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## 1. GENERAL

This section describes the controls and indicators located on the control tray front panel. It also details the operation of the various switches which can be used when the station is operated locally or during servicing. In addition, a brief description of the indications resulting from the station self check is included.

## 2. CONTROLS AND INDICATORS

The controls and indicators associated with the station control functions are shown in Figure 1. Refer to this photograph when performing the adjustments required during installation or when servicing the station. Figure 2 shows the controls and indicators associated with the dc remote control board.

## 3. SWITCH OPERATION

### 3.1 PL DIS/XMIT SWITCH

**3.1.1** When this switch is placed in the XMIT position, the station transmitter is keyed but no audio or PL codes will be present. If this switch is actuated simultaneously with another push-to-talk function, any PL tones or DPL codes will be stripped from the transmitter output.

**3.1.2** In the PL DIS position, the receiver is converted to carrier squelch only operation. When this condition occurs, the DISABLE LED is lighted to provide a warning.

### 3.2 ACC DIS/TEST SWITCH

**3.2.1** Placing this switch in the TEST position forces the digital control circuits on the station control board into the reset state. This also causes an active low RESET signal to be applied to pin 12 of the expansion connector and from there to all other boards in the station. When the switch is released, the station control board performs the built-in self diagnostic routines and the station returns to normal operation. In this manner, the self test feature can be initiated as desired.

**3.2.2** When this switch is set to the ACC DIS position, the following functions occur:

- The repeater push-to-talk command produced by the station control board repeater squelch circuitry is disabled.
- The ACC DIS switch position enables manual selection of the station operating channel via the rotary switch on the dc or tone remote control board front panel.
- Time-out timer functions are disabled.
- Automatic station identification and alarm tones are disabled.
- The ACCESS DISABLE signal to the dc remote control board switches low to disable the dc detectors and enable the CHANNEL select switch. This prevents all wireline commands from reaching the station and allows channel selection via the CHANNEL switch only.
- The CHANNEL select switch always has 4 channel positions in stations with dc remote control and 16 positions in stations with tone remote control. In many cases the station has fewer than 4 or 16 assigned channels. In such cases the CHANNEL select switch performs as follows. When the CHANNEL select switch is set to the next channel after the highest assigned channel in the station, the station will operate in the tuning channel (see the Tuning Channel description in the Maintenance section). When the CHANNEL select switch is set to any channel higher than the tuning channel, it will activate that unassigned channel number on the MUXBUS but it will operate with the station parameters of the highest assigned channel.
- For example, in a two-channel dc remote control station, the CHANNEL select switch will select channel 1 when set at "1", and channel 2 when set at "2". It will select the 'tuning' channel when set at "3", and it will operate on channel 2 when set at "4". Notice,

however, as was stated before when the CHANNEL select switch is set at "3" or "4", the MUXBUS bits which show the operating channel will show channels 3 and 4 respectively.

**3.2.3** When the ACC DIS switch is turned off, the previously disabled functions are re-enabled and the station will resume operation on the channel last selected by wireline command. The optional automatic station identification will also be set to identify after the next transmission.

### 3.3 INTERCOM SWITCH

**3.3.1** The INTERCOM switch allows a serviceman at the station to communicate with the remote control operator without either party having to key the station. When the switch is actuated, the transmit audio gate is turned on connecting the audio from the wireline to the local speaker without requiring a line push-to-talk signal.

**3.3.2** When the microphone push-to-talk switch is actuated, the transmit audio gate is turned off and the local audio gate is turned on. This connects microphone audio to the line driver circuits which route the signal to the remote control point via the wireline. The microphone push-to-talk does not key the transmitter while the INTERCOM switch is activated.

**3.3.3** If the receiver unsquelches while the INTERCOM switch is on, then received audio is gated to the local speaker and to the line driver circuits. This audio will be mixed with any other audio signals which are gated at the same time.

## 4. STATION SELF DIAGNOSTICS INDICATIONS

**4.1** The station control board features a digital self-diagnostics routine that is performed when the station is first powered up or whenever the TEST switch on the front panel is used. Other boards which have a microprocessor (such as the tone remote control board) also perform such a routine. The routine checks the integrity of the microprocessor, the Program ROM, the Code Plug, the MUXBUS read/write circuits, and the serial port (IPCB) read/write circuits, in that order. If any one of these basic blocks fails, the microprocessor flashes the TEST LED a specified number of times to indicate the failure that was discovered; it then waits about 1.5 seconds and resets the board by failing to tickle the watchdog circuits (see Watchdog Circuitry section in Module Description). The result is that the board sends a sequence of flashes, a short flash, another sequence of flashes, a short flash, etc. These flashing indications can be interpreted as follows:

**4.2** If the TEST LED is on steadily or flashing at a rapid rate, the board may have failed in such a way that

the program routines cannot be run, including the power-up diagnostic routine described previously. This is a major digital section failure and the watchdog circuit is intended to keep the board in a benign state until the program routines are again running correctly. Refer to the appropriate board description section of this manual for fault isolation procedures.

**4.3** Other board faults are indicated by the recurrence of a series of 1, 2, 3, or 4 flashes of the TEST LED followed in about 1.5 seconds by a short flash (the microprocessor resetting itself), followed about 4 seconds later by another series of 1 through 4 flashes, etc. This pattern indicates that the diagnostic routine is running and is detecting a fault in the related digital circuits. The meaning of the different sets of flashes is as follows:

**One Flash** — indicates that either the microprocessor or the program ROM is defective and should be replaced.

**Two Flashes** — indicates that the code plug is defective and should be replaced.

**Three Flashes** — indicates that the MUXBUS is not operating properly. Refer to the appropriate board description section of this manual for more detailed troubleshooting information.

**Four Flashes** — indicates that interprocessor control bus IPCB is not operating properly. Refer to the appropriate board description section of this manual for troubleshooting information pertaining to this indication.

**4.4** Another failure indication is a series of short flashes on the TEST LED spaced about 2 seconds apart. This is an indication of excessive loading on the expansion connector. The expansion drive circuits on the station control board are designed to work with a limited total length of ribbon cable and a limited number of external modules (including any remote control board). For more details on proper loading of the Expansion circuits, see the Expansion Connector section in the Station Control Board Description.

## 5. STATION ALARMS

Audible alarm tone beeps are provided as a standard function of the *MSF 5000* station to indicate any of four station failures and four alarm inputs from signals external to the station. The audible alarm tone beeps are provided (depending on station options) on the wireline, over-the-air, both on the wireline and over-the-air, or on neither. Alarm tone beeps are always provided at the local speaker.

When a station alarm occurs, alarm tone beeps are generated once every 10 seconds. If more than one alarm condition occurs simultaneously, the various alarm tone beep messages will be sent one after another (separated

by about 1 second) starting with the highest numbered alarm to the lowest. Each alarm tone beep message consists of a series of tones. The number of tone in the series is equal to the number of the alarm signal. In other words, alarm number 4 (the highest internal station alarm) would result in a string of 4 alarm tone beeps, while alarm number 1 (the lowest internal station alarm) would result in a single alarm tone beep. External station alarms have precedence over internal station alarms.

## 5.1 INTERNAL STATION ALARMS

Station alarms numbered 1 through 4 are internal station alarms and indicate faults that have been diagnosed within the station. The alarms correspond to the four data bits at Address 12 of the MUXbus. The definition of these alarms and the corresponding MUXbus data bits are as follows.

- **RW4 OVG** (Reverse Wild Card Bit 4 — Battery Overvoltage) 12,D3

This bit is the battery overvoltage internal station alarm parameter activated by the station control module. RW4 OVG is active when the station battery charger power supply indicates that the external (customer supplied) station emergency batteries are becoming overcharged due to a fault in the battery charger circuits. The battery overvoltage alarm is indicated by four beeps.

- **RW3 SYN** (Reverse Wild Card Bit 3 — Synthesizer Unlock) 12,D2

This bit is the transmit or primary receiver synthesizer unlocked internal station alarm parameter activated by the station control module. RW3 SYN is active when either the transmit, primary receive, or both synthesizers are unlocked. The synthesizer unlock alarm is indicated by three beeps.

- **RW2 PA** (Reverse Wild Card Bit 2 — PA Fail) 12,D1

This bit is the rf power amplifier fail internal station alarm parameter activated by the station control module. RW2 PA is active when the rf power amplifier has failed. A successful keyup or a station control module reset is required to clear the alarm. The alarm may be active when the transmitter is de-keyed, due to a prior failure. PA Fail means that one or both of the station control module PA status lines (PA On or PA Full Power) are inactive for 30-45 msec after the start

of a keyup, or for 30-45 msec continuously thereafter during keyup. The power amplifier alarm is indicated by two beeps.

RW2 PA is not activated by the station control module personality EPROM rf power cut option. If the station control module service jumper (JU801) is installed, the station control module will activate RW2 PA regardless of the PA status lines. This provides a reminder that the rf power amplifier is operating in a non-standard manner.

- **RW1 BAT** (Reverse Wild Card Bit 1 — Battery Revert) 12,D0

This bit is the battery revert internal station alarm parameter activated by the station control module. RW1 BAT is active when the station battery charger power supply indicates that the station has lost ac power and has switched to emergency battery backup. RW1 BAT becomes inactive as soon as proper ac power is restored to the station. The battery revert alarm is indicated by one beep.

## 5.2 EXTERNAL ALARMS

Station alarms RWC8 through RWC5 are alarm generally controlled by signals external to the station via a Wildcard module. These alarms are generated whenever some station module activates one of the four MUXbus data bits at address 13: RWC8, RWC7, RWC6, and RWC5. When the Wildcard module is used in the station, it allows signals external to the station to activate any or all of these alarms.

The customer defined alarms may be utilized to indicate any alarm condition which can be translated into a closure indication (eg., door open, building temperature in excess of defined limits, etc.). The C232 Wildcard Option or QLN2914 Field Installed Wildcard Option is required for customer defined alarms. The alarms are normally sent over the wireline to the remote control console, but may be sent on-the-air (Option C578). The alarms may be deleted by the C669 Option. The alarms may be enabled, disabled, and changed from over-the-wireline to on-the-air by reprogramming the station control plug (U803).



