Center pivots are not only very handy irrigation devices, but they are also very often targeted by criminals. This application note explains how the GSM Commander range of products can be used not only to control and monitor the pivot or pump house, but how it can protect the system and detect criminal activity. Pivot and pump systems vary widely in terms of layout and detail. Some installations are one-pump-per-pivot, in others there may be more than a single pivot per pump or even multiple pumps feeding the same pivot. For this reason, the GSM Commander is an ideal solution because it can be configured to do almost anything, and it can be customized to solve even the trickiest problems.

Typical challenges to be solved

Controlling a pump & pivot system remotely / automatically
This is more involved than it sounds. It is important not only to switch on the pump, but to also monitor that the pivot in fact did switch on and is working. Automatic control is required to avoid peak times where electricity can cost up to 5 times more than off-peak. Most importantly, the system must be installed in a way that it still allows manual control.

Motor Monitoring
Irrigation pumps are expensive devices and they work very hard, and it is required that the user be informed if something goes wrong at the pump house.

Booster pump control / monitoring
In many instances, additional booster pumps are used in-line to the pivot. These have to be automatically controlled if the rest of the system is to be automated.

Cable theft at pivot
The main control cable running the length of the pivot is a yummy target. Easily accessible, and worth quite a bit. It would be nice to try and protect this cable.

Cable theft at pump
Pump motors chew a lot of power and need a temptingly thick cable to supply the juice. Unauthorized access to the building, and cable cut should be detected and reported.
### Pump / Pivot Control and Monitoring

In this application, the a GSM Commander is installed at the pump house and another at the pivot.

**Switch on**
The user sends a command to the unit at the pump house to switch on the pump, or perhaps the pump is turned on manually. The GSM Commander senses when the pump starts (by a separate contact on the contactor). When pressure arrives at the pivot and it switches on, the GSM Commander on the pivot places a missed call to the GSM Commander at the pump house. This call is to notify the pump house that the pivot has started correctly. If the GSM Commander at the pump house senses that the pump has switched on, and it does NOT receive this call within a few minutes, it knows the pivot did not start correctly, and it can notify the user. (And perhaps also stop the pump, if required)

**Switch off**
If the pump is switched off, the GSM Commander at the pump will place a missed call to the GSM Commander at the pivot, warning it that it is switching off. If the pivot stops (because of a pressure loss or perhaps a safety cut-out), and it did not receive a call from the pump, it knows it there was a problem, and also notifies the user. You can take it one step further and program this unit to also send an SMS to the pump house, instructing it to switch off the pump when a fault is detected.

**Timing functions:**
The GSM commander at the pump can be used to perform timing function, switching the system off an on to avoid peak times. The GSM Commander at the pivot can also be used to control the end tower speed by means of an on/off timer.

**Motor health monitoring:**
A vibration sensor can be connected on the motor to detect if there are abnormal vibration levels on the motor. A temperature sensor can also be connected to the motor to provide additional peace of mind. Last but not least, traditional Motor protection relays can be connected directly to the GSM Commander.
**Booster pump control & monitoring**

Booster pumps can be controlled from the main pump house by placing a GSM Commander at the booster pump. If the main pump starts, it can notify the booster pump to switch on after a specified period. There are of course many permutations and details that are specific to any site, but the GSM Commander is so easily configured, that it can be customized for any installation. Our tech support is just a call away, they can always assist.

**Cable theft on the pivot**

The main control cable running the length of the pivot is a prime target. The GSM commander can be used in many ways to detect if it is tampered with.

**The simple and easy way**

Most people are aware that this cable typically has a single spare wire (typically the pink one meant for the rarely used end-gun) This spare lead can be connected to Neutral at the last tower and used as a neutral return. By monitoring that there is 220V AC between this spare line and the local live conductor, one can detect if the cable is cut. This is a very easy way to do it, but it has a very important limitation: If the pivot is not powered, the cable is not monitored!

**The clever way**

Using a CTM device at the pivot control box allows you to monitor the multi-core cable (without needing the spare wire), even when the power is off! It works by monitoring the resistance on the 3phase cable as seen from the pivot control box. The CTM provides a contact that can be monitored by the GSM Commander. (Which in turn can notify the user)
Vibration sensors
If you have a GSM Commander on the pivot (perhaps for controlling it) you can easily add some vibration sensors to the mix. The Intelligent Vibration Sensor can be installed on each tower to detect when these are climbed onto. The clever bit is that these sensors are completely waterproof, and fully adjustable to prevent false alarms. The sensors are monitored by installing a dedicated 3core cable along the length of the pivot.

Cable theft / security at the Pump
Pump installations remain a prime target for criminals because of the power cables in and around them. The GSM Commander can be installed to detect if cables are tampered with.

First things first
The pump installation always needs some perimeter security. Start by putting up a simple fence and adding some Intelligent Vibration Sensors. Perimeter security is only as good as its monitoring. A fence does not stop many criminals, but it does give you an installation point for vibration sensors, allowing you to receive early warning. If the pump house has a proper door, fit a magnetic switch, and perhaps an infra-red movement sensor, and connect all of these to the GSM Commander.

Remote pumps
If the pump is located far away from its control box (typical for river pumps), the cable leading to it is always at risk, especially when the motor is switched off. By installing a CTM device at the pump house, you can monitor the pump cable even when it is off.

Supply Transformer
The supply transformer is often at risk, as is the cable that runs to it. A CTM in the pumphouse can monitor that the transformer is still connected, which means you are able to distinguish between a power failure and a real incident.

Integrated operation
The power of the GSM Commander becomes evident when we consider the above applications, and the fact that they can all be implemented on the same GSM commander device in a single installation! When considering a pump house, we can implement, using a single GSM Commander, basic perimeter security, motor control, motor protection and cable cut detection and transformer detection. The same principle holds true for pivot installations. The sky is the limit with the GSM Commander!