MIDITEMP

PMM-88

PROGRAMMABLE

MIDI MERGE MATRIX 8 X 8

MIDI EXPANDER CONTROLLER

MANUAL

If Everything Fails, Read The User's Manual!

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SETTING UP

The PMM-88 consists of two separate units. The 19" rack mount unit fits in any standard rack. The remote control may be connected to the processing unit via a (maximum) 10m long cable. You can get it on request in any desired length (up to 10m/33ft).

CONNECTORS:

8 MIDI In/ MIDI Out/ Power Socket/ Remote Control Socket/ Footswitch Socket (1/4" jack)

FEATURES:

The PMM-88 has 8 outputs and 8 inputs. The numeric buttons 1-8 allow you to easily access either the inputs or the outputs. You can switch the input or output section ("IN" and "OUT" section in the following) by pressing the IN/OUT SELECT button.

The IN section is active if the apropriate LED lights and the buttons 1-8 can be used as input select buttons.

If the LED doesn not light, the OUT section is active and buttons 1-8 can be used as output select buttons.

BRIGHTNESS SETTING:

The brightness of all LEDs including the display can be set to 7 levels.

To modify the brightness click the "R"EAD button twice and depress one of the buttons 1-7.

PLAY MODE

After turning the power on, the PMM-88 is in PLAY MODE. In PLAY MODE you can recall up to 128 programs by selecting the appropriate program number. The program number is indicated in the display. By pressing the IN/OUT SELECT button you can select the "IN" and "OUT" buttons.

PROGRAM CHANGES

PROGRAM CHANGES WITH UP/DOWN:

Hit the UP/DOWN button to increment or decrement the program numbers one by one. Hold the UP/DOWN button to increment or decrement the program numbers quickly.

PROGRAM CHANGES DIRECT:

1) Press the MODE button. The cursor blinks in the display.

2) Enter the desired program number with the 0-9 keys.

3) Press the MODE key again to activate the program and to get to the PLAY MODE. You may use the IN/OUT SELECT button as well. This will restart the transmission of MIDI clocks imediately in case they are programmed in this program. See chapter Processing/MIDI Clock.

4) Use the EDIT button to erase errors.

PROGRAM CHANGES VIA MIDI:

The programs can be switched via MIDI as well. For this mode of operation it is necessary to define an input, which will not process the received program changes, but use them for internal program switching. The selection of the master input is described in the chapter INSTALLATION.

PROGRAM CHANGES VIA FOOTSWITCH:

If you don't want to make a use of the remote control or MIDI program switching, there is a possibility to change the programs with any common footswitch as well. You will find the footswitch socket on the front panel of the 19" rack mount unit.

MIDI ON/OFF

MIDI ON/OFF can be switched in the PLAY MODE with the numeric buttuns 1-8. Every input or output of the PMM-88 can be switched off or activated separately. The IN/OUT SELECT button determines whether the inputs or outputs are affected.

Outputs:

By pressing any "OUT" button the transmission of all MIDI data is stopped on the selected output (MIDI-OFF). The PMM-88 sends an ALL NOTES OFF command on this output to avoid stuck notes.

Inputs:

By clicking any "IN" button all incomming MIDI data will be ignored and will not be processed (MIDI-OFF). In this case the ALL NOTES OFF command will not be transmitted because it would not be meaningful in certain program combinations with other inputs. Should some stuck notes occur, activate the ALL NOTES OFF GENERATOR:

ALL NOTES OFF - GENERATOR

If you turn the inputs to MIDI OFF, while notes are playing (e.g. from a sequencer) some notes could be stuck. For this case the PMM-88 has the possibility to send an ALL NOTES OFF

command to all outputs which are assigned to this input. Hit the "IN" button twice. The status (MIDI ON/OFF) of this input will not be affected!

Summary inputs:

With every single click at the "IN" button you may switch between MIDI ON or OFF. With a double click at the "IN" button an ALL NOTES OFF command will be transmitted to all outputs which are assigned to this input. The current MIDI ON or MIDI OFF setting will not be affected!!!

All routings wil be restored after MIDI OFF followed by a MIDI ON either for the "OUT" or the "IN" buttons. The settinas for MIDI ON/OFF are not stored and they will be reset with every program change.

LEDS

Inputs:

Every numeric button 1-8 has it's own status LED. If the "IN" section (IN/OUT SELECT "LED" on) is selected, the LEDs indicate outputs assigned to this input.

"LED" on: This input is routed to 1 or more outputs. "LED" off: This input is not routed or the ON/OFF function is activated.

After a click at an "IN" button (MIDI OFF) the LED aoes off. The previous status will be restored if you press it once more (MIDI ON).

Outputs:

If the PMM-88 is set to the "OUT" mode (IN/OUT SELECT "LED" off) the LEDs indicate inputs assianed to this output.

"LED" on: This output is assigned to 1 or more inputs. "LED" off: This output is not assigned to any input or the ON/OFF function is activated.

After a click at an "OUT" button (MIDI OFF) the LED aoes cff. The previous status will be restored if you press it once more (MIDI ON).

MIDI TRACE: "EYE"

This function enables you to set up and test your MIDI system or superwise your MIDI cable connections.

To select the "EYE' MODE click the MODE button twice and press the "R"EAD button afterwards. To toagle the "IN" and "OUT" mode press the IN/OUT SELECT button.

The flashing LEDs indicate incomming MIDI data on the inputs or MIDI data transmitted from the PMM-88's outputs.

ERROR: "ERR"

If the PMM-88 receives faulty or undefined data the "Err"
message is displayed and the LED of the affected input blinks.
Processing of the next incomming data is not interrupted. This
message appears independently of the processor mode. Press anv
button to get to the last chosen mode.

EDIT MODE

ROUTING

To enter the "E"DIT mode press the "E"DIT button. The
corresponding LED will be on all the time the PMM-88 is in
EDIT mode. In EDIT mode you can program the routings between
inputs and outputs. All MIDI channels on all inputs can be
routed and processed separately with MULTI CONVERTING. To quit
the "E"DIT mode without saving press the "E"DIT button once
again. To save and exit press the "MODE" button (See chapter
STORE).

Now press the "E"DIT button to enter the "E"DIT mode!

The display indicates "U" for "U"NCHANGED. The IN/OUT LED
indicates, that you are in the "IN" section and the LEDs 1-8
indicate whether the corresponding inputs are already routet
or not.

PROGRAMMING:

1) Press the button of the desired input. The correspondinq
   LED blinks. The input is activated for distributinq data to
   the outputs.

2) Press the IN/OUT button, to activate the "OUT" mode. The
   IN/OUT LED goes off.

3) Press the buttons of the outputs, which should transmitt
   data from this input.

4) Select the "IN" section aqain.

5) Press another "IN" button to activate this input for data
   distribution to the outputs.

6) Press the IN/OUT button, to activate the "OUT" mode aqain.

7) Press the desired "OUT" buttons etc ...

The LEDs indicate the routing you made. You are free to route
all 8 inputs to all 8 outputs of the PMM-88. Many combinations
of MERGE and SWITCH functions are possible this way.

UNCHANGE:

The settinq "U" in the display means, that data in this input
is to be received on all channels (OMNI MODE). If you select
this mode also for the outputs, data from any received MIDI
channel will be transmitted on the same ("U"nchanged) MIDI
channel.

You are free, to select only one MIDI channel for the output,
which would transmit all incomming data on a specified sinqle
MIDI channel, independently of the channels in the PMM-88's
inputs. To do this, select with the UP/DOWN buttons the
desired send channel in the display ("OUT" mode) before you
press any output button. See also MULTI CONVERTING.

MULTI CONVERTING

This feature enables a more sophisticated use of the receive
and send channels than the previously mentioned "U"nchanqe.
You should study this feature carefully because it is
inevitable at programming such processing functions as SPLIT
or VELOCITY SWITCH.

Figure 1 shows a relatively simple routing which is possible
with MULTI CONVERTING. The receive channels are sorted already
at the input and are routed separately to the desired outputs.
Before they pass the PMM-88 they can be converted to
completely different MIDI channels.

Advantage 1: Data is transmitted from the outputs only on
             those MIDI channels, which are relevant for the
             connected expander. This also avoids senseless
             transmission of data meaningfull for other
             expanders.

Advantage 2: Older OMNI mode synthesizers can be connected.
             Only channels selected for them will be actually
             passed to them.

PROGRAMMING:

Press the "E"dit button to get to the EDIT mode. Make a
decision of the input and the channels, on which data is qoinq
to be received, when you start programminq.

1) Set the desired channel number in the display (UP/DOWN).

2) Now press the desired "IN" button. The correspondinq LED
   blinks.

3) Select the "OUT" mode. The IN/OUT LED goes off.

4) Set the number of the channel to which the conversion
   should be done; resp. the MIDI send channel of the PMM-88.

5) Afterwards press the button of the desired output (more of
   them can be defined, also the MIDI channels can be modified
   in the display for every new output) to activate this
   setting.

6) If you wish to CONVERT more channels on more inputs repeat
   this procedure from selecting the MIDI receive channel in
   the display. (First select the "IN" section, then UP/DOWN).

It is possible to separately route, convert and multiply
(MANIFOLD) all 16 MIDI channels from all 8 inputs in this
manner.

NOTES: Please note that the routing "U" to "U" and CONVERTING
       do not exclude each other. It is possible to route
       further channels separately even if an "U" to "U"
       connection already exists.

MANIFOLD

This feature is an extension of the above mentioned MULTI
CONVERTING. It allows the conversion of a single receive
channel to more simultaneous send channels.

E.g. MIDI receive channel 1 will be converted to the channels
2,3,4 and 5 and routed to output 2. If an MONO-MODE
synthesizer or an expander is plugged into output 2, four
instrument voices can be played simultaneously; this means you
play with one key on your synthesizers keyboard 4 sounds at a
time.

It is even possible to convert a single MIDI channel to 16
send channels to play 16 sounds of a MONO MODE expander. It's
up to you how many send channels you want to define. By means
of program changes in the PMM-88 it is easy to modify the
number of send channels at the touch of a button which will
enable selective access to certain sounds of the expander.

PROGRAMMING:

1) Select the EDIT mode.

2) Set the receive channelin the display (UP/DOWN).

3) Press the desired "IN" button.

4) Select the "OUT" mode (IN/OUT SELECT).

5) Set the in the display the first send channel (UP/DOWN).

6) Press the desired "OUT" button.

7) Set the in the display the second send channel (UP/DOWN).

8) Press the "OUT" button again.

9) Depending on the number of routings repeat this procedure.

If you want to multiply other channels from this or another
input, repeat the whole starting with the setting of the
receive channel in the display. (First select the "IN" section
then UP/DOWN).

DELETE

If you want to delete an unwanted routing from an input to an
output follow these steps:

1) Activate the input in EDIT mode in the "IN" section. The
   LED starts blinking.

2) Select the "OUT" section. The LEDs show the routing between
   this input and the outputs.

3) Hold the desired "OUT" button for a second. The
   corresponding LED goes off.

All connections between this input and output have been
deleted. If you want to delete a complete program at a stroke,
hold the "E"DIT button longer than a second, when you go to
the "E"DIT mode.

The program is definitely erased when you program new settings
and store them under the same program number.

Remember: All changes/settings are done only in the edit
          buffer. If you are satisfied with the results, store
          the settings in any of the PMM-88's program location
          (press the MODE button twice).

STORE

If you finished programming all needed routing between the
inputs and outputs, you can store this program in any of the
128 program locations of the PMM-88.

1) Press in EDIT mode the red MODE/STORE button.

2) Set in the blinking display the desired program number.

3) Afterwards press the MODE button again. (Pressing the
   "E"DIT button interrupts the STORE procedure).

The program is now saved and the PMM-88 is in the PLAY mode.

READ MODE

The purpose of this feature is to give a quick overview about
the programmed routings in the programs.

Press in PLAY mode the "R"EAD button to enter the READ mode.
The green LED indicates that the PMM-88 is in READ mode.

VERIFICATION OF THE IN/OUT ROUTING:

IN.

The displays shows "in" and the input LEDs indicate the
routing to the outputs. By pressing and holding an "IN" button
the indication changes and all outputs are shown to which this
input is routed to. The display changes from "in" to "out" for
a better orientation.

OUT.

Check the routing of the outputs in the same manner, but
remember to select the "OUT" section first (IN/OUT SELECT).
The display shows "out" and the LEDs indicate the routing to

the inputs. By pressing and holding an "OUT" button the
indication changes and all inputs are shown to which this
output is routed to.

VERIFYING THE CHANNEL ROUTING:

CASE #1:

Select in the "R"EAD mode the "IN" section and click twice the
input button of the channel you want to examine. The
corresponding LED starts blinking.

A pre-defined channel number or an "U" appears in the display.
This means that only data from this channel will be received
at this input (an "U" means that data from all channels will
be received).

Now press the IN/OUT SELECT button to select the "OUT"
section. The LEDs will now indicate the routing between this
input and the outputs. If you want to know, whether you have
converted the receive channel press and hold the "OUT"
buttons.The display shows the send channel numbers from the
PMM-88. If there are more of them (MANIFOLD), they will be
displayed one by one.

CASE #2:

Click an "IN" button twice (LED blinks). The display shows
also an "U" or a pre-defined channel number, but the display
blinks.

The blinking indicates, that several channels are received
simultaneously. Press the UP/DOWN button to see the next
received channels. If you hold the UP button all receive
channels will be displayed one by one.

It is always possible to select the "OUT" section as described
in CASE#1 for any selected input channel to examine the
routing to the outputs or a possible conversion of this MIDI
channel. After examining at the "OUT" section switch back to
the "IN" section and select the next channel in the display.

It is not possible to make any changes in the "R"EAD mode.
Therefore you can use the "R"EAD mode while the PMM-88 is
running (data is received and processed). It is also possible
to jump from the EDIT mode to the "R"EAD mode to examine
quickly already programmed connections. To return to the EDIT
mode press the "R"EAD button again.

Press the "R"EAD button to exit the READ mode.

PROCESSING

To enter the PROCESSING functions click the MODE button twice.
The display shows "Fun" (abbreviation for Function). The
processing functions are numbered from 0 to 9. All settings

made in PROCESSING functions can be saved in the desired
program location. See store in EDIT mode.

SPLIT "SPL" (FUNCTION-1)

This feature splits any connected keyboard in two or three
zones with free SPLIT points. According to the PMM-88's 8
inputs it is possible to SPLIT 8 connected masters in
different ways, and then to assign the SPLIT zones to
different outputs without limits.

HOW IT WORKS:

The routing of the SPLIT zones to the outputs is done by MULTI
CONVERTING.

The lowest SPLIT zone MIDI channel is always set to the
synthesizers send channel. The next higher SPLIT zones are
then set to the next higher MIDI channels.

E.g. if a synthesizer, connected to a splitting input, sends
on channel #1 all notes from the lowest SPLIT zone will be
assigned to channel #1, all notes from the mid zone to channel
#2, and the notes from the upper zone to channel #3. The PMM-
88 behaves in this case as having received data from the
lowest zone on channel #1, the mid zone on channel #2 and the
upper zone on channel #3.

This MIDI channels can be obviously converted with MULTI
CONVERTING to another channels and routed to any desired
outputs.

PROGRAMMING:

1) Click the MODE button twice.

2) Press button #1.

3) Hold the button of the input you want to SPLIT.

4) Set the SPLIT point by pressing the appropriate key on your
   synthesizers keyboard. The corresponding LED will come on.

5) Set the second SPLIT point by pressing another key on the
   keyboard. The display shows always the note number of the
   last SPLIT point.

In the MIDI specification every note has its own number
between 0 - 127.

e.g. C1 = 36; C2 = 48; C3 = 60; C#3 = 61; D3 = 62 etc., so you
could program the SPLIT points in the following manner as
well:

1) Select the SPLIT function ("SPL").

2) Set the desired SPLIT point number with the UP/DOWN BUTTONS
   in the display.

3) Press the desired "IN" button.

4) Set another desired SPLIT point number in the display, if
   you need it. Press the same "IN" button again. After
   setting the second SPLIT point a "SPL" will be displayed.

All 8 inputs are to be programmed in this manner. Don't forget
to program the MIDI routing in EDIT mode, if not done yet. It
is always possible to get back to the PLAY mode again by
pressing the MODE button (if you are satisfied with the
results, don't forget to save the settings! - they are still
in the edit buffer; see below).

VERIFICATION:

The programmed SPLIT points will be shown in the display one
by one by tapping the "IN" buttons repeatedly. By pressing the
"R"EAD button, the current processing function will be
displayed (in this case "SPL").

DELETE:

Delete the unwanted SPLIT points by holding the "IN" button
longer than a second. The appropriate LED will go off.

STORE:

After you have done all wanted SPLIT settings you might want
to store them. To do this go to the EDIT mode and press the
MODE button twice.

SPECIAL TREATMENT OF THE CONTROLLERS:

(Only in conjunction with the SPLIT- and VELOCITY SWITCH
function)

E. g. the Pitch Wheel, Modulation, Sustain etc. belong to the
controller group. The PMM-88 treats all controllers (within
the SPLIT & VELOCITY SWITCH function) as a separate SPLIT
zone. This means that all controller information is assigned
automatically to pre-defined channels.

Independently of the synthesizers send channel in the
splitting input, all controllers are assigned to the channel
#15. This is obviously an internal default value as with the
SPLIT zones. Before the controller data leaves the PMM-88 it
can be converted (by means of MULTI CONVERTING) to another
channels and outputs. This function needs some additional
programming (and thinking...) but offers some reasonable
advantages indeed:

It is possible to define for every single SPLIT zone, whether
the controller data should be transmitted with the note data
or not! If it shoulde be transmitted then the channel #15 of
the input must be assigned the same as the SPLIT zones send
channel.

PROGRAMMING:

1) Set 15 (Ch 15) in the display. Press the "IN" button of the
   desired input.

2) Select the "OUT" section and set in the display the number
   of the channel on which controller data should be
   transmitted. It should correspond to the send channels of
   the desired SPLIT zone.

3) Press the "OUT" button of the selected output.

By omitting these steps for some of the SPLIT zones the
controller data for this SPLIT zone will be filtered (at no
cost)!

TRANSPOSE "trP" (FUNCTION-2)

This feature TRANSPOSEs the pitch either of the whole keyboard
or the defined split zones. Transposition of up to 64 half
tones up or down is possible. It can be set separately for
every input and output.

Transposing the whole keyboard:

1) Click the MODE button twice.

2) Press button #2.

3) Tap the button of the input/output you want to TRANSPOSE.
   The corresponding LED starts blinking.

4) Set the transposition value in the display in half tones
   with the UP/DOWN buttons.

To TRANSPOSE other inputs/outputs repeat step 3) & 4). To get
to the PLAY mode press the MODE button.

Transposing the split zones:

1) Click the MODE button twice.

2) Press button #2.

3) Tap the button of the input you want to TRANSPOSE
   repeatedly. The display shows symbolics of the programmed
   zones as "L", "C", and "H".

"Lo" - Low Zone   = left keyboard zone
"CE" - Center Zone = mid keyboard zone
"Hi" - High Zone   = right keyboard zone

4) Set the transposition value in the display in half tones
   with the UP/DOWN buttons for the current split zone.

5) Select the next zone by tapping the "IN" button and repeat
   step 4).

By holding the "R"EAD button you can immediately examine the split zone for which you are programming the transposition, or the value of the zone just being displayed, respectively. Program the next "IN"puts in the same manner. To switch to the PLAY mode press the MODE button.

VERIFICATION:

Select the split zones in the display one by one by tapping the "IN" buttons repeatedly. By pressing the "R"EAD button the value for the current split zone will be displayed.

STORE:

After you have done all wanted TRANSPOSE settings for the inputs/outputs you might want to store them. To do this go to the EDIT mode and press the MODE button twice.

VELOCITY SWITCH "uEL" (FUNCTION-3)

This function allows velocity controlled selection of the expanders connected to the PMM-88 outputs. You can select different expanders with a soft and hard keystroke on your synthesizers keyboard. Obviously a velocity-sensitive keyboard is assumed on any of the PMM-88's inputs.

HOW IT WORKS:

Every keystroke on a velocity-sensitive MIDI keyboard has its own velocity value. It ranges from 1 (softest) to 127 (hardest).

With VELOCITY SWITCH you can set this value (SWITCH point) for selecting different expanders. All incomming notes in the PMM-88, whose velocity value will be higher than the SWITCH point, will be automatically put on a MIDI channel, which number is 3 higher than the masterkeyboards send channel.

This was done to enable a combination of the SPLIT and VELOCITY SWITCH functions. Every single SPLIT zone can be extended with a VELOCITY zone this way.

Assuming the master-keyboard is transmitting on channel #1, all notes with velocity higher than the SWITCH point would be diverted to channel #4. Naturally this would happen in a splitted input only with the low zone. Data from the mid zone would be sent to channel #5 and those from the upper to channel #6. The routing of these channels could be definitely set with MULTI CONVERTING in the EDIT mode.

With regard to the nature of this function there is one problem: The lower VELOCITY zone can not reach the VELOCITY values of the upper one. Therefore has the PMM-88 a special feature which allows adding a constant value to the lower zone's velocity values to make the expander controlled from the lower zone sound similarly loud to the expander controlled from the upper one. See below. It is also possible to add a negative value to the upper zone to make it as soft as the lower zone. The PMM-88 assignes automatically the positive value to the lower zone and the negative to the upper.

PROGRAMMING:

Both the VELELOCITY SWITCH point and the add value for both VELOCITY zones can be set according to your needs.

1) Click the MODE button twice.

2) Press button #3 ("uEL"). The LEDs indicate those inputs with already programmed VELOCITY SWITCH points. They will also indicate any of the ADDITION/SUBTRACTION/LIMIT functions for this input.

3) Set the desired SWITCH point with the UP/DOWN buttons in the display.

4) Press the button of the desired input. The LED starts blinking. You can still modify the value, while the input is activated to set the value fitting your play style. Please note that not all synthesizers or master-keyboards perform the whole velocity range from 1 to 127. Some of them don't go beyond 99. Select other inputs and go to the PLAY mode by pressing the MODE button.

DELETE:

Delete the unwanted VELOCITY SWITCH points by holding the "IN" button longer than a second. The appropriate LED will go off.

ADDITION/SUBTRACTION/LIMIT:

ADDITION: "Add"

To set the ADDITION value for the VELOCITY zone click the input button of the programmed input twice and set the value in the display. Enter the value by pressing the "IN" button again and the display will change to "Sub".

SUBTRACTION: "Sub"

Now set the SUBTRACTION value in the display for the upper zone. As mentioned above, the addition value refers to the lower VELOCITY zone and the subtraction value to the upper. Enter the value by pressing the "IN" button again and the display will change to VELOCITY LIMIT "uLt".

If no VELOCITY SWITCH point is set, obviously only an addition or subtraction value can be set. In this case you can set only the addition value, which can be represented by a negative number as well.

VELOCITY LIMIT: "uLt"

This feature enables the PMM-88 to act like a (digital) limiter; this means that all incomming notes, with velocity higher than a programmed value, will be compressed to the

LIMIT value. The VELOCITY LIMIT value is valid for both
VELOCITY zones in case a VELOCITY SWITCH point is programmed.

PROGRAMMING:

1) Set the LIMIT value in the display.

2) Select between ADDITION/SUBTRACTION/LIMIT by tappino the
   "IN" button repeatedly and set the appropriate values with
   the UP/DOWN buttons. By holding the "R"EAD button either
   the name of the function to the programmed value or the
   value to the displayed function are shown in the display.

3) Test the settings either by pressing an other "IN" button
   (you will get to the "uEL" mode) or the MODE button, to get
   to the PLAY mode. With a double click at an "IN" button you
   will activate the corresponding input for programmino the
   addition value.

Remember: All changes/settings are done only in the edit
          buffer. If you are satisfied with the results, store
          the settings in any of the PMM-88's program location
          (press the MODE button twice).

VELOCITY OFF

Combining ADDITION and VELOCITY LIMIT a velocity sensitive
keyboard can be turn into a velocity non-sensitive. Any
VELOCITY value can be set (which differs from the fixed "64"-
value of the velocity non-sensitive keyboards).

PROGRAMMING:

1) Set the ADDITION value for the desired input to 127. This
   means, that all notes will get the maximum velocity.

2) Now set the VELOCITY LIMIT to the desired value e.g. 70.
   This will reset all notes with velocity higher than the
   VELOCITY LIMIT point to the value 70. As all notes will fit
   this (with regard to the ADDITION value) all incommino
   notes will leave the PMM-88 with the value 70.

FILTER "FiL" (FUNCTION-4)

This function allows filtering of the following information:

All channel mode messages except Note On/Off. "ALL".
All Controller (except Program Change, AFt, and Pib). "Con".
Program Change. "PCF".
After Touch (Status Dn). "AFt".
Pitch Bend. "Pib".
System exclusive messages + system common
messages (Song Pointer, Tuning, EOX). "SYS".
Real Time. "rti".
Active Sensing. "ACt". For input only.
Single Controller. "1-128". Please find the controller
identification in your MIDI equipments manual.

It is often useful to filter MIDI data separately in the
inputs and the outputs. Therefore the PMM-88 is able of
filtering data at the inputs and outputs independently.

PROGRAMMING:

1) Select the FILTER function. ("FiL").

2) Set the desired filter name in the display (with UP/DOWN).

3) Press the "IN" or "OUT" button. (Switch between them with
   IN/OUT SELECT).

4) Set another filter name in the display, if you need it, and
   push either the same or another numeric button.

DELETE:

Delete all unwanted FILTERS by holding the appropriate "IN" or
"OUT" button longer than a second. The appropriate LED will ao
off (deleting single filters is not possible).

VERIFICATION:

By holding the "R"EAD button the current mode will be
displayed. The programmed filters for the "IN"s or "OUT"s
(IN/OUT SELECT LED) are indicated by the LEDs. By selecting
the single filters in the display, LEDs of all inputs or
outputs with this filter type will come on.

If you want to examine the already programmed filters (you
must be in FILTER function), step them through with the IN/OUT
button of the correspondina input/output.

SEND DATA "Snd" (FUNCTION-5)

This function allows the transmission of preprogrammed MIDI
data bytes to the connected expanders, while switchino the
PMM-88's programs. The MIDI data bytes can be programmed for
every output in every program. A total of 88 bytes for the
PMM-88, Version 2.x, is possible (the version number is
displayed after power on).

E.g. the following jobs could be performed by the SEND DATA
function:

1) Send request - request to the MIDI equipment for sendina
   system exclusive data.

2) OMNI/POLY/MONO - put the syntesizer to the desired mode.

3) Controller - Sustain, Portamento.

4) Start/Stop/Continue/Song pointer etc.

5) Local On/Off etc.

Though PROGRAM CHANGE and VOLUME CONTROL are implemented in
the PMM-88 as builtin functions; they could be proarammed with
the SEND DATA function as well.

For a meaningfull use of the SEND DATA function serious knowledge of the MIDI formats and the MIDI specification is necessary. The data can be entered either hexadecimal or decimal.

PROGRAMMING:

1) Click the MODE button twice.

2) Press button #5."Snd".

3) Enter the first data byte with UP/DOWN (to switch from decimal to hexadecimal input, press the IN/OUT SELECT button). The display shows a "Snd" after the value is entered. While you are in the Hex Input Mode, an "H" will be shown in the right display part.

4) Press the button of the desired output.

5) Enter the next data byte and press the "OUT" button again.

6) To program the remaining outputs, repeat the steps 3 - 5.

Example. The command "Local Off" has the following format:

Bn 7A 00

B= Controller

n= Channel number (0 - 16 dec./0 - F hex.)

7A= Controller number

00= off (means "Local Off"). For "Local On" a 7F should be sent (instead of 00).

Now, if you would like to program e.g. the PMM-88's program number 64 to send from output 2 the "Local Off" command on channel 5, you would have to do the following:

1) Select program #64.

2) Select the SEND DATA function.

3) Set B4 in the display and press the "OUT" button #2.

4) Set 7A in the display and press the "OUT" button #2.

5) Set 00 in the display and press the "OUT" button #2.

To save, enter the EDIT mode and press the MODE button twice.

VERIFICATION:

The programmed data will be displayed one by one by tapping one of the "OUT" buttons repeatedly. Remember, if any new values have been entered meanwhile, they will be stored within the selected program (after you have copied the edit buffer to a program location).

If you want to examine the entered data bytes (you must be still in the SEND DATA function), step them through with the OUT button of the corresponding output.

DELETE:

Delete the unwanted MIDI data by holding the appropriate "OUT" button longer than a second. The corresponding LED will go off. All programmed MIDI data this output will be deleted at one stroke.

PROGRAM CHANGER "PC" (FUNCTION-6)

PROGRAM CHNANGE is a transmit function, which transmitts to connected expanders pre-programmed program change commands. It is activated by switching the PMM-88's programs. Every output (in every program) can have his own program changes to be transmitted.

As the PMM-88 has 128 program locations, 128 combinations can be programmed for its 8 outputs. These commands are transmitted on the base channels (the lowest adjusted send channels at the outputs).

PROGRAMMING:

1) Click the MODE button twice.

2) Press button #6."PC".

3) Set in the display the desired program number to be transmitted.

4) Press the button of the desired output.

5) To program program changes for the remaining outputs, repeat the steps 3 & 4.

TRANSMISSION ON PREDEFINED CHANNELS:

1) Click the MODE button twice.

2) Press button #6."PC".

3) Press the "OUT" button of the desired output.

4) Adjust the transmitt-channel number in the display.

5) Press the "OUT" button again.

6) Set the program number to be transmitted on this channel.

7) Now define the next channel number. Press the "OUT" button. In this manner you could program all 16 channels with their appropriate program numbers. A total of 48 program numbers is possible within a single program (16 channels x 8 outputs). You will apreciate this feature, if you use MULTI MODE expanders.

VERIFICATION:

By tapping the "OUT" buttons repeatedly, the display will
alternate between the channel number and the appropriate
program change settings. By pressing the "R"EAD button the
current processing function will be displayed (in this case
"PC").

DELETE:

Delete the unwanted PROGRAM CHANGES by holding the appropriate
"OUT" button longer than a second. The appropriate LED will go
off. All programmed PROGRAM CHANGES for this output will be
deleted at one stroke.

VOLUME CONTROL "uOL" (FUNCTION-7)

VOLUME CONTROL is a transmit function, which transmitts to
connected expanders pre-programmed volume values. It is also
activated by switching the PMM-88's programs. Every output (in
every program) can have his own volume values to be
transmitted.

As the PMM-88 has 128 program locations, 128 combinations can
be programmed for its 8 outputs. These values are transmitted
on the base channels (the lowest adjusted send channels at the
outputs), but they also may be transmitted selectively on any
MIDI channel (as PROGRAM CHANGEs). You will apreciate this
feature, if you use MULTI MODE expanders.

PROGRAMMING:

1) Click the MODE button twice.

2) Press button #7."uOL".

3) Set in the display the desired volume value to be
   transmitted.

4) Press the button of the desired output. The appropriate LED
   will blink. All the values set here, will be transmitted
   immediately from this output, to allow instant audio
   monitoring of the adjusted value. Press the MODE button, if
   you want to set the value for the current output, or an
   other "OUT" button if the value should be valid for an
   other output.

5) Set in the display another volume value to be transmitted.

6) Press the button of the desired output. The appropriate LED
   will blink.

7) To program VOLUME values for the remaining outputs, repeat
   the steps 3 & 4.

TRANSMISSION ON PREDEFINED CHANNELS:

1) Click the MODE button twice.

2) Press button #7."uOL".

3) Press the "OUT" button of the desired output.

4) Adjust the transmitt-channel number in the display.

5) Press the "OUT" button again.

6) Set the volume value to be transmitted on this channel.

7) Now define the next channel number. Press the "OUT" button.
   In this manner you could program all 16 channels with their
   appropriate VOLUME values. A total of 48 volume values is
   possible within a single program (16 channels x 8 outputs).
   You will apreciate this feature, if you use MULTI MODE
   expanders.

VERIFICATION:

By tapping the "OUT" buttons repeatedly, the display will
alternate between the channel number and the appropriate
VOLUME settings. By pressing the "R"EAD button the current
processing function will be displayed (in this case "uOL").

DELETE:

Delete the unwanted VOLUME VALUES by holding the appropriate
"OUT" button longer than a second. The appropriate LED will go
off. All programmed VOLUME values for this output will be
deleted at one stroke.

TRANSPARENT PANIC "PA" (FUNCTION-8)

An abrupt disconection of a MIDI device can sometimes cause
stuck notes or that the controllers are not reset to normal
position. You will run into serious trouble, particularly in a
live performance, if your expander does not understand the ALL
NOTES OFF command.

The PMM-88 eliminates with TRANSPARENT PANIC such misfortunes
without interrupting the processing of incomming MIDI data, so
these errors will not be noticed by the audience.

USE:

1) Click the MODE button twice.

2) Press button #8."PA".

3) Execution of PANIC starts immediately.

While PANIC is active (about 6 sec) you do not have to
interrupt your performance or stop the sequencer. A premature
exit from PANIC execution is possible by hitting any PMM-88's
button. After PANIC is through, the PMM-88 automatically
switches to the PLAY mode.

The PMM-88's PANIC function transmitts the following data (on
all outputs and all channels):

Pitch Wheel .... value 64 (center position)

Controller #1 .... value 0 Modulation

Controller #2 .... value 0 Breath Controller

Controller #7 .... value 127 Volume

Controller #33 .... value 0 Modulation

Controller #64 .... value 0 Hold/Sustain

Controller #65 .... value 0 Portamento

Controller #66 .... value 0 Sostenuto

Controller #67 .... value 0 Soft

Note Off 1 - 128 .... on all MIDI channels

If you are playing your keyboard very intensive, while PANIC
is running, slight delays may occur as huge MIDI data is
transmitted from the outputs. This is a real challenge for the
MIDI interface. Usually this happens only when expanders
receive data in OMNI MODE, because they have to execute
virtually every MIDI channel based command.

MIDI CLOCK FUNCTION-9 "CLC"

With this function you can synchronize your MIDI drum machines
and sequencers. The MIDI CLOCK data can be transmitted from
any of the PMM-88's outputs. The tempo is to be adjusted in
B.P.M in the range from 40 to 255. ?? You can set the tempo
even for any output individually (in one program, of course)
Transmission of MIDI CLOCKs will start immediately after a
program with programmed MIDI CLOCKs is selected (via MIDI,
Foot Switch or UP/DOWN buttons). If selecting a program with
programmed MIDI CLOCKs via Remote Control, there is an
additional feature for interrupting the transmission of MIDI
CLOCKs. See below MIDI CLOCK-Manual Operation.

Use the MIDI CLOCK function even if your sequencer is capable
of generating it. The simple reason is, that the PMM-88
generates the MIDI CLOCKs at one time on all outputs without
any glitches. You won't get such perfect synchronization with
a configuration like - sequencer at the PMM-88's input syncing
 several drum machines at the PMM-88's outputs (TR-909, TR-
727, R-8, R-50, RX-5, SP-12 ...).

PROGRAMMING:

1) Click the MODE button twice.

2) Press button #9."CLC".

3) Set the B.P.M value in the display. Value 0 means - No
   Clocks.

4) Press the button of the desired output. The appropriate LED
   will come on.

5) Start the transmission of the CLOCKs by pressing the IN/OUT
   SELECT button. LED will come on. If you want to stop the
   transmission press the button again. If you click the
   IN/OUT button twice, while it is switched off, a CONTINUE
   command will be issued instead of START.

You can always modify the tempo in the display while
listening, to find the right one.

To save, press the MODE button. To exit, press the EDIT
button.

START/STOP/CONTINUE MIDI CLOCK - Manual Operation:

The transmission of MIDI CLOCKs is complemented with the
SART/STOP/CONTINUE commands. The START command is issued in
the beginning of the CLOCK transmission (a CONTINUE command
could be issued alternatively). If it is stopped a STOP
command is issued. In programs, where the tempo is set to 0,
only the STOP and CONTINUE commands will be transmitted
without any CLOCKs. This setting is useful for MIDI
instruments which do understand the START/STOP/ /CONTINUE
commands but do not have a MIDI sync facility.

Remember: Transmission of the START/STOP/CONTINUE commands
          could be performed either with the SEND DATA
          function !

START   = FA (hex)

STOP   = FC (hex)

CONTINUE = FB (hex)

USE:

   START/STOP/CONTINUE in the CLOCK function. (Display shows
                  "CLC" or the B.P.M value.)

1) Press the IN/OUT button. The corresponding LED will come on
   and the transmission of MIDI clocks will be started. It is
   always possible to stop the transmission by pressing any of
   the numeric buttons. Activation of MIDI clocks for a new
   output during transmission makes no sense and is neither
   allowed nor possible.

2) Stop the transmission with the IN/OUT button. The LED will go off while a STOP command is issued. Now you can activate an other output for MIDI clocks.

3) A double-click at the IN/OUT button will start the CLOCK again and a CONTINUE command will be issued. The synchronized MIDI equipment will continue from where it stopped. A single click would START the CLOCK complemented by a START command.

START/STOP/CONTINUE in PLAY mode. (Display shows "FUn")

1) Click the MODE button twice. The IN/OUT SELECT button works now, like in the CLOCK function, as a START/STOP/CONTINUE button.

With the other buttons you can select a processing function.

START/STOP/CONTINUE in direct program access mode.

1) Press the MODE button. Set the desired programm number in the display. (See PLAY mode)

2) Activate the new program with the IN/OUT SELECT button, if you want to start the MIDI CLOCKs automatically.

Activate the new program with the MODE button, if you don't want to start the MIDI CLOCKs automatically.

SYSTEM EXCLUSIVE/DUMP FUNCTION-# "dU"

All PMM-88's programs can be saved via MIDI on an external storage unit (e.g your computers hard disc unit). To improve transmission reliability with your librarian program, it is possible to adjust the delay between the transmitted data-blocks. You can also set here the manufacturers MIDI identification code, if there are troubles with System Exclusive Data from other manufacturers MIDI equipment.

PROGRAMMING:

1) Click the MODE button twice.

2) Press button #0.

3) Set the delay value (in 10 ms steps) in the display. Values up to 1270 ms are possible.

4) Press the button of the desired output for the System Exclusive data. The transmission will start immediately.

The data blocks are 128 bytes long. The real delay value is ten times the value indicated in the display (in ms).

Any input can be selected for SYS-EX data reception. It has to be routed in some way or it has to be a master input. The operation mode is unimportant.

You can force the PMM-88 to transmit SYS-EX data via MIDI as well (in PLAY mode only).

The DUMP REQUEST command has the following format:

$F0 / ID-Num. / $52 / Output Num. (0-7) / $44 / $F7.

MODIFICATION OF THE MANUFACTURERS IDENTIFICATION CODE:

Press the IN/OUT SELECT button in the DUMP function. Set the desired number in the display. Please note that the program banks previously complemented with an other identification number will not be recognized by the PMM-88 as its own System Exclusive data.

IMPORTANT:

The MIDITEMP PMM-88's own ID number is 11. Should you modify this number and re-initialize (See also chapter RE-INITIALIZATION) the PMM-88, the default value 11 will be set again.

PROCESSING OF SYSTEM EXCLUSIVE DATA:

The PMM-88 receives and processes all System Exclusive Messages and is capable to transmit them from all 8 outputs in real time, if needed (according to the actual program settings).

However, System Exclusive Data can be received at once only at one input. All incomming data from the remaining inputs is processed only after all System Exclusive is completely transmitted.

INSTALLATION "Int"

This chapter describes additional features, which can adapt the PMM-88 to your existing MIDI equipment. Obviously, it is possible to use the PMM-88 without having done any of these settings. You should go through this chapter only if you are familiar enough with the PMM-88's modes of operation. It will ensure customizing of the PMM-88 to your particular needs.

INSTALLATION FUNCTIONS GENERAL:

Activate the INSTALLATION FUNCTIONS by clicking the MODE button twice followed by pressing the EDIT button. All settings made here are stored (even if you switch the unit off) until new settings are done.

BANKING

With this function you can split the PMM-88's program bank with 128 programs into smaller banks. The following combinations are possible:

2 banks with 64 programs each

4 banks with 32 programs each

8 banks with 16 programs each

The idea for this function was to allow switching of all PMM-88 programs also from synthesizers, which have only 64, 32 or even 16 programs.

PROGRAMMING:

1) Click the MODE button twice.

2) Press the EDIT button.

3) Press button #1.

4) Set the number of banks in the display. Possible values: 1, 2, 4, or 8 banks (with UP/DOWN).

5) Press the MODE button to save the settings. The PMM-88 is now in the PLAY mode.

USE:

While the PMM-88's 128 program bank is splitted into several banks, program changes (with UP/DOWN, FOOT SWITCH, MIDI) are accepted only within the current bank. How to change banks, see below. The banks are labeled with characters from A to H, depending on the number of banks. The characters are displayed in the first display part. It is always possible to make rearrangements of the banks. If you split the main bank into e.g. 2 banks, the programs 1 - 64 will be assigned to bank A and the programs 65 - 128 to bank B.

BANK CHANGES:

1) Press the MODE button and afterwards the EDIT button. The display shows the current bank number. The right display-window shows the currenr program number within this bank.

2) Press a numeric button to select a bank. The numbers 1 - 8 represent the banks A - H.

3) Afterwards select the desired program number with numeric buttons. Should you select a wrong program number, erase it by pressing the EDIT button.

4) Pres the MODE button to start the selected program and to get to the PLAY mode. Should you have programmed the Midi Clock in this program press the IN/OUT SELECT button to start the transmission of clocks immediately. See also chapter PROCESSING/MIDI CLOCK.

PROGRAM CHANGES VIA MIDI

THE MASTER-INPUT:

Before you recall the stored proarams via MIDI, you have to specify an input, which will use the incomming PROGRAM CHANGE commands for switching them.

PROGRAMMING:

1) Click the MODE button twice.

2) Press the EDIT button.

3) Press button #6. "U".

4) Press the button of the desired input. The LED will blink.

5) Set the number of the MIDI channel, on which the program changes for the PMM-88 are transmitted, in the display.

"U"   = program changes on all channels will be recognized

"C1 - C16" = program changes from this channel will be recognized

6) Delete the unwanted settinas by holdina the appropriate "IN" button aer lonthan a second.

7) Press the MODE button to save the settinas. The PMM-88 is now in the PLAY mode.

PROGRAM SPLIT

With this function you can split your PMM-88 in two controllers. each of them havina access to all eiaht outputs.

HOW IT WORKS:

You will have two input groups with independently selectable programs. While the first input group performs e.a. proaram 28, the second will perform a completely different proaram at the same time. A meaninaful use of this function would be the control of an entire MIDI system by two keyboard players. Each of them would serve his own input aroup without interfere with the other, while recalling the PMM-88's proarams.

PROGRAMMING:

The PROGRAM SPLIT point is to be proarammed the same way as the masterinput for Proaram Chanaes via MIDI. It will devide the inputs into two aroups. However, you still have to proaram a master-input for the first aroup; also the same way.

1) Program the master-input of the first group as shown above. (Program Changes Via Midi)

2) Proceed with programming the second master-input (steps 4 - 7), representing the PROGRAM SPLIT point. All inputs lower than this will be assigned to the first input group.

3) Press the MODE button to save the settings. The PMM-88 is now in the PLAY mode.

USE:

In the PROGRAM SPLIT function you can recall with the UP/DOWN buttons and the Foot Switch only the programs of the first input group. However, recalling the PMM-88's programs via MIDI is possible for both of the input groups.

BANK CHANGES FOR THE SECOND INPUT GROUP

If you want to switch program banks of the second input group in the PROGRAM SPLIT function, follow the next steps:

1) Press the MODE button in PLAY MODE.

2) Click the EDIT button twice. The display shows an "in2" for about a second. The current program setting of the second input group will blink.

3) Set the new value in the display and start the program with the MODE button.

4) Pres the MODE button to start the selected program of the input group #2, or go back to input group #1 by clicking the EDIT button twice. If you want to change the bank first, press the EDIT button, set the bank number, and afterwards the program number.

IMPORTANT!

The output processing in the PROGRAM SPLIT function is available only for the input group #1. All output processing functions like Output Filter, Output Transposition, Send Functions, will be ignored, if the selected program has been recalled from input group #2. Still output processing of the first group's programs is active.

The input processing (Split, Input Filter, Velocity Switch and Input Transposition) in the PROGRAM SPLIT function is available for both, the input and output groups.

PROGRAM CHANGER AND VOLUME CONTROL FOR THE SECOND INPUT GROUP:

This function is useful if you want to send Program Changes and Volume Controls while controling your MIDI system via input group #2.

HOW IT WORKS:

It is possible to generate PROGRAM CHANGE comands on any channel and any input. If you recall such program from the

input group #2, the PMM-88 emulates on it's input a virtual sunthesizer transmitting these PROGRAM CHANGES. All you have to do now, is to convert the MIDI channels to your desired and to route them to the wanted outputs.

PROGRAMMING:

1) Press the IN/OUT SELECT button in the PROGRAM CHANGER function. The PROGRAM CHANGE settings will now apply to the inputs.

2) Program all PROGRAM CHANGES as described in PROCESSING/PROGRAM CHANGER. Assign every PROGRAM CHANGE to a different MIDI channel and all of them to a single input of group #2 (you could choose also an input with actually no synthesizer connected to it).

3) Assign in EDIT mode with MULTI CONVERTING those outputs and channels, to which the emulated data should be routed to, to ensure, that the PROGRAM CHANGE commands will reach the right expanders.

DIRECT PROGRAM CHANGE FOR THE SECOND INPUT GROUP

1) Press the MODE button in PLAY mode.

2) Click the EDIT button twice.

3) All settings now made will refer to the second input group. To switch back to first input group, click the EDIT button twice. To delete the current value in the display, press the EDIT button.

VOLUME CONTROL commands can be programmed the same way in the VOLUME CONTROL function as PROGRAM CHANGES are in the PROGRAM CHANGE mode. They will be immediately transmitted, after the appropriate program is recalled from input group #2.

IMPORTANT!

The programs of both input groups can be recalled only in the PLAY mode. If the PMM-88 is in a processing function, program change (program recall) comands are ignored. They are also ignored, if you have pressed the MODE button in the PLAY mode, and recalled the programs from the remote control. You can use this function, if you want to recall patches from your synthesizer, without recalling the PMM-88's programs. Press in the PLAY mode the MODE button and select the program with your synthesizer. For the PLAY mode press the MODE button.

Exception: The EYE function. The incoming program change commands are not ignored!

If you want to change the processing settings, while the PMM-88 is in PROGRAM SPLIT mode, all input groups must select the same program. To change and save, switch the EDIT mode on/off.

1) Press the EDIT button in PLAY mode twice. Both input groups are in the same program (which was selected last) of the first input group. Change the processing settings and save them.

   If you want to use the PROGRAM SPLIT function consistently, it is recommended to inhibit the transmission of the ALL NOTES OFF commands (See chapter ALL NOTES OFF). Be careful with this function, as stuck notes might occur.

VOLUME CONTROLLER

If your MIDI instrument does not respond to the VOLUME CONTROL commands transmitted from the PMM-88, a possible reason could be that it expects a controller number other than #7, which is used by most manufacturers of MIDI equipment (MIDITEMP included). You can change this controller number with this function separately for each output.

1) Select the INSTALLATION function ("Int").

2) Press button #7.

3) Select the desired output with (volume) controller number other than #7 to be set.

4) Set the correct (volume) controller number in the display (with UP/DOWN).

5) Procced in the same manner with other outputs. Please note. that programming incorrect (volume) controller numbers (but probably correct .. numbers) will produce unexpected effects (this is not a bug, this is a feature).

6) Press the MODE button to save the settings. The PMM-88 is now in the PLAY mode.

ALL NOTES OFF YES/NO "Ano"

If you want to use the TRANSPARENT PROGRAM CHANGE function consistently, it is recommended to inhibit the transmission of the ALL NOTES OFF command.

1) Select the INSTALLATION function ("Int").

2) Press button #5.

3) Set the ALL NOTES OFF to Yes or No in the display (with UP/DOWN). If ALL NOTES OFF - Yes is selected, all 8 LEDs will come on.

MEMORY ALLOCATION: "F" - (MEMORY FULL)

No limits have been set in the PMM-88's programming facilities. All 8 inputs and outputs can be combined free of

choice while transposing, converting or multiplying all MIDI channels. Additionaly transmission of programmable long MIDI data chains is possible with the SEND DATA function.

Especially the MULTI CONVERTING function allows settings which heavilly consume memory, but do not make much sense in practical use. A possible setting could be MULTI CONVERSION of a single MIDI channel from a single input to all 16 MIDI channels on all 8 outputs. This would cause playing with a single key stroke 128 notes in the connected expanders.

Should you have programmed such extreme settings in several programs, it could happen, that the processor can not allocate enough memory for all 128 programs. The PMM-88 indicates in this case while you EDIT a program, that no further settings can be made.

The display shows an "F" (Full). All current settings can still be stored in a program location. To proceed with programming you would have to simplify or delete some programs.

REINITIALIZATION

If the PMM-88 should stuck in an undefined state for unknown reasons, switch the unit off and on, while holding the EDIT and MODE buttons simultaneously. Before doing this be sure, that this is really necessary, because all programs will be erased after reinitialization!

TECHNICAL SPECIFICATIONS

Inputs 8

Outputs 8

User Memory (RAM).................. 1-128

Front Panel

Keys .... 14 Buttons

Displays .... 3 Digit 7 Segment
                                    11 LED

Connectors .... Foot Jack
Switches .... Power Switch

Rear Panel
Connectors .... MIDI IN (DIN 5P x 8)
                                    MIDI OUT (DIN 5P x 8)
                                    Remote Control (9P)

Power Requirements .... 220-240V AC 50/60 Hz
                                    Export Unit Configured
                                    for Destination country

Power Consumption 10W

Optional Accessories .... Remote Control Cables
                                    In Various Lengths

CAUTION!

To prevent demages never use the unit in places with
excessive temperature or humidity.

The electronic parts used in the PMM-88 could also be
demaged by pulses in the supply, so disconnect the unit
during thunderstorms or overloaded supply.

To prevent electrical shocks, never open the cover or
repair the unit by yourself.