



# **Toye Corporation Installation and Troubleshooting Guide Hardware & Data Bus**

## **A. GENERAL INSTALLATION CHECK LIST**

Note: This discussion assumes that the cable used is 2 twisted pairs with an over all shield. If three twisted pair are used, with an over all shield, one insulated conductor can be used for the signal ground, and the shield can then be connected to earth ground. This is a preferred wiring approach. If 2 twisted pair cable is used, the shield must be used as a signal ground, and CANNOT be connected to earth ground, except as explained below.

### **1. Handling Power**

Do not plug, or unplug components without first turning off power.

### **2. RS-232 CONVERTER**

MUST be connected to ground before its power supply is plugged in. The master ground for the system and the converter is normally obtained when connected to the computer. Be sure the computer has a three pronged plug and that it is plugged in.

### **3. GROUND ISOLATION**

INPUT POWER TO EACH COMPONENT MUST BE ISOLATED FROM EARTH GROUND. Before connecting power to any module, verify that the power input to be connected to the Module is isolated from earth ground. If this same power source is being used to power other devices in addition to the module, make sure that no short to ground can occur through the wiring or by those devices.

### **4. INPUT POWER REQUIREMENTS FOR ALL SYSTEM COMPONENTS**

Model 4120 series Command Modules require 12-24 volts DC. Model 4110 Command Modules, Alarm Input Modules, and Relay Output Modules require either of the following input voltages: 20-30 VAC 10 VA, or 22-40 Volts DC 10 watts.

### **5. WIRING & POWER SUPPLIES**

Make sure that all the wire lengths and conductor sizes are calculated to provide the required power to each component. Separate power supplies are recommended for each reader or module location. Use a separate power source for all electronic door locks and electromagnetic locks.

#### 6. GROUNDING

Ground each housing and each 4120/4122 module to the nearest good earth ground.

#### 7. SYSTEM BUS

The BUS cable must be 2 twisted pair # 22 or larger with an overall shield. Each conductor must be a unique color.

The shield must be connected to each module AND THE SHIELD MUST BE ISOLATED FROM EARTH GROUND UNTIL CONNECTED TO THE RS-232 CONVERTER.

#### 8. HIGH LIGHTNING AREAS

If the system is to be installed in an area with frequent lightning storms or known transient power problems, the optional high lightning area RS-232 converter is recommended, Model #485-SSK.

#### 9. EXIT BUTTONS

Make sure that the exit button wires are twisted pair, and the exit button is a momentary dry contact N.O. type.

#### 10. SHIELD CONTINUITY

Make sure that each Command Module is connected to the bus shield and that shield continuity is preserved throughout the entire system up to the Converter.

#### 11. POINT TO POINT WIRING

Make sure that point-to-point twisted pairings are preserved and are consistently terminated at the same screw terminal points throughout the system.

#### 12. END OF LINE RESISTOR

At the last Module on each bus (not each stub), install a 220 OHM resistor between terminals C and D. Note: DO NOT install this resistor when using the special converter #485OI9TB furnished with the Toye Network Controller.

#### 13. CALCULATE POWER NEEDS

Be sure that input voltage and power to each component are According to specifications.

### B. DATA BUS TROUBLESHOOTING

1. Measure voltages on the following pairs with a DC Meter:

Between A(-black) and B(+red)

Between C(+red) and D(-black)

Voltages should be the correct polarity, and be between 3-5VDC.

2. The Shield must be entirely isolated from earth ground. Measure voltage (both AC & DC) between the Shield and Earth Ground. Voltage should not exceed 2-3

Volts. If voltage is within spec., disconnect the bus from the RS-232/422 converter, and measure the resistance between the shield and earth ground. The resistance value should be close to infinite.

3. If cable is in conduit, or is run near any possible source of electrical noise, inspect all other cables in the same conduit. If other cables are in the same conduit, verify that they are low voltage, DC. Other data cables, audio, or video cannot be run in the same conduit or near the data bus. If there is any doubt, an oscilloscope must be connected to the bus at various places to be sure no electrical noise is being coupled to the data buss.

4. Checking for lightning damage due to power surges:

Disconnect H1 & H2 from each command module and check the resistance values of each of the components:

a. Z1 thru Z5: Resistance should approach infinite

b. R1 thru R5: Resistance should be 22 ohms +/- 5%

5. Look at the Supervision Screen in the software (Menu item 8.5). This screen shows what readers are online and which ones are offline.

6. If no readers are showing online, try replacing the Converter. It could have been damaged by shorts in the bus or by surges.

7. If the A-B and C-D bus voltages are not correct, it is best to unplug H2 from all 4120/4122 Command modules (Disconnect Terminals 24-27 on all 4110 Modules), and then re-connect one module at a time, and measure A-B and C-D voltages to see if a module is damaged, and pulling down the entire bus. If the bus voltage drops significantly after a module is added back to the system, it is likely that module has been damaged, and must be repaired.

8. If any of the shield isolation measurements above are not to spec., it is suggested that H2 be unplugged from all 4120/4122 Command Modules (Terminal 23 on all 4110 Modules), and the shield ground loops be repaired one at a time until isolation is complete.