Roadrunner Electronic Products Ltd **t. 01428 653300** **f. 01428 653300**
enquiries@roadrunnerelectronics.com **www.roadrunnerelectronics.com**

Notes for guidance when using the Roadrunner Pencil/Wiring System

Introduction

The Roadrunner Wiring Pencil or System may be used for:

- Constructing simple to complex logic and microprocessor circuits
- Constructing Analogue (Discrete component) circuits
- Constructing Surface Mount Technology Circuits
- Repairing or modifying Printed circuit boards – conventional and Surface Mount Technology

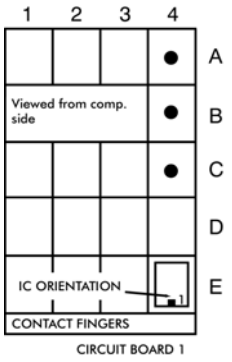
1. Pencil and Wiring System – Logic/Microprocessor Circuits

General Wire Schedule

To obtain full benefit from the Roadrunner System it is essential to generate a wiring schedule, giving consideration to component placement.

Sig.No.	1stConn(a/p)	2nd Conn.	3rd Conn.
0	A4-6	B4-3	C4-2
1			

A4-6 ≡ 1C A4 pin 6



The 2nd column is an 'output' ie. an Ic output or an input signal to contact fingers from an external source.

Decide on Ic/Holder Layout

With Wire Distribution strip positioned (A) - high packing density

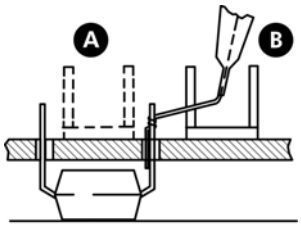
(B) - low packing density

Glue fix strips - coat the base of the strip with a quickset adhesive then place in position.

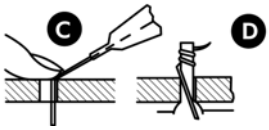
Press Fix strips - press fit into Roadrunner® boards.

Proceed with Wiring

After loading, the Ic's/holder bend the relevant +volts (+v) and Ground (Gnd) pins to retain the components in the board. Turn over the board and wire (+v) and (Gnd) pins first.



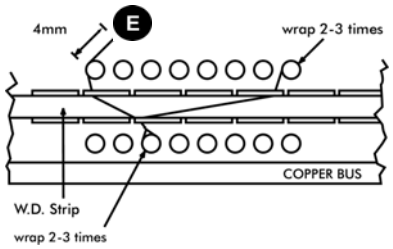
Refer to wiring schedule: If wiring run includes connections to contact fingers wire contact fingers first. With double sided contact finger connections to component side of the board refer C). Don't turn the board over yet - this wastes time - wait until all 'wiring side' connections have been made.



When beginning the 'run' from an Ic/holder pin D) extend - say, 4mm of wire from the pencil tip and bend to a suitable angle for insertion, into the hole containing the Ic leg. Wrap 2-3 times around the pin and lead off into the Wire Distribution strip to the next pin and again wrap 2-3 times - and so on: E). At the end of the 'run', extend the wire, say 4mm and cut the wire close to the Ic leg. This leaves the correct wire length for the next new 'run'.

On completion of wiring, solder all joints. This is effected with the use of a very hot iron, approximately 420°C with resin cored solder. The application of the iron and solder removes the protective lacquer on the wire and makes good the joint.

- See warning notice.



Replacement of Ic's

Ideally holders should be used. However, when wiring direct to Ic legs, replacement is straight forward. In order not to upset the wiring to the Ic, check that all leads are connected to the solder pads on the wiring side of the board. Remove Ic by carefully cutting the pins at the shoulder (comp. side). Place a new component over the leads of the previous device and solder to the original leads.

Wire Modifications

Cut the wire close to the Ic pin. Push this 'clean' end into the 'strip' forming an easily detectable loop that can be followed along the channels, thus making the tracing of wires a simple operation.

CAUTION
Solderable Enamel Wire emits toxic vapour when soldered. Ventilate area

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2. Analogue (Discrete Component) Applications

Solderable Enamel Wire and Tinned Copper Wire are used for this application.

Assemble circuits using normal construction techniques:

- Use the component leads to connect on the underside of the board

or

- Wire components to solder pins

Wiring to components:

- Understand circuit characteristics – use Solderable Enamel Wire and TCW when appropriate to do so, accounting for layout, circuit loadings and signal types.

Wire to component leads or solder pins supporting discrete components.

- Connect to the discrete component lead as shown in 'A' above, or, with the aid of tweezers, clamp the wire close to the component lead or solder pin and wrap 2-3 times around the lead or pin prior to running the wire to the next connection point.
- Where component leads have been used to make part of the circuit connection, Roadrunner wire may be attached at a soldered junction.
- Extend, say 4mm of wire from the pencil tip, tin the wire end, say 3mm, and solder into the existing soldered junction.

3. Printed Circuit Board Repair and Modifications

- Prepare the circuit tracks or pads relating to the repair or modification, which could involve:
  - Removal of solder resist/silk screen if necessary
  - Careful cutting of tracks – not the board!
  - Cleaning the track/pad with an abrasive
  - Tinning the area to be soldered to, say 3mm
- Extend say 4-5mm of wire – solderable enamel or tinned copper wire – from the pencil tip. Tin say 3mm
- Solder to prepared track/pad
- Route the wire to next connection point
- After testing the connection, and if necessary, apply a protective lacquer, which will also hold the wires in place

4. Surface Mount Technology

Roadrunner techniques are now being applied to Surface Mount Technology.
The Roadrunner SMT-C series of boards allows the combined assembly and wiring of Surface Mount Technology with traditional technology.

The SMT-C boards have specially designed component pads for hand soldering with fan-out leads to solder pads that provide for making connections with Roadrunner wire.

The following hand soldering process will get you started but you may need to fine tune temperatures dependant on the soldering equipment and solder used – particularly when using lead free solders.

- SMD manufacturers generally recommend a hand soldering temperature of around 220°C. In practice, this will need to be increased, due to the heat sinking effects of the components and pads
- To prevent contamination and personal injury and for ease of handling, tweezers should be used
  Method:
- Flow a thin line of solder to one component pad pattern (to tin the pad)
- Place a small amount of solder on the relevant device lead (to tin the lead). Carefully centre the device to be soldered on the component foot-print. Place the iron tip at the junction of the device and circuit pad and reflow the solder whilst applying pressure to the top surface of the device to ensure that it will seat flush to the component footprint on the PCB. For multi-leaded components, solder a lead on the opposite corner of the device to ensure the device is flush to the PCB.
- Clean and tin the iron tip.
- Apply the tip and solder to the other device lead(s). Do not apply force to the top of the device when soldering the remaining lead(s). Otherwise the component may be permanently under stress. Solder one side of the device before starting on the other side.
- Examine the first soldered joint and effect a proper solder joint. The first step serves to mechanically position the device on the board and hold it in place to allow both hands to be free to apply solder and iron tip to the remaining component leads
- *(Remember that you will need to have available a temperature controlled soldering iron set to 220-300°C for component soldering and 400-420°C for Solderable Enamel Wire soldering).*
- To wire to the fan-out pads – extend, say, 4mm from the pencil tip and tin, say, 3mm. Tin the fan-out solder pad and make the connection.
- Use the 'Okta Star Points' for multiple connections
- Route wires at random, being sure to allow for subsequent component and wire connections
- Wires may be routed through holes to lessen wire congestion and also to retain wires close to the board.
- When dealing with Surface Mount Devices, pre-tinning of wire is recommended prior to making the joint.
- Magnification is recommended to aid the integrity of soldering.

CAUTION
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