



MODEL 2423 MILLIMETER WAVE VIDEO RADIO LINK

Installation and Operation Manual

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SECTION I

TECHNICAL DESCRIPTION

The 2423 series video radio provides a simplex video and two full-duplex data channels. The radio link consists of a pair of outdoor 2423 RF head units.

The 2423 RF head includes a microwave antenna, transmitter/receiver, baseband signal modulator, an IF down-converter, and a demodulator to allow simultaneous simplex video and dual duplex data channel operation. The RF head is powered from 110 Vac. The 2423 RF head complies with part 15 of the FCC rules.

Cables with mating connectors are required for installation and operation of the radio link. Two are required at each end of the link between the RF head and the user video equipment. The coax cable carries the TX or RX video signals. The 8 wire cable carries the two RS422/485 (optional RS232) control data signals (Table 1). The three-conductor cable supplies the power.

System Interface to Radio:

Video Interface: Radio connects directly to video equipment via a RG-59U (to 600 feet) or RG-11/U (to 1000 feet) of coax cable. TNC connector at RF head and BNC connector at user end.

RS422/485 (RS232) Interface: Radio connects directly to video equipment modem via an 8 conductor with drain wire cable. AERO Electric MS24266R14B12SN

Power: Radio requires 110 VAC via attached 6 foot long power cord with three-prong plug.

Minimum wire gauge from Power source
0' to 250'#16 AWG
250' to 400'#14 AWG
400' to 600'#12 AWG
600' to 1000'#10 AWG

Option Single Cable which includes four(4) twisted pairs which interconnect to both RS422 channels and three 16 AWG conductors to supply DC power to the antenna via the 12 pin connector.



SECTION III

FCC REQUIREMENTS

This microwave system does not require an FCC license or frequency Coordination for installation and operation

The 2423 RF head complies with part 15 of the FCC rules. **Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.**

Operators of part 15 devices are required to cease operation should harmful interference occur to FCC designated authorized users of the radio frequency spectrum.

The 2423 RF head has an integral antenna with a beamwidth of less than 3.5 degrees and a corresponding antenna gain of more than 33 dBi. In addition the radiated transmitter power is less than 2500 millivolts/meter at a distance of 3 meters.

In the rare event that this radio causes harmful interference, the user should set the frequency to a different channel if possible. If this does not eliminate the interference, contact TELENETICS, Inc Technical Staff for the recommended solution.

Changes or modifications to RF head expressly not approved by TELENETICS, Inc will void the user's authority to operate the equipment.



SECTION IV

PATH REQUIREMENTS

The microwave path must be clear “line of sight”. That is, it must have no obstructions of any kind between the two antennas. Ensure that the path is not obstructed by buildings, trees (allow for growth), billboards, telephone poles, light poles, or any other objects either man-made or natural. A strobe light is often used to verify “line of sight”.

The microwave “beam” does not travel along the path in a parallel fashion, it actually spreads out in the middle of the path and it is possible that a portion of this “spread-out” beam may hit an obstruction. In some cases this may cause multi-path interference.

After the path has been checked, and the antenna height verified, attention should be given to the mounting structures for the RF head units. The TELENETICS, Inc 24 GHz radios are designed for easy installation. They will mount to pipes varying in diameter from 2.5 to 13 inches. This will accommodate almost all-mounting structures available. The structure must be predominately rigid to prevent antenna movement when it is windy. The structure must not vibrate, twist, or sway. If necessary, guy wires may be used to stabilize the structure.

SECTION V

SPECIFICATIONS

TECHNICAL SUMMARY

Frequency Range	24.000 to 24.250 GHz
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Standard TX/RX spacing	125 MHz
RF Channel Bandwidth (minimum)	24 MHz
Modulation type	FM
Transmission Configuration 2423	Simplex Video, dual duplex control channels
Control Channels are RS422/485	RS232 (option)

TRANSMITTER CHARACTERISTICS

RF Source	Oscillator/Multiplier
Guaranteed power output	2500 mV/m @ 3 m from transmit antenna
Frequency Stability (-37 to +74 C)	+/- 0.0005%

RECEIVER CHARACTERISTICS

Type	Superhetrodyne
Noise Figure	6.2 dB Typical
Video Threshold	- 80 dBm
Maximum Receiver Input	- 10 dBm

ANTENNA CHARACTERISTICS

Type	Parabolic
Diameter	12.5 Inches (31.8 cm)
Polarization	Linear
Front to back ratio	40 dB
Beamwidth @ 3 dB points	3.5 Degrees

TRANSMISSION DATA

System Gain	137 dB
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ENVIRONMENTAL CHARACTERISTICS

Ambient Temperature Range	- 37 to +74 Degrees C
Storage and Transportation	- 40 to + 80 Degrees C
Humidity	Up to 100%

SPECIFICATIONS (Cont.)

INPUT VOLTAGE REQUIREMENTS

Power Input	120 VAC +/- 10%
Brown-out voltage	90 VAC
Line frequency	50/60 Hz

POWER CONSUMPTION

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Outdoor TX/RX	25 Watts Maximum per link
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FCC INFORMATION

FCC Identifier	108SDC-2423
FCC rules part number	15
Frequency range	24.000 to 24.250 GHz
Frequency tolerance	+/- 0.0005%
FCC Maximum power output	2500 mV/m @ 3 m from transmit antenna

SIZE AND WEIGHT

Height	Depth	Width	Weight
15"	12"	15"	10 pounds
38 cm	30 cm	38 cm	4.6 kg

Outdoor RF unit (excluding mount) No Indoor Interface unit is required

CONNECTORS AND CABLING

Control cabling connector for RS422	Multi-pin connector- mating connector furnished
Video cabling	RG-59/U or RG11/U (100% Shielded)
Video cable connectors	TNC
Power connection (110 VAC)	Six foot power cord with 3 prong plug

FREQUENCIES

CHANNEL	A			B	
	Transmit	Receive		Transmit	Receive
7	24.035	24.160	7	24.160	24.035
8	24.060	24.185	8	24.185	24.060
9	24.085	24.210	9	24.210	24.085

Units are set to above specified frequencies with switches. (Refer to table 2)

Spares: 1 Unit required for A channels, 1 unit required for B channels

POWER SUPPLY OPTIONS

230 VAC
48 VDC
24 VDC, for Solar

SECTION VI

PRELIMINARY INSTALLATION CONSIDERATIONS

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Prior to receiving the radio equipment, there are a number of preliminary tasks, which should be completed. Proper site preparation will significantly expedite the final installation process.

1. Determine the exact sites where the radio equipment will be located.
2. Ensure that the tower or mounting structure is adequate to support the RF head unit, and that line of sight exists between the antenna points, please refer to Section IV, Path Requirements. Note that the mounting point must be stiff enough to hold the pointing within +/- 3.5 degrees.
3. Perform the path survey.
4. Obtain the necessary ancillary equipment (interconnect cable, connectors, etc.), and determine any special installation requirements.
(I.e., Refer to section 1 Cable lengths and type of cable required, Page 3)
5. Ensure that appropriate power (115 Vac) is available at the unit location (or RF head location for 2423 video radio).
6. Install the coax and the data cable runs between the RF head and the equipment.
7. Install mounting bracket and Mount antenna.
8. Set antenna frequencies (refer to table 2 switch settings or figure 2)
9. Mount antenna-observing polarity of antennas at both ends of the link.
10. Antenna labeled "**B**" is video transmitter and located at Camera location.
11. Antenna labeled "**A**" is video Receiver and located at Monitor location
12. Insure wingnuts are secure on antenna and remove screws at the bottom of antenna. (**Weep holes**)

SECTION VII

INSTALLATION INSTRUCTIONS

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General:

The TELENETICS, Inc 2423 Video radio link consists of two terminals, each consisting of one unit. The 2423 RF Head is pole mounted and consists of the microwave antenna, transmitter/receiver, baseband signal modulator, an IF down-converter, and a demodulator.

The RF head is electrically connected to the video equipment by a TNC RG-59/U or 11/U coax cable, a 4 twisted pair cable and a power cable. These cables may be up to 1000 feet long. (Refer to cable selection chart section 1)

Items Required for Installation:

Tools/Test Equipment:

- Crimp Tool for crimping pins on 12-pin connector –
DMC M22520/1-01 tool and M22520/1-02 crimp die
- $\frac{3}{4}$ " wrench to mount antenna-to-antenna bracket and to adjust antenna elevation angle for alignment.
- Hex Wrench sized for mounting bracket and open end wrenches or sockets.
- Tool to install cable connectors
- 2 ea. Fluke 73 series II multimeter or equivalent
- 1 ea. Leader LCG-400 NTSC Pattern Generator or equivalent
- 1 ea. Video receiver
- 1 ea. HP1645A Data Error Analyzer or equivalent
- 1 ea. Reliable Communications Model RSP 584 or equivalent
(RS232 to RS422 Converter)
- 1 ea. RS232 (RS422) loop back cable

Furnished items:

- 2 ea. Mounting bracket for pole mount
- As required Connectors (12 position)

SECTION VII

INSTALLATION INSTRUCTIONS (continued)

Radio Installation

1. Install Interconnect cables (including 110 Vac) between the mounting locations of the user video equipment and the 2423 RF heads. Attach 12

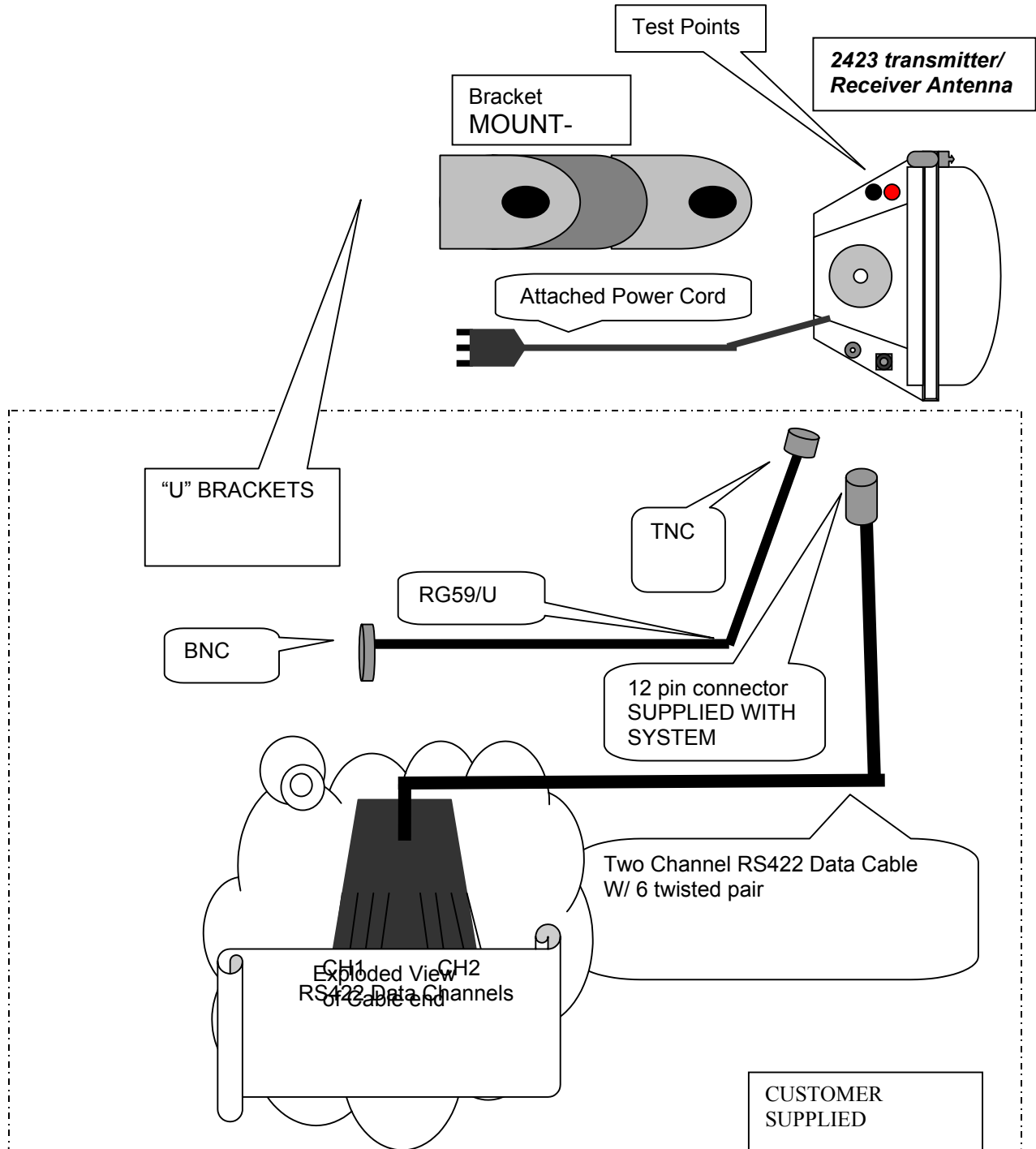
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pin connectors to the cables for the 2423 RF head units. Attach TNC male connectors on the coax cable for the RF heads.

2. Proceed to install 2423 RF head and interconnect cable. The RF head should be mounted with the water drain holes facing down. **If this is not done the unit may fill with water, and the warranty will be voided.**
 - A. Determine desired 2423 RF head orientation for correct antenna polarization at both ends of the link.
 - B. Mount RF heads so both horizontal and vertical-mounting angle can be easily adjusted during the antenna alignment process.
 - C. Connect interconnect cables to the RF head at each end of link. Apply power to the RF head units at both ends of the radio link. Open the RF head unit. The green indicator should be on. If no LED's are on, check the connections for Ac power.
 - D. Antenna alignment requires a person with a communication device (Cellular Phone, Walkie Talkie, etc.) at each end of the link. Visually align antennas at each other. Hold one antenna still. Place the ground lead of the multimeter into the black tip jack on the RF head and the red lead into the red tip jack on the RF head. Monitor the AGC voltage at the far end and move the near end antenna very slowly from side to side to find the maximum AGC voltage. There may be more than one peak, (but only one large one) so make sure the arc is large enough to ensure that the maximum voltage is achieved. Tilt the antenna a little up or down with each horizontal sweep. After an AGC of +4 volts or more is established at each end; adjust antennas very slightly left to right and up to down to find maximum AGC voltage at both ends.
3. Attach test equipment and do a loop back test on the data channel. Link should operate correctly, if not check wiring between test equipment and radio.
 4. The installation is complete.

SECTION VIII

Model 2423 Microwave The Parts



SECTION IX INSTALLATION DRAWINGS

TABLE 1

12 PIN CONNECTOR PIN OUT

PIN NUMBER	CHANNEL	RS422/485	RS232
1	DRAINS	GND	GND
2	CHANNEL 1	+ IN	TX IN
3	CHANNEL 1	- IN	RX OUT
4	AGC	AGC	AGC
5	CHANNEL 1	+ OUT	CTS OUT
6	CHANNEL 1	- OUT	RTS IN
7 (OPTION)	DC		+10
8	CHANNEL 2	- OUT	RTS IN
9	CHANNEL 2	+ OUT	CTS OUT
10 (OPTION)	DC		+10
11	CHANNEL 2	- IN	RX OUT
12	CHANNEL 2	+ IN	TX IN

TABLE 2

Switch settings for designated frequencies

Channel Number	Switch Number				
	5	4	3	2	1
7	1	1	1	0	1
8	1	1	0	0	0
9	1	0	0	1	1

(Refer to Figure 2 for switch location and layout)

Switch position

- 1 = switch ON
- 0 = switch OFF

(ON) position marked on switch

Figure 1

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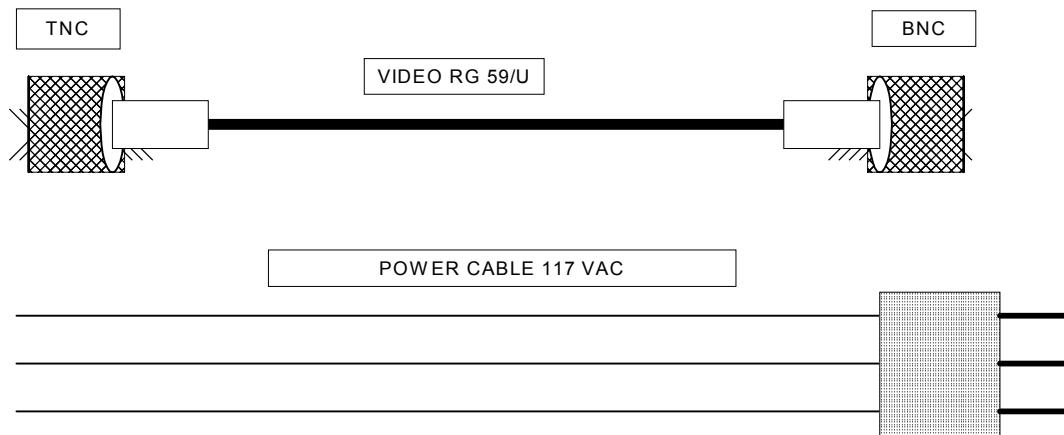
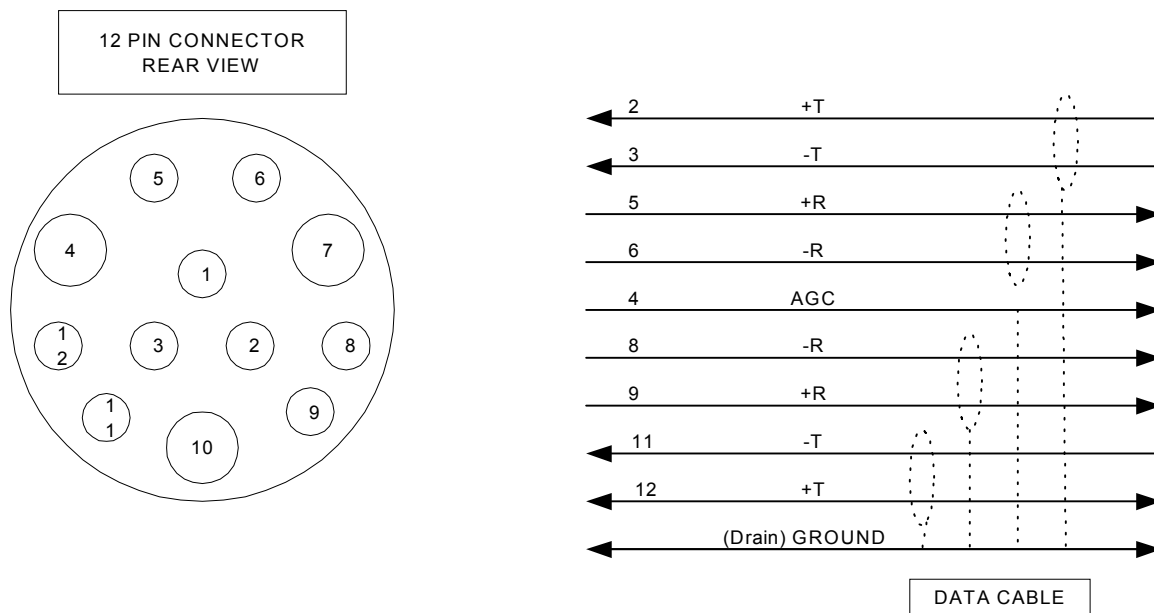
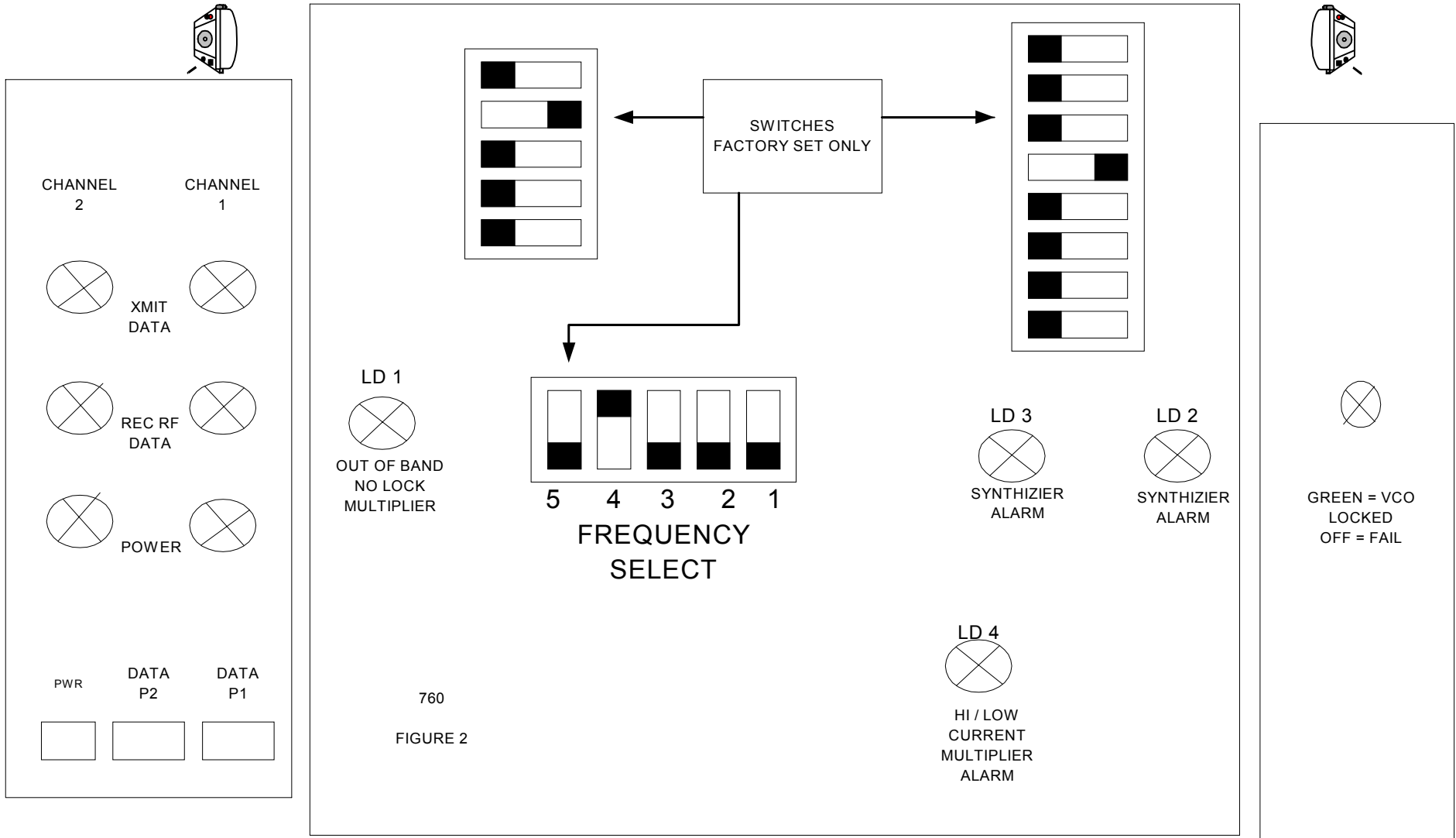


FIGURE 1

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Channel Number	Switch Number				
	5	4	3	2	1
7	1	1	1	0	1
8	1	1	0	0	0
9	1	0	0	1	1

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LIMITED WARRANTY

April 2002

TELENETICS warrants to the Buyer that all TELENETICS goods (equipment and component parts) when sold are free from defects in materials and workmanship under normal use and service for a period of one year from the date of shipment, as evidenced by TELENETICS or its agent's packing list or transportation receipt. TELENETICS's obligation under this warranty shall be limited to the repair or replacement of goods, at TELENETICS's option, which Telenetics examination shall disclose to its satisfaction to be defective. In no event shall Telenetics liability for any breach of warranty exceed the net selling price of the defective goods. No person, including any dealer, agent or representative of TELENETICS, is authorized to assume for TELENETICS any other liability on its behalf.

TELENETICS has no obligation or responsibility for goods, which have been repaired or altered by other than Telenetics employees.

This warranty is the only warranty made by seller and is expressly in lieu of all other warranties express or implied, and warranties of merchantability and fitness for any particular purpose are specifically excluded.

WARRANTY CLAIM PROCEDURES

Defective goods must be returned, transportation charges prepaid, to TELENETICS for correction. TELENETICS will pay return transportation charges for warranty repair. Upon redelivery of goods corrected under this warranty, the repaired or replaced portions shall be subject to this warranty for a period of 90 days or until expiration of the original warranty, whichever is later. All claims of failed or defective goods must be in writing and received by TELENETICS within the specified warranty period. TELENETICS will provide Buyer a return authorization number as authority to return the goods and for use in monitoring repair status.

Repair or replacement of defective goods will be at TELENETICS 's discretion and for the Buyer's account when the cause of failure is determined by Telenetics examination to be misuse, mishandling or abnormal conditions of operation. In such event a firm price quotation for correction of the goods may be submitted to the buyer. No repair or replacement work will be initiated prior to receipt of the buyers written authorization to proceed and approval of price, except as may be necessary to complete Telenetics examination of the goods. If returned goods are determined not to be defective or if the Buyer elects not to authorize correction at its expense of goods not covered by this warranty, TELENETICS may charge a reasonable amount for such evaluation. Any amounts due TELENETICS under these conditions will be subject to the same payment terms as the original sale. The Buyer will not recover from TELENETICS by offset, deduction or otherwise, the price of any goods returned to TELENETICS under this warranty.

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