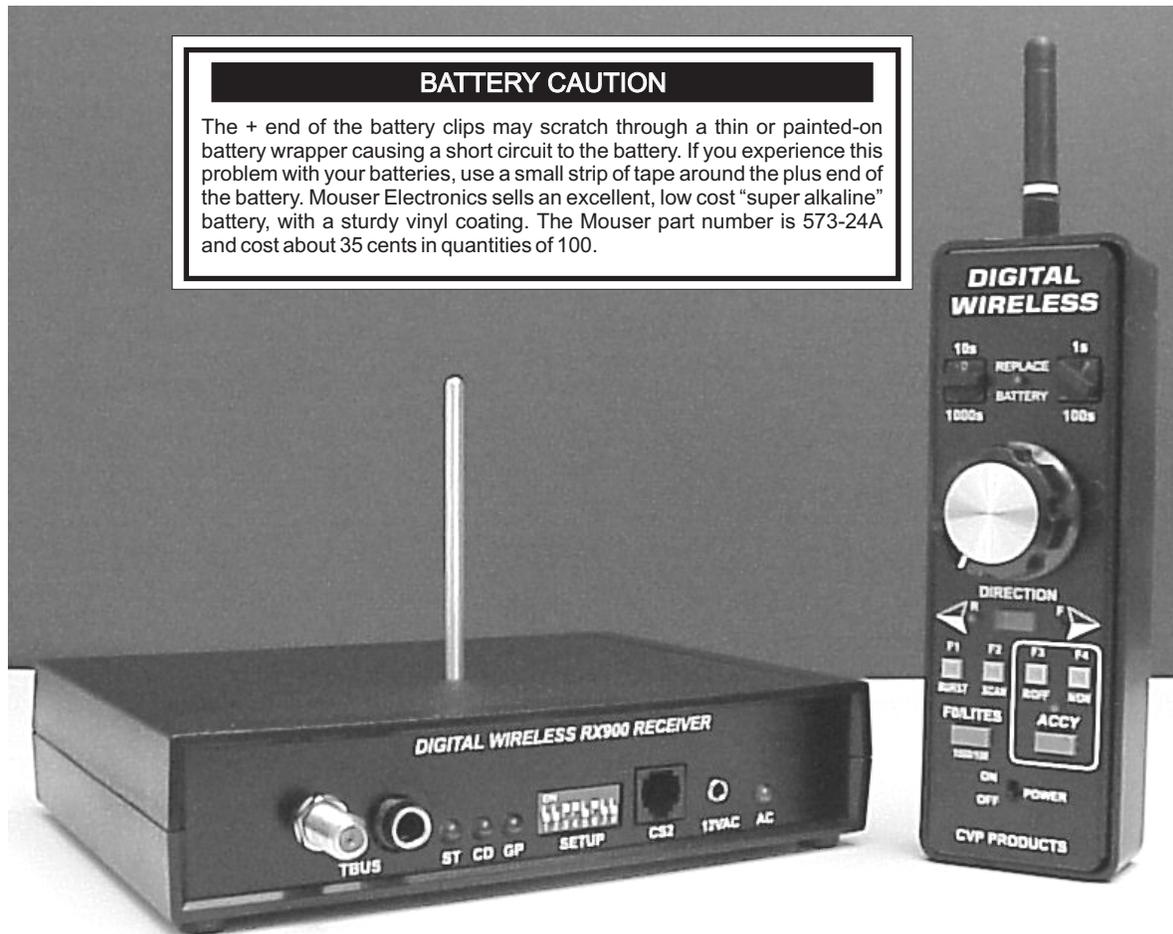


EasyDCC Digital Wireless Throttle System Installation and Setup Guide



Quick Start Procedure

1. Install four AAA batteries into throttle.
2. Set desired frequency inside throttle with SW2. Frequency 0 is the default setting from the factory with all switches on.
3. Reinstall throttle in case.
4. Attach antenna - finger tight.
5. Attach antenna to receiver - finger tight. Take care not to strip threads.
6. Set desired mode - scan mode is usual factory setting.
7. Connect receiver to throttle bus or Command Station.
8. Connect 12VAC transformer to receiver.
9. Turn on throttle power switch.
10. Select address and drive away.

FCC Information Statement

Your wireless throttle is a carefully designed and certified unlicensed low-power transmitter. The FCC ID label and the compliance label serves to show the FCC has authorized this transmitter. This transmitter has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or experienced radio/TV technician for help.

EasyDCC RX900 Receiver Installation Guidelines

Attaching Receiver Antenna

The threaded aluminum rod serves as the receiver's antenna. It is shipped unattached for protection. Gently screw in the antenna through the hole in the top of the case. The antenna should be finger tight for best performance – don't over tighten.

Receiver Setup Options

There are several options from which to choose. Be sure the throttle mode matches the receiver mode.

Scan Mode is the most basic setup the most commonly used (A). This mode is recommend when there are no more than 8 throttles in use and you wish to have each throttle on a dedicated frequency. The benefit is fast response time, no time delay, and no interference from other throttles.

The Burst mode allows multiple throttles to share a single, specific frequency (B). This mode allows for more than 8 throttles to be used simply by adding more receivers. In the burst mode, up to eight throttles can share a single frequency and the receiver is set to the same frequency. Since there are 7 unique frequencies, a total of 8x7 throttles can be accommodated. In the burst mode, the transmitter turns on for a short moment and "bursts" out the data. It then turns off and waits a fixed amount of time before bursting out again. During the quiet time, another throttle can burst out its data. However, since throttles are not synchronized it is possible for two throttles to burst at the same time. If this occurs, the receiver will ignore the both bursts and wait for the next. As more throttles are added to a frequency you may notice a sluggish response to rapid throttle speed changes.

Multi-mode provides a convenient way to have the best of both scan and burst mode at the same time (C). Multi-mode allows one receiver to operate in the scan mode, serving up to 6 dedicated throttles. A second receiver is set to the burst mode and services another 8 throttles. There are two other multi-modes with the only difference being the split between dedicated frequencies and shared frequencies.

Receiver Placement

For best reception, mount the receiver at least 5 feet above the floor. Make sure the antenna is not touching nearby objects. Try and place the receiver in the middle of the room. Walls, pipes, insulation, human bodies and other objects commonly found in the layout room will absorb the transmitter's energy. The fewer obstructions between the receiver and transmitter, the better the reception. No two rooms are alike. Try several locations to determine the best location to permanently mount the receiver.

Hookup Options – Basic Direct

The most basic installation places the receiver near the Command Station. The CS2 jack on the receiver is connected to the THROTTLE jack on the Command station using the enclosed modular cable. Do not use any other type or length of cable. The modular cable must not be longer than 7 feet.

Hookup Options – Existing Throttle Bus (TBUS)

If you already have tethered throttles in use, you may plug the receiver into any convenient fascia plate jack using the a Radio Shack two conductor coiled guitar cord (RS# 42-978). This is a handy way to quickly move the receiver about your layout to determine the best placement. It does not have to be near the Command Station.

Hookup Options – Using A Dedicated Extender

If you have a large layout requiring more than one receiver or you wish to move the receiver away from the Command Station, you must add a throttle Extender. Connect the Extender to the Command Station and use the appropriate length of coaxial cable to connect the receiver back to the extender.

Throttle Bus Terminator

The end of the EasyDCC throttle bus must be terminated with a 75 ohm termination resistor. When your RX900 is at the end of the coax

cable run, you may use the built in terminator. Turn on switch number 7 to activate the internal termination. Do not use the terminator unless the RX900 is at the end of the coax cable.

Hookup Options – Using A Secondary Receiver

For very large layouts or layouts in unusually poor radio reception areas, an additional receiver may be needed. You must use a special "secondary" receiver for proper operation. You can not simply add another primary receiver. The secondary receiver uses special software to allow both the primary and secondary to receive the same transmission. The two receivers then coordinate with each other to decide who places the throttle data on the throttle bus. There are other factors that may influence the usefulness of a secondary receiver. Give us a call to discuss your needs.

Using The RX900 Indicators

The GP LED turns on when good throttle data is received on the proper frequency. This LED is excellent when checking that throttles and receivers are on the proper frequency. This LED will stay on until the last throttle is turned off. This provides a neat way insure all throttles are turned off.

The CD LED briefly turns on whenever throttle data is interrupted. This may occur when addresses are changed or throttles are turned off.

The ST LED is on whenever the receiver is recognized by the Command Station, and valid throttle data is passed on to the Command Station. This LED may flicker depending on the number of throttles in use. This is normal.

Replacement Antennas

The antennas on both units are custom built for CVP. Do not use unauthorized replacements. If your receiver antenna requires replacement, the cost is \$1 plus shipping. The handheld throttle's rubber antenna replacement cost is \$7 plus shipping.

Dealing With Interference

Your wireless throttle is a carefully designed unlicensed low-power transmitter. Unlicensed means other equipment can and do use the same frequencies as your throttle. The most common source of interference is from your own 900MHz cordless telephones (not cellular phones). Cordless 900MHz phones and cordless 900MHz spread-spectrum phones can jam certain frequencies used by your throttles. Jamming usually results in shorter range and intermittent loss of signal. Here are some suggestions to deal with interference:

- Try to determine the source of the interference and turn it off.
- Relocate the RX900 receiver or move the jammer away from the RX900 receiver. This may be as simple as leaving your cordless phone outside the layout room.
- Sometimes moving the receiver a 9 inches in one direction or the other will lessen the interference. Try raising or lowering it also.
- If using scan mode, change to burst mode and try different frequencies. You will usually find several that work satisfactorily.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Add a secondary receiver to improve signal reception in distant areas.

EasyDCC Wireless Throttle Frequencies

The following frequencies are used in the EasyDCC wireless throttle.

| | |
|-----|------------|
| F0: | 903.37 MHz |
| F1: | 906.37 MHz |
| F2: | 907.87 MHz |
| F3: | 909.37 MHz |
| F4: | 912.37 MHz |
| F5: | 915.37 MHz |
| F6: | 919.87 MHz |
| F7: | 921.37 MHz |

EasyDCC Model RX900E Wireless Receiver Setup Options

SETUP SWITCHES

FS1 FS2 FS3 CS B/S E/R TB TM

ON

1 2 3 4 5 6 7 8

Frequency Select 1
Frequency Select 2
Frequency Select 3
Mode Select
TBUS Sockets
CS2 Jack
TBUS Type
TBUS Terminator

FIG 1

FREQUENCY SELECTION San and Multimode

All Scan
ON
1 2 3 4 5 6 7 8
All frequencies scanned normal setup

Multimode 1
ON
1 2 3 4 5 6 7 8
Frequencies 0-5 scanned
Frequency 6,7 ignored

Multimode 2
ON
1 2 3 4 5 6 7 8
Frequencies 0-4 scanned
Frequency 5,6,7 ignored

Multimode 3
ON
1 2 3 4 5 6 7 8
Frequencies 0-3 scanned
Frequency 4,5,6,7 ignored

FIG 2

FREQUENCY SELECTION (Burst Mode)

Frequency #0 **Frequency #4**

Frequency #1 **Frequency #5**

Frequency #2 **Frequency #6**

Frequency #3 **Frequency #7**

Not available in burst mode - do not use

FIG 3

MODE SELECT

BURST MODE
ON
1 2 3 4 5 6 7 8
Receives only a single frequency set by FS1,FS2, FS3

SCAN MODE
ON
1 2 3 4 5 6 7 8
Receiver scans selected frequencies see scan table

FIG 5

ENABLE TBUS SOCKETS

ON

1 2 3 4 5 6 7 8

EasyDCC TBUS in use and RX900E is plugged into either TBUS jack.

If TBUS sockets are not used, both switch 5 and 7 must be turned off.

FIG 6

TBUS TERMINATOR

ON
1 2 3 4 5 6 7 8
75 ohm terminator ON
For use when RX900D is at end of coaxial line

ON
1 2 3 4 5 6 7 8
Terminator OFF

FIG 7

CS2 SOCKET

CS2 Socket Used
ON
1 2 3 4 5 6 7 8
RX900 uses modular cable between Extender or Command Station

CS2 Socket not used
ON
1 2 3 4 5 6 7 8
CS2 socket not used

FIG 8

Recommended Setup

When there are 8 or fewer throttles in use, the best performance is obtained with the receiver and throttles set to **SCAN** mode. There are only two options.

This setup is used when the CS2 jack is used. Plug the modular cable into the Command Station's "Throttle Jack" or the Extender's output jack.

This setup is used when one of the TBUS sockets is used.

Use either coaxial cable or a Radio Shack guitar cord to connect the RX900E to the throttle bus (TBUS).

If CS2 jack is used, the modular cable must not be longer than 7 feet.

FIG 4

INDICATORS

GP: Good transmission and packets received
CD: Address/frequency dropped
ST: Command Station link OK (status)
AC: 12VAC power present

FIG 9

Screw-on Antenna

F-Jack Screw Connector
1/4" headphone jack
Indicators
Setup switches
6-pin modular jack
12VAC transformer input
AC pilot light

FIG 10

EasyDCC Model TX900E Wireless Throttle Setup And Operation

Opening The Throttle

Throttle is sent with antenna unattached and face plate held to plastic box with a 4-40 shipping screw. The faceplate holds all the throttles parts and is easily separated from the box. First remove the shipping screw and discard. Gently remove the face plate from the plastic box by pulling up on the speed knob. Once the battery clips are clear of the box, gently slip the antenna connector out its hole.

Installing Batteries

Throttle is designed to use four standard AAA size batteries. Note the polarity symbol. All batteries face towards bottom off the board. (positive end nearest the power switch). Orient the battery with the positive end facing the + symbol on the board. Center the battery in the clips and gently push battery in until locked in place.

Frequency Selection

The transmit frequency is selected using the three small switches near the antenna connector. Set the desired transmit frequency with the throttle's DIP switches using the tip of a small (1/8th inch blade) screwdriver tip.

Antenna Installation

Reassemble faceplate and box. Screw on the antenna until it is finger tight against box. Do not over tighten

Maximize Battery Life

Throttle does not have an automatic shut off. When throttle is not in use, turn off the power switch. Alkaline batteries provide the longest lifetime. Battery life is estimated at 25 to 30 hours of continuous use. You may also use rechargeable batteries. However, they can not be recharged inside the throttle. They must be removed and recharged with an external battery charger. However, rechargeable batteries will have shorter operation time. When selecting rechargeable batteries, always select AAA size rated at 1.2 to 1.5 volts. Higher voltage batteries will damage throttle.

Battery Life Monitor

When the batteries have about 20 minutes of life remaining, the REPLACE BATTERY indicator will start to flash. You should plan on changing the batteries soon. Continuing to use weak batteries will result in erratic operation.

Throttle Controls and Operation

Please refer to your EasyDCC installation and operation manual's description of the walk-around throttle. The wireless throttle and the tethered throttle have exactly the same functions and keys. There are a few operating differences which will be described next.

Throttle Status Light

The wireless throttle uses the direction 'F' green LED for a status indicator. If you change the locomotive address it begins to flash indicating the throttle has ceased transmission. The throttle will automatically resume transmission in about 10-15 seconds. This prevents you from accidentally gaining control of other addresses as you dial through them.

Emergency Stop

Push and hold the direction key to initiate a system halt. Similar to the tethered throttle, both direction indicators will flash. They will continue to flash even if the throttle power switch is turned off. To restore normal operation, push the direction key again.

4-Digit Addressing

This feature requires the forthcoming upgrade to the Command Station software, scheduled for mid October 1999. Until the Command Station software is upgraded, the wireless throttle only supports the standard two digit addressing mode. Address 00 should not be used. If 00 is selected, none of the indicators will turn on even though the transmitter is on and the battery is being drained.

Maximizing Transmission Range

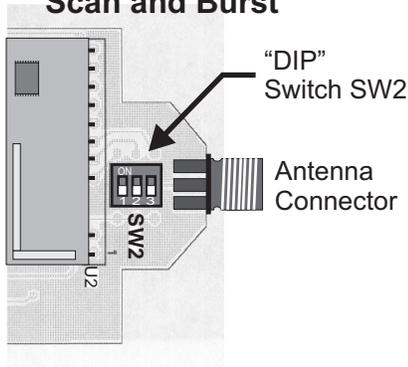
Keep the antenna away from your body and hands. Hold the throttle with the antenna pointed up.

Scan Versus Burst Mode

Your throttle is preset to scan mode at the factory. This is the best mode when no more than 8 throttles are used. Throttles will not interfere with each other since each throttle has its own unique frequency.

When more than 8 throttles are to be used, use burst mode and multiple frequencies. In this mode, up to 8 throttles share a single frequency. As the limit of 8 is approached, sluggish response may be noticed. Balanced receiver loading can help. For example, if you plan to use 10 throttles, put 5 throttles on one receiver and 5 on the second receiver.

Throttle Frequency Selection Scan and Burst



Frequency #0 Frequency #4



Frequency #1 Frequency #5



Frequency #2 Frequency #6



Frequency #3 Frequency #7

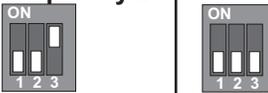
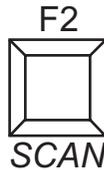


FIG 11

Not available in burst mode - do not use

THROTTLE MODE SELECT Must Match Receiver Mode

Scan- (Recommended)



Note: Throttle is preset to SCAN mode at factory. You may change between scan or burst mode at any time.

To change back to Scan mode from Burst Mode, push and hold F2 and turn on power switch. Green (F) LED will turn on solid indicating Scan Mode is selected. Release F2 and wait for LED to stop flashing. Select throttle's dedicated transmit frequency using SW2 switches.

FIG 12

Burst Mode



Burst mode allows throttles to share a single frequency, The frequency select switches, figure 11, determine the frequency BURST which is shared..

Push and hold F1 and turn on power switch. Yellow (R) LED will turn on solid indicating Burst Mode is selected. Release F1 and wait for LED to stop flashing. Select throttle's shared transmit frequency using SW2 switches. Do not use frequency 7 when in burst mode.

FIG 13

Each throttle in use must be set to a **different** frequency for proper operation. All 8 frequencies may be used in the scan mode.

Each throttle in use must be set to the **same** frequency for proper operation. Frequency 7 is not available for burst mode and should not be used.

One receiver supports up to 8 throttles in the scan mode.

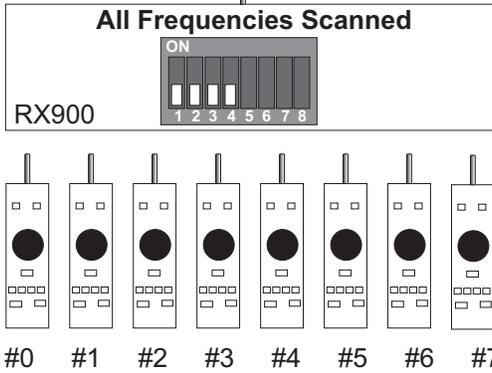
One receiver supports up to 8 throttles in the burst mode.

Maximum number of supported throttles is limited to 8 in scan mode.

Use additional receivers to increase the total number of supported throttles to a maximum of 56.

Scan Mode Operation

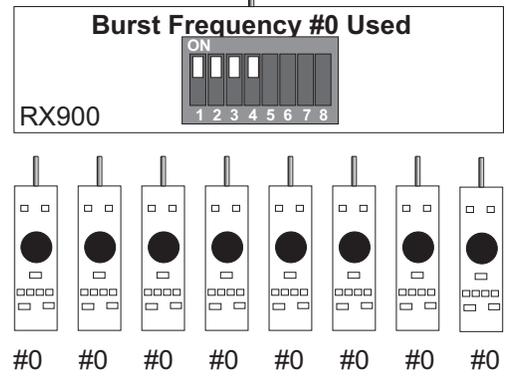
FIG 14



Simple Scan Mode where all throttles are set to a unique frequency. There is no time lag or interference from other throttles. Eight throttles is the maximum number that may be used simultaneously.

Burst Mode Operation

FIG 16



Burst Mode is where all throttles share the same frequency, called a burst frequency. The receiver is set to the same frequency. Frequencies 0-6 may be used.

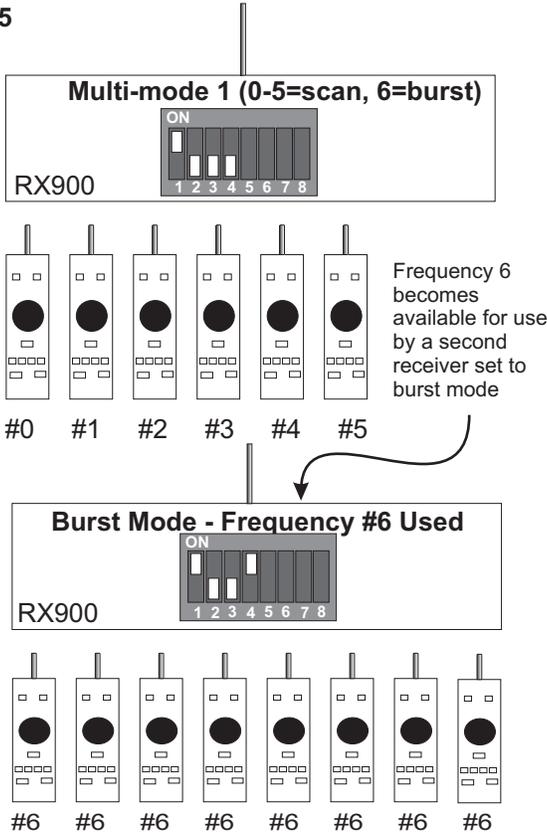
A throttle turns on to the selected frequency to send a short burst of packets and then shuts off. Occasionally, two throttles will turn on at about the same time. If this occurs, the receiver will reject the packet and must wait for the next. You'll notice a sluggish response to rapid speed changes as more throttles are in use.

The benefit of the burst mode is that a second receiver, set to a different burst frequency can support another 8 throttles. Up to 6 more receivers can be added allowing up to 56 throttles to be in use simultaneously.

An additional benefit is the ability to bypass certain frequencies where external interference may be present.

Multimode 1 Example

FIG 15



Multimode Description

Note 1: Multimode is not to be confused with multiple receivers used to enhance signal reception. When using multiple receivers, the receivers all have the same settings.

Note 2: You do not have to use multimode to have more than 8 active throttles. You may elect to have all throttles in burst mode. In that case, the maximum number of active throttles becomes 56 (8 throttles on 7 receivers).

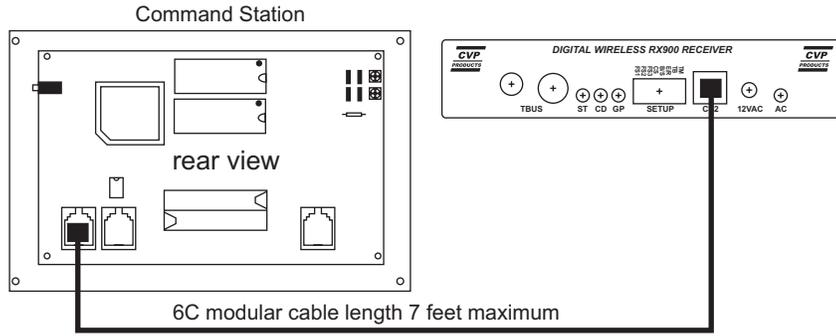
Multimode allows the mixing of dedicated frequencies and shared frequencies. This example shows 6 dedicated frequencies and one shared frequency. The 6 dedicated frequencies provide fast response and interference free operation of locomotives such as for yard and local switches. The one shared frequency provides up to 8 more "road cabs" that may not need fast response time and can tolerate an occasional missed transmission.

If you have any questions about the use of multimode, please call.

MULTI-MODE OPTIONS AND RECEIVER SETUPS

| | 1ST RECEIVER | | | 2ND RECEIVER | | | 3RD RECEIVER | | | 4TH RECEIVER | | | Total Scan Throttles | Total Burst Throttles | Max # All Throttles |
|-----------------|--------------|-----|-----|--------------|-----|-----|--------------|-----|-----|--------------|-----|-----|----------------------|-----------------------|---------------------|
| | FS1 | FS2 | FS3 | | | |
| ALL SCAN | OFF | OFF | OFF | | | | | | | | | | 8 | 0 | 8 |
| MULTIMODE 1 | ON | OFF | OFF | ON | OFF | OFF | | | | | | | 6 | 8 | 14 |
| MULTIMODE 2 | OFF | ON | OFF | ON | OFF | OFF | OFF | ON | OFF | | | | 5 | 16 | 21 |
| MULTIMODE 3 | OFF | OFF | ON | ON | OFF | OFF | OFF | ON | OFF | ON | ON | OFF | 4 | 24 | 28 |
| MODE SETTING | Scan Mode | | | Burst Mode | | | Burst Mode | | | Burst Mode | | | | | |
| BURST FREQUENCY | NA | | | #6 | | | #5 | | | #4 | | | | | |

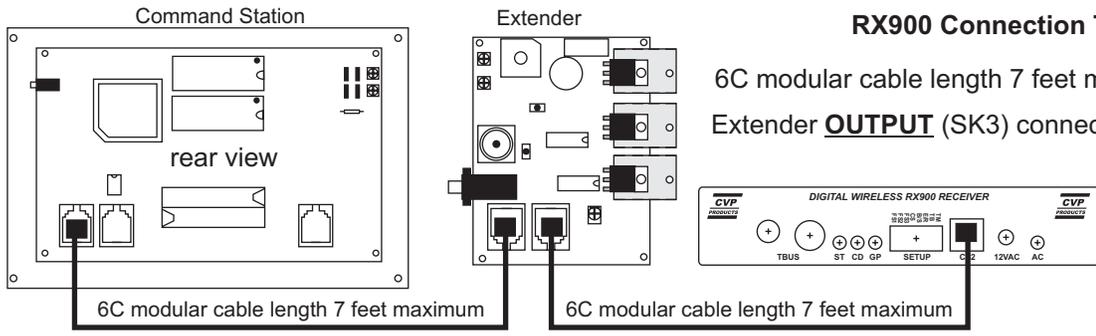
RX900 CONNECTION OPTIONS FOR EASYDCC



RX900 Direct To Command Station

6C modular cable length 7 feet maximum
 Telephone style modular cable
 Do not use DATA or LAN cables

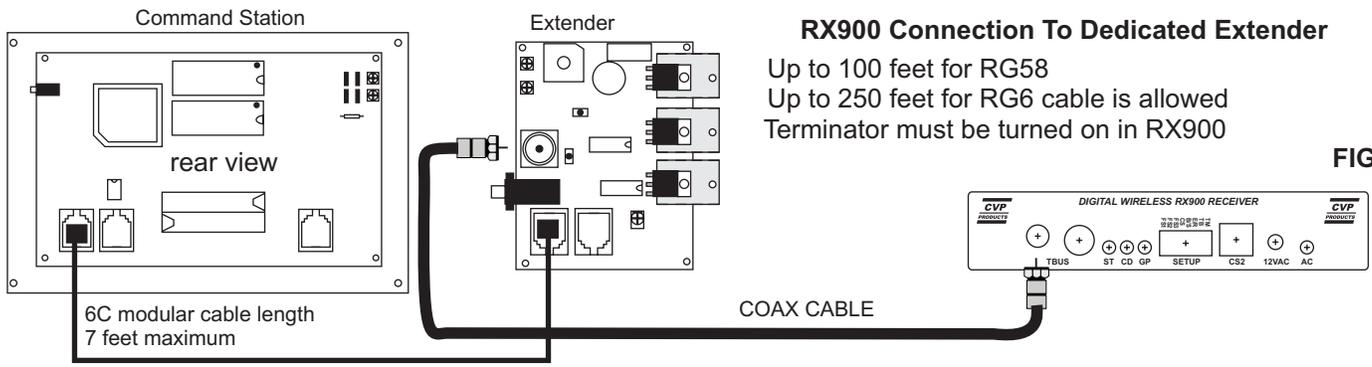
FIG 17



RX900 Connection To Extender

6C modular cable length 7 feet maximum
 Extender **OUTPUT** (SK3) connects to RX900 CS2 jack

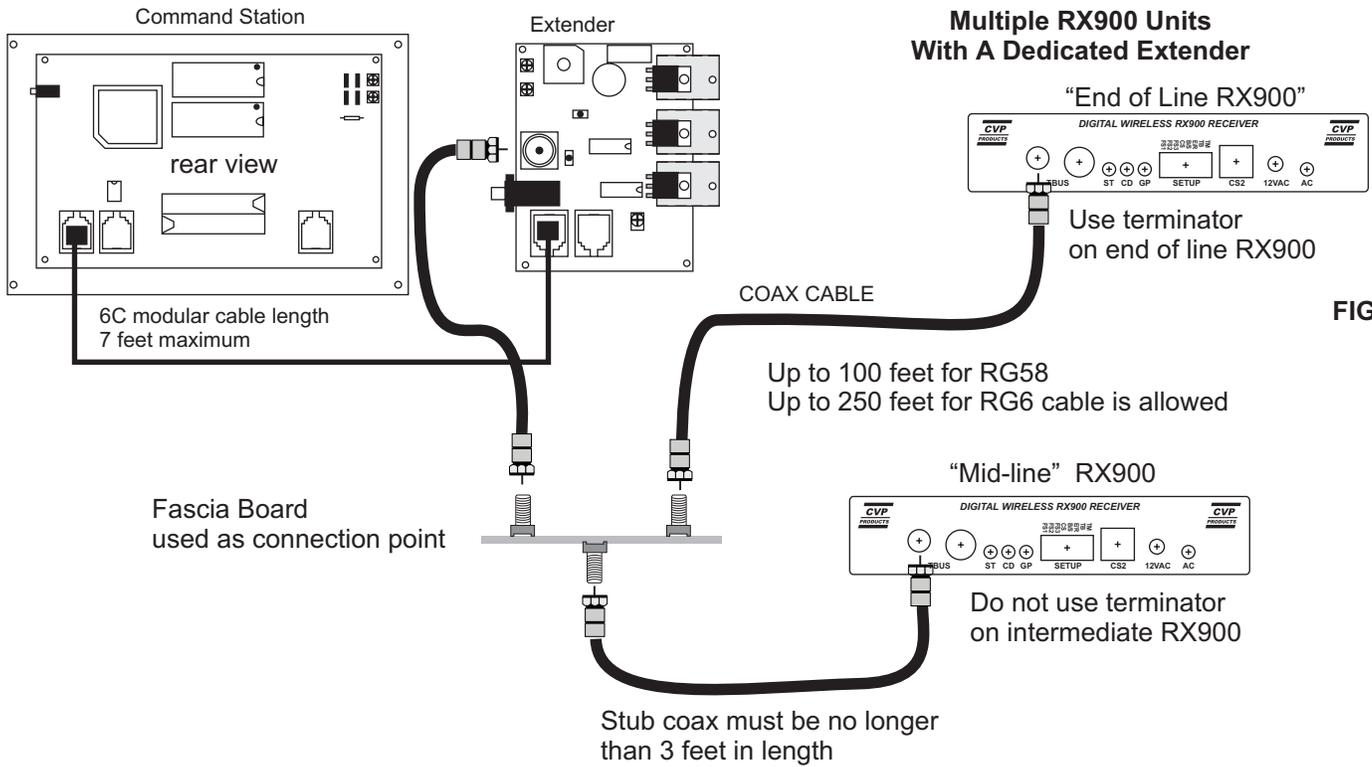
FIG 18



RX900 Connection To Dedicated Extender

Up to 100 feet for RG58
 Up to 250 feet for RG6 cable is allowed
 Terminator must be turned on in RX900

FIG 19



Multiple RX900 Units With A Dedicated Extender

"End of Line RX900"
 Use terminator on end of line RX900

"Mid-line" RX900
 Do not use terminator on intermediate RX900

Up to 100 feet for RG58
 Up to 250 feet for RG6 cable is allowed

FIG 20

Stub coax must be no longer than 3 feet in length