

8/26/75

SQM-1 FULL-LOGIC DECODER INFORMATION

GENERAL:

The BOSE SQM-1 is a plug-in, printed-circuit board that allows proper decoding of SQ source material and simulation of four-channel sound from stereo sources.

The plug-in module becomes activated when the mode switch on the 4401 preamplifier is placed in either the SQ MATRIX or SQ LOGIC positions.

When the SQ MATRIX mode is selected, SQ encoded source material is ~~properly~~ decoded to produce a four-channel output. This position may also be used for other phase-matrix program material (such as QS) for pleasing four-channel effects. In addition, the SQ MATRIX position may be used for enhancement of stereo program material.

When the 4401 mode switch is in the SQ LOGIC position, special full wave-matching logic control circuitry is activated to improve separation between all channels for optimum performance with SQ encoded program material.

SPECIFIC:

Internally installed module connecting to J101 of the 4401 preamplifier.

High-quality, glass epoxy, printed-circuit board construction.

Full wave-matching logic design incorporating three integrated circuits with additional transistor power supply regulation.

Frequency response 50-15 kHz $\pm$ 1 dB.

Harmonic distortion (THD) $\leq$ 0.4% at 2 kHz.

PARTS LIST

SYMBOL	DESCRIPTION	PART NUMBER
<u>SQM-1 DECODER</u>		
<u>Resistors</u>		
R32	1/4 W, Comp, 10 K, 5%	102938-103
R15,16,17	1/4 W, Comp, 180 K, 5%	102938-184
R31	1/4 W, Comp, 20 K, 5%	102938-203
R28,29,30	1/4 W, Comp, 5.1 K, 5%	102938-512
R14	1/2 W, Comp, 20 K, 5%	102942-203
R1,2,11,12	1/2 W, Comp, 3.6 K, 5%	102942-362
R3,4,9,10	1/2 W, Comp, 4.3 K, 5%	102942-432
R13	1/2 W, Comp, 110 Ohm, 5%	102942-111
R23	1/2 W, Comp, 2.2 K, 5%	102942-222
R22	1/4 W, Film, 12.4 K, 1%	102977 -1242
R21	1/4 W, Film, 6.34 K, 1%	102977 -6341
R18	10 K Separation Pot	104255
<u>Capacitors</u>		
C42,43,44	0.001 μ f Disc Ceramic	103729
C6,20,22,25, 40,41	0.01 μ f Disc Ceramic	103730
C23,24,26,27	Electrolytic, Non-polar, 5 μ f, 15 V	103737
C13,14,17,18	0.0039 μ f Disc Ceramic	104243
C3,9	0.0068 μ f, 5%, 50 V, Mylar	104244
C1,4,8,11	0.039 μ f, 5%, 50 V, Mylar	104245
C15,16,19	0.056 μ f, 10%, 50 V, Mylar	104246
C2,10	0.22 μ f, 5%, 50 V, Mylar	104247
C30,31	Electrolytic, PC, 4.7 μ f, 35 V	104248
C33,34	Tantalum, 1 μ f, 10%, 25 V	104250
C37,38	Tantalum, 1.5 μ f, 10%, 25 V	104251
C28,29,39	Tantalum, 4.7 μ f, 10%, 25 V	104252
C5,7	0.0033 μ f Disc Ceramic	104559
C21,45	Electrolytic, PC, 25 μ f, 25 V	104560
C35,36	Electrolytic, PC, 47 μ f, 25 V	104561
C32	Electrolytic, PC, 100 μ f, 25V	103829
<u>Semiconductors</u>		
CR1	Diode IN4148	102410
U1	Integrated Circuit, MC1312P	104257
U3	Integrated Circuit, MC1314P	104258
U2	Integrated Circuit, MC1315P	104259
Q1	Transistor, PNP, 2N3644	103851

PARTS LIST
SQM-1 DECODER
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<u>SYMBOL</u>	<u>DESCRIPTION</u>	<u>PART NUMBER</u>
	<u>Miscellaneous</u>	
J101	15-Circuit PC Connector, End Insert	103836
U1	IC Terminal Strip	103922
U1	Nylon Nest	103923
U2,3	IC Terminal Strip	104253
U2,3	Nylon Nest	104254
	SQ Instruction Sheet	104219
	Std. Metal Screw 6-20 X 5/16	103122-05

SQM-1 SCHEMATIC NOTES

1. Unless otherwise specified:

- a. Resistors are 1/2 watt, 10%.
- b. Capacitors are in μ f.

2. Typical ac and dc voltages are shown on the schematic at significant points of the circuit. Variations of 10% can be considered normal.

3. Signal Tracing

Ac measurement of the SQM-1 circuit is made with a 100-millivolt sine wave at 1,000 kHz inserted into the left and right auxiliary inputs.

Set controls of the 4401 preamplifier as follows:

Source:	Auxiliary
Mode:	SQ Matrix
Low & High Filters:	Out
Tone Controls:	Out
Tape Monitor:	Source
External Equalizer:	Out
Loud:	Out
Muting:	Out

Set all balance and tone controls to the "0" mark.

Component View.

U1	MC1312
U2	MC1315
U3	MC1314

Fixed resistor R21 may be replaced with a 10K-ohm pot (R37) for proper gain adjustment of SQM-1 module.

5. Later production units have R34, R35, R36 added to SQM-1 board to facilitate separation adjustment. These controls are preset and should not be adjusted unless MC1314 (U3) is replaced.

6. SQM-1 Test Procedure

Use of the CBS test record SQT-1100 is required when testing the SQM-1. (This record is available from CBS Special Products, Room 884, 51 West 52nd Street, New York, New York 10019.)

- a. Using Band 1, side B, balance all four outputs (in the stereo mode) referencing 0 dB $\approx$ 1 volt.
- b. Preset R18 at 3 o'clock.
- c. Using side B, Band 5E (C_F to C_R signal), adjust R13 counter-clockwise for a minimum of 15 dB (measuring either $L_F \rightarrow L_R$ or $R_F \rightarrow R_R$) separation (or minimum rear-channel pumping).
- d. Using side B, Band 4, verify logic action of circuitry as indicated under specification section of this manual.

[illegible]

REV. STATUS OF SHEETS		REV.																		PRELIM.		FINAL		X		ENG. APPR.		DATE		SH 2 OF 4			
SH.																		PREP. BY		DATE		APPR.		DATE		REV. DATE							
ITEM		CLASS. CODE		PART NUMBER		REV.		DESCRIPTION																QTY.		U/M		REMARKS		DOC. CODE		COST (ACC'T)	
.1		02		103663				SQ P.C. BOARD ASSEMBLY																REF									
1		45		107289				SQ P.C. BOARD																1		PC							
2		15		103836				P.C. CONNECTOR, END INSERT, 15 CKT.																1		PC		J101					
3		15		103922				IC TERMINAL STRIP, 7 STATION																2		PC							
4		15		103923				NYLON NEST, 7 TERMINAL																2		PC							
5		15		104253				IC TERMINAL STRIP, 8 STATION																4		PC							
6		15		104254				NYLON NEST, 8 TERMINAL																4		PC							
8		10		103730				CAP., 0.01uf DISC CERAMIC																6		PC		C6,C20,C22,C25,C40,C41					
9		10		103737				CAP., ELECTROLYTIC, NON POLAR, 5uf, 15V																4		PC		C23,C24,C26,C27					
11		10		106542-152				CAP., 0.0015uf DISC CERAMIC																3		PC		C14,C17,C18					
12		10		104244				CAP., 0.0068uf, 5%, 50V, MYLAR																2		PC		C3, C9					
13		10		104245				CAP., 0.039uf, 5%, 50V, MYLAR																4		PC		C1, C4, C8, C11					
15		10		104247				CAP., 0.22uf, 5%, 50V, MYLAR																2		PC		C2, C10					
16		10		104248				CAP., ELECTROLYTIC, P.C., 4.7uf, 35V																2		PC		C30, C31					

INDUSTRIAL ENGINEERING
CHECKED BY
DATE

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REV. STATUS OF SHEETS		REV.																	PRELIM.				FINAL				X		ENG. APPR.		DATE		SH 4 OF 4	
REV. STATUS OF SHEETS		REV.																	PREP. BY				DATE				APPR.		DATE		REV. DATE			
REV. STATUS OF SHEETS		REV.																	A.W.L.				6/4/74								12/1/75			
ITEM	CLASS. CODE	PART NUMBER	REV.	DESCRIPTION																QTY.	U/M	REMARKS		DOC. CODE	COST (ACC'T)									
36	35	102944-470		RESISTOR, 1/2W, COMP., 47 OHM, 10%																1	PC	R19												
37	35	102944-472		RESISTOR, 1/2W, COMP., 4.7K, 10%																1	PC	R20												
38	35	102944-474		RESISTOR, 1/2W, COMP., 470K, 10%																4	PC	R24, R25, R26, R27												
40	36	104095-1242		RESISTOR, 1/2W, FILM, 12.4K, 1%																1	PC	R22												
41	36	104095-6341		RESISTOR, 1/2W, FILM, 6.34K, 10%																1	PC	R21												
42	38	104299-103		POTENTIOMETER																1	PC	R18												
44	40	102410		DIODE																1	PC	CR1												
45	40	104257		INTEGRATED CIRCUIT, MC1312P																1	PC	U1												
46	40	104258		INTEGRATED CIRCUIT, MC1314P																1	PC	U3												
47	40	104259		INTEGRATED CIRCUIT, MC1315P																1	PC	U2												
49	40	103851		TRANSISTOR, PNP, 2N3644																1	PC	Q1												
51	50	104784-03		#22 BUS WIRE, PREFORMED																12	PC													
52	65	100407-5		NAMEPLATE, SERIAL NO.																1	PC													
53	80	106373		PRODUCTION TAG																1	PC	INDUSTRIAL ENGINEERING												
54	65	102171		TAPE, MASKING																1	IN	CHECKED BY <u>10/30/74</u>												

