MAINTENANCE MANUAL

CELLULAR RADIO STATION
POWER DISTRIBUTION / MASTER OSCILLATOR PANELS
19D903692G1, G2 & G5

TABLE OF CONTENTS

DESCRIPTION

Power Distribution / Master Oscillator (PD/MO) Panels 19D903692G1, G2 and G5 provide +24 Vdc power distribution and 14.85 MHz reference oscillator distribution to the Compact Radio Channel Unit (CRCU) module shelves via each shelf's backplane. The PD/MO panels use 2 rack unit spaces (3.5 inches (8.89 cm)) of a standard 19 inch (48.26 cm) relay rack. All PD/MO panels provide reference oscillator distribution for up to eight CRCU module shelves.

Each panel meets different power distribution and reference oscillator distribution needs. PD/MO Panel 19D903692G1 provides power distribution for up to eight CRCU module shelves and contains redundant oscillator circuitry while PD/MO Panel 19D903692G2 supplies +24 Vdc to a single CRCU module shelf and contains no redundant oscillator circuitry. PD/MO Panel 19D903692G5 supplies power to a single CRCU module shelf and a 45 watt power amplifier shelf and contains no redundant oscillator circuitry.

CIRCUIT ANALYSIS

+24 VDC POWER DISTRIBUTION

The +24 Vdc primary source connects to bus bar WT1 and the ground return connects to bus bar WT2. These bus bars distribute +24 Vdc power through circuit breakers to the CRCU module shelves (a single CRCU module shelf for PD/MO Panels 19D903692G2 and G5), a Test and Alarm Unit (TAU) for PD/MO Panel 19D903692G1 and a 45 watt PA shelf for PD/MO Panel 19D903692G2. The circuit breakers provide overcurrent protection and the on/off function for each component wired to the rear of the PD/MO panel. Reference the interconnection diagrams for specific cabling between the bus bars, circuit breakers and the rear panel connectors for each PD/MO panel. Cable W2 supplies +24 Vdc power to the Master Oscillator Board for each PD/MO panel.

14.85 MHz MASTER OSCILLATOR DISTRIBUTION

Master Oscillator Boards 19D903399G1 and G2 generate the 14.85 MHz reference oscillator signal used by the transmit and receive frequency synthesizers in the CRCU modules. PD/MO Panel 19D903692G1 houses Master Oscillator Board 19D903399G1 while PD/MO Panels 19D903692G2 and G5 house Master Oscillator Board 19D903399G2. The master oscillator boards distribute the oscillator signal for up to eight CRCU module shelves, each shelf containing up to eight CRCU modules. A block diagram of the master oscillator circuitry is shown in Figure 1.

Master Oscillator Board 19D903399G1

Master Oscillator Board 19D903399G1 consists of primary and redundant secondary oscillator circuits to provide high reliability. Both oscillators operate continuously with level detector and diode switching circuits used to select the oscillator output for the CRCU shelves.

Identical high stability oven controlled crystal oscillator modules Y2 and Y1 connect in a hot standby mode of operation. If primary oscillator Y2 fails, secondary oscillator Y1 switches in to provide continuous operation. The primary oscillator, switching and alarm circuits and circuits common to both oscillators are detailed below.

Regulator U2 provides a regulated 12-volt supply for primary oscillator module Y2. The 14.85 MHz output at Y2-4 is coupled through forward biased diode switch D9 and allows the primary oscillator signal to pass through to buffer amplifier U8 and redundant buffer amplifier U9. The output of primary oscillator Y2 is detected by diode D8 and the output of Q6 goes high. The output of inverter transistor Q7 is low and the output of transistor Q8 is high. The low at Q7 forward biases diode switch D9. The high output at Q8 reverse biases diode switch D10 (redundant) which shuts off the output from secondary oscillator Y1. The output of buffer amplifiers U8 and U9 (redundant) couple through resistors R11 and R13 (redundant) to the eight current mode line drivers, U3, U4, U5, U6, U7, U10, U11 and U12. The line drivers provide an output of approximately 0 dBm into 50 ohm loads.

If the primary oscillator fails, the output of Q6 goes low, and the output of Q7 goes high, thus causing the output of Q8 to go low. Diode D9 is then reversed biased and D10 (redundant) is forward biased allowing the secondary oscillator output to drive the buffer amplifiers.

The detector output at Q6 also drives transistors Q5 and Q4. Transistor Q5 provides an inverter to turn on front panel indicator LED CR2 (PRIMARY OK). Transistor Q4 provides an open collector output which is available at connector J12-2 for remote sensing of the primary oscillator condition. If the primary oscillator fails, Q4 turns off (normally on). The remote sensing device must interpret a high impedance as the failed condition.

In a similar manner, D7 and Q1 provide a signal detector for secondary oscillator Y1. Transistor Q1 drives Q2 and Q3. Transistor Q2 provides an inverter to turn on front panel indicator LED CR1 (SECONDARY OK). Transistor Q3 provides an open collector output which is available at connector J12-1 for remote sensing of the condition of the secondary oscillator. If the secondary oscillator fails, Q3 turns off (normally on). The remote sensing device must interpret a high impedance as the failed condition.

The 24-volt input supplies power to the redundant regulator and oscillator circuits. Primary and secondary circuit breakers, CB2 and CB1 respectively, provide over-current protection for the master oscillator power inputs and the on-off function for the primary and secondary master oscillators. Reverse voltage protection is provided by diodes D5 and D1 (redundant) while voltage regulator VR1 provides over voltage protection. The 24-volt source is recombined by D4 and D2 (redundant) to supply a redundant 24-volt source to the buffer amplifiers and line drivers. Likewise, D6 and D3 (redundant) provide a redundant 12-volt source for the detector, switching and alarm circuits.

Front panel test jacks J9 (SECONDARY) and J10 (PRIMARY) are provided to monitor the outputs of the individual oscillators. Master oscillator board output connectors J1, J2, J3, J4, J5, J6, J7 and J8 are located on the rear of the board. Each provide an output capable of driving a CRCU shelf located up to 50 feet away from the PD/MO panel through type RG316 RF cable or equivalent. Power input connector J11 and alarm output connector J12 are also located on the rear of the board.

Master Oscillator Board 19D903399G2

Master Oscillator Board 19D903399G2 consists of a single high stability oven controlled crystal oscillator circuit. The oscillator circuit operates the same as the primary oscillator circuitry on Master Oscillator Board 19D903399G1 described above. References to redundant detector, indicator, secondary oscillator, and switching circuitry in the Master Oscillator Board 19D903399G1 description above do not apply to Master Oscillator Board 19D903399G2.

ERICSSON

Mobile Communications

CRCU MODULE

TABLE OF CONTENTS

Maintenance Manual

TABLE OF CONTENTS

DESCRIPTION

Compact Radio Channel Unit (CRCU) Module 19D903596G1 plugs into the CRCU module shelf which holds up to eight CRCU modules. Connector J5 on the CRCU power supply/RF board provides CRCU module connections to the CRCU module shelf backplane for +24 Vdc power, cell site controller (CSC) 80 kBPS serial data link, 600 ohm telephone line audio in and audio out, external power amplifier (PA) control, 14.85 MHz reference oscillator input and the backplane's external data terminal connection. CRCU module front panel connector J1 on the audio/logic board provides a terminal connection for local testing. CRCU module front panel telephone jacks J2, J3 and J4 on the audio/logic board provide for test and measurement of the 80 kBPS serial data link (Line, Equipment and Monitor respectively). CRCU module front panel telephone jacks J101, J102 and J103 on the audio/logic board provide for test and measurement of the 600 ohm telephone line audio in and audio out (Line, Equipment and Monitor respectively).

The CRCU module front panel has five indicator LEDs for the following functions:

TX ON - Indicates the transmitter is keyed. CR1 on the audio/logic board.

RCVR 1 - Indicates RX1 is selected either automatically via the switched diversity selection based on the received signal strength indicator (RSSI) levels or manually selected during test and maintenance. CR2 on the audio/logic board.

RCVR 2 - Indicates RX2 is selected either automatically via the switched diversity selection based on the RSSI levels or manually selected during test and maintenance. CR3 on the audio/logic board.

FAULT - Indicates a fault has been detected by the CRCU self test and diagnostics software. CR4 on the audio/logic board.

LOCAL - Indicates the CRCU module is operating in local mode (switch S1 is in the LOCAL position). CR5 on the audio/logic board.

The CRCU module front panel has three switches for the following functions:

POWER ON/OFF - Provides over-current protection and the power on/off function (push in - ON, pull out - OFF) for the CRCU module. CB1 on the audio/logic board.

REMOTE/LOCAL - Alternate action switch: in the down position places the CRCU module in local mode for test and maintenance; in the up position places the CRCU module in remote mode for control via the CSC. Normal operation is with the REMOTE/LOCAL switch in the remote position (up). S1 on the audio/logic board.

RESET - Momentary switch: resets the logic circuitry on the audio/logic board. Momentarily holding the switch in the up position resets the logic. Normal operation is with the RESET switch in the down position. S2 on the audio/logic board.

The CRCU module front panel has two adjustments for the following:

LINE IN - Provides continuous adjustment of the input sensitivity from 0 dBm to -30 dBm for the 600 ohm audio line input to the CRCU module. Potentiometer R102 on the audio/logic board.

LINE OUT - Provides continuous adjustment of the output level from 0 dBm to -30 dBm for the 600 ohm audio line output from the CRCU module. Potentiometer R132 on the audio/logic board.

RF BNC connectors J2 (TRANSMIT OUTPUT), J3 (RECEIVER 1 INPUT) and J4 (RECEIVER 2 INPUT) on the power supply/RF board are at the rear of the CRCU module. These provide direct connections for the CRCU module RF output and inputs to the external 45 Watt PA or Transmitter Combiners and the Receiver Multicouplers.

The CRCU module functions as an Advanced Mobile Phone System (AMPS) analog control channel, voice channel or locate receiver and is hardware ready for operation as a Narrowband Advanced Mobile Phone System (NAMPS) analog voice channel or locate receiver. A future software release will provide NAMPS capability via the cellular switch (MTX).

The CRCU module function is determined by software commands from the MTX via the CSC. When functioning as an AMPS control channel, the module provides a continuous data stream to the cellular subscriber units and processes any access attempts from the cellular subscriber units. When the module functions as a voice channel, the unit serves as a link for voice communications between a cellular subscriber and another party. The primary functions of the voice channel CRCU module are the control of audio paths and call process signalling. When functioning as a locate receiver, the module measures the Supervisory Audio Tone (SAT) and RSSI on a channel specified by the MTX via the CSC.

Each CRCU module is normally collocated with the CSC but can also operate in an Extended RF (remote) mode via an 80 kBPS modem. A modem is required for each CRCU module that is operated remotely. In this remote mode the CRCU is controlled via a 9600 BPS data link between each 80 kBPS modem for the Control Channel and the Locate Receiver. The Voice Channel CRCU is controlled via either a 9600 or 2400 BPS data link for each Voice Channel. The Extended RF mode is programmable via the local test terminal.

The microprocessor controlled CRCU module uses an ordinary video terminal for local test and maintenance functions. Local test software provides the capability to test and program all CRCU module functions. The module is locally programmable to any of the 832 standard analog AMPS cellular band channels from the local test terminal or remotely programmable from the MTX via the CSC. The CRCU is also programmable to any of the 2370 NAMPS analog voice channels via the local test terminal. NAMPS channel programming from the MTX via the CSC will be available in a future software release.

The CRCU module consists of two printed wire board assemblies, the audio/logic board and the power supply/RF board. These boards provide the Northern Telecom (NT) 80 kBPS Manchester serial data control interface to the CSC, the audio processing circuitry for the 600 ohm interface to the cellular switch (MTX) and the RF interface to the cellular subscriber unit. The CRCU module meets the requirements of FCC and TIA standards for cellular land stations as well as the NT proprietary DMSX interface protocol to the CSC.

ERICSSON GE

Ericsson GE Mobile Communications Inc.
Mountain View Road • Lynchburg, Virginia 24502

Printed in U.S.A.