

## LOOK Remote Upgrade User Guide

Customizing the LOOK Infrared Remote Control for your own infrared electronic devices can be completed in 5 simple steps. There are only three things you need to know about the infrared device you are attempting to control.

1. You must know the protocol the device uses. Many modern electronics these days use the NEC1 infrared protocol.
2. Every device has a system address or device address. This is necessary for effectively communicating with the device.
3. Every button or key on the remote transmits a command. You will need these commands.

The easiest way to obtain this information is by using an [infrared decoder](#) connected to your PC. The decoder will decode commands from your remote control and display the results in a terminal program. For this, we will be using [Teraterm](#).

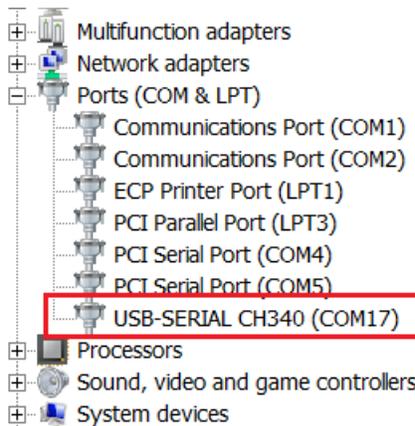
### Step 1.

Connect the infrared decoder device to a USB port on your computer and allow windows to install the driver.

If the driver installation fails, you can [download the driver here](#), and install it manually.

## Step 2.

Once driver installation is successful, the port number must be determined. In windows, navigate to Device Manager and look for the device.

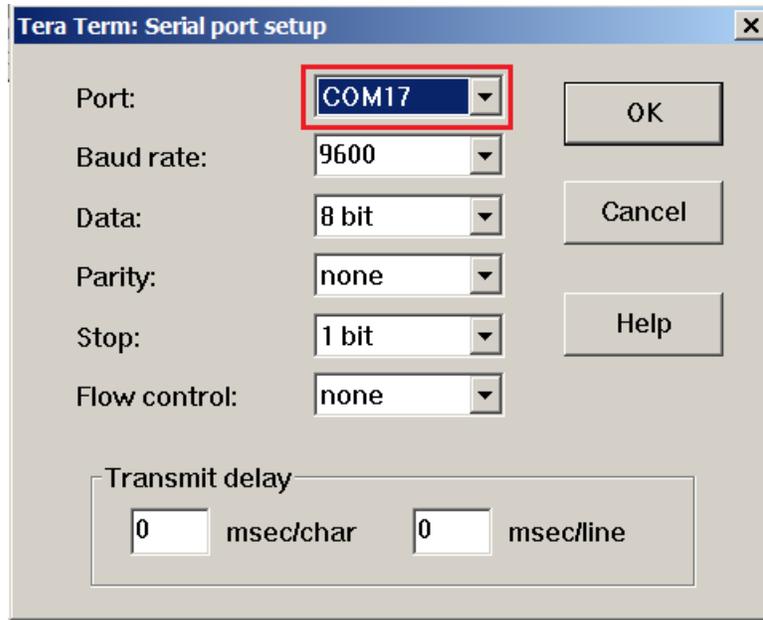


**Fig.1 Windows Device Manager**

Here windows installed the driver on COM17.

## Step 3.

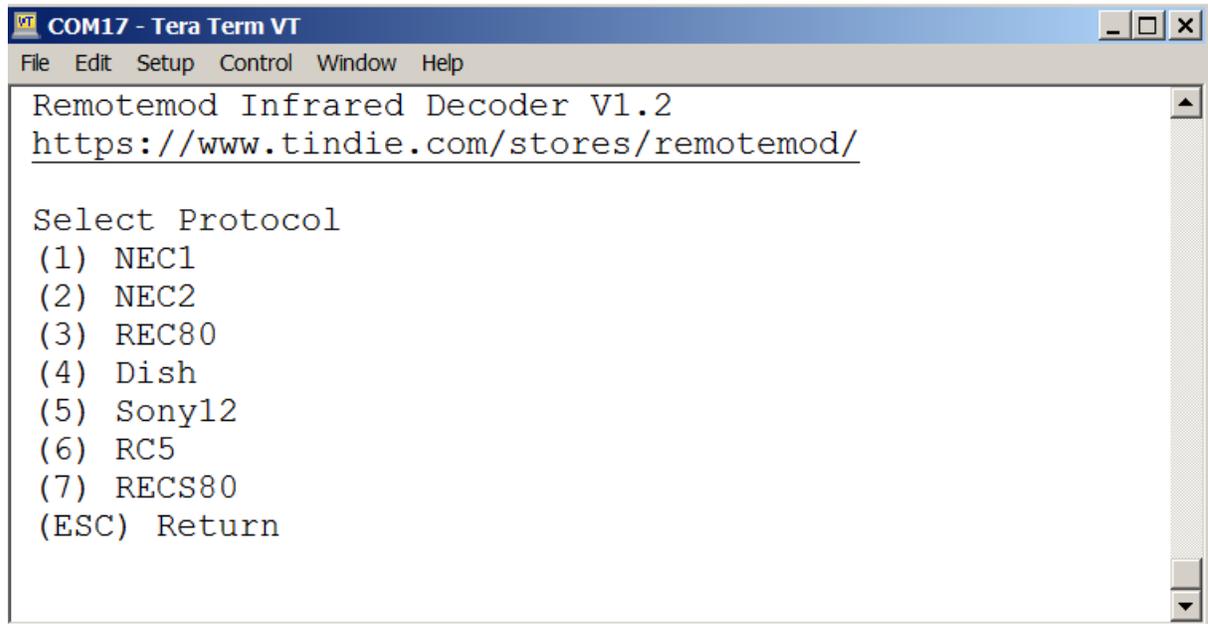
[Download Teraterm](#) and install it. Once installed, click on Setup, then Serial Port. Ensure your settings are the same as in Fig.2 particularly the com port number and select OK.



**Fig.2 Teraterm Settings**

#### **Step 4. Using the Decoder**

When the serial port settings are correct, press the reset button on your decoder. You will see a main menu like this one:



**Fig.3 Decoder Main Menu**

Now select one of the protocols listed above. Aim the remote at the decoder and press a key. If the protocol selected is the correct one for your remote, you will see some data displayed (Fig.4). If you do not see any data, then press ESC on your computers keyboard to get back to the main menu, and try another protocol.

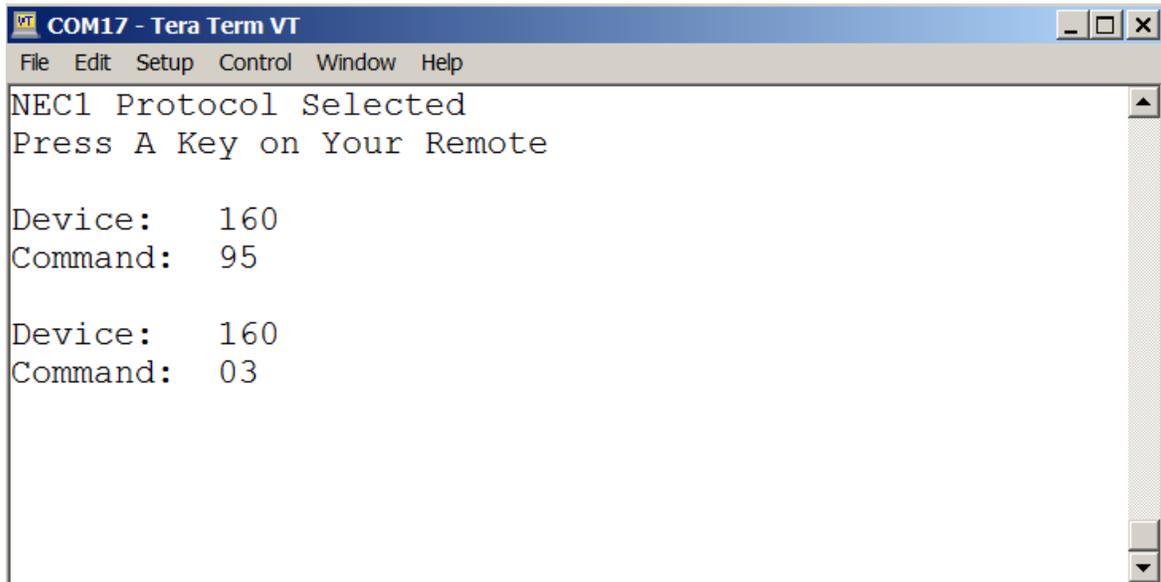


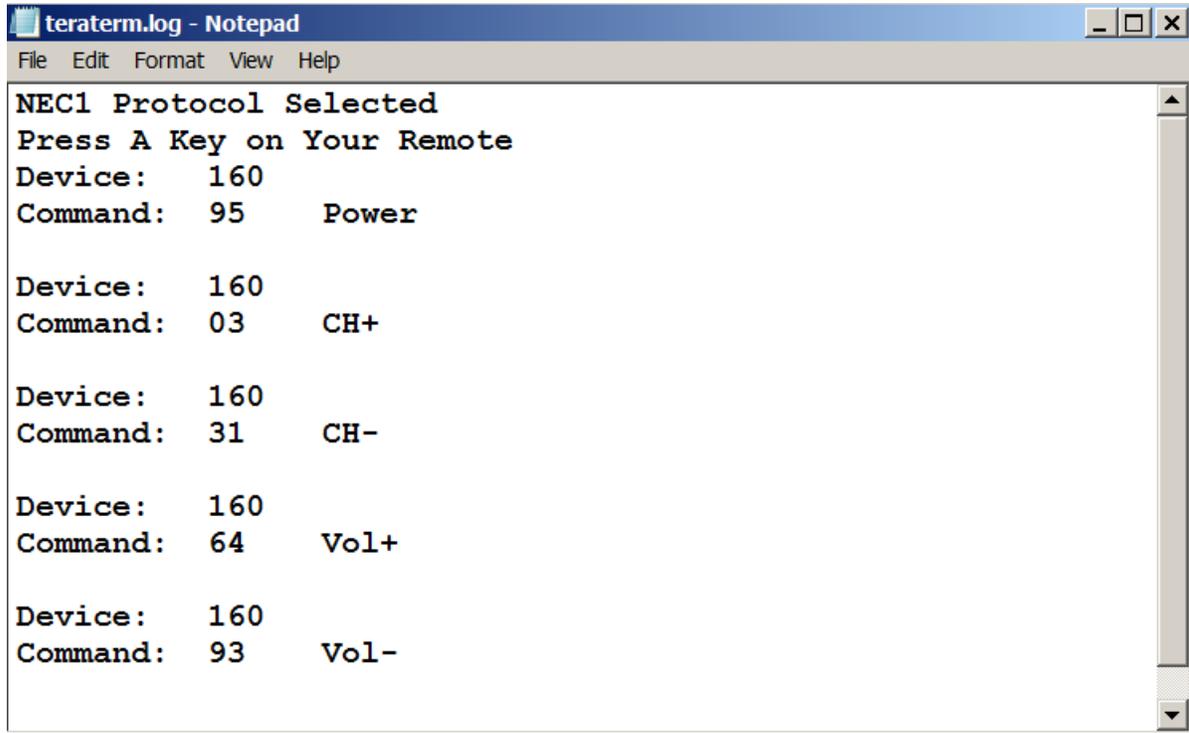
Fig.4 Decoded Result

The Device is the System address for your remote. It will be the same for all commands on the same remote. The Command is the instruction for the key you pressed.

You will need capture all the commands for keys you want to use. The easiest way to do this in Teraterm is to select File, Log. This will record all of the commands to a log file so you have a permanent record of the commands in case the original remote is lost or inoperable.

When you have entered all the commands, maximize the Teraterm log window and select close to close the log file.

Now the file can be edited in notepad. Enter the command description beside each command and save the file.



```
teraterm.log - Notepad
File Edit Format View Help
NEC1 Protocol Selected
Press A Key on Your Remote
Device: 160
Command: 95 Power

Device: 160
Command: 03 CH+

Device: 160
Command: 31 CH-

Device: 160
Command: 64 Vol+

Device: 160
Command: 93 Vol-
```

Fig.5 Teraterm Log File Example

## Step 5. Editing the Source Code

Once you have all of the information needed (the protocol, the Device address and all of the commands for every button) You can enter this data in the source code. Open the keymap.inc file with a text editor. Navigate to the bottom of the keymap.inc file. There you will see:

```
;change system bytes here
.equ  TV_System    = 160 ;RCA 50" TV
.equ  VCR_System   = 1   ;Channel Master DVR+
.equ  SAT_System   = 13  ;Use Look Button
```

### Fig.6 Change Device Address

Enter the Device address for the correct mode. If the remote you are using is for a TV, then enter the Device address on the TV\_System line as shown above. If the remote is for another device, then enter it in one of the other device modes. You can see that the above TV\_System is 160. Refer to our log file (Fig.5 to see the device address).

### Selecting the carrier frequency.

In most protocols except Dish, REC80, Sony12 and RC5, the carrier frequency is 38KHz. With Dish & REC80, the carrier frequency is 57.5 KHz, with RC5 the carrier frequency is 36 KHz, and with Sony12 the carrier frequency is 40 KHz.

Choose one of the carrier frequencies in the carrier frequencies list. You will find this below the "change carrier frequency here" line.

i.e. if your TV remote works with 38KHz, then enter 51 on the TV\_Freq line as shown below. If your satellite receiver works with 57KHz then enter 34 in the SAT\_Freq line as shown below). This must be done for all modes, TV\_Freq, VCR\_Freq and SAT\_Freq)

```

;change carrier frequency here
.equ  TV_Freq      = 51          ;38KHz
.equ  VCR_Freq     = 51          ;38KHz
.equ  SAT_Freq     = 34          ;57KHz

;do not change anything here
;the data has been carefully calibrated for the remotes clock frequency
;54              ;36 KHz for RC5
;51              ;38.4 KHz for all except Dish, RC5, Sony12, REC80
;49              ;40 KHz for Sony12
;34              ;57.5 KHz for Dish or REC80

```

### Fig. 7 Change Carrier Frequency

#### Entering the Commands

Open LOOK.asm with a text editor. If the remote you are using is a TV remote, you will want to edit the TV\_Table. (Choose the table to edit according to the device you are using, i.e. for a DVD player or VCR, edit the VCR\_Table, for a satellite receiver, edit the SAT\_Table) This way when the mode button for TV is pressed, the LOOK remote will send the commands in the TV\_Table. When the mode button for VCR is pressed, the LOOK remote will send the commands in the VCR\_Table.

```

TV_Table:                ;RCA 50" TV (NEC1 Protocol)
.db 95,255,255,255,26,85,12,19    ; 0 - 7
.db 89,81,86,20,27,71,83,80      ; 8 - 15
.db 18,79,76,14,75,72,10,68     ;16 - 23
.db 3,31,64,93,16,23,255,28     ;24 - 31
.db 9,13,77,8,255,77,255,255    ;32 - 39

```

#### Fig.8 Changing the Command

Find the key you want to use on the LOOK remote in the keymap.inc file. In the keymap.inc file, all of the keys are numbered. For example, the Power key is number 0. This number corresponds to the address in the TV table.

**\*\*The table begins at address 0 (not 1)\*\***

By looking at our log file from Teraterm (Fig.5 above), you can see that the power command is 95. You will enter this data at the correct address in the TV table, location 0. The table address is listed on the end of each line in the table, to make it easier. Now when the power button is pressed (in TV mode) the 95 command will be sent.

Another example. You would like to edit the command that the Channel UP key sends on the LOOK remote. According to the keymap.inc file, the address is 24 for the CH+ key (CHPlus). Find the command for the CH+ key from your original remote by referring to the Teraterm log file. In the above example (Fig.5) the command is 3. Enter 3 at location 24 in the table.

Do this for every command, and in all modes (TV, VCR & SAT modes). For buttons not used, enter 255 in the table address. The remote will not send any infrared data if the command is 255 (0xFF). This is necessary if you would like to disable some of the keys on the remote. When you are finished entering all of the commands, find the protocol information in LOOK.asm.

```

TV_Mode_TX:
    ldi    ZH,HIGH(TV_Table*2)      ;point to the table
    ldi    ZL,LOW(TV_Table*2)
    rcall  Get Key
    rjmp   TX_NEC1                  ;change protocol here

TV_Table:                                ;RCA 50" TV (NEC1 Protocol)
    .db   95,255,255,255,26,85,12,19   ; 0 - 7
    .db   89,81,86,20,27,71,83,80      ; 8 - 15
    .db   18,79,76,14,75,72,10,68      ;16 - 23
    .db   3,31,64,93,16,23,255,28      ;24 - 31
    .db   9,13,77,8,255,77,255,255     ;32 - 39
;

```

### Fig.9 Changing the Protocol

Simply edit the line above with the comment  
";change protocol here".

The choices at the time this file is being created are:

```

rjmp  TX_NEC1           ;NEC1 protocol
rjmp  TX_NEC2           ;NEC2 protocol
rjmp  TX_REC80          ;REC80 protocol
rjmp  TX_NEC_RNC        ;NECrnc protocol
rjmp  TX_DISH           ;Dish protocol
rjmp  TX_Sony12         ;Sony12 protocol

```

You must change the protocol for every device you want to use.

(i.e. change TV\_Mode\_TX, SAT\_Mode\_TX, or VCR\_Mode\_TX).

## Step 6. Compiling and Programming the Source Code

When all the changes have been made to the source code, save your files and double click "001 assemble.bat". A hex file called "LOOK.hex" will be created. This is the file you want to program into the remote.

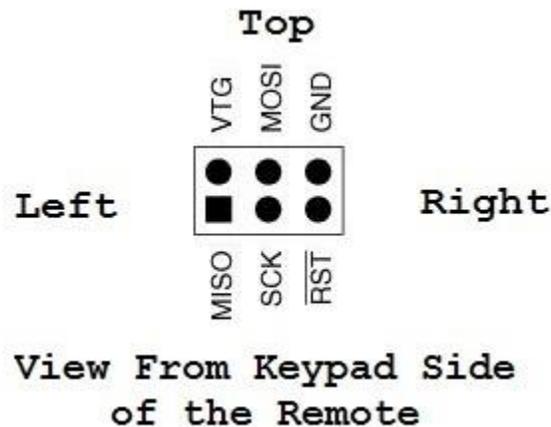


Fig.10 Orientation of the ISP Programming Connector

In order to program the remote, you will need to use the supplied ISP Pogo adapter. Please note the orientation of the programming pins above in Fig.10 above.

If your programmer is a usbaspp programmer you can double click "002 PROG-USBASP.BAT", and the code will automatically be programmed.

The remote has been tested before it is shipped so there will be working test code loaded when you receive it. For this reason, you do not need to program the fuses. **If you want to change the fuses, do so at your own risk.** You could brick the device and render the upgrade module inoperable. You have been warned. If you decide to open the remote control, please be aware that the shell is very delicate. You need special plastic pry tools to safely open the remote. Without these special tools you will most likely damage the case or break the tabs holding the remote together.

## Troubleshooting and FAQ

Q: The remote doesn't work!

A1: The first thing I always do is check if the remote is transmitting something, regardless if it's the wrong data. You can view the IR LED with the camera on your smartphne. When you press a key on the remote, the LED will glow when viewed from the camera on your smartphne.

A2: If it does not, check the command table. If the key address contains a "255" then the remote will not transmit anything.

A3: If the LED does not glow and you are certain the software is correct, the LED may be blown.

A4: If the LED is glowing, then perhaps you have the command, system device, or protocol set up incorrectly.

A5: Try using the decoder to see exactly what the remote is sending. You will know instantly what the problem is.

A6: Still not working? Check the batteries!

Q: I am getting errors when I compile the source code.

A: Send email to the email address below. Send me the error message and the code where the error exists. I will try to help you.

Q: The programming fails.

A1: 99% of the time it's the programmer.

**Always use a programmer that takes power from the remote, and install new batteries in the remote.**

A2: Did you check the orientation of the programming connector? (See Fig.10 above).

A3: Did you place the pogo pins in the right location on the pads? This may take some time getting used to programming with the pogo pin adapter. If you apply too much pressure on the pins, you may damage the pins and/or the circuit board on the remote. You can try detecting the device (not programming anything) until you are confident with using the Pogo Pin adapter.

A4: An simple program to use in order to read the Atmega328PB device ID is [avrdudess](#). There is no easier way!

A5: If the version of avrdude you are using is an older version, it may not support the atmega328PB. Download [this fix here](#). Please follow the instructions carefully.

A6: If you change the fuses and it fails, you may be locked out of the atmega328PB! Again, get the above fix because more than likely your avrdude.conf file does not support the atmega328PB correctly!

A7: Most usbasp clones are configurable in whether or not they use target power or USB power. Usually it's just a matter of de-soldering a solder bridge or jumper on the usbasp programmer board.

A8: A genuine AVR programmer (like an avrispII or a dragon) rarely gives me problems because these programmers monitor the target voltage.

Most programming problems are usually caused by a cheap usbasp programmer clone. I have seen some of these programmers not able to control the reset correctly on the target circuit. This will always result in programming failure.

Any questions?

Please email:

[remotemod328@gmail.com](mailto:remotemod328@gmail.com)

Always happy to offer support.