

Radio Frequency (RF) Installation and Support

Revised: 110102



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Welcome to GameTech International, Inc. (GTI)

Purpose of this Guide

This manual is designed to be used by GTI staff. It provides the instructions for using TED[®] and TED²C[™] RF on the Diamond system.

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CHAPTER 1: RADIO FREQUENCY (RF)

Objectives

In this chapter:

- An Overview of RF
 - Modes of Operation
- RF Signals
- Operational Information
 - How it Works
- Jurisdictional Restrictions
- System Installation
 - Hardware: Base Station Controllers and Transmitters
 - RF Test Tools
 - Signal Strength Meter (SSM)
 - Standalone Battery Powered Transmitter
 - Getting Started
- Paper Survey
- Questions and Answers



Overview

With radio frequency (RF), TED[®] and/or TED²C[™] users can enjoy the advantages of playing with wireless electronics. Depending on the mode being used, users can enjoy from a fully automatic mode of play which does all the daubing, game and session changes to a game change only mode which notifies the unit of game and session changes only and requires the user to manually daub numbers.

Modes of Operation

There are five modes of operation available with an RF installation as listed below however, it is the responsibility of the technician to be aware of any jurisdictional or state laws governing the use of RF and, which method is approved in their jurisdiction.

The following information is the same or similar regardless of which mode of operation is being used. More specific information pertaining to the specific modes follow.

In all modes of operation...(Exception: Game Change Only.)

- the units will enter sleep mode when left inactive for a period of time.
(Exception: Fully Automatic mode.)
- players can *CHOOSE* to manually enter numbers in all modes of operation and they will be accepted by the TED[®] and/or TED²C[™] units. (This is enabled by the customer through a menu option.)

Note: Numbers MUST be entered manually if the RF signal has been lost.

- the unit displays “Bingo Pending” after it has received the RF signal and will bingo after the customer has pressed enter.
 - *Exception:* In the Fully Automatic mode this will be the case only if the customer has chosen to enter numbers manually.
 - *Exception:* In the Manual Daub #3 Mode units can bingo on manually entered numbers.
- if the TED[®] and/or the TED²C[™] unit is on the wrong game or session, it is corrected automatically when the next RF signal is received.
- in addition to game information, the RF signal sends out session information. This supports halls selling more than one session at a time.
- the units will display “RF MODE,” ball-calls (in the order received), number of cards and number away on the main screen.

1) Fully Automatic

In the fully automatic mode, *everything is done automatically* without user intervention.

- **Ball calls, game numbers, patterns and session information** is sent and received by the TED[®] and/or TED²C[™] unit **each time a signal is received**.
- The TED[®] and/or TED²C[™] units will **not enter sleep mode or shut off** when using the fully automatic mode.

2) Manual Daub #1

In the manual daub #1 mode, the *enter button must be pressed to daub cards*.

- Pressing enter will **catch the player up to all ball calls, game, and session** information should the player not press enter each time.
- **Incorrect manual entries are corrected** when the next RF signal is received.

3) Manual Daub #2

In the manual daub #2 mode, the *enter button will daub **ONE NUMBER** at a time only*.

- Pressing enter a **second time** will **daub numbers in the order they were called**.
- If the customer misses the **last five ball calls, enter would have to pressed five times** to catch up. The player will be able to see what numbers are missing by going to the units' flashboard.
- **Incorrect manual entries are corrected** when the next RF signal is received.

4) Manual Daub #3

In the manual daub #3 mode, the *enter button will daub **ONE NUMBER** at a time only*.

- Pressing enter a **second time** will **daub numbers in the order they were called**.
- If the customer misses the **last five ball calls, enter would have to pressed five times** to catch up. The player will be able to see what numbers are missing by going to the units' flashboard.
- Units can bingo on manually entered numbers.

5) Game Change Only

In the game change only mode, the *only RF information received is when the caller changes the game or session*.

RF Signals

The following information pertains specifically to RF signals received by the TED[®] and/or TED²C[™] units.

- The single frequency RF system utilizes frequencies at 915 MHz ISM (Instrumentation, Scientific, Medical) band. The RF energy in this band acts more like light instead of radio waves and this ultra high frequency RF energy will bounce off walls and can be absorbed or blocked by human bodies or obstructions.

Attention: As a general rule, each RF TED[®] and/or TED²C[™] needs to be able to “see” at least two transmitters to avoid dead spots.

Note: Dead Spots: In certain situations when RF energy bounces off objects, the two signals, called the incident and the reflected, can reach a receiver (i.e. TED[®]/TED²C[™]) at the same time. This phenomenon is called “multi-path.” When the reflected wave is 180 degrees out of phase with the incident wave, the two signals can cancel and produce a “dead spot.” It is for this reason that multiple transmitters are used.

- The TED[®] and/or TED²C[™] units play automatically as soon as the Caller advances to game one.
- Cell phones have no effect on GTI RF units.
- Players are notified when the TED[®] and/or TED²C[™] unit receives a signal. This assures the customer that the unit is receiving.
- If a unit loses the RF signal (for 10 seconds (not adjustable)) it has a visual flashing message displaying “Manual Entry Required for Last Ball” and an audio alarm requiring customer acknowledgement. “RF MODE” will not display.
 - If a unit alarms and then the alarm stops, it is again receiving a signal.
 - If any key is pressed while the unit is alarming, it will go into manual mode and ball calls can be entered manually. Once the signal resumes, it will go back into RF mode.
- When a unit is voided, the RF signal ensures all cards are erased.
- If the TED[®] and/or the TED²C[™] are missing, a locate feature on the POS will make the unit beep until it has been located and a button on the unit is pressed.
- The unit will display status information to the player such as cards getting close to a bingo and how many numbers they are away from a bingo.

Operational Information

The following list explains some of the additional features of RF play.

- RF TED[®] and TED²C[™] units are marked as RF capable on the case. In addition, RF TED[®] units are two-tone colored and all TED²C[™] units are marked as RF capable.

Note: Although TED[®] and TED²C[™] units are RF capable, they may be used in a non-RF hall.

- Supported Games:
 - Callers Choice
 - Hard Luck (for progressive games).
 - Play with Paper
 - Speed Games (With two-second ball calls as required by some jurisdictions.)
- When games come up in a session that the player has not purchased cards for, the electronics will display “No cards” or “No cards for this Game” depending on whether the unit is a TED[®] or TED²C. (Based on available display space.)

How it Works

- The Diamond master provides information to the ¹Base Station Controller (BSC) via a 9-Pin RS-232 connection...(The master must have a working com port.)
- the Base Station Controller (BSC) provides information to the transmitters via a CAT5 cable connection...

Note: The transmitters also receive power from the Base Station Controller.

- the Transmitters (XMTR) (usually four) provide information to the TED[®] and/or TED²C[™] units via an RF signal which loops three times per second.

Note: Currently this is a one-way communication. When two-way has completed development, the TED[®] and/or TED²C[™] unit will be able to communicate information back to the Diamond[™] system via an RF signal. The CAT5 cable provides bidirectional communication and power from the BSC to the XMTRs.

¹This device 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.

Jurisdictional Restrictions

As with many aspects of bingo operations, RF may not be legal in some jurisdictions or, if legal, may require setup variations to ensure the legality of the installation. The hall technician has the responsibility of being knowledgeable and implementing RF to conform to these jurisdictional guidelines. For information on guidelines, the technician should contact their immediate supervisor.

FCC Compliance Statement

This device 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.

Unauthorized modifications or changes made to this device not expressly approved by the party responsible for compliance could void the users authority to operate the equipment.

System Installation

Required Hardware

The GameTech 900 MHz RF TED[®] and TED²C[™] system contains three basic components as follows:

Base Station Controller (BSC)

The BSC should be installed within close proximity of the ball call PC (up to 25') and within 6' of an AC power plug.

Note: The BSC should remain within easy access. If transmission problems occur, a reset may be required.

Transmitters (XMTR)

- There are four transmitters that should be strategically placed around the hall to ensure full line of sight coverage from at least two transmitters to the TED[®] units over the entire playing floor. (Range: 100' radius, 200' diameter.)
- The XMTRs can be placed right-side up or upside down but, the antenna must be perpendicular to the floor for maximum coverage over the playing area.
- The CAT5 cables should be routed from each XMTR to the BSC and connected to ensure a clean installation.

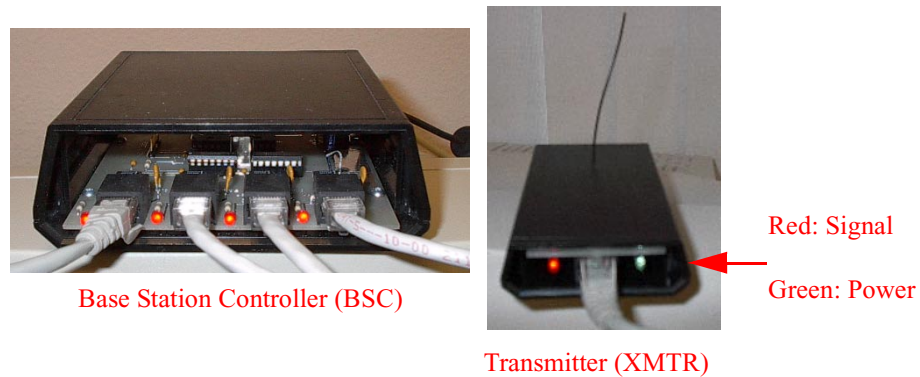


Figure 1. Base Station Controller and Transmitter

Note: The Transmitter and the Battery Powered Transmitter visually appear to be exactly the same however, when the battery is plugged into each unit, they will respond differently as follows:

- **Transmitter** - Green light will be on, red light will not.
- **Battery Powered Transmitter** (used for site survey only) - Green light will be on indicating power, red light blinks at one second intervals.

TED[®] and TED²C[™] Units

These units are standard GameTech products that have 900 MHz RF receivers installed. Each unit has hardware modifications to accommodate the RF receivers and special software for using the new source of data from the RF module. These units will be marked as RF capable.

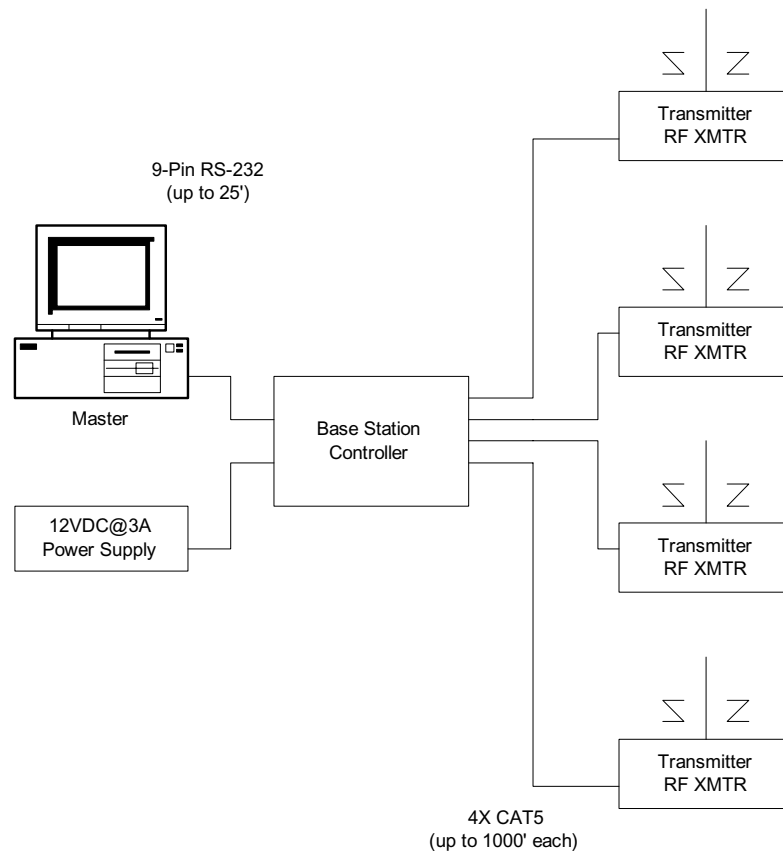


Figure 2. RF Connectivity Diagram

Note: Be aware that the GTI system cannot differentiate between RF and non-RF units which could affect customer billing. RF units should be sold from a separate window to ensure players are getting the type of unit they desire.

RF Test Tools

Suitability of a hall is determined by two factors: **Interference** and **Coverage**. Engineering has developed two tools to help in the evaluation of the hall, a Signal Strength Meter (SSM) and a Standalone Battery Powered Transmitter. (Contact your supervisor to obtain the RF testing tools if you are required to do a site survey, part numbers are listed below.)

- 99-90000-0001 SF RF Site Survey Kit (consisting of the following):
 - 99-90000-0002 SF RF Survey Receiver
 - 99-90000-0003 SF RF Survey Transmitter
 - 99-56400-0001 SF RF Transmitter Battery Cable

Signal Strength Meter (SSM)

One tool is the handheld RF Signal Strength Meter (SSM) as pictured in Figure 3. The SSM is battery powered (9V) and activated by a push button switch located on the side of the unit and is tuned to the same frequency used by the system. The SSM uses the same receiver that is used in the TED[®] and TED²C[™] units to receive the RF signals and, has seven light emitting diodes (LED) located on the front. The LED's give a visual bar-graph indication similar to that of a volume indicator on the front of a modern stereo to communicate the strength of the signal to the user. There are four green, one yellow and two red LED's located from top to bottom.



Figure 3. Handheld Signal Strength Meter (SSM)

Standalone Battery-Powered Transmitter

The other tool is the standalone battery powered transmitter as shown in Figure 4. This tool is used to generate an RF signal to help in the measurement of signal coverage in the hall. The standalone transmitter also uses one external 9V battery (with a special harness) and will operate for several hours while the tests are conducted.

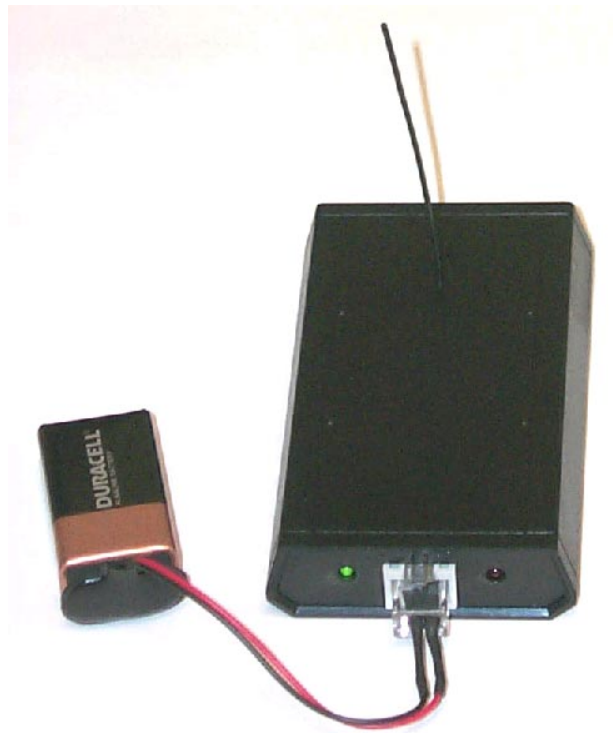


Figure 4. Stand-Alone Battery Powered Transmitter

Note: The Transmitter and the Battery Powered Transmitter visually appear to be exactly the same however, when the battery is plugged into each unit, they will respond differently as follows:

- **Transmitter** - Green light will be on, red light will not.
- **Battery Powered Transmitter** (used for site survey only) - Green light will be on indicating power, red light blinks at one second intervals.

Paper Survey

Use the site survey form to begin the evaluation of RF in a bingo operation. Diagraming the hall is an important step to lay out the necessary testing areas. Figure 5 provides a sample hall on which to base your diagram. If the hall has more than one room, each room will need to be diagramed individually. Create an architectural diagram of the hall using the graph paper located in the site survey form.

Note: RF site surveys must be performed or approved by a Field Supervisor.

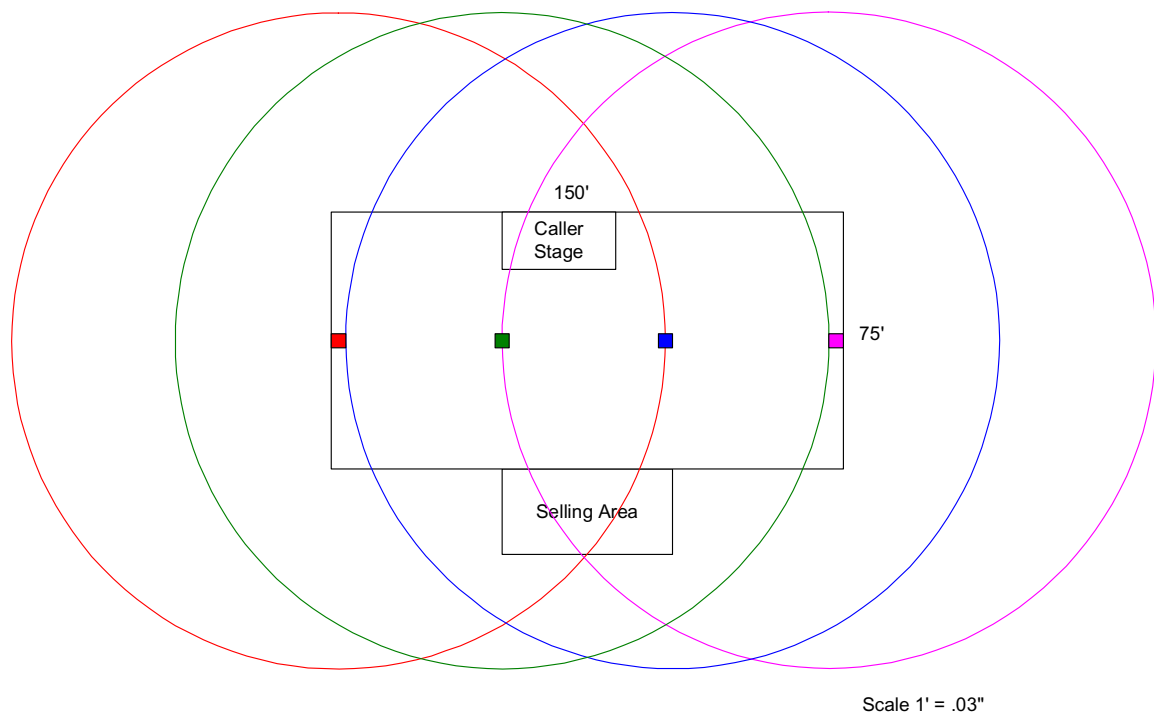


Figure 5. Sample Hall Diagram

Diagramming a Hall

- Print the site survey form.
- Measure the room(s) in the hall.
- Locate where the master computer is placed. The Base Station Controller (BSC) needs to be located within a 25 ft. cable length of it.
- Once the location of the BSC is determined, the optimum placement of the transmitters and routing of the CAT5 cables from the BSC to each transmitter needs to be determined. Each transmitter can cover a circular area with a radius of about 100 feet (200' diameter). Use the site survey form to assist in the placement.
- Using the site survey form to create a diagram, cut out four circles representing the 100' radius of the transmitters. Adhere to the rule that each location on the floor must be able to see at least two transmitters. The sample hall in Figure 5 displays the radiation patterns of each respective transmitter. (The scale of the drawing has been reduced for this document.)
- The transmitters are represented by the small squares down the center line of the hall. Ceiling mounting is highly recommended because it keeps the signal from being blocked by player's bodies and the height gives the best overall coverage for each transmitter.

Interference Signals

When walking through the hall with all equipment (computers, etc.) turned on and no active transmitters, only the bottom red LED on the SSM should be illuminated when the power switch is pressed. Noise or other insignificant signals may cause the second red LED to flash randomly. If a constant yellow or green illumination is present, the source of the interfering signal must be determined and considered.

Examples of Possible Interferences:

- | | | |
|--------------------------|-----------------------|------------------|
| -Wireless Gaming Devices | -Wireless microphones | -Cordless Phones |
| -Cell Phones | -Walkie Talkies | -Radios |

Location and Isolation of Interferences:

When walking through the hall and interference is picked up, attempt to locate the item(s) either visually or by asking persons in the area. If the signal is too strong and cannot be moved in frequency or eliminated, it may disqualify the hall from using as an RF system.

Coverage

- Position the standalone battery-powered transmitters in locations determined by the paper survey.
- The SSM is then used to determine the adequacy of coverage of the transmitter placement.
 - With the system active at least one green LED should illuminate in all locations within the circle defined by the paper survey. Remember with one transmitter only, you may see the "dead spots" from location to location as you move through the area. This is normal. The SSM's receiver is calibrated to respond like those in the TED[®] and TED²C[™].
 - One green LED illuminated is sufficient signal for essentially error free data transmission. When the entire system is installed it's expected for the top green LEDs to blink during normal system operation. Each transmitter is turned on sequentially by the BSC. No two transmitters are ever on at the same time. Consequently, the signal strength indicated by the green LEDs will vary causing the top LEDs to blink on and off at the scan rate of the system. This phenomenon is caused by the SSM picking up transmitters close by (large signal) and those farther away (small signal).
- If the signal strength, as indicated by the SSM, is adequate throughout the hall, the hall can be considered a good candidate for the RF system.

MASTER.INI Settings

Make the following changes to the [GENERAL] section of the MASTER.INI:
(\TXT directory)

RFENABLED=00=Off or 1, 2, 3 or 4 for appropriate com port.

CHH.INI Settings

Make the following changes to the [GENERAL] section of the CHH.INI: (\CHH directory)

USE_RF=1 This setting should always be one.

Technician Questions

Q: How long will the battery on the SSM lasts?

A: Quite a long time since it is activated only when the button is pushed and the button is momentary.

Q: Any special way that the SSM should be held while performing tests?

A: With antenna straight up is best.

Q: Where should the BPT be placed? Is on top of a bingo table close enough when the real unit will go in the same location just 20 feet higher? Does it need to be exactly where the other transmitter will go?

A: Without people in the room, just on a table or maybe a 6' step ladder. People make the biggest difference in signal propagation.

Q: How long should the tech stop in each location to ensure that they are getting a good signal? How many locations should they check for signal at?

A: They should go to the extremes of the hall (corners) and then down the center stopping for 5 to 10 seconds at each location about 20' feet apart. With a single BPT when they stop they should move the SSM around for the best signal. With one BPT there will be dead spots during this test.

Q: Can we assume that the hall will be empty when the test is done? Do we care?

A: Only if the BPT is on the ground level and if there are a few bodies around it probably won't be a big deal.

Q: How do you know when the battery is dead on the BPT?

A: There are two LEDs on the BPT, a Green and Red. The Green LED indicates power and is always on when there is power applied. The Red one blinks at a 1 second rate when transmitting (transmission is constant even though the LED blinks). When the Red LED stops blinking the Green one is dim it is time to change the battery. A typical 9V alkaline battery has a capacity of about 590 mAH so the BPT should easily last at least 12-15 hours if left on continuously.

Q: In the “Interference” information, what are some examples of devices that may interfere (cordless phones, walkie talkies, etc.)? Possibly other wireless gaming devices?

A: You hit on two of the biggies. Wireless microphones are another potential source. At the BETA hall we experimented with both a cordless phone and the Wireless mic and neither caused any problems. There is currently no data on other wireless gaming devices like the Fortunet system. Some Commercial Power companies use 928 MHz for their SCADA (System Control And Data Acquisition) systems and communicate with their substations with it. This is a very remote possibility for interference.

Q: In the “Coverage” information, is there any special way that they need to mount the BPT when doing the test? Height, location, antenna direction, etc.

A: At the BETA hall, the XMTRs were mounted upside down attached to the ceiling framework. Learning from that experience each XMTR enclosure now has a small slot cut in the bottom to accommodate a tie wrap mount technique.

Conducting a Site Survey

Prior to conducting the site survey, the technician should read and be familiar with the information contained in the GameTech RF Installation and Support manual. The site survey must be completed prior to considering a hall for RF and must include the following information:

- Information on how the site survey was performed.
- Results of site survey.
- Transmitter locations.
- Site survey notes.

For assistance call Customer Support at 1-800-959-1727.

Note: RF site surveys must be performed or approved by a Field Supervisor.

Site Survey Form

The following worksheet is provided for technician use. Please ensure the information is completed in detail. Several diagrams are provided to diagram the hall to scale. For transmitter radius, use the provided circles or a protractor to ensure the proper coverage.



Getting Started

To provide guidance for conducting an RF site survey, use the following as a guideline.

1. **Contact field supervisor** to obtain **testing tools** as follows:
 - Signal Strength Meter (SSM)
 - Standalone Battery Powered Transmitter
2. **Print the site survey form.**
3. **Walk the hall** using the **SSM** to check for interference with all equipment turned on (computers etc.) and no active transmitters. If hall passes this step, continue to next step.

Attention: As a general rule, each RF TED[®] and/or TED²C[™] needs to be able to “see” at least two transmitters to avoid dead spots.

4. Using the site survey form, **measure** and **diagram** the **hall**.
5. **Mount BPT** (Battery Powered Transmitter) based on hall diagram.
6. If results are positive, hall can be installed with RF (must be approved by Field Supervisor).

GameTech International Radio Frequency (RF) Site Survey



Hall Name: _____
 Address: _____
 City, State, Zip: _____
 Phone: _____ Hall Manger: _____
 GTI Salesperson: _____ Survey By / Date: _____



(Fill in or circle the appropriate response.)

Does the master have an open working com port? Yes No

What are the number of TED[®] units? _____ TED²C[™] units? _____

How many RF units are being added? _____ TED _____ TED²C[™]

Do jurisdictional guidelines allow the installation of RF into this hall? Yes No Supv. Initials_____

Do jurisdictional guidelines allow the use of auto daub in this hall? Yes No Supv. Initials_____

What is the mode of operation? (see manual for reference)

__Fully Automatic __Manual Daub 1 __Manual Daub 2 __Manual Daub 3 __Game Change Only

How many rooms does this bingo operation have? _____

If there are multiple rooms, will the transmitters be able to be placed within "site" of two transmitters in another room? Yes No

Will additional transmitters be needed to accommodate room size or multiple rooms? If yes, explain:

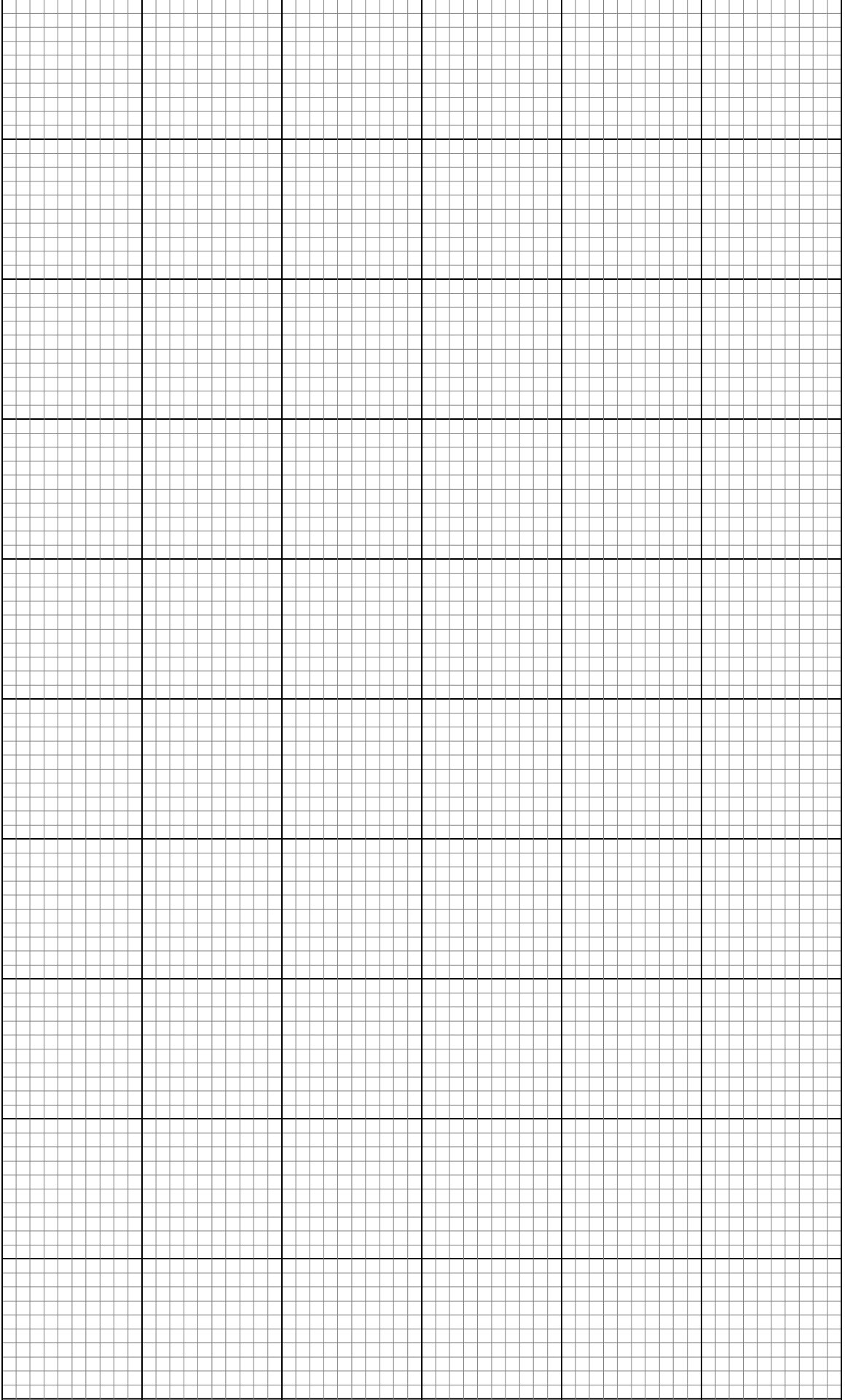
Can the Base Station Controller be easily and professionally placed within 25 ft. or less from the master and within 6 ft. of a power outlet? Yes No

(Note: The BSC should remain within easy access. If transmission problems occur, a reset may be required by cycling it's power.)

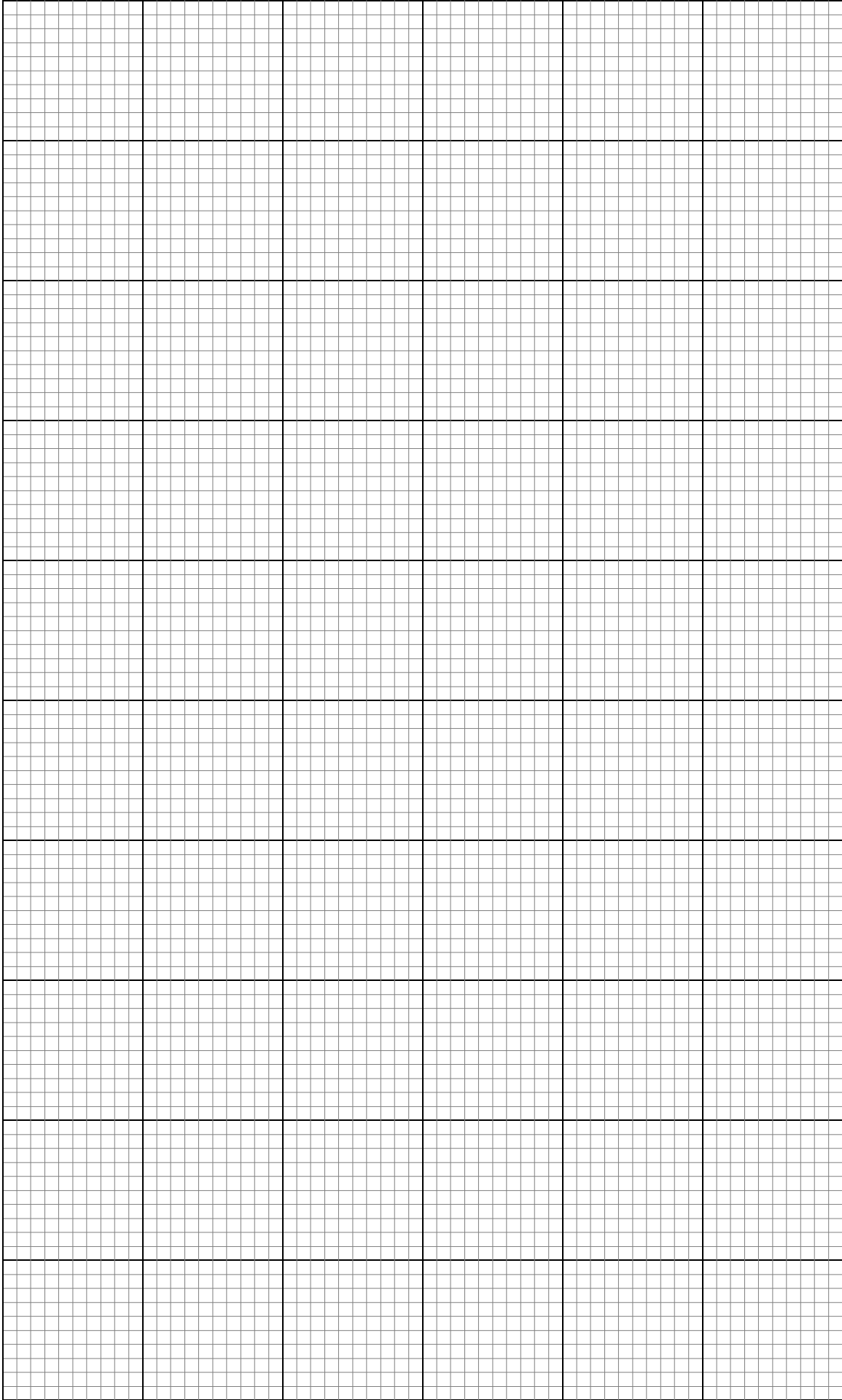
Can the Transmitters (minimum of four) easily and professionally be placed at a maximum of 1000 ft. from the Base Station Controller? Yes No

Can the hall be covered with four (4) transmitters and, have all areas covered by two (2) transmitters at all times? Yes No

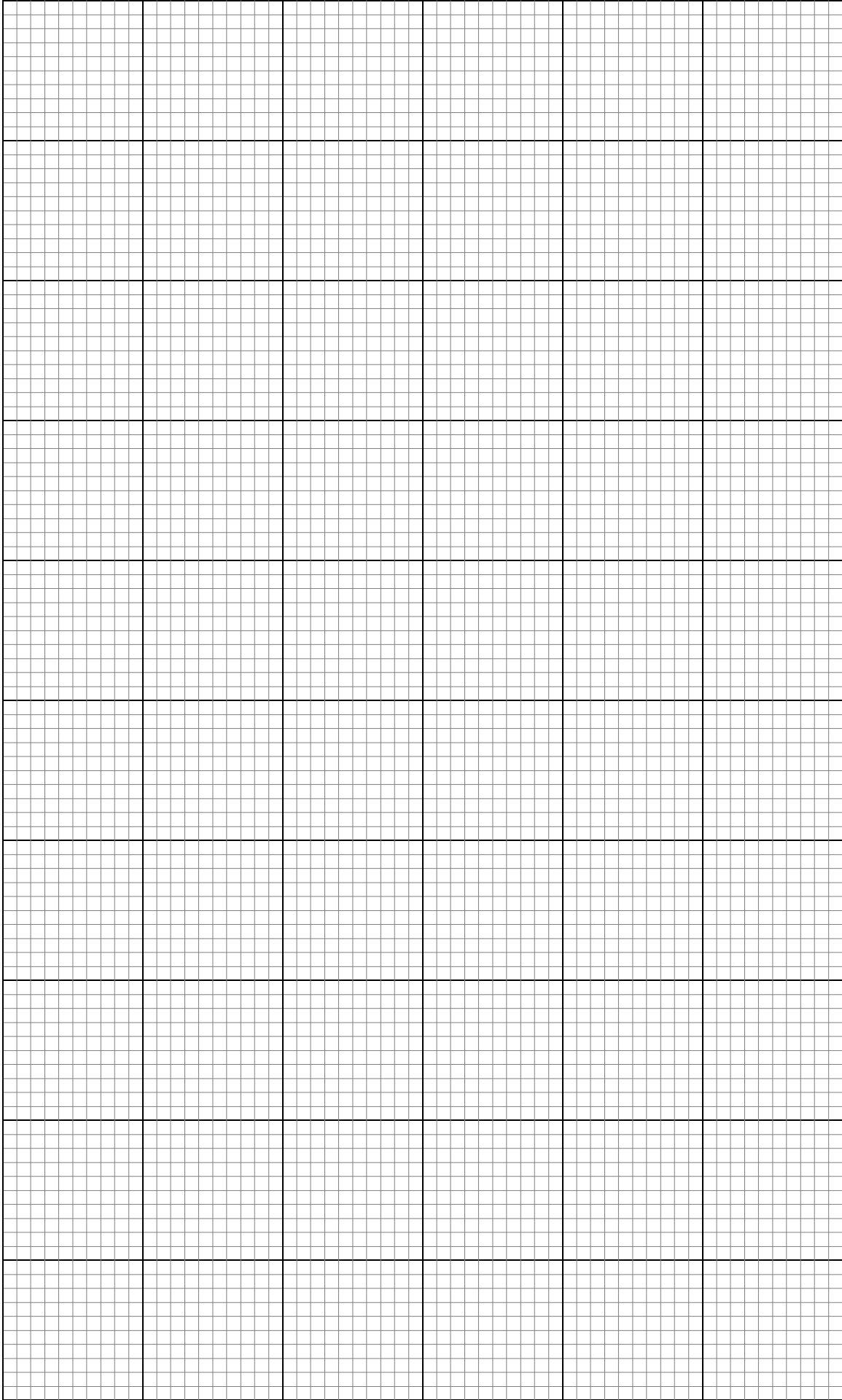
Scale of Drawing (choose one): _____ 1"=50' (each square=5') _____ 1"=100' (each square=10')



Scale of Drawing (choose one): _____ 1"=50' (each square=5') _____ 1"=100' (each square=10')



Scale of Drawing (choose one): _____ 1"=50' (each square=5') _____ 1"=100' (each square=10')



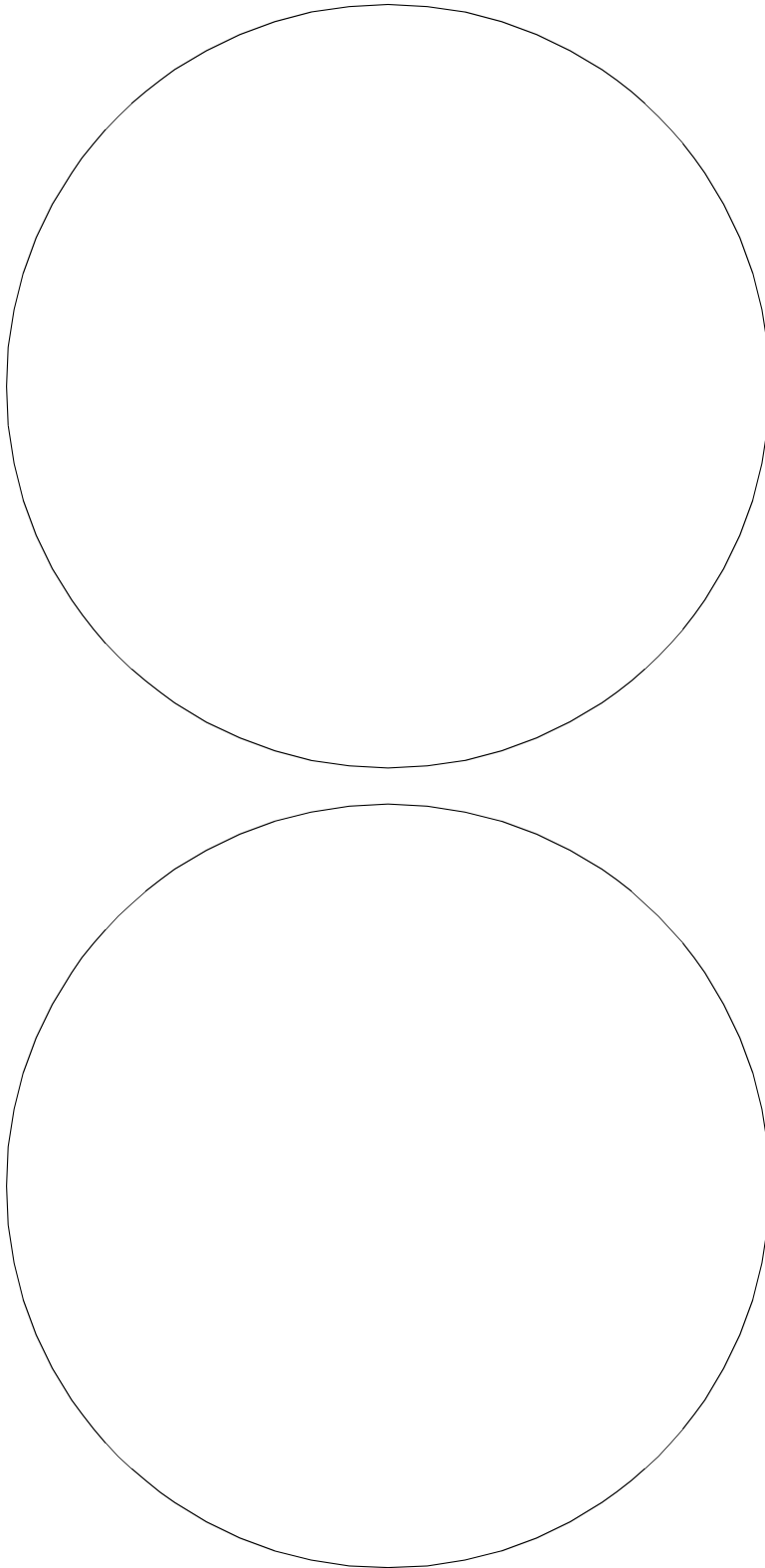


Figure 2. 1" = 50' Scale

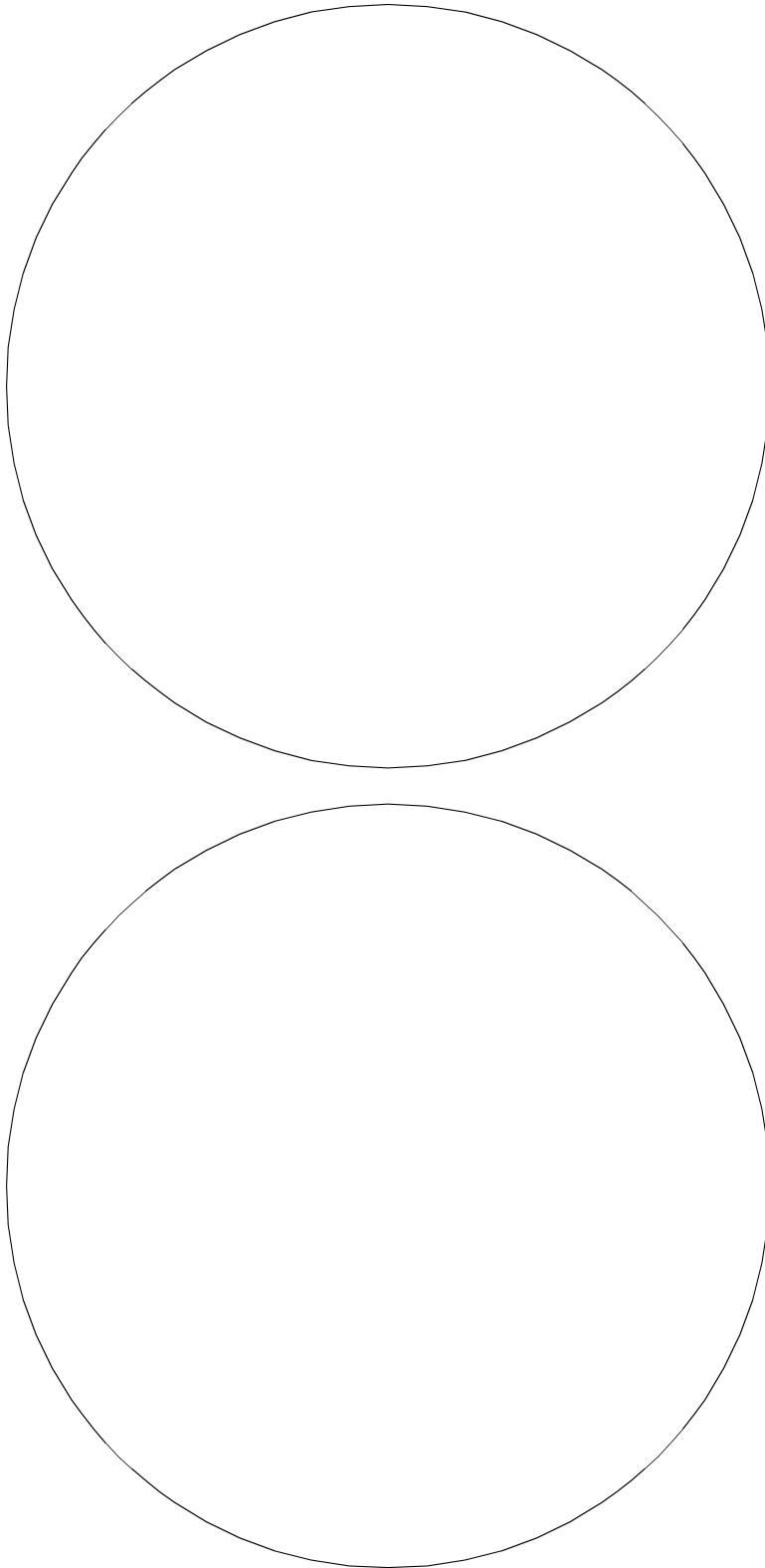


Figure 3. 1" = 50' Scale

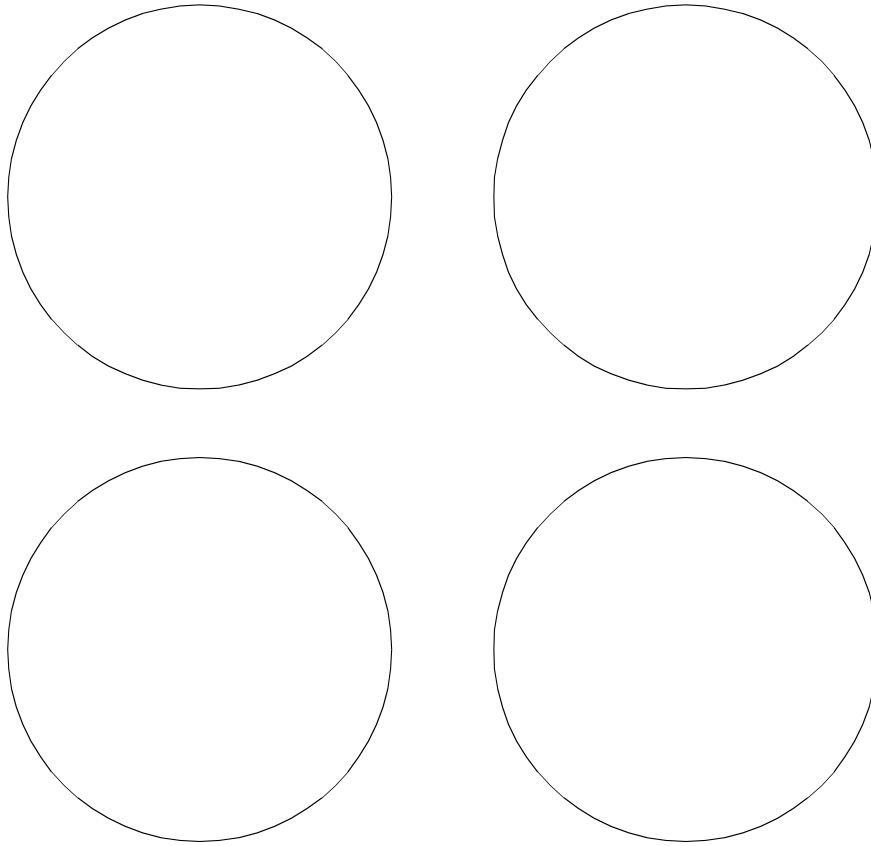


Figure 4. 1" = 100' Scale

Provide a brief description of how the site survey was performed.

Survey Results: _____ Pass _____ Fail

Reason(s) for Pass/Fail Results:

Additional Comments:

Technician Signature: _____
Date: _____

RF Pass/Fail Results Approved By Supervisor: _____
Date: _____

RF Installation Date: _____

Note: RF site surveys must be performed or approved by a Field Supervisor.

Send Us Your Comments

If you have any comments about the usability or accuracy of this manual, please send them to us. Your comments help us to better understand your needs and improve this user guide.

Send your comments to:

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E-mail: publications@gtiemail.com

Thank you.

