1 MAINTENANCE

### A. MAINTENANCE

At six-month intervals, inspect the interior of the SMC1 for excessive dust, dirt, and/or moisture. Remove any such accumulations with a damp cloth only after ensuring all input power has been removed.

Add desiccant packets inside the bottom of the SMC1 if the unit is opened frequently or if the SMC1 is located in a heavy humidity environment.

### B. TROUBLESHOOTING

In the event a motor does not turn in the proper direction, reverse any two phases at the motor to obtain proper rotation. If a limit switch does not properly stop antenna motion in a given direction, reverse the limit switch wiring to ensure proper antenna motion direction to proper limit switch orientation.

If the antenna does not respond to the SMC1 Stow Motor Control Unit front panel commands, verify the following:

1. SMC1 Stow Motor Control Unit front panel direction switch set to UP or DOWN
2. All interlocks are cleared
3. Antenna is not in a limit
4. Proper input power is applied to the SMC1 and all three phases are present
5. SMC1 Logic PWA Power LED is illuminated
6. SMC1 Motor Starter/Protector is in the ON position (not tripped or OFF)
7. SMC1 Logic PWA Interlock, UP, and/or DOWN LED's are NOT illuminated
8. SMC1 Logic PWA Local Control LED is illuminated

If the antenna does not respond to the SMC1 Remote Unit commands, verify the following:

1. SMC1 Stow Motor Control Unit front panel direction switch set to REMOTE
2. SMC1 Remote Unit Power LED is illuminated
3. All interlocks are cleared (Interlock LED not illuminated)
4. Antenna is not in a limit (UP or DOWN Limit LED not illuminated)
5. Proper input power is applied to the SMC1 and all three phases are present
6. SMC1 Logic PWA Power LED is illuminated
7. SMC1 Motor Starter/Protector is in the ON position (not tripped or OFF)
8. SMC1 Logic PWA Local Control, Interlock, UP, and/or DOWN LED's are NOT illuminated