

# OXMOOR<sup>®</sup>

C O R P O R A T I O N

A Limited Liability Company

## RCM-4<sup>™</sup> ROOM COMBINING MODULE



Installation  
&  
Operation  
Manual

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# RCM-4 INTRODUCTION

The RCM-4 Room Combining Module provides the means for simplified, central control of zone-combining and source selection functions in commercial sound systems.

Several kinds of control signals may be issued by the RCM-4. Used with a compatible mixing matrix system, such as the Oxmoor RMX-44, the RCM-4 will generate the signals required to cause multiple sound systems to be combined to form a single system. In hotels or convention centers, for example, systems in adjacent meeting rooms may be combined when moveable partitions are open to form a single, large hall.

Through the RCM-4, a user may also select which source, or combination of sources, is to be used in the combined system. The operator may simply push a button, for example, to dictate that a particular end of the room will be the location of the head table or entertainment. By not selecting the sources of any of the other

combined zones, the possibility that they might contribute hum or other undesired noise is eliminated.

The user may just as easily select multiple sources, making it possible to plug microphones or other audio sources into any desired inputs within the combined zones.

The RCM-4 may be used to link remote volume controls of multiple systems, using Oxmoor Corporation, LLC's DCA-2 Digital Control Attenuator and RC-16 Remote Controls (Figure 3). This may be accomplished with or without the room combining function (Figure 5). Likewise, room combining may be performed in systems with or without remote volume controls.

In the example shown in Figure 4, no remote volume controls are used. This leaves the Remote Control jacks available for other switching purposes.

The logo for Oxmoor, featuring the word "OXMOOR" in a stylized, bold, serif font. The letters are closely spaced and have a slightly three-dimensional appearance with shading.

# RCM-4 CALLOUTS

(Callouts refer to Figures 1 and 2)

1. **POWER LED** - The front panel LED is illuminated when the unit is on. The absence of an On/Off switch is a performance safety feature, eliminating accidental shutdown during operation.
2. **REMOTE CONTROLS** - Female 6-pin modular TELCO connectors. Channels are paralleled when a combine command is given through the CONTROLLER INPUT. While this may facilitate a variety of custom remote switching functions, it is primarily designed for linking Oxmoor's RC-16 and RC-2 Remote Volume Controls.
3. **INTERNAL RELAY** - Links the Remote Control channels A, B, C, and D of the RCM-4 (i.e.: A to B, B to C, C to D, D to A) when a combine command is given through the CONTROLLER INPUT.
4. **MOMENTARY PULSE** - When a zone combine command is given through the CONTROLLER INPUT, causing some remote controls to become linked, Pin 1 on the IN connector and Pin 6 on the OUT connector of each affected REMOTE CONTROL line are momentarily shorted to common. This is intended to be used with Oxmoor's DCA-2 Digital Control Attenuator. When the DCA-2 sees this momentary pulse it will force all affected audio channels to a predetermined volume level.
5. **CONTROLLER INPUT** - Female, 15-pin, standard D-sub connector. The CONTROLLER INPUT provides access to RCM-4 control functions. Application of a latching type contact closure between the controller input pins and common causes pre determined combinations of the modular Telco connectors to be connected in parallel. DC power of +5VDC @225mA is provided for powering LEDs, etc.
6. **RMX CONTROL PORT** - Female, 25-pin, standard D-sub connector. This port provides control of the Oxmoor RMX Mixing Matrix Products. Signals issued via the CONTROLLER INPUT cause contact closures to occur between appropriate CONTROL PORT pins and common. The RMX Mixing Matrix uses these signals to combine certain audio channels.
7. **FUSE HOLDER** - Replace only with approved type of fuse in a rating appropriate to the mains voltage, as indicated on back panel. (see SPECIFICATIONS).
8. **POWER CONNECTOR** - Standard IEC 3-pin connector for AC power cord. Use only with grounded (3-wire) outlets. Cord sets are available for all world connection standards.
9. **CHASSIS GROUND POST** - Nuts on a threaded stud conveniently enable the installer to secure the chassis to the sound system ground.

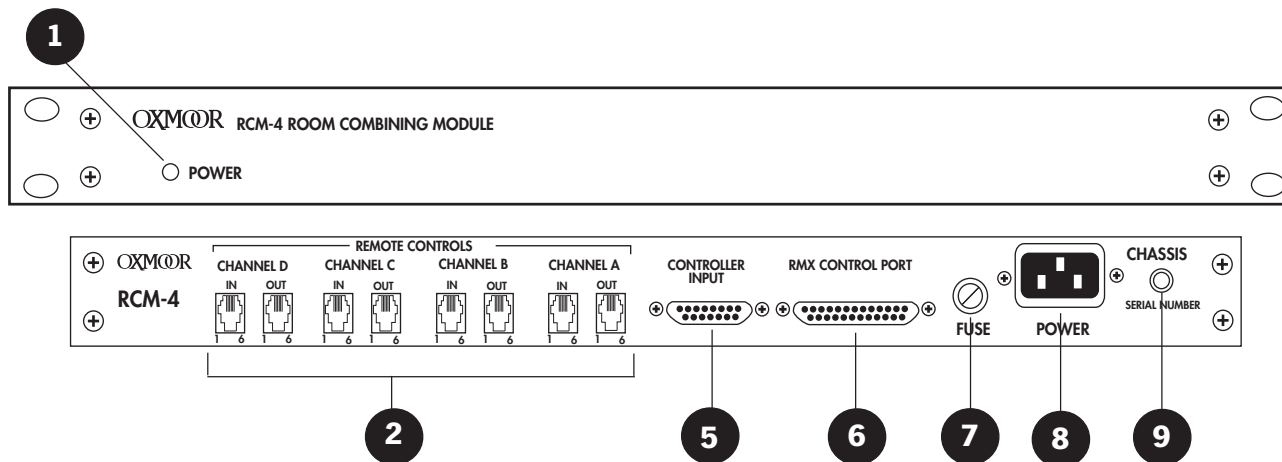
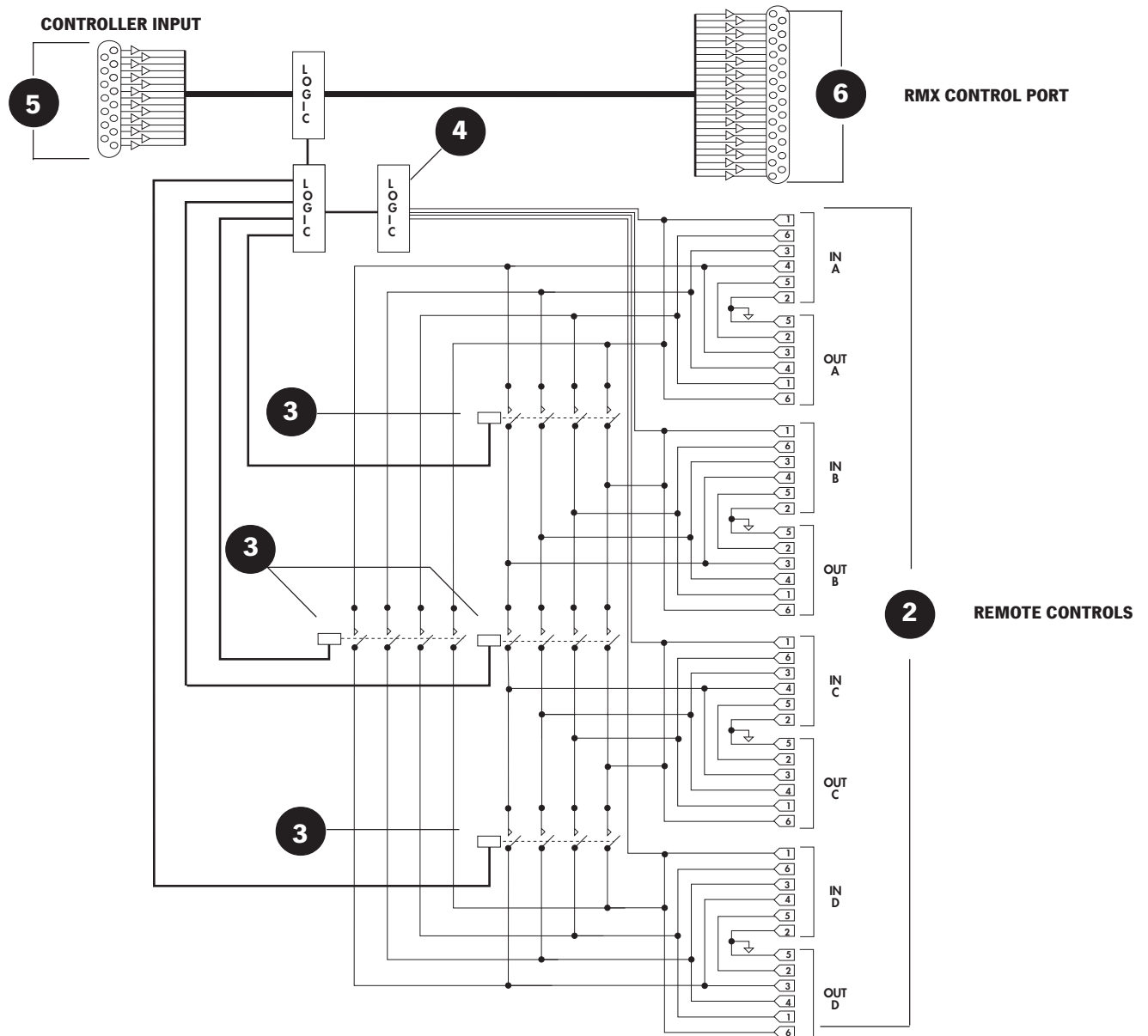


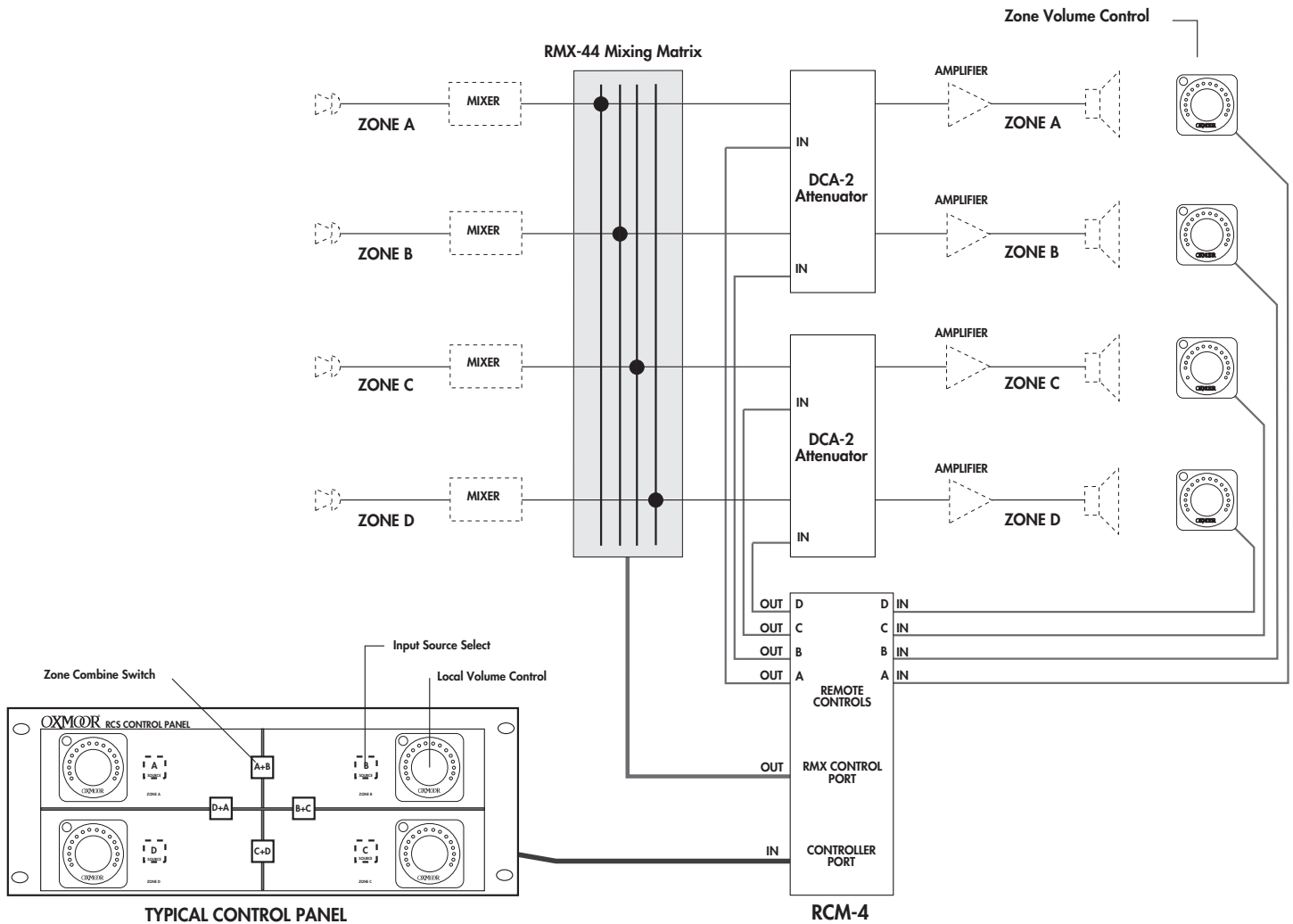
Figure 1.0: Front and Rear Panel Views of RCM-4

# RCM-4 BLOCK DIAGRAM



**Figure 2:** Block Diagram of RCM-4 Room Combining Module

# RCM-4 APPLICATIONS



**Figure 3.0:** Typical Four-Room Combining Application \*

Figure 3 shows the Oxmoor four-room combining system. At the heart of the system is the RCM-4 Room Combining Module. The drawing includes a Control Panel which serves as the module's user interface. The RCM-4 delivers both zone-combining and source-selection signals to an RMX-44 Mixing Matrix.

When combining zones, the RMX-44 mixes the appropriate signal sources (mixer outputs) within the combined zones. Also, all RC-16 Remote Controls within the combined zones will be linked together and forced to a common preset level. This allows all RC-16s in each combined zones to serve as master level controls over all speakers in the combined system.

The RCM-4 Room Combining Module may be user con-

figured for two different modes of operation when zones are combined. One mode of operation allows the RMX-44 to mix all sources within the combined zones. Because all sources within the combined zones are active, microphones, etc., may be plugged in wherever desired within the combined zones.

The second mode of operation mutes the sources of the combined zones, allowing the user to select a source or a combination of sources to be used within the combined zones.

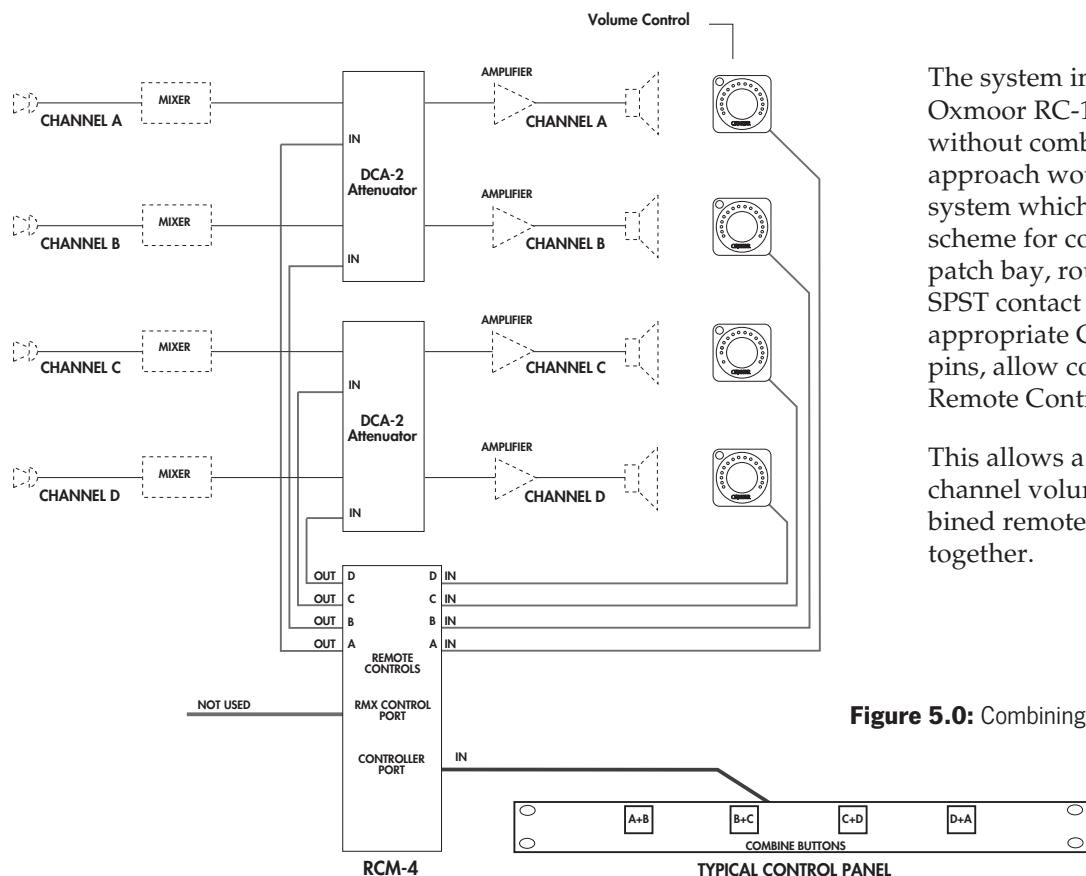
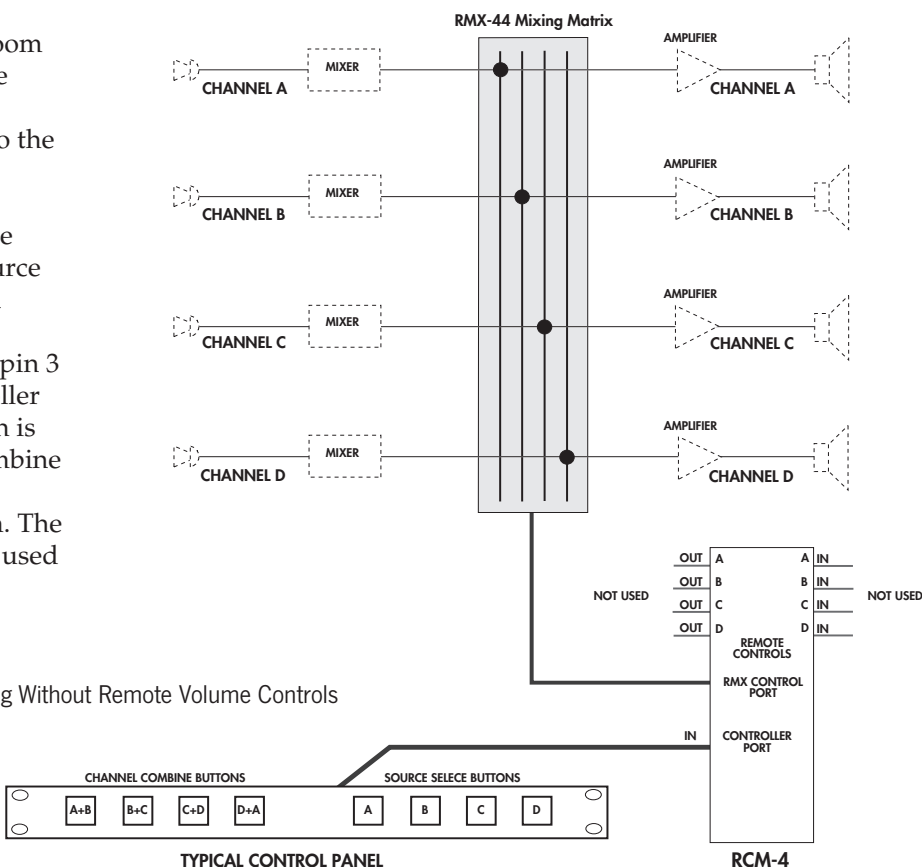
The user can select where the head table will be –where the entertainment microphones will plug in – without any chance of hum, buzz, or ambient noise from unused sources.

\*For the application shown, we recommend the Oxmoor RCS Room Combining System. When purchased as a package, the Room Combining System offers substantial savings over the cost of the individual pieces. The Control Panel shown is one of four optional control panels offered only for the RCS System. Input Source Select buttons are options on each Control Panel.

## RCM-4 APPLICATIONS (CONTINUED)

Figure 4 illustrates a typical four-room combining system in which Remote Volume Controls are not used. A control panel is shown connected to the CONTROLLER INPUT. This panel would require four latching, SPST contact closures in order to combine adjacent channels. If individual source selection is desired, four additional SPDT latching contact closures are required. To enable this option, tie pin 3 (source select option) of the Controller Input to common. When this option is used the activation of any zone combine button will cause the sources to be muted for the selected combination. The sources select buttons may then be used to un-mute the source.

**Figure 4.0:** Room Combining Without Remote Volume Controls

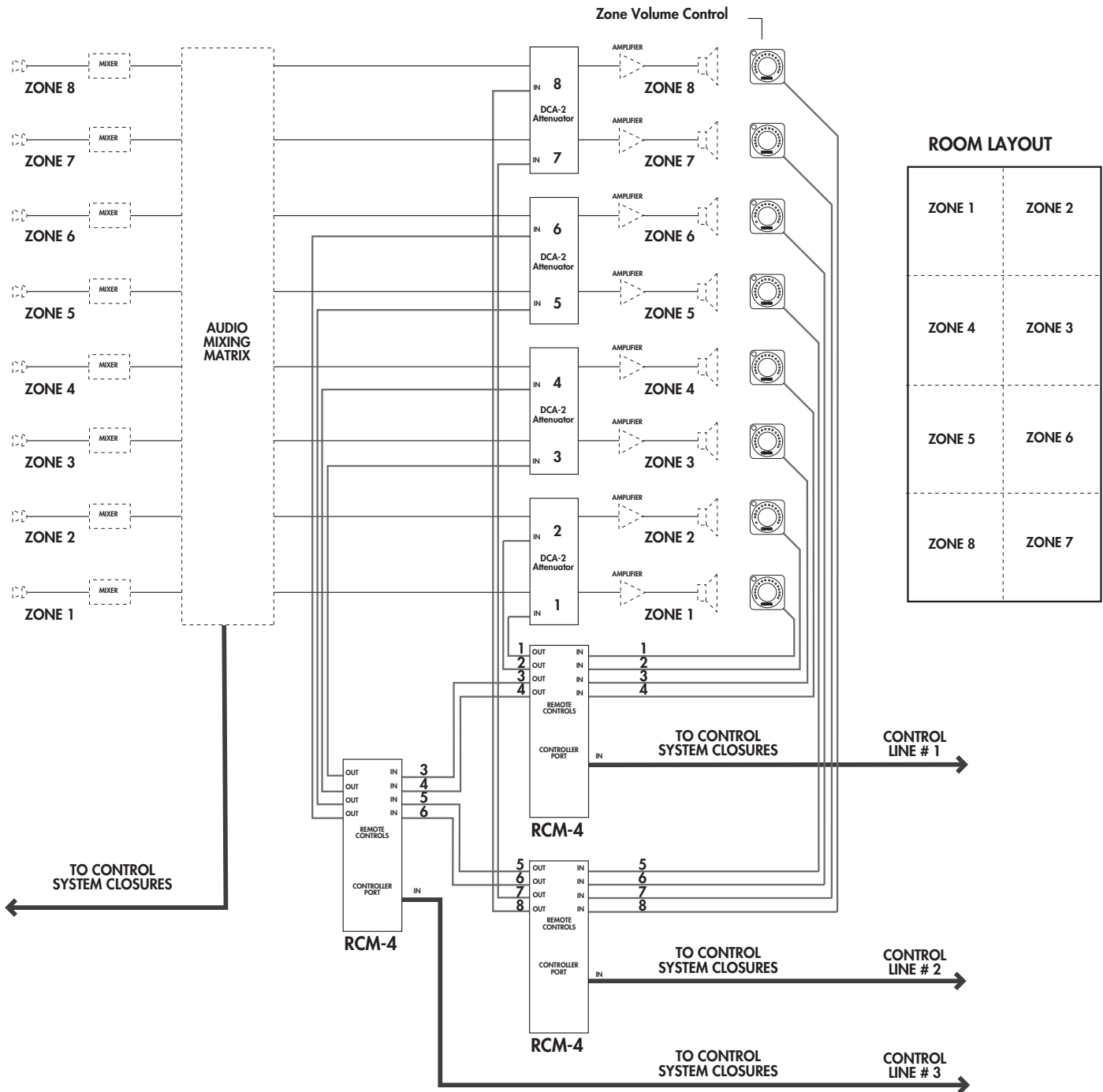


The system in Figure 5 combines Oxmoor RC-16 Remote Controls without combining audio sources. This approach would also be used in a system which employs some unrelated scheme for combining audio, such as a patch bay, router, etc. Four latching SPST contact closures, tied to the appropriate CONTROLLER INPUT pins, allow combinations of adjacent Remote Controls to be combined.

This allows a choice of independent channel volume adjustment, or combined remote controls that track together.

**Figure 5.0:** Combining Remote Volume Controls

## RCM-4 APPLICATIONS (CONTINUED)



**Figure 6.0:** Eight-Zone Combining System



## RCM-4 APPLICATIONS (CONTINUED)

Figure 6.0 illustrates the switching flexibility that may be realized by using multiple RCM-4 Room Combining Modules. In this example, up to eight Oxmoor RC-16 Remote Controls can be combined.

Control line #1 provides linkage between two, three or all four of the zones designated 1 through 4. Control line #2 and its RCM-4, offers identical room combination possibilities within zones 5-8. Control line #3 goes to a third RCM-4 which allows the same kind of combining within zones 3-6. This RCM-4 adds the significant advantage of allowing zones 3 and 6 and zones 4 and 5 to be linked. This makes it possible to combine any of the first four zones with any of the last four.

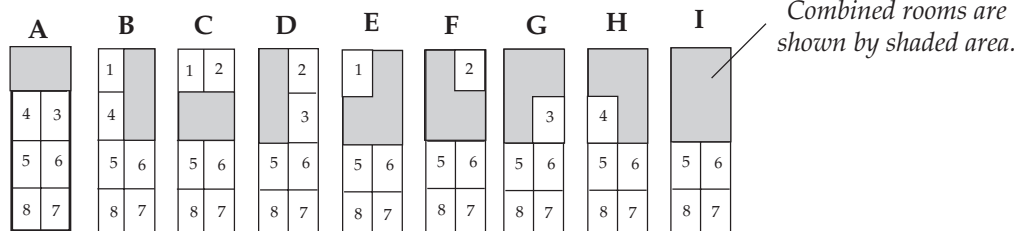
Figures 6.1, 6.2 and 6.3 show the combinations available from system closures connected by

control lines to each RCM-4. The linking function allowed by Control Line 3 and its RCM-4 makes still more combinations available.

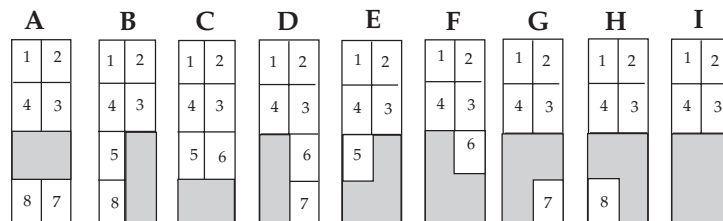
Note that multiple combined zones may be operated concurrently. For example, the systems described by Figures 6.1-I, 6.2-A and 6.2-C may be selected to function simultaneously as three separate systems.

If it is desired that zones 1-6 be combined, then all control lines used to achieve Figures 6.1-I and Figure 6.3-G must be taken to common. Similarly, if all zones (1-8) are to be combined, all the switching used to achieve Figures 6.1-I, 6.2-I and 6.3-G must be employed (all control lines to common).

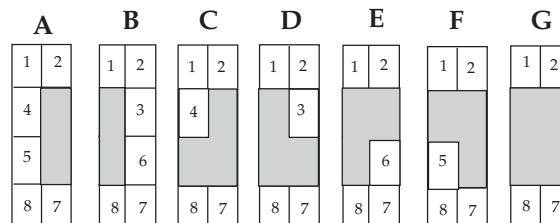
**Figure 6.1:**  
Room Combinations  
Using Control Line # 1



**Figure 6.2:**  
Room Combinations  
Using Control Line # 2



**Figure 6.3:**  
Room Combinations  
Using Control Line # 3



*NOTE: Additional combinations are possible using all three control lines together.*

# RCM-4 CONNECTIONS

(Please refer to Figure 7.0)

## CONTROLLER INPUT

Female, 15-pin, standard D-sub connector.

Pin #	Pin Assignment
1 .....	Common
2 .....	Common
3 .....	Source Select Option
4 .....	A + B Combine
5 .....	B + C Combine
6 .....	C + D Combine
7 .....	D + A Combine
8 .....	+ 5 VDC@ 225mA (same as pin 15)
9 .....	Common
10 .....	Common
11 .....	A Source Select
12 .....	B Source Select
13 .....	C Source Select
14 .....	D Source Select
15 .....	+ 5 VDC @ 225mA (same as pin 8)

## REMOTE CONTROLS

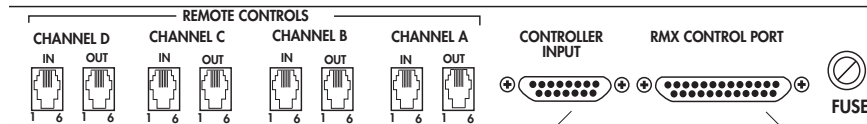
Channels A through D, female 6-pin TELCO connectors.

IN Pin #	OUT Pin #
1	6
2	5
3	4
4	3
5	2
6	1

## RMX CONTROL PORT

Female, 25-pin, standard D-sub connector.

Low-voltage DC: Pins 8 and 15 of the RMX Controller Port are identical, paralleled DC outputs providing +5 VDC at 225 mA maximum. This supply may be utilized to power LED indicators, etc.



### CONTROLLER INPUT

(WITH SOURCE SELECT OPTION TIED TO COMMON)

### RMX CONTROL PORT

Pin # Shunted to Common	Action	PIN # Forced to Common
3 .....	Source Select Option	12, 7, 22, 17
4 .....	A + B Combine	12, 7, 22, 17, 8, 11
5 .....	B + C Combine	12, 7, 22, 17, 6, 23
6 .....	C + D Combine	12, 7, 22, 17, 18, 21
7 .....	D + A Combine	12, 7, 22, 17, 9, 20
4 & 5 .....	A + B + C Combine	12, 7, 22, 17, 8, 11, 6, 23, 24, 10
5 & 6 .....	B + C + D Combine	12, 7, 22, 17, 6, 23, 18, 21, 19, 5
6 & 7 .....	C + D + A Combine	12, 7, 22, 17, 18, 21, 9, 20, 24, 10
7 & 4 .....	D + A + B Combine	12, 7, 22, 17, 9, 20, 8, 11, 19, 5
* .....	A + B + C + D Combine	12, 7, 22, 17, 8, 11, 6, 23, 24, 10, 18, 21, 20, 9, 19, 5
*Any three of pins 4 through 7.		

**Figure 7.0:** Example Of Interaction Between The RCM-4 Controller Input and RMX Control Port

# RCM-4 SPECIFICATIONS

## REMOTE CONTROLS

IN – Channels A, B, C, and D loop through to their respective outputs using 6-pin RJ-11 modular phone jacks.

OUT – Channels A, B, C, and D loop through to their respective inputs using 6-pin RJ-11 modular phone jacks.

INTERNAL RELAY – Links Remote Control Channels A to B, B to C, C to D, and D to A when a combine command is given through the CONTROLLER INPUT.

## INTERNAL RELAY

Contacts .....	4PST, Normally Open
Voltage .....	50 V
Current .....	100 mA
Switching Time .....	10 mS
Bounce .....	75 uS

## MOMENTARY PULSE

When a combine command is given through the CONTROLLER INPUT, Pin 1 on the Remote Control IN connectors and Pin 6 on the Remote Control OUT connectors are momentarily shorted to common. This only applies to the channels that are to be combined.

Circuit Type .....	Open Collector to Common
Switching Time .....	13 mS
Duration .....	76 mS

## CONTROLLER INPUT

Provides access to RCM-4 control functions. The RCM-4 control lines require a maintained closure to common in order to execute a function.

Logic Action .....	Active Low, Requires Maintained Closure to Common
Control Lines .....	Internally Pulled Up to +5VDC
Input Protection .....	1/2 Max. Line Voltage, 12 kV Static
Connector .....	Female 15-Pin Standard D-Sub
Logic Levels .....	Low < 0.9 Volts, High > 2.2 Volts
Parallel Inputs .....	16 Maximum
Sink Current .....	1 mA Maximum
Cable Length .....	300m (1000 ft.) Maximum, Using #22 AWG
Switching Time .....	13 ms
Power Output .....	+5 VDC $\pm 0.1$ V, 225 mA Current Limited to 250 mA

## RMX CONTROL PORT

This control port was designed to control Oxmoor's RMX-44 Mixing Matrix. The RCM-4 provides closures to common on the RMX Control Port pins which causes an RMX-44 Mixing Matrix to combine the appropriate audio channels.

Circuit Type .....	Open Collector to Common
Connector .....	Female 25-Pin Standard D-Sub
Parallel Outputs .....	64 Maximum
Sink Current .....	100 mA Maximum (Each Output)
Voltage .....	50 V Maximum
Cable Length .....	600m (2000 ft.) Maximum, Using #22 AWG

## FUSE TYPE

125 mA (1/8 amp) SB @ 115 VAC
63 mA (1/16 amp) SB @ 230 VAC

## POWER REQUIREMENTS

100 to 125 VAC or 200 to 230 VAC
50/60 Hz; 13 Watts Maximum

## MECHANICAL

Dimensions .....	44 H x 482 W x 183 D mm; (1.72H x 19 W x 7.18 D in)
Finish .....	Textured Black Paint
Weight .....	Shipping: 3.8 Kg (8.5 lb), Net: 3.1 Kg (6.9 lb)

*Specifications subject to change without notice.*

# OXMOOR FACTORY SERVICE

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Additional Installation & Operation Manuals are available from Oxmoor. Contact the Oxmoor Sales Department for pricing and other ordering information. Consult warranty statement for cautions concerning unauthorized service.

## OXMOOR TWO YEAR LIMITED WARRANTY

Oxmoor warrants that each Oxmoor electronic product shall be free from defects in workmanship and materials and will, at its option, repair or replace any part of the product without charge provided the product is delivered to Oxmoor within two years of date of original purchase from or delivery by an authorized Oxmoor dealer. Excluded from this warranty are finish and appearance items and malfunction resulting from abuse, from use that is not in accordance with instructions, or operation under other than specified conditions. Also excluded are incidental or consequential damages except where precluded by applicable law. This warranty provides the customer with specific legal rights; there may also be other rights which vary from state to state.

Repair by other than Oxmoor Factory Service Department or its authorized service agency, unauthorized modification, or the removal or defacing of the serial number will void this warranty.

Products returned for factory warranty service must be prepaid and packaged in such a way as to insure safe transit and must be accompanied by a sales slip or other valid proof of purchase date.

PRIOR AUTHORIZATION FROM OXMOOR IS REQUIRED FOR RETURN. Contact Oxmoor for a Return Authorization (R.A.) Number and shipping information before returning product for service.



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For 24-hour access to product specs and information visit Oxmoor's complete product line on the internet at [www.oxmoor.com](http://www.oxmoor.com).

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