CMI-335

AUDIO MOTHER BOARD

rminology
B: Waveform Buss
P: Waveform Processor CMI-33
RAM: Waveform RAM (1 to 7 cards each 2Mbytes) CMI39
C: Channel Card (8 used per system) CMI31
SC: Channel Support Card CMI32
M: Audio Module (8 cards used per system) CMI-331
MM: Audio Mixer Module CMI-334
IDI CARD: CMI-332
MPTE CARD: CMI-333
AMPLER: CMI-337
HIELD: CMI-336
EBUG CARD: Q133
MIDI BOARD: CMI28
MB: Audio MotherBoard

ıtroduction
The Audio MotherBoard (AMB) is the central interface between the igital part or computer of the CMI and the audio output stage.
The audio circuitry receives all its power supplies and signals from ıis card. The exception is, of course, the Audio outputs and the MIDI, MPTE and Sampler interfaces to the outside world.
The AMB is located in the centre of the CMI facing in the opposite irection to the Digital motherboard.

tructure of the Motherboard
The AMB is structured so that most connections of audio signals are ccomplished without the need for hand wiring as in the Series II ıachines. The board is set up with thirteen slots into which plug the arious modules for interfacing to the outside world. A modular rrangement was used to allow the required equipment to fit while till allowing ease of servicing and upgradeability. The power supply rom CMI310 is via a multi-way power cable soldered directly to the oard. The digital five volts is connected directly from the digital notherboard to the five volt buss on rev 0, 1 and 2 boards while rev 3 ınd 4 have a five amp fuse mounted on the AMB and solder pads for he cables.
Starting at the right hand end of the AMB is slot 1 which holds the Sampler card for stereo input. The next eight slots are for the eight Audio Modules (AM) followed by two slots (10 & 11) for mixer modules and two for the MIDI and SMPTE modules (12 & 13).
Cables to supply these cards are connected via IDC type mass termination connectors at either end of the AMB.
The digital and analog grounds have their only direct connection on the CMI-335 between slots 5 and 6. Both grounds are separately bussed to each slot.

Interconnection Structure
Slot 1 (Sampler CMI-337) is connected to its own power supply from CMI310 via the power cable, signals are connected via a ten way cable to the Waveform Processor (WP).
Slots 2 through 9 are for Audio Modules. The Audio Modules connect to the motherboard via two edge connectors, one a double

sided thirty-four way device (68 pins total) for those signals which are bussed along the motherboard and the second a double sided thirteen way connector (26 pins total). This connector is an edge to cable IDE type connector which allows the signals from the CC to connect directly to the AM without going via the AMB first. Since the two connectors are in line with one another they are considered to be one edge connector split into two sections. This allows unambiguous labelling of the AM edge fingers. To satisfy the physical positioning of the two edge connectors the same numbering pattern used in the digital card cage is used here, i.e. The edge connector is numbered as if it were a 78 way double sided device with the solder side labelled as the A side and the component side as the B side, the IDE type connector occupying fingers 8 A and B through to 20 A and B, the 34 way connector then occupies fingers 45 A and B through to 78 A and B.

The above numbering system is used everywhere with any exception specifically noted.

The AM slots receive data, power and digital control lines and output audio for mixing purposes via the 34 way connector. The flat ribbon cable connected to the IDE connector carries power from the AM to the CC, data clocks, and analog control voltages in the reverse direction.

Slots 10 and 11 are for mixer modules which are optional devices. Each CMI is shipped with a CMI-334 basic mixer module which is primarily for headphone and monitoring purposes. Slots 10 and 11 differ in that the control function outputs from the mixer modules are connected on slot 11 but not on slot 10. Two reasons exist for this, one is that if two modules are inserted then both would conflict on driving the mixer lines, the second reason is that by positioning the mixer in slot 10 the AMs are set so that no digital control signals (i.e. mix) are active.

Slots 12 and 13 are for the MIDI and SMPTE support modules. These may be inserted in any order since these slots have no electrical difference. The MIDI and SMPTE cards, and the mixers, connect via a double sided 48 way edge connector (96 pins). The main connections are to the CMI-28 SMIDI card and to the power supply. Note that the MIDI connection to the FAIRLIGHT music keyboard is routed in an unusual fashion, this is to avoid additional cabling within the CMI.

Circuit Description

The AMB is mainly an interconnection device for various signals used in the audio section.

Looking from the component side, in the top left corner the 34 way flat cable connector which carries the 16 bit data from the waveform buss in differential form is located. This data is bussed along slots 2 through 9 for the AMs. The 10 way ribbon cable connector, located at the bottom right corner of the AMB near slot 1, is for the Sampler signals to the waveform processor.

On the left hand end of the AMB are 3 ribbon cable connectors, the Debug cable (J1) , the MIDI cable (J2) and the headphone output cable (J3). These connect to the Debug card, the MIDI card and the CMI310 power supply board respectively.

Slot Schedule

Each slot is listed below showing the connections available from the AMB.

Slot 1: Stereo ADC.

Side A

Pin	Signal Name	Function	Source
20	MUTE	power on mute	various
17	-DATA	data from WP	CMI33
16	+DATA	data from WP	CMI33
15	-SAMPCLK	start conversion pulse	CMI33
14	+SAMPCLK	start conversion pulse	CMI33
13	DATAOUT	data to WP	CMI337
12	CLKOUT	bit clock to WP	CMI337
11	EOC	end of conversion	CMI337
9,10	DSGND	digital gnd	CMI337
7,8	+9V	+9V sampler supply	CMI310
5,6	-20V	-20V sampler supply	CMI310
3,4	ASGND	sampler analog gnd	CMI310
1,2	+20V	+20V sampler supply	CMI310

Side B

Pin	Signal Name	Function	Source
9,10	DSGND	digital gnd	CMI33
7,8	+9V	+9 sampler supply	CMI310
5,6	-20V	-20V sampler supply	CMI310
3,4	ASGND	sampler analog gnd	CMI310
1,2	+20V	+20 sampler supply	CMI310

A polarising key is fitted in place of fingers 39A and B

Slots 2 to 9
These signals are bussed.
Please see text for description of numbering system used for edge fingers.

Side A

Pin	Signal Name	Function	Source
77,78	D+5	digital 5 volts	CMI35
76-61	D0+ to D15+[1]	16 bit WB data +	CMI32
59,60	DGND	digital gnd	CMI35
58		polarizing key	
56,57		spare	
55	MUTE	mute control	various
53,54	+15V	regulated +15volts	CMI310
51,52	-15V	regulated -15volts	CMI310
48-50	AGND	analog gnd	CMI310

Note 1: data to the audio modules is differential with + and - on opposite sides of the edge connector.

The following are signals which arrive at slots 2 through 9 via IDE type cable to edge connectors, each CC connecting to its corresponding AM (slot 2 from CC 1,.. slot 9 from CC 8).

20	n/c	no connection	CMI31
19	DGND	digital gnd	CMI31
18	PCLK-2[2]	pitch clock 2	CMI31
17	PCLK-1[2]	pitch clock 1	CMI31
16	DCLK-1[2]	data clock 1	CMI31
15	DCLK-2[2]	data clock 2	CMI31
13,14	n/c	no connection	CMI31
12	AGND	analog gnd	CMI331
11	+15V	+15volts to CMI31	CMI331
10	RES1[3]	resonance control	CMI31
9	VCF1[3]	filter control	CMI31
8	VCA1[3]	VCA control	CMI31

Note 2: PCLKs and DCLKs are differential with + and - on opposite sides of the connector. Two differential pairs of each for two channels on the AM.
Note 3: Two sets of RES, VCF and VCA on opposite sides of the connector for the Two channels of the AM.

Side B

Pin	Signal Name	Function	Source
77,78	D+5	digital +5 volts	CMI35
76-61	D0- to D15-[1]	data 0 to data 15 -	CMI32
59,60	DGND	digital gnd	CMI35
58		polarizing key	
55-57		spare	
53,54	+15V	regulated +15 volts	CMI310
51,52	-15V	regulated -15 volts	CMI310
48-50	AGND	analog gnd	CMI310

The following are signals which arrive at slots 2 through 9 via IDE cable to edge connectors, each CC connecting to its corresponding AM (slot 2 from CC 1,.. slot 9 from CC 8).

20	n/c	no connection	CMI31
19	n/c	no connection	CMI31
18	DGND	digital gnd	CMI31
17	PCLK+2[2]	pitch clock	CMI31
16	PCLK+1[2]	pitch clock	CMI31
15	DCLK+1[2]	data clock	CMI31
14	DCLK+2[2]	data clock	CMI31
13	n/c	no connection	CMI31
12	-15V	-15volts to CMI31	CMI331
11	AGND	analog gnd to CMI31	CMI331
10	RES2[3]	resonance control	CMI31
9	VCF2[3]	filter control	CMI31
8	VCA2[3]	VCA control	CMI31

Signals which are not common or bussed are described below.

Slot 2 — Audio Module 1

Side A

Pin	Signal Name	Function	Source
47	CONTROL1	audio module control 1	slot 11
46	AUDIO1+	channel 1 audio +	CMI331
45	AUDIO2+	channel 2 audio +	CMI331

Side B

Pin	Signal Name	Function	Source
47	CONTROL2	audio module control 2	slot 11
46	AUDIO1-	channel 1 audio -	CMI331
45	AUDIO2-	channel 2 audio -	CMI331

Slot 3 — Audio Module 2

Side A

Pin	Signal Name	Function	Source
47	CONTROL3	audio module control 3	slot 11
46	AUDIO3+	channel 3 audio +	CMI331
45	AUDIO4+	channel 4 audio +	CMI331

Side B

Pin	Signal Name	Function	Source
47	CONTROL4	audio module control 4	slot 11
46	AUDIO3-	channel 3 audio -	CMI331
45	AUDIO4-	channel 4 audio -	CMI331

Slot 4 — Audio Module 3

Side A

Pin	Signal Name	Function	Source
47	CONTROL5	audio module control 5	slot 11
46	AUDIO5+	channel 5 audio +	CMI331
45	AUDIO6+	channel 6 audio +	CMI331

Side B

Pin	Signal Name	Function	Source
47	CONTROL6	audio module control 6	slot 11
46	AUDIO5-	channel 5 audio -	CMI331
45	AUDIO6-	channel 6 audio -	CMI331

Slot 5 — Audio Module 4

Side A

Pin	Signal Name	Function	Source
47	CONTROL7	audio module control 7	slot 11
46	AUDIO7+	channel 7 audio +	CMI331
45	AUDIO8+	channel 8 audio +	CMI331

Side B

Pin	Signal Name	Function	Source
47	CONTROL8	audio module control 8	slot 11
46	AUDIO7-	channel 7 audio -	CMI331
45	AUDIO8-	channel 8 audio -	CMI331

Slot 6 — Audio Module 5

Side A

Pin	Signal Name	Function	Source
47	CONTROL9	audio module control 9	slot 11
46	AUDIO9+	channel 9 audio +	CMI331
45	AUDIO10+	channel 10 audio +	CMI331

Side B

Pin	Signal Name	Function	Source
47	CONTROL10	audio module control 10	slot 11
46	AUDIO9-	channel 9 audio -	CMI331
45	AUDIO10-	channel 10 audio -	CMI331

Slot 7 — Audio Module 6

Side A

Pin	Signal Name	Function	Source
47	CONTROL11	audio module control 11	slot 11
46	AUDIO11+	channel 11 audio +	CMI331
45	AUDIO12+	channel 12 audio +	CMI331

Side B

Pin	Signal Name	Function	Source
47	CONTROL12	audio module control 12	slot 11
46	AUDIO11-	channel 11 audio -	CMI331
45	AUDIO12-	channel 12 audio -	CMI331

Slot 8 Audio Module 7

Side A

Pin	Signal Name	Function	Source
47	CONTROL13	audio module control 13	slot 11
46	AUDIO13+	channel 13 audio +	CMI331
45	AUDIO14+	channel 14 audio +	CMI331

Side B

Pin	Signal Name	Function	Source
47	CONTROL14	audio module control 14	slot 11
46	AUDIO13-	channel 13 audio -	CMI331
45	AUDIO14-	channel 14 audio -	CMI331

Slot 9 **Audio Module 8**

Side A

Pin	Signal Name	Function	Source
47	CONTROL15	audio module control 15	slot 11
46	AUDIO15+	channel 15 audio +	CMI331
45	AUDIO16+	channel 16 audio +	CMI331

Side B

Pin	Signal Name	Function	Source
47	CONTROL16	audio module control 16	slot 11
46	AUDIO15-	channel 15 audio -	CMI331
45	AUDIO16-	channel 16 audio -	CMI331

Slot 10 and 11 Mixers
The following signals are common to both slots.

Side A

Pin	Signal Name	Function	Source
48	CA1	Debug PIA line	Q133
47	A0	Debug PIA line	Q133
46	A2	Debug PIA line	Q133
45	A4	Debug PIA line	Q133
44	A6	Debug PIA line	Q133
43	B0	Debug PIA line	Q133
42	B2	Debug PIA line	Q133
41	B4	Debug PIA line	Q133
40	B6	Debug PIA line	Q133
39		Polarizing key	
38	CB1	Debug PIA line	Q133
36,37	D+5	digital +5 volts	CMI35
34,35	DGND	digital gnd	CMI35
32,33	+15V	regulated +15 volts	CMI310
30,31	-15V	regulated -15 volts	CMI310
28,29	AGND	analog gnd	CMI310
27	CONTROL16	control line 16	CMI334
26	AUDIO16+	audio output 16	slot 9
25	AUDIO15+	audio output 15	slot 9
24	CONTROL14	control line 14	CMI334
23	AUDIO14+	audio output 14	slot 8
22	AUDIO13+	audio output 13	slot 8
21	CONTROL12	control line 12	CMI334
20	AUDIO12+	audio output 12	slot 7
19	AUDIO11+	audio output 11	slot 7
18	CONTROL10	control line 10	CMI334
17	AUDIO10+	audio output 10	slot 6
16	AUDIO9+	audio output 9	slot 6
15	CONTROL8	control line 8	CMI334
14	AUDIO8+	audio output 8	slot 5
13	AUDIO7+	audio output 7	slot 5
12	CONTROL6	control line 6	CMI334
11	AUDIO6+	audio output 6	slot 4
10	AUDIO5+	audio output 5	slot 4
9	CONTROL4	control line 4	CMI334
8	AUDIO4+	audio output 4	slot 3
7	AUDIO3+	audio output 3	slot 3
6	CONTROL2	control line 2	CMI334
5	AUDIO2+	audio output 2	slot 2
4	AUDIO1+	audio output 1	slot 2
3	MIXRT+	right mixed audio	CMI334
2	MIXLFT+	left mixed audio	CMI334

Side B

Pin	Signal Name	Function	Source
48	CA2	debug PIA line	Q133
47	A1	debug PIA line	Q133
46	A3	debug PIA line	Q133
45	A5	debug PIA line	Q133
44	A7	debug PIA line	Q133
43	B1	debug PIA line	Q133
42	B3	debug PIA line	Q133
41	B5	debug PIA line	Q133
40	B7	debug PIA line	Q133
39		polarizing key	
38	CB2	debug PIA line	Q133
36,37	D+5	digital 5 volts	CMI35
34,35	DGND	digital GND	CMI35
32,33	+15V	regulated supply	CMI310
30,31	-15V	regulated supply	CMI310
28,29	AGND	analog GND	CMI35
27	CONTROL15	control line 15	CMI334
26	AUDIO16-	audio output 16	slot 9
25	AUDIO15-	audio output 15	slot 9
24	CONTROL13	control line 13	CMI334
23	AUDIO14-	audio output 14	slot 8
22	AUDIO13-	audio output 13	slot 8
21	CONTROL11	control line 11	CMI334
20	AUDIO12-	audio output 12	slot 7
19	AUDIO11-	audio output 11	slot 7
18	CONTROL9	control line 9	CMI334
17	AUDIO10-	audio output 10	slot 6
16	AUDIO9-	audio output 9	slot 6
15	CONTROL7	control line 7	CMI334
14	AUDIO8-	audio output 8	slot 5
13	AUDIO7-	audio output 7	slot 5
12	CONTROL5	control line 5	CMI334
11	AUDIO6-	audio output 6	slot 4
10	AUDIO5-	audio output 5	slot 4
9	CONTROL3	control line 3	CMI334
8	AUDIO4-	audio output 4	slot 3
7	AUDIO3-	audio output 3	slot 3
6	CONTROL1	control line 1	CMI334
5	AUDIO2-	audio output 2	slot 2
4	AUDIO1-	audio output 1	slot 2
3	MIXRT-	right mixed audio	CMI334
2	MIXLFT-	left mixed audio	CMI334
1	MUTE	mute control line	various

he following signals are unique to each slot.

lot 10
ide A

in	Signal Name	Function	Source
	D+5	module select 2	CMI35

lot 11

Pin	Signal Name	Function	Source
	DGND	module select 1	CMI35

lot 12 and 13 MIDI and SMPTE
Both slots are identical.

ide A

Pin	Signal Name	Function	Source
47	CLICK IN	click track input	CMI333
46	SMPTE OUT	SMPTE signal output	CMI28
45	RUN/STOP	drum machine control	CMI28
44	RESET/START	drum machine control	CMI28
43	MIDI IN C	MIDI input 3	CMI332
42	SYNC OUT 3	sync output	CMI28
41	SYNC OUT 2	sync output	CMI28
40	SYNC OUT 1	sync output	CMI28
39	MIDI OUT A	MIDI output 1	CMI28
36,37	D+5	digital 5 volts	CMI35
34,35	DGND	digital GND	CMI35
32,33	+15V	regulated supply	CMI310
30,31	-15V	regulated supply	CMI310
28,29	AGND	analog GND	CMI310
21	LK19	link between slots	future
20	LK17	link between slots	future
19	LK15	link between slots	future
18	LK13	link between slots	future
17	LK11	link between slots	future
16	LK9	link between slots	future
15	LK7	link between slots	future
14	LK5	link between slots	future
13	LK3	link between slots	future
12	LK1	link between slots	future
10		polarizing key	
3	MUTE	mute control line	various
2	METOUT	metronome out	CMI333
1	KEY+	MIDI from keyboard	CMI310

Side B

Pin	Signal Name	Function	Source
48	PB1	PIA control line	Q133
47	CLICK OUT	sync output	CMI28
46	SMPTE IN	SMPTE input	CMI333
45	MIDI IN D	MIDI input 4 (KBD)	CMI332
44	MIDI OUT D	MIDI output 4	CMI28
43	MIDI OUT C	MIDI output 3	CMI28
42	MIDI IN B	MIDI input 2	CMI332
41	MIDI OUT B	MIDI ouput 2	CMI28
40	MIDI IN A	MIDI input 1	CMI332
36,37	D+5	digital 5 volts	CMI35
34,35	DGND	digital GND	CMI35
32,33	+15V	regulated supply	CMI310
30,31	-15V	regulated supply	CMI310
28,29	AGND	analog GND	CMI310
21	LK20	link between slots	future
20	LK18	link between slots	future
19	LK16	link between slots	future
18	LK14	link between slots	future
17	LK12	link between slots	future
16	LK10	link between slots	future
15	LK8	link between slots	future
14	LK6	link between slots	future
13	LK4	link between slots	future
12	LK2	link between slots	future
10		polarizing key	
2	AGND	analog GND	CMI310
1	KEY-	MIDI from keyboard	CMI310

Cable Schedule

Socket J1 is connected as per table 8 in the CMI wiring schedule.
Socket J2 is as per table 7 in the CMI wiring schedule.
Socket J3 is as per table 5, Socket J4 is as per table 11 and socket J5 is as per table 9.