# 102-300 Hardware Programming Essentials Kit
## Reference List

Total number of different parts: 41
Total number of pieces: 117
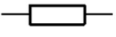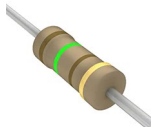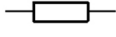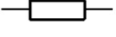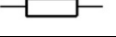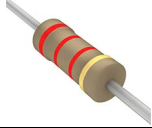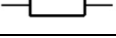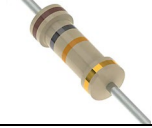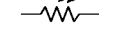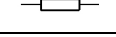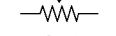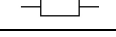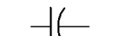
**Notes:**
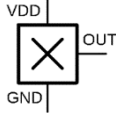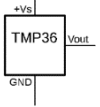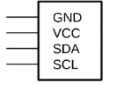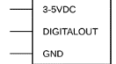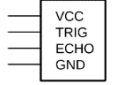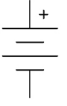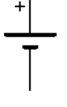
- Parts in this kit can be used with various microcontrollers and single-board computers. Such as an Arduino or Raspberry Pi. (Not Included)
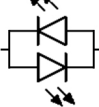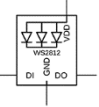- Many parts are a choking hazard. Keep them away from small children and pets.
- Some parts look identical (except for the color code or part number). Be sure to put each part back in its place.
- The code shown in certain part images should also be printed on the actual part.
- Many parts come on strips of tape. Gently peel off any tape and wipe off adhesive before using each part.
- Bend leads in the middle (not against the body of the component). This helps prevent the leads from breaking.
- The **location** column shows where to place each part when using a STOREHOUSE 10 Tray Utility Box from Harbor Freight.

| | | | Cables | |
|---|---|---|---|---|
| Symbol | Kit QTY | Image | Description | Location |
| **No symbol** | 1 | | USB 2.0 Type A/B Cable (For use with Arduino Uno R3) | Box 3, Tray 5 |
| | | | **LEDs** | |
| | 10 | | 5mm Red LED (lens may be red or clear) Forward Voltage (Vf) = 2V, Current = 20mA | Box 3, Tray 8 |
| | 2 | | 5mm Green LED Forward Voltage (Vf) = 2.1V, Current = 20mA | Box 3, Tray 8 |
| | 5 | | 5mm Bi-color Red/Green Two Lead LED Forward Voltage (Vf) = 2.1V Green, 1.95V Red Current = 20mA | Box 3, Tray 8 |
| | 5 | | 5mm Addressable Diffused RGB LED, WS2812 standard 4.5V – 6V | Box3, Tray 8 |

## Resistors
All resistor tolerances are ±5% (gold stripe)

| Symbol | Kit QTY | Image | Description | Location |
|---|---|---|---|---|
| —WW— OR ⬚ | 10 | | 150Ω ¼W 5% Carbon Film Resistor Brown, Green, Brown | Box3, Tray 7 |
| —WW— OR ⬚ | 10 | | 360Ω ¼W 5% Carbon Film Resistor Orange, Blue, Brown | Box3, Tray 7 |
| —WW— OR ⬚ | 10 | | 1KΩ ¼W 5% Carbon Film Resistor Brown, Black, Red | Box3, Tray 7 |
| —WW— OR ⬚ | 10 | | 2.2KΩ ¼W 5% Carbon Film Resistor Red, Red, Red | Box3, Tray 7 |
| —WW— OR ⬚ | 10 | | 10KΩ ¼W 5% Carbon Film Resistor Brown, Black, Orange | Box3, Tray 7 |
| —W— OR ⬚ | 1 | | CdS Photocell Dark Resistance. ≈ .5MΩ Light Resistance = Between 16 – 33 KΩ) | Box 3, Tray 8 |
| —W— OR ⬚ | 1 | 103 | 10KΩ (code 103)  Trimmer Potentiometer (Style may vary) | Box 3, Tray 8 |

## Capacitors
Package color may vary.
Voltage rating printed on the electrolytic capacitors will vary, but should always be 25V or higher.

| Symbol | Kit QTY | Image | Description | Location |
|---|---|---|---|---|
| —‖— | 2 | 104 | 0.1µF (100,000 pF) 50V Radial Ceramic Capacitor | Box 3, Tray 8 |
| —)‖— OR ⬚ | 2 | | 1 µF 50V Radial Electrolytic Capacitor | Box 3, Tray 8 |

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## Transistors, Diodes, and Integrated Circuits

| Symbol | Kit QTY | Image | Description | Location |
|---|---|---|---|---|
| | 2 | 1N4007 | 1N4007 1A Rectifier Diode , Forward Voltage (Vf)=1.1V@1A (0.7V@.02A) DC Reverse Voltage (Vr) = 1000V | Box 3, Tray 10 |
| C B E | 2 | PN2222 | PN2222 Bi-Polar Junction Transistor (BJT) NPN 40volts 1A (Can also be used in projects calling for a 2N3904 transistor) | Box 3, Tray 10 |
| | 1 | L293 | L293D Quadruple half-H motor driver, 16 pin DIP 4.5V to 36V, 600mA | Box 3, Tray 10 |
| | 1 | MCP3008 | MCP3008 10-bit Analog to Digital Converter, 16 pin DIP 2.7V to 5.5V | Box 3, Tray 10 |
| | 1 | SN74H595N | SN74HC595N 8-BIT Shift Register, 16 pin DIP 2V to 6V | Box 3, Tray 10 |

## Switches and Relays

| Symbol | Kit QTY | Image | Description | Location |
|---|---|---|---|---|
| OR | 1 | | Tact Switch 12*12mm Through Hole SPST-NO | Box 3, Tray 1 |
| | 1 | | 8.4 – 12 VDC Relay – SPDT (1 Form C) (PN RT214012) | Box 3, Tray 1 |

## Magnets

| Symbol | Kit QTY | Image | Description | Location |
|---|---|---|---|---|
| No symbol | 1 | | 3D printed magnet wand containing a brushed nickel neodymium-iron-boron (NdFeB) magnet (For use with Hall effect sensor) | Box 3, Tray 2 |

# Sensors

| Symbol | Kit QTY | Image | Description | Location |
|---|---|---|---|---|
| VDD ⊠ OUT GND US1881 | 1 | | US1881 Hall Effect Digital Switch Latch Open Drain, 3.5V to 24V | Box 3, Tray 9 |
| +Vs TMP36 Vout GND TMP36 | 1 | | TMP36 Analog Temperature Sensor -40C to 125C TO92-3 2.7V to 5.5V | Box 3, Tray 9 |
| GND VCC SDA SCL | 1 | | ADXL345 3axis digital accelerometer 3.3V to 5V | Box 3, Tray 6 |
| 3-5VDC DIGITALOUT GND | 1 | | HC-SR501 PIR Motion Sensor 3V to 5V | Box 3, Tray 6 |
| VCC TRIG ECHO GND | 1 | | HC-SR04 Ultrasonic Distance Sensor 5 Volts | Box 3, Tray 6 |

# Power Supplies and Battery Connectors

| Symbol | Kit QTY | Image | Description | Location |
|---|---|---|---|---|
| ┴+ | 1 | | 9V Alkaline Battery (Brand may vary) Note: Ensure the contacts don't touch anything metal by storing in a separate compartment or with battery connector attached. | Box 3, Tray 2 |
| No Symbol | 2 | | 9V Battery Connector with plug for breadboard jumpers | Box 3, Tray 5 |
| No Symbol | 1 | | 9V Battery Connector with plug for the Arduino Uno | Box 3, Tray 5 |
| + | 2 | | Two pack AA alkaline batteries (Brand may vary) Total of four batteries | Box 3, Tray 2 |
| No Symbol | 1 | | Four AA battery holder with plug for 9V Battery Connector (Provides 6 volts) Note: Ensure the contacts don't touch anything if stored with batteries installed. | Box 3, Tray 4 |

## Prototyping Supplies

| Symbol | Kit QTY | Image | Description | Location |
|---|---|---|---|---|
| No Symbol | 1 | | 830 Point Solderless Plug-in Breadboard | Box 3, Tray 5 |
| No Symbol | 1 | | Jumper Wires Male to Male 6" 20PCS | Box 3, Tray 4 |
| No Symbol | 1 | | Jumper Wires Male to Female 6" 20PCS | Box 3, Tray 4 |

## Speaker

| | 1 | | 8 Ohm Speaker 800mW Breadboard Friendly<br>Note: Before using the speaker, remove the sticker that says, "Remove After Washing." | Box 3, Tray 6 |
|---|---|---|---|---|

## Motors

| | 1 | | Gearmotor 200 RPM 3V to 6V DC | Box 3, Tray 3 |
|---|---|---|---|---|
| | 1 | | 28BYJ-48 Unipolar Stepper Motor 5V to 6V, 513 steps per revolution, Step angle: 0.702" | Box 3, Tray 3 |
| | 1 | | SG92R Servomotor and horns 3V to 6V<br>It is recommended to store the servo horns in the same box. Use a spare baggy to keep them safe. | Box 3, Tray 6 |

| | | | | |
|---|---|---|---|---|
| **Safety** | | | | |
| No Symbol | 1 | | Safety Glasses, Use With or Without prescription Eyewear | Not stored in parts boxes |
| **Microcontroller or Single Board Computer (Not included in kit)** | | | | |
| No Symbol | N/A | | This kit is designed to work with an Arduino type microcontroller or Raspberry Pi type single board computer (sold separately) | Box 3, Tray 3 |