

# Arduino TITO and TITO Deluxe

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## OVERVIEW

This is a TITO-only version of my larger project; re-designed for the Arduino UNO and as a compatible upgrade to the BETTORSlots TITO and TITO Deluxe hardware.

Project: <https://github.com/marcrdavis/ArduinoTITO-PlayerTracking>

## HARDWARE REQUIRED

Arduino UNO (or BETTORSlots TITO/Deluxe Board)

<https://www.amazon.com/gp/product/B01EWOE0UU>

W5100 Ethernet Shield (if you want to use the Deluxe features)

<https://www.amazon.com/gp/product/B00AXVX5D0/>

MAX3232 Serial port (or compatible)

<https://www.amazon.com/gp/product/B083L99CGZ>

1' USB Cable

<https://www.amazon.com/1-feet-USB-2-0-Printer-Device-Cable-Black-Type-A-Male-Type-B-Male-Plug-A-Male-to-B-Male-High/dp/B000JC00UO>

Four 2" DuPont M-F jumper wires

CAT5 cable long enough to reach from your network jack to inside the game cabinet

<https://www.amazon.com//dp/B07QXNWRWJ>

Serial cable to connect to game

- For IGT Games: 5-pin Dupont to Male DB9 Serial pigtail (I reused the one from the BETTORSlots TITO board)
- <https://www.amazon.com/gp/product/B081GJR1MN>

5 Watt or greater USB Power Brick

3D printed case for Arduino (or something to protect Arduino from shorting-out on metal in cabinet)

Compatible slot machine

- Tested on IGT S2000/GameKings/AVP, Bally, WMS and Konami machines; will probably work on others based on the SAS 6.x protocol; you will need a compatible cable to connect to the serial port on the machine

## SOFTWARE REQUIRED

Latest version of Arduino IDE

<https://www.arduino.cc/en/software>

## BEFORE YOU BEGIN

These instructions assume familiarity with electronics, coding and slot machine configurations. If you are new to any of these then this project may not be for you. My instructions were not written for beginners. You may damage your game or the Arduino/TITO hardware if you do not understand what you are doing.

## WIRING (skip if reusing BETTORSlots hardware)

- The Ethernet Shield attaches to the Arduino UNO via the built-in pin headers [Deluxe Only]
- The Serial board needs to be wired as follows:

Serial	Arduino
VCC	5V
RXD	Data Pin 0
TXD	Data Pin 1
GND	GND

You will need to power the Arduino board from the Accessory Outlet in the base of the slot machine using a USB power brick (5W or greater).

- Do not power the board from any built-in USB port on the game – it will not provide enough power

You will also need to run a CAT5 cable into the cabinet for the network or use a WiFi-RJ45 Bridge – which will require separate power [Deluxe Only]

Compatible WiFi bridge: [https://www.amazon.com/BrosTrend-600Mbps-Adapter-Wireless-WNA016/dp/B0118SPFCK?ref=ast\\_sto\\_dp](https://www.amazon.com/BrosTrend-600Mbps-Adapter-Wireless-WNA016/dp/B0118SPFCK?ref=ast_sto_dp)

## INITIAL SETUP

- **[Deluxe Only] IMPORTANT:** Remove any SD card from the slot if present; since we are not loading the SD library it will interfere with the networking if a card is present.
- Assumes you have the Arduino IDE setup, the board and COM port settings are correct
- **[Deluxe Only]** The following libraries and versions are required:
  - o Ethernet\* (Latest version)

\*Can be downloaded via the Arduino IDE Library Manager

- **IMPORTANT:** Before you program the Arduino you must temporarily disconnect the two wires on serial pins 0 and 1 because the serial connection is shared between the USB and the 9-pin connector
- Connect the board to your computer via USB and load the ArduinoTITO or ArduinoTITODeluxe sketch as appropriate
- For both versions there are some settings that need be modified in the sketch before you download it to the Arduino:
  - o ChangeToCredits – set to 1 to add credits via the Service/Change button
  - o changeCredits – set to the number of credits to add on each push of the Service/Change button
  - o useDHCP – set to 1 to get a unique IP address from the network; you will need to discover the address by checking your router after the device is connected
  - o **[Deluxe Only]** webUI – By default this is set to the address of the hosted web console; if you want to host the web console on your network change this to the address of your site
  - o **[Deluxe Only]** mac – set a unique mac address for the Ethernet board; only necessary if you will be deploying more than one Arduino TitoDeluxe board on your network
  - o **[Deluxe Only]** ip – set a unique IP address for your network
- Download the sketch to the Arduino; wait until complete
- Unplug the Arduino from the PC
- **IMPORTANT:** Re-attach the serial connections on pins 0 and 1
- Mount the hardware into the slot machine's lower cabinet
- Connect the board to the game's serial port using the DB9-to-DuPont cable or existing compatible cable
- **[Deluxe Only]** Connect the CAT5 Ethernet cable from your network switch to the Arduino
- Connect the USB power to the machine's accessory outlet
- Power on the machine and test
  - o Assumes you are replacing an existing TITO board or have already setup your machine per the instructions later in this document

## UPGRADING BETTORSLOTS HARDWARE

This software was designed to allow owners of the BETTORSlots TITO and TITO Deluxe hardware the option of upgrading their software to The Arduino TITO project.

**WARNING! If you choose to upgrade your BETTORSlots board to The Arduino TITO Project software you do so at your own risk. The process is irreversible and you will lose any support, if any is still available, from the original vendor. I have only tested this on the few BETTORSlots boards I have in my possession.**

The procedure is identical to the INITIAL SETUP process above; if you have a BETTORSlots Deluxe board then use the ArduinoTITODeluxe sketch; otherwise use the ArduinoTITO sketch.

For the Deluxe version you will need to REMOVE THE SD CARD from the device. It will not be used and can interfere with the network.

## REMOTE ACCESS (Deluxe Version Only)

The web interface allows you to control various aspects of your game by using a web browser.

In the latest version the web interface has been moved from the device to a hosted site. This was done for several reasons:

- Performance
- Memory limitations of the Uno hardware
- The need to free up code space for additional features

Even though the web interface is hosted on the Internet it does not have access to your network. You can only manage machines on the same local network as the device you are connecting from. If you are still not comfortable with that for any reason you can host the webpage yourself on a web server on your network – then simply change the ‘webUI’ property in the code to point to your server. The only file needed is the index.html file, which is included in the package.

To access the web interface you can either browse to the IP Address of your game or go to <http://arduinotito.infinityfreeapp.com> and enter the IP Address of the game in the space provided.

**Arduino TITO Deluxe**

Add Credits

1000

Sound On

Sound Off

Unlock Play

Lock Play

Enable Bill Validator

Disable Bill Validator

Change/Credits On

Change/Credits Off

Game Statistics

Reboot Arduino

Jackpot Reset

Update Ticket Info

Casino Name/Location

Address Line 1

Address Line 2

Update Ticket Info

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Most functions are self-explanatory; The Change/Credits feature allows you to enable adding credits by pressing the Change (or Service) button. The number of credits added on each press is set in the sketch prior to loading it onto the Arduino.

The Update Ticket Info option allows you to change the information printed on the cash-out ticket.

## CONFIGURING YOUR IGT MACHINE (S2000/GameKing)

Before getting started with setting up your IGT machine for TITO please ensure your Bill Validator is working correctly and your Ticket Printer can print clear and legible tickets. You will also need a Keychip appropriate for your type of machine. These instructions assume familiarity with the Keychip process.

Note – keychips and menu option locations vary from model-to-model. Please consult your IGT user manual or me if you have questions.

1. Clear any credits off your machine
2. Keychip your machine
3. Once in the Keychip Menu, ensure your Denomination, Devices, Limits and Game settings are as you want them
4. Setup the Comm Options as follows
  - a. IGT SAS Primary Channel = Channel 3
  - b. SAS Secondary = Off
  - c. Bally Miser = Off
  - d. Progressive Link = 7
  - e. WAMM 1.0 = Off
5. Setup the Validation/Redemption Options as follows
  - a. Validation = System Validation
  - b. Redemption = SAS Redemption
6. Setup the IGT SAS Options as follows
  - a. System Bonusing = SAS Legacy
7. Setup the SAS Channel (Primary Channel) Options as follows
  - a. Address = 1
  - b. Legacy Bonus = Enabled (X)
  - c. Validation = Enabled (X)
8. Setup the Machine Terminal Options as follows
  - a. Voucher Limit Follows = Credit Limit
9. Save all options and make any other changes you wish before pressing Return to Game to exit the keychip menu

Test the game by inserting money and then pressing Cash Out to generate a ticket. The ticket serial number should match the number of credits you inserted. Insert the ticket into the machine, it should accept it for the same number of credits.

## CONFIGURING YOUR IGT MACHINE (AVP)

Please see this video for how to configure your AVP Game:

<https://www.youtube.com/watch?v=JKjyeFQPltA>

## NOTES AND COMMENTS

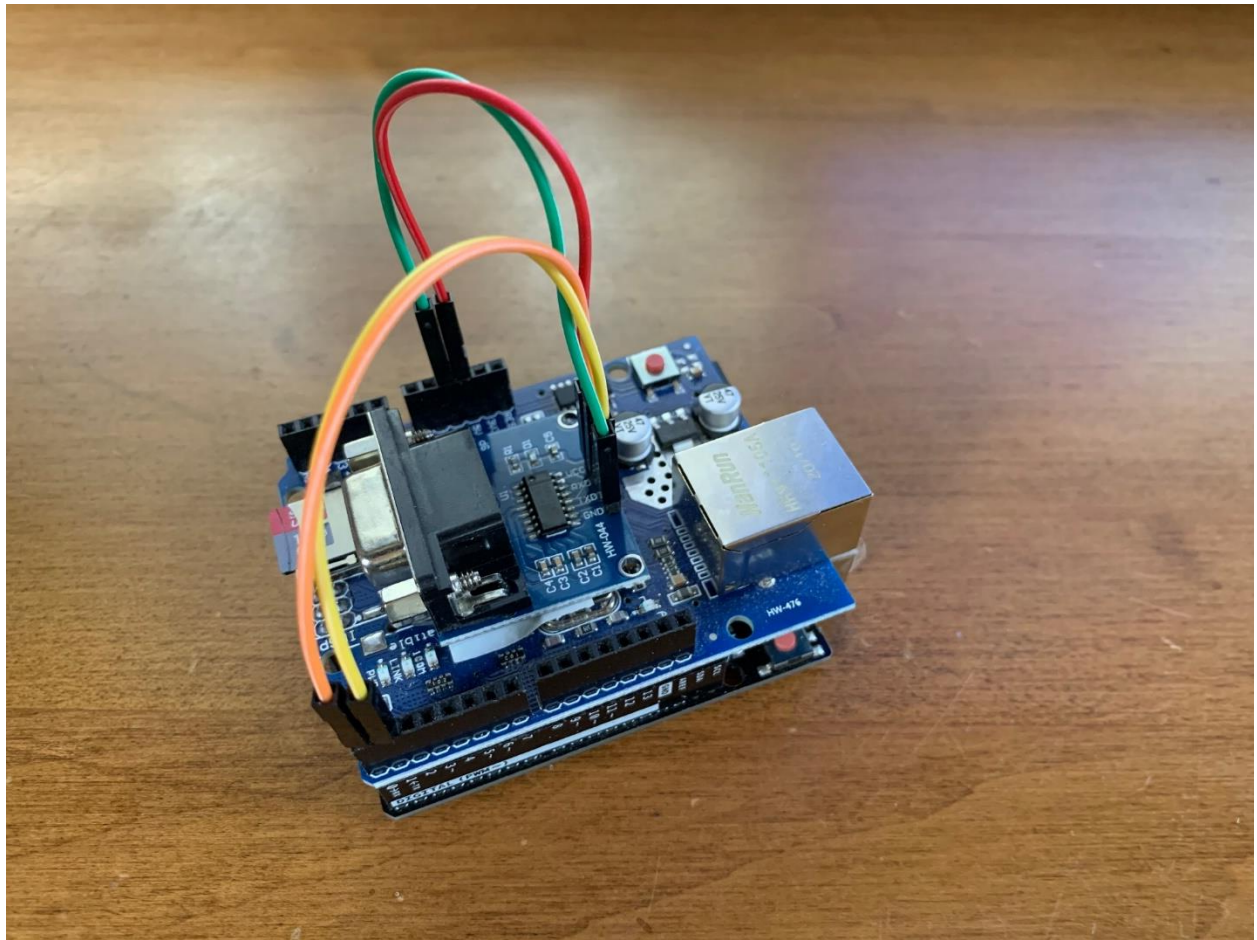
- This version was designed to create new TITO-only boards as well as upgrade or reuse existing BETTORSlots TITO and TITO Deluxe boards; if you choose to attempt to upgrade a BETTORSlots board you do so at your own risk and the process is irreversible.
- Why was the SD card support removed?
  - o The Deluxe sketch had maxed out the available 2K memory on the Arduino Uno. In order to fix certain bugs and continue to improve the sketch I decided to remove the need for the SD card to free up much needed memory. This proved possible with the online hosting of the improved web interface. Since the remaining settings can be set prior to flashing the device and/or updated from the web UI; it seemed a fair compromise to increase the stability of the code and provide room for future enhancements.

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Figure 1 – Mockup



Example of Deluxe board wiring

FIGURE 2: IGT Serial Cable



IGT S2000/GameKing Serial Pinout

DB9 Male	Signal direction	S2000 J82
3 Receive Data	←	1 Transmit Data
2 Transmit Data	→	2 Receive Data
5 Signal Ground	---	5 Signal Ground

Option: DB9 to Dupont Serial Cable: <https://www.amazon.com/gp/product/B081GJR1MN>

