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- Based on COM20022 Rev. B Industrial Network Controller
- Supports both standard and backplane signaling schemes
- COAX and UTP support for standard ARCNET signaling in both bus and star topologies
- Isolated and direct RS485 interfaces
- All media interfaces are jumper selectable
- Data rates from 156 Kbps to 10 Mbps
- 8/16 bit, I/O mapped bus interface, I/O address is switch selectable
- Programmable DMA channel
- On-board node ID switch
- Capable of receiving all packets
- Includes demo software
  - Sample driver, network monitor and mapping routes

## **APPLICATIONS:**

Test equipment, network development and debug, network management/monitoring, network evaluation, performance analysis

### I/O Address Selection

The EVB-20022 is a 16 bit I/O mapped card. Addresses A3-A15 are user selectable at switches S2 and S3. For example, 02E0h would be 000000101110.

### Node ID Selection

The EVB-20022 is equipped with an on-board ID switch, S1. The COM20022 network controller requires a software programmable ID, therefore the switch does not automatically provide a node ID to the COM20022.

### COM20022 ICs

The chip can be attached to the board in two different ways: it can either be socketed or it can be mounted right to the board on U8. Only one or the other can be done, not both.

### LEDs

In the front of the card, there are four LEDs. The PWR LED indicates that there is power on the board. The CPU LED shows CPU I/O activity. The TX LED shows the data being transmitted. The DMA LED shows DMA activity.

### Interrupts/DMA's

Use JP1 for interrupt selection. IRQs 3, 4, 5, 6, 7, 9, 10, 11, 12 and 15 can be selected. DACK selection is done at JP2. DACKs 0, 1, 3, 5, 6 and 7 can be selected. DRQ selection is done at JP3. DRQs 0, 1, 3, 5, 6 and 7 can be selected. If DMA's are being used, both the DACK and DRQ must both be set to the same value.

### Media Interfaces (Transceivers)

The COM20022 supports four types of transceivers:

- ARCNET Coax – operation is valid only at 2.5 Mbps and use SMSC HYC9088 hybrid
- Twisted Pair line interface– operation is valid only at 2.5 Mbps
- Direct coupled RS-485
- Isolated RS-485

### Software

For evaluation purposes SMSC provides **DEMOAT**, an MS DOS software utility which can be used to verify and evaluate the COM20022 evaluation board. DEMOAT was developed at SMSC to both setup and verify basic functionality of the COM20022 evaluation. The software provides a general user interface, which can be used to change, or Read/Write register information. This software utility can also be used to both transmit and receive ARCNET packets. When using this utility in a general network configuration, multiple ARCNET nodes must be operational. A minimum of two ISA based PCs must be connected via the appropriate cable for correct operation. Both machines must have the DEMOAT installed and loaded. Once the software is loaded, registers can either be initialized at their default settings or changed to your custom requirements. At this point traffic can be produced to send and verify ARCNET frames of data from node to node or PC to PC.

#### **Installing DEMOAT**

At the a:\ prompt type DEMOAT

#### **Loading DEMOAT software**

1. From within the Arcnet directory Type "Demoat". When the software loads, it prompts the user for the ARCNET evaluation board type.
2. Type "a", for COM20020 to test COM20022. If a screen comes up asking if the board is a COM20020, type "y". The program will ask for the I/O address, type the address in that is selected by S3 and S2, typically 2e0.
3. Next, the main menu will come up. When using any of the transceivers except the coax (BNC), you need to do a setup with option A. If the coax transceiver is being used, go to step 7.

4. At the next menu type "a". The screen will have a list of registers and their values. Got to the config register, one from the bottom. Change the third bit from the right (BKPLNE) from a "0" to a "1". Exit to the previous menu.
5. Select "b" from the menu. Change the register labeled IOH\_1. The left most bit (P1MODE) needs to be change from a "0" to a "1". Exit back to the main menu.
6. At the main menu, select option "D" to save all of the changes that have been made to the registers.
7. To start the test, select "I" from the main menu, Ping-Pong. This is only to be done on one machine.
8. A menu will come up asking how many other nodes, and the node ID of the other nodes. Make sure the nodes IDs are not the same. If the test is running correctly, "T" and "R" should alternate scrolling down the screen on both machines .

### Coaxial Interface

The coaxial interface uses a standard 93-ohm BNC connector, the same as a 50-ohm BNC, and requires a RG-62 type cable with 93-ohm terminations. The following guidelines for bus topology should be used for coaxial interface:

1. Max. distance(without repeaters).....1000'
2. Min. distance between nodes .....3'
3. Max. number of nodes per segment.....8 (i.e. no repeaters)
4. Max number of nodes with repeaters .....255

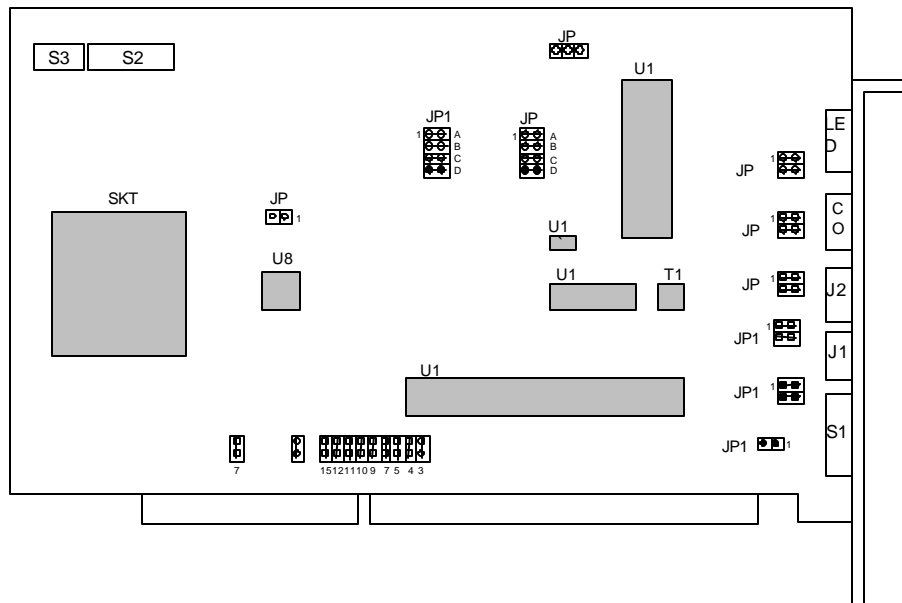
Operation is valid only at 2.5 Mbps and uses the SMSC HYC9088 hybrid (U15).

To setup the board for coaxial interface, with the use of SMSC DEMOAT software, perform the following steps:

1. Install both jumpers horizontally at JP11 (Differential paired data)
2. Install the jumper horizontally at JP12 (Coax filter)
3. Set jumper blocks JP13 and JP5 both to D (Transmit data and receive data)
4. Set I/O board address as specified in I/O address selection in User Guide ( e.g. 02E0)
5. Set Node ID as specified in Node ID selection in User Guide

**Note:** Make sure JP6, JP8, JP9, and JP10 are left unconnected.

**Note:** If socketed COM20022 (SKT1) is being utilized, U8 (alternate COM20022 device) must not be mounted on evaluation board.



**Figure 1**

For proper coaxial operation, installed jumpers denoted in black.

## Twisted Pair (TW) Interface

The twisted pair interface uses a standard 105 ohm 24 AWG unshielded twisted pair cable. The twisted pair interface uses RJ-11 modular connectors that follow the ARCNET Trade Association (ATA) standard pinout for twisted pair with Phase A on Pin 3 and Phase B on pin 2. The following guidelines for bus topology should be used for twisted pair interface:

1. Max. distance (without repeaters) .....400'
2. Min distance between nodes .....6'
3. Max number of nodes (without repeaters).....10

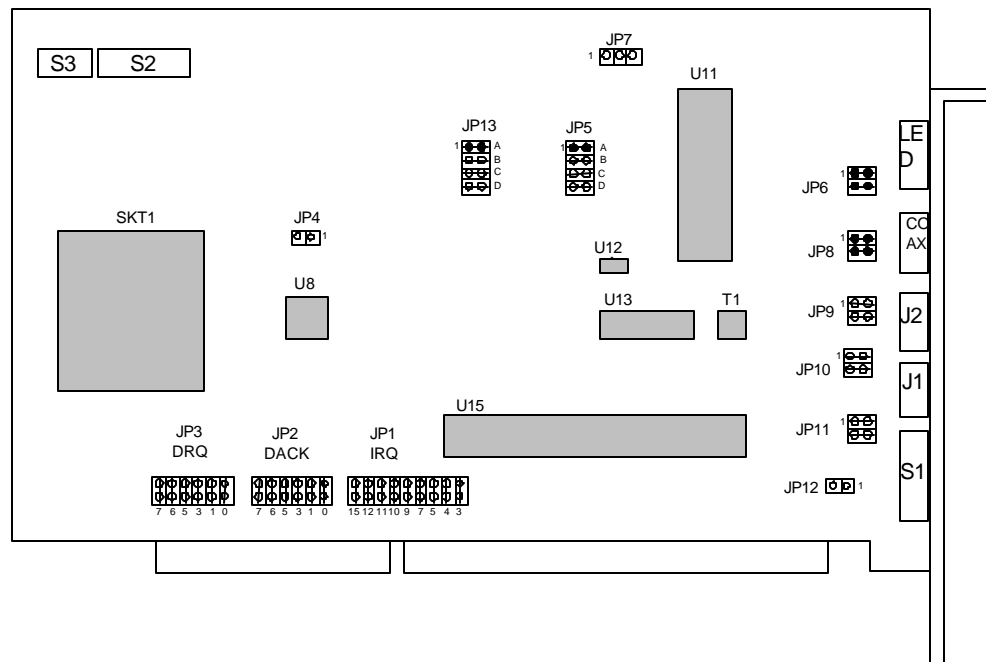
The line must be terminated at each end of the cable with a 105-ohm impedance. Stubs or drops are not allowed in the TP interface. The cable segments should be connected in a daisy chain fashion. The TP interface operation is valid only for 2.5Mbps and uses the TMC ACPWR (U11).

To setup the board for twisted pair interface, with the use of SMSC DEMOAT software, perform the following steps:

1. Install both jumpers horizontally at JP6 (RJ11 filter)
2. Install both jumpers horizontally at JP8 (Differential paired data)
3. Set jumper blocks JP13 and JP5 to A (Transmit data and receive data)
4. Set I/O board address as specified in I/O address selection in User Guide (e.g. 02E0)
5. Set Node ID as specified in Node ID selection in User Guide

**Note:** Make sure JP9, JP10, JP11, JP12 are unconnected

**Note:** If socketed COM20022 (SKT1) is being utilized, U8 (alternate COM20022 device) must not be mounted on evaluation board.



**Figure 2**

For proper twisted pair operation, installed jumpers denoted in black.

## Direct Coupled RS-485

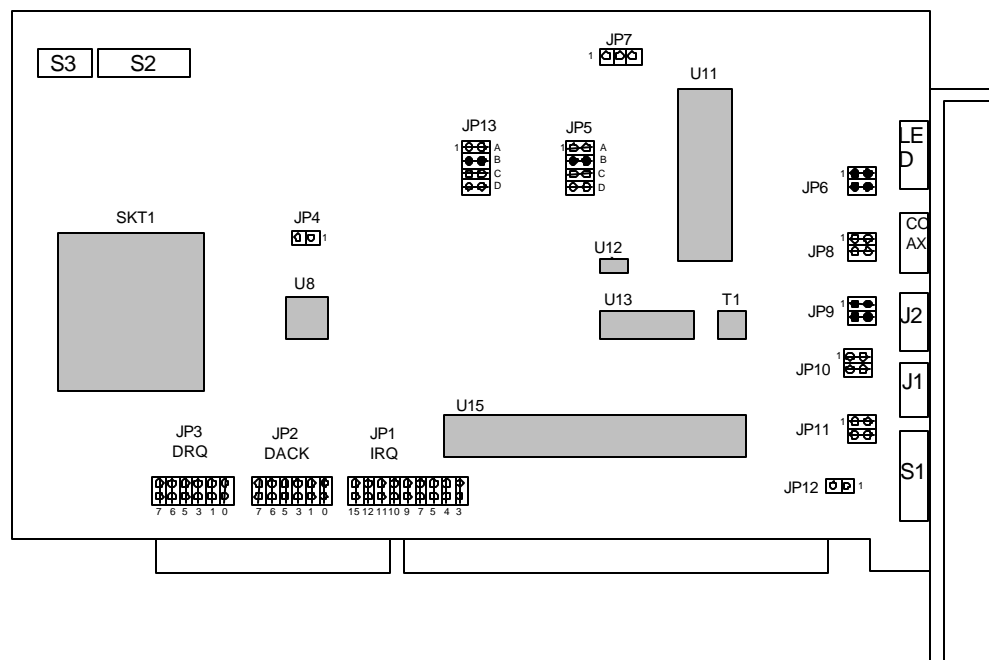
The direct-coupled RS-485 interface uses RJ-11 connectors with Phase A on pin 3 and Phase B and pin 2. Short stubs or drops of less than 1 foot can be tolerated but not recommended. The direct-couple RS-485 interface is not compatible with either the isolated RS-485 or the standard ARCNET twisted pair interfaces. Data rates from 156 Kbps to 10 Mbps are allowed, and the 75ALS176BD (U12) transceiver is used.

To setup the board for direct-coupled interface, with the use of SMSC DEMOAT software, perform the following steps:

1. Install both jumpers horizontally at JP6 (RJ11 filter)
2. Install both jumpers horizontally at JP9 (Differential paired data)
3. Set jumper blocks JP13 and JP5 both to B (Transmit data and receive data)
4. Set I/O board address as specified in I/O address selection in User Guide (e.g. 02E0)
5. Set Node ID as specified in Node ID selection in User Guide

**Note:** Make sure JP8, JP10, JP11, and JP12 are unconnected.

**Note:** If socketed COM20022 (SKT1) is being utilized, U8 (alternate COM20022 device) must not be mounted on evaluation board.



**Figure 3**

For proper direct-coupled operation, installed jumpers denoted in black.

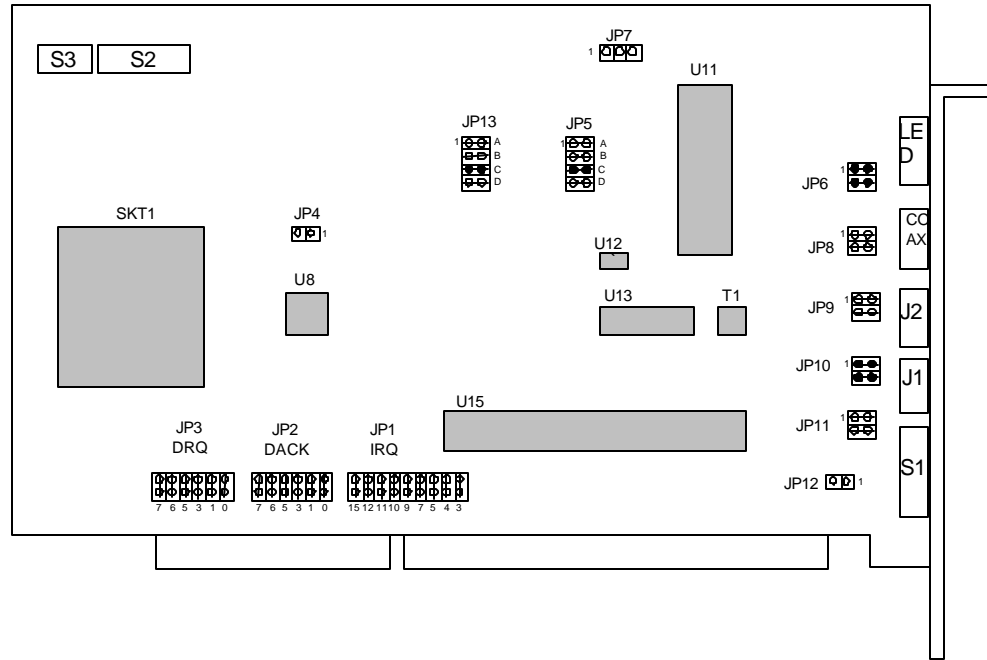
## Isolated RS-485

The isolated RS-485 interface uses transformer coupling to electrically isolate the data lines and make the connections insensitive to polarity. Isolation is provided up to 2KV. The isolated RS-485 interface uses RJ-11 connectors with Phase A on pin 3 and Phase B and pin 2. The isolated RS-485 interface is not compatible with direct-coupled or standard ARCNET interfaces. Data rates from 156 Kbps to 10 Mbps are allowed and the 74ALS1178N (U13) transformer is used.

To setup the board for isolated RS-485 interface, with the use of SMSC demoat software, and perform the following steps:

1. Install both jumpers horizontally at JP6 (RJ11 filter)
2. Install both jumpers horizontally at JP10 (Differential paired data)
3. Set jumper blocks JP13 and JP5 to C (Transmit data and receive data)
4. Set I/O board address as specified in I/O address selection in User Guide (e.g. 02E0)
5. Set Node ID as specified in Node ID selection in User Guide

- Note:** Make sure JP8, JP9, JP11 and JP12 are unconnected.
- Note:** If socketed COM20022 (SKT1) is being utilized, U8 (alternate COM20022 device) must not be mounted on evaluation board.



**Figure 4**  
For proper isolated RS-485 operation, installed jumpers denoted in black

**JUMPER LIST**

JP1	IRQ Select	
JP2	DACK Select	
JP3	DRQ Select	
JP4	Fast/Slow Bus Timing	1 2 High Speed Timing 2 2 Not Connected, Normal Timing
JP5	TX Enables	A Twisted Pair ARCNET B Direct Coupled RS-485 C Isolated RS-485 D Coaxial
JP6	RJ11 Termination	1 2 RJ11 Terminated 3 4 RJ11 Terminated
JP7	See TMC Spec	
JP8	Twisted Pair ARCNET Connected to RJ11	1 2 Connected 3 4 Connected
JP9	Direct Coupled RS-485 Connected to RJ11	1 2 Connected 3 4 Connected
JP10	Isolated RS-485 Connected to RJ11	1 2 Connected 3 4 Connected
JP11	COAX Connected to BNC	1 2 Connected 3 4 Connected
JP12	COAX Termination	1 2 COAX Terminated
JP13	RX Enables	A Twisted Pair ARCNET B Direct Coupled RS-485 C Isolated RS-485 D Coaxial