



**Crimzon<sup>®</sup>**

**Crimzon RC Bullet<sup>®</sup>  
Reference Design Kit v1.2**

**User Manual**

UM021302-1006



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# Introduction

ZiLOG's Crimzon RC Bullet<sup>®</sup> ready-to-manufacture universal remote control reference design kit v1.2 (see [Figure 1](#)) provides a reference design and turnkey remote control development platform for ZiLOG's ZLP32300 family of infrared (IR) microcontrollers. A universal remote control integrates the features of IR remote controls for various type of devices. You can select a device to control by entering its three-digit device code.

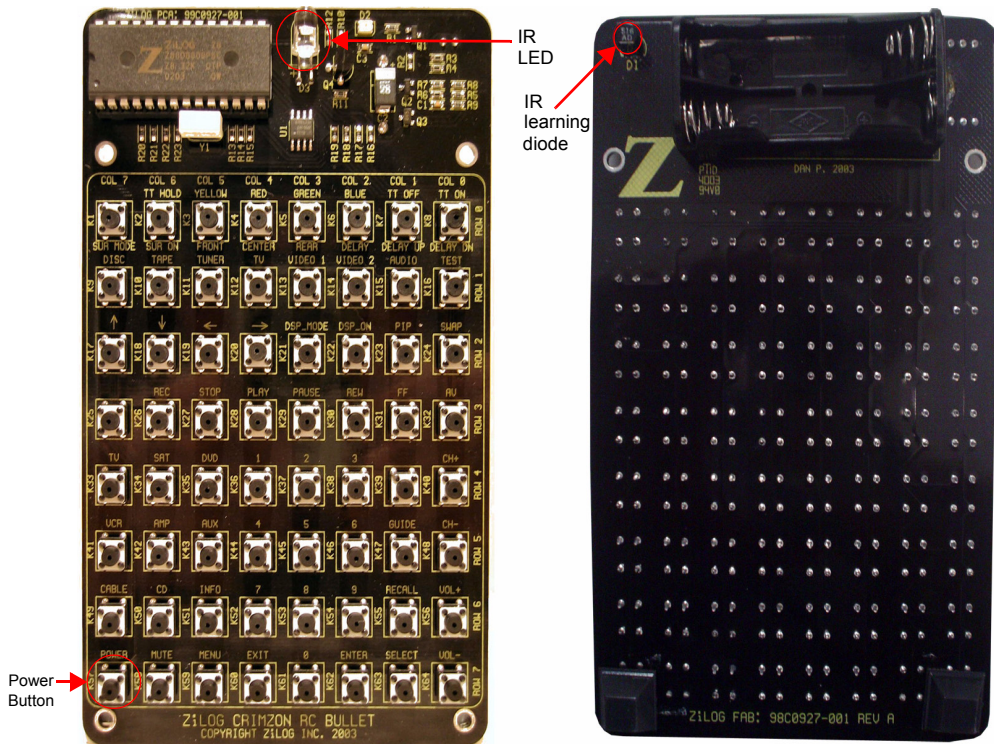


Figure 1. Crimzon RC Bullet Front and Back View



The Crimzon RC Bullet comes with four programmed microcontrollers. You need to insert a selected microcontroller carefully into the U2 socket before inserting batteries.

<b>Top Mark Label</b>	<b>Description</b>	<b>Brand Code Cross Reference File Name in CD</b>
Crimzon RC Bullet ZLP32300 NAL V 1.2 CC3F	North America database with learning	RM0049
Crimzon RC Bullet ZLP32300 NANL V 1.2 1769	North America database without learning	RM0033
Crimzon RC Bullet ZLP32300 EL V 1.2 25C3	European database with learning	RM0050
Crimzon RC Bullet ZLP32300 ENL V 1.2 8024	European database without learning	RM0034

**Table 1. Default Brand on Each Device**

<b>Device</b>	<b>North America Versions with or without Learning</b>	<b>European Versions with or without Learning</b>
TV	SONY	Philips
VCR	Panasonic	Philips
DVD	SONY	Philips
Satellite	Dish Network	B Sky B
Cable	Comcast	Philips
Amplifier	SONY	SONY



## Overview

Crimzon RC Bullet ready-to-manufacture universal remote control reference design kit v1.2 allows you to rapidly evaluate and develop remote controls for turnkey manufacturing. The Crimzon RC Bullet v1.2 is programmed to operate with a wide variety of infrared-controlled televisions, VCRs, cable boxes, satellite receivers, and audio equipments. [Table 2](#) lists the Crimzon RC Bullet v1.2 models.

**Table 2. Crimzon RC Bullet v1.2 Models**

<b>Model</b>	<b>OTP Microcontroller</b>	<b>Description</b>
6-in-1 North American Non-Learning	ZLP32300 with 32 K memory	<ul style="list-style-type: none"> <li>• Controls up to six devices (TV, VCR, DVD, cable box, satellite receivers, and audio equipment).</li> <li>• Without learning capability.</li> </ul>
6-in-1 North American Learning	ZLP32300 with 32 K memory	<ul style="list-style-type: none"> <li>• Controls up to six devices (TV, VCR, DVD, cable box, satellite receivers, and audio equipment).</li> <li>• With learning capability.</li> </ul>
6-in-1 European Non-Learning	ZLP32300 with 32 K memory	<ul style="list-style-type: none"> <li>• Controls up to six devices (TV, VCR, DVD, cable box, satellite receivers, and audio equipment).</li> <li>• Without learning capability.</li> </ul>
6-in-1 European Learning	ZLP32300 with 32 K memory	<ul style="list-style-type: none"> <li>• Controls up to six devices (TV, VCR, DVD, cable box, satellite receivers, and audio equipment).</li> <li>• With learning capability.</li> </ul>



## Crimzon RC Bullet v1.2 General Specifications

[Table 3](#) lists the general specifications for the Crimzon RC Bullet v1.2.

**Table 3. Crimzon RC Bullet v1.2 General Specifications**

Power	Two 1.5 V AAA batteries
Board to Device Range	5 meters
Board Dimensions	5 5/8" L x 3 3/8" W x 1" H
Weight (without batteries)	0.45 lb (204 g)
Operating Temperature	20 °C ± 10 °C
Operating Humidity	10–90% RH (non-condensing)

# Getting Started

Powered by two 1.5 V AAA batteries; this reference design kit is a complete and independent unit and supports up to 800 codesets using ZiLOG's universal IR database. [Table 5](#) on page 17 lists the references of the device code for the available models.

## Kit Contents

The Crimzon RC Bullet reference design kit contents are listed below:

- One Crimzon RC Bullet reference design kit v1.2 board.
- Two 1.5 V AAA batteries.
- Product CD-ROM containing the Crimzon RC Bullet reference design kit v1.2 User Manual (UM0213) and schematics.
- Four programmed ZLP32300 OTPs.

## Installing the Batteries

The Crimzon RC Bullet v1.2 requires two 1.5 V AAA batteries (supplied with the kit). Follow the steps below to insert or replace the batteries and for verifying the operation:

1. Insert new batteries into the battery compartment on the back side of the board matching the polarities (+ and -) on the batteries with the diagram in the battery compartment. Rotate the batteries to ensure that they are fully seated.



**Caution:** When replacing the batteries use only fresh batteries of required size (AAA) and recommended type (1.5 V). If you do not want to use the remote control unit (RCU) for an extended





period, then remove the batteries. They can leak chemicals which destroys the electronic parts.

2. Press the **POWER** button on the board. The IR LED illuminates as you press the button. If it does not, reseal the batteries and try again. If the IR LED still fails to illuminate, contact your supplier for a replacement.

## Crimzon RC Bullet v1.2 Operation

Follow the steps below to control a device using the Crimzon RC Bullet v1.2:

1. Program the Crimzon RC Bullet v1.2 to work with your device as described in [Programming Crimzon RC Bullet v1.2](#) on page 10.
2. Select a device mode by pressing the appropriate device button. For example, to set the Crimzon RC Bullet v1.2 to operate in TV mode, press the **TV** device button.
3. Aim the remote at the device.
4. Press the **POWER** button to turn ON the device.
5. Use the other Crimzon RC Bullet v1.2 buttons to operate the device. For description of Crimzon RC Bullet v1.2 keys, see [Table 4](#) on page 8.



## Punch-Through Features

The Crimzon RC Bullet v1.2 provides two key punch-through features which allows you to control TV volume and DVD operation when the Crimzon RC Bullet v1.2 is operating in another device. The key features are explained below.

- **Volume Punch-Through**—The TV Volume/Mute punch-through feature allows you to control the volume and mute the function of your TV when the Crimzon RC Bullet v1.2 is in another device mode. This feature is applicable for all devices and brands which do not use the volume control buttons for other purposes.

► **Note:** If the **AUX** key is programmed to operate another TV, then the volume keys emit the signals for the **AUX** device.

- **Transport Key Punch-Through**—The DVD transport key punch-through feature allows you to control play, stop, pause, rewind, fast forward, and record functions of your DVD when the Crimzon RC Bullet v1.2 is operating in other modes. The feature is applicable for all devices and brands which do not use the transport keys for other purposes. This feature is not applicable when the RCU is in DVD and VCR mode.



## Crimzon RC Bullet v1.2 for 6-in-1 Models

Table 4 lists the Crimzon RC Bullet v1.2 keys for 6-in-1 models.

**Table 4. Crimzon RC Bullet v1.2 Keys for the 6-in-1 Models**

Key	Key Name	Key Description
1	TV	Press this key to control your TV set. This key can also be used to program the Crimzon RC Bullet v1.2.
2	VCR	Press this key to control your VCR set. This key can also be used to program the Crimzon RC Bullet v1.2.
3	DVD	Press this key to control your DVD set. This key can also be used to program the Crimzon RC Bullet v1.2.
4	Cable	Press this key to control your cable box. This key can also be used to program the Crimzon RC Bullet v1.2.
5	SAT	Press this key to control your satellite receiver. This key can also be used to program your Crimzon RC Bullet v1.2.
6	Audio	Press this key to control your audio device.
7	AUX	Press this key to control your auxiliary device. This key can also be used to program the Crimzon RC Bullet v1.2.
8	POWER	Press this key to turn the device ON or OFF.
9	CH+	Press this key to increase the channel numbers.
10	CH-	Press this key to decrease the channel numbers.
11	Vol+	Press this key to increase the volume of the device.
12	Vol-	Press this key to decrease the volume of the device.
13	MUTE	This key mutes the volume of the device (switches OFF the device sound).
14	MENU	This key invokes the cable box or satellite main menu.
15–18	UP, DOWN, RIGHT, and LEFT	These keys are used to move through the menu selections.
19	OK/Select	Press this key to select highlighted menu or exit power scan mode.



**Table 4. Crimzon RC Bullet v1.2 Keys for the 6-in-1 Models (Continued)**

Key	Key Name	Key Description
20	RECALL	This key returns the device to the previously selected channel.
21	INFO	This key displays the channel number and program information.
22	EXIT	This key removes the on screen display to return to normal viewing.
23–32	Digits 0–9	These keys are used to select a channel number or to enter device codes.
33	-/--	Press this key to enter single or two digit channel number.
34	AV	This key is used to switch the audio/video input between antenna, video, game console, etc.
35	ENTER	This key is used to change the channel number.
36–40	STOP, PLAY, PAUSE, REW, and FF	These keys are used to control the stop, play, pause, rewind, and fast forward functions on your VCR or DVD.
41	REC	This key is used in VCRs, DVD recorders for recording purposes.
42–48	RED, GREEN, YELLOW, BLUE, TT ON, TT OFF, TT HOLD	These keys are used as teletext keys in the TV mode only for the European Models.
49–52	PIP, PIP CH, SWAP, PIP FREEZE	These keys are used for picture in picture functions.
53	GUIDE	This key is used in the cable box and satellite mode to display a channel guide.
54	TEST	This key is used to enter the learning mode along with the device key.



## Programming Crimzon RC Bullet v1.2

The Crimzon RC Bullet v1.2 is factory-programmed to support up to 800 codesets. There are three ways to program the Crimzon RC Bullet v1.2 as listed below:

1. Select the 3-digit codeset number from the codeset reference manual for the device you want to operate, and then enter that code manually into the Crimzon RC Bullet v1.2.
2. Use the power scan feature to find device codes automatically.
3. Use the learning feature on learning-equipped Crimzon RC Bullet v1.2 models to capture remote control codes from an existing device remote control.

### Manually Programming the Crimzon RC Bullet v1.2

Follow the steps below to manually program any device except auxiliary (AUX) devices:

1. Locate the codeset number for the device you want to program using the codeset tables in the Crimzon RC Bullet v1.2 codesets cross reference manual as described in [Codesets](#) section on page 17.
2. Press and hold the key for the device you want to program for more than three seconds.
3. The LED turns ON indicating that the Crimzon RC Bullet v1.2 is ready to accept a 3-digit codeset number. Release the key.
4. Within 30 seconds, enter the 3-digit codeset number corresponding to your device. The LED turns OFF, indicating that the Crimzon RC Bullet v1.2 is programmed successfully. If the LED turns OFF and then blinks once, then programming is not successful. Try programming again.
5. With the device still powered ON, operate it using keys appropriate to the device you are trying to control. If the device responds as



expected, no further programming is required. If the device does not respond, repeat the above steps with another codeset number.

The Crimzon RC Bullet v1.2 provides the ability to assign a device to its **AUX** key. For example, use the **AUX** key to program the Crimzon RC Bullet v1.2 for another TV.

Follow the steps below to program an auxiliary device:

1. For more than three seconds, press and hold both the **AUX** key and the device key corresponding to the device type you want to use as an auxiliary device.
2. The LED turns ON indicating that the remote is ready to accept a 3-digit codeset number. Release the **AUX** and device key.
3. Within 30 seconds, enter the 3-digit codeset number corresponding to your device. The LED turns OFF indicating that your Crimzon RC Bullet v1.2 is programmed successfully. If the LED instead turns OFF and then blinks once, programming was not successful. Try programming again.
4. With the device still powered ON, try to operate it using keys appropriate to the device you are trying to control. If the device responds as expected, no further programming is required. If the device does not respond, repeat the above steps with another codeset number.

## **Power Scan Programming of Crimzon RC Bullet v1.2**

With power scan programming, the Crimzon RC Bullet v1.2 tests all the codes available in the codeset database and assigns the correct one for the selected device. Although this method is more time consuming, it saves time for searching the codeset numbers necessary for manual programming.



Follow the steps below to power scan program the Crimzon RC Bullet v1.2:

1. Press and hold the device key for more than 3 seconds. The LED turns ON indicating that the remote is in programming mode. To program an auxiliary device with the power scan method, press and hold both the **AUX** and the selected device key for more than 3 seconds.
2. Press and release the **POWER** key. The LED blinks once and remains ON indicating that the remote is in the power scan state.
3. Press **CH+** or **CH-** key repeatedly till the device switches ON (**CH+** key conducts an upward search while the **CH-** key conducts a downward search in the codeset database).
4. When the device responds, press and release the **SELECT** key to program the Crimzon RC Bullet v1.2 with the new code and exit. To exit without programming, press the **EXIT** key.
5. Press any other operable key (**VOL+** or **VOL-**). If the device responds, no further programming is required. If the device does not respond repeat [step 1](#) through [step 4](#).

To ensure that the searched code is appropriate for your device, you can enter into codeset test mode when the Crimzon RC Bullet v1.2 is in the power scan state. After performing the upward and downward search for the appropriate code ([step 3](#)), follow the steps below to conduct a power scan codeset test:

1. Press the device key for which power scan is performed. The LED blinks once and remains ON, indicating that the Crimzon RC Bullet v1.2 is in the codeset test mode.
2. Switch ON your device.
3. Press a few operable keys. If the device responds, no further programming is required.



4. Press the device key again to exit codeset test mode. The LED turns ON, indicating that the Crimzon RC Bullet v1.2 has returned to the power scan state.
5. Press the **SELECT** key to program the Remote with the new code and exit the power scan state. To exit without programming, press the **EXIT** key.

► **Note:** The Crimzon RC Bullet v1.2 exits from the codeset test mode after 30 seconds, if no other operation is performed.



# Learning Capability of Crimzon RC Bullet v1.2

Two of the 6-in-1 models of the Crimzon RC Bullet v1.2 family have the ability to learn or capture, operating codes from the original remote control for a device you want to control the signals. Using the learning feature of Crimzon RC Bullet v1.2 you can add new features for devices not supported by the codeset.

The Crimzon RC Bullet v1.2 can also be programmed to learn the key functions of another device. The learning feature is applicable for all the devices supported by the Crimzon RC Bullet v1.2. In addition, when the Crimzon RC Bullet v1.2 is controlling a particular device it can be programmed to learn key operations of another device.

Before using the learning feature, note the following points:

- ▶ **Notes:**
  1. The original, specific remote controls for a device must be in working order for the learning feature to work properly.
  2. Learned keys are device specific, therefore each learned key stores a unique function for a specific device.
  3. Device keys cannot be used for learning. Any operable key can be used for learning. When the learning is programmed to a previously operable key, the original functions of that key is overwritten.



## Programming Learning to a Key

Follow the steps below to program the learning function:

1. Insert fresh batteries into the Crimzon RC Bullet v1.2 and into the original remote control.
2. On the Crimzon RC Bullet v1.2, press and hold both the device keys to be programmed and the **TEST** key till the LED D2 turns ON (The **TEST** key is located on the Crimzon RC Bullet keypad column 0, row 1).
3. Release the device and **TEST** keys.
4. Press the key to be programmed. Device keys are not assigned as a programmable key.
5. The Crimzon RC Bullet v1.2 learning diode is located underneath the top right corner of the circuit board. Place the original remote control two to three inches with good line of sight from the Crimzon RC Bullet v1.2 learning diode.
6. Press and hold the original remote control key to be learned.
7. If the learning is successful, LED D2 on the Crimzon RC Bullet v1.2 turns OFF. If LED D2 does not turn OFF, position the original remote control closer to the Crimzon RC Bullet v1.2 and try again. If the learning process fails, LED D2 blinks once. Repeat [step 4](#) through [step 6](#). LED D2 turns ON again if learning is successful.
8. To program other keys on the Crimzon RC Bullet v1.2, repeat [step 4](#) through [step 7](#).
9. When you have finished programming keys on the Crimzon RC Bullet v1.2, press and release the TV device key. LED D2 turns OFF and the unit returns to its normal operating state.

► **Note:** In learning mode, the Crimzon RC Bullet v1.2 does not respond to key presses when waiting for the external signal from the original remote control.



## Deleting Programming from a Learned Key

Following are the three methods to clear the learned functions:

### 1. To delete all learned key data in all devices

Press and hold digits **1**, **0**, and **3** simultaneously for more than three seconds. The LED turns ON and remains ON until all the keys are released. After all the keys are released, the LED stays ON for one second and turns OFF, indicating that your Crimzon RC Bullet v1.2 is back to its pre-programmed factory setting and all the learned keys for all the devices are deleted.

► **Note:** When LED is ON, the RCU erases the present configuration and loads the default settings. This process takes up to 90 seconds depending on the number of learnt signals.

### 2. To delete all learned key data in one device

Press and hold any device key and the **EXIT** key together for 3 seconds and release them. The LED turns ON and remains ON, indicating that the Crimzon RC Bullet v1.2 is in the deleting learning mode. Press any other device key. All the learned keys for the first device will be cleared. The LED turns OFF indicating that learned function is cleared successfully.

### 3. To delete a learned key data in one device

Program the device to another codeset (see [Manually Programming the Crimzon RC Bullet v1.2](#) on page 10). All the learned keys for the device will be erased. However, any key learned for other devices will not be erased.

## Low-Voltage Indication

The Crimzon RC Bullet v1.2 unit enters the low-battery mode when the voltage falls below the threshold voltage (about 2.4 V). During low-voltage, if you press a key, the LED blinks once on key release. This



blinking occurs even if the Crimzon RC Bullet v1.2 fails to transmit a signal.

The behavior of the device is undefined when the device enters the low-battery mode during programming or learning mode. Change the battery and clear the memory for correct operation.

- **Notes:**
1. For the non-learning Crimzon RC Bullet v1.2 models, after battery replacement, the Crimzon RC Bullet v1.2 must be re-programmed to operate with your devices.
  2. The learning Crimzon RC Bullet v1.2 models retain the last programmed state.
  3. If any functional/valid IR key is held down for more than 2 minutes, the IR transmission stops even though the key is held down.

## Codesets

[Table 5](#) lists the reference manuals for device code information. The codeset reference manuals are located on the Crimzon RC Bullet v1.2 product CD-ROM.

**Table 5. List of Related Codesets Documentation**

Document Number	Description
RM0033	Codeset Reference Manual for 6-in-1 North American Non-Learning Crimzon RC Bullet v1.2
RM0034	Codeset Reference Manual for 6-in-1 European Non-Learning Crimzon RC Bullet v1.2
RM0049	Codeset Reference Manual for 6-in-1 North American Learning Crimzon RC Bullet v1.2
RM0050	Codeset Reference Manual for 6-in-1 European Learning Crimzon RC Bullet v1.2



# Customer Support

If you experience any problems while operating this product, please check the ZiLOG Knowledge Base:

<http://kb.zilog.com/kb/oKBmain.asp>

If you cannot find an answer or have further questions, please see the ZiLOG Technical Support web page:

<http://support.zilog.com>