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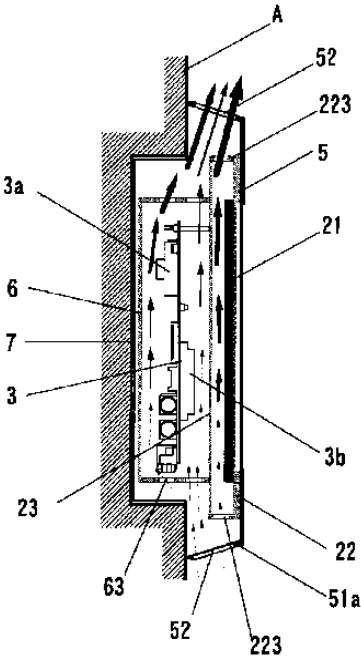
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(54) [Name of invention] Heat dissipation structure of wall embedded liquid crystal panel unit

(57) [Summary]

[Issues] Provide a heat dissipation structure for wall embedded liquid crystal panel units.

[Means for solving the problems] A drive circuit board 3 that drives the liquid crystal panel 2 and a power supply circuit board 4 that supplies power to the drive circuit board 3 or the liquid crystal panel 2, etc., are disposed on the back of the liquid crystal panel 2 that displays images such as video. A heat dissipation structure of a wall-embedded liquid crystal panel unit in which the panel unit body is housed in a front cover 5, which is fixed such that the liquid crystal panel 2 is exposed from the front surface, is attached to a mounting surface such as a wall surface. The front face of the front cover 5 is mounted protruding from the mounting surface A and a plurality of vent openings 52 are provided at the perimeter wall 51 of the projection to vent and dissipate heat generated from the mounting parts of the printed circuit board inside the panel unit body via the vent openings 52.



[Scope of Claims]

[Claim 1] A driving printed circuit board for driving the liquid crystal panel and a power supply printed circuit board for supplying power to the driving printed circuit board or the liquid crystal panel are arranged on the back of the liquid crystal panel that displays images such as video; a heat dissipation structure for a wall-embedded liquid crystal panel unit in which the panel unit main body, which is housed in a front cover that fixes the liquid crystal panel to be exposed from the front, is mounted on a mounting surface such as a wall surface.

The front surface of the front cover is attached with the front surface protruding forward from the mounting surface, and a plurality of ventilation openings for releasing heat are provided in the peripheral wall of the protrusion, and the panel unit main body is connected through the ventilation openings. A heat dissipation structure for a wall-embedded liquid crystal panel unit characterized by ventilating and dissipating heat generated from components mounted on an internal printed circuit board.

[Claim 2] The heat dissipation structure of the wall embedded liquid crystal panel unit according to claim 1, wherein the peripheral wall of the projection is tilted.

[Claim 3] The heat dissipation structure of the wall-embedded liquid crystal panel unit described in Claim 1 or 2, characterized in that the aforementioned vent openings are provided on the upper and lower sides of the aforementioned peripheral wall, and not on the left and right sides, respectively.

[Claim 4] The heat dissipation structure of a wall embedded liquid crystal panel unit according to any one of claims 1 to 3, wherein the driving printed circuit board is arranged parallel to the liquid crystal panel, and a heat-generating component, such as a regulator, that is prone to heat generation, is placed upwards, and a heat-sensitive weak thermal component, such as a CPU, is placed downwards.

[Claim 5] The heat dissipation structure of a wall embedded liquid crystal panel unit according to any one of claims 1 to 4, wherein the driving printed circuit board is formed by placing the exothermic component on one side and the low heat component on the other side using a double-sided circuit board.

[Detailed description of invention]

[0001]

[Technical field to which the invention belongs] The present invention relates to a heat dissipation structure of a wall embedded liquid crystal panel unit containing a liquid crystal panel together with a drive circuit, etc.

[0002]

[Prior art] In the past, monitoring and control information in buildings and other buildings was often displayed using display means such as CRT displays, but recently, due to factors such as thinner, lighter, and lower prices, liquid crystal panels have been used. Displaying by a display means using a built-in liquid crystal panel unit is also increasing.

[0003] Among these liquid crystal panel units, when using the wall-embedded type liquid crystal panel unit that is installed in a recess formed on the mounting surface such as a wall surface, it can be

installed without impairing the aesthetic appearance, making it suitable for use in non-residential buildings. They are increasingly being used not only in buildings, but also in buildings such as residences where aesthetic appearance is particularly important. One example of this is a wall-embedded liquid crystal panel unit that displays in real time information such as visitor video information captured at the entrance, etc., and equipment monitoring information obtained from security sensors, etc., used in living spaces such as kitchens and living rooms.

[0004] In the wall-mounted type liquid crystal panel unit described above, the panel unit body is embedded in the mounting surface such as the wall surface where heat dissipation is difficult to expect, and some of the members that make up this are vulnerable to heat. For some reason, it is necessary to avoid thermal damage to these components. Thus, as a heat dissipation structure, a method for dissipating heat is employed by providing a heat dissipation opening on the back side of the outer shell case forming the panel unit body and dissipating heat from the interior via the space portion of the back wall.

[0005]

[Problems to be solved by the invention] By the way, the panel unit main body may be embedded and installed using an embedded box. In addition, in recent liquid crystal panel units, it has been proposed that more advanced functions and high performance have been achieved than in the past, and for example, those equipped with large current type inverter circuits to realize higher brightness of liquid crystal panels, or those equipped with higher performance CPUs to realize browsing functions for open networks, the power consumption inside has increased more and more, and more heat is being generated from components mounted on internal printed circuit boards than ever before.

[0006] In other words, in the case of a high-performance type wall embedded liquid crystal panel unit as described above, a heat generation member such as an inverter circuit for liquid crystal panel drive and a high-level integrated circuit such as a CPU are sealed and buried in the outer casing on the back side of the mounting surface. In addition, it was assumed that in the absence of ventilation on the back side of the mounting surface, the operation of integrated circuits such as liquid crystal display and CPU would become unstable due to the accumulation of heat inside.

[0007] In view of such a reason, the present invention seeks to provide a heat dissipation structure for a wall embedded liquid crystal panel unit that can release heat generated from the internal mounting parts even in the absence of ventilation on the back side of the mounting surface.

[0008]

[Means for Solving the Problems] In order to solve the above objectives, in the heat dissipation structure of the wall-embedded liquid crystal panel unit of the present invention, a driving printed circuit board driving the same liquid crystal panel and a power supply printed circuit board providing power to the same printed

circuit board or its liquid crystal panel, etc., are arranged at the back of the liquid crystal panel, and the panel unit body housed with a front cover that secures the liquid crystal panel from the front surface, etc., is attached with the front surface of the front cover protruding from the front surface of the mounting surface, and a plurality of ventilation openings are provided to release heat from the peripheral wall of the projection, and the heat generated from the mounting part of the printed circuit board of the panel body through the same ventilation opening.

[0009] With this configuration, the front surface of the front cover is mounted protruding from the wall surface in order to allow heat to escape from the interior to the outside, and a plurality of vent openings are provided for releasing heat in the peripheral wall of the projection, and heat generated inside the liquid crystal panel unit through the same vent opening is vented and dissipated.

[0010] It is also preferable to tilt the peripheral wall of said protrusion. In this case, the vent opening is formed in the circumferential wall of the inclined projection on the front side of the front cover.

[0011] Moreover, it is preferable that the ventilation openings are provided on the upper and lower sides of the peripheral wall and not on the left and right sides. In this case, the heat generated inside the unit is radiated only in the vertical direction on the front side of the front cover.

[0012] Also, the driving printed circuit board is arranged in parallel with the liquid crystal panel. In addition, it is preferable to dispose exothermic parts such as regulators that easily generate heat on the upper side and weakly heat-sensitive parts such as CPUs on the lower side. In this case, the exothermic parts that easily generate heat are provided above the weak heat parts that are vulnerable to heat on the driving printed circuit board that is arranged parallel to the liquid crystal panel that is arranged upright on the ground.

[0013] Also, it is preferable to form the driving printed circuit board using a double-sided circuit board, and to place the exothermic component on one side thereof and the weak thermal component on the other side. In this case, a heat-generating part prone to heat generation is provided on one side of the printed circuit board for driving by a double-sided circuit board arranged parallel to the liquid crystal panel arranged in a direction upright to the ground, spaced apart from the heat-sensitive weak heat-generating part on the other side.

[0014]

[Embodiment of the present invention] FIG. 1 shows an embodiment of a wall embedded liquid crystal panel unit embodying a heat dissipation structure of the wall embedded liquid crystal panel unit of the present invention, (a) is a front view, and (b) is a side view. FIG. 2 is a perspective view of the same wall embedded liquid crystal panel unit; FIG. 3 is an exploded perspective view of the same wall embedded liquid crystal panel unit from a rear side; FIG. 4 is an illustration showing the heat dissipation structure of the wall embedded liquid crystal panel unit of the present invention by the same wall embedded liquid crystal panel unit.

[0015] The wall embedded liquid crystal panel unit 1 according to the heat dissipation structure of the wall embedded liquid crystal panel unit of this embodiment is provided with a drive circuit board 3 driving the same liquid crystal panel 2 and a power supply circuit board 4 providing power to the same circuit board 3 or its liquid crystal panel 2, etc., on the back of the liquid crystal panel 2 which displays images such as video, as shown in FIG. 3, and a panel unit body accommodated in a front cover 5, which is fixed such as the liquid crystal panel 2 from the front surface, mounted on a mounting surface A, such as a wall, with the front surface of the front cover 5 protruding ahead of the mounting surface A, and a plurality of ventilation openings 52 for releasing heat are provided in the perimeter wall 51 of the projecting portion, and the heat generated from the mounted parts of the printed circuit board inside the panel unit main body is ventilated and radiated through the ventilation openings 52. In this case, the panel unit body is configured with a rear cover 6 provided.

[0016] The liquid crystal panel 2 is a conventionally known liquid crystal panel for displaying information such as video, etc., and displays information such as video, etc., that is exposed to the front surface of the front cover 5 described below, which is the front side of the wall embedded liquid crystal panel unit 1, and processed internally. The liquid crystal panel 2 consists of a liquid crystal panel body 21 and a front liquid crystal panel cover 22 and a rear liquid crystal panel cover 23 as described below. The liquid crystal panel body 21 is sandwiched between the front liquid crystal panel cover 22 and the rear liquid crystal panel cover 23 and arranged in the front cover 5 so as to be positioned parallel to the wall. Furthermore, the liquid crystal panel body 21 is electrically connected to the driving printed circuit board 3 described below to provide a power supply and a video signal to display information such as video.

[0017] The front liquid crystal panel cover 22 is for fixing the liquid crystal panel body 21 to the body of the wall embedded type liquid crystal panel unit 1, and includes a frame 221 exposing the liquid crystal panel body 21 on the front side. The frame 221 has left and right flange portions 222, and the flange 222 is made of a sheet metal material. The liquid crystal panel main body 21 has a flange portion 222. The rear liquid crystal panel cover 23 is screwed to 222 and held there. Further, through holes on both sides of the frame 221, the frame 221 is screwed and arranged on the front cover 5, which will be described later. Incidentally, in this front liquid crystal panel cover 22, a vent opening 223 for heat dissipation is provided in a reinforcing piece formed by bending the frame 221 up and down. It is designed so as not to obstruct the vertical ventilation path inside the panel unit main body.

[0018] The rear surface liquid crystal panel cover 23 is for narrowing and holding the liquid crystal panel body 21 together with the front liquid crystal panel cover 22 described above, and in this case is formed of a generally rectangular shaped metal plate. This rear surface liquid crystal panel cover 23 also forms a

mounting space for the driving printed circuit board 3, which will be described later, and a plurality of spacers 231 are mounted to the rear surface liquid crystal panel cover 23. That is, as shown in FIG. 4, the driving printed circuit board 3 is mounted on the rear side of this rear surface liquid crystal panel cover 23 via a plurality of spacers 231, which creates a partition within the panel unit body that separates the front side arranged by the liquid crystal panel body 21 and the two spaces arranged by the driving printed circuit board 3, preventing the distribution of heat between each space.

[0019] The driving printed circuit board 3 is for driving and controlling the liquid crystal panel 2, and in this case, is formed of a double-sided circuit board material such as a glass epoxy resin substrate. This driving printed circuit board 3 is mounted on one side of the rear liquid crystal panel cover 23 and is arranged parallel to the wall, i.e., upright to the ground. In addition, in this driving printed circuit board 3, a large number of circuit modules such as a controller for driving liquid crystal panel 2, inverter circuit, CPU, memory, input/output interface for keyboard and mouse, network interface, various device driver controllers, backup power supply, etc. are mounted on the board, but parts with heat generation and parts that are sensitive to heat are densely mounted on the board.

[0020] In this case, the exothermic unit 3a that generates heat such as regulators, power supply capacitors, heat sinks, etc. is placed above the back side of the above-mentioned double-sided printed circuit board, and the weakly heat-sensitive unit 3b that is vulnerable to heat such as CPU, memory, and gate IC is placed below the front side of the board. Furthermore, for the same purpose as described above, said exothermic unit 3a and weakly heat-sensitive unit 3b are arranged on separate sides, and parts with heat generation are arranged separately from heat sensitive parts. Therefore, the exothermic unit 3a is provided above the weakly heat-sensitive unit 3b of the driving printed circuit board 3 arranged parallel to the liquid crystal panel 21 arranged in a direction upright to the ground, and the exothermic unit 3a is provided on one side of the driving printed circuit board 3 separated from the weakly heat-sensitive unit 3b on the other side by the double-sided circuit board, making the weakly heat-sensitive unit 3b less susceptible to heat by separating the nature of heat moving upward in natural ventilation from the space confronted by the driving printed circuit board 3.

[0021] The printed circuit board 4 for power supply supplies each part of the panel unit body, and is composed of power supply circuits, etc., that lower and stabilize AC power supply, and in this case is formed by having a connection terminal 41 for connection to AC power supply from the back side of the panel unit body. This power supply printed circuit board 4 is also a major cause of heat generation, so it is mounted to the rear surface liquid crystal panel cover 23 via the spacer 231 described above so that the surface of the exothermic unit 3a is substantially the same as the surface on which it is mounted, reducing the effect of heat on the weakly heat-sensitive unit 3b.

[0022] The front cover 5 is a cosmetic cover provided for aesthetic

purposes, and is formed from an open box, for example made of sheet metal, on the rear side having a small opening 54 that exposes the liquid crystal panel 21 on the front. This front cover 5 corresponds to a protrusion of the panel unit body, and a perimeter wall 51 is provided around the front plate 53 formed of the aforementioned small opening 54 to form a sloped surface 51a that is inclined backwards with the front as the starting point, in which case a plurality of vent openings 52 are provided only on the top and bottom of the perimeter wall 51. As a result, the heat generated inside the unit is ventilated and radiated only in the vertical direction on the front side of the front cover. The vent openings are also formed in the peripheral wall of the front slanted protrusion of the front cover, and the vent opening 52 is formed with a larger area.

[0023] The rear cover 6, together with the front cover 5 described above, constitutes an outer case that houses the entire device, such as the liquid crystal panel 2, and is formed of, for example, a sheet metal box. In this case, a small cover 61 for external access to the aforementioned connection terminal 41 is provided in the bottom plate portion on the back side of the panel unit body, and a network panel 62 is provided when access to the input/output portion of the driving printed circuit board 3 is enabled, and a plurality of vent openings 63 are provided in the upper and lower side walls, so that heat in the panel unit body is dissipated by forming a vent path through the vent openings 52 in the front cover 5, as shown in FIG. 4. This rear cover 6 is threadedly coupled to the front cover 5 via a coupling piece 64 provided at the open peripheral edge of the box body.

[0024] The wall embedded liquid crystal panel unit 1 according to the above configuration is buried and used in the wall that serves as the mounting surface of a building, such as a housing, using, for example, a conventionally known embedded box 7 formed from a front-opening steel plate box, as shown in Fig. 4. This wall-embedded liquid crystal panel unit 1 can be used by exposing the panel wall of a hollow wall structure to the wall surface or using an exposure box, other than buried installation by the embedded box 7.

[0025] In addition, FIG. 4 is an illustration showing the internal thermal flow in the heat dissipation structure of the wall embedded liquid crystal panel unit according to the present invention, and the wall embedded liquid crystal panel unit 1 described above is vented and heat dissipated through a plurality of vent openings 52 provided in the upper and lower perimeter wall 51 of the front cover 5 protruding from the front surface of the front cover 5 to the front surface A, and generated heat from the panel unit body. At this time, inside the panel unit main body, the exothermic parts 3a of each substrate such as the drive printed circuit board 3 which easily generate heat are arranged in parallel with the liquid crystal panel 21 which is arranged in a direction to stand upright on the ground. On one side of the drive printed board 3 made of a double-sided circuit board, the space between each board is separated from the weakly heat-sensitive unit 3b that are weak against heat on the other side and arranged in parallel with the wall surface are formed, together with vent openings 52 and 63 provided on the upper and lower sides of the front cover 5 and the rear cover 6 respectively,

the air is ventilated upward from the bottom and the heat is dissipated. In other words, heat generated from the exothermic unit 3a of the mounting parts such as the driving printed circuit board 3 rises in the panel unit due to its nature, and is radiated externally by the vent opening 63 provided on the upper surface of the rear cover 6 and the vent opening 52 provided on the front cover 5, and is radiated without heating the weakly heat-sensitive unit 3b. In this case, the vent opening 63 provided on the lower surface of the back cover 6 is also configured to form a vent path that dissipates heat from the vent opening 52 provided on the front cover 5, and serves to dissipate heat from the bottom towards the top.

[0026] Also in this case, the wall embedded liquid crystal panel unit 1 is divided into two space front and back by the rear surface liquid crystal panel cover 23, and a portion of the rear space is divided into almost two central and rear by the driving printed circuit board 3, forming three large spaces forward, central, and rear. Directing the mounting surface of the weakly heat-sensitive unit 3b of the driving printed circuit board 3 to be accommodated in this central space reduces convection of heat in the central space.

[0027] According to the heat dissipation structure of the wall embedded liquid crystal panel unit 1 described above, the front surface of the front cover 5 is mounted protruding forward from the wall surface, and a plurality of vent openings 52 are provided with a larger area for emitting heat to the sloped surface 51a above and below, and heat generated in the liquid crystal panel unit through the same vent opening 52 is vented and more efficiently dissipated, so that heat generated in the panel unit is released from the vent opening 52 due to the nature of heat convection, and thus heat generated from the internal mounting part can be released even in the absence of venting on the back side of mounting surface A.

[0028] In addition, since the exothermic unit 3a on the driving printed circuit board 3 is disposed above the substrate opposite to the weakly heat-sensitive unit 3b, the heat generated from the exothermic unit 3a is moved upward as is, making the weakly heat-sensitive unit 3b disposed below the back surface of the substrate less susceptible to heat.

[0029] It should be noted that the wall embedded liquid crystal panel unit 1 of the present invention is not limited to those described above, and it is of course possible to make various changes within a range that does not deviate from the summary of the present invention.

[0030]

[Effects of the present invention] As described above, according to the heat dissipation structure of the wall embedded liquid crystal

panel unit according to Claims 1 to 5 of the present invention, the front surface of the front cover is mounted protruding from the wall surface, and a sloped surface is formed so that the periphery wall of the projection is tilted, and a plurality of ventilation openings are provided to dissipate heat generated in the liquid crystal panel unit through the same ventilation opening, so that heat generated in the panel unit can be dissipated from the internal mounting parts even in the absence of ventilation on the back side of the mounting surface by dissipating heat generated in the liquid crystal panel unit from the ventilation opening due to the nature of the convection of heat.

[0031] In addition, since the exothermic units on the driving printed circuit board are disposed above the substrate on the side that is spaced apart from the weakly heat-sensitive unit, heat generated from the exothermic unit is moved as is upward, and the weakly heat-sensitive units disposed below the back surface of the substrate are less susceptible to heat, so the operation of the liquid crystal display or CPU, etc., which is weak to heat can be more stabilized.

[Brief Description of Drawings]

[Figure 1] shows an embodiment of a wall embedded liquid crystal panel unit embodying a heat dissipation structure of the wall embedded liquid crystal panel unit of the present invention, where (a) is a front view and (b) is a side view.

[Figure 2] A perspective view of the same wall embedded type liquid crystal panel unit.

[Figure 3] It is the disassembled perspective view which looked at the same wall embedded-type liquid crystal panel unit from the back side.

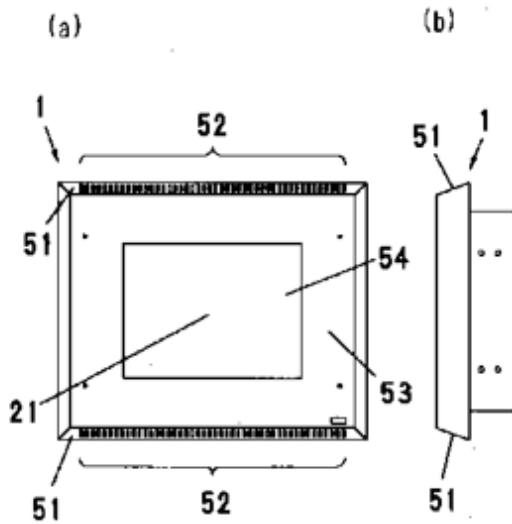
[Figure 4] An illustration showing the heat dissipation structure of the wall embedded liquid crystal panel unit of the present invention by the same wall embedded liquid crystal panel unit. .

[Reference Signs List]

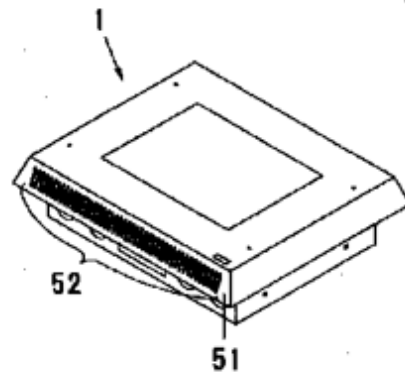
1. wall embedded liquid crystal panel unit
2. liquid crystal panel
3. drive circuit board
- 3a. exothermic unit
- 3b. weakly heat-sensitive unit
4. power supply circuit board
5. front cover
51. perimeter wall
52. vent opening
- A. mounting surface

[Figure 1]

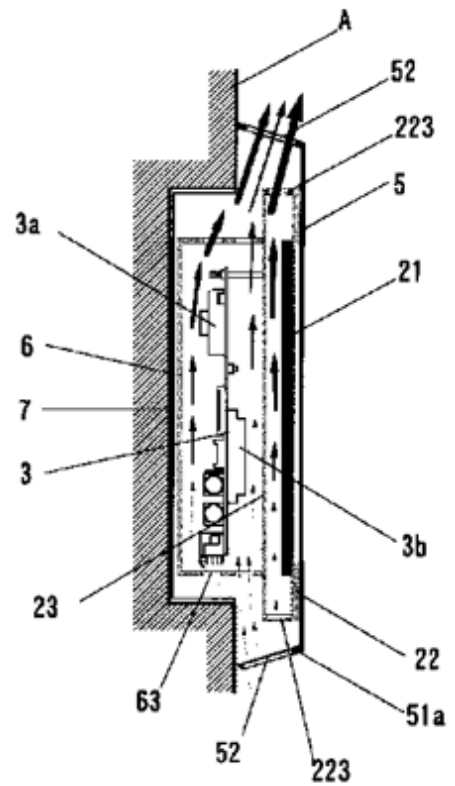
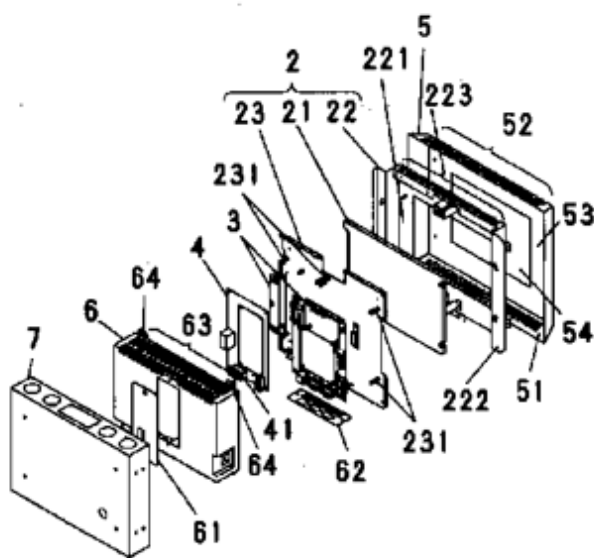
[Figure 2]



[Figure 3]



[Figure 4]



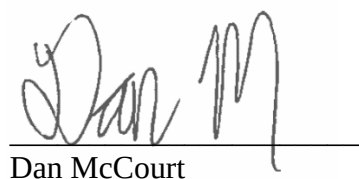
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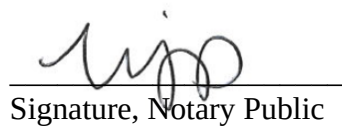


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