

## MDC 1200 SIGNALLING

MDC 1200 is a Motorola data system using audio frequency shift keying, (AFSK) using a 1,200 baud data rate. Mark and space tones are 1,200 Hz and 1,800 Hz. The data are sent in bursts over the radio system's voice channel.

MDC signaling includes a number of features: unit ID, status buttons, emergency button, selective inhibit, radio check, and selective calling. These features are programmable and could be used in any combination desired by the user. They are typically incorporated in higher-end analog or digital FM commercial and public safety radios made by Motorola. Motorola radios with MDC have an option allowing the radio to filter out data bursts from the receive audio. Instead of hearing the AFSK data, the user hears a short beep from the radio speaker each time a data burst occurs. This is enabled in the radio's option programming settings.

A general option setting for all MDC systems is to enable or disable an acknowledgment (ack) data packet. For example, following a selective call, the called radio replies with an ack. This data "handshake" confirms the called radio is powered on, has received and decoded the call. The encoder beeps to confirm the call got through to the target radio. The disadvantage of using an ack on busy channels is that more air time is used: roughly double the air time used by the selective call data alone. The ack packet takes roughly the same amount of air time as the selective call itself.

Many MDC-1200 systems utilize the unit ID option. With each push-to-talk press, the radio sends a data burst identifying the sending radio. Unit IDs are decoded as unique four-digit numbers. Every radio would have a unique four-digit ID, (for example: 0423 or 5990). Several display model radios can also incorporate an alias function. This allows the user's name to be displayed, usually limited to eight characters.

Unit ID can be sent as leading or trailing a voice message. In the leading option, the data burst is sent at the moment a user presses the radio's push-to-talk button. An option can be set to make the radio's speaker emit a tone for the length of the unit ID data, (about .1 - .5 seconds). This reminds a user to wait until the data has been sent before talking. The leading unit ID takes slightly more air time (is longer) than a trailing ID because of a header tone and the need to delay the data burst to allow time for the private line decoders and repeater, if used, to open an audio path to the decoder. A default delay is defined with the unit ID option. To adjust for time delay variations in each individual system, radios can be programmed to delay the sending of a radio's unit ID data by up to hundreds of milliseconds within a range. In the trailing option, the data packet is sent at the moment the microphone button is released. This avoids timing issues because the audio path to the base station is already open. The negative side is that the other radio users do not know who is transmitting until they are finished.

In the event a radio is stolen, or a user's permission to access the radio system is revoked, a data packet can be sent to the radio's ID to disable the radio. This prevents the radio from transmitting or receiving until either an un-inhibit packet is sent to the radio or in

some cases re-programmed using the appropriate service software. This feature is known as selective radio inhibit, or stunning.

A request can be sent to the radio to determine if it is turned on, on a specific frequency, or within range. The radio will respond with an 'ack' if it hears the request containing its individual ID. The radio can also be programmed to ignore these packets and not acknowledge them. It can also be programmed to perform this acknowledgement 'silently' (the radio user never knows that his radio has been 'pinged').

MDC systems have an option for selective calling. By pressing pre-programmed buttons a data packet is sent that activates a lighted indicator or makes the radio beep. On some radio models with alphanumeric displays, the display may flash CALL until a reset button is pressed. On radio models with full keypads, radios may be programmed to selectively call one another in this manner. In order to call a radio, the calling party must know the four-digit MDC identity of the radio to be called, or the name (alias).