ARCNET Active Hub
Part No. 05P00090-0279
For use on MicroTrac Local Area Network

Revision History

The following table shows pages that have been revised since the first release of this document.

Date	Affected Pages
4/23/97	First release; supersedes RD 90-297 dated 11/27/95

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IN NO EVENT SHALL THE COMPANY BE LIABLE FOR LOSS OF PROFIT, INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES WHETHER ARISING OUT OF WARRANTY, BREACH OF CONTRACT OR TORT.

INTRODUCTION   The ARCNET Active Hub is an electronic bi-directional repeater designed to expand the number of ARCNET nodes that can be used on a single network. A network node is any attached device that can participate in the token-passing process. Nodes can be drives, PLC gateways, remote display controllers, remote logic nodes, remote computers, etc.

The ARCNET Hub receives messages sent by any one transmitting node, and relays the message to all other nodes on the network. The ARCNET Hub has four ports. Each port can accommodate a cable segment containing up to eight (8) nodes. The ARCNET Hub also has LED indicators on the Hub card showing which port LAN segments are actively receiving. The ARCNET Hub card can be used in a separate power supply/card cage as a stand alone unit, or installed into a PLC gateway.
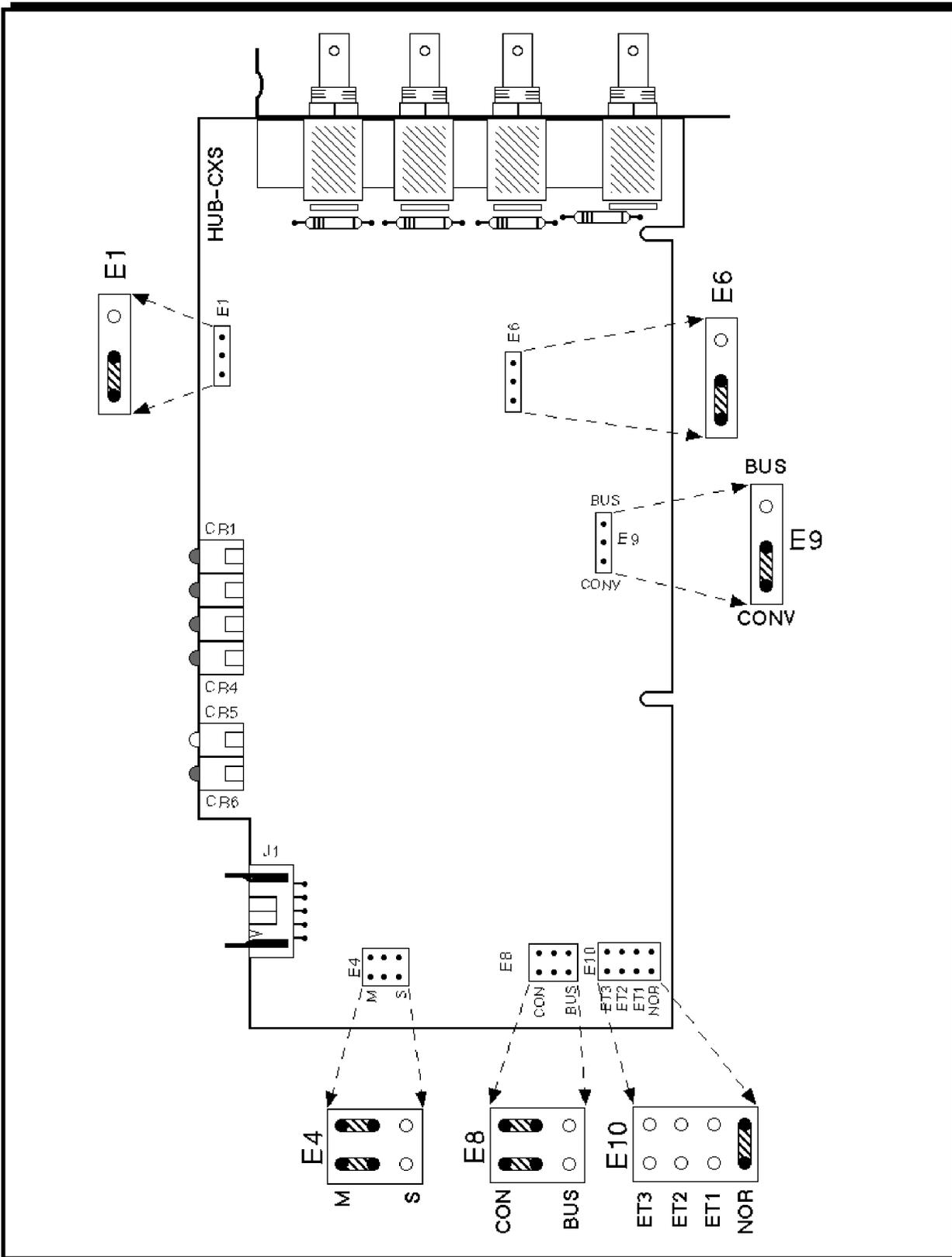
Figure 1. Top View of Hub Card Showing Jumper Positions For Single Hub Card System

INSTALLATION

> **WARNING**
>
> **It is extremely important that when you work with the ARCNET Active Hub you avoid static electricity. Static electricity will cause severe damage to the system's electrical components. Always ground yourself by wearing a wrist or ankle strap. When not in use, keep the ARCNET Active Hub in its anti-static bag.**

Installation Into a PLC Gateway

1. Remove the cover of the MicroTrac DSD PLC Gateway.

2. Remove the Hub Card from its protective anti-static bag. See Warning.

3. Before proceeding, verify all jumper positions shown in Figure 1.

4. Install the Hub Card in an empty slot of the PLC Gateway.

5. Secure the Hub Card with a 6-32 metal screw and a star washer.

6. Important Note: Read "LAN Cabling Rules and Guidelines".

Stand Alone Unit

The ARCNET Hub stand alone unit comes ready to be mounted on a panel. It is recommended that the stand alone unit be firmly grounded through the chassis, as well as the power cord. This can be accomplished by first scraping away paint on the panel around at least one of the chassis mounting holes. Next mount the assembly using star washers on the mounting bolts. It is also recommended that the ARCNET Hub be installed away from high power equipment with devices of similar function (PLC gateways, metering equipment). This is to prevent noise interference.

Important Note: Verify the jumper positions (see Figure 1), and read "LAN Cabling Rules and Guidelines" before installation or operation.

LAN CABLING RULES AND GUIDELINES

The ARCNET LAN uses RG-62A/U coaxial cable, BELDEN number 9269 or equivalent (MagneTek Part No. 05P00211-0047). Other cable types will not work properly.

The LAN cable should be routed with signal level wires only. The LAN cable may cross power wiring, but only at a 90 degree angle. A LAN cable that runs parallel to power wiring may pick up noise from that power wiring even if separated by a space of several inches. It is best to separate signal level wiring (including the LAN cable) from power wiring (including relay coil wiring) with a metal divider in a cable tray or by routing the signal wire through its own metal conduit.

LAN nodes may be connected in any order. Minimum cable length between nodes is 6 feet, and the minimum bend radius of the cable is 2.5 inches. The maximum distance from one end of the LAN to the other without the Active Hub is 900 feet. The ARCNET Active Hub can support a maximum of 900 feet on each of its 4 ports. A maximum of eight (8) nodes can be connected to each Active Hub port.

Each LAN node is directly connected to the coaxial cable with a TEE connector (MagneTek Part No. 05P00034-0540). Both ends of the coaxial cable must be terminated with a 93 ohm termination (MagneTek Part No. 05P00034-0586). The ARCNET Active Hub provides its own active termination as long as power is applied to it. No TEE connector should be used on the Hub ports. The ARCNET Active Hub must be connected at the end of the coaxial cable. Leave unused ports open; it is not necessary to terminate them with 93 ohm terminators.

If a node is disconnected at a TEE connector, either replace the TEE connector using a BNC-BNC splice or (if temporary for diagnostic purposes) leave it open. Do not add another 93 ohm terminator, as it may overload the signal and destroy communications.

The outer conductor of the LAN cable must not touch ground. This means that cable TEE connectors and terminating resistors should not touch a drive chassis or any other grounded surface. If cable splice connectors are used for wiring convenience, they must be insulated from metallic conduit or pull boxes.

ARCNET LAN SEGMENT
(See Note below for LAN cable length)

Node

DRIVE PLC PLC DRIVE DISPLAY Computer DRIVE DRIVE

Length between nodes
(See Note below)

Terminators
(93   )

HUB
CARD

Port

DRIVE DRIVE DRIVE

Note: LAN cable length can be up to 900 feet for each of the Hub
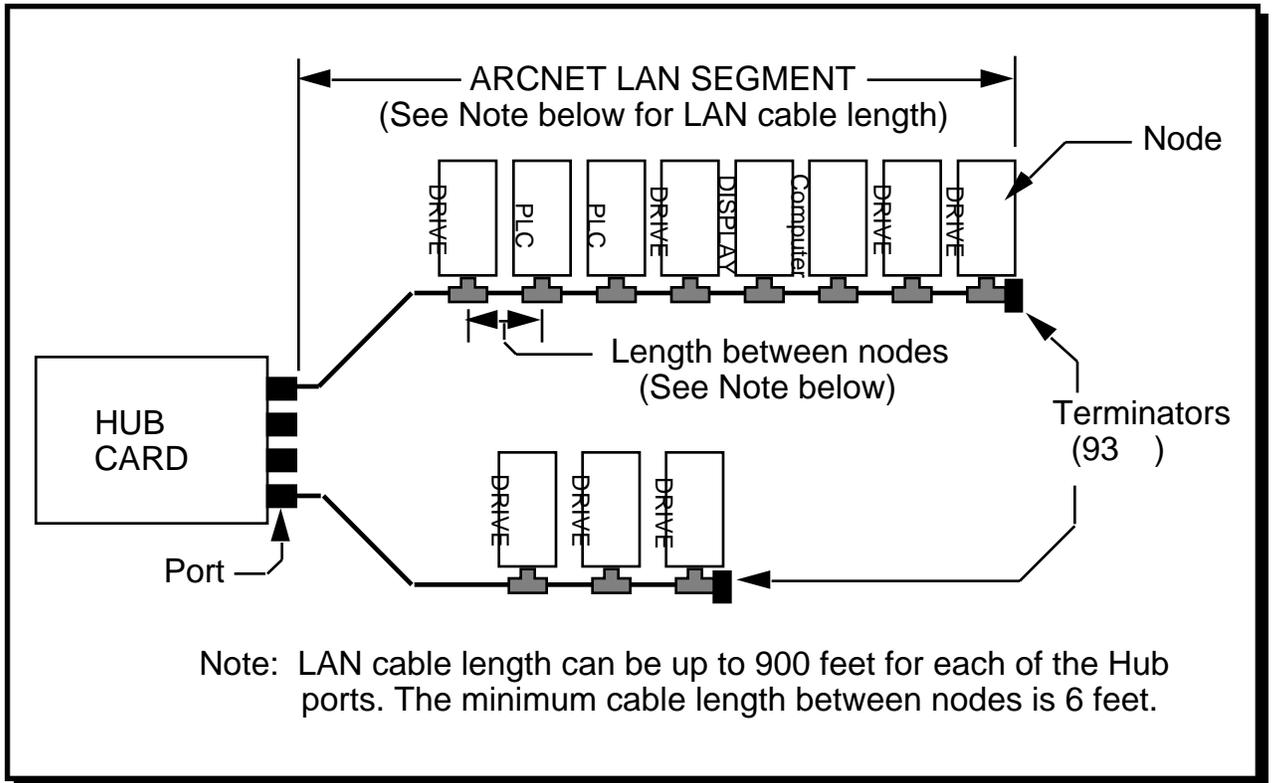ports. The minimum cable length between nodes is 6 feet.

*Figure 2. **MicroTrac DSD LAN Cabling***

MASTER - SLAVE CONFIGURA- TION (When more than 4 ports are needed)

In some instances more than 4 ports are needed. When this occurs, two or more ARCNET Active Hubs are required. The setup for this configuration is as follows:

1. Position jumpers of E4 in one of the Active Hubs as shown:

E4

M

S
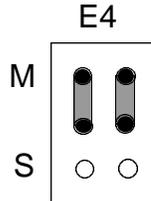
This will be the **master** Active Hub.

2. Position jumpers of E4 in the other Active Hubs as shown:

E4

M

S
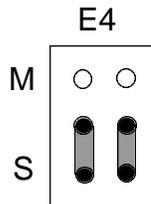
These will be the **slave** Active Hubs.

3. Position jumpers of E8 in both master and slaves as shown:

E8

CON

BUS
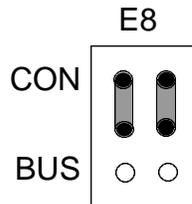
These jumpers MUST be in this position in order to direct control signals to J1. This connector distributes the timing and signals between the Hub cards.

4.   A 10 pin ribbon cable connector is used in J1 to daisy chain the master
      and slave Active Hubs.

10 pin connector
(MagneTek Part No.
05P00034-0321)

10 pin ribbon cable
(MagneTek Part No.
M35102280010)

Pin 1

2 inches

Figure 3. **Ribbon and Connectors for Master-Slave Configuration**

OPERATION The Operation of the ARCNET Active Hub can be monitored through the LED activity indicators. Figure 4 shows the LED corresponding to each port.
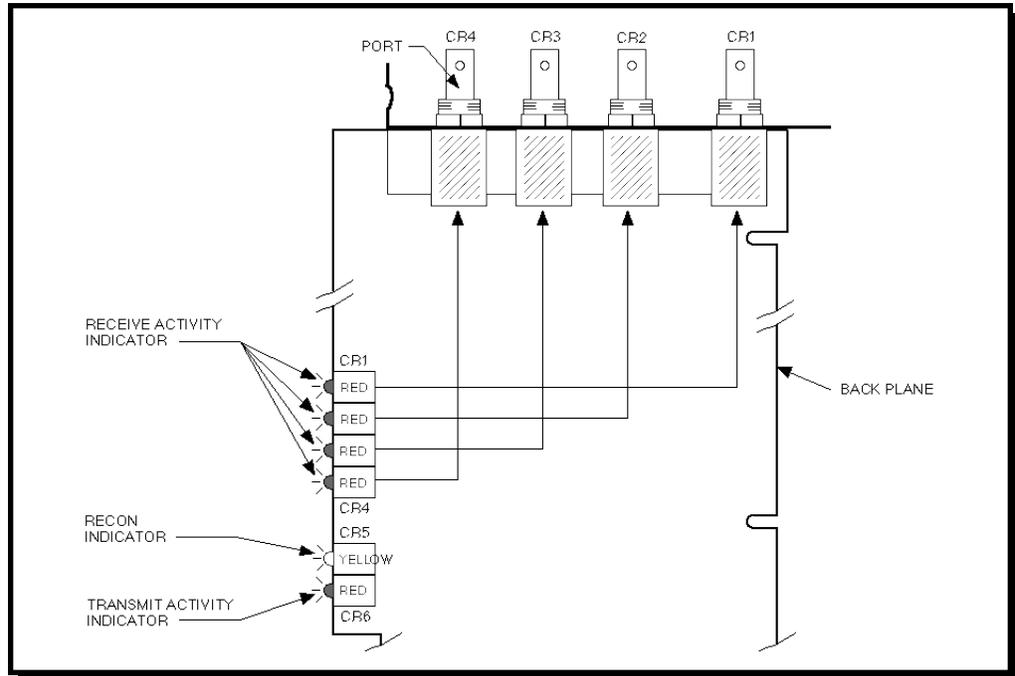
Figure 4. **LED Indicators**

When a Receive Activity LED indicator is lit solid, there is LAN activity on that port. If a LED is blinking, there is an idle condition on that port, and all nodes on that port are not receiving. In most cases when this happens, the yellow Recon (Reconfiguration) LED indicator will also be 'ON'. When the proper passing of the token is disrupted, the network must be reconfigured. During reconfig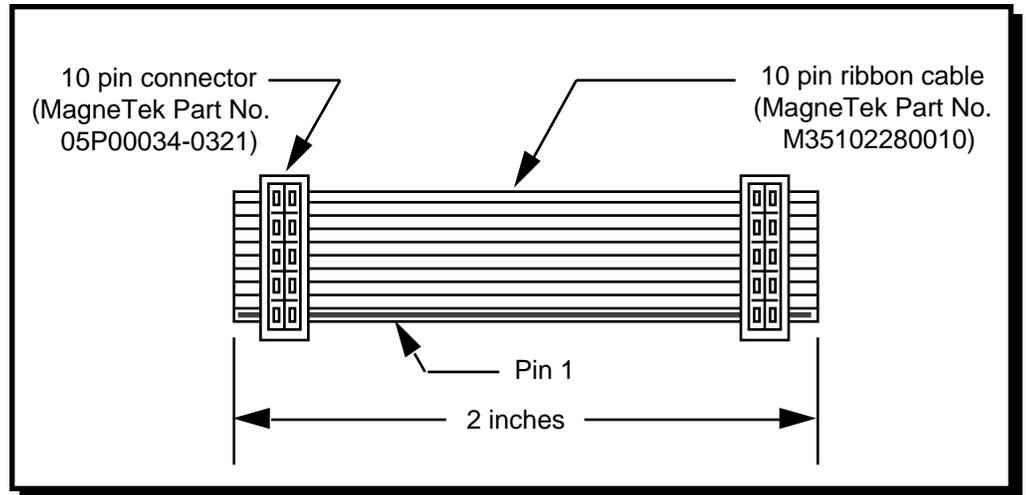uration, the ARCNET LAN identifies all the active nodes on the network. (See "What To Do When the Recon Indicator Lights Up".)

The Recon (yellow) LED indicator shows the stability of the network. This light is 'OFF' when the system is operating properly. The Recon indicator will light up when the system is first powered up, when a node is removed, or when a node is added to the system. Under these conditions, the yellow Recon LED should remain 'ON' for no more than 1 second.

If the RECON indicator lights up for other than the above mentioned conditions, the network is not under stable operating conditions. Action must be taken to determine and correct the cause of repetitive Recons, as they will interfere with normal LAN communications. (See "What To Do When the Recon Indicator Lights Up".)

What To Do When the Recon Indicator Lights Up

The following flowchart and corrective actions provide a systematic approach of isolating the node(s) that generate RECONs. If after following these steps no nodes have been isolated and RECONs continue, contact a MagneTek representative.

Are Power Supply LEDs 'ON' and steady (located on backplane)?

Yes →

Is Recon LED 'ON'?

No → This is good. There are no Recons on the Network.

Yes ↓

Are there any RED Receive Activity Indicator LEDs (CR1 - CR4) 'ON'?

No → The ARCNET Active Hub will indicate a RECON when there are no LAN segments connected to the Hub, or when 1 LAN segment with only 1 node is powered up. These are valid conditions.

Yes ↓

Is there more than 1 MicroTrac LAN node powered up?

No → There must be at least 2 nodes powered up for token passing to occur. If only 1 node is powered up, there is no node to pass the token to, so a RECON will occur.

Yes ↓

(A)

No ↓

If blinking: Ensure that the proper loading resistor assemblies are installed in the backplane of the chassis assembly.
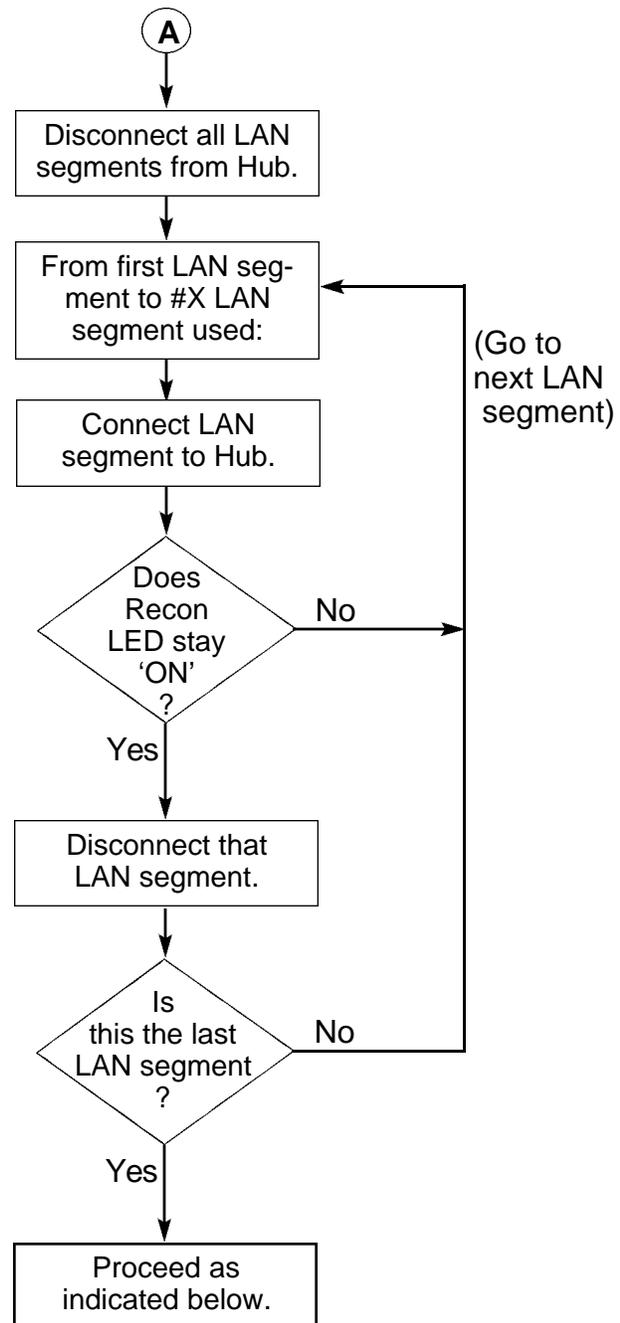For Hub Assemblies: MagneTek P/N 05P00090-0397 (10 ohm, 5W) should be installed into J1, and MagneTek P/N 05P00090-0398 (56 ohm, 5W) should be installed into J2.
For PLC gateway assemblies: MagneTek P/N 05P00090-0398 (56 ohm, 5W) should be installed into J2.
If 'OFF': Verify that 110 Vac power is applied to power supply (i.e. is switch ON, is incoming power hot, etc.). Verify fuses. The unit includes two (2) fuses. One fuse is located on the power supply board. If needed, replace this fuse with a 5MF2A250V or equivalent. The other fuse is located in the Input Power connector assembly, between Power Switch and IEC plug. A spare fuse is located above the fuse holder. If needed, replace this fuse with a T2AL250V or equivalent.
If 'OFF' and 110 Vac is present and fuses are not burnt: The power supply is bad; so the chassis assembly must be replaced.
For Hub assemblies: MagneTek P/N 05P00090-0268 (PC chassis, 4 half slots, 65W P.S.).
For PLC gateway assemblies: MagneTek P/N 05P00090-0273 (PC chassis, 3 half / 3 full slots, 65W P.S.).

Ⓐ

⬇

Disconnect all LAN
segments from Hub.

⬇

From first LAN seg-
ment to #X LAN
segment used:

(Go to
next LAN
segment)

⬇

Connect LAN
segment to Hub.

⬇

Does
Recon
LED stay
'ON'
? → No

Yes ⬇

Disconnect that
LAN segment.

⬇

Is
this the last
LAN segment
? → No

Yes ⬇

Proceed as
indicated below.

At this point, one or more trouble LAN segments have been isolated. These
LAN segments generated RECONs. The nodes on these LAN segments
should be looked at next, in order to isolate the trouble making node.

Proceed as follows for each LAN segment:

   1.   Disconnect all nodes from that LAN segment, including the Hub connection, by removing the TEE from all nodes, taking care that they do not touch anything.

   2.   With an ohmmeter, check cable resistance at the cable end that plugs into the Hub. This resistance should be 93 ohms from the center pin at the BNC to the shield. If resistance is greater than 93 ohms, there is an open or missing terminator on the LAN segment, or a bad cable. If resistance is between 0 ohms and 93 ohms, the segment has a wrong type of terminator or a shorted cable.

   3.   Plug the LAN cable into any port on the Hub. The Hub should show no activity on that port, and no RECONs. If the Hub shows activity or RECONs, not all the nodes have been disconnected from the LAN segment.

   4.   Add 1 node at a time to the LAN segment, watching the RECON indicator LED. If it stays 'ON', disconnect that node and move to the next node. Note that it is normal for the RECON LED to turn on initially when a node is added; however, it should soon turn off and stay off.

   5.   At this point, you should have a stable network with no RECONs. The node(s) that were disconnected could have the following problems, depending on whether the system is new, or if it has been operating for some time with no problems:

New System

- Duplicate Node numbers on Network; none are allowed.

    Action: Check PAC Diagram LAN I.D. numbers.
                  Check Remote LAN node hardware Node I.D. switch settings.

- Hardware failure

    Action: Check power supplies.
                  Make sure system has a good grounding scheme. Contact MagneTek for Grounding Practices publication.
                  Swap suspected bad hardware PCB with a known good hardware PCB.
                  Make sure ARCNET coaxial TEE connector touches no metal objects other than the BNC connectors.
                  Make sure ARCNET coaxial termination resistor touches no metal objects other than the TEE connector.

System That Has Been Operating For Some Time With No Problems

- Hardware failure

    Action: Check power supplies.
    Make sure system has a good grounding scheme. Contact MagneTek for Grounding Practices publication.
    Swap suspected bad hardware PCB with a known good hardware PCB.
    Make sure ARCNET coaxial TEE connectors are not touching other metal objects.
    Make sure ARCNET coaxial termination resistor touches no metal objects other than the TEE connector.