

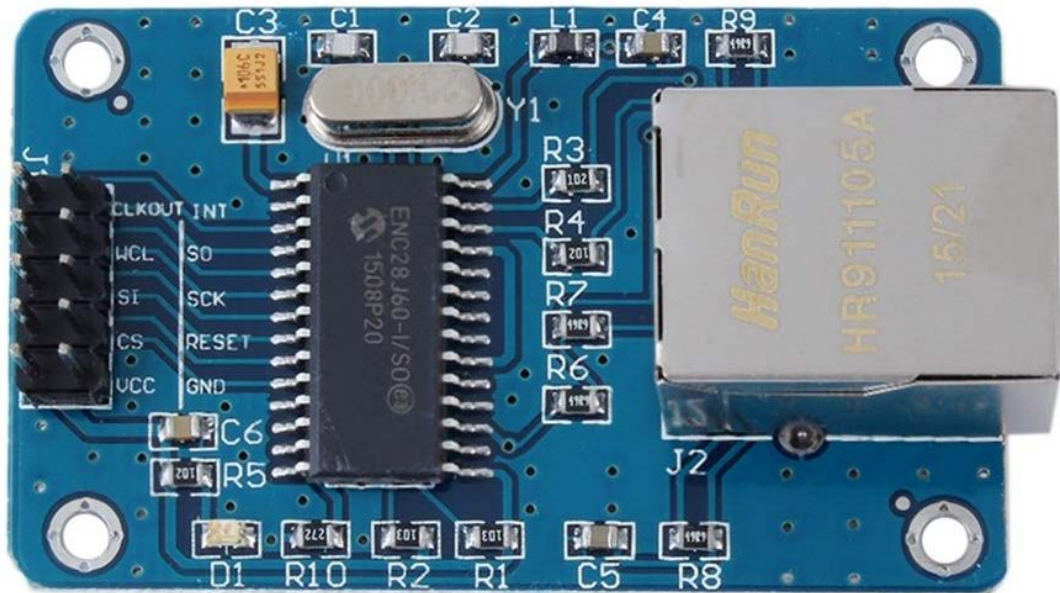
# The 'Interface 1bis' Ethernet Port

Specification

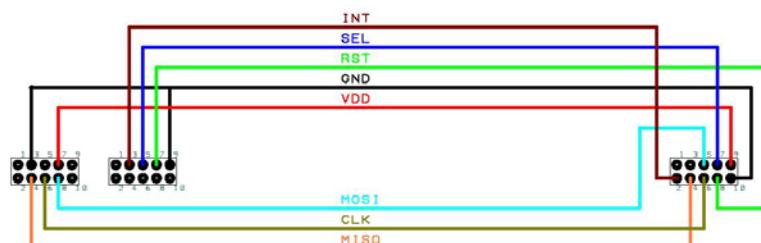
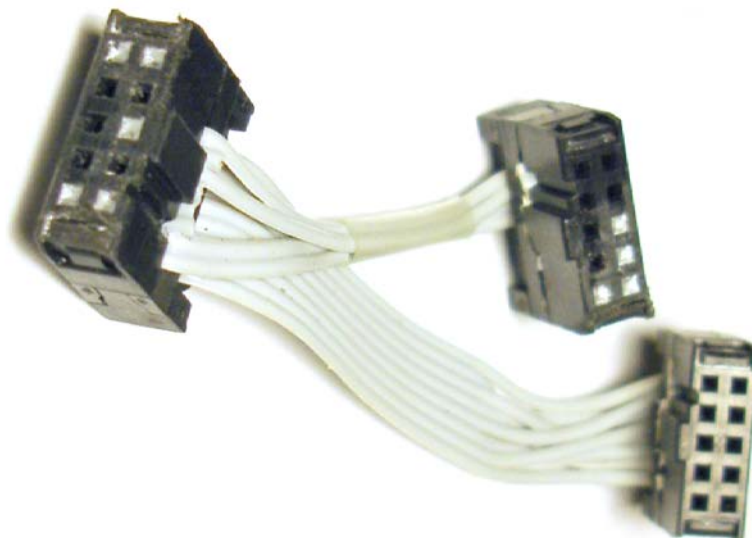
23 September 2016

## Hardware

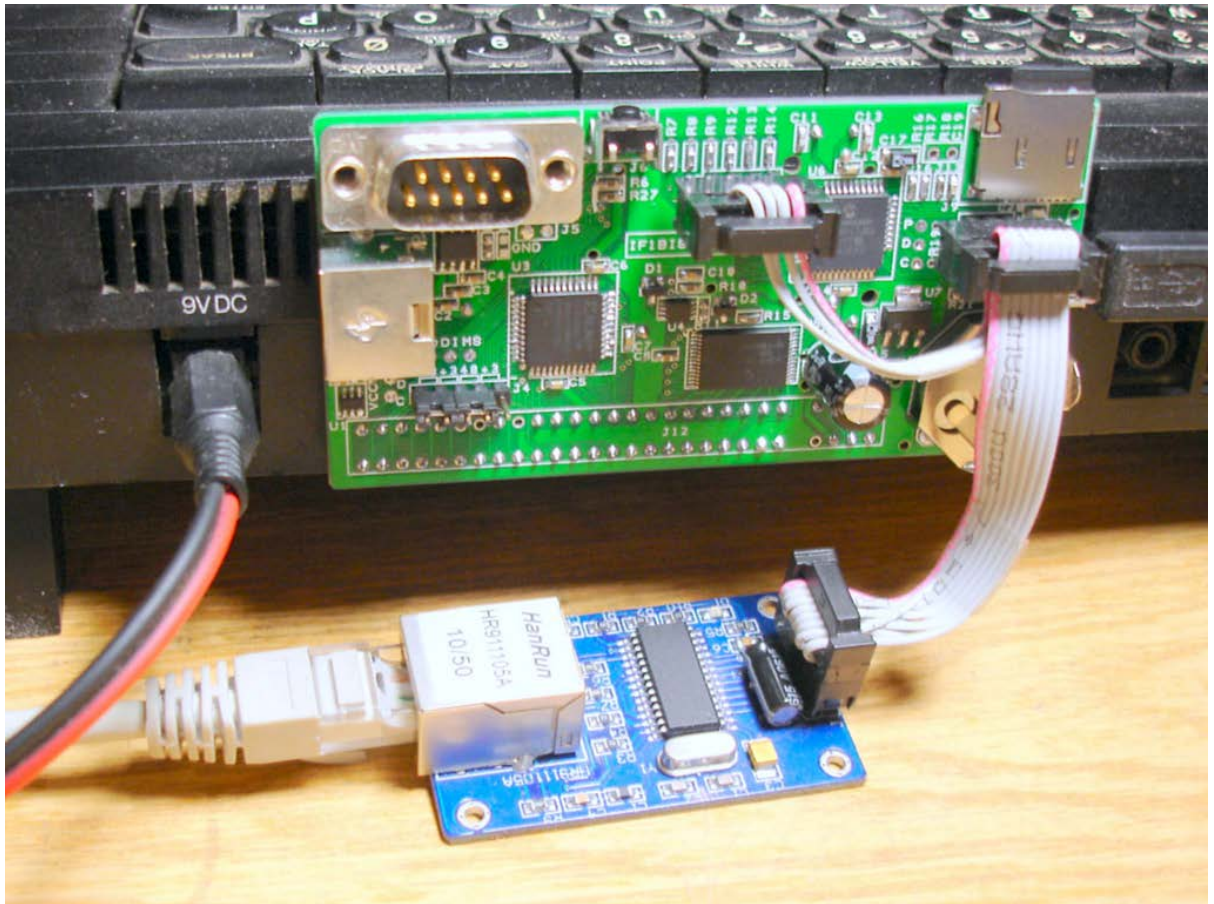
A third party, Microchip ENC28J60 based, Ethernet module can be attached to the SPI port of the 'Interface 1bis'. The model shown below is particularly well suited and also widely available at an extremely low price.



The custom SPI cable, to connect the module to the 'Interface 1bis' board, may be ordered as an optional accessory.



When used with 'Interface 1bis' models prior to C lot 04, a 100µF aluminium capacitor, that was supplied at the time with every cable, **must be added** in parallel to the Ethernet module's C6 capacitor.



Because the Ethernet module requires up to three times more current than the 'Interface 1bis', good electrical contact, both at the edge connector and SPI cable connectors, is an absolute necessity for reliable operation. If needed, the pins that mate with the SPI cable's receptacles should be slightly bent, to achieve a better electrical contact through increased friction.

If an Ethernet module is connected, the 'C' and 'M' LEDs of the 'Interface 1bis' indicate: 'Module Selected' and respectively 'Module Interrupt', while their regular functions are multiplexed with the one of LED 'U'.

## Setup

As a first step, before connecting the Ethernet module it is necessary to configure the IP address, subnet mask, default gateway and DNS server, by issuing an extended BASIC command like:

```
CAT 0;"ead192.168.1.196;255.255.255.0;192.168.1.254;192.168.1.254"
```

The above example shows the default firmware settings.

The actually entered values are stored on the SD card and are used in the absence of a DHCP server on the local network.

Even if a DHCP server is present, it is useful to specify the IP address to be requested, and then eventually also allocated by the DHCP server, if it falls within its range and does not conflict with other devices. In this way, the unit will always have the same IP address.

It is advisable to connect the Ethernet module through a switch, rather than directly to the router, to avoid it being swamped with irrelevant packets.

When the 'Interface 1bis', with an attached Ethernet module, is switched on, the 'U' LED lights up if the SD card is present and/or a mouse is attached and/or a server machine is connected to the USB port. After 5 seconds it is turned off, and then, after a short while, **on** again, **only** if the IP acquisition process succeeds. The most probable cause for failure is bad contacts, requiring attention.

Each 'Interface 1bis' unit has a unique MAC address and host name, which can be viewed in the DHCP server's address table.

| DHCP Table    |                   |                  |          |
|---------------|-------------------|------------------|----------|
| Type          |                   |                  |          |
| Leased ▶      | Expired ▶         | Permanent ▶      |          |
| Leased Table  |                   |                  |          |
| IP Address    | MAC Address       | Client Host Name | Expiry   |
| 192.168.1.137 | 00:04:a3:1b:20:c5 | IF1B20C5         | 11 hours |
| 192.168.1.104 | f0:4d:a2:f9:f9:db | HOMEWRK1         | 8 hours  |

These values are also returned by the command:

```
CAT 0;"ei"
```

All 'Interface 1bis' Ethernet communication occurs over **UDP** port **41772**, which has to be opened and forwarded to a server PC or 'Interface 1bis' unit behind a NAT firewall, in order for it to be accessible from the internet.

## Software

The 'extended BASIC' designates the network port as: device "N", just like for the original ZX Interface 1.

The operating system of the 'Interface 1bis' supports communication over an IP network with up to seven 'stations', which can be file devices: PCs running a suitable server applet, or block devices: other 'Interface 1bis' units.

Before it can be accessed, a station has to be 'linked', using the command:

```
FORMAT "n" ; <s> ; "<n> "
```

where <s> is the station number, in the range: 1-7, and <n> its host name or IP address. If successful, this creates a record in the 'stations table', which can be viewed by issuing the command:

```
CAT 0 ; "es "
```

The procedure for buffered data exchange over the network between 'Interface 1bis' units, using the `OPEN#`, `PRINT #`, `INPUT #`, `INKEY#` and `CLOSE#` statements is strictly compatible with the original ZX Interface 1 'extended BASIC', including relevant hook codes and structure of the "N" channel.

Incoming data, from up to four different 'client' stations is buffered internally and can be retrieved at a later stage to the "N" channel.

Unlike the original ZX Interface 1, the 'Interface 1bis' can handle block device requests in the background, independently of the host machine, so that file oriented network operations do not require any manual intervention at the target station. The syntax of the 'network' `CAT`, `ERASE`, `LOAD`, `MERGE`, `MOVE`, `SAVE` and `VERIFY` statements is the same as for regular storage devices, excepting a non-zero 'station number'.

```
LOAD * "m0" ; 24 ; "prog "
```

loads from the current directory of the on-board SD card's drive 24, while

```
SAVE * "v3" ; 1 ; "prog "
```

saves to the current directory of the server machine linked as station 3.