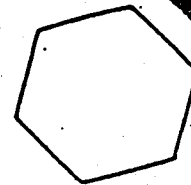




MTM



Service Manual

SIMMONS

Alban Park, Hatfield Road, St. Albans, Herts. AL1 0JH

TECHNICAL MANUAL FOR SIMMONS MIDI TRIGGER MIDI UNIT

Contained within this manual :

Description of self-tests carried out during power-up.

Power supply checks.

Bare board test procedures.(includes initialisation procedure)

Final test procedures.

QA procedures.

Technical description.

Circuit diagrams.

Layout diagrams.

Wiring diagrams for selector cable & footswitches.

Breakdown of factory data

ABOUT MTM

The initials MTM stand for Midi Trigger Midi. As you might expect, this means that the MTM is concerned mainly with MIDI information. It is primarily designed for use with the SDS7 and will increase the dynamic range and performance of the SDS7 and also provide a fully assignable MIDI interface. Other uses of the MTM are wherever audio signals are required to drive MIDI equipped synthesisers.

Features

incoming analogue signals :

The MTM will clean-up "messy" incoming signals and carry out compression/dynamic/threshold/hold-off functions.

outgoing trigger signals :

The pulse height and pulse width of trigger signals from the MTM are controlled by the MTM

routeing of signals :

The routeing of channels (input to output) is under software control. This allows incoming signals to play voices of other synthesisers, for example.

other features :

The MTM when used with the SDS7, can change the kit number via the selector pad, which is connected to the MTM.

Programmable echo, MIDI note and chord layering are achievable. (this allows the user to select different MIDI notes according to how he strikes the drum pad).

Also contained within the MTM are a programmable run-generator, pitch-generator and up/down programmable chromatic scales.

The memory of the MTM is divided into 5 areas :

- 1) sequences
- 2) patches
- 3) processes
- 4) routes
- 5) effects

A sequence is a string of patch numbers. The MTM can store up to 10 sequences, each containing up to 64 patches.

A patch consists of a process number, a route number and an effect number.

Processes are a set of conditions for inputs and outputs. These conditions will control absolute threshold, hold-off type, hold-off time, dynamic hold-off adjustment, curve number, minimum output level, fixed output pulse width & dynamic output pulse width control for each trigger output from the MTM.

For MIDI input signals to the MTM, there is control of MIDI absolute threshold, MIDI compansion curve & MIDI minimum output level.

For MIDI output signals from the MTM there is control of the MIDI output width and dynamic control of the MIDI output width.

Routes consist of linking input channels to output channels by relating trigger in, trigger out and MIDI note.

There are 100 programmable routes available.

Effects are programmable echo, MIDI note and chord layering (which enable the drummer to select different MIDI notes according to how the drum-pad is struck), selectable up/down chromatic scales, pitch generator and programmable run-generator.

DESCRIPTION OF TESTS

Whenever the MTM is powered up, the following self-tests are carried out :

Checksum total of both EPROMs.

If the test is failed, then the LCD display will show :

"prom checksum "

"failed"

Integrity of RAMs. (writes information to RAMs, one byte at a time, and then reads that information back to verify that information is correct)

If the test is failed, then the LCD display will show :

"ram write/read "

"failed hhh/lll "

where hhh is the high part of the decimal address
and lll is the low part of the decimal address.

Time of A-to-D conversion (checks for too fast conversion & too slow conversion).

If test is failed, then LCD display will show :

"a/d convertor "

"failed - no EOC " (end of convert)

or

"failed - slow "

or

"failed - slow "

At the end of these tests, if assuming that all tests are passed, the LCD will display

" SIMMONS "

"MTM (c) 1985 V01 "

after a few seconds this will change to :

"play patch F01"

"F01 01 01 08"

This is the end of the power-up self tests.

There are other self-tests which can be selected at power-up, and these are described during the section entitled "TEST PROCEDURES".

POWER SUPPLY CHECKS

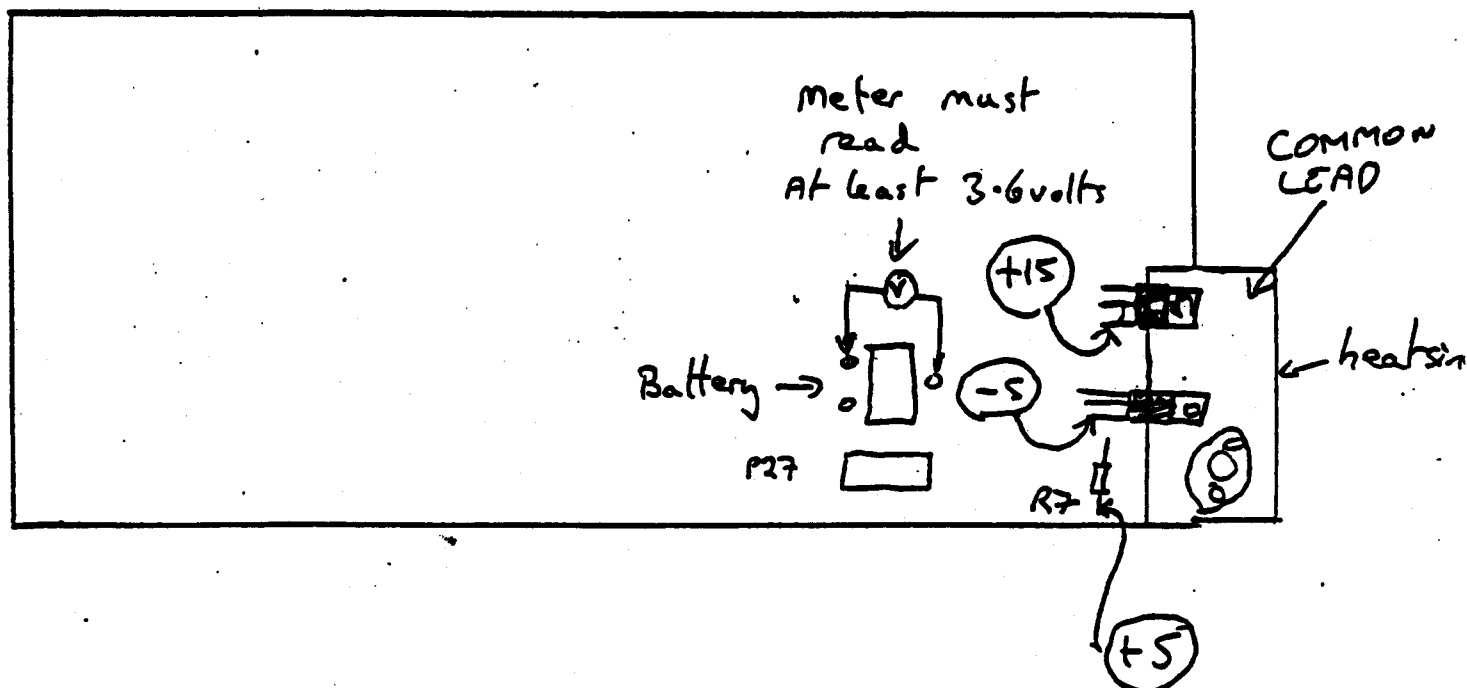
The outputs from the three voltage regulators are easily measured. They are not expected to present any problems, but in any case should be measured prior to commencement of repair work or any testing.

This may save a lot of time!

Before powering the unit, check that the RAM battery measures 3.6v at least. If not, power the unit for 1 hour (after checking the outputs from the voltage regulators as follows), switch off for at least 2 hours and re-test.

With the jack sockets located away from you, the voltage regulators are located on the right-hand side of the PCB. Check the points shown for the indicated voltages. These voltages must be within .25 of a volt. (ie the output from the 5 volt regulators must be between 4.75 volts & 5.25 volts, the output from the 15 volt regulator must be between 14.75 volts and 15.25 volts.)

diagram 1.



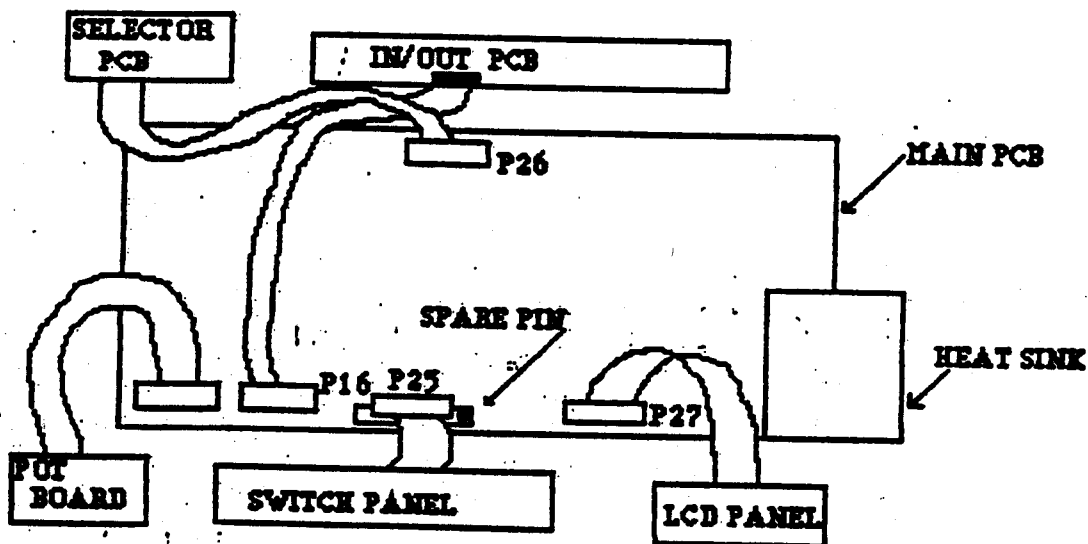
FIRST TEST PROCEDURE

1) Before connecting the PCB to the test-rig, measure the battery voltage : (minimum 3.6v)

(see diagram 1.)

diagram 2.

2) Connect the PCB to the test-rig.



3) Power the unit up whilst holding down the ALL/DFAULT button.
(make sure that there are no leads connected to the MIDI sockets,
or else the unit may not go into the correct self-test mode!)

Connect the leads coming from the red/green LED board mounted on
the test-rig to the MIDI in and MIDI through sockets.

The green LED should glow continuously, and the red LED should
flash at about 1 flash per second.
(This checks 15 volt output to high hat and also MIDI through
circuitry).

Now remove the leads from the MIDI in and MIDI through.

The display will show
"do you wish to "
"initialise data?"

Release DFAULT button.
Press YES button.

The display will then show :
"overwrite "
"user data. sure? "
Press YES button.

The unit will now initialise the data and check whether this has
been carried out correctly or not.

If it is correct, the display will show :

"overwrite "
"passed ok ..."
(now press OPTION/SELECT button)

If it is not correct, the display will show :

"failed l hhh,lll" (where hhh and lll are the high and low
decimal addresses of where the failure has occurred.)

4) The display will now show :

"do you want to
"initialise usr data?"

press YES button.

If the initialisation has not been carried out correctly, the display will show :

"failed ! hhh,lll"

If this initialisation is carried out correctly, the display will show :

"verify init data"

"passed ok"

The Board has now been initialised to the factory settings.
(see page for breakdown of factory settings)

5) Switch the unit off.

PLUG TRIGGER OUTPUTS INTO TRIGGER INPUTS.

6) Press the MIDI button and turn the unit on.

The display will show :

"MTM test software"

"version 1.0"

the MTM will now perform some self tests as follows :

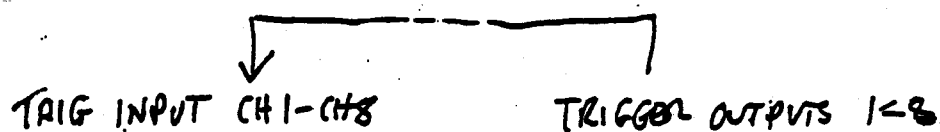
Prom checksum

RAM integrity

A-to-D convertor checks (as described at start of this section).

After this the unit will send signals through its trigger outputs and read them back into its trigger inputs.

You must attach the jack leads as shown :



4) A-to-D, D-to-A, and detrigger test.

During this test, 8 sets of numbers are displayed. These represent the value of votage which has been sent out from the D-to-A convertors and read back in via the A-to-D convertors.

C111 222 333 444
555 666 777 888

where 111 is the value at channel 1 etc
and C is the test letter.

description of test letter :

A high gain input, high value output all channels
B high gain input, low value output all channels
C low gain input, high value output all channels
D low gain input, low value output all channels

Test A.

Set all TRIG in pots and the TRIG out pot fully clockwise.
The display should read :

A252 249 245 245
245 245 245 255

(note these figures are approximate only. They may vary from 240-255).

Turn the TRIG out pot slowly anti-clockwise. For the first 2/3 of its rotation, the numbers displayed will not alter vey much. During the last 1/3 of its rotation, the numbers displayed should all decrease until at the end of the rotation of the pot, the numbers displayed should read 000.

Turn the TRIGGER out pot fully clockwise.

Rotate each TRIGGER in pot in turn. Again, during the first 2/3 of the roation of this pot, the numbers displayed will not alter very much.

During the last 1/3 of the rotation of the pot, the relevant channel display will decrease to 000. (ie if you are turning the pot for channel 1 TRIGGER in, the display for channel 1 will alter.)

Repeat this for all channels.

Check for erratic numbers. (ie number jumps up and down instead of decreasing smoothly). This is caused by a "noisy" pot.

When you have finished, press OPTION SELECT.

B) Display will show :

B123 456 789 012

345 678 901 234

(numbers depend on settings of TRIGGER pots)

Turn all pots fully clockwise

Display should now show :

R200 200 200 200

200 200 200 200

(numbers will continuously vary between about 180 and 230).

Repeat rotation of pots as described previously. The numbers displayed should start to drop once the pots have gone through about $2/3$ of their rotation, and should read 000 at the end of the rotation.

When you have finished, press OPTION SELECT.

C) Display will show :

C100 100 100 100

100 100 100 100

(numbers depend on settings of TRIGGER pots)

Turn all pots fully clockwise

Display should now show :

C100 100 100 100

100 100 100 255

(numbers will continuously vary between about 090 and 120, except channel 8, which should read 255).

Repeat rotation of pots as described previously. The numbers displayed should start to drop once the pots have gone through about $2/3$ of their rotation, and should read 000 at the end of the rotation.

When you have finished, press OPTION SELECT.

D) Display will show :

D100 100 100 100

100 100 100 100

(numbers depend on settings of TRIGGER pots)

Turn all pots fully clockwise

Display should now show :

D050 050 050 095

050 050 050 255

(numbers will continuously vary between about 040 and 060, except channel 8, which should read 255, and channel 4 which will read between 90 and 105.

Repeat rotation of pots as described previously. The numbers displayed should start to drop once the pots have gone through about 2/3 of their rotation, and should read 000 at the end of the rotation.

When this test is completed, press option select repeatedly until the display once more shows :

111 222 333 444

555 666 777 888.

(The MTM will step through its tests)

Now connect the "Jack to Cannon" leads (input1 to output1) and repeat the TRIGGER test (part A only).

If this is successful, press OPTION select 3 times, so that the next set of tests is displayed.

8) Switch test.

This not carried out until final test.
Press OPTION SELECT to proceed to next test.

9) MIDI in/out test.

The display will show :
"midi in/out test"
"failed"

Connect the MIDI (DIN to DIN) lead from the MIDI in socket to one of the MIDI out sockets.

The display should now show :

"midi in/out test"
"passed"

(if not, then the MIDI test has failed)

Now connect the lead to the other MIDI out socket, and the display should again show :

"midi in/out test"
"passed"

10) press OPTION SELECT to proceed to the cassette in/out test

Connect a data recorder to the cassette interface.

The LCD display shows :

"cass interface"
"press yes to dmp"

Start data recorder.

Press YES button.

Display shows :
"cass interface"

LM016L

1. SUMMARY

- 16 characters x 2 lines
- Built-in control LSI HD44780 type

2. MECHANICAL DATA (Nominal dimensions)

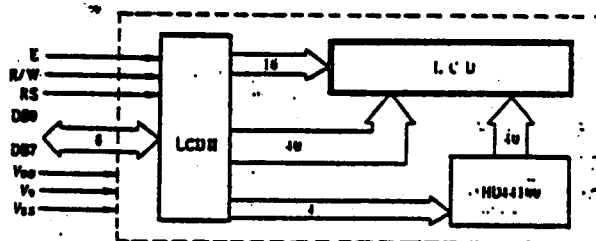
- (1) Module size 84W x 44H x 15D (max.) mm
- (2) Effective display area 61W x 15.8H mm
- (3) Character size (5 x 7 dots) 2.96W x 4.86H mm
- (4) Pitch 3.55 mm
- (5) Dot size 0.56W x 0.66H mm
- (6) Weight about 25g

3. ABSOLUTE MAXIMUM RATINGS

- | | min. | max. |
|---|------|---------|
| (1) Power supply for logic (VDD-VSS) ... | 0 | 7.0V |
| (2) Power supply for LCD drive (VDD-Vo) 0 | | (13.5V) |
| (3) Input voltage (VI) | VSS | VDD V |
| (4) Operating temperature (Ta) | 0 | +50°C |
| (5) Storage temperature (Tstg) | -20 | +70°C |

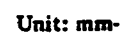
4. ELECTRICAL CHARACTERISTICS

- (1) $T_a=25^\circ\text{C}$, $V_{DD}=5.0V\pm0.25V$
- (2) Input "high" voltage (V_{IH}) 2.2V min.
- (3) Input "low" voltage (V_{IL}) 0.6V max.
- (4) Output "high" voltage (V_{OH})
($-I_{OH}=0.2\text{mA}$) 2.4V min.
- (5) Output "low" voltage (V_{OL}) ($I_{OL}=1.2\text{mA}$) 0.4V max.
- (6) Power supply current (I_{DD}) ($V_{DD}=5.0V$) 0.5mA typ.
3.0mA max.
- (7) Power supply for LCD drive. (Recommended)
($V_{DD}-V_o$) $D_u=1/16$
at $T_a=0^\circ\text{C}$ 4.6V typ.
at $T_a=25^\circ\text{C}$ 4.4V typ.
at $T_a=50^\circ\text{C}$ 4.2V typ.



5. BLOCK DIAGRAM

10-12-44

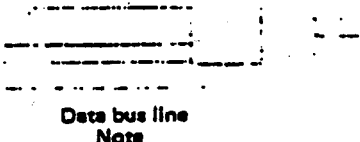


6. EXTERNAL DIMENSION



7. DOT SIZE

8. INTERFACE TABLE

Pin No.	Symbol	Level	Function
1	V _{SS}	—	0V
2	V _{DD}	—	5V
3	V _O	—	—
4	RS	H/L	L: Instruction code input H: Data input
5	R/W	H/L	H: Data read (LCD module→MPU) L: Data write (LCD module←MPU)
6	E	H, H→L	Enable signal
7	DB0	H/L	
8	DB1	H/L	
9	DB2	H/L	
10	DB3	H/L	
11	DB4	H/L	
12	DB5	H/L	
13	DB6	H/L	
14	DB7	H/L	

Note:

Notes:
In the HD44780, the data can be sent in either 4-bit 2-operation or 8-bit 1-operation so that it can interface to both 4 and 8 bit MPU's.

During this part of the procedure, you have set the user data to the factory settings.

There are:

patches	20 factory	99 user
processes	5 factory	15 user
routes	20 factory	79 user
effects	10 factory	30 user
sequences	0 factory	10 user

these are broken down as follows :

patches

1-20

process=1,

route=21-40,

effect=1 (all off)

MIDI channel=1

prog=1-20

selector pad=1-16,1,2,3,4

21-40

route=21-40

effect=2

prog=21-40

all other parameters as in patches 1-20

41-60

route=41-60

effect=3

prog=41-60

all other parameters as in patches 1-20

61-80

route=61-80

effect=4

prog=61-80

all other parameters as in patches 1-20

81-99

route=81-99

effect=5

prog=81-99

Processes

1 mono pads

2 stereo pads

3 snare/rim channels 1 & 2, bass=3

4 unassigned

5 accoustic drums

6-20 3 copies of above sets

Effects

1-10 factory sets

11-40 three copies of factory sets

FINAL TEST PROCEDURE

- 1) Power the unit up whilst holding down the ALL/DEFAULT button.

The display will show

"do you wish to "
"initialise data?"

Release default button.

Press OPTION SELECT button.

The display will then show :

"do you want to "
"verify usr data? "
Press YES button.

The unit will now verify the data.

If it is correct, the display will show :

"verify init data"
"passed ok.... "
(now press OPTION/SELECT button)

If it is not correct, the display will show :

"verify init data "
"failed ! hhh,lll" (where hhh and lll are the high and low
decimal addresses of where the failure has occurred.)

- 2) Switch the unit off.

- 3) Press the MIDI button and turn the unit on.

The display will show :

"MTM test software"
"version 1.0 "

the MTM will now perform some self tests as follows :

From checksum

RAM integrity

A-to-D convertor checks (as described at start of this section).

After this the unit will send signals through its trigger outputs
and read them back into its trigger inputs.

You must attach the jack leads as shown :

"dumping"

When the dump has finished (after about 10 seconds), the display
shows :

"push YES to load"

Rewind the tape , press YES button, set data recorder to replay.
Display will show either :

"passed"
or
"failed"

4) A-to-D, D-to-A, and dettrigger test.

During this test, 8 sets of numbers are displayed.

These represent the value of votage which has been sent out from the D-to-A convertors and read back in via the A-to-D convertors.

C111 222 333 444
555 666 777 888

where 111 is the value at channel 1 etc
and C is the test letter.

description of test letter :

A high gain input, high value output all channels
B high gain input, low value output all channels
C low gain input, high value output all channels
D low gain input, low value output all channels

Test A.

Set all TRIG in pots and the TRIG out pot fully clockwise.

The display should read :

A252 249 245 245
245 245 245 255

(note these figures are approximate only. They may vary from 240-255).

Turn the TRIG out pot slowly anti-clockwise. For the first 2/3 of its rotation, the numbers displayed will not alter vey much. During the last 1/3 of its rotation, the numbers displayed should all decrease until at the end of the rotation of the pot, the numbers displayed should read 000.

Turn the TRIGGER out pot fully clockwise.

Rotate each TRIGGER in pot in turn. Again, during the first 2/3 of the roation of this pot, the numbers displayed will not alter very much.

During the last 1/3 of the rotation of the pot, the relevant channel display will decrease to 000. (ie if you are turning the pot for channel 1 TRIGGER in, the display for channel 1 will alter.)

Repeat this for all channels.

Check for erratic numbers. (ie number jumps up and down instead of decreasing smoothly). This is caused by a "noisy" pot.

When you have finished, press OPTION SELECT.

B) Display will show :

B123 456 789 012

345 678 901 234

(numbers depend on settings of TRIGGER pots)

Turn all pots fully clockwise

Display should now show :

B200 200 200 200

200 200 200 200

(numbers will continuously vary between about 180 and 230).

Repeat rotation of pots as described previously. The numbers displayed should start to drop once the pots have gone through about 2/3 of their rotation, and should read 000 at the end of the rotation.

When you have finished, press OPTION SELECT.

C) Display will show :

C100 100 100 100

100 100 100 100

(numbers depend on settings of TRIGGER pots)

Turn all pots fully clockwise

Display should now show :

C100 100 100 100

100 100 100 255

(numbers will continuously vary between about 090 and 120, except channel 8, which should read 255).

Repeat rotation of pots as described previously. The numbers displayed should start to drop once the pots have gone through about 2/3 of their rotation, and should read 000 at the end of the rotation.

When you have finished, press OPTION SELECT.

D) Display will show :

D100 100 100 100

100 100 100 100

(numbers depend on settings of TRIGGER pots)

Turn all pots fully clockwise

Display should now show :

D050 050 050 095

050 050 050 255

(numbers will continuously vary between about 040 and 060, except channel 8, which should read 255, and channel 4 which will read between 90 and 105.

Repeat rotation of pots as described previously. The numbers displayed should start to drop once the pots have gone through about 2/3 of their rotation, and should read 000 at the end of the rotation.

When this test is completed, press option select repeatedly until the display once more shows :

A111 222 333 444

555 666 777 888.

(The MTM will step through its tests)

Now connect the "Jack to Cannon" leads (input1 to output1) and repeat the TRIGGER test (part A only).

If this is successful, press OPTION select 3 times, so that the next set of tests is displayed.

5) Switch test.

The purpose of this test is to check that all switches function correctly.

The tester is asked to press a sequence of switches. The name of the required switch is displayed on the LCD panel. When the switch is pressed and if it functions correctly, the next switch name is displayed.

This test includes the footswitch which must be connected to the unit.

If the switch does not function, then the switch test is unable to proceed. The tester must then press OPTION select in order to proceed to the next test.

6) MIDI in/out test.

The display will show :

"midi in/out test"

"failed"

Connect the MIDI (DIN to DIN) lead from the MIDI in socket to one of the MIDI out sockets.

The display should now show :

"midi in/out test"

"passed"

(if not, then the MIDI test has failed)

Now connect the lead to the other MIDI out socket, and the display should again show :

"midi in/out test"

"passed"

7) press OPTION SELECT to proceed to the cassette in/out test

Connect a data recorder to the cassette interface.

The LCD display shows :
"cass inter ice"
"press yes to dmp"

Start data recorder.

Press YES button.
Display shows :
"cass interface"
"dumping"

When the dump has finished (after about 10 seconds), the display shows :
"push YES to load"

Rewind the tape , press YES button, set data recorder to replay.
Display will show either :
"passed"
or
"failed"

VISUAL INSPECTION

Check all lettering for smudging, cracks, missing sections etc.

Check casing for scratches, scuff marks etc.

Check that the front switch panel is correctly aligned so that the LCD display is aligned with the panel, and so that the pot knobs are free to turn without fouling the panel.

Check that all cannon and jack sockets are aligned with the holes in the metalwork.

Check that all jack sockets have nuts fitted.

Check that the MIDI and tape DIN sockets are correctly aligned with the holes in the casing.

Check that pot knobs are not loose.

Check LCD display for shorted or missing segments.

Pass to QA.

Midi +tape

Midi data is sent by the uart onboard the 8031 via '04' inverters. This signal is attenuated and used to dump the user memory to tape by an fsk code. Midi in data is recieved via the opto isolator IC5 at IC6 port 3 pin10 as is tape load info from tape that has been shaped by IC19. The tape input is disabled when not in use by a "high" signal on D28.

Memory

Micro ram and user storage is provided by two Cmos rams IC10, IC11, IC 11 is a 2k ram and IC 10 can be an 8 or 2k dependant upon the final user area. The ram is backed up by a 3.6 v nicad cell and power up/ down protection is provided by holding chip selects high during this period with a 74hc00 gate. The rams are only enabled when an ac signal from the tx is present on R39. Program memory is provided by IC12 which is a 27128 eprom.

Outputs.

The micro creates eight gate signals by writing values to the d-a IC16 and multiplexing the analog voltage to one of eight S+H's. Gain is added to the 5v output of the d-a to boost the signal to a maximum of 15v (needed to drive analog synths).

SDS7 selector in-out

These connectors are fitted to enable the selector pad to select MTM patches and MTM to change SDS7 kit numbers. It does this by mimicking the read/write mux's fitted to the SDS7. Port C of IC14 is connected to the selector pad and the SDS7 is connected to port1 of the 8031.

Switches and displays.

The switches are of the membrane type and are read by port A and B of IC14, two switches are formed by the foot switch that can be plugged into P9 which can be programmed to step backwards and forwards through patch numbers. The lcd has a dedicated chip onboard which deals with character sets, and display timing, all the micro does is to write to the display via the data buss and the display does the rest.

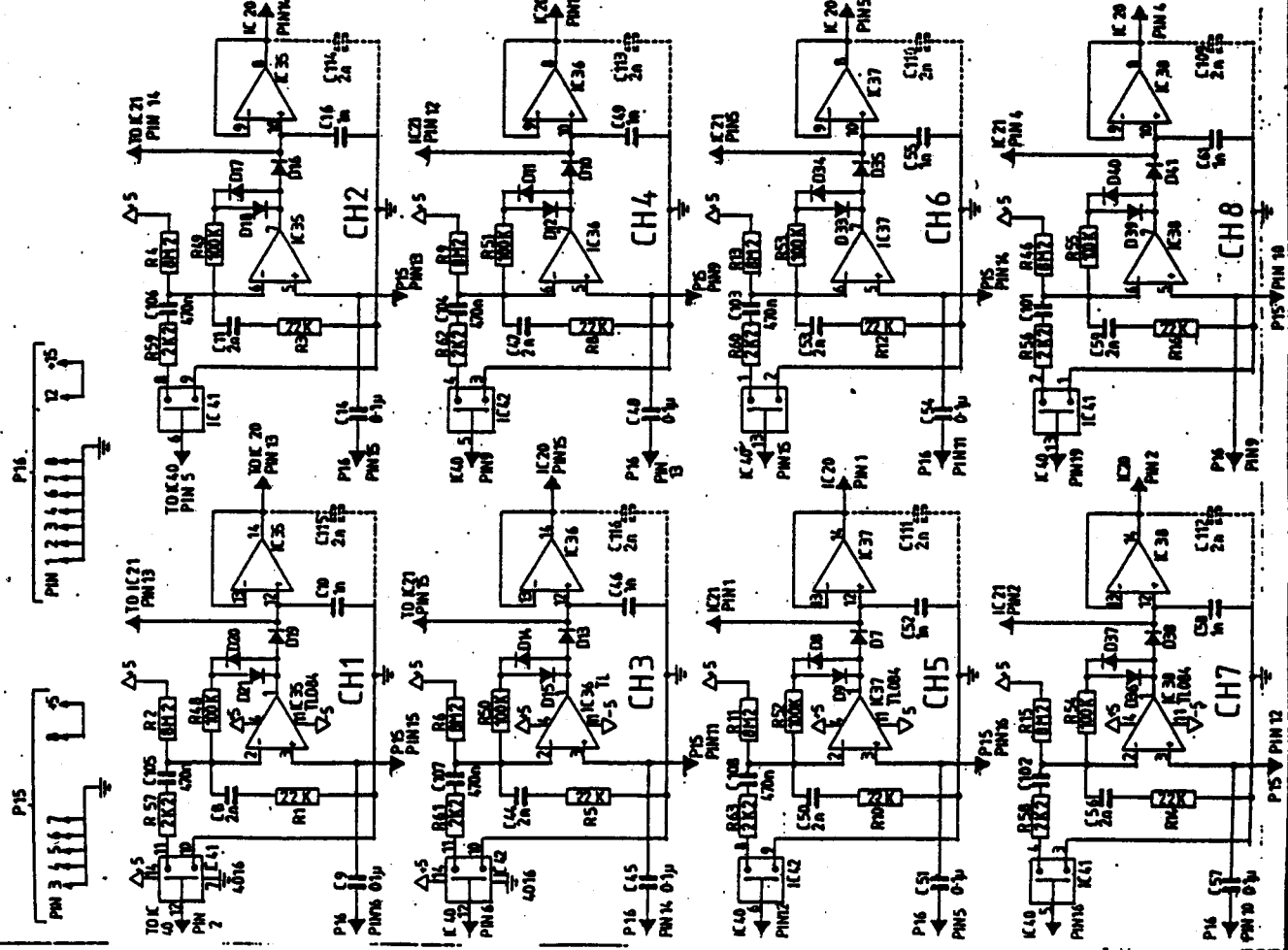
Input circuitry

There are eight input amplifiers and peak-hold circuits. IC35-38. These are fed from eight jack sockets and eight XLR type connectors arranged in pairs. Channels 2,4,6,8 are switched to the "ring" contact of a stereo jack plug should it be plugged into channels 1,3,5,7. This means that four of SIMMONS'S stereo pads can be plugged into the unit, each pad using two channels. The input amplifiers have two gain ranges which can be individually switched by the micro to suit mic or line signal levels. This is achieved by writing to the 373 control latch which switches the relevant resistors to gnd via two 4016 an. switches.

Once the micro has detected a trigger, the charge on the hold capacitors can be discharged by the de- trigger an. mux IC3. The relavent path to ground through the 4051 being opened by the address selected by ic14 port b pins 0,1,2. The micro "reads" from a channel input by reading from the a-d address, which opens the channel mux IC2 and starts the successive aprox. a-d. When the micro recieved the E.O.C it reads the value placed on the data buss by the a-d, IC7. All the inputs are AC coupled apart from channel 8 which is DC to read position voltage from an SDS4 hi-hat pedal if it is used. Power to the pedals opto is

SDS M.T.M MB ISSUE 3 INPUT SAMPLE & HOLDS

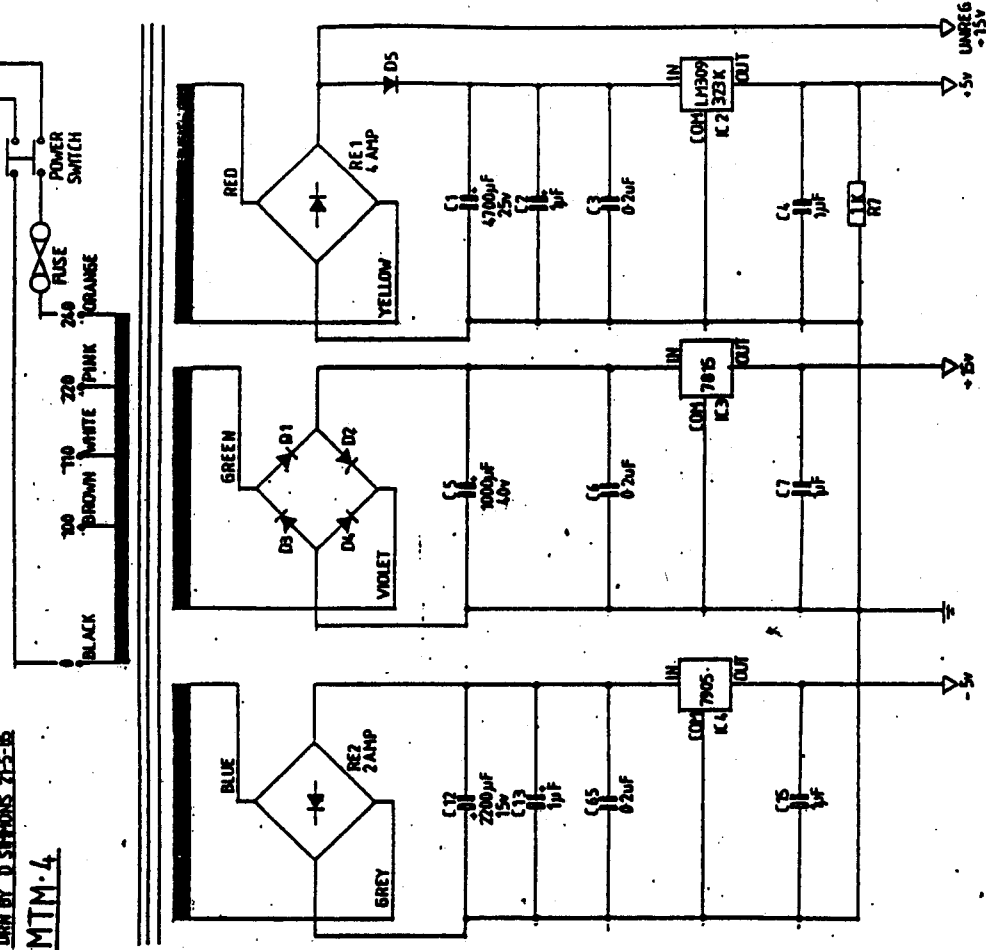
MTM-2



MTM MB POWER SUPPLY

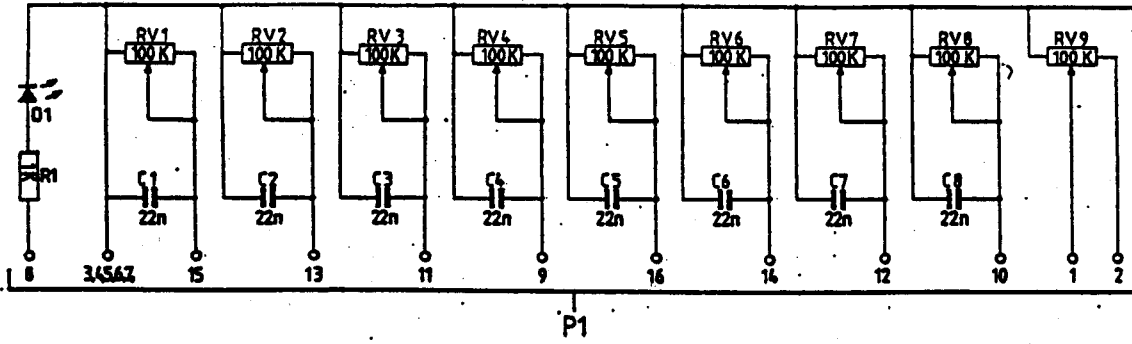
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MTM-4

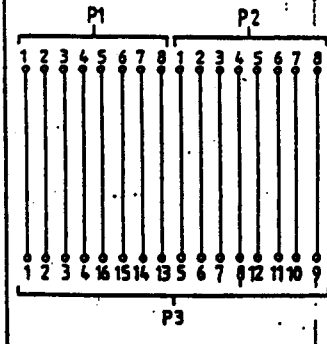


SDS MTM POT, SELECTOR & INPUT BOARDS

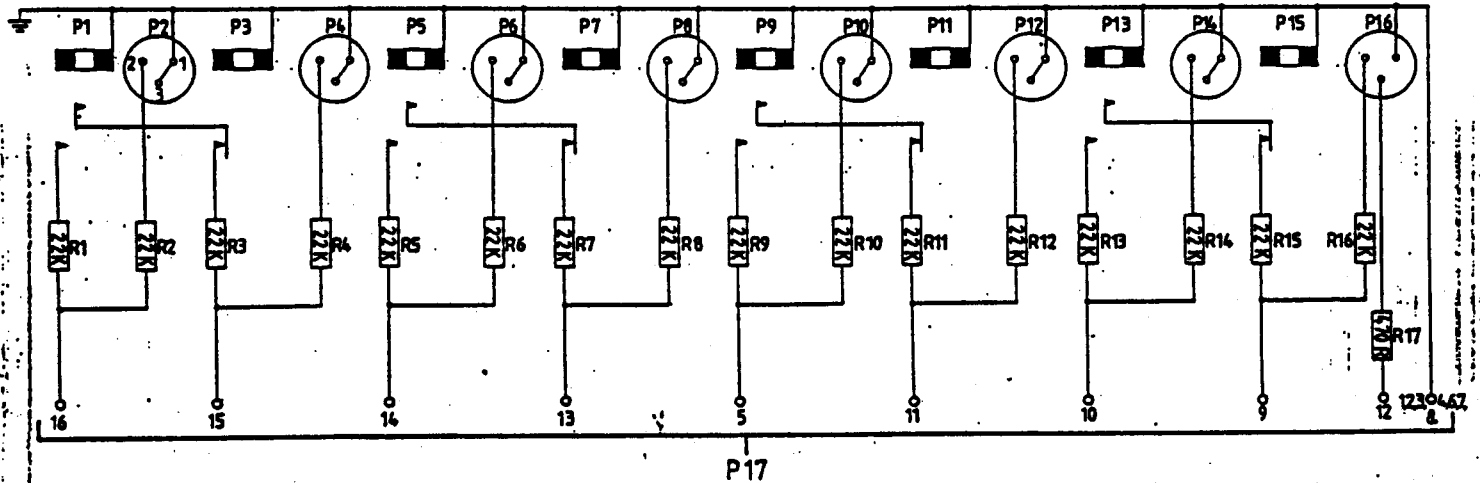
URG No 1111-3
DRN BY J PINNOCK
DATE SEPTEMBER 85



SDS MTM POT BOARD



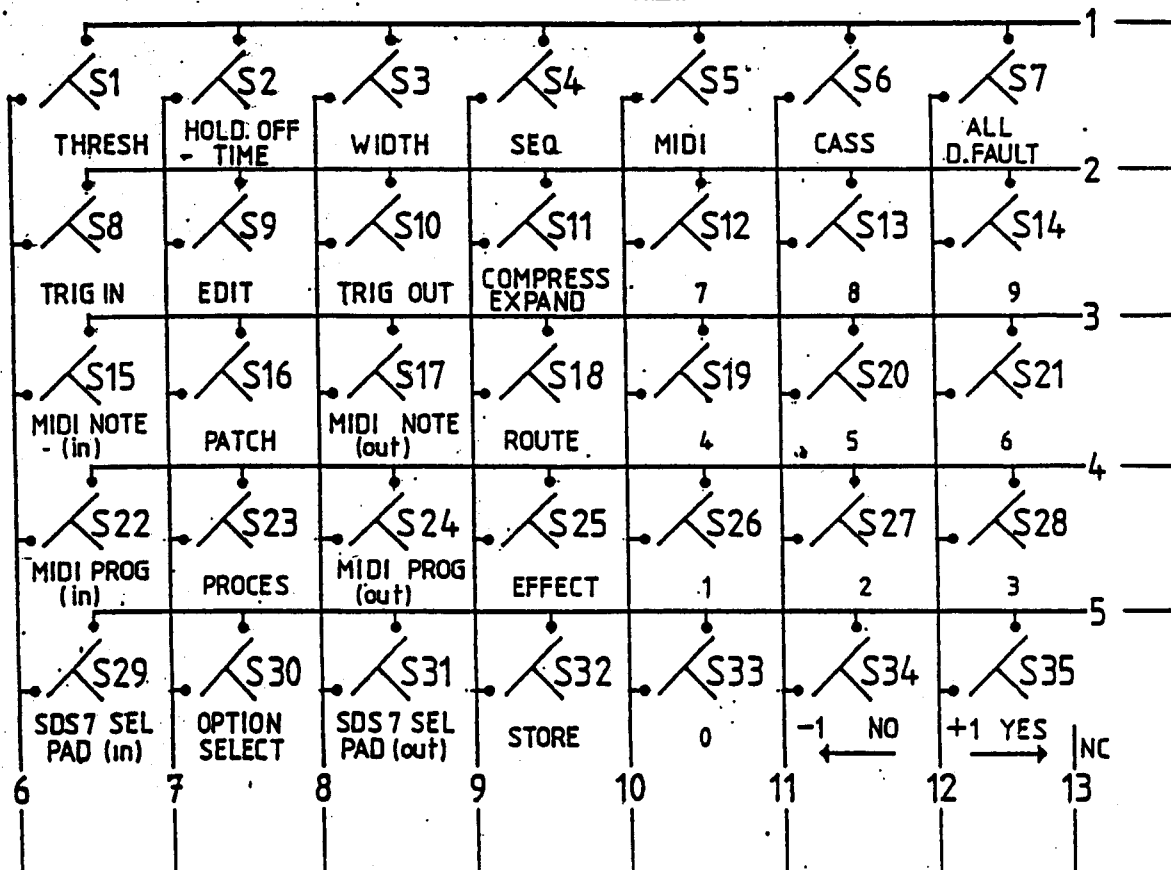
SELECTOR BOARD



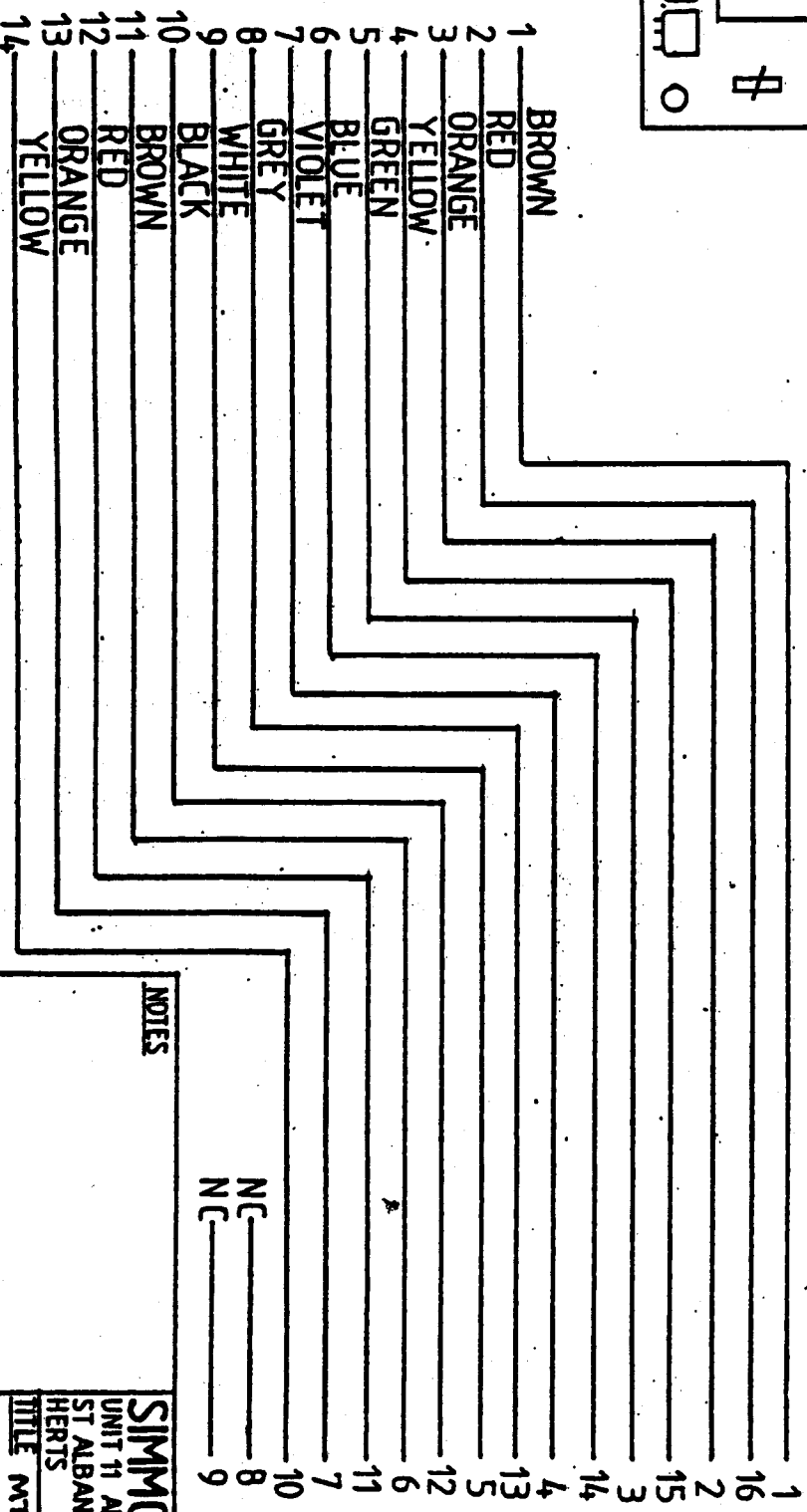
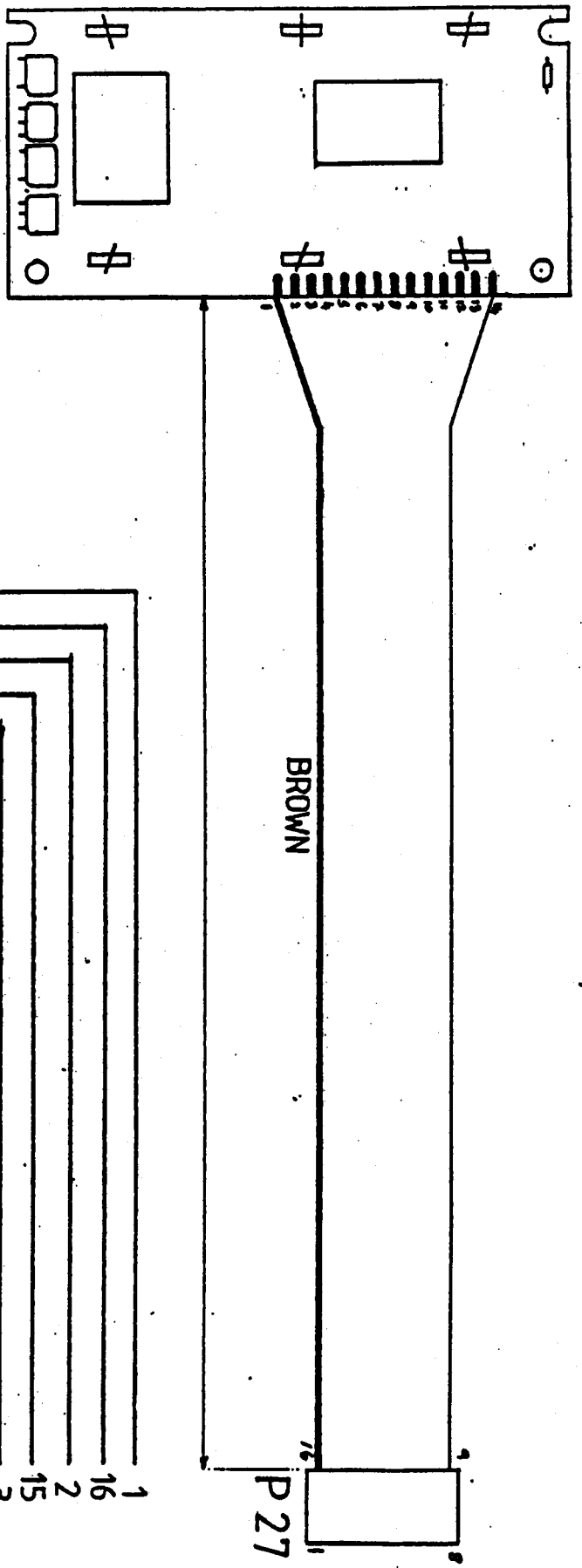
SDS MTM INPUT BOARD

SDS MTM SWITCH PANEL

MTM-8



TO
P25



NOTES

NC ——— 8
 NC ——— 9

SIMMONS ELECTRONICS
 UNIT 11 ALBAN PARK
 ST ALBANS
 HERTS

TITLE M7M LCP

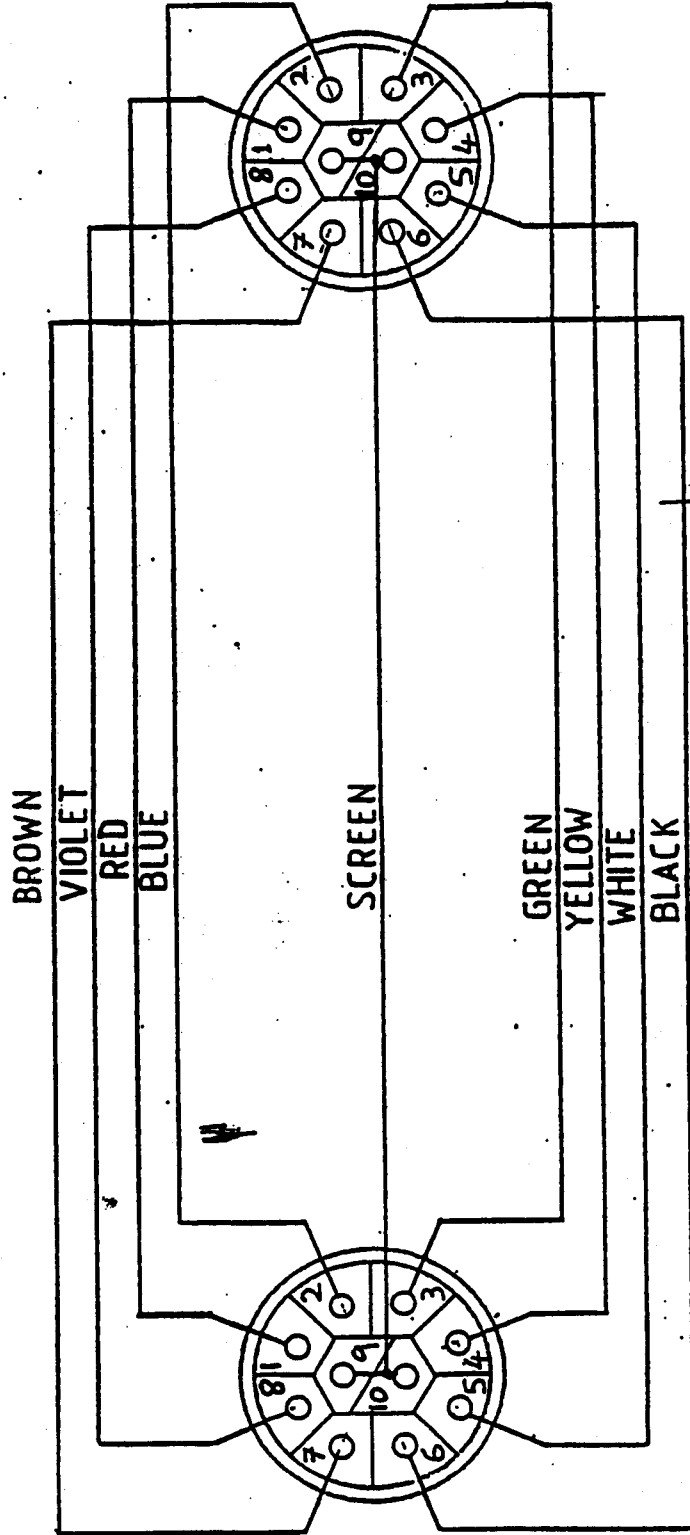
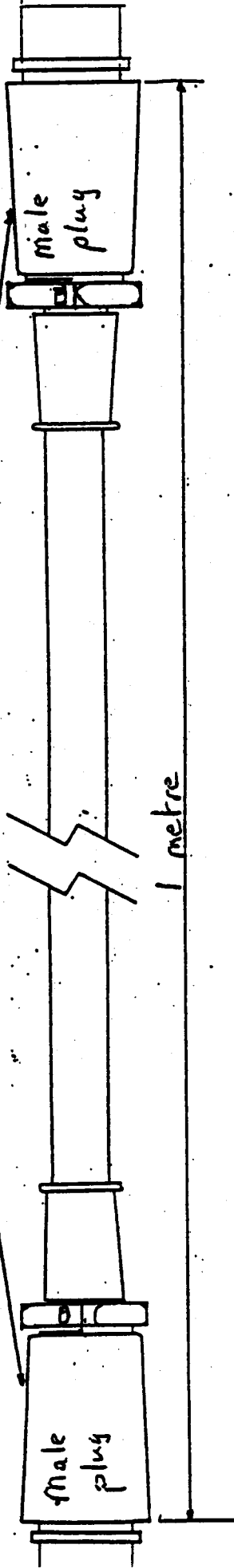
WIRING

DRAWN S.P. DATE 10.

SCALE 100% DRNG No

SIMMONS

15mm 10 WAY CABLE MOUNTING PLUG



NOTES

1 Cable to be 8 core
(7/0.2mm) Braided Screen
OD = 6.3 mm

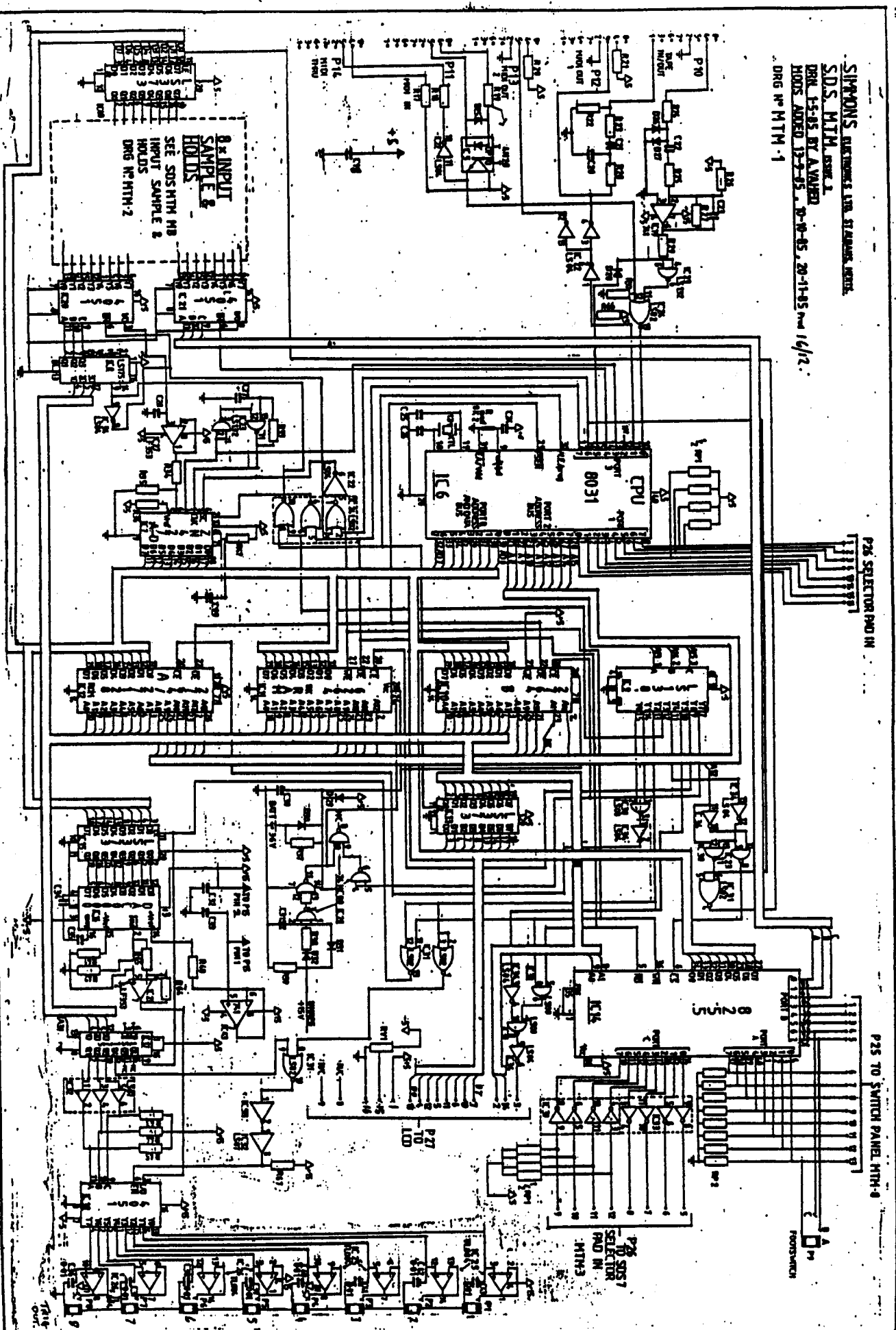
SIMMONS ELECTRONICS LTD
UNIT 11 ALBAN PARK
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HERTS

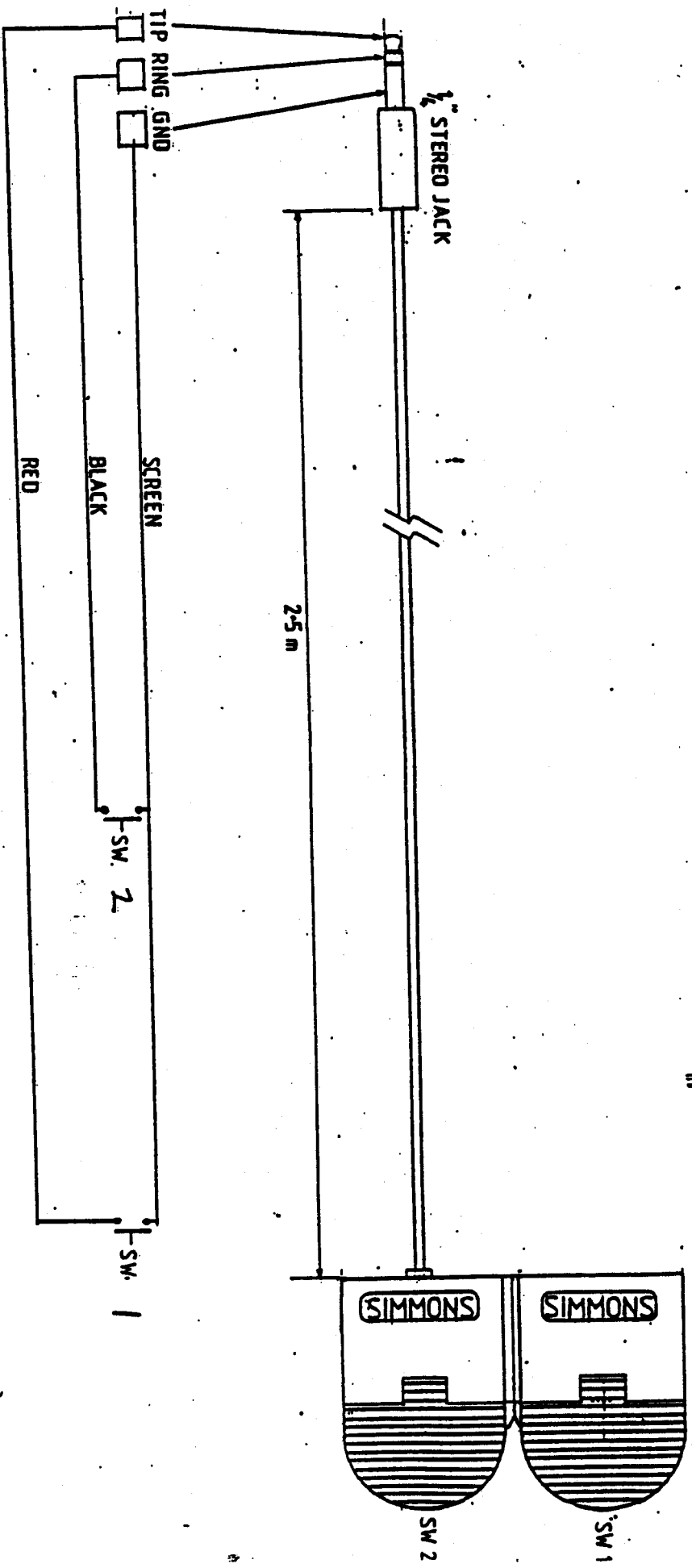
TITLE MTM SELECTOR
CABLE

DRAWN Sim DATE 8-10-85

SCALE DRNG N°
SDN00126

SIMPONS ELECTRONICS LAB. STAMPAER. MOORE.
 SDS MTM, VER. 1
 DRN 1-5-65 BY AVA/HD
 MODS ADDED 12-2-65, 10-11-65 AND 1/1/72.
 DRG NO MTM-1





NOTES

1 SW182 TO BE HONENTARY
CONTACT TYPE

SIMMONS ELECTRONICS
UNIT 11 ALBAN PARK
ST ALBANS
HERTS

TITLE MTM DUAL
FOOTSWITCH

DRAWN J PINNOCK
SCALE 1:1
DATE 7-10

SDN00126

Approved 26/11/15

SECOND EDITION
July 1988

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Introduction