

Prox Cloner/Programmer Operating Instructions



Cloner/Programmer Circuit installed into a “Covert” Day Planner Notebook

Overview

The portable Prox cloner/programmer circuit is comprised of a commercial HID Proxpoint Plus Reader unit operating in conjunction with a customized embedded microcontroller/display unit. The design provides the ability to read, duplicate (clone), and program HID 125Khz Prox credentials (cards and fobs).

Some of the main features of the unit are as shown below.

- Supports two “switch-selectable” modes of operation (Read/Clone and Program).
- Reads and copies all 26-bit, 34-bit, 35-bit and 37-bit HID 125Khz Prox credentials.
- Writes data to all standard T5557/T5567/T5577 programmable credentials.
- Proxpoint Reader provides read functionality via wiegand output.
- A separate circuit and loop antenna provides all write functionality.
- Displays card content information including format, facility code and card number.
- Program mode supports programming credentials with a user specified format, facility code and card number.
- PIC32 Microcontroller used to manage reader communication and OLED display interface.

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- Fully Portable standalone operation
- Simple two-button Operation (“Arm” and “Write”) used in Read/Clone mode.
- Fast user data entry in Programmer mode using numerical keypad interface.
- Three multi-color Status LED’s
- Powered by a 4 standard AA batteries.

The Prox cloner/programmer unit uses a PIC32 microcontroller to receive and decode the credential information from the reader wiegand interface.

The device is capable of operating in two different modes depending on the setting of the “Mode Select” switch at the time power is applied. Due to limited processing resources, the unit does NOT allow both modes to operate at the same time.

Read/Clone Mode

The Read/Clone mode provides the ability to read a credential and have its stored data automatically decoded and displayed. If the user desires to make a copy of the credential read then a new card can be presented and the previously captured data can be copied over to the second card using a simple one button operation.

When operating in Read/Clone mode, the Proxpoint reader continuously polls for the presence of a HID Prox credential. When an Prox credential is encountered, the microcontroller will receive the card data transmitted across the wiegand interface and store all of the information obtained. The relevant card information will then be decoded, decrypted and displayed on the small OLED display. The captured data will be retained until the unit has been re-armed at which point a new set of data can then be received.

After the credential data has been captured, the user then has the option to write the data to a T55x7 credential, in effect cloning the original card.

Program Mode

The Program mode allows the user to enter a set of data that will be used to program a custom credential. The user has the option to select one of four widely used HID credential formats (26-bit, 34-bit, 35-bit Corp 1000, or 37-bit. After selecting a format the user can then enter a custom facility code, and card number using the keypad interface. After the data has been entered the microcontroller will perform a validity check of the data before allowing the credential to be programmed. If the data is valid then the user can initiate a write operation to a credential using a simple one button operation. If the data entered is invalid or out-of-range for the format chosen then the operator will be notified and corrections can be easily made before writing the credential.

User Interface

The Prox cloner/programmer unit utilizes a set of sixteen pushbutton switches, one mode select slide switch and four status LED’s to interact with the user. A separate small white pushbutton switch is used to power the unit on and off. A description of each of the switch and status LED functions is included below. The layout of the printed circuit board showing all switch locations is shown in Figure 1 below.

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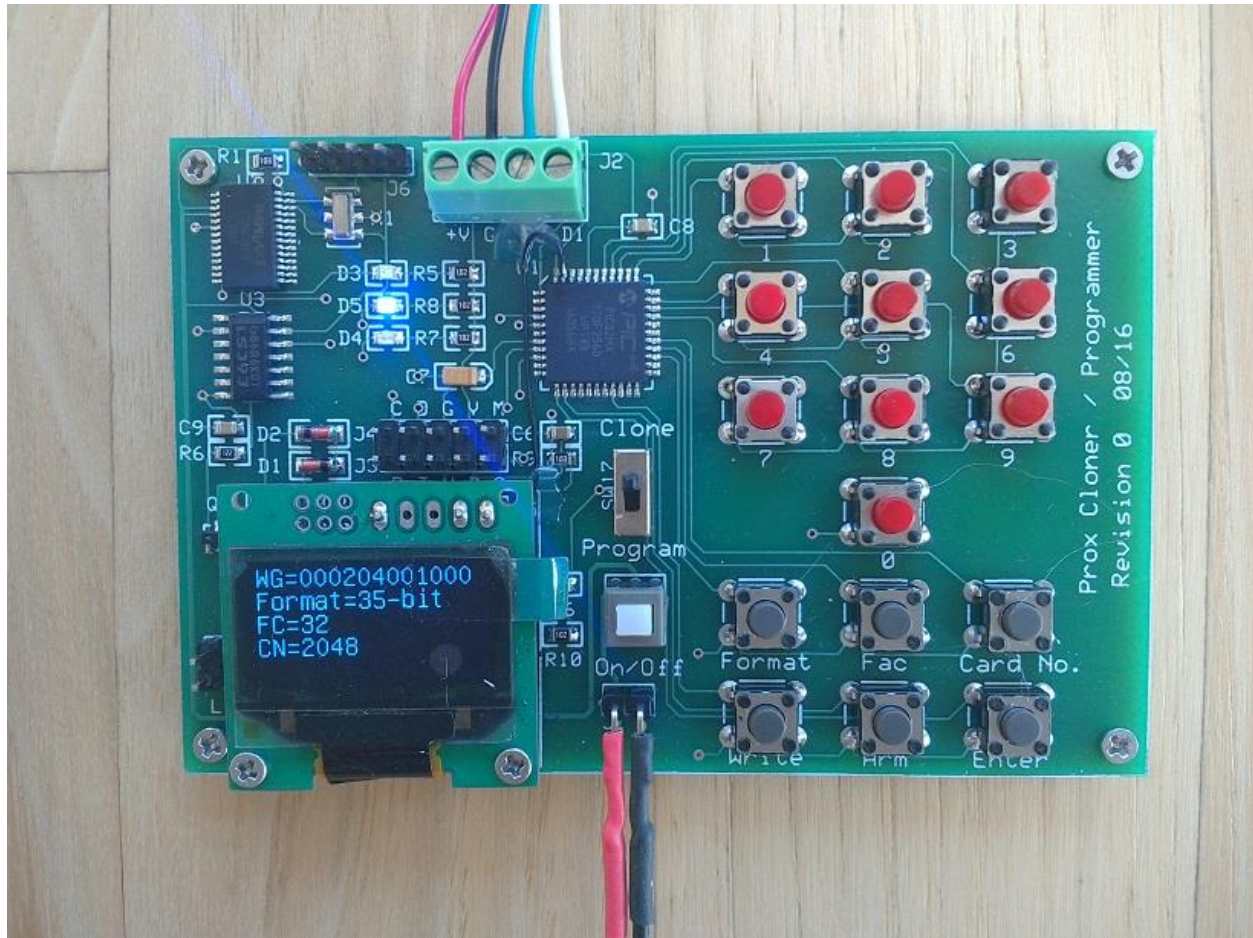


Figure 1. Prox Cloner/Programmer Circuit Board and OLED Display

Switch Functions

[On/Off]

Power to the Cloner/Programmer unit is handled by the small white pushbutton switch located near the right side of the OLED display. Push the switch once to turn the unit on, push it again to turn the unit off.

[Mode]

The “Mode” switch is located directly above the power On/Off switch. Depending on the state of this switch when the unit is powered on, the unit will either enter “Read/Clone” mode or “Program” mode. Put it in the up position to select “Clone” mode and the down position to select “Program” mode.

[Numeric Data Entry 0-9]

The ten red pushbuttons are used to enter numeric data when operating in “Program” mode. These push buttons are used when entering the facility code and card number data fields. These switches are NOT used in the “Read/Clone” mode.

[Format]

When operating in Program Mode, the “Format” button is used to select one of four supported

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credential formats. Each time the button is pressed the selected format will cycle between 26-bit, 34-bit, 35-bit and 37-bit. This switch is NOT used in the “Read/Clone” mode.

[Facility]

When operating in Program Mode, the “Facility” button is used to inform the microcontroller that subsequent data entry should be directed to the Facility Code field. Any numeric data entered after pressing this button will be used to specify a Facility Code that will be used when programming the credential. This switch is NOT used in the “Read/Clone” mode.

[Card No.]

When operating in Program Mode, the “Card No.” button is used to inform the microcontroller that subsequent data entry should be directed to the Card Number field. Any numeric data entered after pressing this button will be used to specify a Card Number that will be used when programming the credential. This switch is NOT used in the “Read/Clone” mode.

[Enter]

When operating in “Program” mode, pressing this button will cause the microcontroller to perform a validity check on the credential data that has already been entered. This button should only be pressed after all desired credential data (Format, Fac Code and Card Number) has been entered. No write to a credential will occur unless a validity check has been performed and the blue LED has been lit. This switch is NOT used in the “Read/Clone” mode.

[Arm]

The “Arm” pushbutton is only used in the “Read/Clone” mode.

In “Read/Clone” mode the “ARM button is used to instruct the ProxPoint reader to Re-Arm and begin accepting a new wiegand data stream from the Proxpoint reader. Pushing this button will erase all previously captured credential data which will then be replaced with new credential data when it becomes available.

[Write]

The “Write” pushbutton is used when operating in either “Read/Clone” mode or “Program” mode. Pressing this button will initiate a write operation to a credential that has been placed on top of the loop antenna located directly below the circuit board. Data can only be written if the “Blue” LED is on. In “Read/Clone” mode, this operation will write data that was captured from a previous credential read. In “Program” mode, this operation will write all user specified data that has been entered from the keypad.

Status LED's

[Green LED]

The green LED is located next to the On/Off switch on the printed circuit board. This LED is on whenever power has been applied to the unit.

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[Blue LED]

The blue LED is located above the OLED display on the cloner circuit board. This LED is activated whenever valid data is available to be written to a credential.

In “Read/Clone” mode, this LED will be lit whenever a successful read of a credential has been completed.

In “Program” mode this LED will be lit once all user data has been entered and a data validity check has been performed.

[Note: once the blue LED has been activated, no further data will be accepted from the reader until the unit has been re-armed by pushing the “ARM” push button .]

[Red LED]

The red LED is located above the OLED display on the printed circuit board. This LED is activated whenever an error condition is encountered. The most likely reason this LED will be activated is if a write operation has been attempted before a card has been read or a data validity check has been performed.

[Yellow LED]

The yellow LED is located above the OLED display on the printed circuit board. This LED is activated whenever a write operation is in progress. The credential being written should remain on top of the antenna while the yellow LED is illuminated (approximately 1.5 seconds).

“Read/Clone” Mode Operation

To Read a Credential:

1. Position the “Mode” switch in the up position to select “Read/Clone” mode.
2. Apply power to the unit. The green LED will be on.
The ProxPoint reader will take approximately 3 seconds to power up. At this time the OLED display should show the message “Read/Clone Mode” / “Awaiting Data ...”
The unit is now armed and polling for a valid HID Prox credential.
3. Place a credential near the ProxPoint Reader (within 2-3 inches).
The reader will automatically read the credential data and display the results on the OLED display. The blue LED will be activated indicating that valid data has been captured. The unit will disable further data capture until the “Arm” pushbutton is activated or power has been cycled.

To Write a Credential:

1. Ensure that the Blue LED is ON. If not, follow the read procedure above.
2. Lay the T55x7 credential to be written on top of the loop antenna.
3. Press and release the “Write” pushbutton.
4. Wait for the Yellow LED to flash on and then off again (~ 1-2 seconds).
5. If another credential is to be written with the same data then repeat steps 2,3, and 4 above.
6. If the red LED is activated, correct the problem and repeat steps 1-4 above.
7. Remove the credential from the vicinity of the antenna.

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“Program” Mode Operation

To Program a credential with user specified data:

1. Position the “Mode” switch in the down position to select “Program” mode.
2. Apply power to the unit. The green LED will be on.
The ProxPoint reader will take approximately 3 seconds to power up. The reader will blink its red LED and beep when completed. The OLED display will now show the following:

```
Program Mode
Fmt :
FC  : 0
CN  : 0
```

3. Press the “Format” button one or more times to roll through the available format options.
4. Press the “Fac” button followed by the desired Facility Code value.
5. Press the “Card No” button followed by the desired Card Number value.
6. Press the “Enter” button to perform a validity check of the data that was entered above. If the data entered is valid then the Blue LED will be lit. If an error is detected, the Red LED will be momentarily lit, indicating to the user that a portion of the data needs to be re-entered .
7. Place a T55x7 credential on top of the antenna and press the “Write” button.

[NOTE: If a T55x7 fob is being written, the fob should be held approximately 1” above the antenna. Due to a mis-match of antenna sizes, the fob cannot be reliably written when it is layed directly on top of the antenna.]

Program Example:

To program a credential with the following parameters, the keypad sequence should be as shown below.

Sample Card Parameters:

```
Format: 35-bit Corporate 1000
Facility Code: 150
Card Number: 300525
```

The key sequence for the above parameters would be:

[Fmt] [Fmt] [Fmt] [Fac] [1] [5] [0] [CN] [3] [0] [0] [5] [2] [5] [Enter] [Write]

If data is accidently entered incorrectly simply press the appropriate field selection key again followed by the correct numerical data (e.g. [Fac] [1] [5] [2] ...)

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Other Important Information

[Valid Data Ranges]

The following data ranges are applicable to the specified credential formats. Any value entered outside of this range will cause the “Red” LED to flash when the “Enter” key is pressed.

| Format | Facility Code Range | Card Number Range | PIN Code Range |
|------------------|---------------------|-------------------|----------------|
| 26-bit H10301 | 0-255 | 0-65535 | 1-9999999999 |
| 34-bit N1002 | 0-65535 | 0-65535 | 1-9999999999 |
| 35-bit Corp 1000 | 0-4095 | 0-1048575 | 1-9999999999 |
| 37-bit H10304 | 0-65535 | 0-524287 | 1-9999999999 |

[Battery Life]

The Prox Cloner/Programmer unit is powered by 4 “AA” batteries. The unit draws approximately 100 ma of current from the batteries which should allow for approximately 10 hours of use from a standard set of alkaline batteries. To preserve battery life the unit should be switched off when not being used.

If there are any questions regarding these instructions please contact Carl at info@proxclone.com