LinkNet Pressroom Monitoring Software

Installation and Operating Manual

LinkNet

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1. Introduction

The Link Systems Network Application (LinkNet) provides detailed monitoring of stamping operations utilizing Link equipment. Supported equipment includes the OmniLink 5000 press control and associated option modules, and the System 1100 tonnage monitor. By using a simple to wire "daisy chained" cable arrangement to attach these units to an Intel based personal computer running Microsoft Windows, a wealth of information can be gathered automatically.

1.1 Features

- Average tonnage, highest good tonnage, and lowest good tonnage is collected (from equipment with tonnage monitors) in 10 minute intervals. This gives a good view of the consistency of the production process.

- Production Rate is collected in 10 minute intervals. The production rate is also factored into summary information for press utilization calculations versus standard rate.

- Down time codes may be defined. A description for each down time code can be typed in once at the computer and the descriptions are downloaded to all Link equipment on the network. The user may choose from the descriptions, not just the numeric code, at the press. Down time code information is collected and stored by shift, day, week, month, year, since last rework, and over all time.

- "Events" are recorded. Events are automatically logged in the same databases as down time codes. Examples of events include tonnage alarms, bypass changes to tonnage monitor and die protection, die protection faults, part counter limits, etc.

- All data is stored in industry standard Microsoft Access database files. These files can be read from many common spreadsheets, reporting tools, visual basic, etc.

- Jobs may be stored and recalled to and from the host computer giving Link equipment attached to the network essentially unlimited job storage

- Standard reports are provided by LinkNet to make the information gathered by the system more accessible and easier to interpret.

- Reports are generated using Seagate Software Crystal Reports. This allows the end user to customize (with separate purchase of Crystal Reports) LinkNet reports for any special requirements, add a company logo, etc.

- Preventive Maintenance setpoints can be set by elapsed time, press running time, and strokes. OmniLink 5000 controls additionally support setpoints by "Motor On" time, Total feed length, and Clutch/Brake engagements.

- Tonnage signatures can be sent from OmniLink 5000 and System 1100 tonnage monitors to the network for analysis, storage, or printing. Previous signatures can be overlaid for direct comparison.

- Notes for each machine and die can be entered at the computer and viewed on OmniLink 5000 operator terminals.

1.2 System Requirements

LinkNet has been designed to run on the Windows 95 or Windows NT operating systems.

Minimum Hardware Requirements:

- Pentium 166MHz CPU
- 16MB memory
- 1.2GB hard drive
- VGA (640 by 480) display
- Mouse

- At least one free RS232 serial port

Recommended Hardware:

- Pentium II 333MHz CPU or better
- 32MB memory
- 4GB or larger hard drive
- SVGA (800 by 600) display or better
- Mouse
- At least one free RS232 serial port

2. Installation

LinkNet is connected to each piece of equipment in a bussed arrangement commonly called “daisy chaining”. The means that the communications cable goes from the computer to the first machine, from the first machine to the second, from the second to the third, and so on as shown in Figure 2.1.

The “Drop Boxes” shown in the figure are small boxes that contain plugable terminal strips. The boxes are mounted on the press and serve as junctions for the network wire to come in to the machine, go out to the next machine, and drop to Link equipment on the press. In addition, the boxes can contain circuitry (called a repeater) to enable the network to work with extremely long cable lengths or with more than 32 machines.

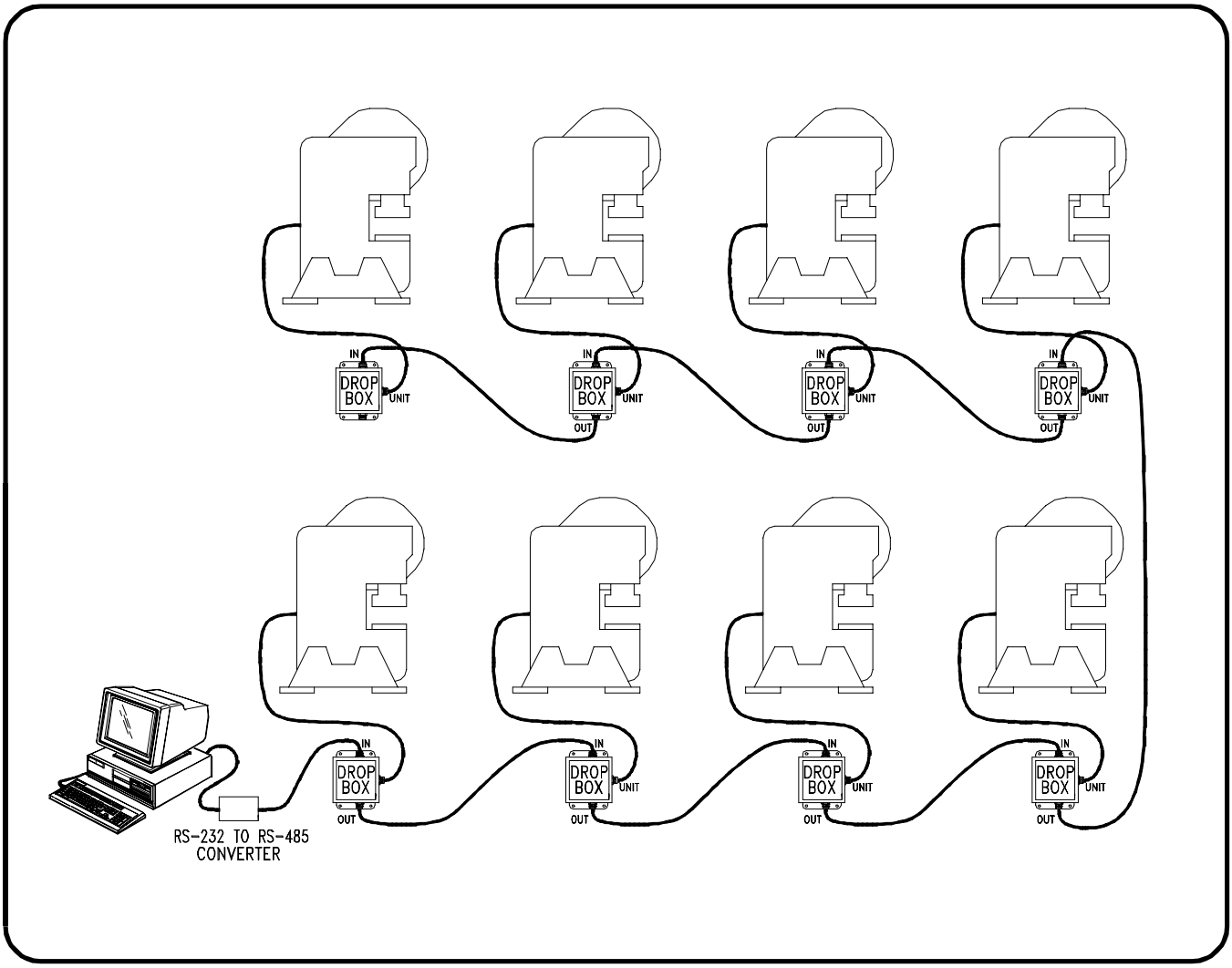

Figure 2.1: Daisy Chained Network Example

At the computer, an RS232 to RS485 converter is necessary. This converts the standard serial port on the host computer to a differential serial port suitable for electrically noisy industrial environments. Link makes an RS232 to RS485 converter specifically for this purpose with termination resistors built in that provide for reliable communications.

The computer that runs the network should be capable of running Windows 95, Windows 98, or Windows NT 4.0 (service pack 4 or higher). Suggested computer is at least a Pentium II 333MHz with 32 MB of memory, 4GB of hard disk space, Super VGA with resolution of 800 by 600 or better, mouse, and at least one spare RS-232 port.

The network wiring should be Belden 8103 or equivalent (three twisted pairs and a shield) and should not exceed 4000 ft (unless using a repeater).

Belden 8103 cable and many similar cables organized as twisted pairs use a special color code scheme. Instead of each wire using a different color, each pair uses a color. One wire in the pair is predominately white with a thin color stripe, and the other wire in the pair is predominately the color with a thin white stripe. When referring to these wires a common convention is to name the predominate color first. For example, a blue wire with a thin white stripe is called blue with white (shortened to blue/white). A white wire with a thin blue stripe is called white with blue (shortened to white/blue). This convention will be used in this document.

Other wire types can be used, but assuming Belden 8103 cable and the Link RS232 to RS485 converter, the network should be wired as shown in the following sections.

2.1 RS232-RS485 Converter Connections

The Link converter is labeled the same way as network drop boxes on the RS485 side. The RS232 side is equipped with a 6' cable that plugs into any standard 9 pin serial port connector on the host computer. A power cord is also provided. The six terminal RS485 connector should be wired as follows:

GND - Green/White and White/Green
RXD+ - Orange/White
RXD- - White/Orange
TXD+ - Blue/White
TXD- - White/Blue
SHLD - Shield (bare) Wire of Cable

If another kind of RS-232 to RS-485 converter is used, it should be set up in the following manner:

1) If configurable, transmit should always be on.
2) TX+ should connect to RXD+ on the drop box (Orange/White wire).
3) TX- should connect to RXD- on the drop box (White/Orange wire).
4) RX+ should connect to TXD+ on the drop box (Blue/White wire).
5) RX- should connect to TXD- on the drop box (White/Blue wire).

Note that "RX" and "TX" can be called different things depending on the manufacturer of the converter, but will almost always reflect some variation of "transmit" and "receive" (such as TXD and RXD).

2.2 OmniLink 5000 Connections

There should be 5 connectors on the back of the OmniLink 5000 operator interface terminal as shown in Figure 2.2. If only 4 connectors are present, then an older communications board is installed. If this is the case, contact Link for pricing to upgrade the unit to the new communications board with network support. Appendix "A" has complete instructions for updating OmniLink 5000 software and retrofitting the new communications board. Port 5 is the network port and should be wired as follows:

REF - Green/White and White/Green
RXD+ - Orange/White
RXD- - White/Orange
TXD+ - Blue/White
TXD- - White/Blue

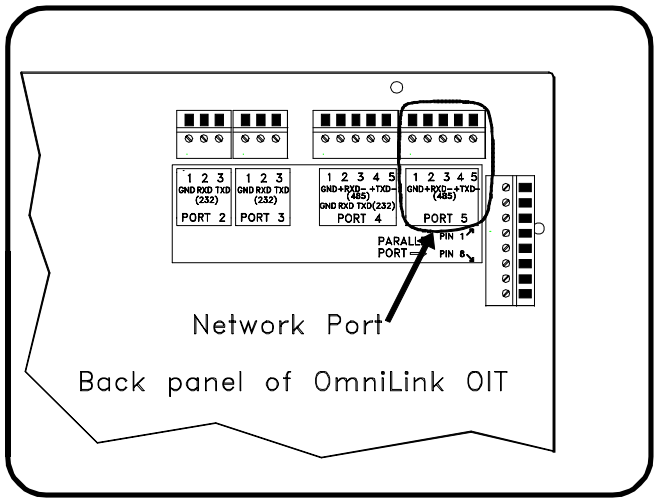

Figure 2.2: OmniLink 5000 OIT Backpanel

2.3 System 1100 Connections

System 1100 tonnage monitors with software versions older than version 3.2 in the operator interface board (the circuit board that is mounted on the door of the 1100) will need to have a software upgrade in order to function with LinkNet. Contact Link for the appropriate software. Appendix "A" has complete instructions for upgrading the software. The System 1100 has 3 terminal strips on the circuit board mounted to the door of the unit, two of which should already be wired. The "NETWORK" port (see Figure 2.3) should be wired as follows:

Terminal A - Green/White and White/Green
Terminal B - White/Blue
Terminal C - Blue/White
Terminal D - White/Orange
Terminal E - Orange/White

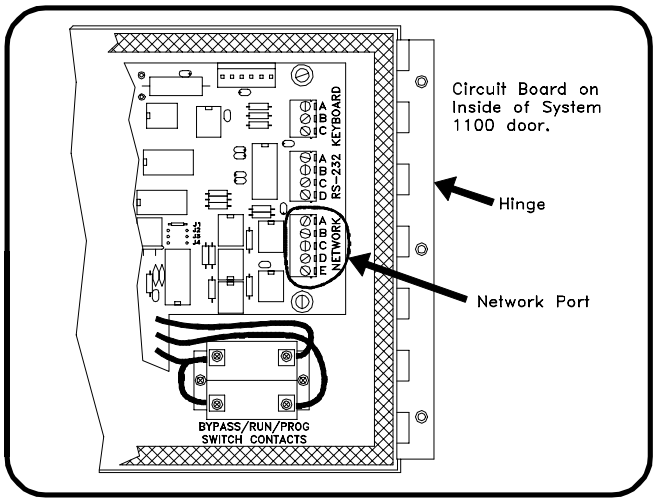

Figure 2.3: System 1100 Door Circuit Board

2.4 Drop Box Terminals

There are two kinds of drop boxes, regular and repeater.

Regular drop boxes (Figure 2.4) simply have connectors for field wiring to pass the communication signals through.

Repeater drop boxes (Figure 2.5) have active circuitry in addition to the terminals the regular drop box has. This circuitry allows the network to extend over 4000ft and can allow more than 32 units to be attached to the line.

Drop boxes have three sets of plugable terminal strips labeled "DATA IN", "DATA OUT", and "UNIT". The terminal strip labeled "DATA IN" should be connected to the wire coming from the host computer side, "DATA OUT" should go to the next drop box, and "UNIT" should go to the Link equipment on the press. All three connectors should be wired as follows:

GND - Green/White and White/Green
RXD+ - Orange/White
RXD- - White/Orange
TXD+ - Blue/White
TXD- - White/Blue
SHLD - Shield (bare) Wire of Cable

For Repeaters Only:

L1 - "Hot" side of 110V AC
L2 - "Neutral" side of 110V AC
M. GND - Machine Ground

Some older versions of the drop box do not have the "SHLD" terminal. In this case, tie the shields of all the cables together with a wire nut.

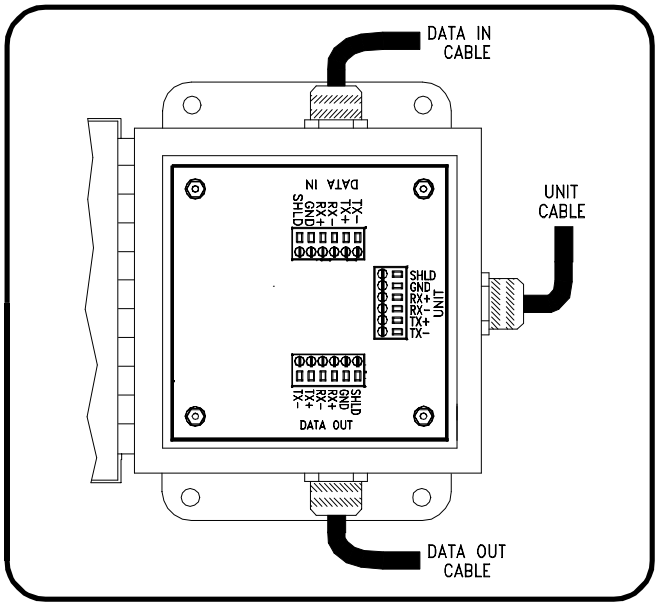

Figure 2.4: Regular Drop Box Connectors

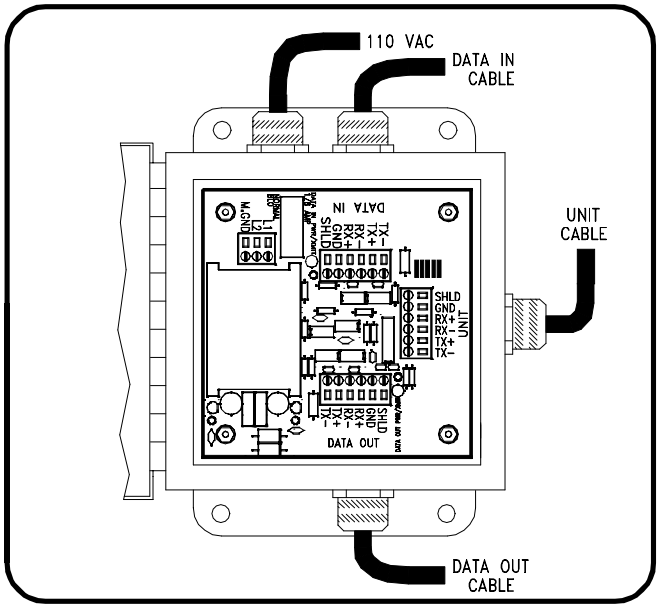

Figure 2.5: Repeater Drop Box Connections

Whenever possible, the drop boxes should be mounted on the press in easy reach for troubleshooting purposes. In addition, the length of the line from the drop box to the Link equipment should be kept as short as is reasonably possible. The drop boxes have knockouts sized for ½" conduit or cord grips.

2.5 Software Installation

Once the wiring is completed, the software on the host computer must be installed. Insert the LinkNet compact disk (CD) in the computers CD-ROM drive. If "Auto Insert Notification" is enabled for the drive (it is by default), then the LinkNet installation program will automatically start when the CD is inserted. If for some reason "Auto Insert Notification" is not enabled, hit the "Start" button on the desktop, select "Run...", and when prompted for the name of the program to run type "D:\SETUP" (without the quotes) and hit the "OK" button. Note that the "D" in "D:\SETUP" should be the drive letter of your CD-ROM drive.

The installation program will ask where to put the LinkNet files. It is strongly recommended that the default directory be accepted. Program and data files will then be installed.

The installation program will create a new program group called “LinkNet” and will put a LinkNet icon on the windows desktop. To start LinkNet, double click on the icon on the desktop, or select it from the programs menu by hitting the Windows “Start” button, then “Programs”, then the “LinkNet” group, and then the “LinkNet” selection in that group.

3. Configuration

After the software is installed, it must be configured. This consists of the following steps:

- Select a communications port for LinkNet to use to "talk" to the presses.
- Set the number, days, and starting times of shifts.
- Enter down time codes and their descriptions.
- Tell LinkNet what machines are present.
- Tell LinkNet what dies are present.
- Configure Preventive maintenance.

3.1 Configuring the Comm Port

LinkNet uses a standard RS-232 serial port (commonly called a "comm port") to communicate with the machines on the factory floor via an external RS-232 to RS-485 converter. No boards have to be installed or configured on the host computer. There are typically two comm ports installed in most computers, "COM1" and "COM2". A spare comm port must be available for LinkNet to use.

Select "Configure" and then "Comm Port" from the menu in LinkNet as shown in Figure 3.1 and a dialog box similar to Figure 3.2 should appear. Note that only comm ports that are not currently in use (by anything other than LinkNet itself) show up in the list. Pick the comm port that will be used by LinkNet from the list and click on the "OK" button.

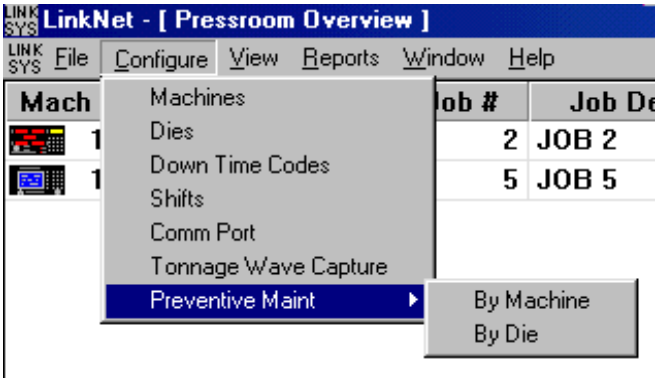

Figure 3.1: Configuration Menu

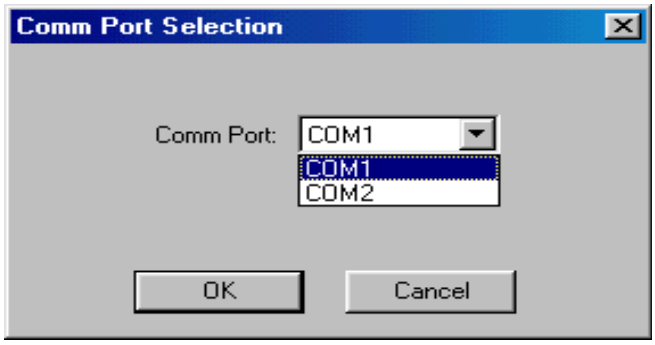

Figure 3.2: Comm Port Selection Dialog

3.2 Configuring Shifts

LinkNet collects information only while in a shift. This keeps the system from needlessly filling up the hard drive with information not related to production and lets many types of information be tracked by shift. The relative performance of different shifts can then be compared and analyzed.

To configure shifts, select "Configure" and then "Shifts" from the LinkNet menu as shown in Figure 3.1. A dialog similar to Figure 3.3 should appear.

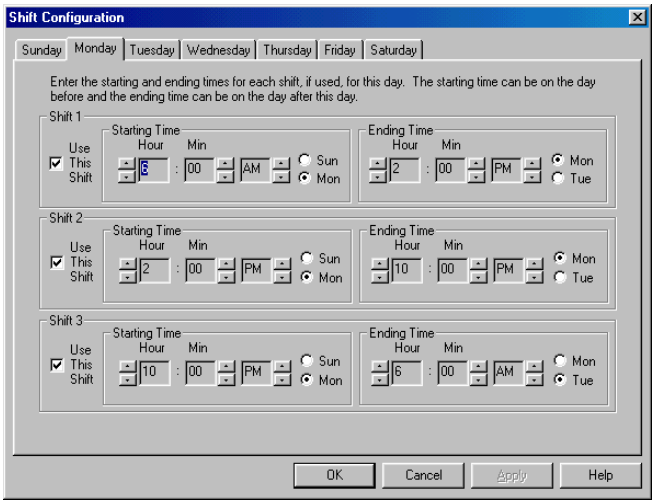

Figure 3.3: Shift Configuration Dialog

Each day may have up to three shifts configured. The "Use This Shift" checkbox by each shift determines whether or not the shift will be used for that day. Note that a shift can be used some days and not others - each day is individually configurable. Also note that each starting time can be on the day before the current day, and that each ending time can be on the day following the current day. This allows the flexibility to assign a shift to a day on which it does not necessarily start or end. For example, it may be desired to have a shift that starts at 10PM on Monday and runs until 6AM on Tuesday to be considered a Tuesday shift. Likewise, a shift that starts a 6PM on Monday and runs until 2AM on Tuesday can be considered a Monday shift.

NOTE: Each day except Monday has a "Set Same as Monday" button. Since the typical case is for Monday through Friday to have the same shift times, set the shift times for Monday first, and then go to each day that should be the same as Monday and hit the "Set Same as Monday" button to copy the shift times over to that day. Any other days can be set according to need.

The starting and ending time of each shift can be configured in 10 minute intervals. Use the up and down arrows next to the hour, minute, and AM/PM boxes to change each setting. When the shifts are configured as desired, click on the "OK" button.

No two shifts may overlap in time either on the same day or across days. If any shifts overlap in time, a message will be displayed indicating which days have a problem.

3.3 Configuring Down Time Codes

Down time codes (DTCs) are numeric values that have a user assigned meaning attached to them. These codes allow the user to track the uptime, downtime, and usage of each press. Each DTC has a user entered description that is downloaded to the Link equipment on the presses. When a machine has to be stopped (or is stopped by monitoring equipment such as tonnage monitors, die protection, and so on) the operator can enter the reason for the stop by selecting one of the DTC descriptions that were downloaded to the press.

The time spent in a DTC is logged by LinkNet into a database that can be viewed and analyzed. Problem spots (such as repeated problems with a feed, material, lubrication, etc.) can be easily identified by the percentage of down time that they cause. This enables supervisors to target limited time, money, and other resources at the areas that will do the most good in terms of production.

To configure down time codes, select "Configure" and then "Down Time Codes" as shown in Figure 3.1. A dialog box similar to Figure 3.4 should appear.

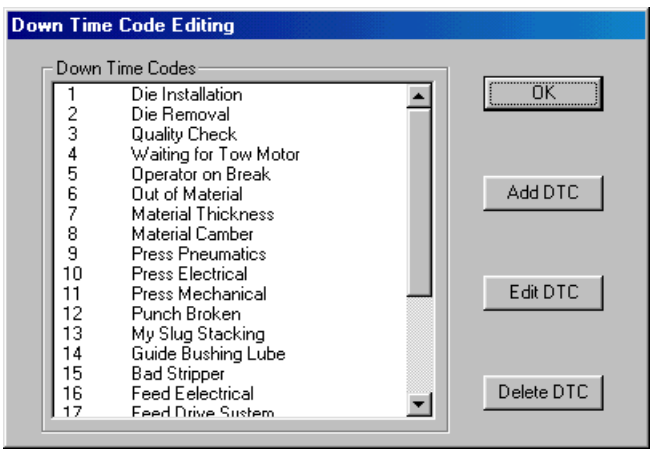

Figure 3.4: DTC Configuration List

This dialog allows DTCs to be added, edited, or deleted.

After all additions and changes have been made, click the "OK" button. The DTC descriptions will

then be sent to each press on the network automatically.

3.3.1 Adding a Down Time Code

To Add a DTC, click on the "Add DTC" button. A dialog box similar to Figure 3.5 should appear.

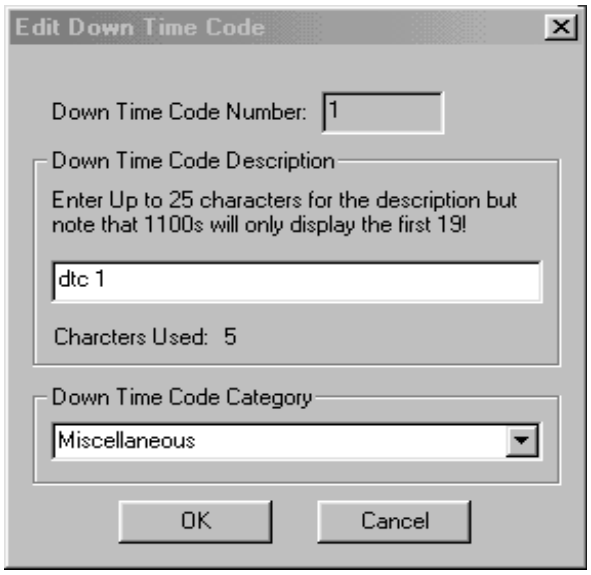

Figure 3.5: Add/Edit DTC Dialog Box

By default the DTC number is the next available number, but may be changed to any unused number between 1 and 250 if desired. Up to 25 characters can be entered for the DTC description, but note that the System 1100 can only display the first 19 characters. In addition, a down time category can be assigned. Available categories are Miscellaneous, Die Change Related, Press Related, Die Related, Feed Related, Straightener Related, Material Related, and Scheduled Maintenance. When viewing a down time report, the down time percentages will be shown by individual down time code and by category.

3.3.2 Editing a Down Time Code

To Edit a DTC, select a DTC from the list (see Figure 3.4) and click on the "Edit DTC" button. The dialog box of Figure 3.5 will appear but will not allow the DTC number to be changed - only the description and category. This is to prevent accidental changes that would affect the way information in the database has been stored. If the DTC needs to be changed, delete the old DTC and add a new one with the desired number.

3.3.3 Deleting a Down Time Code

To delete a DTC, select a DTC from the list (see Figure 3.4) and click on the "Delete DTC" button. A message will appear indicating that the selected DTC is about to be deleted and will ask for confirmation. Click the "Yes" button to delete the DTC or the "No" button to keep the DTC.

3.4 Configuring Machines

Since the same network cable is shared by each machine on the network, LinkNet uses a machine number to identify the particular press that it wants to "talk" to. Each machine on the network must therefore be assigned a unique non-zero number.

Before a piece of Link equipment can "talk" to LinkNet, it must be assigned a machine number. Refer to section 6.1 for details on how to set the machine number for OmniLink 5000 press automation controls, and section 7.1 for System 1100 tonnage monitors.

3.4.1 Adding a Machine to LinkNet

When the machine numbers of each unit connected to the network have been entered, LinkNet must be told what they are. Select "Configure" from the main LinkNet menu as shown in Figure 3.1, then select "Machine" and a dialog box similar to Figure 3.6 should appear.

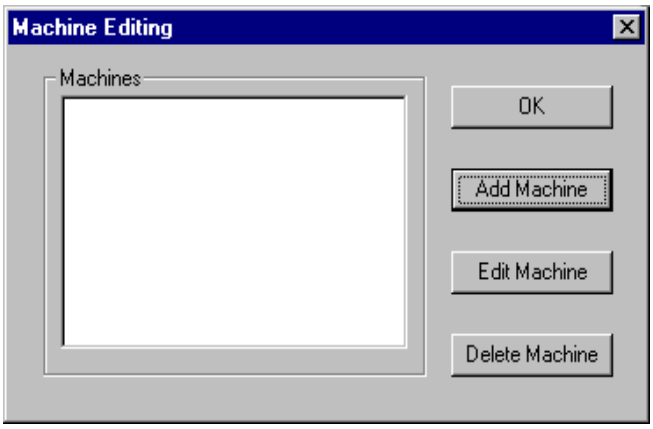

Figure 3.6: Machine Configuration List

This dialog allows machine to be added, edited, and deleted.

To add a machine, hit the "Add Machine" button. A dialog box like figure 3.7 will appear asking for the machine number of the machine to add.

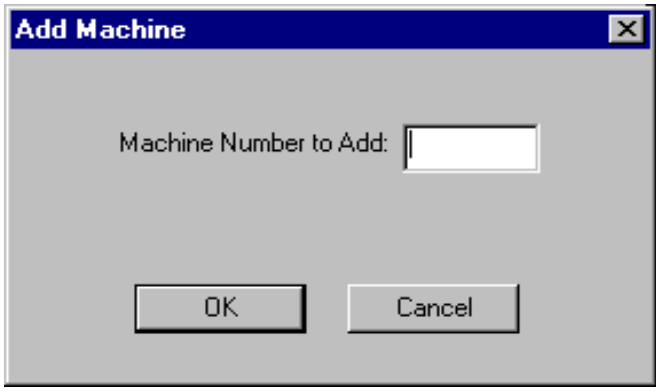

Figure 3.7: Machine Add Dialog

Type the machine number and push the "OK" button. LinkNet will look for the machine on the network. If found, the dialog of Figure 3.8 will appear, otherwise a message indicating the machine could not be found will be displayed.

Note that machines have to be powered up and properly connected to the network in order to add them to LinkNet. To add them correctly, LinkNet "asks" the machines what they are and which options are installed.

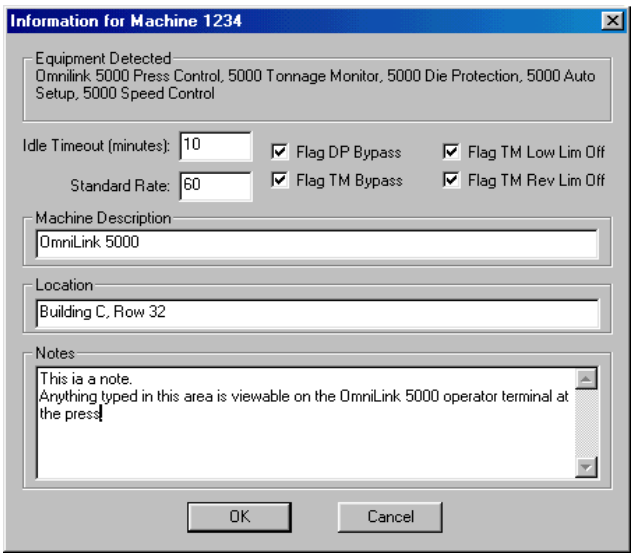

Figure 3.8: Machine Info Dialog Box

The "Equipment Detected" section of this dialog box lists the Link equipment on the network for this press.

Type a machine description in the "Machine Description" field. This is displayed in the overview screen to help identify the press by something more easily remembered than a machine number.

"Location" is an optional field that can be displayed in some reports and may also be used by future LinkNet enhancements.

"Notes" are also optional. If used, anything types in the note area is viewable on the OmniLink 5000 operator interface terminal at the press. Lubrication types, material needs, or any other information desired can be typed here.

"Idle Timeout" is the amount of time in minutes that a machine can go without making a stroke before being considered "idle". In order to track machine utilization, it is necessary to know not only when a machine is down, but also when it is simply not in use. After the number of minutes set by this parameter without stroking, the machine will automatically go into a "Machine Idle" down time code. This condition is automatically cleared when the press makes a stroke.

Note that the idle condition will be activated ONLY if a down time code is not already entered and accounting for the lack of machine operation. A user entered down time code will always override the "Machine Idle" down time condition.

"Standard Rate" is the expected average production rate in strokes per minute of this press. This value is used only if a standard rate is not entered for a machine/die combination. The standard rate value is used to compute machine utilization.

"Flag DP Bypass", "Flag TM Bypass", "Flag TM Low Lim Off", and "Flag TM Rev Lim Off", when checked, tells LinkNet to blink the status field in the overview display with a red "DP Bypassed", "TM Bypassed", "TM Low SPs Off", or "TM Rev SPs Off" respectively when die protection is bypassed, tonnage monitoring is bypassed, tonnage monitor low setpoints are off, or tonnage monitor reverse setpoints are off. In addition, if the computer is equipped with a sound card and speakers, a warning chime will sound. The event log, however, will always show these conditions regardless of these settings.

3.4.2 Editing Machine Information

From the list dialog shown in Figure 3.6, select a machine and push the "Edit Machine" button. The dialog of Figure 3.8 will be displayed and the machine description, location, notes, idle timeout, and flags can be changed. Click on the "OK" button to keep changes or hit the "Cancel" button to keep the original settings.

3.4.3 Deleting a Machine from LinkNet

From the list dialog shown in Figure 3.6, select a machine and click on the "Delete Machine" button. A message box will appear and ask for verification. Select "Yes" to delete the machine or "No" to cancel. Note that deleting a machine will cause LinkNet to collect no further information from that machine, but existing information in the database will be retained.

3.5 Configuring Dies

For LinkNet to track maintenance information by die, and to put certain information on some reports, it must be aware of the die. Since the same die will inevitably use slightly different setup parameters on each machine it runs on, configuring a die starts with entering the die number and the machine on which it is run. The die may be set up on more than one machine.

Note that if a die is not already set up when a job is stored *from* a press *to* LinkNet, it will be automatically set up for that machine.

To configure dies select "Configure" and then "Dies" as shown in Figure 3.1. A dialog box similar to Figure 3.9 should appear.

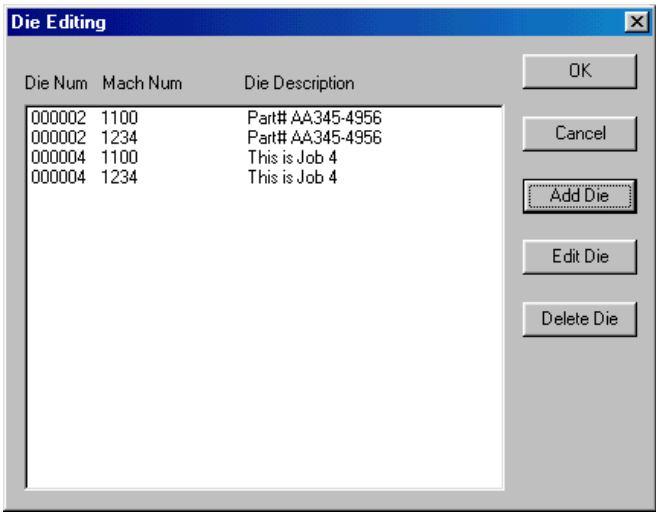

Figure 3.9: Die Configuration List

3.5.1 Adding Dies

To add a die hit the "Add Die" button on the dialog of Figure 3.9. A dialog box similar to Figure 3.10 should appear.

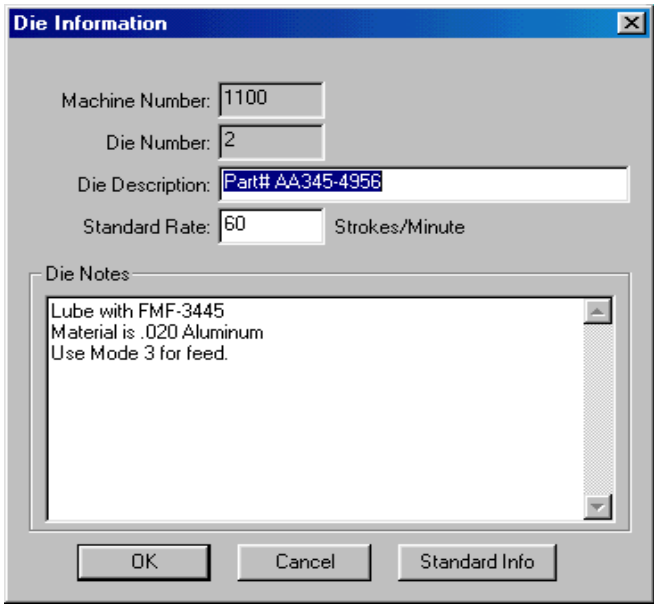

Figure 3.10: Die Configuration Information

Enter the machine number that this die information applies to, the die number, the die description, and the standard rate.

The standard rate is used for press utilization calculations and is the strokes per minute, on average, that the die is expected to run on this press. This value can be different for each press the die will run on. If this value is 0, then the standard rate value for the machine will be used by default.

"Die Notes" can be entered in this screen as well, but are not required. If present, die notes can be viewed on OmniLink 5000 operator terminals. These notes are free form text and can be material requirements, lubrication requirements, quality limits, or anything else desired. If the notes do not fit on one screen of the OmniLink terminal, the press operator can scroll through as many pages as are required.

If the "Standard Info" button is hit, the dialog of Figure 3.11 will appear. This dialog allows standard information about the die, such as the die description, notes, die manufacturer, and standard rate to be entered. This information will be used by default whenever a the same die is set up for a different machine. Note that this default information can be changed on a machine by machine basis.

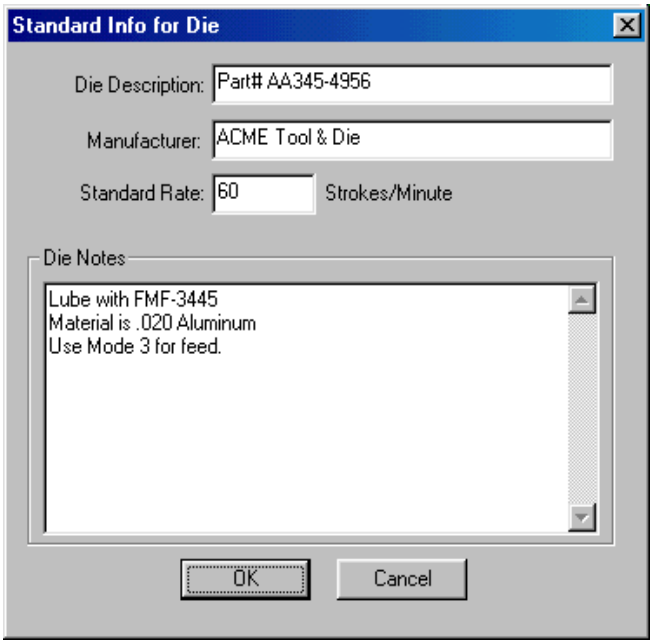

Figure 3.11: Standard Die Information

3.5.2 Editing Die Information

To edit an existing die, select it from the list of Figure 3.9 and hit the "Edit Die" button. The dialog of Figure 3.10 will then appear. Information (except for die number and machine number) can then be changed as desired.

Note that even if a job has been stored, settings associated with the Press Control, Die Protection, Tonnage Monitor, Programmable Limit Switch, Auto-Setup Board, Speed Control, and other specific press related settings which can affect machine/tool protection and/or operator safety can only be modified at the machine. This allows setup personnel to test and verify the configuration at the machine where they can see what effect changes have on the production process. A simple illustration of possible problems with modifying a job at the computer instead of the press would be a mis-typed shutheight value. If too low, the press or die could catastrophically malfunction and/or break and possibly injure people in the area as well as cause equipment damage.

3.5.3 Deleting Dies

To delete a die, select it the list Figure 3.9 and hit the "Delete Die" button. A message box will appear to verify that the die is to be deleted. Hit the "Yes" button to delete the die or the "No" button to abort the deletion.

3.6 Configuring Tonnage Wave Capture

LinkNet has tonnage signature capture built in. In fact, the system can be set up so that tonnage monitor equipped presses can print a waveform right from the press. To do this, LinkNet needs to know the orientation (portrait or landscape) of the paper and the printer to use. Select "Tonnage Wave Capture" from the "Configure" menu as shown in figure 3.1 to bring up the dialog box of figure 3.12.

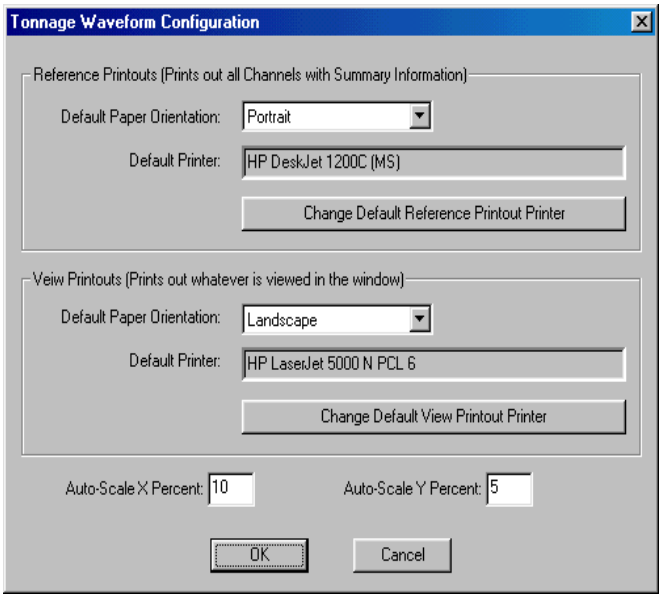

Figure 3.12: Tonnage Waveform Capture Config

This dialog box allows contains the settings for two different print types. Reference printouts print out each channel of the tonnage monitor separately (but still on one page) as well as numerical peak tonnage and setpoint information. View printouts print whatever is viewed on the screen as large as possible on the printer. For each printer, choose the default paper orientation and the printer to use.

Note that these settings can be changed when the graph is printed from LinkNet, but if the graph is printed directly from a press, it will automatically use the Reference Graph settings.

In addition to the printer settings, there are two parameters called "Auto-Scale X Percent" and "Auto-Scale Y Percent". These parameters control the amount of space LinkNet will try to leave around a tonnage signature graph when it automatically scales the graph when a new signature is captured. The typical values of 10% for X and 5% for Y should work in most applications.

3.7 Configuring Preventive Maintenance

Preventive maintenance (PM) allows one or more setpoints to be entered for each machine or die. These setpoints can be set by elapsed time, press running time, and strokes. OmniLink 5000 controls additionally support setpoints by "Motor On" time, Total feed length, and Clutch/Brake

engagements.

PM can be set by machine or die. If set up by die, the PM settings will be tracked regardless of which machine the die is run on. For example, if a stroke based PM setting is applied to a die with a limit of 20000 strokes, then 10000 strokes run on machine 1234 and 10000 strokes run on machine 1100 will cause the limit to be reached.

The actual configuration by machine or by die is identical except that dies have a default PM item - "Strokes". This item can be reset and the limit can be changed but it may not be deleted. If the limit is zero (the default) then this item will never "come due". The number of strokes accumulated under this item is printed on tonnage signature printouts to give an idea of how far into the service cycle the die was when the hit was made.

The following sections show dialogs for configuring *machine* PM items. Configuration of *die* PM items is identical except that references to machines or machine numbers should be replaced with dies or die numbers!

3.7.1 Adding a Preventive Maintenance Item

Select "Preventive Maint" from the "Configure" menu as seen in figure 3.1. A sub-menu with "By Machine" and "By Die" will appear. Select the desired sub-menu and the dialog of figure 3.13 should appear.

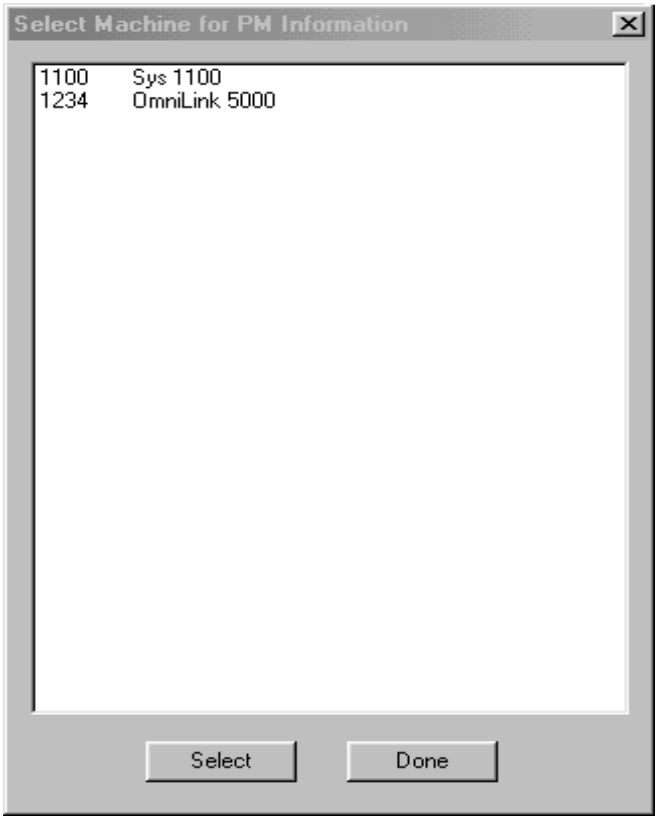

Figure 3.13: PM Machine List

This dialog shows a list of all machines or dies depending on the menu selection made. Select the machine or die for which a PM item is to be configured and hit the "Select" button. A dialog similar to figure 3.14 should appear.

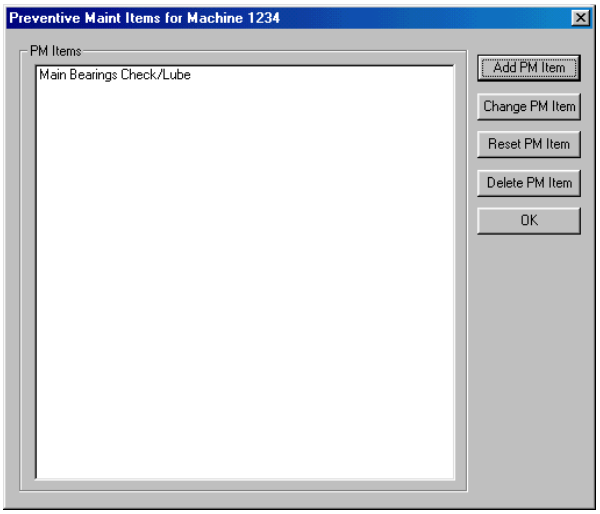

Figure 3.14: PM List for Selected Machine

This dialog shows a list of all PM items that have been set up for this machine or die. The descriptions shown are the user entered descriptions and can be

anything desired.

Hit the "Add PM Item" button and the dialog of figure 3.15 should be displayed.

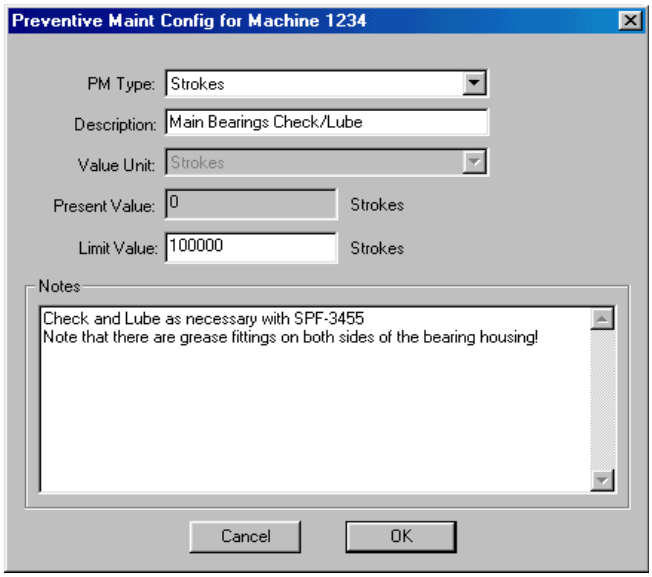

Figure 3.15: PM Item Configuration

The dialog of figure 3.15 shows the data already entered. The information to enter is as follows:

- *PM Type* - Select the type of limit this PM item should have. This can be one of the following:
  - *Running Time* - Amount of time the press was actually stroking since the last time this PM item was reset.
  - *Motor On Time* - Amount of time the main motor of press has run since the last time this PM item was reset.
  - *Elapsed Time* - Amount of time that has gone by since the last time this PM item was reset.
  - *Strokes* - Number of strokes since the last time this PM item was reset.
  - *Total Feed Length* - Accumulated total of feed length since the last time this PM item was reset.

- *Description* - Enter the description for this PM item. This could be "Bearing Check", "Clutch/Brake Wear Check", "Press Stopping Time Check", etc. This description will appear in the PM list of figure 3.14 and in PM reports.

- *Value Unit* - Applies to all time related PM types and to total feed length. For time related items, select Hours, Days, Weeks, Months, or Years. For total feed length, select feet or meters.

- *Present Value* - When adding an item, this will always be 0 (since no strokes, time, etc. has accumulated.). When editing an item, this will show the current accumulation of whatever is being monitored. This value can not be edited! This value will be in the units selected in the "Value Unit" box.

- *Limit Value* - The limit to be placed on this PM item. This value will be in the units selected in the "Value Unit" box.

- *Notes* - These are free form notes that will appear in the PM reports associated with this item. Typical uses would be check lists, procedures, materials, or anything else that a maintenance worker would need to know in order to perform the indicated maintenance.

When all data has been entered, hit the "OK" button and the maintenance item will be added.

3.7.2 Editing a Preventive Maintenance Item

To edit a PM item, select "Preventive Maint" from the "Configure" menu as seen in figure 3.1. A sub-menu with "By Machine" and "By Die" will appear. Select the desired sub-menu and a dialog similar to figure 3.13 should appear. This dialog shows a list of all machines or dies depending on the menu selection. Select the machine or die for which a PM item is to be configured and hit the "Select" button. A dialog similar to figure 3.14 should appear. Select a PM item to edit and hit the "Change PM Item" button. The dialog of figure 3.15 should appear. The limit and value units are the only information that can be changed in this dialog. If a PM item needs to be renamed, it must be deleted and re-added with the new name (this is to keep the database consistent when tracking PM history).

3.7.3 Resetting a Preventive Maintenance Item

When a PM has "tripped" (exceeded its limit), it will appear in the "tripped items" PM report. When the item has been inspected or serviced, it must be reset for the next interval. Resetting the item leaves all the information the same except the value, which is reset to zero. The PM history report will show all the times and at what point this item has been reset.

To reset a PM Item, select "Preventive Maint" from the "Configure" menu as seen in figure 3.1. A sub-menu with "By Machine" and "By Die" will appear. Select the desired sub-menu and a dialog similar to figure 3.13 should appear. This dialog shows a list of all machines or dies depending on the menu selection. Select the machine or die for which a PM item is to be configured and hit the "Select" button. A dialog similar to figure 3.14 should appear. Select a PM item to reset and hit the "Reset PM Item" button. A message box will appear to asking to verify that the item is to be reset. Hit "Yes" to reset the item, and "No" to cancel the operation.

3.7.4 Deleting a Preventive Maintenance Item

If a PM item no longer needs to be monitored, it may be deleted. To delete a PM Item, select "Preventive Maint" from the "Configure" menu as seen in figure 3.1. A sub-menu with "By Machine" and "By Die" will appear. Select the desired sub-menu and a dialog similar to figure 3.13 should appear. This dialog shows a list of all machines or dies depending on the menu selection. Select the machine or die for which a PM item is to be configured and hit the "Select" button. A dialog similar to figure 3.14 should appear. Select a PM item to reset and hit the "Delete PM Item" button. A message box will appear to asking to verify that the item is to be deleted. Hit "Yes" to delete the item, and "No" to cancel the operation.

4. Using LinkNet

4.1 The Overview Window

When LinkNet is started, there is one screen open by default, the pressroom overview window (see Figure 4.1). This window contains information to give an "at a glance" status of the entire pressroom operation. Each column contains a different kind of information as follows:

Mach # - The machine number of the press. This is the machine number that was programmed into the Link equipment on the press (see section 3.4).

Mach Descrip - The machine description as set in the machine information dialog box of Figure 3.12.

Job # - The job number that is being run on the press.

Job Descrip - The description of the job that is being run on the press.

Status - The status of the press. This is "Production" if the press is running normally, "Press Idle" if the press has exceeded the idle timeout (set in the machine information dialog of Figure 3.12) without making a stroke, a DTC description if the operator has selected a DTC, or the current status of the machine for OmniLink 5000 controls (the same current status as given in the "Press Control" screen on the OmniLink OIT). The color is green for production, yellow for idle and some other automatic DTCs (like part count complete), and red for DTCs entered by the operator. In addition, certain conditions (if enabled) will cause a flashing warning message to appear in this space (Die Protection Bypassed, Tonnage Monitor Bypassed, Tonnage Monitor Low Limits Off, Tonnage Monitor Rev Limits Off).

Part Count - The actual part count from the part counter and the percent complete (based on the part limit). If the part counter is turned off, this area will have a message to that effect. Note also that a blue area representing the percentage complete will fill this area as the part counter approaches its limit. This gives an immediate graphical indication of how near the job is to completion. For example, If 25% complete, the blue area will fill 1/4 of the part count area, if 50%, it would fill ½ of the area, and if 75%, it would fill 3/4 of the area.

SPM - The current strokes per minute of the press updated every 15 seconds. Note that in single stroke operations with a long time between strokes this number may jump around quite a bit.

TTC - Estimated time to completion for the job in hours and minutes. This number is calculated using the part count, part limit, and average strokes per minute. LinkNet polls machines every 10 minutes for average tonnage and production rate. The average part per minute rate for the last 10

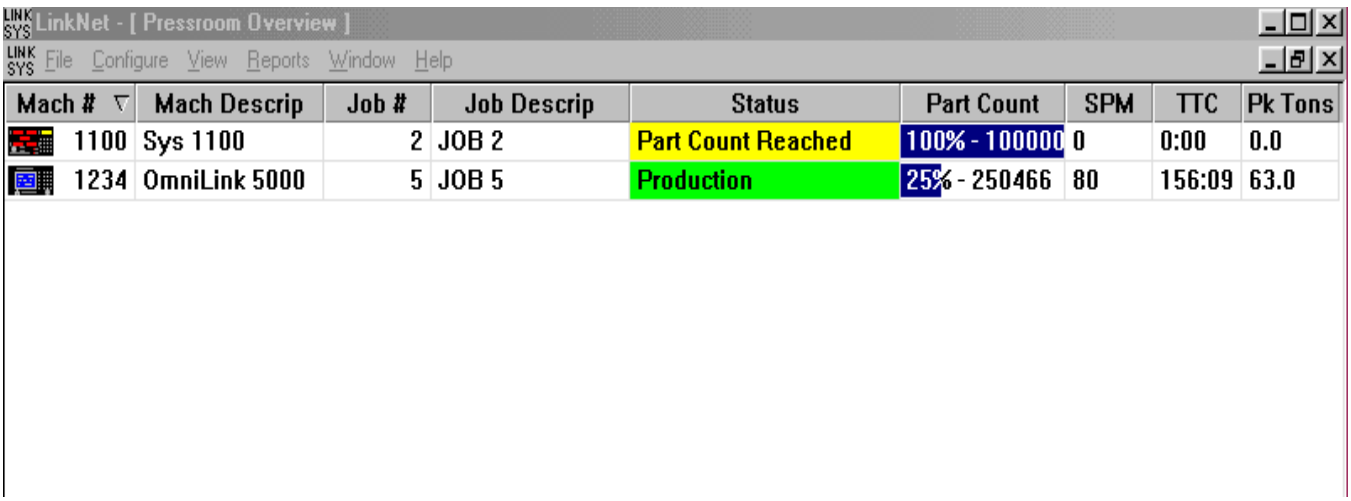

Figure 4.1: Example Pressroom Overview Window

minute poll is multiplied by the remaining parts to be produced as given by the part counter to get an estimated completion time. Note that if the part counter is turned off or the average production rate is 0, this field will display "?:??" because there is not enough information to calculate a completion time. If the last 10 minute poll production rate is 0, the 15 second average strokes per minute is used instead.

Pk Tons - The peak forward tonnage of the last stroke if a tonnage monitor is present.

Each of these column headings can be clicked on to sort the machines by the heading data. For instance, if the "Mach #" heading is clicked, the machine will be sorted by ascending machine number. If the heading is clicked again, the machines will be sorted by descending machine number. Likewise, if the "Pk Tons" heading is clicked, the machines will be sorted by ascending tonnage and so on for each column. A small arrow appears in the column heading that is being used to sort and points up for ascending order and down for descending order.

4.2 Detail Dialogs

Additional detail can be viewed on a machine by machine basis by double clicking anywhere on the row for a machine in the overview window. This brings up a tabbed dialog with several different sections of information. Each section is a tab at the top of the dialog box.

4.2.1 Counter Detail

The counter detail screen ("Counters" tab - see Figure 4.2) is the default for the tabbed dialog box. This has the status, count, limit, and estimated time to completion of the part, batch, and quality counters. Estimated time to completion is given in hours, minutes, and seconds and is calculated the same way as the TTC field in the overview screen (see section 4.1).

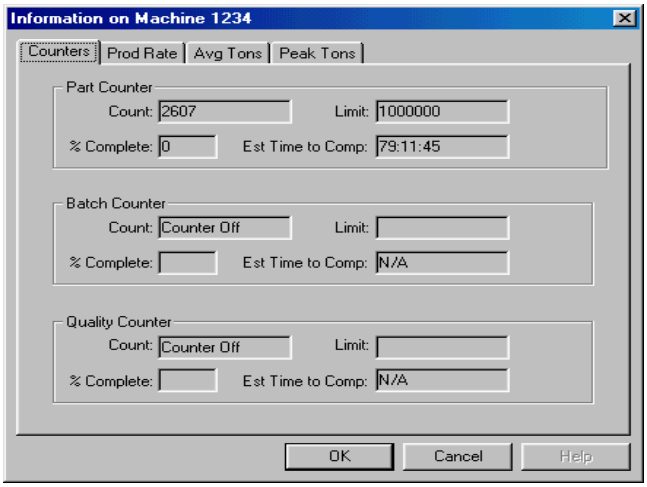

Figure 4.2: Example of Counters Detail View

4.2.2 Average Tonnage Detail

The average tonnage detail screen ("Avg Tons" tab - see Figure 4.3) graphically shows the average tonnage for a machine for the current day.

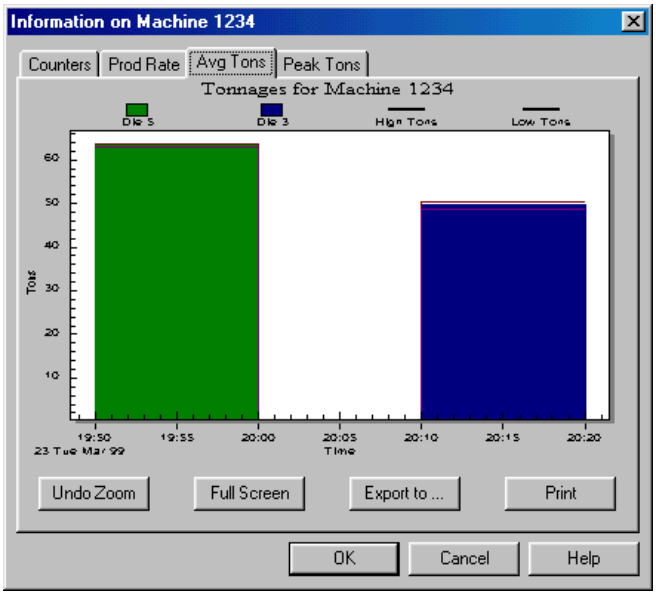

Figure 4.3: Example Average Tons Detail View

The current day starts with the first shift on that day and ends with the last shift on that day. This means that a "current day" may not necessarily start or end on the same day. For instance, if on Monday shift 1 is configured to start at 6:00AM Monday and run to 2:00PM Monday, shift 2 is configured to start at 2:00PM Monday and run to 10:00PM Monday, and shift 3 is configured to start at 10:00PM Monday and end at 6:00AM Tuesday, then "Monday" runs from 6:00AM Monday to 6:00AM

Tuesday.

The average tonnage, highest good tonnage, and lowest good tonnage are collected in 10 minute intervals (unless a job is changed, in which case the interval is terminated to keep the tonnages associated with the correct job).

The highest good tonnage is the highest tonnage that did not exceed the high setpoint and the lowest good tonnage is the lowest tonnage that did not go below the low setpoint. The average tonnage is the average of all in-limit hits.

This screen shows the average tonnages as an area graph, the highest good tonnage as a line graph, and the lowest good tonnage as a line graph. The average tonnage for each different die run on the machine appears in a different color.

The graph is arranged by time of day and can be zoomed if greater detail is desired from a section of the total graph. To zoom in on the graph, move the mouse pointer to one corner of the area to zoom in on, hold down the left mouse button, and without letting up on the button, move the mouse to the other corner of the area to zoom in on. When the mouse is being dragged to the second corner, a rectangle will show the zoom area. Note that after a zoom, the graph can be zoomed again to go even further in. To restore the graph to the full view, click on the "Undo Zoom" button.

The graph can be enlarged to full screen by clicking the "Full Screen" button. Hit the ESC key or click on the title bar to return to the normal view.

To export the graph to a file or clipboard for use by other windows programs, click in the "Export to ..." button. A window will appear with choices about where to send the graph.

To print the graph, click on the "Print" button. The graph will be sent to the default windows printer.

4.2.3 Production Rate Detail

The production rate detail screen ("Prod Rate" tab - see Figure 4.4) graphically shows the production rate for a machine for the current day (see section 4.2.2 for discussion of how current day is determined).

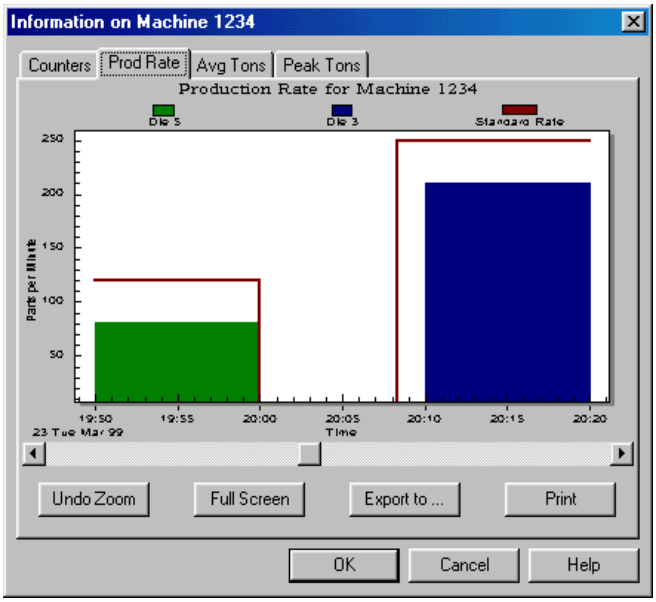

Figure 4.4: Example Prod. Rate Detail View

This graph shows the production rate in parts per minute as an area graph in 10 minute intervals (unless a job is changed, in which case the interval is terminated to keep the rates associated with the correct job). The production rate for each die that is run that day on the machine appears in a different color.

The graph is arranged by time of day and can be zoomed if greater detail is desired from a section of the total graph. To zoom in on the graph, move the mouse pointer to one corner of the area to enlarge, hold down the left mouse button, and without letting up on the button, move the mouse to the other corner of the area. When the mouse is being dragged to the second corner, a rectangle will show the zoom area. Note that after a zoom, the graph can be zoomed again to go even further in. To restore the graph to the full view, click on the "Undo Zoom" button.

The graph can be enlarged to full screen by clicking the "Full Screen" button. Hit the ESC key or click on the title bar to return to the normal view.

To export the graph to a file or clipboard for use by other windows programs, click in the "Export to ..." button. A window will appear with choices about where to send the graph.

To print the graph, click on the "Print" button. The graph will be sent to the default windows printer.

4.2.4 Tonnage Detail

The tonnage detail screen ("Peak Tons" tab - see Figure 4.5) shows the tonnage, high setpoint, low setpoint, reverse setpoint, and any alarms for each channel of the tonnage monitor. In addition, the mode of the tonnage monitor (run/program/bypass) and whether reverse and low limits are on or off are displayed on this screen.

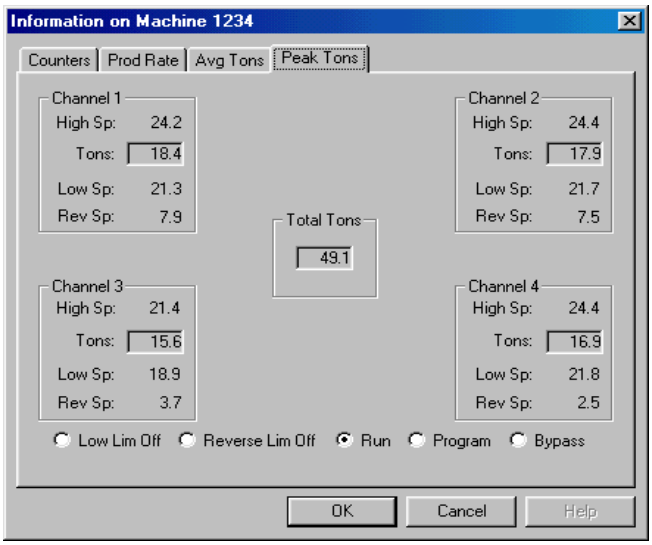

Figure 4.5: Example Peak Tons Detail View

Note that additional tabs for data windows 1 through 4 will be present for each data window that is enabled (See System 1100 manual or OmniLink 5000 tonnage monitor manual for information on data windows).

4.3 The "Window" Menu

The "Window" menu (see Figure 4.6) is used to manage multiple windows.

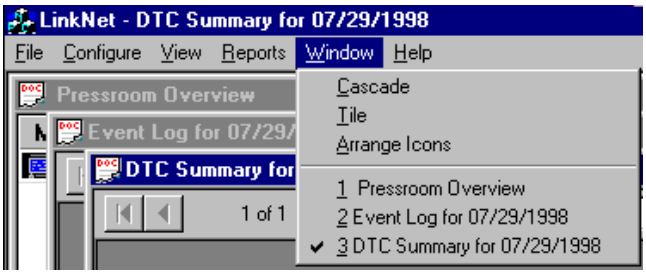

Figure 4.6: Example Window Menu

Notice that the bottom of the window menu lists all the windows that are open in LinkNet. The active window is the one with a check mark beside it. Any of these windows may be made the active window, whether they are visible or not, by either selecting the window from the menu or by hitting the number key associated with the window. Of course, clicking on any viewable part of a window will also make that window active. In the example above, there are three windows open - the Pressroom Overview (which is always open), and 2 reports.

"Cascade" and "Tile" are two standard ways of arranging the windows. Cascade will stagger the windows so that the title bars of each window are visible but the windows overlap. Tile will size and position the windows so that none of the windows overlap.

4.4 The "View" Menu

The "View" has three selections - "Status Bar", "Current Databases", and "Message Rate".

The "Status Bar" menu simply allows the status bar to be turned on and off. The status bar is at the bottom of the LinkNet screen and shows the date, time, and what shift, if any, is currently active.

"Current Databases" will show the currently used databases in the system.

"Message Rate" shows the number of messages per minute going over the line from the host computer to the equipment at the presses.

4.5 The "Help" Menu

The "Help" menu has a single selection, "About LinkNet...". This selection displays a dialog with the version number of the LinkNet software.

5. Reports

There are several reports that can be generated from the data that LinkNet collects. In addition, these reports can be modified by the user using a commercial software package called Crystal Reports available from Seagate Software. Many of these reports can be generated by machine or by die.

To generate a report, select the "Report" menu. Reports can be generated by press as shown in figure 5.1, by die as shown in figure 5.2, or for preventive maintenance as shown in figure 5.3.

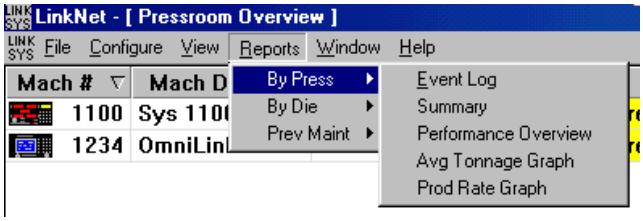

Figure 5.1: "Report By Press" Menu

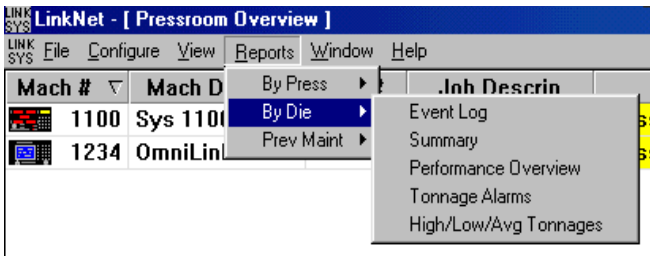

Figure 5.2: "Report By Die" Menu

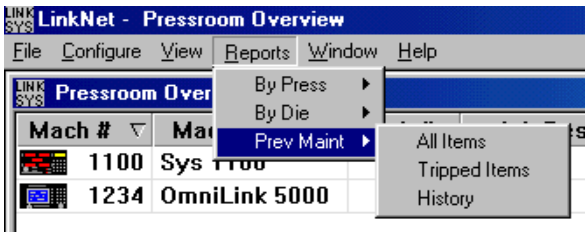

Figure 5.3: Prev. Maintenance Report Menu

The following sections go into detail about how these reports are generated and the information in them.

5.1 The Event Log Report

The event log is intended to give the "blow by blow" report of what has happened throughout the day on a given press or die in great detail. Down time codes and events are logged into this database with a date and time stamp. Down time codes and events are logged similarly, but with a critical distinction. Down time codes are occurrences that have an amount of time associated with them. For instance, a die change that took 20 minutes to do, or a machine electrical fault that took 3 hours to repair. Events, on the other hand, happen at a certain time, but do not have an amount of time associated with them. An example would be a high setpoint alarm on a tonnage monitor that occurs at 12:34PM on 7/23/98. The event log shows both types in chronological order for each machine or die.

The event log can be generated by press (see figure 5.1) or by die (see figure 5.2). If generated by press, all information is shown according to what die or dies was running in that press. If generated by die, all information is shown according to the press or presses the die was running on. When the menu selection is made by press or by die, a list of event logs will be shown similar to figure 5.4

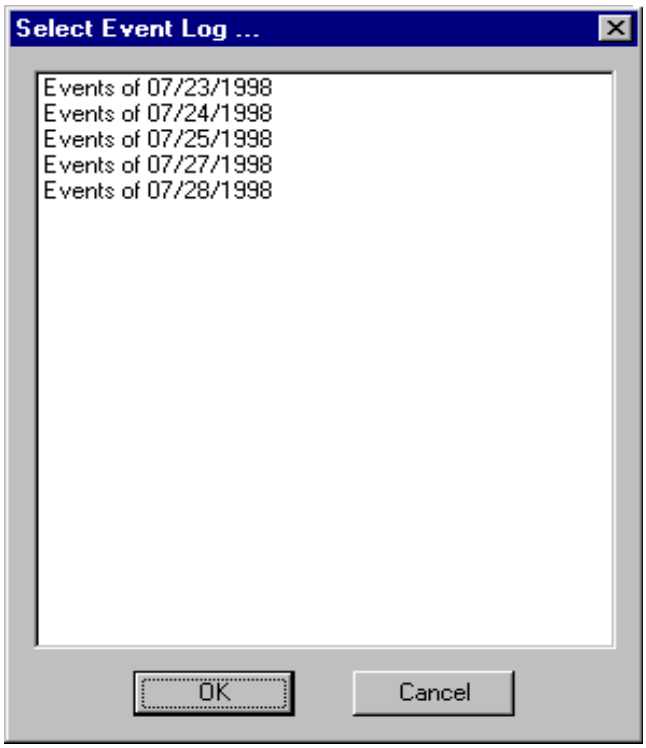

Figure 5.4: Event Log List

Select the day of interest from this list and the event log should appear.

The event log is captured by day because of the level of detail. This allows for keeping only certain days, if desired, to keep disk space requirements low.

The event log records the description, die number (if generated by press), machine number (if generated by die), start time, end time (for down time codes), Run/Program switch status, tonnage monitor bypass state, tonnage monitor "low limits off" state, tonnage monitor "reverse limits off" state, and the die protection bypass state that applies to each entry in the log for a given machine or die.

5.2 The Summary Report

The summary report is intended to take the information from the event log and "boil it down" to a more usable form for trend analysis.

To generate a summary report, select the "Summary" menu option by machine or by die as shown in figures 5.1 and 5.2. A dialog similar to figure 5.5 will appear.

The following discussions show an example of generating the summary report by machine. Generating these reports by die uses the same process but machine numbers and descriptions are replaced by die numbers and descriptions.

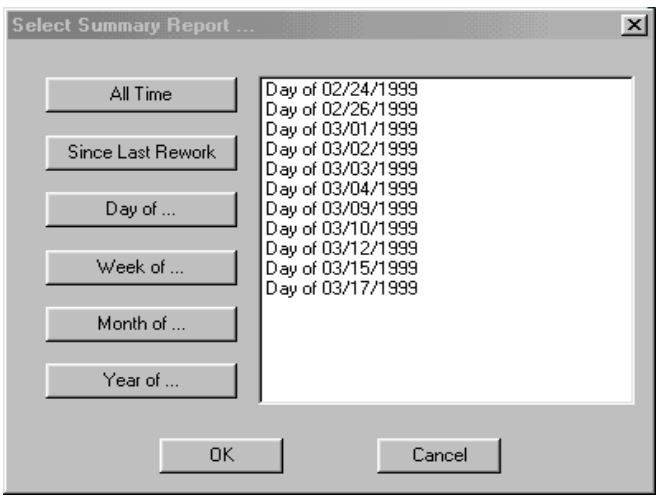

Figure 5.5: Example Time Selection Dialog

The summary report can be viewed by day, week, month, year, and over all time. Hit the button corresponding to the time period of interest and the list box will show the available days, weeks, months, or years as appropriate (the exception to this is the "All Time" button, which will immediately activate the next dialog). Select a time from the list and a dialog similar to figure 5.6 will appear.

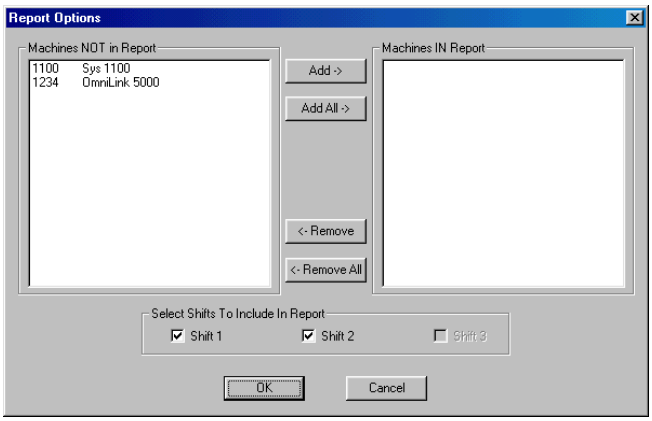

Figure 5.6: Example Machine/Shift Selection

The left list box shows machines that are ***not*** included in the report. The right side shows machines that ***are*** included in the report. Select a machine from the left list box and hit the "Add" button to move it to the right list box or hit the "Add All" button to include all machines in the report. Similarly, select a machine from the right hand list and hit the "Remove" button to transfer it to the left hand list box or hit the "Remove All" button to remove all machines from the report.

Below the list boxes are three check boxes - one for each possible shift. If a shift is greyed out, it means that there is no data for that shift in the database for the time period selected. This could come about if only one shift is run on a Saturday, for instance. This will also be true if a plant does not run shift two or shift three. In any case, only data from those shifts that are "checked" will be included on the report. This is a good way to compare statistics between shifts - generate the report for shift one only, and then for shift two only, and so on.

Hit the "OK" button to generate the report when that machines and shifts are selected. Again, the report will show data ONLY for those machines in the right hand list box and for the shifts that are "checked"! This report can be zoomed, paged

through, exported, or printed from the tool buttons at the top of the report window. The three sections in this report are: specific down time code breakdown, down time code category break down, and a machine utilization breakdown.

The specific down time code breakdown section lists each different down time code with the number of occurrences, the total time, average time per occurrence, and percent of total time spent in that down time code. In addition, each different kind of event is displayed with the number of times it happened. Events include such things as run/program switch changes, tonnage overloads, die protection faults, and other items which do not have a time interval, but simply a time they happened. A pie chart is also displayed giving a graphical representation of the percentage of time each down time code represents.

The down time code category breakdown section lists the category, number of occurrences, total time, average time per occurrence, and percentage of total down time the category represents. For instance, both die installation time and die removal time can be shown separately in the specific down time code section, but would be lumped under the "Die Change Related" category in this section for a higher level view.

The machine utilization breakdown lists the time, standard rate, actual production rate, strokes available at the standard rate, actual strokes, and machine utilization of each die that ran on the machine (or each machine the die ran on if the report is by die) and for all dies. Machine utilization is the actual production rate verses the standard rate.

5.3 Press Performance Overview Report

The press overview report is intended to give a very high level view of the utilization and uptime of presses over a given time frame. To generate this report, select the "Reports" menu, then the "By Press" submenu, and finally "Performance Overview" as shown in figure 5.1. A dialog box similar to figure 5.5 will appear to allow a selection of the time of interest (see section 5.2 for a discussion of how this works). After the day, week, etc is selected, the dialog box of figure 5.6 will appear with a list of presses and shifts that are valid for that time period.. Select the presses and shifts that are to be included in the report and hit the "OK" button to generate the report.

Information on this report includes:

- Machine Number and Description.
- Number of dies run in this time interval.
- Standard SPM (strokes per minute) for the press.
- Actual SPM the press ran, on average.
- SPM variance between standard and actual.
- Press utilization percentage.
- Press uptime percentage.

Note that the standard SPM (strokes per minute) and actual SPM of the press are the time weighted average of the SPMs! For example, if a die with a standard rate of 100 SPM ran for 2 hours on a press, and another die with standard rate of 200 SPM ran for 1 hour on that press, the SPM standard for the press over the 3 hours the dies ran would be 133 SPM.

5.4 Press Average Tonnage Graph

The average tonnage graph for a press on a past day can be viewed by selecting the "Reports" menu, then the "By Press" submenu, and finally "Avg Tonnage Graph" as shown in figure 5.1. A dialog box will appear with all the days for which average tonnage graphs are available. Select the day and another dialog box will appear with a list of machines with data on that day. Select a machine and the graph will appear in a window. In addition, a new menu item, "Graph", will appear as shown in figure 5.7.

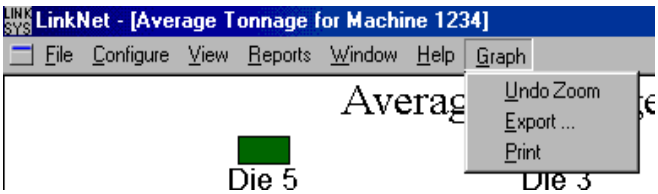

Figure 5.7: Graph Menu

The graph shows the average tonnage, highest good tonnage, and lowest good tonnage which are collected in 10 minute intervals (unless a job is changed, in which case the interval is terminated to keep the tonnages associated with the correct job).

The highest good tonnage is the highest tonnage that did not exceed the high setpoint and the lowest good tonnage is the lowest tonnage that did not go below the low setpoint of the tonnage monitor. The average tonnage is the average of all in-limit hits.

This screen shows the average tonnages as an area graph, the highest good tonnage as a line graph, and the lowest good tonnage as a line graph. The average tonnage for each different die run on the machine appears in a different color.

The graph is arranged by time of day and can be zoomed if greater detail is desired from a section of the total graph. To zoom in on the graph, move the mouse pointer to one corner of the area to zoom in on, hold down the left mouse button, and without letting up on the button, move the mouse to the other corner of the area to zoom in on. When the mouse is being dragged to the second corner, a rectangle will show the zoom area. Note that after a zoom, the graph can be zoomed again to go even further in. To restore the graph to the full view, click on "Undo Zoom" in the graph menu of figure 5.7.

To export the graph to a file or clipboard for use by other windows programs, click on "Export..." in the "Graph" menu of figure 5.7. A window will appear with choices about where to send the graph.

To print the graph, select "Print" from the "Graph" menu of figure 5.7. The graph will be printed to the default windows printer.

5.5 Press Production Rate Graph

The production rate graph for a press on a past day can be viewed by selecting the "Reports" menu, then the "By Press" submenu, and finally "Prod Rate Graph" as shown in figure 5.1. A dialog box will appear with all the days for which average tonnage graphs are available. Select the day and another dialog box will appear with a list of machines with data on that day. Select a machine and the graph will appear in a window. In addition, a new menu item, "Graph", will appear as shown in figure 5.7.

This graph shows the production rate in parts per minute as an area graph in 10 minute intervals (unless a job is changed, in which case the interval is terminated to keep the rates associated with the correct job). The production rate for each die that is run that day on the machine appears in a different color.

The graph is arranged by time of day and can be zoomed if greater detail is desired from a section of the total graph. To zoom in on the graph, move the mouse pointer to one corner of the area to enlarge, hold down the left mouse button, and without letting up on the button, move the mouse to the other corner of the area. When the mouse is being dragged to the second corner, a rectangle will show the zoom area. Note that after a zoom, the graph can be zoomed again to go even further in. To restore the graph to the full view, click on "Undo Zoom" in the graph menu of figure 5.7.

To export the graph to a file or clipboard for use by other windows programs, click on "Export..." in the "Graph" menu of figure 5.7. A window will appear with choices about where to send the graph.

To print the graph, select "Print" from the "Graph" menu of figure 5.7. The graph will be printed to the default windows printer.

5.6 Die Performance Overview Report

The die performance overview report is intended to give a very high level view of the utilization and uptime of dies over a given time frame. To generate this report, select the "Reports" menu, then the "By Die" submenu, and finally "Performance Overview" as shown in figure 5.2. A dialog box similar to figure 5.5 will appear to allow a selection of the time of interest (see section 5.2 for a discussion of how this works). After the day, week, etc is selected, the dialog box of figure 5.6 will appear with a list of dies and shifts that are valid for that time period.. Select the dies and shifts that are to be included in the report and hit the "OK" button to generate the report.

Information on this report includes:

- Die Number and Description.

- Number of presses the die ran on in this time interval.
- Standard SPM (strokes per minute) for the die.
- Actual SPM the die ran, on average.
- SPM variance between standard and actual.
- Die utilization percentage.
- Die uptime percentage.

5.7 Die Tonnage Alarms Report

The die tonnage alarm report shows how many and what kind of tonnage alarms a die has experienced in a given time frame. To generate this report, select the "Reports" menu, then the "By Die" submenu, and finally "Tonnage Alarms" as shown in figure 5.2. A dialog box similar to figure 5.5 will appear to allow a selection of the time of interest (see section 5.2 for a discussion of how this works). After the day, week, etc is selected, the dialog box of figure 5.6 will appear with a list of dies and shifts that are valid for that time period.. Select the dies and shifts that are to be included in the report and hit the "OK" button to generate the report.

Information on this report applies to the time period selected (day, week, month etc.) and includes:

- The run time of the die.
- Number of strokes.
- Number of high limit alarms, low limit alarms, and reverse limit alarms.
- Date and time the die was first run.
- Date and time the die was last run.

5.8 Die High/Low/Average Tonnage Report

The die high/low/average tonnage report shows the highest good tonnage, lowest good tonnage, and average tonnage over the time interval selected. To generate this report, select the "Reports" menu, then the "By Die" submenu, and finally "High/Low/Avg Tonnages" as shown in figure 5.2. A dialog box similar to figure 5.5 will appear to allow a selection of the time of interest (see section 5.2 for a discussion of how this works). After the day, week, etc is selected, the dialog box of figure 5.6 will appear with a list of dies and shifts that are valid for that time period.. Select the dies and shifts that are to be included in the report and hit the "OK" button to generate the report.

Note that the highest good tonnage and lowest good tonnage are only those tonnages that fell within the high or low setpoints in the tonnage monitor. The purpose of this report is to show process variability and to show abnormal hits would make that information unavailable. Each die that was selected is shown with the tonnages for each channel and each data window, if configured, for every press it ran on.

5.9 "Quick" Reports

For quick reports on the current days data for a specific machine, use the right mouse button to click anywhere on the row for a machine on the overview screen. A pop-up menu will appear with two report options - "Show Event Log" and "Show Summary".

"Show Event Log" will display a new window with the press event log from the start of the current day to the present time (see section 5.1 for details on the Event Log).

"Show Summary" will display a new window with the press summary report from the start of the current day to the present time (see section 5.2 for details on the summary report).

Note that when a quick report is generated, it only applies to the machine that was clicked on to generate the report and only applies to the current day. If a report is desired for all machines or for a different day than the current day, use the "Reports" menu.

6. Using the OmniLink 5000 with LinkNet

The OmniLink 5000 press automation control gains some powerful new capabilities when combined with LinkNet. The OmniLink 5000 will work the same way it always has, but with a few additional screens and softkeys.

6.1 Configuring the OmniLink 5000 for LinkNet

Before the OmniLink can communicate with LinkNet, it must be assigned a machine number. Since LinkNet shares a single cable with all machines on the network, the machine number is used by LinkNet to call out the machine it wants to "talk" to.

No two machines may have the same machine number or a machine number of 0!

- From the main screen (the screen the OmniLink powers up in), select the "PRESS CONTROL" softkey.
- With the Run/Prog keyswitch in the "Prog" position, push the "CONFIG" softkey. Note that this softkey will not be present unless the unit is in program mode. After entering the access code, a screen similar to Figure 6.1 should appear.
- Push the softkey for "OPERATOR TERMINAL". A screen like Figure 6.2 should appear.
- Push the "CONFIG COMM." softkey to display the communications setup screen which should look similar to Figure 6.3 (the port configurations may vary depending on how the particular machine is set up and what options have been installed).
- Use the up and down arrow keys to highlight "Port 5" and hit the "CHANGE TASK" softkey until the description for port 5 reads "Link Network".
- Hit the "CONFIG TASK" softkey and a screen similar to Figure 6.4 should appear. Highlight the field for "Machine Number" and enter the machine number desired for this press. If necessary, highlight the "Baud Rate" field and hit the "CHANGE SETTING" softkey until it reads "19200".
- Exit back out to the main screen.

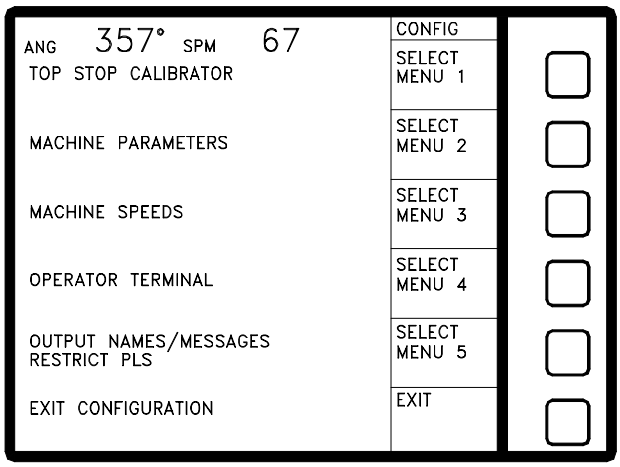

Figure 6.1: OmniLink Main Configuration Screen

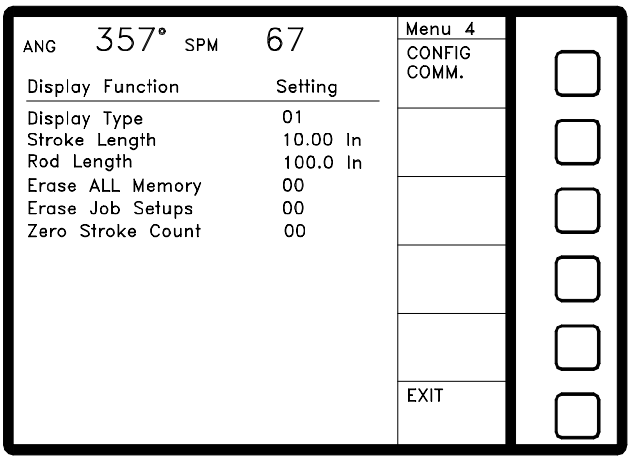

Figure 6.2: OmniLink Operator Terminal Configuration Screen

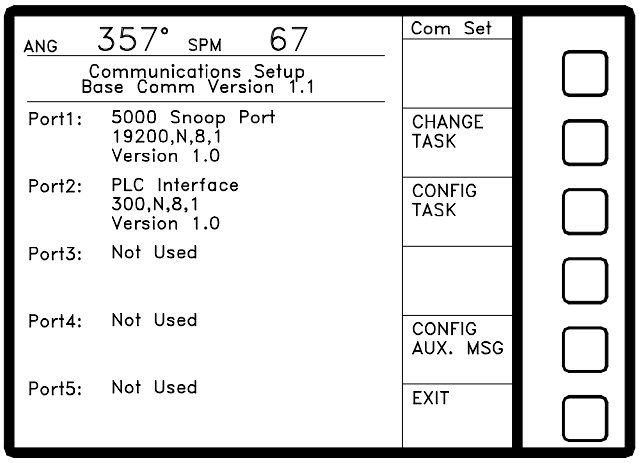

Figure 6.3: OmniLink Communications Configuration Screen

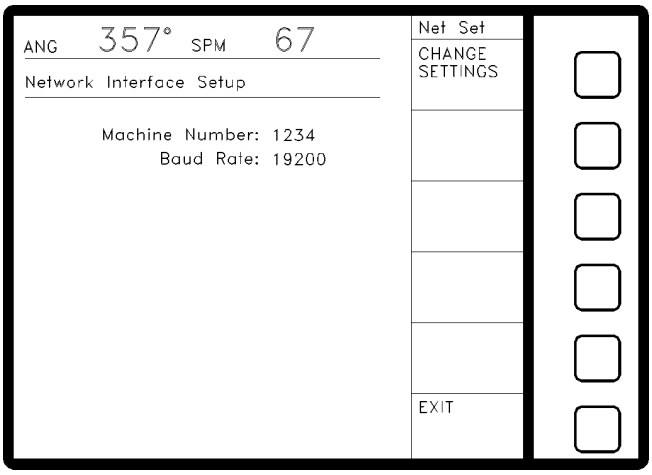

Figure 6.4: OmniLink Network Configuration Screen

6.2 Using Down Time Codes on the OmniLink 5000

Down time codes (DTCs) are a way for the press operator to easily keep a record of reasons why the press is not in production. The DTCs are configured by an administrator using LinkNet as discussed in section 3.3. When the LinkNet option is enabled (see section 6.1), a new message appears at the bottom of the counter screen and a new softkey, "NETWORK OPS", is displayed (also in the counter screen).

Note that the "NETWORK OPS" softkey and the "Current DTC" message in the counter screen will not appear unless the Link Network has been configured as explained in section 6.1!

To select or clear a DTC, hit the "NETWORK OPS" softkey in the counter screen. This will bring up a screen similar to Figure 6.5. Note that the down time code descriptions are the ones that are configured in LinkNet and downloaded to the OmniLink 5000 automatically.

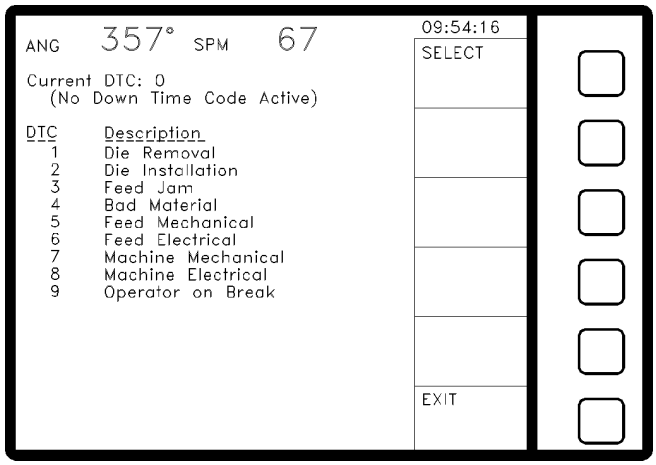

Figure 6.5: Sample Down Time Code Screen

The current down time code and description are displayed near the top of the screen. Note that this area may display "AUTO" for the down time code and have a description that is not on the list. These automatic down time codes, such as "Press Idle" or "Part Count Reached", are sent by the OmniLink 5000 under certain conditions without operator intervention. In all cases, automatically entered down time codes are automatically cleared when the press makes another stroke.

If the network is not running or if a wiring problem is preventing the OmniLink 5000 from communicating with LinkNet, the message "* Network NOT on line! *" will be displayed in the current down time code description area.

To select a down time code, use the up and down arrow keys to move the highlight to the desired code and press the "SELECT" softkey. The down time code will then become the current code until cleared or replaced. It is not necessary to clear a down time code before selecting a new one.

If a down time code is active, whether automatic or operator entered, a "CLEAR DTC" softkey will be displayed. Hitting this softkey or hitting the "CLR" key on the regular key pad will clear the down time code.

6.3 Network Job Storage on the OmniLink 5000

Virtually unlimited job storage is available when using an OmniLink 5000 with LinkNet. Jobs can be stored from the OmniLink 5000 to LinkNet in the following manner:

- From the main menu of the OmniLink OIT, hit the "JOB SETUPS" softkey to enter the jobs screen.
- Hit the "STORE SETUP" softkey to enter the store screen. Note that the Run/Prog key MUST be in the Prog position for this softkey to be available!
- Use the "ENTER JOB #" softkey and the "ENTER DESC." softkey to change the job number and job description, if desired. This step may be skipped if the job number and job description as shown in this screen are already correct.
- Hit the "STORE NETWORK" softkey to send the job to the network. A status screen will appear to show the progress of the job send. A message will appear indicating whether or not the store was successful. If the network is not on line, a message will appear indicating this condition. A job can NOT be stored to the network unless it is online!

IMPORTANT! Jobs stored using the "STORE SETUP" softkey will still be stored as local jobs on the OmniLink as they always have - NOT the network. A job stored on the network is independent of the same job number stored at the OmniLink. If you change the settings for a job on the network, it DOES NOT affect the settings of the same job number stored on the OmniLink and vice versa! Make sure the job is sent to its intended destination.

6.4 Network Job Recall on the OmniLink 5000

Jobs may be recalled from LinkNet to the OmniLink 5000 in the following manner:

- From the main menu of the OmniLink OIT, hit the "JOB SETUPS" softkey to enter the jobs screen.
- Hit the "RECALL SETUP" softkey to enter the store screen. Note that the Run/Prog key MUST be in the Prog position for this softkey to be available!
- Hit the "RECALL NETWORK" softkey to enter the network job recall screen.
- If the network is off line, a message indicating this will appear. Jobs may NOT be recalled from the network if it is off line! Otherwise, a prompt will appear asking for the job number to recall.
- Enter the job number to recall and hit the "ENT" button on the OmniLink OIT keypad. If the job has not been previously stored on LinkNet, a "Job Not Found" message will appear. Otherwise, this screen will display the status of the job download. A message will appear at the end of the download indicating success or failure or the job recall.

6.5 Sending Tonnage Graphs from the OmniLink 5000

LinkNet has the ability to receive and display tonnage signatures from the OmniLink 5000 tonnage monitor. To send a tonnage signature to LinkNet, take the following steps:

- From the main menu of the OmniLink OIT, hit the "TONNAGE MONITOR" softkey to enter the tonnage monitor main screen.
- Hit the "GRAPH" softkey to enter the tonnage monitor graph settings screen.
- Hit the "SEND GRAPH" key to enter the wave screen. Note that the Run/Prog key MUST be in the Prog position for this key to be available.
- Hit the "WAVE TO NETWORK" softkey to send the signature to LinkNet. It will be displayed in a window automatically at the LinkNet computer. It may then be viewed, saved, or printed. If the network is off line or not configured this softkey will not be present. The status of the transfer will be shown on the screen and an indication of success or failure will be made at the end of the transfer. Note that depending on the number of machines connected and network load this operation can take more than a minute.
- Hit the "PRINT WAVE" softkey to automatically print a reference waveform to the configured printer (see section 3.6 for details on this). If the network is off line or not configured this softkey will not be present. The status of the transfer will be shown on the screen and an indication of success or failure will be made at the end of the transfer. Note that depending on the number of machines connected and network load this operation can take more than a minute.
- Hit the "ARCHIVE WAVE" to send the waveform to LinkNet for storage in the waveform database. The waveform will be stored in the database by machine number, die number, and date/time of capture. If the network is off line or not configured this softkey will not be present. The status of the transfer will be shown on the screen and an indication of success or failure will be made at the end of the transfer. Note that depending on the number of machines connected and network load this operation can take more than a minute.

6.6 Viewing Machine and Die Notes on the OmniLink 5000

OmniLink 5000 operator interface terminals can display notes entered at the LinkNet computer for both the machine and the current die - if any have been entered. To do this take the following steps:

- From the main menu of the OmniLink OIT hit the "COUNTER" softkey to enter the counter screen.
- Hit the "NETWORK OPS" softkey to go into the down time code screen.
- Hit the "NOTES" softkey to enter the notes screen. Any machine notes that have been entered in the LinkNet machine configuration (see section 3.4 for details on how to enter machine notes) will appear on the screen. If the notes are longer than a screen, then a "NEXT PAGE" or "PREV PAGE" softkey will appear as appropriate.
- A softkey called "DIE NOTES" will appear when viewing machine notes, and a softkey called "MACHINE NOTES" will appear while viewing die notes. Once in the notes screen, hit the "DIE NOTES" softkey to display the notes entered for the currently selected die (see section 3.5 for details on how to enter die notes). The same paging action is available as discussed for machine

notes above. Hit the “MACHINE NOTES” softkey to view the machine notes again.

7. Using the System 1100 Tonnage Monitor with LinkNet

The System 1100 tonnage monitor gains down time codes, tonnage logging, and virtually unlimited job storage with the addition of LinkNet.

The unit will operate as it always has, but will have an additional menu selection in the main menu called "NETWORK". This menu will allow the operator to store and recall network jobs, view the network clock, and send tonnage graphs to the network. In addition, the "DOWN TIME CODE" key on the keypad will call up down time codes for selection.

7.1 Configuring the System 1100 Tonnage Monitor for LinkNet

Before the System 1100 can communicate with LinkNet, it must be assigned a machine number. Since LinkNet shares a single cable with all machines on the network, the machine number is used by LinkNet to call out the machine it wants to "talk" to.

> No two machines may have the same machine number or a machine number of 0!

For a System 1100, the machine number is set as follows:

- From the top level menu (the menu the 1100 powers up in), and with the RUN/PROG/BYPASS key in the PROG position, use the up and down arrow keys to select "CONFIG" and hit the "Enter" key.
- Enter the access code when prompted and use the up and down arrow keys to select "MACH NUMBER" and hit the "Enter" key. Enter the desired machine number at the prompt.
- Hit the "EXIT" key until back in the main menu.

7.2 Using Down Time Codes on the System 1100 Tonnage Monitor

Down time codes (DTCs) are a way for the press operator to easily keep a record of reasons why the press is not in production. The DTCs are configured by an administrator using LinkNet as discussed in section 3.3. When the network is running and the System 1100 is properly configured (see section 7.1), the "DOWN TIME CODE" key will bring up the DTC screen .

> Note that pressing the "DOWN TIME CODE" key will result in a message of "NETWORK NOT ACTIVE" if LinkNet is not running, if the System 1100 has been not been properly configured as explained in section 7.1, or if there is a wiring problem!

The DTCs are shown one at a time on the System 1100s 2 line screen. The up and down arrow keys scroll through the available DTCs. The first part of the top line shows the DTC number while the second shows the currently selected DTC number. The bottom line shows the DTC description. An example screen might look like:

```
05 (CURRENT DTC:00)
Material Bad
```

The above screen is showing DTC number 5 which is "Material Bad". The current DTC is number 0, which means that no DTC has been entered and the press is considered to be in production.

Note that the current DTC can be shown as "SP". This signifies that an automatic DTC is in effect. These automatic down time codes, such as "Press Idle" or "Part Count Reached", are sent by the System 1100 under certain conditions without operator intervention. In all cases, automatically entered down time codes are automatically cleared when the press makes another stroke.

When a user entered DTC (not an automatic DTC) is active, the bar graphs beside each channel blink on and off to remind the operator that the DTC is in effect. In addition, the production counters (part, batch, and quality) do NOT count and average tonnage is not collected since the machine is not considered to be in production!

To enter a DTC:

- Go to the DTC screen if not already there by pressing the "DOWN TIME CODE" key.
- Use the up and down arrow keys to scroll through the list of available DTCs and hit the "Enter" key when the screen shows the desired DTC.
- Note that it is not necessary to clear a DTC before entering a new one.
- The "EXIT" key will cause the System 1100 to return to the screen it was in before the "DOWN TIME CODE" key was pressed.

To clear a DTC:

- Go to the DTC screen if not already there by pressing the "DOWN TIME CODE" key.
- Either select "Production" (DTC 0) or hit the "CLEAR" key.

7.3 Network Job Storage on the System 1100

By using LinkNet, virtually unlimited job memory is available. Jobs can still be stored and recalled locally (in the System 1100) as they always have. When LinkNet is active, a new top level menu (the menu that is active when the 1100 is first powered up) called "NETWORK" becomes available.

Note that the "NETWORK" menu will not appear if LinkNet is not running, if the System 1100 has been not been properly configured as explained in section 7.1, or if there is a wiring problem!

IMPORTANT: Jobs stored or recalled under the "STO/RCL" menu are stored or recalled locally - not on the network. Likewise, jobs stored under the "NETWORK" menu are stored on the network - not locally. The same job number and description can be stored both locally and on the network but with different setpoints. Use care to recall or store the job from or to its intended location!

To store a job:

- From the top level menu (the top level menu can be reached by hitting the "EXIT" key until the menu does not change), use the up and down arrow keys to select "NETWORK" and hit the "ENTER" key.
- Use the up and down arrow keys to select "STORE JOB" and hit the "ENTER" key.
- A prompt will appear for confirmation to store the current job on the network. Hit the "YES" key to store the job or the "NO" key to abort. Note that this is the current job. To change the job number or job description, go into the "STO/RCL" menu and change them the same way as for a local store operation (See System 1100 manual for details).

If the network is not active, the message "WAITING FOR NETWORK - HIT EXIT TO CANCEL" will appear on the screen. A successful store will result in the message "JOB STORAGE DONE - PRESS EXIT".

7.4 Network Job Recall on the System 1100

By using LinkNet, virtually unlimited job memory is available. Jobs can still be stored and recalled locally (in the System 1100) as they always have. When LinkNet is active, a new top level menu (the menu that is active when the 1100 is first powered up) called "NETWORK" becomes available.

Note that the "NETWORK" menu will not appear if LinkNet is not running, if the System 1100 has been not been properly configured as explained in section 7.1, or if there is a wiring problem!

IMPORTANT: Jobs stored or recalled under the "STO/RCL" menu are stored or recalled locally - not on the network. Likewise, jobs stored under the "NETWORK" menu are stored on the network - not locally. The same job number and description can be stored both locally and on the network but with different setpoints. Use care to recall or store the job from or to its intended location!

To recall a job:

- From the top level menu (the top level menu can be reached by hitting the "EXIT" key until the menu does not change), use the up and down arrow keys to select "NETWORK" and hit the "ENTER" key.
- Use the up and down arrow keys to select "RECALL JOB" and hit the "ENTER" key.
- A prompt will appear to request the job number to recall. Enter the job number using the numeric keypad and hit the "ENTER" key.

If the network is not active, the message "WAITING FOR NETWORK - HIT EXIT TO CANCEL" will appear on the screen. A successful recall will result in the message "NETWORK JOB RECALLED - PRESS EXIT".

7.5 Sending a Tonnage Graph from the System 1100

The System 1100 can display a tonnage graph with the addition of the Graphical Tonnage Analyzer (GTA) package which is primarily intended for laptop use. Eventually, the full capabilities (and more) of the GTA will be incorporated into LinkNet. In the meantime, the basic tonnage graph can be viewed by sending a graph to LinkNet.

To send a tonnage graph:

- From the top level menu (the top level menu can be reached by hitting the "EXIT" key until the menu does not change), use the up and down arrow keys to select "NETWORK" and hit the "ENTER" key.
- Use the up and down arrow keys to select "SEND GRAPH" and hit the "ENTER" key.

The graph will appear in its own window back on the host computer. The graph title will tell which machine and die it originated from as well as the date and time it was sent.

7.6 The Network Clock on the System 1100

For convenience, the time as transmitted from the host computer can be displayed on the 1100.

To display the clock:

- From the top level menu (the top level menu can be reached by hitting the "EXIT" key until the menu does not change), use the up and down arrow keys to select "NETWORK" and hit the "ENTER" key.

- Use the up and down arrow keys to select “CLOCK” and hit the “ENTER” key.

A screen with the current time as transmitted from the host computer will be displayed.

Appendix A - Upgrading Link Equipment

Many new Link products will ship with network support - but products produced before September of 1998 may need to have software and/or hardware upgrades. New equipment may also need software upgrades to take advantage of new features both network and non-network related - it's a good idea to check with Link on the status of any new software upgrades when installing the Link network. The following sections explain how to do the software and hardware upgrades.

A.1 General Chip Changing Rules

Changing the software on Link equipment is accomplished by swapping electronic chips called EPROMS (called "chips" in the rest if this section). These chips are plugged into sockets on various circuit boards on the equipment and can usually be identified by the label that gives the chip type and version number. No special equipment is necessary to change a chip but it is necessary to observe a few precautions and rules:

- Make sure that power to the system is ***OFF*** when changing chips. Failure to observe this precaution can result in damage to the equipment.
- ***Gently*** pry a chip from its socket using a small blade screw driver (or chip remover if available). Be sure to place the screw driver between the socket and the chip - ***Not*** between the socket and the circuit board!
- When inserting a chip into its socket, make sure the notch on the end of the chip is aligned with the notch in the socket. The unit will not work if the chip is inserted backwards and damage to the chip may result.
- When inserting a chip into its socket, make sure that no pins are bent under the chip and that all pins are in the socket.

A.2 System 1100 Tonnage Monitor Upgrade Procedure

The System 1100 will require upgrading if the existing software is older than version 3.3 on the operator interface board (the circuit board mounted to the door of the unit) or version 2.6 on the motherboard (underneath the channel 1 & 2 dual channel card in the bottom of the unit). OIT software versions 2.0 and up will display the OIT software version and the motherboard software version for about 5 seconds when the unit powers up. Older software will only display the OIT version at power-up - the channel 1 & 2 dual channel card must be removed to check the motherboard software version.

If the OIT software version is older than version 2.0, the OIT and motherboard software MUST both be changed at the same time.

A.2.1 System 1100 OIT Software Upgrade Procedure

- Review section A.1 for chip changing rules!
- Turn off the power to the System 1100.
- Open the front door of the System 1100 enclosure.
- Using Figure A.1, locate the software chip on the circuit board mounted to the System 1100 enclosure door and remove it.
- Install the new software chip labeled 1100-OIT in the socket. All software versions prior to V2.0 had different chips for 2 channel and 4 channel tonnage monitors, but V2.0 or higher works with both 2 and 4 channel OITs.

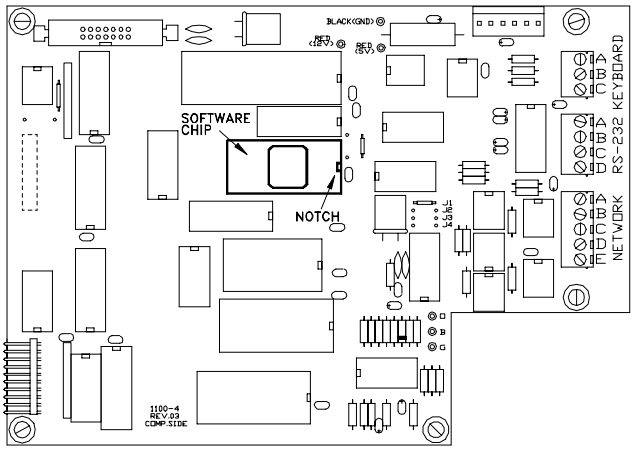

Figure A.1: System 1100 OIT Circuit Board

A.2.2 System 1100 Motherboard Software Upgrade Procedure

- Review section A.1 for chip changing rules!
- Turn off the power to the System 1100.
- Open the front door of the System 1100 enclosure.
- Remove the five pan-head screws holding down the channel 1 and 2 dual channel card (the card in the bottom of the unit that has the channel 1 and channel 2 strain gauges plugged into it). Remove the channel card by pulling on the handle on the card.
- Using Figure A.2, locate the software chip on the 1100-1 circuit board and remove it.
- Install the new software chip labeled "1100-2-MB" in the socket for a two channel unit, or the chip labeled "1100-4-MB" for a four channel unit. A 4 channel chip in a 2 channel motherboard or a 2 channel chip in a 4 channel motherboard will prevent the unit from working correctly!
- Install the Channel 1 and 2 dual channel card - Be sure not to leave any lockwashers or screws loose in the unit!
- Restore power to the System 1100.
- Make sure that the System 1100 resets. You should see a screen that look similar to:

  LINK SYSTEMS 1100
  V2.7 OIT V2.5MB

  on the LCD for about 5 seconds after power-up. The main menu should then appear.

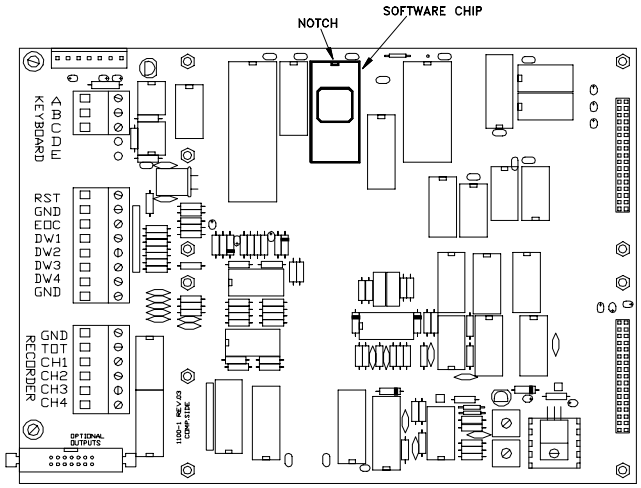

Figure A.2: System 1100 Motherboard Circuit Board

A.3 OmniLink 5000 Upgrade Procedure

Most OmniLink 5000 press controls shipped prior to July 1998 will need to have a hardware upgrade to work with LinkNet. This upgrade consists of replacing the old back plate and communications card on the operator interface terminal with a new back plate and communications card.

To determine which kind of communications board is installed, look at the back of the OmniLink operator interface terminal (the box with the display screen on it - also called the OIT). There should be 5 connectors on the back of the OIT if a new communications board is installed (see Figure A.3). If only 4 connectors are present, then an older communications board is installed (see Figure A.4) and will need to be upgraded. Even if the new communications board is present, the press control may need a software upgrade. It's a good idea to check with Link before installing LinkNet.

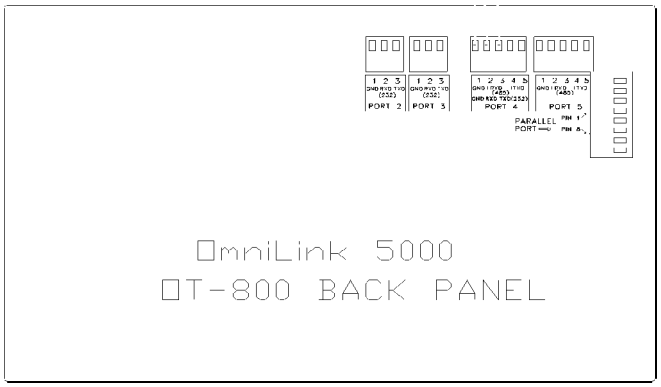

Figure A.3: Back Panel View of OIT with New Communications Board.

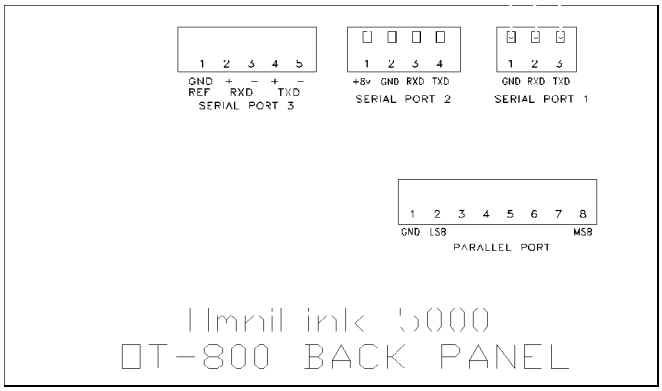

Figure A.4: Back Panel View of OIT with Old Communications Board.

A.3.1 OmniLink OIT Communications Board Upgrade Procedure

This procedure is for replacing an old communications board and back plate with a new communications board and back plate. Refer to Figure A.5 for the following steps:

- Remove power from the OmniLink card rack **and** the OIT.
- Remove the screws from the back panel of the OIT, and remove the back plate. Note that there is a ribbon cable connecting the circuit board on the back plate to the OIT circuit board in the can. Disconnect the ribbon cable from the circuit board on the back panel.
- Using the cable assembly supplied with the upgrade kit, connect wire A of the cable to terminal A on the OIT, and wire B of the cable to terminal B on the OIT. Do not disconnect the wires going to the card rack (there will be two wires each in the A and B positions of the terminal strip on the OIT circuit board).
- Connect the ribbon cable between the display board and the new communication board.
- If not already plugged in, connect the cable supplied with the upgrade kit to port 1 of the new communications board. This is the only port on the inside of the back panel.
- Install the back panel on the Operator Terminal.

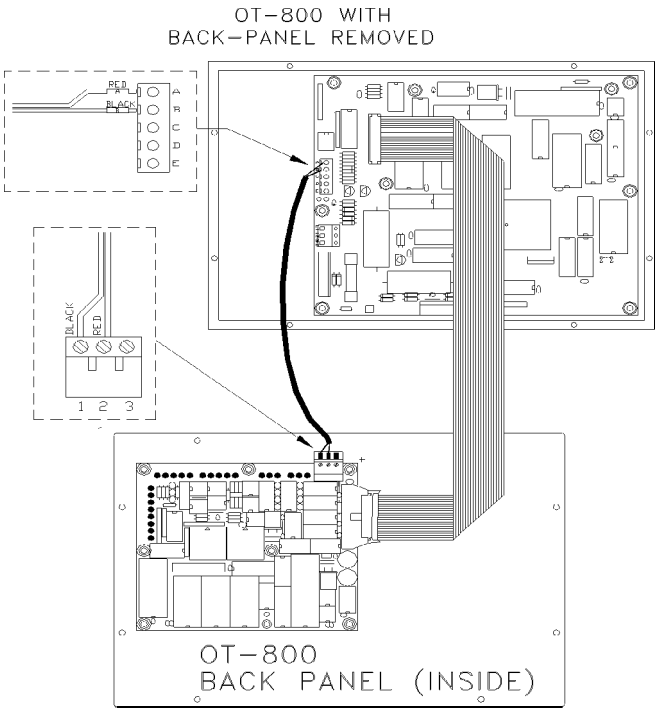

Figure A.5: OIT to New Communications Board Connections

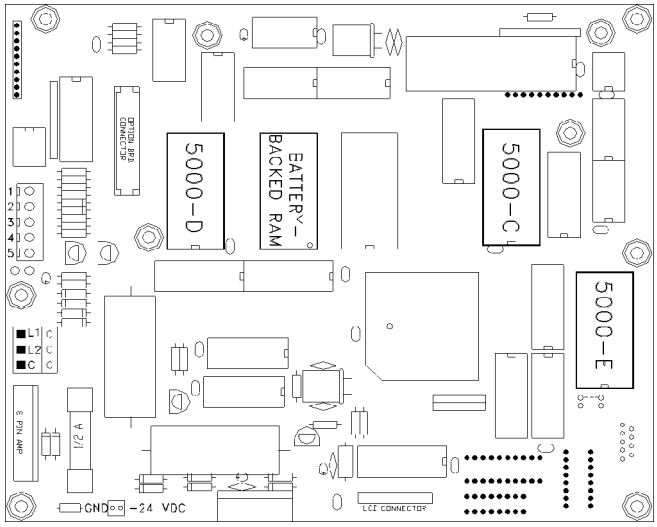

Figure A.6: OIT Circuit Board

A.3.2 OmniLink OIT Software Upgrade Procedure

- Review the chip changing rules in section A.1.
- Remove power from the OmniLink card rack **and** the OIT.
- Remove the screws from the back panel of the OIT, and remove the back panel.
- Using Figure A.6, locate and remove chips 5000-C, 5000-D, and 5000-E.
- Insert the new 5000-C, 5000-D, and 5000-E chips.
- Install the back panel on the Operator Terminal.

A.3.3 OmniLink OIT Communications Card Software Upgrade Procedure

Note that older communications cards DO NOT have any software. This section applies ONLY to new communications cards. See Figures A.3 and A.4 to determine which card is present.

- Review the chip changing rules of section A.1.
- Remove power from the OmniLink card rack **and** the OIT.
- Remove the screws from the back panel of the OIT, and remove the back panel.
- Using Figure A.7, locate and remove chip 800-3.
- Insert the new 800-3 "Base" chip in the location labeled "800-3" in figure A.7.
- Install the back panel on the Operator Terminal.

Note that communications cards can have up to two additional software chips as options (a feed support chip for example). If updating an existing option chip, replace that chip **only** with a chip that has the same labeling (except for the version)! If a chip is being added, it may go into either available socket. ***Note that the "Base" chip must always go in the socket labeled "800-3" in figure A.7!***

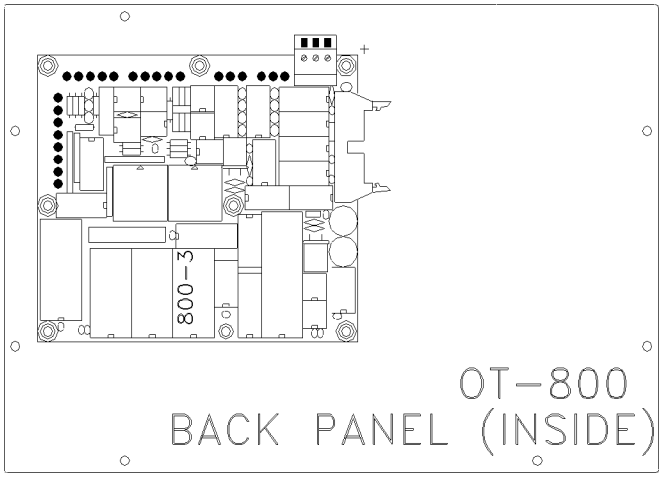

Figure A.7: Communications Circuit Board

A.3.4 OmniLink Logic Module Upgrade Procedure

The base card rack has only one card, the Logic Module, that contains software. To upgrade the logic module:

- Review the chip changing rules of section A.1.
- Remove power from the OmniLink card rack **and** the OIT.
- Remove the logic board from the card rack.
- Using Figure A.8, locate and remove chips 5000-A and 5000-B.

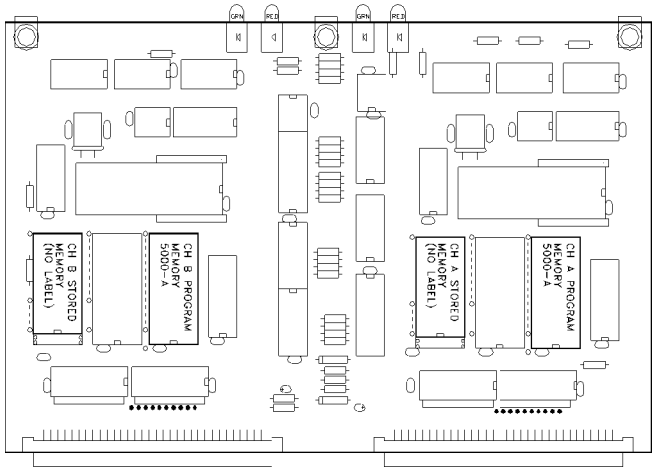

Figure A.8: OmniLink 5000 Logic Module Circuit Board

- Insert the new 5000-A and 5000-B chips. Make absolutely sure that the "A" chip is in the "A" socket and the "B" chip is in the "B" socket.
- Insert the logic board in the card rack.

A.3.5 OmniLink Die Protection Module Software Upgrade Procedure

This upgrade procedure applies only if the OmniLink control has an extended card rack and has the die protection module installed.

- Review the chip changing rules of section A.1.
- Remove power from the OmniLink card rack **and** the OIT.
- Remove the Die Protection board from the card rack.
- Using Figure A.9, locate chip 5000-7 and remove it.

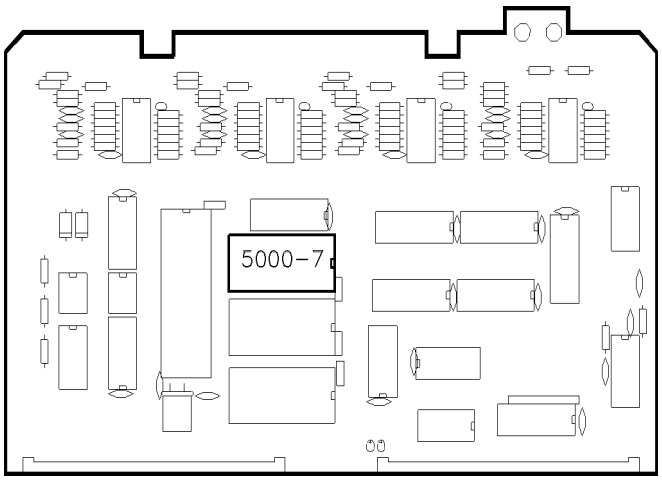

Figure A.9: OmniLink 5000 Die Protection Module Circuit Board.

- Insert the new 5000-7 chip.
- Insert the Die Protection board in the card rack.

A.3.6 OmniLink Tonnage Monitor Module Software Upgrade Procedure

This upgrade procedure applies only if the OmniLink control has an extended card rack and has the tonnage monitor module installed.

- Review the chip changing rules of section A.1.
- Remove power from the OmniLink card rack **and** the OIT.
- Remove the Tonnage Monitor Module from the card rack.
- Using Figure A.10, locate and remove the 5000-8 chip.

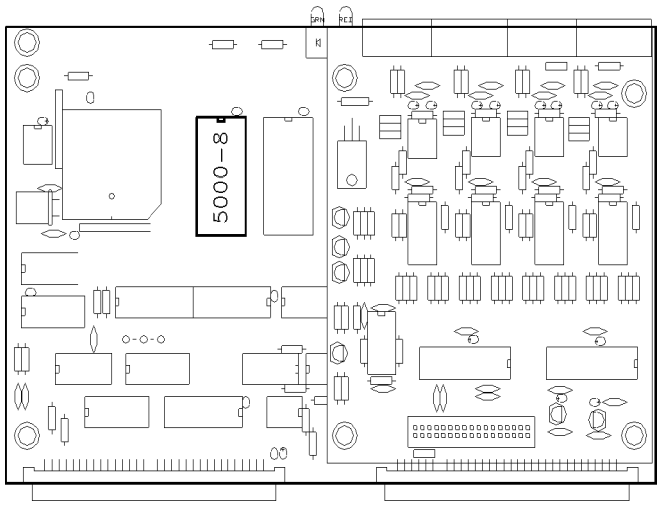

Figure A.10: OmniLink 5000 Tonnage Monitor Module Circuit Board.

- Insert the new 5000-8 chip.
- Insert the Tonnage Monitor Module in the card rack.

A.3.7 OmniLink Auto-Setup Module Software Upgrade Procedure

This upgrade procedure applies only if the OmniLink control has an extended card rack and has the auto-setup module installed.

- Review the chip changing rules of section A.1.
- Remove power from the OmniLink card rack **and** the OIT.
- Remove the Auto-Setup board from the card rack.
- Remove the module (if present) installed in the SS1 position.
- Using Figure A.11, locate and remove the 5000-10 chip.

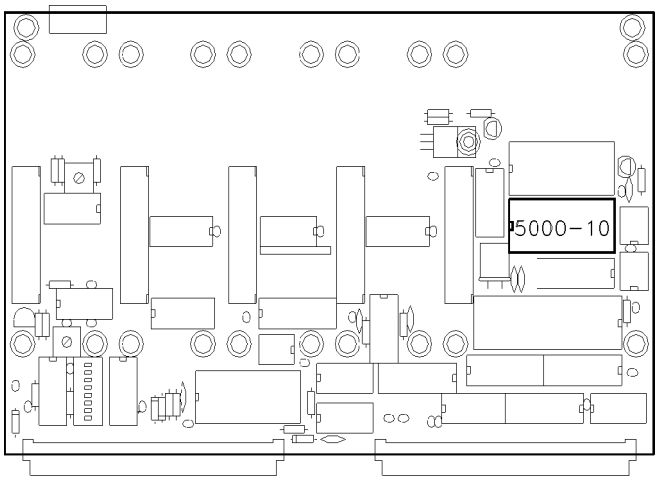

Figure A.11: OmniLink 5000 Auto-Setup Module Circuit Board.

- Insert the new 5000-10 chip.
- If a module was removed from SS1, replace it.
- Insert the Auto-Setup Module in the card rack.