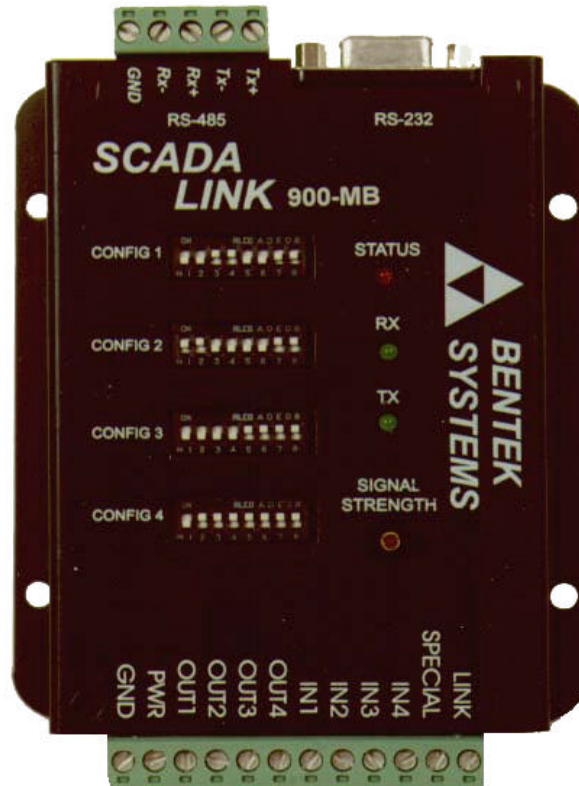


BENTEK SYSTEMS LTD

SCADALink 900-MB



Wireless Remote Controller / Radiomodem

USER MANUAL

Issue V1.2 for SCADALink 900-MB Version 260

BENTEK SYSTEMS LTD

504 - 42nd Avenue S.E., Calgary, Alberta, T2G 1Y6 Tel: (403) 243-5135 Fax: (403) 243-5165
#175 - 1089 West Broadway, Vancouver, BC, V6H 1E5 Tel: (604) 732-7990 Fax: (604) 732-7771

CANADA

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WARNING

SCADALink 900-MB radios incorporate a 16-bit address code to give 65,535 different ID settings, aiding the receiver in identifying the proper transmitter. However, you should be aware that **any other SCADALink 900-MB radio operating in your vicinity, set to the same ID code, may activate your receiver.** While the likelihood is small, the possibility is real. For this reason each customer system (a network of SCADALink 900-MBs) will have a unique factory programmed ID code which cannot be changed by the user. If the customer is using the same ID coded system for different point-to-point or point-to-multipoint links they should ensure that the frequency band selection is unique.

COMPLIANCE

This device complies with the requirements of the Federal Communication Commission (FCC) as specified in document CFR47 Part 15.247 and Industry and Science Canada (ISC), as specified in document RSS-210. The device is permitted only on a no-interference no-protection basis, that is, it must cease operation when it is determined that it causes harmful interference to the services authorized by the FCC or the ISC.

Changes or modifications not expressly approved by BENTEK SYSTEMS LTD could void the user's authority to operate the equipment.

SCADALINK FEATURES

SCADALink TECHNOLOGY

BENTEK SCADALink 900-MB devices employ frequency hopped spread spectrum technology to provide optimum performance under present FCC and ISC regulations. These devices are virtually immune to interference since they provide the interference and range benefits of a narrow band receiver while utilizing the entire 902 - 928 MHz band. The radio frequency hop pattern is pseudo random in nature and each frequency is used for 65 msec before hopping to the next one. This hop sequence repeats approximately every 4 sec.

The SCADALink 900-MB is designed to operate specifically in the 902-928 MHz band. Many manufacturers have designed their ISM band equipment to operate in an ideal environment which the unlicensed bands are not. The SCADALink 900-MB radios are designed to co-exist with all other radios legally allowed in these bands and will generally outperform most other systems currently available.

Independent frequency groups allow 4 systems to co-exist with no overlap in frequencies. Many more units can co-exist in one location with a slight penalty in response time.

SCADALink DATA INTEGRITY

SCADALink 900-MB products are designed for industrial applications. Every effort has been made to ensure that data over the link is secure and fail-safe. In addition to CRC-16 error checking, a number of self checking features have been implemented. A special output on all SCADALink 900-MB transceivers (LINK) indicates the status of the radio link and provides a fail-safe means of shutting down remote equipment in the event of a failure in the link.

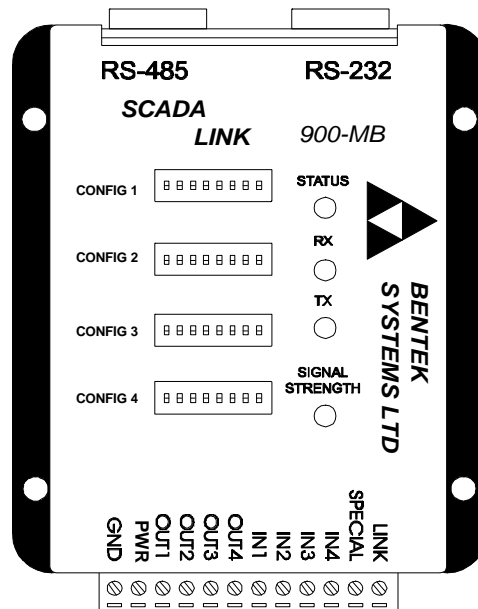
SCADALink COMMUNICATIONS

The SCADALink 900-MB supports serial communications in either RS-485 or RS-232 mode. The SCADALink 900-MB has 4 digital or analog inputs and 4 digital outputs for remote control purposes which can be read or written to using Modbus RTU protocol.

OPERATION

INITIAL SETUP

The SCADALink 900-MB can be completely configured using the DIP switches on the front of the unit or by a terminal via the RS-232 port. The diagram below shows the switch designations.



The following sections describe how to set up the DIP switches in each of 4 switch banks (config 1 - config 4). All 4 switch banks comprise of 8 bits labeled bit 1 to 8, starting from the left hand side of the switch bank.

Switch position convention:

ON = up = 1
OFF = down = 0

CONFIG 1

Bits 1 & 2 select one of four frequency groups. Bits 3 to 7 are factory preset.
Bit 8 selects Terminal Mode.

CONFIG 1 DIP SWITCH

	BIT #1	BIT #2	BITS #3-6	Bit #7	BIT #8	SWITCH POSITION
Freq grp 1	OFF	OFF	FACTORY SET	4-20 mA/1-5V	TERMINAL MODE ACTIVE	ON
Freq grp 2	OFF	ON		0-20mA/0-5V	REGULAR MODE ACTIVE	OFF
Freq grp 3	ON	OFF				
Freq grp 4	ON	ON				

CONFIG 1 DIP SWITCH

Bit 7 is used to select between 0-20mA/0-5V and 4-20mA/1-5V. After changing the setting, the power must be cycled for the new setting to take effect.

Bit 8 is used to set the radio in either terminal mode, or regular mode. This bit must be set "ON" to access terminal programming functions, and must remain set "ON" in order for those settings to be followed. If Bit 8 is set to "OFF", the radio's operating parameters will only follow the switch settings. If Bit 8 is set to "ON" the radio will only follow the parameter settings which are programmed into memory using the terminal.

CONFIG 2

Bits 1 to 8 are factory preset.

CONFIG 3

LINK TIME-OUT: Selects the amount of time since the last Modbus Poll of the SCADALink 900-MB (Modbus I/O enabled) before a Link Time-out is declared. When declared, the LINK output on the SCADALink 900-MB will go low and all parallel outputs will default to either OFF or MAINTAIN LAST STATE depending on the condition of the FAIL MODE switch setting.

FAIL MODE: On a LINK TIME-OUT, the parallel outputs can be selected to either MAINTAIN LAST STATE or be turned OFF. In either case, the LINK output will always turn OFF.

PRIMARY PORT: Both RS-232 and RS-485 ports are available on the SCADALINK 900-MB unit. However only one of the two serial ports may be used for serial communications over the radio. The remaining port can be used as a local Modbus port.

RADIO MODE: In any system, one radio must always be set to MASTER mode. All other radios in the system will be configured as SLAVES. MASTER and SLAVE radios in the same system must have the same hop sequence id and must be set to the same frequency group. To synchronize the hopping sequences, the SLAVE always derives its timing from the MASTER. SLAVE radios can only communicate to the MASTER radio, not between themselves.

BUFFER:

TRANSPARENT - Transmission starts as soon as a character is received and continues until the buffer is clear. Used for file transfer or ASCII based communication protocols.

PACKET - Used for Modbus RTU protocol. Transmission of characters starts after 4 character pause in the data string occurs and continues until the entire packet has been sent.

BIT/PARITY/STOP: Determines the characteristics of both the RS-232 and the RS-485 ports. Radio transmission characteristics are not affected.

BAUD: 4 user interface baud rates are supported. These baud rates do not affect the radio transmission rates.

CONFIG 3 DIP SWITCH

BIT #	FUNCTION	MODE SELECT	
		ON	OFF
1	LINK TIMEOUT	120 sec	10 sec
2	I/O FAIL MODE	DEFAULT OFF	MAINTAIN LAST STATE
3	PRIMARY PORT	RS-485	RS-232
4	RADIO MODE	RADIO MASTER	RADIO SLAVE
5	BUFFER	PACKET	TRANSPARENT
6	BIT/PARITY/STOP	N,8,1	E,7,1

BIT #		BAUD
7	8	
OFF	OFF	1200
OFF	ON	19200
ON	OFF	4800
ON	ON	9600

CONFIG 4:

NO MODBUS: In this mode, the SCADALINK acts as a standard packetized radio modem. The parallel Inputs and Outputs are unused. The Link output is still active. This configuration permits maximum throughput when used as a serial modem.

MODBUS ADDRESS: Any switch setting for (2-8) other than all 1's or all 0's is treated as a MODBUS RTU address (1-126 are allowable MODBUS addresses).

END-TO-END I/O: The end-to-end configuration enables inputs on the master radio to be mapped to outputs on the slave radio and inputs on the slave radio to be mapped to outputs on the master radio. The end-to-end I/O will work when the radios are used in a point-to-point mode (ie. only 1 slave radio for each master radio).

FUTURE: Reserved for future expansion.

CONFIG 4 DIP SWITCH

BIT#								FUNCTION
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	NO MODBUS
OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	MODBUS ADDRESS #1
OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	MODBUS ADDRESS #2
				.				
				.				
				.				
OFF	ON	ON	ON	ON	ON	ON	OFF	MODBUS ADDRESS #126
OFF	ON	ON	ON	ON	ON	ON	ON	END-TO-END I/O
ON	-	-	-	-	-	-	-	FUTURE

- = Don't Care

TERMINAL PROGRAMMING

Terminal mode is activated by having switch #8 on CONFIG1 up and pressing the 'ENTER' key. While in Terminal Mode, both the Rx and Tx LEDs flash simultaneously. This indicates to the user that the radio may be configured by computer terminal, rather than by following the switch settings. The radio waits 15 seconds for the 'ENTER' key to be pressed. For Instructions on how to connect to the radio using Terminal Mode, consult the documents in Appendix A.

Most features available on with the 4 config switches are available through menus in the terminal programming mode. When switch #8 on CONFIG1 is up, and a 15 second startup has elapsed, the radio will operate as per the terminal configuration. Switches settings are over ridden at this point. Setting switch #8 on CONFIG1 down, lets the switch settings override the terminal programming.

NOTE: FOR radio to make use of terminal settings in memory, CONFIG 1, bit 8 must be "ON". IF CONFIG1 Bit 8 is down, radio will follow settings from switches on radio, and ignore settings made in memory.

Advanced Terminal Configuration: This is the highest configuration level available and offers a table of choices to change the hopping code. The hopping code that is selected in this menu is stored into memory and is what is used for operation of the radio, after Terminal mode is exited (regardless of whether switch#8 of CONFIG1 is set, or not). It also allows the user to enter a new value in the table provided there is not already 16 values in the table. The user needs a seed value in order for this new value to be programmed. This value can only be obtained from Bentek Systems Ltd.

Bentek Systems Ltd.

Advanced Terminal Configuration

Choose one of the following codes <default ID CODE = 3AAA> :
(Current Hopping Code of radio) ^^^^

```
0 : No Change.  
1 : 12EE  
2 : 23FF  
3 : 34AE  
4 : 2300  
5 : 1900  
6 : 0030  
7 : 39F5  
8 : 033F  
9 : 3AFE  
A : 0000  
B : 3FFF  
C : 25FF  
D : 3AAA  
H : Custom Entry
```

Enter Choice (0-H): 1

- Use '0' to make no changes and leave.
- Select a listed number/letter for choice.
- Use 'H' for Custom Hopping Code entry.

Terminal Configuration: This is the lowest configuration level available and all existing functionality via switches can be changed here. Future functionality features will be made available here.

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Terminal Configuration

```
Choose the Number of Data Bits (1:7 Data Bits 2:8 Data Bits) <2> :
Choose the Parity (1:None 2:Even 3:Odd) <1> :
Choose the Number of Stop Bits (1:1 Stop Bit 2:2 Stop Bits) <1> :
Choose the Baud Rate (1:1200 2:2400 3:4800 4:9600 5:19200) <4> :
Choose Handshaking Configuration <3> :
1 : None
2 : RTS as DTE
3 : Full as DTE
4 : Full as DCE
>:
Choose Input Configuration <1> :
1 : 0-20mA / 0-5V Counts
2 : 4-20mA / 1-5V Counts
3 : 4-20mA / 1-5V Percentage
>:
Enter the Modbus Address of the radio (in hex) <3> :

Do you wish to exit Terminal Configuration? <N> y

Configuration Complete - Exiting Terminal Mode

Cycle Power to Enable Entries.
```

MODBUS I/O

The SCADALink 900-MB has 4 input (analog or digital) and 4 digital output channels that can be read or written using Modbus-RTU protocol.

The SCADALink 900-MB Modbus address can be set to values from 1-126. It will respond to commands sent over the radio (in SLAVE radio mode) or the local communications channel (in MASTER radio mode).

With the address set to 0 the SCADALINK I/O is disabled.

SCADALINK MODBUS-RTU Protocol Compatibility

The SCADALink 900-MB supports a subset of the Modbus RTU protocol. The following table shows the command codes supported.

SUPPORTED MODBUS COMMANDS

Command	Description
01	Read 000xx register
02	Read 100xx register
03	Read 400xx register
04	Read 300xx register
05	Write single 000xx register
06	Write single 400xx register
15	Write multiple 000xx registers
16	Write multiple 400xx registers

MODBUS Registers

The following tables shows Modbus register mapping for I/O at each SCADALink 900-MB.

MODBUS I/O MAPPING

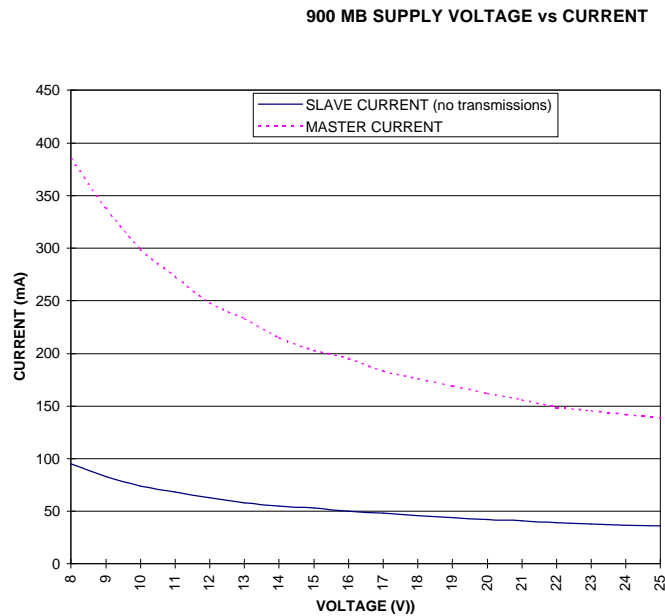
	000xx	100xx	300xx	400xx
01	DOUT1	DIN1	IN1	OUT1
02	DOUT2	DIN2	IN2	OUT2
03	DOUT3	DIN3	IN3	OUT3
04	DOUT4	DIN4	IN4	OUT4
05				
06				
07				
08				
09				WATCHWRITE
10				PACKED DOUT1-4
.				
38				SERIAL NUMBER L
39				SERIAL NUMBER H
40				
41				ID1
42				ID2
43				CONFIG12
44				CONFIG34
45				RSSI - 16 BIT
46				VOLTAGE - 16 BIT
47				RSSI - dBm
48				VOLTAGE - 10ths V
49				
50				PACKED DIN1-16
51				IN1
52				IN2
53				IN3
54				IN4

MODBUS I/O SCALING

Signal	Register	Scaling	Engineering Units
IN1-IN4	30001-30004 40051-40052	0 -32767	0-5 V
RSSI	40045	0 -32767	0-5V
SUPPLY VOLTAGE	40046	0 -32767	0-30 V
PACKED DIN1 – 16	40050	None	HEX

I/O TERMINAL BLOCK

PWR/GND: The SCADALINK 900-MB will operate at any voltage from +9V to +26V. The higher the voltage the lower the current as shown in the following graph.



OUT1-4: These Outputs are open collector type outputs which are each capable of switching 0.25A. but the combined capacity of all 4 outputs cannot exceed 0.5 A. The switches have a common ground which is fused at 0.5A. See Appendix B for typical output wiring.

IN1-4: These Inputs are high impedance with 100 K pull-downs to ground. See Appendix B for typical input wiring. Tie the input to a +9-26V source referenced to GND to provide "ON" state, otherwise input is in "OFF" state. Analog inputs are 0-5V DC inputs referenced to GND.

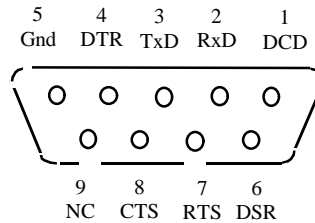
LINK: This Output indicates that the slave radio is locked onto the master radio and the communications link is good. It functions electrically like OUT 1-4. If slave radio loses communication for more than 20 seconds, the output goes "high". It will return to pull "low" if communications is restored. A "pull to good" indicates good communications

SPECIAL: Used for future expansion

SERIAL PORTS

RS232 PORT

The RS-232 port is a 9 pin DB-9 female connector which conforms to DCE functionality.



RS-232 DCE FUNCTIONALITY

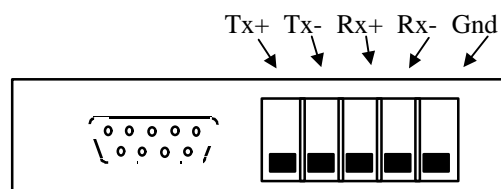
PIN	FUNCTION	TYPE	Notes
1	DCD	OUTPUT	Follow Link Status
2	RxD	OUTPUT	To DCE
3	TxD	INPUT	From DCE
4	DTR	INPUT	Not Used
5	GROUND		
6	DSR	OUTPUT	Always On
7	RTS	INPUT	Not Used
8	CTS	OUTPUT	CTS - OK to send
9	Not Used		

3 Wire Interface: The RS-232 port can be used in 3 wire mode (TXD, RXD, GND) without any handshaking.

CTS Handshaking: CTS handshaking can be used for flow control between the DTE and the SCADALink. On power up, the CTS signal is active, once the buffer is almost full, the CTS signal is pulled low to signal the DTE to stop transmitting. Generally used for file transfer operation. SCADALink buffer is 4K.

RS485 PORT

The RS-485 port is a half-duplex port which supports both 2-wire and 4-wire RS-385 communications. The port uses a quick disconnect screw terminal connector.



LED INDICATORS

RED STATUS LED:

MASTER MODE: A solid light indicates the unit is active and is hopping through its frequency band. A slow flashing pattern indicates low power supply voltage.

SLAVE MODE: A solid light indicates that the unit is locked and tracking a MASTER. A slow flashing light indicates the unit is functioning normally but has not locked onto a MASTER or that the power supply voltage is low.

Note: If SCADALink frequency band is changed, the next time the SCADALink is powered up it will have to recalculate its hopping sequence. This takes approximately five seconds during which the STATUS LED will be off.

GREEN RX LED:

TERMINAL MODE: A constantly flashing Rx LED (flashing simultaneously with the TX LED) indicates the radio is in Terminal Mode.

REGULAR MODE: Indicates that data is being received over the radio link.

GREEN TX LED:

TERMINAL MODE: A constantly flashing TX LED (flashing simultaneously with the RX LED) indicates the radio is in Terminal Mode.

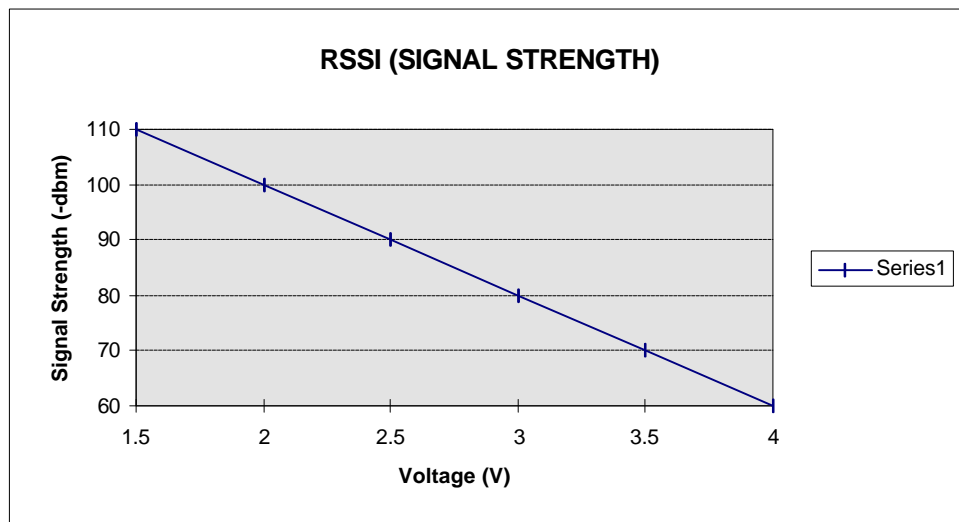
REGULAR MODE: Indicates that the unit is transmitting data over the radio link.

RECEIVED SIGNAL STRENGTH INDICATOR (RSSI)

SIGNAL STRENGTH: This is a voltage output which gives an indication of the received signal strength. This indication is derived by measuring the signal strength in the channels which it has received error free. It does not measure the level of signals in channels which have interference and is therefore a very accurate measurement of signal strength of only the desired signal over the full 26 MHz operating bandwidth.

To use this output one needs only to connect a dc voltmeter and read the voltage directly. It can be seen from the graph below, that for signal levels from -100 dBm to -40 dBm the voltage changes almost exactly 20 dB per volt. At about 2.0 V the signal strength is approximately -100 dBm. One should generally set up a system such that the received signal strength is greater than or equal to this level. The system will still remain operational for an additional 10- dB drop in signal level (1.5 V) to provide a reasonable fade margin.

The following graph can be used to give an approximate correlation of Signal Strength readings to Receive Signal Strength.



NOTE: The RSSI can be read remotely from the master radio if the SCADALink 900-MB is in Modbus mode.

ANTENNA SYSTEM AND CONNECTORS

The SCADALINK 900-MB Transceiver comes with a 2 foot long antenna pigtail that adapts the chassis mount MCX connector to a BNC-Male connector. The user will connect the antenna feedline via this connector.

The SCADALINK 900-MB Transceiver is supplied from the factory adjusted to 1 Watt RF output power. This is the maximum transmitter output power allowed under FCC and ISC regulations.

Regulations limit the effective isotropic radiated power (EIRP) to 6 dBw. The EIRP is dependent on the transmit output power, the antenna feeder loss, and the antenna gain. With 1 Watt output power, antenna's with an isotropic gain of 6 dB are allowed assuming no feeder cable losses.

The total antenna gain minus the cable loss is not to exceed 6 dBw.

WARRANTY

All SCADALink 900-MB modules come with a one year limited product warranty to the original purchaser, covering defects in materials and workmanship under normal use and service. BENTEK SYSTEMS LTD's entire liability and your exclusive remedy shall be, at BENTEK option, either the (a) repair or (b) replacement of the SCADALink 900-MB module, which is returned to BENTEK SYSTEMS LTD freight prepaid with a copy of the purchase receipt. If failure has resulted from accident, abuse or misapplication, BENTEK SYSTEMS LTD shall have no obligation to repair or replace. In no event shall BENTEK SYSTEMS LTD be responsible for incidental or consequential damage caused by defects in its products, whether such damage occurs or is discovered before or after replacement or repair, and whether or not such damage is caused by the negligence of BENTEK SYSTEMS LTD.

REPRESENTATION

BENTEK SYSTEMS LTD makes no representation or warranties with respect to this manual, or, except as specifically stated in the applicable user agreement or warranty notice, with respect to any hardware, firmware, or software described in this manual. BENTEK SYSTEMS LTD specifically disclaims any express or implied warranties of merchantability, title, or fitness for any particular purpose. The information contained in this document is assumed to be correct and current. BENTEK SYSTEMS LTD reserves the right to make revisions or changes to any and all parts of the manual, hardware, firmware, or software at any time without obligation to notify any person or entity of the changes.

SPECIFICATIONS

GENERAL

Power:	<i>Voltage</i>	9-26 VDC
	<i>Current Rx</i>	60 mA @ 12V; 40 mA @ 24V
	<i>Current (Maximum)</i>	250 mA @12V; 145 mA @24 V (assumes Continuous operation in MASTER mode)
Temperature Range:	Operating	-40 to +60 C
	Storage	-55 to +90 C
Size: Max dimensions	Length	5"
	Width	3.75"
	Height	1.5"
	Mounting	4 x 5/32" Dia. mounting holes (Fits #8 Screws)
	Material	.06" Anodized Aluminum 2 Pcs.
Case:		
Weight:		9.2 Oz. (960 grams)

RADIO SPECIFICATIONS

Technique	Frequency Hopping
Frequency	902-928 MHz
Hop Sequence Length	63
Available Sequences	255
Available ID Codes	65535
Frequency Bands	4 Interleaved
Hop Dwell Time	65 ms
Transmit Power	1 Watt
Rx Sensitivity	<-110 dBm to maintain synchronization
Error Detection	CRC-16
Error Correction	Auto Packet Repeat
Typical Range	2 km with Omni Directional Antennas
	5 km+ with Yagi antennas

SERIAL COMMUNICATIONS

Interface:	RS-232 (9 pin DB-9 Female DCE standard) RS-485 (2 Wire or 4 Wire Half Duplex)
Data Rates:	1200,2400,4800,9600 (19,200 optional)
Data Format:	Asynchronous - N,8,1 or E,7,1
Flow Control:	RTS/CTS or None
Bit Error Rates	10e-6 BER at -104 dBm without error correction
Protocol	Modbus RTU

PARALLEL INPUTS/OUTPUTS

Interface:		Quick-disconnect screw terminal
Base I/O:	Inputs DI/AI	4 - Analog/Discrete inputs Discrete - 0 - 26 V Analog - 0 - 5 V DC
		Outputs DO
	Link Status	Open Collector to GND.
	Special	Reserved for future expansion

TECHNICAL NOTES/CONFIGURATION

APPENDIX A - TECHNICAL NOTES/CONFIGURATION

TECHNICAL NOTES/CONFIGURATION

Hyperterminal Settings for Use with SCADALink 900MB Terminal Mode

1. Select Start->Programs->Accessories->Hyperterminal
2. Run Hypertrm.exe.
3. Choose an icon and make a name called SCADALINK, Click OK.
4. Click 'Connect using:'
5. Select DIRECTtoCom1 or whichever Com Port you wish to use, Click OK.
6. Click the 'Configure' Button.
7. Set Bits per Second to 9600.
8. Set Data Bits to 8.
9. Set Parity to None.
10. Set Stop Bits to 1.
11. Set Flow Control to Hardware.
12. Click OK.
13. Click OK.
14. Save settings
15. You now have an icon in Hyperterminal called SCADALINK.ht that sets up your Com Port to communicate to the radio.
16. Next time, just double click on the SCADALINK.ht icon you just created.

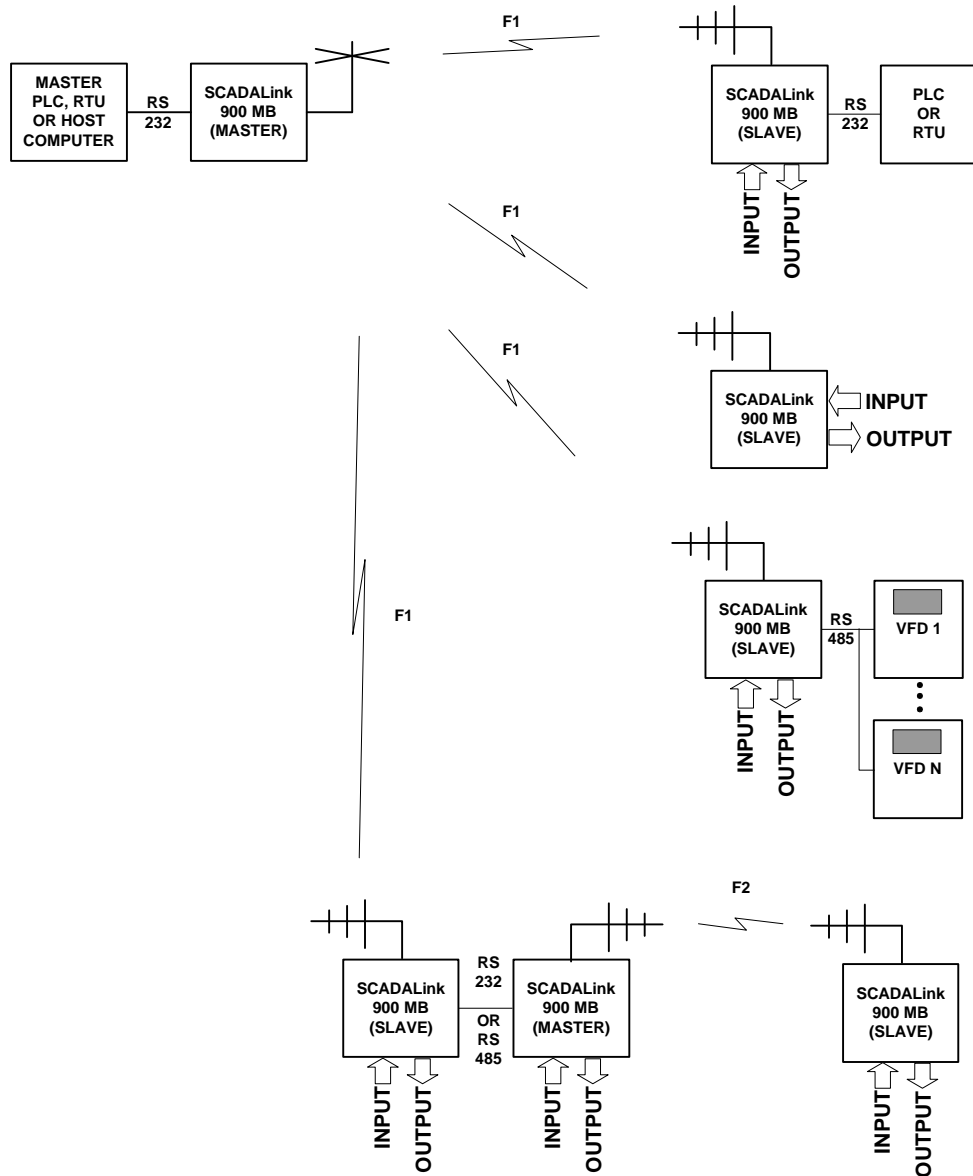
Using these settings on Hyperterminal, you can access the terminal programming part of the radio. If you choose to use a different terminal emulation software package, please use the following settings:

Terminal Emulation: VT100
Baud Rate: 9600
Data Bits: 8
Parity: None
Stop Bits: 1

TECHNICAL NOTES/CONFIGURATION

Hardware Setup for Use with SCADALink 900MB Terminal Mode

1. Connect the computer to the radio's RS-232 port.
2. Put Switch 8 on CONFIG1 in the 'up' position.
3. Turn radio on. The Tx and Rx LEDs should flash simultaneously.
4. You have 15 seconds to hit <enter> before the radio returns to regular mode.



(REPEATER CONFIGURATION)

CONFIGURE THE 900-MB IN POINT TO MULTIPOINT MODE IF A MASTER IS POLLING:

- A NUMBER OF STANDALONE 900-MB SLAVES
- DEVICES COMMUNICATING THROUGH RS-485 OR RS-232 PORT.

- User configuration is all done through Dip Switches CONFIG1 to CONFIG 4 located on the front of the 900-MB.
- Settings are not recognized by the 900-MB until the power supply is reset.(Please refer to engineering drawing SCADI/O from the SCADALink 900-MB manual for complete description of DIP Switches.)

CONFIG 1

- Switch 1 and 2 select 1 of 4 Frequency Groups. 900-MB's will only establish radio communications with other 900-MB's if they have the same frequency group.
- Program different Frequency groups only when you need to isolate one SCADALink system from another one operating in the same area (i.e. a repeater application).

CONFIG 2 (Leave all off if unused)

- Currently only used as a channel enable if a SCADALink single channel Analog Adapter is connected to an input or output.

CONFIG 3

- Set switches 1,2,3,5,6,7,8 as appropriate for your system requirements (i.e. switch 3 in off position if RS-232 port is used as primary port).
- Set the 900-MB at the host/master site as a master (switch 4 on) and set the 900-MB's at the Remote sites as slaves (switch 4 off). **NOTE: Excluding a Repeater configuration, there should only be one master in any system. Slave 900-MB's cannot communicate with other slave 900-MB's.**
- When configuring a Repeater, at the Repeater site, two 900-MB's are connected back to back via RS-232 or RS-485 and one is set as a master and the other as a slave (see drawing).

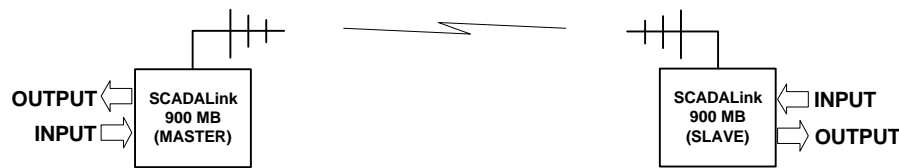
CONFIG 4 (Leave all off if unused)

- Assign Modbus address to radio (switch 8 is LSB) when on board I/O is being used. Leave all off to assign no Modbus address.



BENTEK SYSTEMS LTD.
 504 - 42 Ave. S.E.
 Calgary, AB, T2G-1Y6
 Tel: (403) 243-5135
 Fax: (403) 243-5165

TITLE		2		30/6/98	SP
SCADALink Point to Multipoint Configuration		REV.		DESCRIPTION	
		DATE July 30/98		DAMOYR	
COMPANY:	SCADALink		DRAWN BY		JW
SCALE	NTS	LOCATION:	DRAWING No.		SCADpmp1
		CHECKED BY			



***NOTE:** Serial Communication is still functional in I/O End to End Telemetry mode.

CONFIGURE THE 900-MB IN I/O END TO END TELEMETRY MODE IF AN I/O WIRELINE REPLACEMENT IS REQUIRED: (Analog or Digital) inputs on one side become (Analog or Digital) outputs on the other side.

- User configuration is all done through Dip Switches CONFIG 1 to CONFIG 4 located on the front of the 900-MB.
- Settings are not recognized by the 900-MB until the power supply is reset. (Please refer to engineering drawing SCAD I/O from the SCADALink 900-MB manual for complete description of DIP Switches.)

CONFIG 1

- Switch 1 and 2 select 1 of 4 Frequency Groups.
- 900-MB's will only establish radio communications with other 900-MB's if they have the same frequency group set. **NOTE: Ensure that both 900-MB's being used in an I/O End to End Telemetry system are set to the same Frequency Group otherwise they will not communicate with each other.**

CONFIG 2 (Leave off if unused)

Currently only used as a channel enable if a SCADALink single channel Analog Adapter is connected to an input or output.

CONFIG 3

- Set switches 1,2,3,5,6,7,8 as appropriate for your system requirements.
- Set one 900-MB to be the master (switch 4 on) and the other 900-MB as a slave (switch 4 off). **NOTE: Ensure one 900-MB is set as a master and the other as a slave: 2 masters cannot communicate with each other and 2 slaves cannot communicate with each other.**
- Serial communications is still functional in I/O End to End Telemetry mode.

CONFIG 4

- Set all switches on except switch 1 to configure for I/O End to End Telemetry mode.



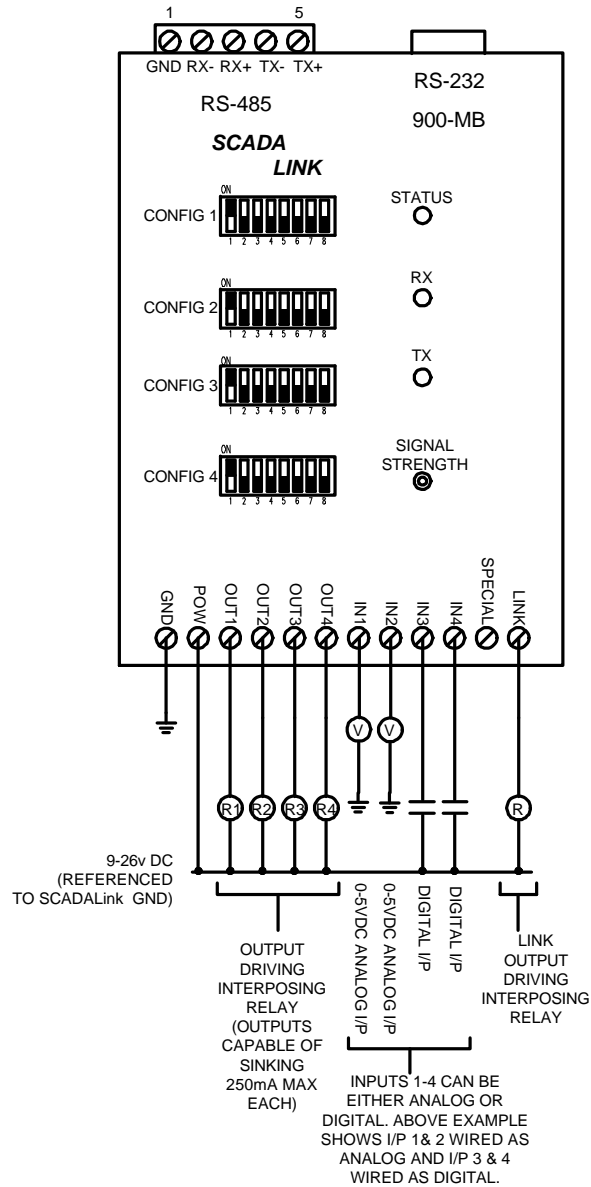
BENTEK SYSTEMS LTD.

504 - 42 Ave. S.E.
 Calgary, AB, T2G-1Y6
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 Fax: (403) 243-5165

TITLE		2		30/6/98	SP
SCADALink I/O End to End Telemetry Configuration		REV.	DAMOYR	DESCRIPTION	
DATE	July 30/98	COMPANY:	SCADALink		DRAWN BY
SCALE	NTS	LOCATION:	.		JW
					CHECKED BY
					DRAWING No.
					SCADEet1

APPENDIX B - SYSTEM DRAWINGS

TYPICAL I/O WIRING



RS-232 (DCE) PINOUT

- 1 DCD
- 2 RXD
- 3 TXD
- 4 DTR
- 5 GND
- 6 DSR
- 7 RTS
- 8 CTS
- 9 NC

DIP SWITCH SETTINGS

CONFIG 1

	BIT #1	BIT #2	BITS #3-6	BIT #7		BIT #8
FREQ1	OFF	OFF	FACTORY SET	4-20mA/1-5V	ON	TERMINAL MODE ACTIVE
FREQ2	OFF	ON				
FREQ3	ON	OFF		0-20mA/0-5V	OFF	REGULAR MODE ACTIVE
FREQ4	ON	ON				

CONFIG 2

BITS 1-8
FACTORY SET

CONFIG 3

BIT #	FUNCTION	FUNCTION	
		ON	OFF
1	LINK TIMEOUT	120 SEC	10 SEC
2	I/O FAIL MODE	DEFAULT OFF	MAINTAIN LAST STATE
3	PRIMARY PORT	RS-485	RS-232
4	RADIO MODE	RADIO MASTER	RADIO SLAVE
5	BUFFER	PACKET	TRANSPARENT
6	BIT/PARITY/STOP	N,8,1	E,7,1

BAUD RATE

BIT#		BAUD
7	8	
OFF	OFF	1200
OFF	ON	19200
ON	OFF	4800
ON	ON	9600

CONFIG 4

BIT#								FUNCTION
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	NO MODBUS
OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	MB ADDRESS #1
OFF	ON	ON	ON	ON	ON	ON	OFF	MB ADDRESS #126
OFF	ON	ON	ON	ON	ON	ON	ON	END-TO-END I/O
ON	-	-	-	-	-	-	-	FUTURE



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TITLE

Switch Settings and I/O Layout

DATE Oct 20/98

COMPANY:

SCADALink

DRAWN BY

JW / DJ

SCALE

LOCATION:

CHECKED BY

REV. DAMOYR

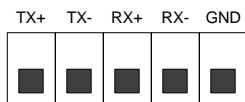
DESCRIPTION

DRAWING No.

SCADI/O 260

RS-485 Connector Pinout

SCADALink
SCREW TERMINAL
(FRONT VIEW)

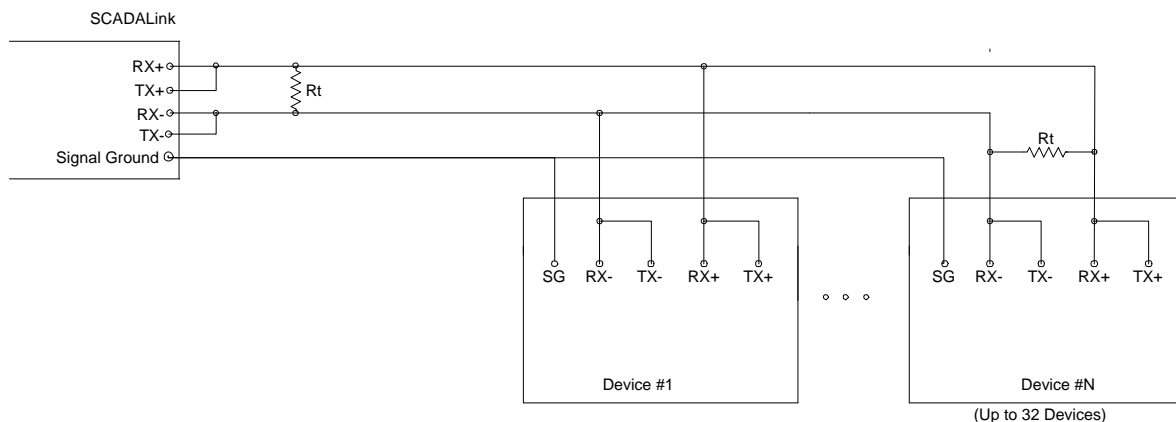


RS-232 Connector Pinout

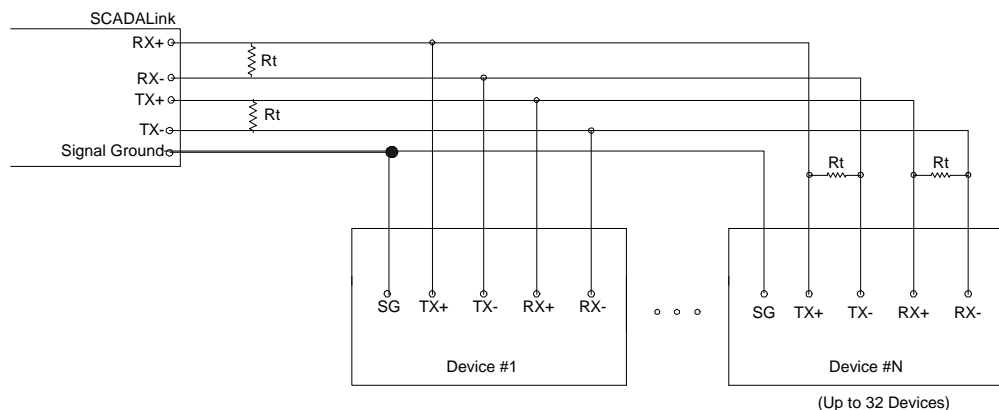
SCADALink
DB9-FEMALE

PIN#	FUNCTION
1	DCD
2	RX
3	TX
4	DTR
5	SIGNAL GROUND
6	DSR
7	RTS
8	CTS

Two Wire RS-485 Connection



Four Wire RS-485 Connection



Notes:
Rt = 120 Ohms. Only required at the ends of an RS-485 bus and when cable lengths exceed 100 feet.



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TITLE

Communication Details

DATE June 11/97

COMPANY:

SCADALink

DRAWN BY

JW

SCALE

LOCATION:

CHECKED BY

1/7/98

Mods. to cable lengths

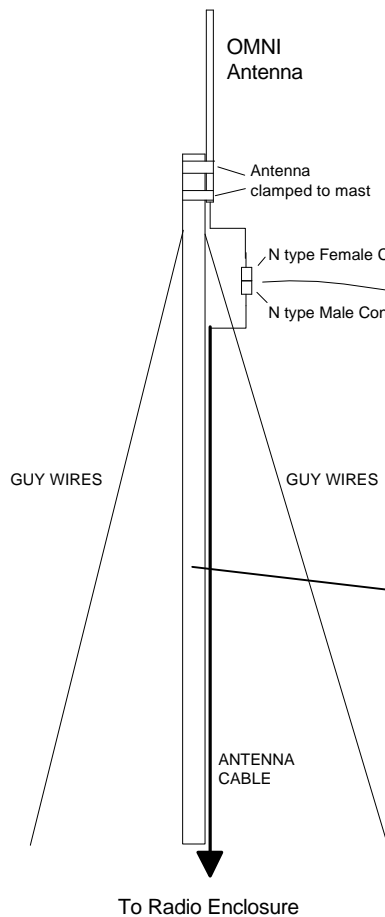
REV. DAMOYR

DESCRIPTION

DRAWING No.

SCADCOM

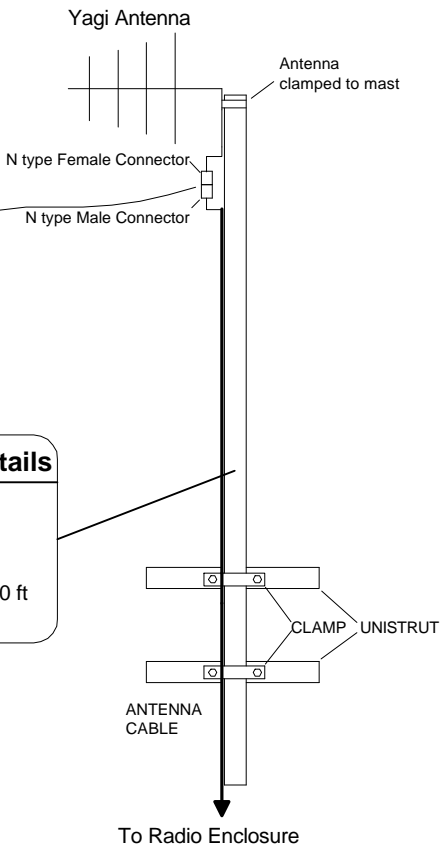
BASE STATION



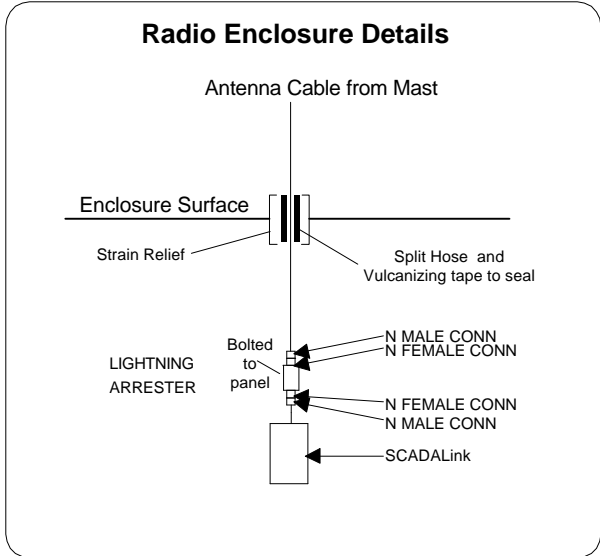
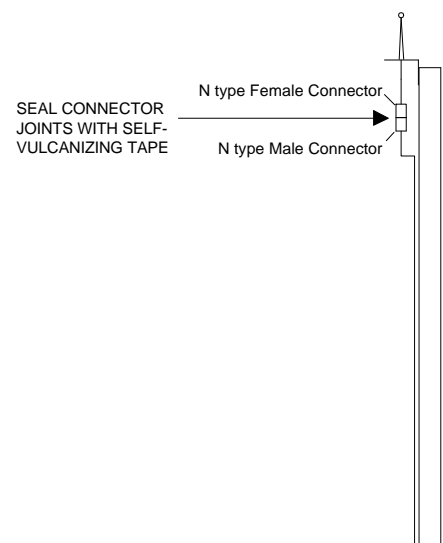
Antenna Mast Details

-1.5inch dia. or greater
- recommend 1.5 inch Aluminum sched 40, 20 ft length

REMOTE SITE

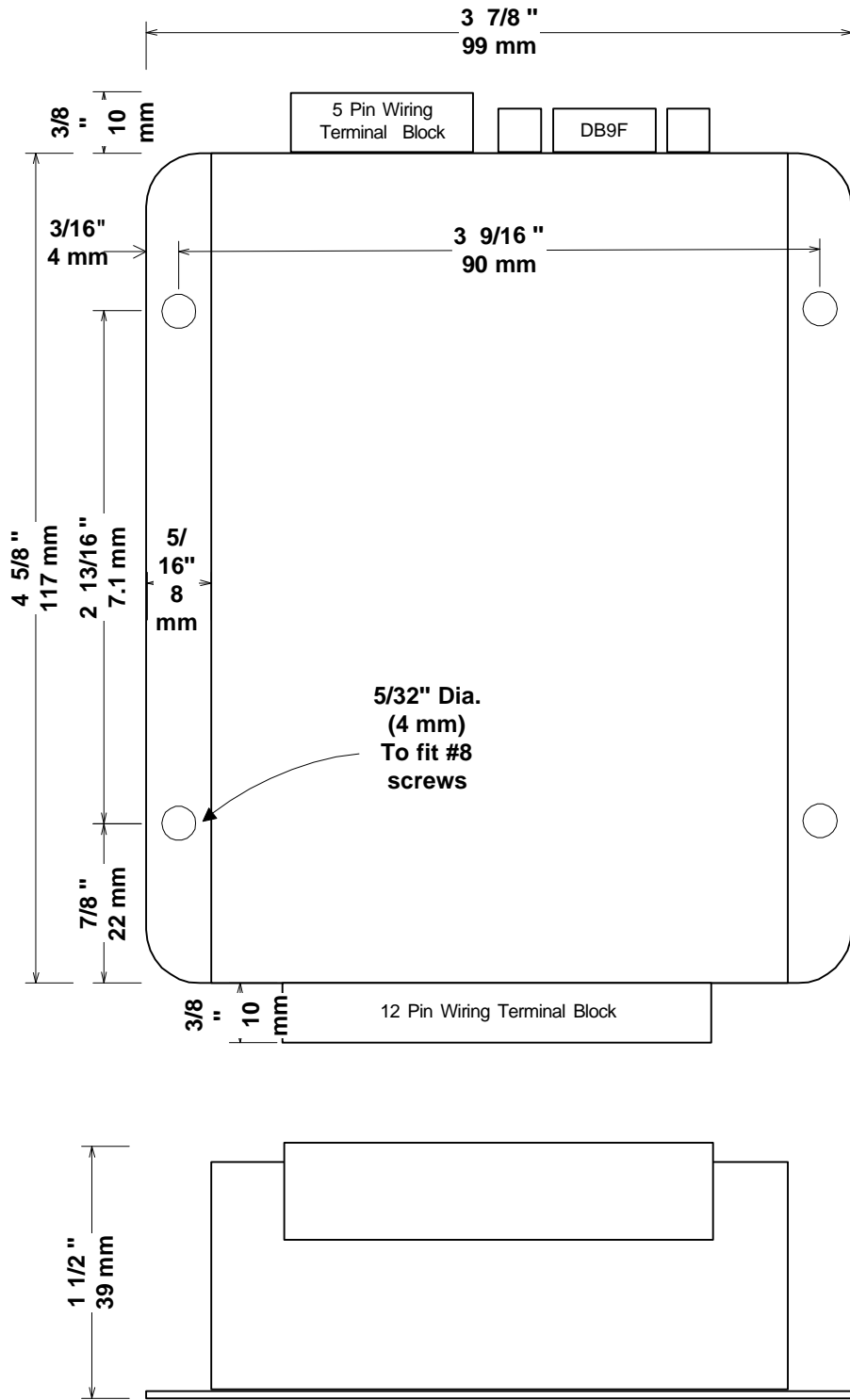


Q 900 1/4 Wave Antenna



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Fax: (403) 243-5165

TITLE		Antenna Installation Details - Typical		REV.	DAMOYR	DESCRIPTION
DATE	June 11/97	COMPANY:	SCADALink	DRAWN BY	KDR	DRAWING No.
SCALE	.	LOCATION:	.	CHECKED BY		SCADANT



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TITLE
SCADALink 900-MB Mounting Dimensions

DATE July 9/97

COMPANY:

DRAWN BY

JW

REV. DAMOYR

DESCRIPTION

DRAWING No.

SCADdim

SCALE

LOCATION:

CHECKED BY