

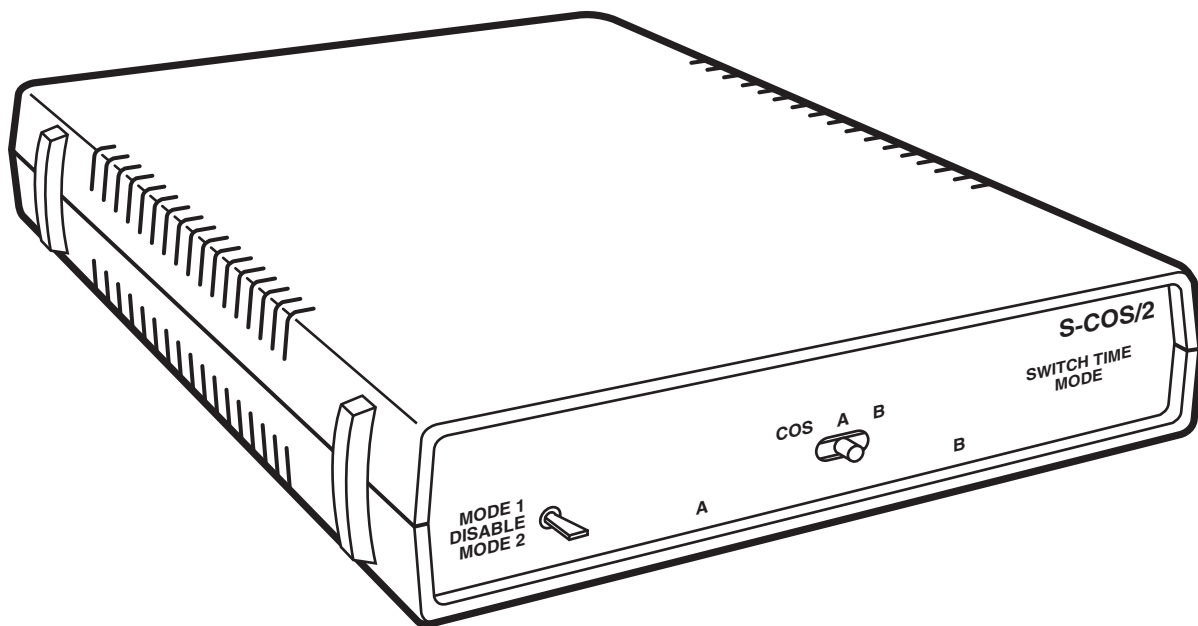


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Serial Code Operated Switch S-COS/2



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RADIO FREQUENCY INTERFERENCE STATEMENTS**

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

TRADEMARKS USED IN THIS MANUAL

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INSTRUCCIONES DE SEGURIDAD (Normas Oficiales Mexicanas Electrical Safety Statement)

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico debe ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
 - A: El cable de poder o el contacto ha sido dañado; u
 - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
 - C: El aparato ha sido expuesto a la lluvia; o
 - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
 - E: El aparato ha sido tirado o su cubierta ha sido dañada.

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1. Specifications

Interface —	RS232/V.24, full duplex, asynchronous
Connectors —	(3) DB25 female
Coding —	5 to 8 bit, asynchronous
Controls —	External — (2) toggle switches (modes and manual override) Internal — Baud rate and format DTE/DCE configuration switch for each port Auto Timeout Arming Character
Indicators —	(3) LEDs: Channel A, Channel B, and SWITCH TIME MODE
Addressing —	Two-digit code: First digit is switch-selectable, initiates Switch Time Mode—factory setting is EOT (Ctrl D, Hex 04) Second digit assigns channel; Hex 31H-32H locks out the other channel No port is selected in the Switch Time mode
Data Rate —	75, 300, 600, 1200, 2400, 4800, 9600, 19,200 bps
Power —	115 VAC, 60Hz, 11 watts
Enclosure —	High-impact plastic
Humidity —	15% to 95% noncondensing
Temperature —	Operating — 32 to 122°F (0 to 50°C) Storage — -4 to +158°F (-20 to +70°C)
Size —	2.25"H x 8.75"W x 11.25"D (5.7 cm x 22.2 x 28.6)
Weight —	2.6 lb. (1.2 kg)

Circuits Supported		
Pin	Name	Description
1	FG	Chassis Ground, wired straight through
2	TD	DTE/DCE switched for each channel
3	RD	DTE/DCE switched selectable for each channel
4	RTS	Switch-selected to be pulled up or tied to pin 5
5	CTS	Switch-selected to be pulled up or tied to pin 4
6	DSR	DTE/DCE switched for each channel
7	SG	Signal return, wired straight through
8	DCD	Received-line signal detector, switch-selected to be pulled up or not to be pulled up
20	DTR	DET/DCE switch selectable for each channel
Pins 6 and 20 (control in and control out) are switched by the S-COS/2. Pin 4 or 8 can be selected for control in or control out.		

2. Introduction

The Code Operated Switch is an asynchronous RS-232C switch. Under code control, a master port can select subordinate ports. The master device (a CPU or terminal) selects any of the other ports (printers, modems, or terminals) by transmitting the proper arming and switching code.

Any of the subordinate devices can also make the communications link by transmitting their own channel address codes while the switch is in the Switch Time mode. Once the communications link is established, all other ports are locked out.

The ports remain locked out until either the master port or the selected subordinate port sends an arming character. Reception of the arming character causes the S-COS/2 to break all switched connections—leads 2 (TD), 3 (RD), control in, and control out—between the master and subordinate port. The unit then resumes Switch Time mode.

All signal grounds (pin 7) are tied together, as are all chassis grounds (pin 1). All of the ports have DB25 female connectors. Switches for each port allow DTE or DCE configuration. There are also switches to select baud rate and word format (parity, character length, and number of stop bits).

The computer selects which device to communicate with by transmitting the proper arming and switching code.

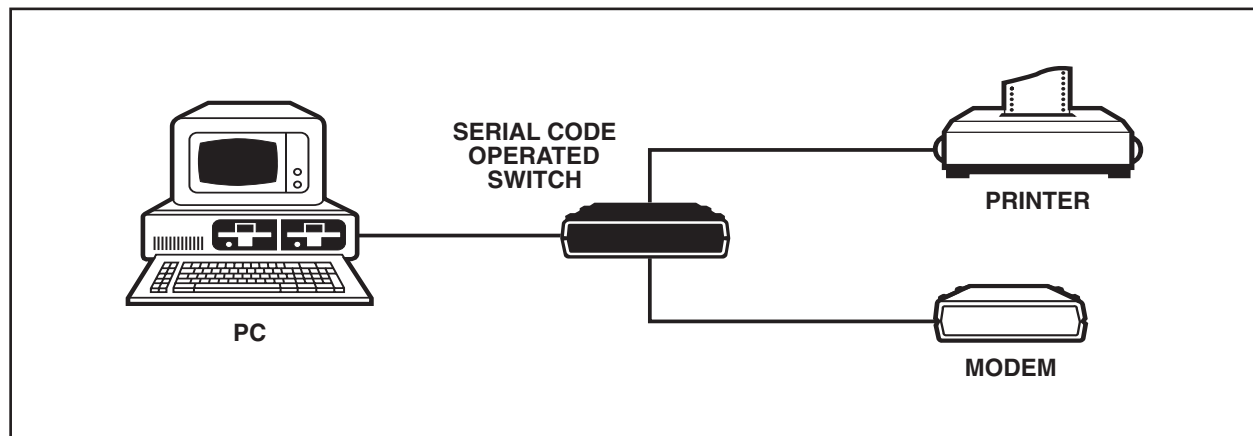


Figure 1. Typical Application.

3. Installation

3.1 General

Installation of the Code Operated Switch is a matter of connecting the MODEM and TERMINAL connectors to the proper communications equipment using the RS-232 connectors.

All ports have DB25 female connectors normally configured as DCE. With internal DIP switches, you can individually reconfigure each port for DTE operation if necessary.

The Master port is the only port to enable port selection.

3.2 Switch Settings

Determine if any internal switches must be reconfigured to match your particular application. The unit's internal DIP switches are factory-preset to the following parameters:

Baud Rate:	9600 bps
Word Format:	8 data bits, 1 stop bit, and parity disabled
Auto Timeout:	Disabled
Arming Character:	04 Hex (EOT), CTRL D
All Serial Ports:	DCE

CAUTION

Be certain that power is disconnected from the unit while changing any DIP switch settings.

Refer to Figure 2 on page 7 for the location of the internal switches.

S1 — WORD FORMAT

The parameters set by this switch will be the same for the entire network.

Switch Position	Status	Description
1	Open Closed	Even Parity Odd Parity
Position 2 Closed Open Closed Open	Position 3 Closed Closed Open Open	5-Bit Word Length 6-Bit Word Length 7-Bit Word Length 8-Bit Word Length
4	Open Closed	2 Stop Bits 1 Stop Bit
5	Open Closed	Parity Disable Parity Enable
6	Always Open	
7	Always Closed	
8	Always Open	

S2 — BAUD RATE

Close only *one* position to set the baud rate.

Position Closed	Baud Rate
1	75 bps
2	300 bps
3	600 bps
4	1,200 bps
5	2,400 bps
6	4,800 bps
7	9,600 bps
8	19,200 bps

SERIAL CODE OPERATED SWITCH S-COS/2

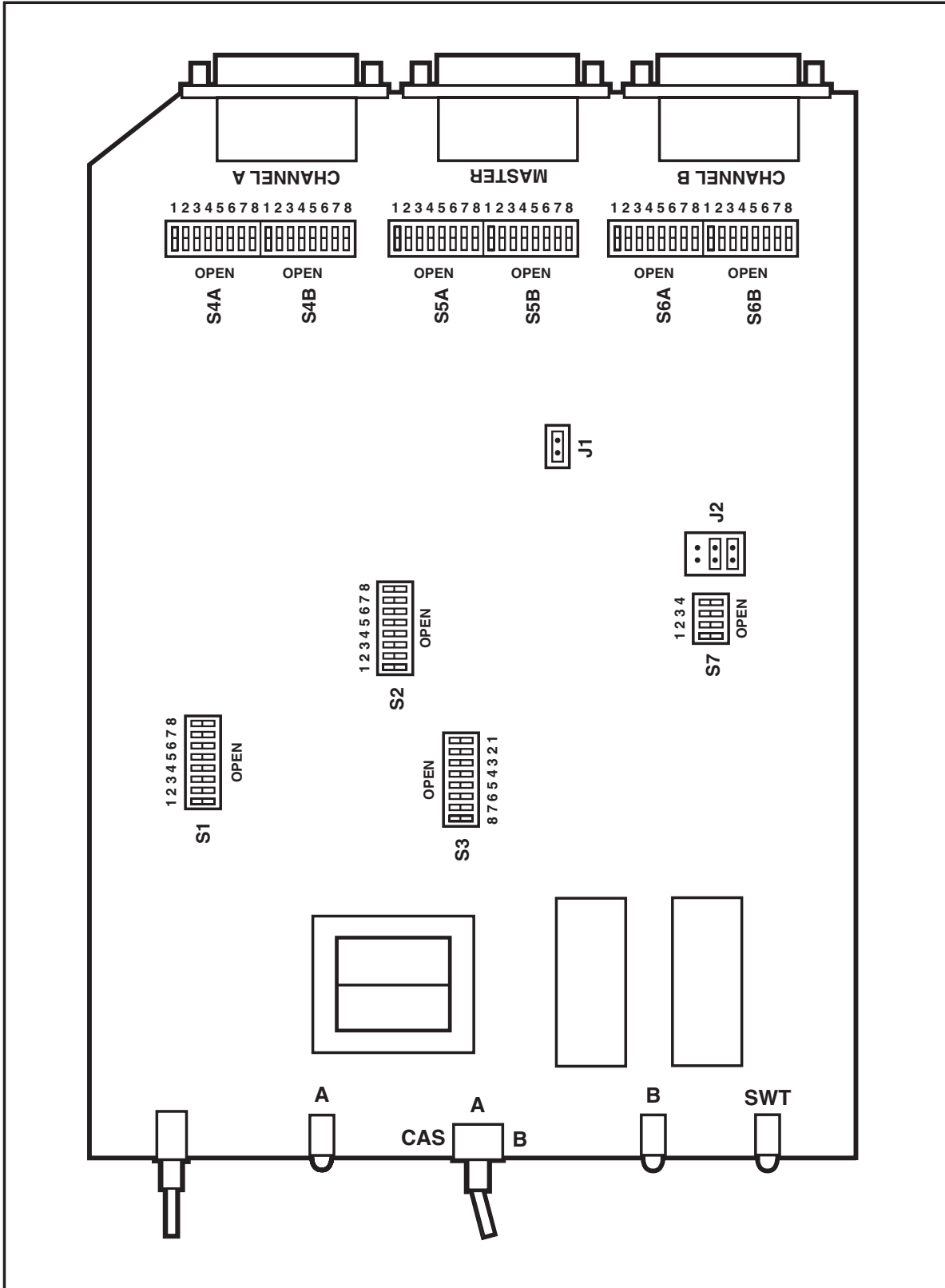


Figure 2. Component Layout.

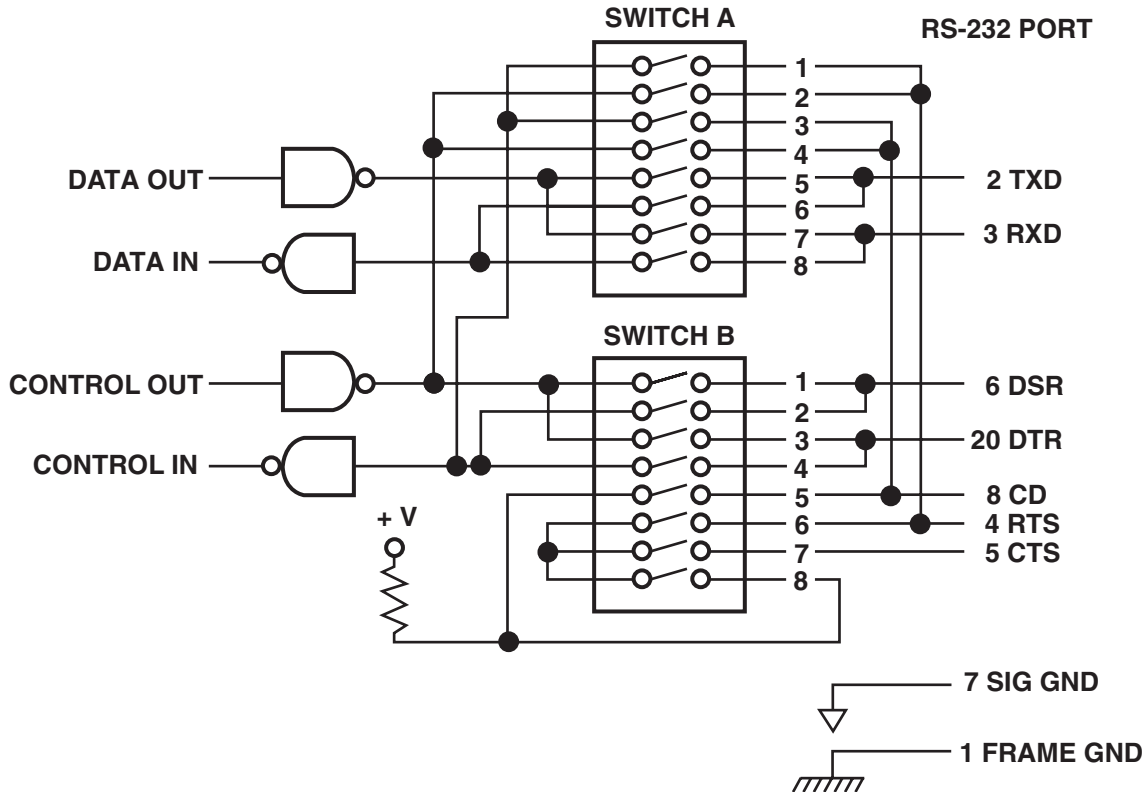


Figure 3. Port-Configuration Switches.

S3 — ARMING CHARACTER CODE

The S-COS/2 is set at the factory for an EOT (04) arming code. If you need to change the code, refer to **Section 4.3** for a listing of codes and the appropriate switch settings. The arming character must never appear in the normal data unless the vertical 3-position toggle switch (MODE 1, DISABLE, MODE 2) is set to DISABLE or MODE 2.

S4A, S4B, S5A, S5B, S6A, AND S6B — PORT CONFIGURATION

The port-configuration switches set the port configurations for the Master and Channel ports as follows:

- S4A and S4B are for the Channel A port
- S5A and S5B are for the Master port
- S6A and S6B are for the Channel B port

Refer to Figure 3 for a diagram of these switches.

Switch positions 6, 7, and 8 on Switch B may be selected to assert RTS or CTS high or to tie RTS directly to CTS. Switch 5 may be used to assert CD high.

DTE AND DCE

When connecting two devices together with a straight-pinned cable, the devices must be opposites (one DTE, one DCE). Thus the S-COS/2's port must be configured to be the opposite of the connecting device.

SERIAL CODE OPERATED SWITCH S-COS/2

A DTE (Data Terminal Equipment) device outputs data on pin 2 and receives data in on pin 3. Its control output pins are (4) RTS and (20) DTR. Its control input pins are (5) CTS, (6) DSR and (8) DCD. Terminals, personal computers, and DEC™ computers are all examples of DTE devices.

Typical Configuration for the S-COS/2 to Appear as DTE

Switch	Positions Closed
A	5 and 8
B	2 and 3

A DCE (Data Communication Equipment) device is the opposite of DTE. It outputs data on pin 3 and receives data in on pin 2. Its control output pins are 5 (CTS), 6 (DSR) and 8 (DCD). Modems, HP® computers, and DG computers are all examples of DCE devices.

Typical Configuration for the S-COS/2 to Appear as DCE

Switch	Positions Closed
A	6 and 7
B	1 and 4

S7 — MODE 2 TIMEOUT

This 4-position DIP selects the amount of timeout delay when the S-COS/2 is in Mode operation (see **Section 4.1** on page 11). Close only one position of this switch at a time.

When the value for delay time is expressed in hex words, you can convert the figure to real time by using the following equation:

$$((1/Y) \times (X))/0.2 = T$$

Where:

Y = baud rate

X = word delay

T = time in seconds

Examples:

- A 100-hex-word delay at 9600 baud equals a 52-millisecond delay.
- A 100-hex-word delay at 4800 baud equals a 104-millisecond delay.
- A 50-hex-word delay at 9600 baud equals a 26-millisecond delay.
- A 50-hex-word delay at 4800 baud equals a 52-millisecond delay.

Timeout Delay when the S-COS/2 is in Mode Operation

Position Closed	Timeout Period
1	5 hex words
2	25 hex words
3	50 hex words
4	100 hex words

3.3 Jumpers

J1 — BREAKS

When jumper J1 is installed, the S-COS/2 will pass breaks. If jumper J1 is not installed, the S-COS/2 will not pass breaks.

The S-COS/2 generates a break signal as follows: When the master or slave port UART receives a break, the UART raises pin 14 to a logical 1 (this represents a framing error to the UART). The UART thinks it has received a character with an invalid stop bit. The raising of the framing-error pin starts the multivibrator timing circuit that sends a constant space signal for approximately 257 milliseconds to the connected output port. This duration represents a break.

Once the break condition has occurred, multiple breaks cannot be sent, because the framing-error pin on the UART cannot be reset, and the UART does not know whether the next character received is valid data or not. To reset the framing-error pin on the UART, put the S-COS/2 into Switch Time Mode (see **Section 4.1**). Then reconnect the other port or power off and on.

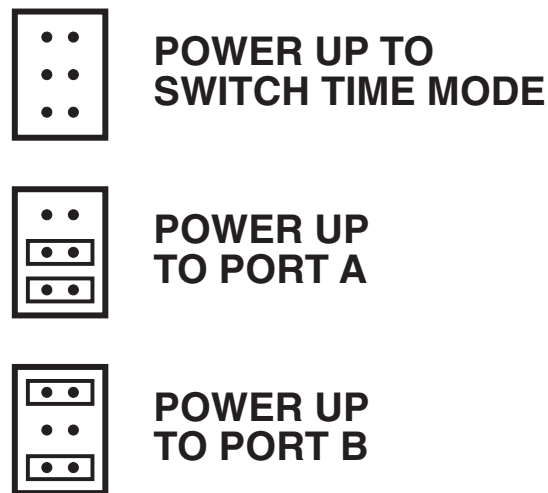


Figure 4. J2 Jumper Settings.

J2 — MODE DEFAULT SETTING

Jumper J2 determines the default mode when the S-COS/2 is powered up or reset. See Figure 4 for the available settings and results.

3.4 Installation Procedure

1. Remove the cover from the S-COS/2.
2. Set the switches for your application as described in **Section 3.2**.
3. Replace the cover of the S-COS/2.
4. Connect the serial devices to the terminals on the rear of the S-COS/2.
5. Plug the power cord into the AC wall outlet.
6. Apply power to the connected devices.

The S-COS/2 is now ready for operation.

4. Operation

4.1 Modes of Operation

The S-COS/2 has three possible modes of operation: MODE 1 (text mode), DISABLED (manual mode), and MODE 2 (transparent or graphics mode). These modes are selected by the two switches on the front panel.

MODE 1 (TEXT MODE)

To operate in mode 1, the mode switch must be in the MODE 1 position and the manual switch must be in the COS position. In this mode, switching a channel port to the master port is done using software commands. The device connected to the master port sends an arming character to the S-COS/2. The arming character is selected by SW3 (see **Section 4.3** for the possible arming characters).

NOTE: The arming character must be a character that is not used in the text during normal operation of the S-COS/2. Arming characters are not passed through the S-COS/2.

When the S-COS/2 receives an arming character, it enters the Switch Time mode. In Switch Time mode, the S-COS/2 can switch port A or port B to the master port. The master port must send hex code 31H to connect to port A or hex code 32H to connect to port B.

NOTE: Any signal sent from the master port other than than hex codes 31H or 32H when the unit is in Switch Time mode will not be passed by the S-COS/2.

When a channel port is connected to the master port, the S-COS/2 enters the channel-selected setting and the channel port connected to the master port is shown on the corresponding front-panel LED. Circuits TD, RD, DSR, and DTR are connected between the master port and the appropriate channel port. After the channel has been selected, all codes (except the arming character) can be sent through the unit.

Only the master port can send an arming character to terminate the channel-selected setting and bring the S-COS/2 back to the Switch Time mode. Turning the power off and on will also terminate this mode (the S-COS/2 will power up according to the setting of jumper J2).

NOTE: Only the device connected to the master port can send arming charcters and hex codes 31H and 32H to select the desired channel ports. The mode 1 switching operations cannot be initiated by the devices connected to ports A and B.

This mode of operation would normally be used when you are certain that no arming characters are going to be sent to the S-COS/2 except for port selection.

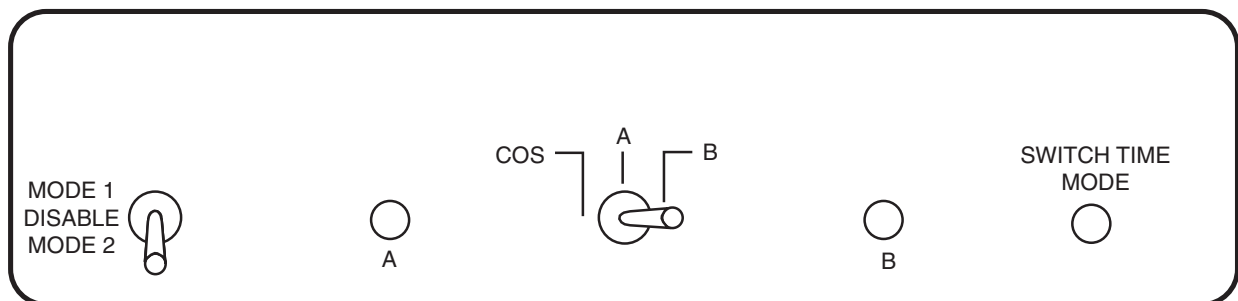


Figure 5. The front panel of the Serial Code Operated Switch S-COS/2

DISABLED (MANUAL MODE)

When the mode switch is in the Disabled position, the master port of the S-COS/2 is connected to the port selected by the manual switch (A or B). All characters will be passed at all times and code operation is not possible.

MODE 2 (TRANSPARENT OR GRAPHICS)

To operate in mode 2, the mode switch must be in the MODE 2 position and the manual toggle switch must be in the COS position. DIP switch 1, position 7 must be closed and position 8 must be open.

NOTE: Only the device connected to the master port can control the switching in this mode.

The first character sent from the device connected to the master port must be the arming character (selected by Switch S3) followed immediately by the port letter (A or B) that is to be connected to the master port. Once the channel port is switched to the master port, all characters will be passed—including arming characters. Switching channel ports requires a period of time (selected by Switch S7) to elapse after transmission has stopped before the S-COS/2 can be set to switch ports. To switch ports after the timeout period, the master port must send the arming character immediately followed by the channel port letter.

4.2 Manual Override

The switch in the center of the front panel is for manual override. When this switch is in the COS position, code operation is possible as per the setting of the mode switch.

Set the manual override switch to position A and set the mode switch to the DISABLE position to have the master port connected to port A. Set the manual override switch to position B and set the mode switch to the DISABLE position to have the master port connected to port B. All characters will be passed through the S-COS/2.

4.3 Switch SW3 Arming Code Settings

EOT is the factory-default arming character.

1 = Closed (ON); 0 = Open (OFF)

ARMING CHARACTER				SWITCH POSITIONS							
				LSB							MSB
ASCII	CTRL	HEX	DECIMAL	1	2	3	4	5	6	7	8
NUL	@	00	0	1	1	1	1	1	1	1	1
SOH	A	01	1	0	1	1	1	1	1	1	1
STX	B	02	2	1	0	1	1	1	1	1	1
ETX	C	03	3	0	0	1	1	1	1	1	1
EOT	D	04	4	1	1	0	1	1	1	1	1
ENQ	E	05	5	0	1	0	1	1	1	1	1
ACK	F	06	6	1	0	0	1	1	1	1	1
BEL	G	07	7	0	0	0	1	1	1	1	1
BS	H	08	8	1	1	1	0	1	1	1	1

SERIAL CODE OPERATED SWITCH S-COS/2

ARMING CHARACTER				SWITCH POSITIONS							
ASCII	CTRL	HEX	DECIMAL	LSB	2	3	4	5	6	7	MSB
				1							8
HT	I	09	9	0	1	1	0	1	1	1	1
LF	J	0A	10	1	0	1	0	1	1	1	1
VT	K	0B	11	0	0	1	0	1	1	1	1
FF		0C	12	1	1	0	0	1	1	1	1
CR	M	0D	3	0	1	0	0	1	1	1	1
SO	N	0E	14	1	0	0	0	1	1	1	1
SI	O	0F	15	0	0	0	0	1	1	1	1
DLE	P	10	16	1	1	1	1	0	1	1	1
DC1	Q	11	17	0	1	1	1	0	1	1	1
DC2	R	12	18	1	0	1	1	0	1	1	1
DC3	S	13	19	0	0	1	1	0	1	1	1
DC4	T	14	20	1	1	0	1	0	1	1	1
NAK	U	15	21	0	1	0	1	0	1	1	1
SYN	V	16	22	1	0	0	1	0	1	1	1
ETB	W	17	23	0	0	0	1	0	1	1	1
CAN	X	18	24	1	1	1	0	0	1	1	1
EM	Y	19	25	0	1	1	0	0	1	1	1
SUB	Z	1A	26	1	0	1	0	0	1	1	1
ESC	[	1B	27	0	0	1	0	0	1	1	1
FS	\	1C	28	1	1	0	0	0	1	1	1
GS	]	1D	29	0	1	0	0	0	1	1	1
RS	^	1E	30	1	0	0	0	0	1	1	1
US	—	1F	31	0	0	0	0	0	1	1	1
SPACE		20	32	1	1	1	1	1	0	1	1
!		21	33	0	1	1	1	1	0	1	1
"		22	34	1	0	1	1	1	0	1	1
#		23	35	0	0	1	1	1	0	1	1
\$		24	36	1	1	0	1	1	0	1	1
%		25	37	0	1	0	1	1	0	1	1
&		26	38	1	0	0	1	1	0	1	1
'		27	39	0	0	0	1	1	0	1	1
(		28	40	1	1	1	0	1	0	1	1
)		29	41	0	1	1	0	1	0	1	1
.		2A	42	1	0	1	0	1	0	1	1

SERIAL CODE OPERATED SWITCH S-COS/2

ARMING CHARACTER				SWITCH POSITIONS							
				LSB							MSB
ASCII	CTRL	HEX	DECIMAL	1	2	3	4	5	6	7	8
+		2B	43	0	0	1	0	1	0	1	1
,		2C	44	1	1	0	0	1	0	1	1
-		2D	45	0	1	0	0	1	0	1	1
.		2E	46	1	0	0	0	1	0	1	1
/		2F	47	0	0	0	0	1	0	1	1
0		30	48	1	1	1	1	0	0	1	1
1		31	49	0	1	1	1	0	0	1	1
2		32	50	1	0	1	1	0	0	1	1
3		33	51	0	0	1	1	0	0	1	1
4		34	52	1	1	0	1	0	0	1	1
5		35	53	0	1	0	1	0	0	1	1
6		36	54	1	0	0	1	0	0	1	1
7		37	55	0	0	0	1	0	0	1	1
8		38	56	1	1	1	0	0	0	1	1
9		39	57	0	1	1	0	0	0	1	1
:		3A	58	1	0	1	0	0	0	1	1
;		3B	59	0	0	1	0	0	0	1	1
<		3C	60	1	1	0	0	0	0	1	1
=		3D	61	0	1	0	0	0	0	1	1
>		3E	2	1	0	0	0	0	0	1	1
?		3F	63	0	0	0	0	0	0	1	1
@		40	64	1	1	1	1	1	1	0	1
A		41	65	0	1	1	1	1	1	0	1
B		42	66	1	0	1	1	1	1	0	1
C		43	67	0	0	1	1	1	1	0	1
D		44	68	1	1	0	1	1	1	0	1
E		45	69	0	1	0	1	1	1	0	1
F		46	70	1	0	0	1	1	1	0	1
G		47	71	0	0	0	1	1	1	0	1
H		48	72	1	1	1	0	1	1	0	1
I		49	73	0	1	1	0	1	1	0	1
J		4A	74	1	0	1	0	1	1	0	1
K		4B	75	0	0	1	0	1	1	0	1
L		4C	6	1	1	0	0	1	1	0	1

SERIAL CODE OPERATED SWITCH S-COS/2

ARMING CHARACTER				SWITCH POSITIONS							
ASCII	CTRL	HEX	DECIMAL	LSB	2	3	4	5	6	7	MSB
				1							8
M		4D	77	0	1	0	0	1	1	0	1
N		4E	78	1	0	0	0	1	1	0	1
O		4F	79	0	0	0	0	1	1	0	1
P		50	80	1	1	1	1	0	1	0	1
Q		51	81	0	1	1	1	0	1	0	1
R		52	82	1	0	1	1	0	1	0	1
S		53	83	0	0	1	1	0	1	0	1
T		54	84	1	1	0	1	0	1	0	1
U		55	85	0	1	0	1	0	1	0	1
V		56	86	1	0	0	1	0	1	0	1
W		57	87	0	0	0	1	0	1	0	1
X		58	88	1	1	1	0	0	1	0	1
Y		59	89	0	1	1	0	0	1	0	1
Z		5A	90	1	0	1	0	0	1	0	1
[		5B	91	0	0	1	0	0	1	0	1
		5C	92	1	1	0	0	0	1	0	1
]		5D	93	0	1	0	0	0	1	0	1
		5E	94	1	0	0	0	0	1	0	1
<-		5F	95	0	0	0	0	0	1	0	1
-		60	96	1	1	1	1	1	0	0	1
a		61	97	0	1	1	1	1	0	0	1
b		62	98	1	0	1	1	1	0	0	1
1		63	99	0	0	1	1	1	0	0	1
d		64	100	1	1	0	1	1	0	0	1
e		65	101	0	1	0	1	1	0	0	1
f		66	102	1	0	0	1	1	0	0	1
g		67	103	0	0	0	1	1	0	0	1
h		68	104	1	1	1	0	1	0	0	1
i		69	105	0	1	1	0	1	0	0	1
j		6A	106	1	0	1	0	1	0	0	1
k		6B	107	0	0	1	0	1	0	0	1
l		6C	108	1	1	0	0	1	0	0	1
m		6D	109	0	1	0	0	1	0	0	1
n		6E	110	1	0	0	0	1	0	0	1

SERIAL CODE OPERATED SWITCH S-COS/2

ARMING CHARACTER				SWITCH POSITIONS							
				LSB							
ASCII	CTRL	HEX	DECIMAL	1	2	3	4	5	6	7	8
0		6F	111	0	0	0	0	1	0	0	1
p		70	112	1	1	1	1	0	0	0	1
q		71	113	0	1	1	1	0	0	0	1
r		72	114	1	0	1	1	0	0	0	1
s		73	115	0	0	1	1	0	0	0	1
t		74	116	1	1	0	1	0	0	0	1
u		75	117	0	1	0	1	0	0	0	1
v		76	118	1	0	0	1	0	0	0	1
w		77	119	0	0	0	1	0	0	0	1
x		78	120	1	1	1	0	0	0	0	1
y		79	121	0	1	1	0	0	0	0	1
z		7A	122	1	0	1	0	0	0	0	1
		7B	123	0	0	1	0	0	0	0	1
--		7C	124	1	1	0	0	0	0	0	1
		7D	125	0	1	0	0	0	0	0	1
		7E	126	1	0	0	0	0	0	0	1
DEL		7F	127	0	0	0	0	0	0	0	1