Report On: ***Unication G5 pager use with Franklin County Fire and EMS agencies (including 2-tone paging) on both the UHF and CoMIRS systems***

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Summary

The *Unication G5* pager is currently a viable option on the CoMIRS Trunked system for some departments, and can or will be a viable option for other agencies with additional infrastructure improvements (some already planned). On the legacy UHF system, the Unication G5 could be a direct replacement for the Minitor series pager. As a dual-band pager, it can be used to monitor communications on both UHF and CoMIRS Digital Trunked systems. The pager also functions and alerts reliably on both the UHF and CoMIRS systems just as the Motorola Minitor series of pagers does on the UHF, however there are some important caveats and unique differences that should influence a department's decision on whether to adopt it for this use.

Unit Tested

Make: Unication ***Model***: G5 ***Frequency Band***: UHF: 450-520 & 763-776, 851-870 MHz
Features: Dual Band (UHF/800), Conventional, P25 Trunked (Phase II), QCII Decode
Notes*:* Unication offers multiple different pager models with different frequency band coverage and paging functionality. Currently the G5 is the only pager capable of decoding 2-tone alerting on an 800 Trunked system such as CoMIRS.

General Impressions

Size

The Unication is approximately the same volume but slightly thicker and heavier than a Motorola Minitor VI, lending to a generally larger "belt feel." The unit includes an integrated belt clip with various carrying case options for purchase. There is a short "stubby" exposed antenna on the top of the device that attaches via an SMC connector. It is possible to unscrew the antenna and replace it with a higher performing integrated or external one if desired.

The balance of the device with the battery and belt clip installed is slightly rear-biased. This combined with the rubber "bumpers" on the bottom corners of the device means that it easily and routinely falls over backwards when placing down on a flat surface. Resonance of the belt clip and the device makes this otherwise gentle tip sound extremely dramatic and disruptive.

Physical Controls

Top knobs operate the same way as the Minitor pager line, with one serving as an On/Off/Volume control and the other as a 8 position function selector. The front of the device has 4 soft buttons, a back button, a menu button, and a central knub for navigating through the on-screen menus. The side of the device has two buttons, the larger of the two mimicking the “reset” button found on the Minitor pager, and the smaller activating a “voice memo” function. The larger button also doubles as a mute button when in monitor mode.

Display and Menus

There is a large screen on the front of the pager which turns off after a short period of time but comes to life whenever a transmission is received. Time-out duration for the screen can be set in programming, but the presence and behavior of the display is conspicuous when in public.

Device menus are generally responsive but I have found that I am unable to navigate any menu options while a transmission is being received. I have searched for an option in the programing to allow for menu navigation during receive but have been unable to find one. Generally, this should not be an issue for regular use, but has caused significant frustration during testing.

Battery Life

The pager comes with a proprietary rechargeable battery that is secured in the device under a screw-on cover. I have found the battery life to be sufficient for at least one full day’s use including monitoring multiple active frequencies or talkgroups. If left on silent/alert mode 2-day’s use may be possible, but nightly recharging will likely be a practical recommendation.

Durability

Without long-term testing it is impossible to say personally how it will hold up. In short-term use the device feels suitably rugged with the weak points appearing to be the exposed antenna and perhaps the screen. Reports from Amherst Fire who tested the device for a while indicated that it did not prove as rugged in their environment as the equivalent Minitor pagers. My gut is that Unication is well enough rugged for the vast majority of Franklin County Fire and EMS responders, but will likely “age” more aggressively than the Minitor series.

Functionality

In addition to the 8-position selector knob on the top of the device, the pager is capable of containing multiple “Zones” that can be selected through the menu system. This functionality is exactly like that found on the Motorola radios in the county, allowing for specific zones for different frequency bands, use cases, channel lists, departments, etc.

After selecting the desired “Zone” the user can rapidly select between 8 different sub functions/channels/alert profiles/etc through the top knob position.

A single zone can contain any mix of Conventional or Trunked options, but each specific knob position can only serve one kind. (For example: Zone A can contain a Conventional Channel on knob position 1 and a Trunked Talk Group on position 2, but a single knob position could not scan both a conventional and trunked channel at the same time.) This functionality means that a department could program a G5 to scan or alert on the UHF system, and then with a single click of the function knob, begin monitoring the CoMIRS Trunked system for dispatch and response updates.

Volume adjustment is displayed as a graph from 1-100, but changes in units of 5 when turning the knob. I have found the volume adjustment does not feel linear in the same way the Minitor does, and I suspect that the 5-unit increments is representative of how the pager is actually adjusting the volume. Additionally, my impression is that there is a lag between volume knob adjustment and the changes in speaker output, resulting in decreased user satisfaction.

It is clear that the pager is responding to button and knob input to change operation through the software rather than a more direct hardware change to the device. As a result, user inputs can feel sluggish, particularly when manipulating the top function knobs the on-screen changes lag and especially compared to the Minitor line. Anyone used to rapidly changing channels to follow a conversation first heard during scan will find this frustrating.

Two-Tone (QCII) Paging and Alerting

The Unication pager is capable of decoding the Motorola QCII codes which are colloquially known as “two-tone” pairs currently utilized in the county to activate Fire and EMS agencies. Unication pager behavior is just like the Minitor series with options for Tone, Vibrate, Tone & Vibrate, Push-to-Listen, etc. Multiple different alert sounds are also available to choose from the help differentiate between different tone pairs. In addition, the pager can be programmed to display different colors on the screen in response to receiving specific alerts.

Just like Minitor pagers, the G5 can be programmed to record transmissions after alerting. The last record can be rapidly brought up by pushing a small button on top of the function knob like the Minitor. A list of all available recordings are accessible through the on-screen menus in the “mailbox” and include timestamps. On-screen icons and messages indicate the presence of a message that has not yet been listened to or acknowledged. The pager can be programmed to record only the transmissions associated with proper tones, or all transmissions on a specific channel.

In the same way menu navigation is hindered, playback of a recording is also interrupted or prevented if a transmission is received on a monitored channel, meaning the ongoing

radio traffic (such as units signing on the air) will prevent the user from listening to the original dispatch. The easiest way to counteract this is to change the function knob to a silent position (no audio of channel/talkgoup traffic), as this will leave the G5 clear to perform playback. While this proved incredibly frustrating initially, I have found there to be some value to the pager forcing the user to listen to ongoing radio traffic in case there is vital updates or other information.

Like the Minitor, behavior of the pager after alerting can be set to require manual resetting through pushing the side button or can reset automatically after a predetermined amount of time. Pager behavior can be set to remain silent until the appropriate tone codes are received for an alert, or can monitor "openly" a frequency and alert when the codes are received.

Alert volume can be set to adjust with the volume knob or at a fixed volume and I've found to be absolutely acceptable. Vibrate feels less pronounced than the Minitor VI.

In general, the Unication pager can be set up to behave however a department's Minitor is currently programmed, reducing the burden to re-learn function knob settings or behavior.

Programming

The pager is packaged with a USB charging cable that plugs into the side of the device located under a rubber protective cap. This cable doubles as a programming cable, and the programming software is available free of charge through the Unication website. Having significant familiarity with Motorola programming, there was some learning curve adapting to the new software, but once the nomenclature differences were learned, along with some YouTube tutorials, programming proved relatively straight forward. Unication seems active in updating both programming software and pager firmware, meaning new functionality or upgrades to usability have already and could occur in the future.

Accessories

The pager ships with a charging cable, but a desk charger similar to that which ships standard with Minitor pagers is an additional cost. The desk charger is significantly larger than the Minitor equivalent but works well. Considering the small rubber flap that covers the unit's small USB charging port, I would recommend purchasing and utilizing the desk charger as standard practice, as it utilizes exposed contacts on the bottom of the pager.

Also available is an amplified desk charger with integrated speaker, external antenna connector, and accessory activation pinouts.

General Performance

Radio reception performance has been as good or better than equivalent pagers and radios.

Price

As quoted by "Beltronics" (the regional Unication distributer):

G5 Pager:	$695.00
Desk Charger:	$90
Optional 3 Year warranty:	$130
ITT57 MA State Bid Disc:	-$137.25

In contrast a single band UHF Minitor pager costs approximately $450. (There is currently no trunking capable Minitor pager.)

<u>UHF Performance on Legacy Franklin County System</u>

General Performance

In general, the performance of the Unication pager is equivalent to that of the Minitor VI pager on the UHF county system. Anywhere a department's current pagers can receive transmissions the Unication should match.

Paging

Based on my experience, G5 performance and capabilities with alerting to two-tone pairs on UHF is no different than the Minitor VI.

<u>800 MHz Trunking Performance on the CoMIRS System</u>

General Performance

In general, the receive performance of the Unication pager is equivalent to a Motorola portable radio (APX6000) on the digital trunked system. The pager reliably receives any and all talkgroups programmed into the pager and quickly finds control channels on the closest tower. Since receiving the Unication pager I have been using it exclusively to monitor and scan the Franklin County talkgoups as opposed to a portable radio or desktop scanner.

The pager can be set up with an audio buffer, which is recommended for reliable recording and playback. The downside to enabling this option is that it creates a second or two delay of the audio coming from the pager. While this does prevent the echo-chamber phenomenon when the transmitting radio is nearby, it can create difficulty in

interpreting speech when listening to the pager along side a device that is not buffering the audio.

Because the pager must scan multiple frequencies on boot-up or function knob selection to find the local control channel before being able to decode transmissions, there is a lag before the pager can initially translate a transmission. The practical impact is the pager user will not be able to turn on or listen to different channels as quickly as they may be used to with a conventional channel and/or with the Minitor. If for example the pager alerts on a conventional UHF channel and then the user changes the function knob to listen to the Fire 1 trunked talkgroup, there may be a long enough delay while the pager learns the correct trunking frequencies that follow-up transmissions are missed. It is worth noting that while this characteristic does exist, it has not had a practical negative impact on the G5's performance in my use-case.

Paging

Two-tone alerting with the Unication off of the CoMIRS system has been flawless when considering the caveats (see below). Behavior is exactly the same as we've come to expect with the Minitors while also maintaining higher audio fidelity. This outstanding performance is a result of the way that the tone codes are encoded in the transmission and the increased audio performance on the trunked system. Additionally, the shortcomings of the G5 on UHF are not present on the Trunked talkgroups, meaning there are more options and functionality available on the CoMIRS side. The reliability and functionality of the Unication is such that I have effectively decommissioned my Minitor VI in everyday use.

Paging Caveats

I have only been able to program the **Digital** CoMIRS system into the pager, and the effective coverage area of the Unication pager is equal to it as a result. I would refer a department to the existing documentation and experience around the digital coverage area for an idea of where the G5 will operate on CoMIRS. Practically this means that east county departments, along with Greenfield/TFFD units (in building) may find the coverage unacceptable until CoMIRS is further upgraded to digital in the upcoming years.

Furthermore, the way the CoMIRS system is currently deployed, the Franklin County talkgroups (Fire , OPS, etc) are only being transmitted 100% of the time on the "Troop B North" trunking site. The system will transmit talkgroups further south into "Troop B South" only when an authorized subscriber unit (two-way radio) travels down there, and because the Unication pager is receive only and does not interface with CoMIRS, and is therefore dependent on what talkgroups are already being broadcast, there is no way to insure reliable alerting outside of the "Troop B North" coverage area. It is therefore necessary that the Unication pager only be programmed to recognize "Troop B North" for reliable alerting. The documented Troop B North coverage map must be referred to see if adequate coverage exists for southern Franklin County communities. If not, a

discussion could be had whether or not Fire 1 should be extended to Troop B South permanently for wider toning coverage. Practically I have found “Troop B North” coverage generally acceptable in southern Franklin County, but gaps in coverage, or while at Cooley Dickenson Hospital (for instance), do exist.

While the alerting functionality of the Unication pager on the 800 Trunked CoMIRS system may be currently more limited geographically compared to the legacy UHF system, the pager does provide reception/coverage feedback to the user. In this way, the Unication pager is better than a Minitor, as it can display an alert (message on the display, brief tone and vibrate) to alert the user that the pager is “out of range.” This feedback allows the user to know the device will not receive or alert to a tone, and they can make a decision about whether to move the pager to a place that does still have reception or to switch to a subscriber unit (portable radio) that might be able to maintain coverage through a different trunking site. A perfect example of this would be when an EMS crew travels into the “Troop B South” coverage area such as Cooley Dickenson Hospital or Baystate Medical Center. On fringe areas the repeated notifications from the pager of loss and regaining of reception, while annoying, in the very least notify me that I’m reaching the limit of its capability. (It’s worth noting that the duration of signal loss before an alert is adjustable in the programming if frequent but transient loss of signal does occur.)

Finally, the toning functionality on the CoMIRS system works so reliably because the information about the tones is encoded in the data stream. When tones are broadcast by Shelburne Control, the Unication pager is actually responding to the data sent along in the transmission. This tone encoding is a feature in the system available to Shelburne Control, but does not exist in every console or radio. Communities that want to maintain the ability to tone and alert in-house on the Franklin County CoMIRS talkgroups may need to upgrade their systems. I am not certain, but it is my belief that Greenfield Fire currently does not have this ability for example.

Conclusion

The performance of the Unication G5 has been outstanding when considered within the limitations that currently exist within the device and the system. The dual-band functionality of the G5 means that it can be utilized on the legacy UHF system for toning like the Minitor pagers, a means to scan and monitor the CoMIRS trunked system, and as a potential solution to future toning solutions on the 800.

For South County EMS, this means the G5 can immediately replace our UHF Minitor pagers and also double as a means for staff to monitor CoMIRS talkgroups without the need of a more

expensive radio. If a future toning solution is to transition to the 800 trunked, these pagers will already be capable.

Because it can be utilized on both the outgoing UHF for toning, and also for monitoring the new CoMIRS system, South County EMS will likely replace any outgoing Minitor pagers with the Unication G5. (It is worth mentioning that there are currently no Minitor pagers that can receive or monitor the CoMIRS system.)

If the CoMIRS system is dedicated to continued two-tone encoding over the digital trunked system, it is my opinion that the Unication G5 and QCII alerting on the CoMIRS system be considered a viable option to the problem of inevitable UHF decommissioning. Even without a commitment to two-tone encoding, the Unication G5 provides a cost-effective way to provide personnel with means to monitor CoMIRS talkgroups on an individual basis.

Respectfully,

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