

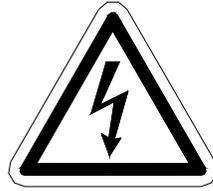


Gas and Flame Detection

Operation and Maintenance Manual

95/TX Wireless Alarm Station & Repeater

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CAUTION: FOR SAFETY REASONS THIS EQUIPMENT MUST BE OPERATED AND SERVICED BY QUALIFIED PERSONNEL ONLY. READ AND UNDERSTAND INSTRUCTION MANUAL COMPLETELY BEFORE OPERATING OR SERVICING.

ATTENTION: POUR DES RAISONS DE SÉCURITÉ, CET ÉQUIPEMENT DOIT ÊTRE UTILISÉ, ENTRETENU ET RÉPARÉ UNIQUEMENT PAR UN PERSONNEL QUALIFIÉ. ÉTUDIER LE MANUE D'INSTRUCTIONS EN ENTIER AVANT D'UTILISER, D'ENTREtenir OU DE RÉPARER L'ÉQUIPEMENT.

REVISION HISTORY

Revision 1.0 3/1/14 Initial Release

CONTENTS

1	SAFETY INFORMATION	5
	FOR YOUR SAFETY	5
	WARRANTY	5
	IF YOU HAVE QUESTIONS	5
2	GDS CORP WIRELESS SYSTEM OVERVIEW	6
	GDS Corp Wireless Devices	7
	Key Features	8
3	95/TX HARDWARE	9
4	INSTALLATION	11
	Choosing a Location	11
	Power and Signal Wiring	13
	Antenna selection	14
5	SETUP & OPERATION	17
	User Interface	17
	Network Setup	18
	Channel Setup	19
	Alarm Device Setup	19
6	TROUBLESHOOTING GUIDE	20
7	USER MENUS	21
8	SPECIFICATIONS	26
9	SPARE PARTS	27
10	DRAWINGS AND DIMENSIONS	28
11	NETWORK SETTINGS	31
12	WIRELESS SYSTEM SETUP CHECKLIST	32
13	WIRELESS RANGE CALCULATIONS	33

TABLE OF FIGURES

FIGURE 2-1: GDS CORP WIRELESS GAS DETECTION SYSTEM.....	6
FIGURE 3-1: 95/TX SINGLE ENCLOSURE CONFIGURATION	9
FIGURE 3-2: 95/TX ALARM STATION / REPEATER WITH LOCAL STROBE & HORN.....	9
FIGURE 3-3: 95/TX ALARM STATION / REPEATER WITH RATED HORN & STROBE	10
FIGURE 3-4: 95/TX WITH REMOTE LIGHT STACK (PRELIMINARY)	10
FIGURE 4-1: DC POWER INPUT WIRING	13
FIGURE 4-2: AC POWER INPUT WIRING	13
FIGURE 4-3: 95/TX ALARM RELAY CONNECTIONS.....	14
FIGURE 4-4: YAGI DIRECTIONAL ANTENNA	15
FIGURE 5-1: 95/TX DISPLAY	17
FIGURE 7-1: 95/TX MAIN MENU TREE.....	21
FIGURE 7-2: CHANNEL CONFIGURATION MENU	22
FIGURE 7-3: SYSTEM CONFIGURATION MENU.....	23
FIGURE 7-4: COMMUNICATIONS MENU	24
FIGURE 7-5: SYSTEM SECURITY MENU	25
FIGURE 7-6: TECHNICIANS ONLY MENU.....	25
FIGURE 9-1: 95/TX SPARE PARTS.....	27
FIGURE 10-1: 95/TX DIMENSIONS (DC, STROBE ONLY).....	28
FIGURE 10-2: 95/TX DIMENSIONS (AC, NR HORN + STROBE).....	29
FIGURE 10-3: 95/TX DIMENSIONS (XP HORN + STROBE).....	30
FIGURE 11-1: GDS CORP NETWORK SETTINGS.....	31
FIGURE 12-1: STEP-BY-STEP WIRELESS SETUP CHECKLIST.....	32
FIGURE 13-1: RF TRANSMISSION MARGIN	33
FIGURE 13-2: RF TRANSMISSION ZONE.....	34

1 SAFETY INFORMATION

Important – Read Before Installation

Users should have a detailed understanding of 95/TX operating and maintenance instructions. Use the 95/TX only as specified in this manual or detection of gases and the resulting protection provided may be impaired. Read the following WARNINGS prior to use.

FOR YOUR SAFETY

- The 95/TX wireless alarm station described in this manual must be installed, operated and maintained in accordance with information contained herein. Installation in any hazardous area must comply with all applicable restrictions, requirements and guidelines for said hazardous areas. It is the end user customer's final decision to ensure that the 95/TX is suitable for the intended use.
- Do not operate the 95/TX if its enclosure is damaged or cracked or has missing components. Make sure the cover, internal PCB's and field wiring are securely in place before applying power.
- Do not expose the 95/TX to electrical shock or continuous severe mechanical shock. Protect the 95/TX and related assemblies from dripping liquids and high power sprays.
- Periodically test for correct operation
- Use only for applications described within this manual.

WARRANTY

GDS Corp. hardware products carry a 2-year limited repair or replacement warranty on electronics and workmanship. GDS Corp. reserves the right to void warranty claims based on evidence of misuse, abuse, or the misapplication of a specific sensor in an environment known to adversely affect sensor life.

Warranty period starts on date of shipment from GDS Corp.

IF YOU HAVE QUESTIONS

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2 GDS CORP WIRELESS SYSTEM OVERVIEW

The new GDS Corp TX-Series wide-area Wireless Gas Detection System incorporates a wealth of new features and capabilities that make installation, setup and operation easier and faster and provides the best in wireless personnel safety and equipment protection.

The system consists of a C2/TX Wireless Site Manager 32-point controller with WiFi, MODBUS satellite or cellular connectivity, one or more GASMAX/TX single or dual channel battery-operated wireless gas detectors for toxic and combustible gases and one or more 95/TX Wireless Alarm Station / Repeaters that allow highly visible strobes or horns to be placed in locations such as gates, guard shacks or worker's quarters where timely indication of hazardous conditions can reduce injuries or save lives.

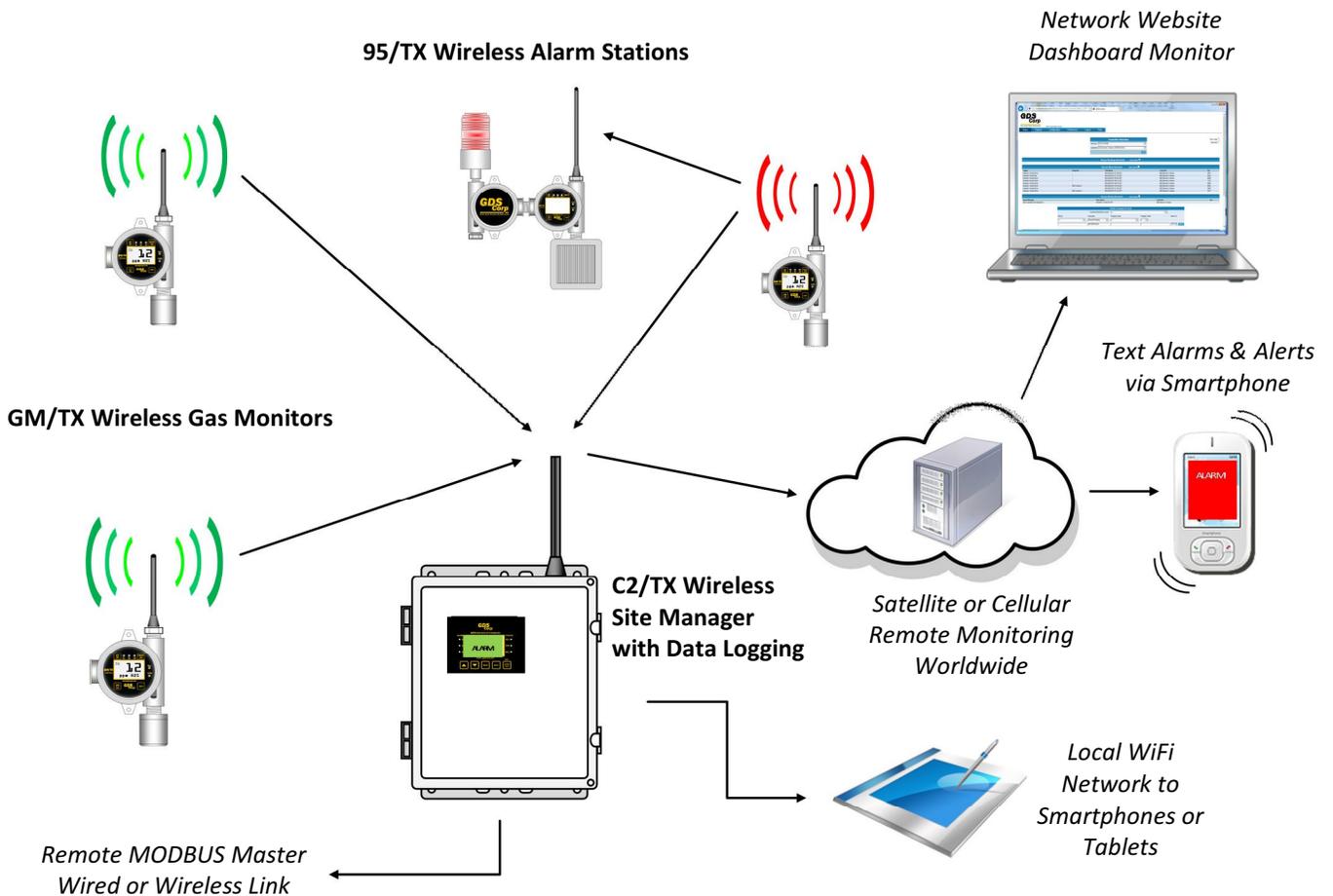


Figure 2-1: GDS Corp Wireless Gas Detection System

GDS CORP WIRELESS DEVICES

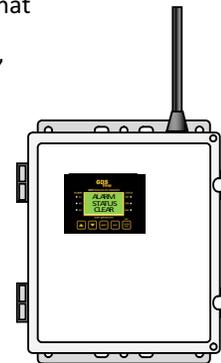
GASMAX/TX GAS MONITOR (GM/TX)

The battery-powered single or dual channel GASMAX/TX monitor uses the latest in ultra-low power infrared or electrochemical sensors to sample the ambient air every six seconds for toxic or combustibles gases. If gas is present, a *gas data packet* containing level and alarm data is transmitted to any active listener device. A user programmable ‘wake-up timer’ guarantees that even if gas is not present, a transmission will occur on predetermined intervals to notify the C2/TX controller that the detector is present and working. *For more information on the GASMAX/TX monitor see the GASMAX/TX Users Guide (P/N 1200-0863).*



C2/TX WIRELESS SITE MANGER (C2/TX)

The C2/TX Wireless Site Manager listens for broadcast gas data packets and verifies that transmissions are being received from all active channels. If an alarm condition exists, the C2/TX activates local warning devices and updates its MODBUS database. An optional cellular or satellite remote access system reads changes in the MODBUS database and transmits alarm information to a cloud server which, in turn, sends text messages or email warnings and alerts. The C2/TX also acts as the Beacon Server for the entire system, transmitting a broadcast signal that all radios use to synchronize their transmissions. *For more information on the C2/TX Wireless Site Manager, see the C2/TX Users Guide (P/N 1200-0866).*



95/TX WIRELESS ALARM STATION (95/TX)

The 95/TX Wireless Alarm Station also listens for gas data packets broadcast by GASMAX/TX monitors and activates local horns or strobes if an alarm condition exists. In addition, the 95/TX can also be programmed to retransmit (“repeat”) each received gas data packet. Finally, if required by network topology, a 95/TX alarm station can be programmed to act as the Beacon Server for the network. This might be appropriate if the 95/TX is mounted on a pole or other ‘high point’ that provides better line-of-sight communications with all GASMAX/TX monitors, C2/TX controllers and other 95/TX alarm stations. *This manual contains information on the 95/TX Wireless Alarm Station.*



KEY FEATURES

BATTERY-POWERED COMBUSTIBLE MONITORS

In addition to standard low-power electrochemical sensors, the new GASMAX/TX supports an ultra-low power infrared detector for methane, propane, general hydrocarbons as well as carbon dioxide gas. Dual-channel GASMAX/TX monitors can be configured to measure both combustible and toxic hydrogen sulfide gases with no external source of power.

LISTENER DEVICE AUTO-CONFIGURATION

Each GASMAX/TX gas monitor periodically broadcasts a *config data packet* that contains information on tag name, engineering units, zero and span values, alarm levels and other user-adjustable settings. When a C2/TX site manager or 95/TX alarm station receives a config data packet, setup information in the GASMAX/TX is automatically loaded into the listener's channel information database. This makes it unnecessary to independently program listener devices, and allows them to announce alarms using customer-recognizable tag names such as "North Fence" or "Drillers Shack" previously programmed into the individual GASMAX/TX monitor.

REMOTE ACCESS

The C2/TX Wireless Site Manager can be optionally configured for satellite or cellular remote access packages. These packages include a dedicated satellite or cellular modem with optional GPS receiver, antenna cable, lightning arrestor and antenna, and are custom programmed to query the C2/TX Modbus database and transmit alarm and event data to network-based servers that display the information on a "dashboard" display. Users can setup the dashboard to automatically generate emails, text messages or cellular phone calls in the event of a gas alarm or maintenance event.

ADVANCED RF TECHNOLOGY

GDS Corp wireless products use 900 MHz or 2.4 GHz RF modems based on Frequency Hopping Spread Spectrum (FHSS) technology. FHSS radios offers longer range and higher power than those found in typical mesh networks. In the United States, Canada and selected other countries, 900 MHz is recommended due to increased power output available (up to 1 watt), greater range and ability of lower frequency signals to travel around interfering objects. Systems utilizing 2.4 GHz are license-free in most areas of the world and tend to be less susceptible to interference from existing radio frequency sources.

3 95/TX HARDWARE

The GDS Corp 95/TX Wireless Alarm Station is available in a number of different configurations that include rated and non-rated horns and strobes as well as remote two, three or four strobe light stacks with optional horn sounder. Dimensions and mounting recommendations are shown in Appendix X.

The 95/TX repeater-only or repeater plus strobe configuration includes a single NEMA 7 enclosure as shown in Fig 3-1. DC input power can range from +12 to +30VDC.

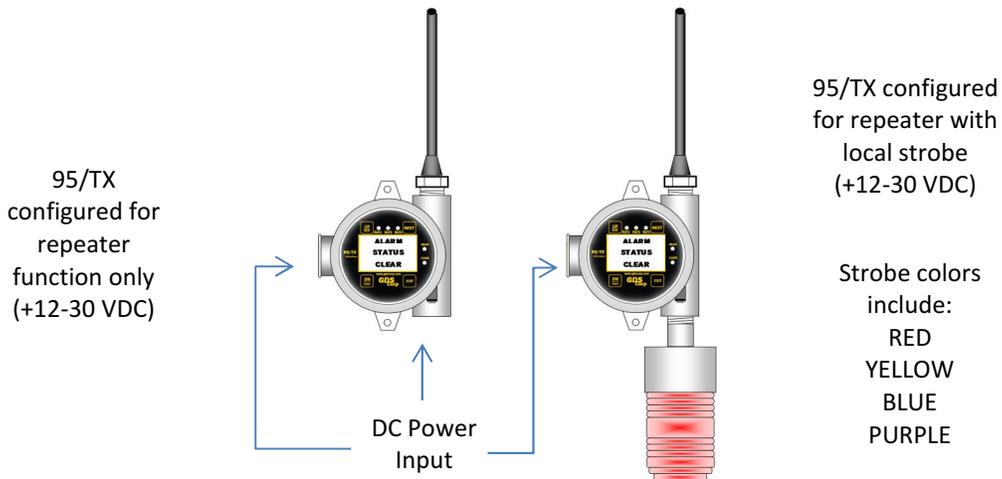


Figure 3-1: 95/TX Single Enclosure Configuration

If the 95/TX configuration includes an AC power supply or horn sounder, the device is configured using two NEMA 7 enclosures as shown in Fig 3-2. The optional AC power supply is located in the left-side enclosure. Input power is limited to +12VDC, +24VDC or 110/220VAC only.

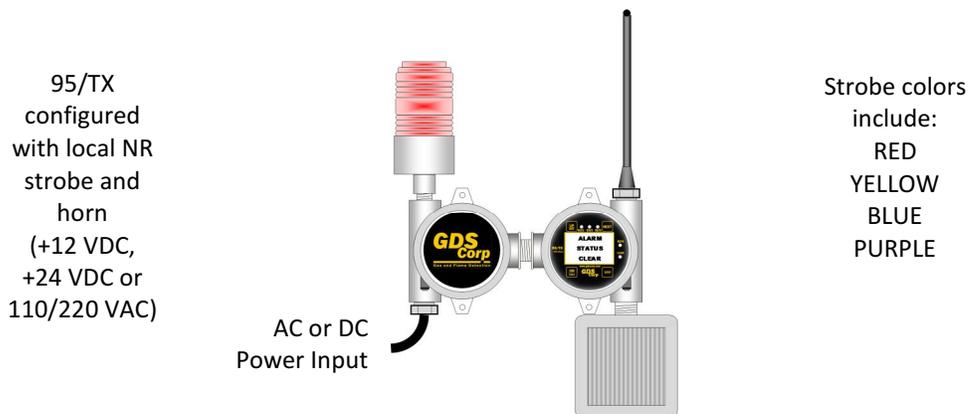


Figure 3-2: 95/TX Alarm Station / Repeater with Local Strobe & Horn

Figure 3-3 shows the same configuration with Class 1 Division 2 rated strobe and Class 1 Division 2 rated horn. Input power is limited to +12VDC, +24VDC or 110/220VAC only.

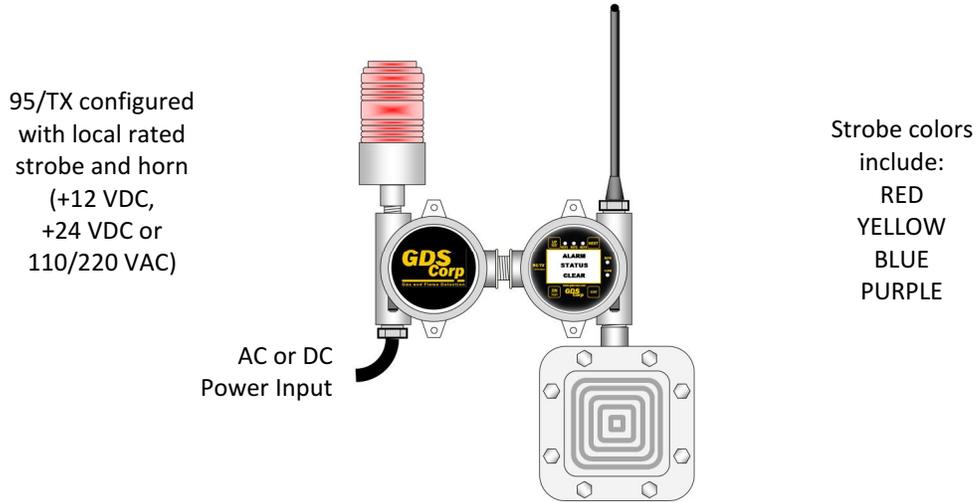


Figure 3-3: 95/TX Alarm Station / Repeater with Rated Horn & Strobe

The 95/TX Alarm Station / Repeater is also available with remote two strobe, two strobe plus horn, three strobe and three strobe plus horn combinations (See Figure 3-4). Contact GDS Corp for more details.

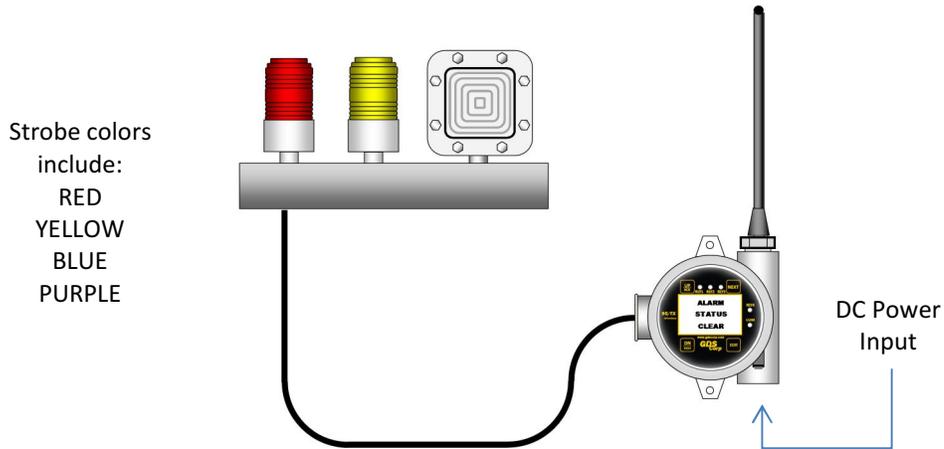


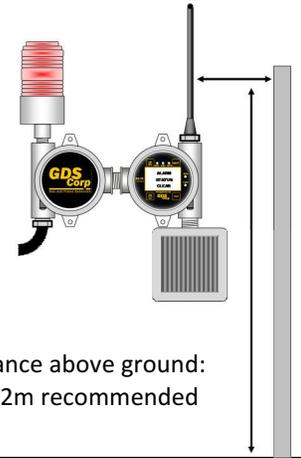
Figure 3-4: 95/TX with Remote Light Stack (Preliminary)

4 INSTALLATION

CHOOSING A LOCATION

The most important role of an Alarm Station is to provide real-time warning of hazardous conditions that may be present in the vicinity. As a result, it is *important to install the 95/TX such that the strobe and/or warning horn provide maximum coverage for the warning area.* At the same time, consideration must be given to the following conditions: 1) ability to receive gas data packets from all GASMAX/TX wireless gas detectors; 2) access to a continuous source of AC or DC power, and 3) maintaining a minimum distance between the antenna and closest metallic object, *or any object that creates RF interference such as high voltage power lines or large sodium or mercury vapor lamps.* The minimum spacing distance is determined by the RF frequency chosen and is shown below.

Distance from antenna to nearest metallic surface:
900 MHz => 24" Minimum
2.4 GHz => 6" Minimum

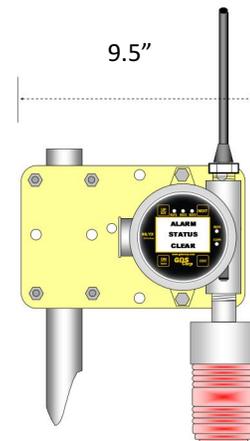


MOUNTING THE 95/TX (Single Enclosure)

The 95/TX standard enclosure is a single cast aluminum explosion-proof (NEMA 7) enclosure that has two 0.27" diameter mounting holes spaced 5.0" apart. If a local strobe is attached, the strobe body extends 0.5" behind the plane of the enclosure. If the 95/TX is to be mounted on a flat plate, then spacers must be installed between the enclosure mounting holes and the plate to allow for clearance between the strobe and backplate. Furthermore, if the 95/TX is plate-mounted, the plate should be designed such that the antenna extends *above* the plate into free space. Power to the unit should be brought through the left-hand side 3/4" NPT threaded opening using an appropriate fitting (not provided).



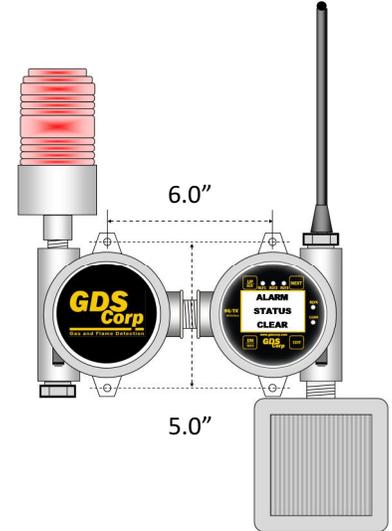
For pole mount applications, GDS Corp offers a pole mounting kit (P/N 20-0165) that contains a pre-drilled plate, stainless steel mounting bolts and two stainless steel U-bolt assemblies. The pole mounting kit supports poles up to 2.0" in diameter.



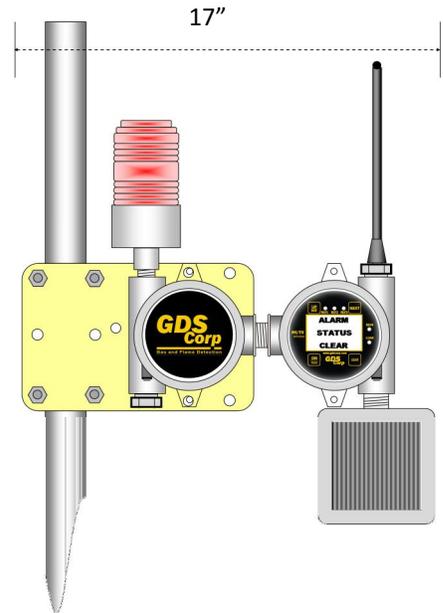
In all cases, the 95/TX enclosure must be properly connected to earth ground to maximize radio reception and as protection against electrical discharge and lightning strikes.

MOUNTING THE 95/TX (Dual Enclosure)

If the 95/TX configuration includes either a horn or AC power supply, the unit consists of two enclosures mounted side by side as shown at right. There are four 0.27” diameter mounting holes spaced as shown. The optional AC supply is always mounted in the left-hand side enclosure and AC or DC power enters through the lower left side 3/4” NPT threaded opening using an appropriate fitting (not provided). Both the horn and strobe extend rearward past the plane of the mounting holes by 0.5” so if the unit is to be plate mounted, then appropriate spacers must be installed between the enclosure mounting holes and plate to allow for clearance between the backplate and strobe and horn. *If mounting the unit on a plate, be sure that the antenna extends above the plate into free space.*



The dual-enclosure unit can also be mounted using the p/n 20-0165 pole-mounting kit as shown at right. For best protection against lightning or electrical discharge, make sure the pole is buried at least 3’ into the ground or is properly bonded to earth ground using large diameter wire or braided cable. If the pole extends above the level of the antenna as shown, the pole will provide some additional protection against direct lightning strikes.



POWER AND SIGNAL WIRING

DC POWER

When using a source of 24VDC, the power and ground connections are made to the right-hand side terminal block (TB1) on the 95/TX I/O power supply board located in the back of the enclosure.

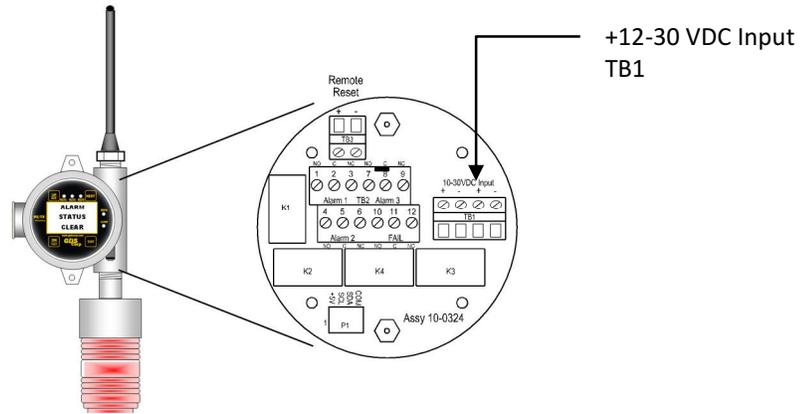


Figure 4-1: DC Power Input Wiring

AC POWER

When using a source of AC power, the line, neutral and earth ground connections are made to AC power supply located in the left-hand side enclosure. A cable gland is provided to run the power wiring out the lower left side enclosure opening.

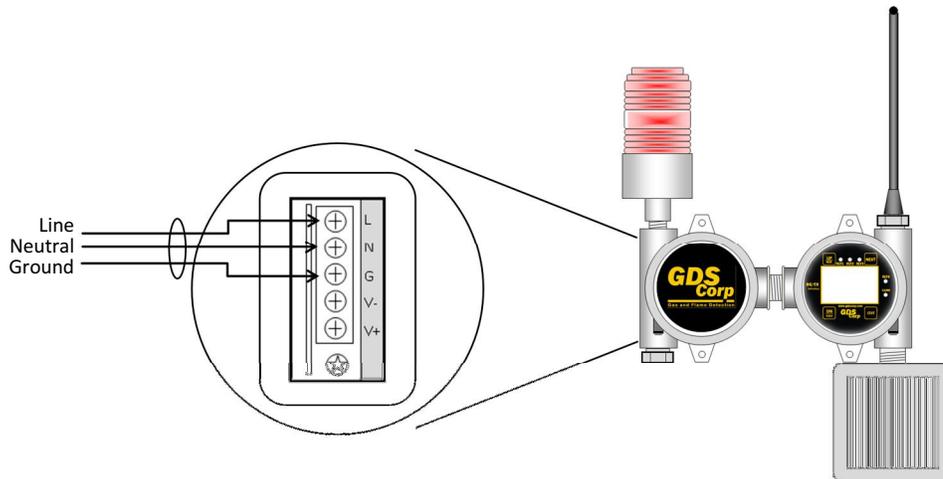


Figure 4-2: AC Power Input Wiring

CONNECTING ALARM DEVICES

The 95/TX provides three SPDT alarm relay outputs and one dedicated fault relay output. Terminals are labeled “NO” (normally open), “NC” (normally closed) and “C” (common) and are located on the power supply board located in the back of the enclosure. The power supply board also provides contacts for a remote “alarm acknowledge” button. Power for 24V strobes or horns can be taken from spare “+” and “-” pins on TB1.

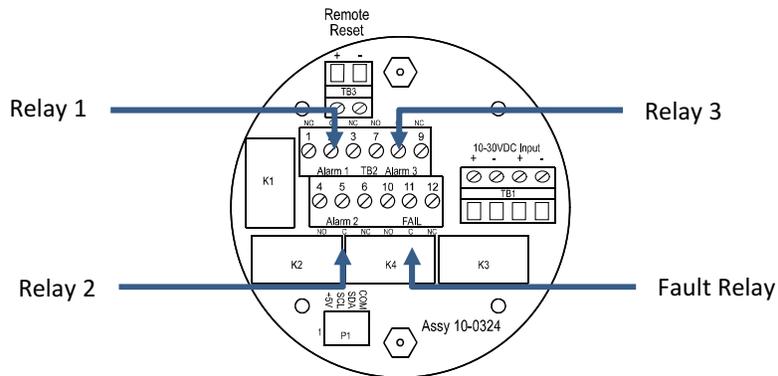


Figure 4-3: 95/TX Alarm Relay Connections

ANTENNA SELECTION

MONOPOLE AND COLLINEAR OMNI-DIRECTIONAL ANTENNAS

The 95/TX Wireless Alarm Station includes a standard “rubber duck” omnidirectional antenna. “Omni” antennas are the most commonly used antenna for portable and semi-portable equipment. When mounted vertically, they provide good all-around (“omnidirectional”) reception and transmission from horizontal directions, and are generally rugged and when sealed properly against moisture can provide years of quality service.

The 95/TX is also available with a flexible omnidirectional antenna that is more resistant to damage in field applications. The flexible antenna offers the same gain and reception pattern.

Collinear antennas are similar in appearance to ‘rubber duck’ antennas, but are more sophisticated and combine several vertical antennas that operate in parallel to increase signal gain by focusing the reception pattern in a more horizontal plane. Collinear antennas should be used where additional signal gain is required.

YAGI DIRECTIONAL ANTENNAS

Yagi antennas are directional along the central beam of the antenna. The folded element is towards the back and the antenna should be “pointed” in the direction of the transmission. Yagi antennas should also be mounted with at least 2-3’ of clearance from other objects. Mount the Yagi antenna as shown for maximum RF transfer.

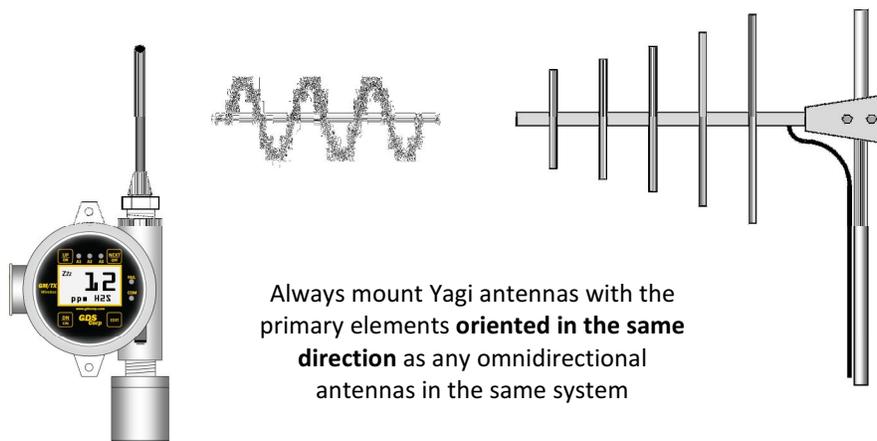


Figure 4-4: Yagi Directional Antenna

In networks spread over wide areas, it is common for a central receiver / controller to have an omnidirectional antenna (such as a collinear) and the remote GAMAX/TX monitor to have Yagi directional antennas. Care should be taken to ensure the Yagi is aligned correctly to achieve optimum performance.

COAXIAL CABLES

When installing a coaxial cable between the 95/TX and a remote antenna, constructing a loop of cable below the antenna is always recommended. The loop allows water to drip off the bottom of the U instead of into the connection, reduces installation strain and provides spare cable length in case later the original connectors need to be replaced.

Avoid installing coax cables together in long parallel paths. Leakage from one cable to another has a similar effect as mounting an antenna near another antenna.

SURGE PROTECTION & GROUNDING

Voltage surges primarily enter the 95/TX Alarm Station via the antenna connection as a result of electrical discharge in the atmosphere. Electrical energy follows the most direct path to earth and the best protection is achieved by “draining” the surge energy to earth via an effective earth ground. Wireless

devices should have a solid connection to earth via a ground stake or ground grid if the soil has poor conductivity. Solid connection means a large capacity conductor (not a small wire) with no coils or sharp bends. All other devices connected to the 95/TX, such as remote strobes or horns, should be grounded to the same ground point if possible. There can be significant resistance between different ground points leading to very large voltage differences during lightning activity.

It is very difficult to protect against direct lightning strikes but the probability of a direct strike at any one location is very small. Unfortunately, power line surges and electromagnetic energy in the air can induce high voltage surges from lightning activity several miles away.

SEALING ANTENNA AND CABLE FITTINGS

If a coax cable connects to the antenna via connectors, it is very important to weatherproof the connection using #1000-2314 or equivalent sealing tape. Moisture ingress into a coax cable connection is the most common cause of problems with antenna installations. A three layer sealing process is recommended – an initial layer of electrical PVC tape, followed by a second layer of self-vulcanizing weatherproofing tape (#1000-2314), with a final layer of electrical PVC tape.

USE IN HAZARDOUS AREAS

The 95/TX enclosure is certified for use in Class 1 Division 1 hazardous areas. The standard 10-0295 antenna coupler is designed to meet Class I Division 2 hazardous area standards but is not 3rd party certified.

5 SETUP & OPERATION

USER INTERFACE

There are four magnetic switches on the face of the 95/TX, arranged in a quadrant around the LCD display labeled “NEXT”, “EDIT”, “DOWN/TEST” and “UP/ACK”. To activate, or “press” a magnetic switch, swipe the magnet near the switch. To access the Main Menu, press the “EDIT” key. While in the menu display, use the UP and DOWN keys to select an item, EDIT to change an item, and NEXT to exit the menu.

NOTE: HOLDING A MAGNET OVER THE DN/TEST KEY WILL ACTIVATE (TEST) ALL ALARM RELAYS

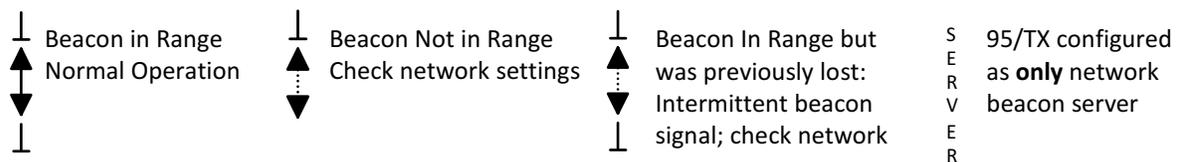
When power is applied to the 95/TX, the display will show one of two messages – “Alarm Status Clear” if the 95/TX has identified and locked onto the network beacon, or “No Server Found”, indicating that the beacon signal is either too weak OR the network selection (“A” through “Z”) is not programmed to match the current network.



Figure 5-1: 95/TX Display

Once programming is complete and the beacon server is ‘in range’, the “Alarm Status Clear” message will be displayed until an alarm event occurs. This includes both gas alarms as well as communications errors caused by missing gas data packet information.

An icon on the right-hand side of the screen indicates the status of the beacon server and can be useful when troubleshooting network issues:



NETWORK SETUP

Integrating the 95/TX Wireless Alarm Station into a GDS Corp network requires adjustment of the following network device settings. Systems shipped from GDS Corp will already have these settings pre-programmed.

NETWORK ID

All devices on a single GDS Corp wireless network must share the same Network ID. The Network ID parameter combines the definition of a unique "System ID", the selection of a set of operating frequencies and the use (or not) of data encryption algorithms when transmitting and receiving data. See Chapter 12 for a complete definition of network parameters defined by each Network ID. Data transmission on networks "A" through "L" are non-encrypted, while data transmission on networks "M" through "Z" are encrypted in software. There is no performance penalty associated with an encrypted network selection.

To select the Network ID, press "EDIT" to access the main menu, and then select "Communications" and "Network ID". If the selected Network ID matches that programmed into the primary Beacon Server, the "Alarm Status Clear" message will appear.

RF MODE

Mode determines if the 95/TX is defined as the "Beacon Server". In any GDS Corp network, one device acts as the beacon server, transmitting a continuous signal that allows each wireless device to synchronize its own transmission while minimizing power consumption. If the 95/TX is set for "Client", then no beacon is transmitted; if set for "Server", the 95/TX will broadcast the beacon signal.

NOTE: ONLY ONE DEVICE IN ANY GIVEN NETWORK SHOULD BE PROGRAMMED AS THE BEACON SERVER.

In some cases, it may be advantageous for a 95/TX to act as the beacon server, if the C2/TX controller is mounted inside a building or structure and the 95/TX alarm station is mounted outside and above ground level. In this case, a beacon transmitted by the 95/TX may have a better chance of reaching the remote GASMAX/TX monitors. In this case, be sure that the C2/TX Client/Server setting is set to "Client".

To select Client or Server, press "EDIT" to access the main menu, and then select "Communications" and "RF Mode". Remember, only one device in any given network should be set as the "Beacon Server".

RF POWER

Systems that operate on 900 MHz offer adjustable power levels, from 10 mW up to 1.0 Watt. Unless there are other GASMAX/TX monitors located in close proximity to the 95/TX, GDS Corp recommends setting the power level to 1.0 Watt.

To select the power level, press “EDIT” to access the main menu, and then select “Communications” and “TX Power”. Power levels in systems that utilize 2.4 GHz radios cannot be adjusted.

CHANNEL SETUP

The next step after the 95/TX is successfully integrated into the wireless network is to setup the total number of active channels and enable individual channels assigned to each remote GASMAX/TX gas monitor.

ACTIVE CHANNELS

Set the total number of channels (From “1” to “32”) that the 95/TX needs to monitor by selecting “Edit” followed by “System Config” and then “Active Channels”. Press “EDIT” to modify the setting.

INDIVIDUAL CHANNEL SETUP

Once the total number of channels is set, activate each channel that will be associated with an individual GASMAX/TX gas monitor. You will need to know the Remote ID of each GASMAX/TX monitor. Dual channel devices will have two device ID settings; this will allow the 95/TX to individually monitor and alarm on each channel separately.

For each monitored channel, the 95/TX can be programmed to “repeat”, or re-broadcast each received gas data packet. This is useful if the 95/TX is located between the GASMAX/TX monitor and C2/TX controller, or if the gas data packet needs to be repeated to other 95/TX alarm stations located in remote areas.

To enable a specific channel and set the Device ID and Repeat Packet parameters, press “EDIT” followed by “Channel Config”.

ALARM DEVICE SETUP

Once the network and channel parameters are set properly, program each relay to activate based on alarm data from specific channels. For more information on relay setup, see the User Menu section on relays.

To program each relay, press “EDIT”, followed by “System Config” and then select “Relay Config”.

6 TROUBLESHOOTING GUIDE

DISPLAY SCREEN SHOWS “NO SERVER FOUND”

- 95/TX located too far from beacon server; move closer
- 95/TX network ID not set to match network ID of primary beacon server; match Network IDs
- 95/TX antenna or antenna cable broken or damaged; repair or replace
- Radio type incorrect (using 900 MHz radio in 2.4 GHz network or vice-versa)

IN-RANGE ICON SHOWS DOTTED LINE

- Beacon server signal lost and regained; check communications

EVENT LOG SHOWS SINGLE CHANNEL IN COMM ERROR

- GASMAX/TX battery dead; replace battery
- GASMAX/TX too far from beacon server or too far from 95/TX; move closer

EVENT LOG SHOWS ALL CHANNELS IN COMM ERROR

- Network ID set incorrectly; check Network ID
- Beacon server unavailable; check device designated as beacon server
- Lightning strike on antenna or in vicinity; replace radio

CHANNEL SHOWS CONFIG PENDING

- This is normal – config data is broadcast by each GASMAX on 8 hour intervals. If condition persists for more than 24 hours, check GASMAX/TX Wakeup Timer setting.

DISPLAY SCREEN BLANK

- DC power failed or too low
- AC power unavailable or AC power supply failure

7 USER MENUS

The 95/TX Main Menu tree is shown below. To access the Main Menu, swipe the magnetic wand over the EDIT key. Use the UP and DN keys to select an item and press EDIT. Use NEXT to exit a menu.

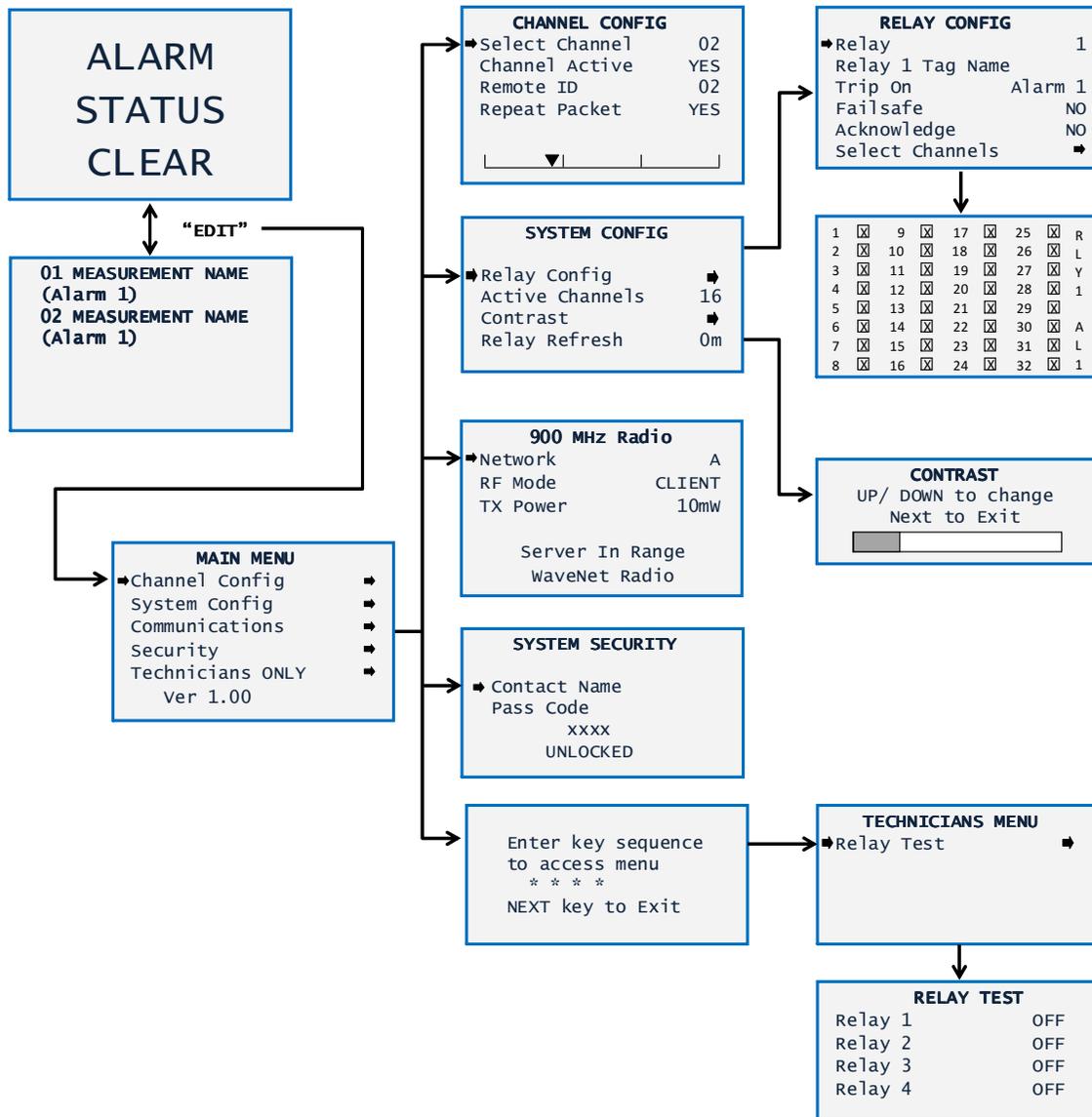


Figure 7-1: 95/TX Main Menu Tree

CHANNEL CONFIGURATION MENU

The Channel Configuration menu contains settings that are unique to each channel. There are two channels and each menu contains identical entries.

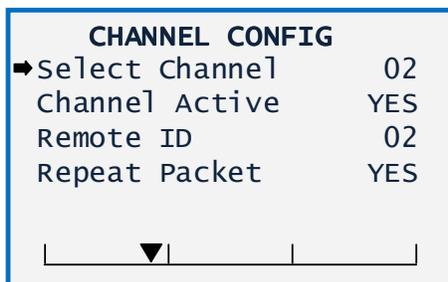


Figure 7-2: Channel Configuration Menu

SELECT CHANNEL – Use the EDIT key to select the channel to configure.

NOTE: WHEN EDITING CHANNEL INFORMATION, MAKE SURE TO SELECT THE CORRECT CHANNEL MENU BEFORE MAKING CHANGES.

CHANNEL ACTIVE – Set for YES if this channel is to be used to monitor a remote gas detector.

REMOTE ID – Set to match the Remote ID of the specific GASMAX/TX gas monitor associate with this channel.

NOTE: ALTHOUGH NOT REQUIRED, GDS CORP RECOMMENDS MAINTAINING A 1:1 RELATIONSHIP BETWEEN THE GASMAX/TX DEVICE ID AND 95/TX CHANNEL SELECTION. IN OTHER WORDS, IF THE GASMAX / TX DEVICE ID IS 5, THEN ASSIGN THAT GASMAX/TX TO CHANNEL 5 ON THE 95/TX, EVEN IF CHANNELS 2, 3 AND 4 ARE NOT USED.

REPEAT PACKET – Set for YES if the 95/TX should rebroadcast (“repeat”) the data packet received from the assigned GASMAX/TX gas monitor. This is useful if the GASMAX/TX is located farther away from the main controller. Default is “NO” and must be enabled if the repeat function is desired.

A “Comm Error Timeline” is shown in the bottom of the screen that indicates time since the last received transmission for this channel. Each time a gas data packet is received, the upper arrow indicator is moved to the far left, and then slowly moves to the right. If the arrow reaches the far right hand side of the screen, a Comm Error is generated for this channel.

SYSTEM CONFIGURATION MENU

The System Configuration menu contains items that are system dependent.

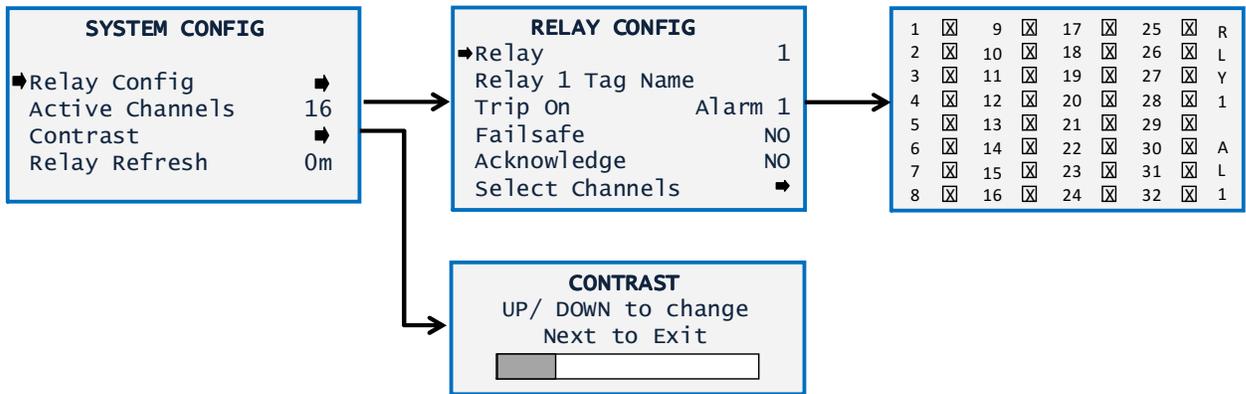


Figure 7-3: System Configuration Menu

RELAY CONFIG – Relay config allows the user to assign specific relays to each channel.

RELAY N – selects the specific relay programming to modify.

RELAY N TAG NAME – Allows the user to assign a name to a specific relay. Examples include “Horn” or “Red Strobe”.

TRIP ON – Assigns the relay to one of several alarm events: “Alarm 1”, “Alarm 2”, “Alarm 3”, “Fault/Comm” or “Any Alarm”.

FAILSAFE – Activates the relay in ‘no-alarm’ conditions such that the relay drops out when the alarm occurs. Use caution when setting relays for FAILSAFE if unit is running on solar or battery power.

ACKNOWLEDGE – Clears the alarm relay condition if the UP/ACK button is pressed.

NOTE: WHEN EDITING RELAY INFORMATION, MAKE SURE TO SELECT THE CORRECT RELAY MENU BEFORE MAKING CHANGES.

ACTIVE CHANNELS - Sets the total number of channels available. Setting this number to match the total number of gas detectors in a system minimizes the need to configure unused channels.

CONTRAST - Select the LCD contrast command and use the UP or DOWN to adjust the contrast of the LCD display.

RELAY REFRESH – Sets the time interval between required alarm acknowledge actions. In other words, if an alarm occurs and is acknowledged, and the condition persists for the programmed period of time, the alarm relay will be reactivated and will require another ACK. Setting Relay Refresh to “0” disables this feature.

COMMUNICATIONS MENU

The Communications Menu is used to configure the radio modem in the 95/TX. There are two similar menus, one for 900 MHz radios and another for 2.4 GHz radios.

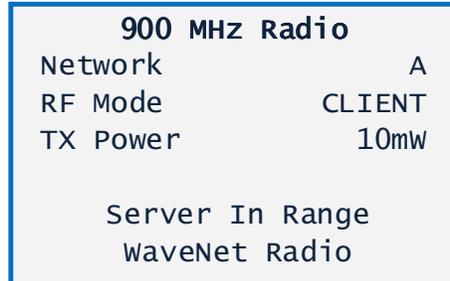


Figure 7-4: Communications Menu

NETWORK ID - May be set from "A" through "Z" and assigns the pseudo-random radio frequency hopping pattern and system identifier. A transmitter will not go In Range of or communicate with another transmitter operating with a different Network Identifier. Different Network Identifiers can be used to prevent radios in one network from listening to transmissions of another. Installations having more than one Server network should also have different Network Identifiers for each network.

RF MODE - Determines if the device is configured to transmit the network beacon server ("SERVER") or listen for the network beacon from another device ("CLIENT"). Only one device in any network should be programmed as a server.

TX POWER - Allows the user to adjust transmitter power levels if using a 900 MHz radio. Options are 10 milliwatts (mW), 200 mW, 400 mW and 1.0 Watt. Transmit power also affects the power level of the beacon signal if the 95/TX is set as the 'server'. Radios designed for 2.4 GHz are preset to 50 mW and power level cannot be adjusted.

SYSTEMS SECURITY MENU

The System Security menu allows the user to program a four digit pass code, requiring an operator to enter the pass code before altering any menu settings. The pass code locks the entire menu database.



Figure 7-5: System Security Menu

CONTACT NAME - A 12 character ASCII field that is available for displaying a phone # or name of a person or contact who knows the Pass Code. Lost Pass Codes may be recovered by entering the locked security menu and holding the UP key for 5 seconds. The 4-digit code appears near the bottom of the screen.

TECHNICIANS ONLY MENU

The Technician's Only menu group contains a Relay Test function that allows the user to individually activate each of the internal relays for test purposes. Select the desired relay and hit the EDIT key to toggle the relay between OFF and ON.



Figure 7-6: Technicians Only Menu

The sequence to enter the Technician's Only menu is four "UP" keys.

8 SPECIFICATIONS

Power	+12-30VDC, +24VDC, +12VDC or 110/220VAC depending on configuration and peripherals. Radio and display require 3 watts maximum.
Display	64 x128 pixel LCD with engineering units, bargraph and 30-minute trend
Input	Monitors up to 32 channels of wireless gas detection from GASMAX/TX wireless gas detectors. Supports GDS Corp networks "A" through "Z"
Output	Four programmable SPDT relays and one dedicated fault SPDT relay. Relays are rated for 5A @ 110/220VAC or 24VDC.
Output	Rebroadcasts wireless data packets (programmable on a per-channel basis)
RF Section (900 MHz)	Receiver sensitivity -100 dBm Frequency range 902 to 928 MHz. Repeater function: User adjustable transmit power from 10 mW to 1.0 watt
RF Section (2.4 GHz)	Receiver sensitivity -100 dBm Frequency range from 2.406 GHz to 2.435 GHz (network identifier A – R) and from 2.444 GHz to 2.472 GHz (network identifier S – Z) Repeater function: Fixed transmit power of 50 mW.
Temperature	Operating -40°C to +55°C
Memory	On-board non-volatile memory retains all user settings
Housing	Aluminum housing(s) with epoxy paint standard; #316 stainless steel optional
Dimensions	See dimensional drawings in Chapter 10.
Approvals	Enclosure CSA certified for Class I Division 1 hazardous areas
Warranty	Two years on electronics

9 SPARE PARTS

DISPLAY & ENCLOSURE

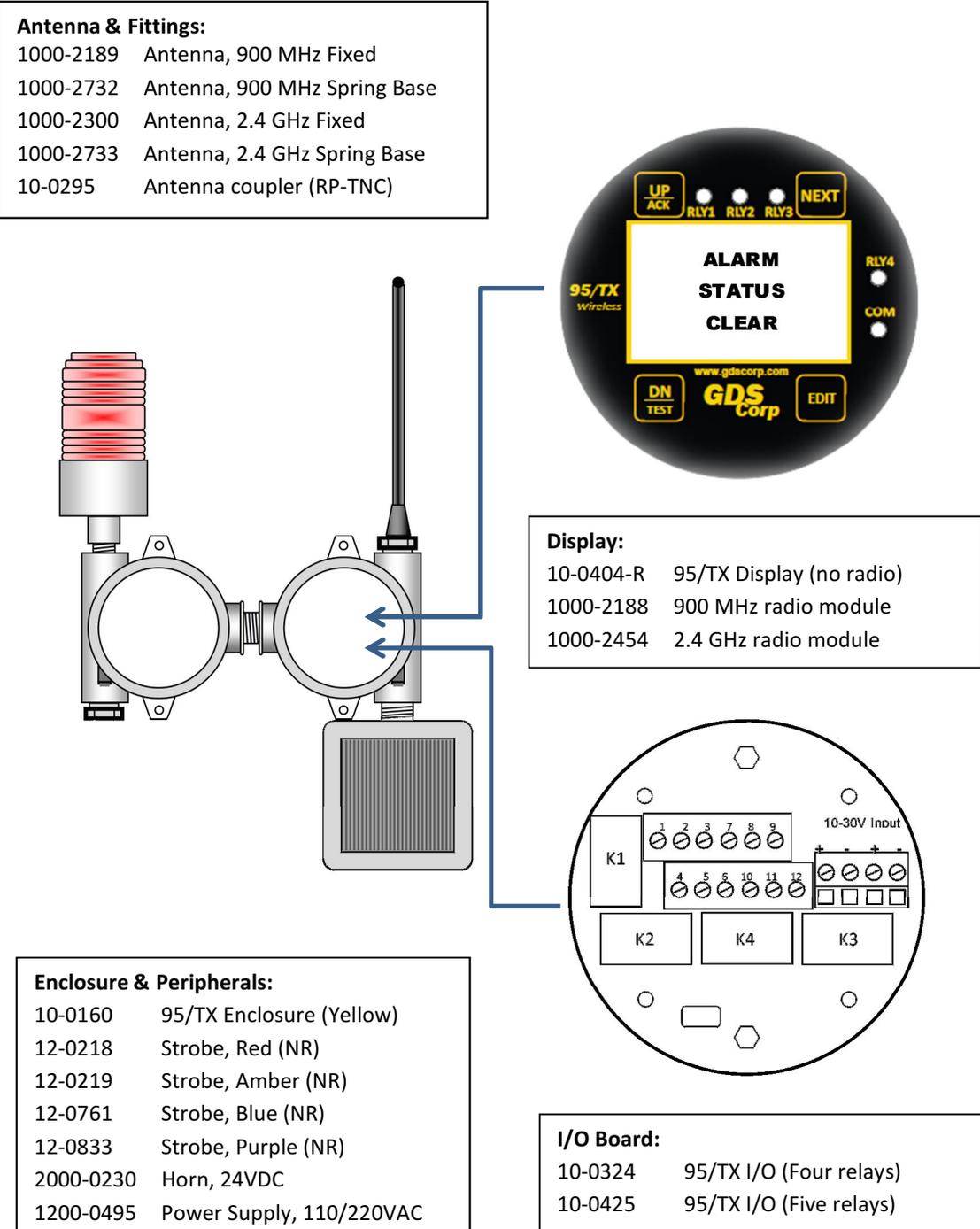


Figure 9-1: 95/TX Spare Parts

10 DRAWINGS AND DIMENSIONS

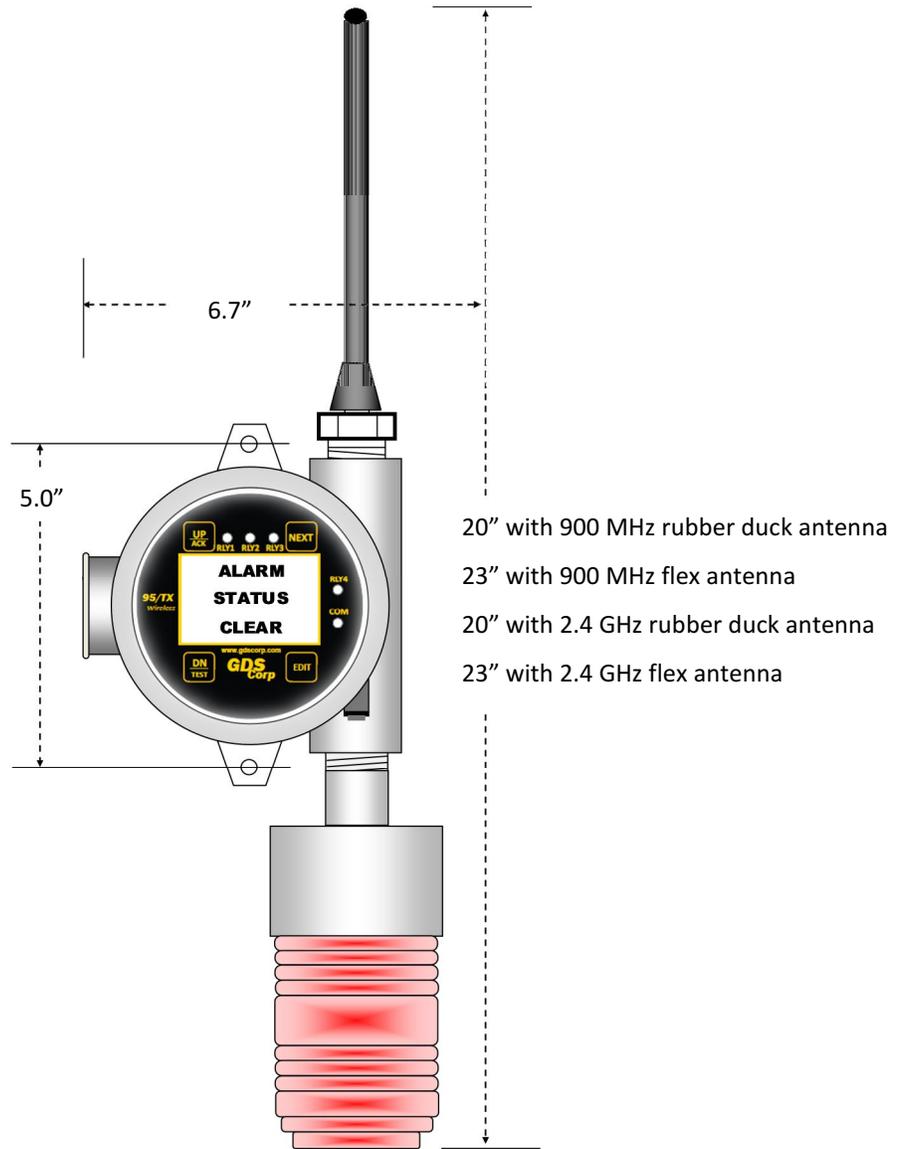


Figure 10-1: 95/TX Dimensions (DC, Strobe Only)

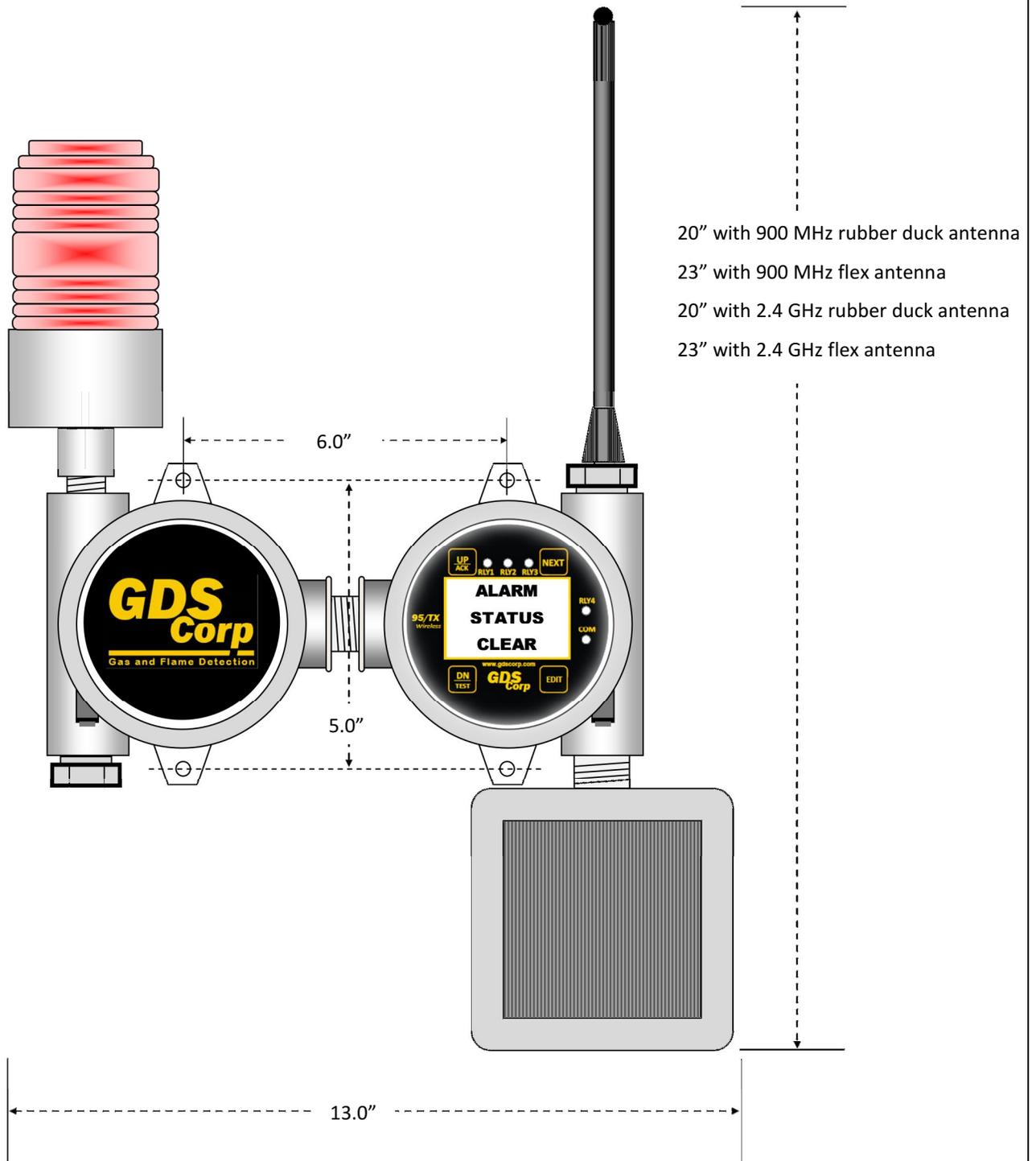


Figure 10-2: 95/TX Dimensions (AC, NR Horn + Strobe)

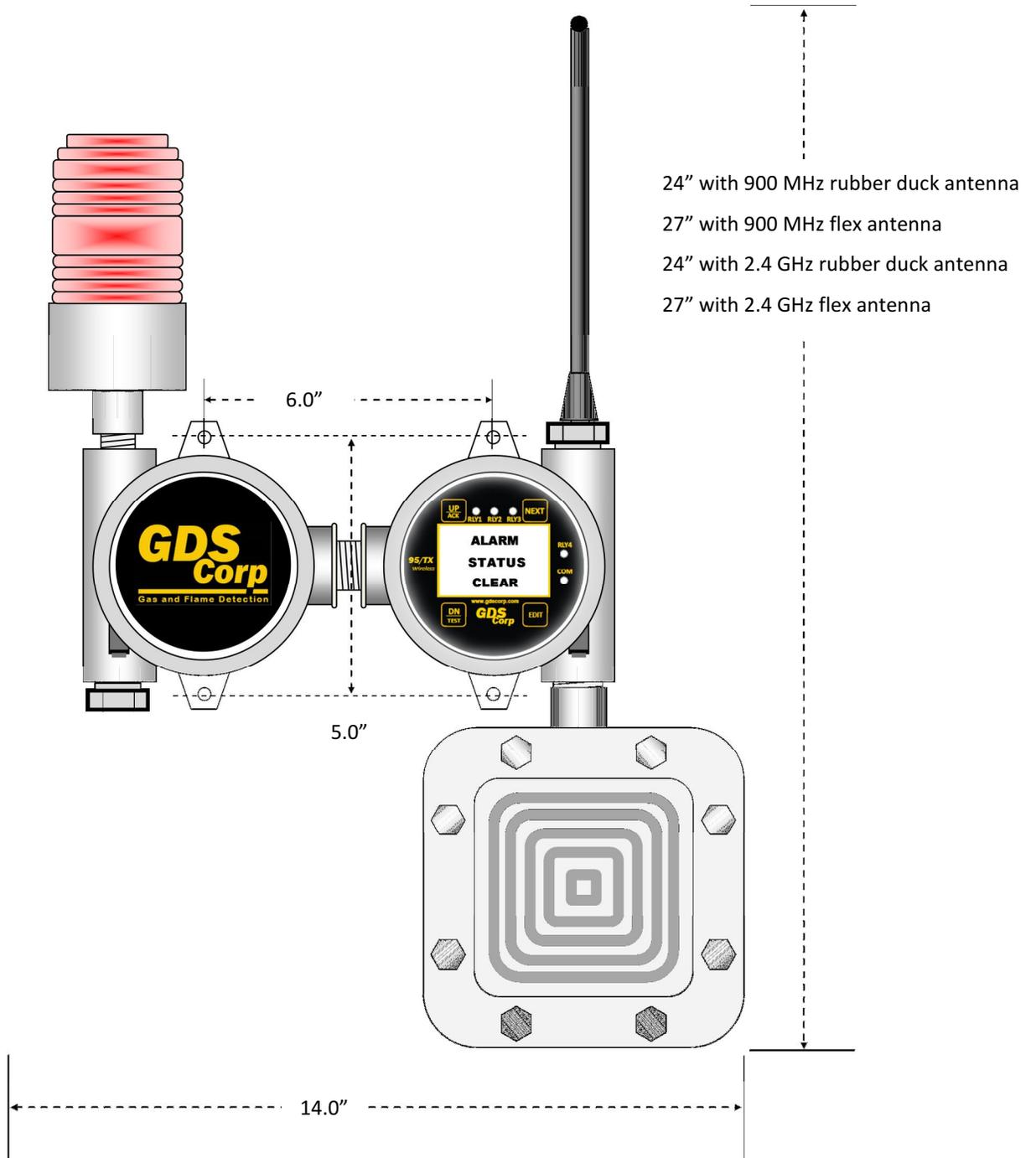


Figure 10-3: 95/TX Dimensions (XP Horn + Strobe)

11 NETWORK SETTINGS

The set of Network Identifiers used by the 95/TX specify a combination of frequency hopping pattern, frequency band, System ID value and whether or not the data is encrypted using a proprietary software-based algorithm.

NETWORK ID	HOP PATTERN	System ID	Data Encrypted?	900 MHz Band	2.4 GHz Band	Compatible with previous generation?
A	1	1	No	902-928 MHz	2.402 - 2.478 GHz	Yes
B	2	2	No	902-928 MHz	2.402 - 2.478 GHz	Yes
C	3	3	No	902-928 MHz	2.402 - 2.478 GHz	Yes
D	4	4	No	902-928 MHz	2.402 - 2.478 GHz	Yes
E	5	5	No	902-928 MHz	2.402 - 2.478 GHz	Yes
F	6	6	No	902-928 MHz	2.402 - 2.478 GHz	Yes
G	7	7	No	902-928 MHz	2.402 - 2.478 GHz	Yes
H	8	8	No	902-928 MHz	2.402 - 2.478 GHz	Yes
I	9	9	No	902-928 MHz	2.402 - 2.478 GHz	Yes
J	10	10	No	902-928 MHz	2.402 - 2.478 GHz	Yes
K	11	11	No	902-928 MHz	2.402 - 2.478 GHz	Yes
L	12	12	No	902-928 MHz	2.402 - 2.478 GHz	Yes
M	13	13	YES	902-928 MHz	2.402 - 2.478 GHz	No
N	14	14	YES	902-928 MHz	2.402 - 2.478 GHz	No
O	15	15	YES	902-928 MHz	2.402 - 2.478 GHz	No
P	16	16	YES	902-928 MHz	2.402 - 2.478 GHz	No
Q	17	17	YES	902-928 MHz	2.402 - 2.478 GHz	No
R	18	18	YES	902-928 MHz	2.402 - 2.478 GHz	No
S	19	19	YES	902-928 MHz	2.402 - 2.478 GHz	No
T	20	20	YES	902-928 MHz	2.402 - 2.478 GHz	No
U	21	21	YES	902-928 MHz	2.402 - 2.478 GHz	No
V	22	22	YES	902-928 MHz	2.402 - 2.478 GHz	No
W	23	23	YES	902-928 MHz	2.402 - 2.478 GHz	No
X	24	24	YES	902-928 MHz	2.402 - 2.478 GHz	No
Y	25	25	YES	902-928 MHz	2.402 - 2.478 GHz	No
Z	26	26	YES	902-928 MHz	2.402 - 2.478 GHz	No

Figure 11-1: GDS Corp Network Settings

12 WIRELESS SYSTEM SETUP CHECKLIST

Follow the sequence shown below to properly power-up a wireless gas detection system based on a single C2/TX Wireless Site Manager, one or more GASMAX/TX Wireless Gas Monitors and one or more 95/TX Wireless Alarm Stations.

STEP 1	<p>Identify a central location for the C2/TX Wireless Site Manager. Install the C2/TX and remote 'base station' antenna (if so equipped).</p> <p>Install each GASMAX/TX Gas Monitor in a location where gas hazards may exist, and where the antenna is visible from the base station antenna (if possible). Do NOT install next to sources of RF interference such as high voltage power lines or mercury vapor lighting.</p> <p>Install each 95/TX Wireless Alarm Station / Repeater in a location where alarm indication is needed, and where the antenna is visible from the base station antenna (if possible). Do NOT install next to sources of RF interference such as high voltage power lines or mercury vapor lighting.</p>
STEP 2	<p>Apply power to the C2/TX Wireless System Manager</p> <p>Select the desired network identifier ("A" through "Z") and Select RF Mode = "Server"</p> <p>If using 900 MHz radios, set the desired transmit power output. One watt is recommended.</p> <p>Enable the desired number of wireless channels</p> <p>Program relays / warning devices associated with each channel.</p>
STEP 3	<p>Apply power to each 95/TX Alarm Station</p> <p>Select the network identifier ("A" through "Z") to match the ID programmed into the C2/TX</p> <p>Select RF Mode = "Client"</p> <p>Enable the desired number of wireless channels</p> <p>Program repeater function for desired channels</p> <p>Verify "Server In Range"</p> <p>Program relays / warning devices associated with each channel.</p>
STEP 4	<p>Turn on each GASMAX/TX gas monitor by holding a magnet over UP/ON key for several seconds</p> <p>Select the network identifier ("A" through "Z") to match the ID programmed into the C2/TX</p> <p>Configure the RTU # (device ID) for a unique value</p> <p>Program channel tag name (visible on C2/TX and 95/TX)</p> <p>Hold a magnet over the UP key to force a gas packet transmission</p>
STEP 5	<p>Confirm reception of wireless transmissions and valid gas detector readings on the C2/TX</p> <p>Confirm reception of wireless transmissions on each 95/TX alarm station</p>
STEP 6	<p>Perform end-to-end test (apply gas, confirm alarms) using calibration or test gas</p>

Figure 12-1: Step-by-Step Wireless Setup Checklist

13 WIRELESS RANGE CALCULATIONS

In order for reliable wireless communication to occur, transmitter power output, antenna 'gain' and receiver sensitivity must exceed the 'loss', or attenuation experienced by radio signals as they travel between transmitter and receiver. RF signals experience two kinds of 'loss' as they travel through space. "Free space loss" is due strictly to the fact that RF signals 'spread out' as they propagate from a single point source. Additionally, RF signals experience loss as a result of interference and interaction with buildings, trees, structures and other physical barriers.

This gain or loss is measured in decibel-milliwatts (dBm) and is a function of both distance and frequency. An estimate of free space loss for 900 MHz and 2.4 GHz is shown at right.

Free Space Loss @ 900 MHz:

-71 dBm at 300 ft., -91 dBm at 3000 ft.

Free Space Loss @ 2.4 GHz:

-80 dBm at 300 ft., -100 dBm at 3000 ft.

EXAMPLE POINT TO POINT GAIN CALCULATION

In a typical 2.4 GHz system shown below, for example, the transmitter power output is +21 dBm, each antenna provides an additional gain of +3 dBm and the receiver sensitivity allows reliable reception of a signal at -95 dBm power. Therefore, the total system gain is $21+3+3-(-95) = 122 \text{ dBm}$.

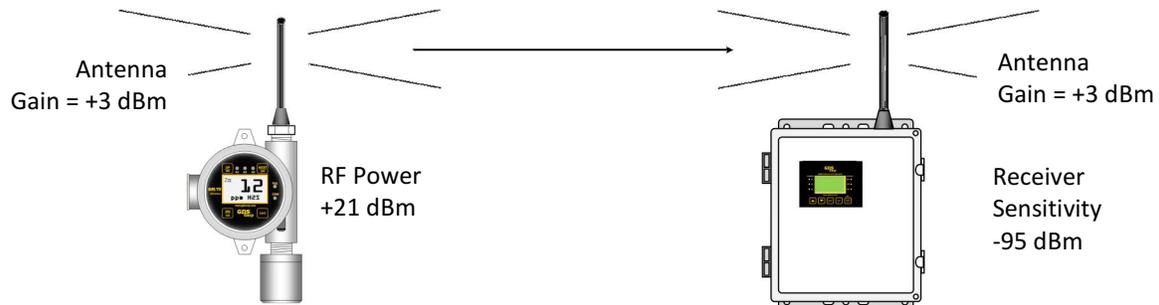


Figure 13-1: RF Transmission Margin

Since a reliable system requires a gain margin of +20 dBm, this system will work acceptably if the total free space loss is less than **102 dBm** ($122 \text{ dBm} - 20 \text{ dBm}$). However, this theoretical calculation does not take into account additional losses due to intervening structures or foliage.

WAYS TO MINIMIZE RF SIGNAL LOSS

One way to minimize free-space loss is to ensure that the combined height of the transmitter antenna and receiver antenna exceeds the diameter of the "RF Transmission Zone" (see Fig. 13-2) and that at least 60%

of the area inside the zone should be free of obstacles. Although both 900 MHz and 2.4 GHz signals can travel around or through most towers or buildings, structures such as large metal tanks or solid metal buildings may attenuate the signal to the point where reception is marginal.

Raising the antenna at either end of the path will improve signal strength and reduce transmission errors. GDS Corp recommends placing any antenna at least 6 feet above the surrounding terrain, and even more if possible. However, note that the standard antenna transmits its maximum signal strength in a relatively flat 'donut-shaped' pattern which may affect the performance of 95/TX monitors located in close proximity to an elevated C2/TX WSM or receiver/controller.

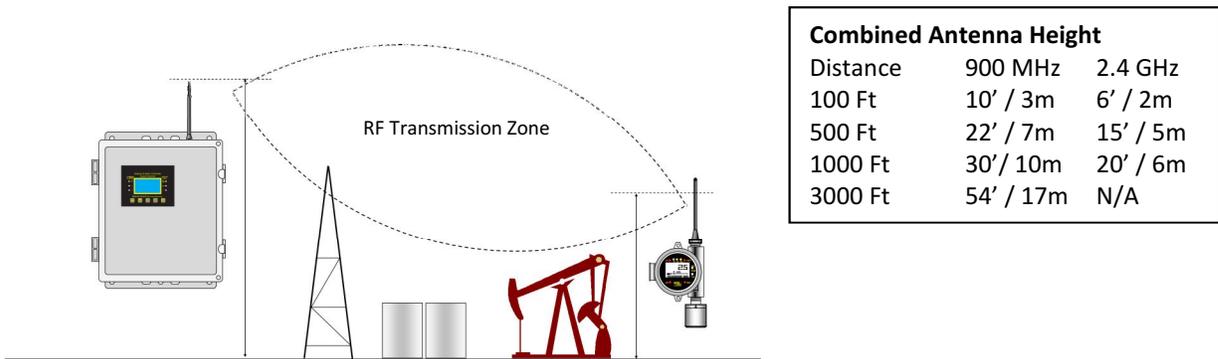


Figure 13-2: RF Transmission Zone