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**PC-MIDI, MEGAS STUDIO, QUARTZ, SOLO-MIDI, SOLITAIRE-Midimute,
JADE (mute/sel cpu) MXD
(also applicable to mute/selector sections of Solo Logic, Solitaire &
Jade-S fader systems)**

INTRODUCTION

Soundtracs were one of the first manufacturers in the World to introduce automated muting systems in mixers during the early 1980's. The early CM and CP mixers operated on a patented control scheme and the principles developed are used in the mixers noted above. These mixers use a basically identical circuit and control system but the different models use differing PCB's with various hardware connections, numbers of channels and control panel systems. As a result, fault finding these systems is identical for all types with minor differences depending on connections and grouping. The following notes are to aid repairers tracing problems in these systems. The CM and CP range operate on some of the same principles but use different hardware systems. Refer to CM/CMX/CP technical service for details of these systems.

PRINCIPLES OF OPERATION

The mute system uses a Z80 microprocessor IC using EPROM stored program controlling a series of PIA (parallel interface adapter) IC's, mostly the 82C55. There are also interfaces to the mixer's midi port(s) and the local control panel. These provide control of individual mutes and recall of "patches" which is a "snapshot" of the settings of all controls. In these notes we refer to the main control PCB of whatever type as the CPU. Each automated control on each mixer channel is individually connected to the CPU. It is important to note each local mute switch does NOT directly control the mute circuit (FET switch or analogue switch IC). The operating the switch sends a command to the CPU. The CPU in turn sends a command back to the mute circuit. The CPU will also send commands to the mute circuit initiated by midi commands, independently of the mute switch. The latch function of the mute is provided by the CPU (not by the channel) and all switches are momentary.

MODEL NOTES

Solo Midi P12385, Megas P12278, Quartz P11758

PC-Midi 16 & 24 share P10637, PC-midi 32 is P12051

Jade mute/selector P12500 CPU is independent (but communicates by midi to) the Jade Tracmix system. The record and play selectors are functionally identical to the mutes and all fault finding techniques apply equally to these. When working on the Jade System ensure the Tracmix computer is turned off.

Solitaire P13109 provides CPU mute functions and passive distribution of ADP and meter feeds

Jade, Jade-S, Solitaire VCA - channel control cable shares ADP and meter connections.

Jade, Jade-S, Solitaire VCA, Solo Logic - use industrial version 8086 CPU

Solo Logic - channel control cable in blocks of 8 channels and distributed by channel back plane PCB's

Note that for any mixer fitted with Tracmix automation, the 2 systems operate entirely separately (except for Jade)

FAULT FINDING

NO OPERATION

In the absence of any CPU function all mutes will stay on (the unpowered default state). Normally the mixer solo (PFL) system will work OK as this is pre-mute. If all mutes are stuck on, check power to the CPU. (Jade, Quartz, Solitaire use +5V, PC-midi, Megas, Solo midi use +12V with an on-board +5V regulator) If there is no keyboard LED display this generally indicates no power. All CPU's use NiCad battery support for RAM. If this has failed short circuit there is supply monitor circuit which will halt the Z80. Other items that can cause a complete halt whilst typically allowing some display activity:- Tarnished IC sockets for CPU, EPROM, RAM - remove and reseat IC's. Failed crystal - check for clock

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signal around crystal with an oscilloscope. Occasionally the system can crash, although the software for these systems can be considered unconditionally stable. This can be cleared by a reset. PC midi models have a hardware reset button (small hole in front panel) other models have a software reset. See TB 48 for details of this and other test programs.

INTERMITTENT LOSS OF MEMORY

If the system operates OK whilst powered but loses stored settings at switch off or after a few hours this is the NiCad RAM support battery. This should read at least 3.0V (3.9V typical) under all conditions. This is a standard component available from the factory or local component supplier. Note that a Nicad left for a some time (weeks or months) may go short-circuit (reading 0V) and cannot be recharged. This may also halt the CPU permanently.

FAULTY MUTE OPERATION

First confirm this individual channel or an adjacent group of channels? Simultaneous failure of widely separated channels is not normally caused by a common fault. Failures in groups are normally due to cabling or more commonly a PIA IC problem.

The 82C55 PIA IC (many PCB's use NEC71055 equivalent) used on the Jade, Megas, Solo, Quartz, PC midi and Solitaire Mute is a 12 channel device. Failure of this will affect 6 channels (Quartz, PC, Megas, Solo - 12 switches & 12 lamps – 6 pairs of mutes) or several channels in a pattern (Jade). Check for this by swapping plug in IC's. (Solitaire VCA, Jade-S and Solo Logic automation systems use 74HCT245 & 74HCT574 8 way multiplexers & latches)

Circuit diagrams include connector diagrams which cross reference unique CPU control address lines (SW for switch input, LP for lamp/mute output) to external channel connector number, prefix CN.

Note that in systems like the jade the channels are wired in 8's whereas the control lines are in 12's.

The mixer wiring is used to connect in the correct order but as a result there is no fixed relationship between IC's and channels affected.

Cabling problems causing groups of channels to fail can be determined as follows.

Jade - All mute connections are connected from the CPU in blocks of 8 channels. A failure of 8 channels points to this cable. Channel selection is by passive distribution PCB Megas, Quartz, have address jumpers (selecting 1 of 4) on individual module PCBs. All connection to CPU are in groups of 4 channels common on 1 ribbon cable. A failure of 4 channels points to this cable. (Note that for this reason address jumper must be changed if modules moved around the mixer)

A failure of one or several (but not all) mutes can generally be narrowed down to CPU, channel module or interconnect failure. If not attributed to a multiple channel interconnect failure (see above) normal "analogue" fault tracing applied to this. Swap channel PCB's (this can be by swapping mute control ribbon cables in most mixers (not Solo Midi which has back plane PCB's) check if the fault moves with the module. Swap interconnect cables between channels, check if the fault moves with the cable.

Where a PCB based failure (not interconnect) is suspected problems can be narrowed down to the switch side or mute side of the signal path. Use a meter or scope to check the outgoing switch line from the channel and the returning mute circuit control signal to the channel for change of state when the button is pressed. These should toggle 5V approx.

Note that the signal that drives the mute circuit is physically the same signal (as it comes back to channel PCB) that operates the mute indicator LED or lamp. Therefore a working mute but not LED or vice versa is always a local channel fault (eg. broken lamp)

If the switch fails to toggle the control line to the CPU, the mute line back naturally will not function. Generally if this is the case remote control of the CPU by midi or by recall of stored patches with the particular mute changing state, will cause the mute to function correctly.

Note for Quartz, Jade etc. that the in-place-solo (IPS) function is a "mute all other channels" function but this does not use the mute CPU. The normal local channel mute circuit is accessed by a separate IPS

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buss activated by a section in the master module. This can be used to check the operation of the channel mute circuit, independent of the CPU.

Failure of external midi communications is likely to be the associated opto isolator IC. The comms port is individually driven from the Z80. If this shows a fault replace the appropriate IC. A common cause of such failure is “hot plugging” the cable particularly if the external source is a PC. PC PSU's can float a high voltage above earth causing failure of the LED in the mixer port opto IC.

Other Relevant Soundtracs Publications

Technical Bulletin 48 Software reset/test of Mute CPUs

Technical Bulletin 43 Test & setup menus for Solitaire and Solo Logic

Quartz Console user manual, Solo Midi user manual

Megas Console Range Service Manual

CM/CMX/CP Consoles Service Manual