

# IDC TM90 ControlNet Interface:

*June 23, 2001*

file TMCN.DOC

## Revisions:

03/29/2000	Correct ordering of Tonnage & Motion tables
05/15/2000	PDF conversion
07/10/2000	Add LED diagnostic notes
08/05/2000	Corresponds to ControlNet EPROM Version 01.07
	Modify Functions 7 to specify 32-bit length in Low/High order (see Note 13)
	Modify Function 8 to specify Shutheight readback in Low/High order (see Note 13)
	Added Note to Scheduled Output definition regarding Die ID usage recommendation
10/02/2000	Added Function 50 to access shared RAM (see Note 14)
11/15/2000	Revised file addresses to reflect actual usage in the Tonnage Monitor (instead of using "typical" PLC file addresses)
	Added summary of ladder logic sequence for unscheduled read/write operations
06/21/2000	Added clock tic reporting in Scheduled I/O & Shared Memory words 59 & 60
	Add word 17 (TrakMode) to Function 6 for CN 1.15+ with TM90E026+
	Note TM90E026 & up now define TrakBeg & TrakEnd values in DEGREES

# ControlNet Hardware configuration

Generally a customer will receive a pre-configured unit. In the event of a field conversion, however, it may be necessary to perform or check some of the following configuration procedures.

## *PCM-SX Board Setup & EPROM installation*

\_\_\_\_\_ Configure Jumper field by 24.000 MHz crystal as follows



\_\_\_\_\_ Install EPROM: Version \_\_\_\_\_

\_\_\_\_\_ Set up CMOS configuration

Plug in keyboard cable, video board, and power supply

Power up and hit DEL key to get into CMOS setup

In Standard CMOS setup screen, set Hard Disk type to NONE

Exit & save changes

\_\_\_\_\_ Upon reboot, should get messages "Starting MS-DOS" & "ControlNet board not found"

Unplug keyboard, video board, power supply

Install on TM90-CPU with Remote I/O board, connect Blue Hose, & power up

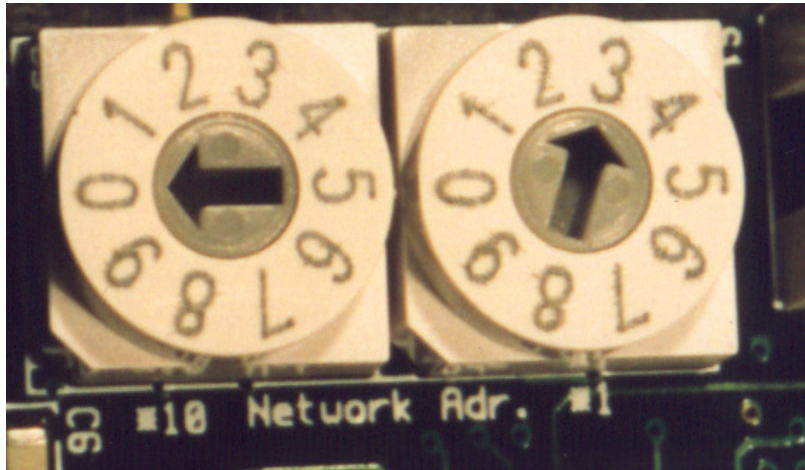
\_\_\_\_\_ Should get green & Red LED's in about 15 secs, after some beeping

\_\_\_\_\_ Apply green paper dot to Square IC above EPROM

## *ControlNet Adapter Board Address Setup*

Address jumpers on the Synergetic MicroSystems board must be set as shown below:

The ControlNet MAC ID is set with the rotary switches on the ControlNet adapter board shown below:



## **ControlNet Configuration procedure**

Before you can successfully connect a TM90 ControlNet Interface to a ControlNet system, you must configure the ControlNet “keeper” to recognize it. As of this writing, the only known valid “keeper” is a PLC, and the only known available method of configuring it is using RSNetworkx software from Rockwell Software. The procedure outlined below is known to work with RSNetworkx Version 1.6 & 1.7, running under Windows NT 4.0 (service pack 3 or 4). It is believed this procedure will also work in Windows 95 with the DCOM package that comes with RSNetworkx or RSLinx installed.

Before RSNetworkx can recognize these cards, it is necessary to install an add-on program on the workstation with the RSNetworkx. The procedure is as follows:

- You must have RSNetwork & RSLinx (or RXLinx Lite) already installed
- Log in to the computer with Administrator privileges (in Windows NT)
- Copy the file **hilscher.hwx** to the directory **\Program Files\Rockwell Software\RSCommon**
- Make sure RSNetworkx & RSLinx are NOT running
- From Windows Start Menu, run an MSDOS command prompt; this will leave you in a DOS window

- Type the command `cd \Program Files\Rockwell Software\RSCommon` to switch to the directory where **hilscher.hwx** exists.
- Type the command `\winn\system32\regsvr32 hilscher.hwx`. A message box should appear indicating that the operation was successful
- Exit (close) the DOS window

At this point RSNetworkx is capable of recognizing the cards when they appear on a network. You can verify this by running RSNetwork, clicking on the Hardware tab in the left pane of the dialog box, then clicking on the “+” for the “ControlNet Communication Products” heading. This will reveal the existence of an icon for the Hilscher PC Interface.

Before you are ready to configure a network, however, some pre-planning must be done. First, you must identify an *unused* MAC ID (“node address”) and set the interface board to that address using the rotary switches on the card; with the card installed in a TM90, the bottom rotary switch is the 1’s digit and the top is the 10’s digit.

Next, you should run RSNetworkx, make sure the Online box is checked, and *right-click* on the PLC in the right pane of the window and choose the option **ControlNet Configuration** from the menu. This will bring up a table showing the current network configuration. The bottom portion of the screen has boxes showing the current file usage for configuring scheduled transfers. You need to take note of the following:

- Data Input File
- Data Input File Size
- Data Output File
- Data Output File Size

This information is needed because you must make sure that the PLC has sufficient *unused* file space to accommodate 16 consecutive words of Inputs and 16 consecutive words of Outputs, and you need to know the file numbers to adapt the ladder logic program to interact with the TM90.

In the middle section of the RSNetworkx window is a table showing already configured connections, if any. If you look at the Input Address and Input Size columns, you can tell if there’s a block of unused addresses for inputs, and likewise for Output Address and Output Size columns. If there is space available in these areas, you can skip the next paragraph.

If the input and output files are filled up already, then you should run RSLogix and configure the specified files to have more space. This is done by right-clicking on the above-identified file number(s) in the “.RSP” pane, then choosing the Properties item from the menu and increasing the number of elements by 16 channels (per monitor being configured). Do this for both the Data Input and Data Output files, as needed. Make sure you do this on-line, so that the PLC gets updated.

When the files have adequate space then go to the RSNetworkx window, make sure you’re Online, and attach the ControlNet cable to the TM90 Interface (with the TM90 power on, of course). This should cause an icon for a Hilscher PC Interface to appear in the right pane, with the selected MAC ID number below the icon and a “+” icon at the top indicating that it is an “extra” (unconfigured) node on the net. Next, *right-click* on the PLC and select the **ControlNet Configuration** option.

This will put you back in the ControlNet Configuration screen, as discussed above. Next, *right-click* on the unconfigured Hilscher PC Interface line and select the **Insert Device Connection** option. This will “fill in” the rest of the line, automatically allocating input and output sizes of 16, but leaving the *Input Address* and *Output address* columns partially configured; the File Number will be pre-entered, but the word address will be “---“. Now *double-click* the **Input address** cell of the table: the system will automatically choose the next available word as a starting address. If this is acceptable, you can just hit ENTER to accept it. Otherwise, you can enter another address, as long as it doesn’t conflict with any other configurations. Repeat this procedure in the **Output Address** and **Status Address** cells of the table.

This completes the configuration for Scheduled Transfers. *Be sure to save your work!*

At this point, you should have a green light on the ControlNet Interface card in the TM90, and the “+” icon in the RSNetworkx network diagram should be gone. You should be able to run RSLogix, go Online and see status bits and see the Peak Tonnage values shown on the face of the TM90 appear in the appropriate files according to the file layouts shown below (whether the PLC is in Run or Program mode doesn’t matter!) You can also use the RSLogix data edit functions to set bits in the monitor, and achieve such things as resetting faults or turning the AutoTrak light on and off.

If you are hooking up to multiple TM90s, each one will need a unique MAC ID, and will appear on the network and need to be configured in RSNetworkx. Each will operate in the same Input and Output files, with different word addresses.

In the Scheduled I/O definitions that follow, you must substitute the Input and Output file numbers configured above, and add the starting word addresses to the word addresses given to obtain the real-world addresses for your system.

# Discrete I/O Status and Data Transfer definitions

## Definitions and Terminology:

HOST= a device capable of initiating message-level interchanges with an IDC ControlNet Adapter: an example would be a PLC, or a computer.

READ = an operation that is initiated by the HOST, and reads data from the IDC ControlNet Interface.

WRITE = an operation initiated by the HOST that writes data to IDC ControlNet Interface.

Adapter = IDC ControlNet interface board.

Input = discrete status bit inputs to HOST from TM90 via Adapter

Output = discrete control bits sent to TM90 (via Adapter) from HOST

All WORD data are 16 bits unsigned binary.

Adapter discrete (SCHEDULED) I/O appears on the ControlNet as two INTEGER files, one containing discrete INPUT bits and Peak Tonnage information, the other containing OUTPUT (control) bits and words. These file addresses are assigned by the Network Configuration tool. Bit and word definitions are given below based on a simple example file set. The user must adjust these addresses to reflect the STARTING ADDRESS setup in the ControlNet configuration process.

Peak values for each channel and totals will be included in SCHEDULED data, producing a total of words of Unscheduled data.

UNSCHEDULED transfers will be used for additional setup and signature data as defined below. These transfers are controlled by Message instructions aimed at the ControlNet port of the PLC. Further information on this is given in the appropriate section, below.

## SCHEDULED Input usage example: HOST file N14: X

(where N14 is assigned by the Network Configuration tool)

Example Address	Description
N14:0/0	Press Limit OK (Normally Open, HELD CLOSED when OK)
N14:0/1	Die Limit OK (Normally Open, HELD CLOSED when OK)
N14:0/2	Slide Interference OK (Normally Open, HELD CLOSED when OK)
N14:0/3	AutoTrak™ Limits Active
N14:0/4	New Data Available (i.e., press cycled, new AutoTrak, etc.)
N14:0/5-7	Reserved for future use
N14:0/8	Press OVERLOAD Flag, Channel 1
N14:0/9	Press OVERLOAD Flag, Channel 2
N14:0/10	Press OVERLOAD Flag, Channel 3
N14:0/11	Press OVERLOAD Flag, Channel 4
N14:0/12	Press OVERLOAD Flag, Channel 5
N14:0/13	Press OVERLOAD Flag, Channel 6
N14:0/14	Press OVERLOAD Flag, Channel 7
N14:0/15	Press OVERLOAD Flag, Channel 8
N14:1/0	Die HIGH Limit Fault Flag, Channel 1
N14:1/1	Die HIGH Limit Fault Flag, Channel 2
N14:1/2	Die HIGH Limit Fault Flag, Channel 3
N14:1/3	Die HIGH Limit Fault Flag, Channel 4
N14:1/4	Die HIGH Limit Fault Flag, Channel 5
N14:1/5	Die HIGH Limit Fault Flag, Channel 6
N14:1/6	Die HIGH Limit Fault Flag, Channel 7
N14:1/7	Die HIGH Limit Fault Flag, Channel 8
N14:1/8	Die LOW Limit Fault Flag, Channel 1
N14:1/9	Die LOW Limit Fault Flag, Channel 2
N14:1/10	Die LOW Limit Fault Flag, Channel 3
N14:1/11	Die LOW Limit Fault Flag, Channel 4
N14:1/12	Die LOW Limit Fault Flag, Channel 5
N14:1/13	Die LOW Limit Fault Flag, Channel 6
N14:1/14	Die LOW Limit Fault Flag, Channel 7
N14:1/15	Die LOW Limit Fault Flag, Channel 8
N14:2	Current Die ID
N14:3	TM90 Clock Tic, Seconds in 1/100 second increments (0-5999)
N14:3-5	Reserved
N14:6	Channel 1 Peak Reading
N14:7	Channel 2 Peak Reading
N14:8	Channel 3 Peak Reading
N14:9	Channel 4 Peak Reading
N14:10	Channel 5 Peak Reading
N14:11	Channel 6 Peak Reading
N14:12	Channel 7 Peak Reading
N14:13	Channel 8 Peak Reading
N14:14	Total 1 Peak Reading
N14:15	Total 2 Peak Reading

## SCHEDULED Output usage example: HOST file N15: X,

where N15 is assigned by the Network Configuration Tool

Example Address	Description
N15:0/0	Reset Faults
N15:0/1	Cycle Camswitch (Peak-reading Monitors only)
N15:0/2	Calculate AutoTrak <sup>tm</sup> Limits
N15:0/3	Enable AutoTrak Monitoring
N15:1	Requested Die ID Number (0-30)
N15: 2-15	Reserved for future use

**NOTE:** in installations where the Unscheduled Message functions are used to manipulate setup functions for individual dies, it is strongly recommended that the Requested Die ID Number be set to 0 (zero) at all times. Mixing of Die ID use with individual parameter controls introduces sequencing issues that are avoided by using only Die ID 0.

# Unscheduled Data Definitions

There is a large amount of data that can be accessed by Unscheduled transfers. Because the volume of data exceeds the available file space, a small block of registers is set aside as a pair of “mailboxes” to specify and coordinate the contents of the larger file blocks, as detailed below.

As of this writing, two duplicate files will be provided, so that 2 “HOSTs” can independently and simultaneously exchange information with the Tonnage Monitor. It is anticipated that a control system HOST will use one of these channels, while a host computer emulating a PC may use the other. Though the Tonnage Monitor will not care which file “belongs” to a particular type of processor, the convention will be adopted that the Control system will use the lower-numbered file. The first file is always N3, and the second is always N4. Each file has a length of 400 unsigned integer registers. This leads to the register assignments indicated below. The second “channel” will be a duplicate of the definitions here, differing only by file number.

## Mailbox register definitions

### ***HOST WRITE Command mailbox (General Definition):***

This block tells the IDC unit what to do with the data in the HOST Write DATA block (below). The HOST should fill the Data block with appropriate data first, THEN write the COMMAND in these 5 registers. The IDC unit will monitor the Write Command Message Counter, and when it sees that it differs from the Write Response Counter, it will attempt to execute the command. When the IDC unit finishes processing the command, it will copy the entire Write Command mailbox to the Write Response mailbox. Thus, when the two counters are equal the HOST will know that the command has been processed. In the event of any error, the IDC unit will place a non-zero error code in the Write Error Code location (N3:14).

- N3:0            Function Code specifying type of data to be written according to the Function list below
- N3:1            Pointer within Code data (0=start of defined data)
- N3:2            Length (1-128 words) of data to be transferred  
(0 defaults to full block for the above-specified function)
- N3:3            Write Command Message Counter: HOST should increment this for each write, after preparing the data block with the data to be written. When the IDC unit is done with the data, it will COPY the number here into the response mailbox below.
- N3:4-9        Reserved

### ***IDC Write RESPONSE mailbox (General definition):***

- N3:10            Function Code processed (copied from N3:0)
- N3:11            Pointer value used, copied from N3:1
- N3:12            Length of data processed (copied from N3:2)
- N3:13            Write Response Counter, copied from N3:3
- N3:14            Write Error Code (0=OK)
- N3:15-19        Reserved

### ***HOST Write Data Buffer***

- N3:20-N3:147    Data buffer interpreted according to the HOST Write Mailbox detailed above

## ***HOST READ Request mailbox (General Definition):***

This block tells the IDC unit what data to copy into the HOST Read DATA block (below). The HOST writes to this mailbox first, changing the Counter register to notify the Adapter that a new request has been issued. The IDC unit will copy the appropriate data to the Read Data block, then copy this entire block to the Read Response mailbox. The HOST will know that the data is ready by monitoring the equality of the Request and Response counter registers. In the event of any error, the IDC unit will place a non-zero error code in the Read Error Code location (N3:214).

N3:200 Function Code defining data request

N3:201 Pointer within Code data (if non-zero, offsets start of data within function)

N3:202 Length of data requested (0 defaults to entire block for the function)

N3:203 Read Request Counter: HOST should increment this for each read. When the IDC unit has the requested data ready, it will COPY the number here into the response mailbox below.

N3:204-209 Reserved

## ***HOST READ Response mailbox (General Definition):***

N3:210 Function Code defining data request

N3:211 Pointer within Code data (if non-zero, offsets start of data within function)

N3:212 Length of data requested (0 defaults to entire block for the function)

N3:213 Read Request Counter: HOST should increment this for each read. When the IDC unit has the requested data ready, it will COPY the number here into the response mailbox below.

N3:214 Read Request Error Code: 0 = OK

## ***HOST Read Data Buffer***

N3:220-347 Buffer for data going from the IDC to the HOST, interpreted according to the contents of the Read mailboxes described above.

## **Further remarks on DATA REQUEST/DEFINITION CODES for Unscheduled Transfer Mailbox Words:**

### **Summary of Ladder Logic Sequences for Reading & Writing**

Here is the basic sequence that needs to be executed in the ladder logic for each of the functions.

#### **READING:**

1. using a Message instruction, write the Function Code Header to address N3:200 in the Tonnage Monitor (the Read Request Mailbox)
2. using a Message instruction, read the Read Response Mailbox at N3:210 in the monitor until the Header matches what you wrote in step 1.
3. using a message instruction, read the Read Data buffer at N3:220

#### **WRITING:**

1. Using a message instruction, write the data to the Write Data Buffer at N3:20
2. Using a message instruction, write the Function Code Header to the Write Request Mailbox at N3:0
3. To confirm the action, use a message instruction to read the Write Response Mailbox at N3:10 until it matches the Header data you wrote in step 1.

## General Definitions:

The **first word** of the word contains a Function number identifying the basic logical data block (see below) to be read/written.

The **second word** is a pointer within the logical data block. It may contain 00 to read/write starting at the beginning of the logical data block. To read/write data starting within this block, place the desired Function number in the first word and the desired starting Pointer value in the 2nd word, and optionally specify the length to be written/read in the 3rd word of the block transfer write.

The **third word** optionally specifies a LENGTH (number of registers) to be transferred. If 0 is supplied, the Adapter will use the full length of the logical data block (if the Pointer is 0) or the remaining words in the functional block starting at the Pointer location.

The **fourth word** of a mailbox is a “counter” register that the HOST changes to indicate that it needs a response. The value can be an actual counter, or it can be used as a “flip/flop” (0/1 states). The main point is that when the IDC unit has acted upon the request, it will copy the value from the request mailbox to the response mailbox. The HOST can then wait for the response to match the request it sent, and know that the next step of the transfer may be initiated.

The **fifth word** of a Response mailbox is an error code, to be defined. 0 is defined as no error.

### Notes:

1. Code and Function numbers in the table below are DECIMAL values for the convenience of ladder logic programming. All data transferred will be 16-bit unsigned binary.
2. Some items are read-only: this means writes will be ignored
3. The Write checkmark below indicates that the protocol will support reading or writing to the register.
4. The Write Protect checkmark means that the protocol will support writing to the register, but it may be ineffective if the hardware write protect is enabled in the monitor. In this case, writes will seem to be ignored (the data will not change).
5. For those Functions that have some read-only items amongst read/write items, writing to the entire block is OK; it just won't change the read-only items.
6. All functions are optional: if a function is not implemented in ladder logic in the HOST, the function will be dormant and will not affect HOST memory requirements. In other words, HOST memory only needs to be allocated for those functions that are used in a particular application.
7. It is not the intent of this document to fully describe the various features of IDC's Tonnage Monitor. If further clarification is needed, users should consult IDC's Tonnage Monitor User's Manual.

8. SCALING: the Peak Readings and the various forms of Signature data are scaled to the units specified in the Channel Rating parameters (usu. Tons). This is true for Inner & Outer Press Tonnage curves and Die Maximum and Minimum, too. For this reason, if you send Tonnage Curve information or Die Max/Min data TO a Monitor that hasn't been initialized (such as a replacement unit being initialized by the host processor) you should send the Channel Rated prompt information first. This will not be an issue if the monitor is already in service.
9. SCALING: Some presses, notably Transfer presses, have been configured with different Channel Rating values for the "left" side (Channels 1 & 2) and the "right" side (Channels 3 & 4). In these instances, when a die limit setting or press limit curve is sent, they should be scaled in terms of the TOTAL tons. This will automatically be proportionally allocated to each channel (i.e., if you send 50% of Total, it will translate to 50% of the capacity of the individual channels).
10. Unrecognized Code, Pointer or Length parameters will cause Read or Write operations to be ignored within the Tonnage Monitor: a non-zero error code (to be defined) will be returned.
11. When reading a subset of a Code group (i.e., by specifying a starting Pointer) the first DATA word will be the beginning of the requested data. Data left in the buffer beyond the specified Length will be indeterminate: the adapter will only update the requested number of words.
12. As of this writing, the Signature data for Tonnage Monitor only occupies 128 words per channel, so the "Pointer" value is optional: it will be ignored in initial Tonnage Monitor releases. Up to 512 words may be defined in future revisions and variations, however, so it is best for a programmer to make provisions for the extra data.
13. As of version 01.07, the Shutheight Length parameters in Function 7 and the actual Shutheight feedback in Function 8 occupy 2 integer words each, in Low/High order. The resulting 32-bit number normally represents 1/1000ths of an inch. In any PLC calculations performed on this data (or Data Table Edits) the user must take into account the fact that the TM90 treats each of these as UNSIGNED INTEGERS. This is particularly true for the Low words, which will be displayed as signed integer values in the default Data Table display, and may be displayed as negative numbers when the value is between 32768 & 65535.
14. Starting with Version 10, 60 words of general-purpose RAM memory are made available for general exchange of data between the TM90 itself, the Remote I/O host, and the TM90's Modbus master (the standard communication port of the TM90). This memory provides read/write access from any of these ports. The format is 16-bit unsigned, stored in the TM90

in Lo/Hi format. The data is saved in battery-backed RAM, so it may or may not survive power-down of the TM90, depending on the state of the battery.

The functional allocation of this memory is application dependent, and must be coordinated between the ports on a case-by-case basis. The programmer of each port should be careful to write only to the registers allocated for writing by that port to avoid over-writing another user's data.

**Code and Pointer definitions (Code & Pointer definitions are DECIMAL):**

NOTE: Items in **Arial Bold** font should be considered for inclusion in Die Recipes. Items in *Arial Italic* font should be considered for inclusion in a single-copy backup storage for the purpose of backing up the monitor's setup. These indications are indicated for 4-channel units as used with typical Transfer or Progressive presses.

Code	Pointer	Read	Write	Write Protect	DEFINITION
0000	xxxx				INVALID (No Operation, i.e., ignored)
<b>1</b>	<b>0</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<b>Peak Tonnage Values: 10 Registers (DEFAULT BTR)</b>
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Channel 1
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Channel 2
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Channel 3
	4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Channel 4
	5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Channel 5
	6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Channel 6
	7	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Channel 7
	8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Channel 8
	9	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outer (Slide 1) Total
	10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Inner (Slide 2) Total
<b>2</b>	<b>0</b>				<b>Counter/Status Registers</b>
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Good Parts Counter
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Total Parts Counter
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	High Hits Counter
	4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Low Hits Counter
	5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Worst Hit Register
	6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Batch Preset Register
	7	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Encoder/Resolver Position (binary)
	8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Fault Position (resolver angle, binary)
	9	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Log Begin (angle where first signature logged)
	10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cycle Length (Size of signature, each channel)
	11	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	FIFO Length (# Signatures in storage)
	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	TM90 ROM Version
	13	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ControlNet Adapter ROM Version

<b>3</b>	<b>0</b>				<b>Press-related Configuration (Consult TM80 manual)</b>
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Channel 1 Rated (Scale Factor)
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Channel 2 Rated
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Channel 3 Rated
	4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Channel 4 Rated
	5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Channel 5 Rated
	6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Channel 6 Rated
	7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Channel 7 Rated
	8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Channel 8 Rated
	9	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	No. Outer Channels (or Slide 1)
	10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	No. Inner Channels (or Slide 2)
	11	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Outer Type
	12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Encoder Type
	13	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Encoder Offset
	14	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Encoder Bits
	15	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Outer Dwell Position
<b>4</b>	<b>0</b>				<b>Press Motion Curves</b>
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Inner (Slide 2) Deg. at 0.0"</i>
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Inner (Slide 2) Deg. at 0.5"</i>
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Inner (Slide 2) Deg. at 1.0"</i>
	4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Inner (Slide 2) Deg. at 1.5"</i>
	5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Inner (Slide 2) Deg. at 2.0"</i>
	6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Inner (Slide 2) Deg. at 2.5"</i>
	7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Inner (Slide 2) Deg. at 3.0"</i>
	8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Inner (Slide 2) Deg. at 3.5"</i>
	9	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Inner (Slide 2) Deg. at 4.0"</i>
	10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Inner (Slide 2) Deg. at 4.5"</i>
	11	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Inner (Slide 2) Deg. at 5.0"</i>
	12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Inner (Slide 2) Deg. at 5.5"</i>
	13	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Inner (Slide 2) Deg. at 6.0"</i>
	14	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Outer (Slide 1) Deg. at 0.0"</i>
	15	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Outer (Slide 1) Deg. at 0.5"</i>
	16	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Outer (Slide 1) Deg. at 1.0"</i>
	17	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Outer (Slide 1) Deg. at 1.5"</i>
	18	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Outer (Slide 1) Deg. at 2.0"</i>
	19	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Outer (Slide 1) Deg. at 2.5"</i>
	20	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Outer (Slide 1) Deg. at 3.0"</i>
	21	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Outer (Slide 1) Deg. at 3.5"</i>
	22	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Outer (Slide 1) Deg. at 4.0"</i>
	23	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Outer (Slide 1) Deg. at 4.5"</i>
	24	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Outer (Slide 1) Deg. at 5.0"</i>
	25	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Outer (Slide 1) Deg. at 5.5"</i>
	26	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Outer (Slide 1) Deg. at 6.0"</i>

<b>5</b>	<b>0</b>				<b>Press/Die Rating Curves</b>
	1	☒	☒	☒	<i>Inner (Slide 2) Rating at 0.0"</i>
	2	☒	☒	☒	<i>Inner (Slide 2) Rating at 0.5"</i>
	3	☒	☒	☒	<i>Inner (Slide 2) Rating at 1.0"</i>
	4	☒	☒	☒	<i>Inner (Slide 2) Rating at 1.5"</i>
	5	☒	☒	☒	<i>Inner (Slide 2) Rating at 2.0"</i>
	6	☒	☒	☒	<i>Inner (Slide 2) Rating at 2.5"</i>
	7	☒	☒	☒	<i>Inner (Slide 2) Rating at 3.0"</i>
	8	☒	☒	☒	<i>Inner (Slide 2) Rating at 3.5"</i>
	9	☒	☒	☒	<i>Inner (Slide 2) Rating at 4.0"</i>
	10	☒	☒	☒	<i>Inner (Slide 2) Rating at 4.5"</i>
	11	☒	☒	☒	<i>Inner (Slide 2) Rating at 5.0"</i>
	12	☒	☒	☒	<i>Inner (Slide 2) Rating at 5.5"</i>
	13	☒	☒	☒	<i>Inner (Slide 2) Rating at 6.0"</i>
	14	☒	☒	☒	<b>Outer (Slide 1) Rating at 0.0"</b>
	15	☒	☒	☒	<b>Outer (Slide 1) Rating at 0.5"</b>
	16	☒	☒	☒	<b>Outer (Slide 1) Rating at 1.0"</b>
	17	☒	☒	☒	<b>Outer (Slide 1) Rating at 1.5"</b>
	18	☒	☒	☒	<b>Outer (Slide 1) Rating at 2.0"</b>
	19	☒	☒	☒	<b>Outer (Slide 1) Rating at 2.5"</b>
	20	☒	☒	☒	<b>Outer (Slide 1) Rating at 3.0"</b>
	21	☒	☒	☒	<b>Outer (Slide 1) Rating at 3.5"</b>
	22	☒	☒	☒	<b>Outer (Slide 1) Rating at 4.0"</b>
	23	☒	☒	☒	<b>Outer (Slide 1) Rating at 4.5"</b>
	24	☒	☒	☒	<b>Outer (Slide 1) Rating at 5.0"</b>
	25	☒	☒	☒	<b>Outer (Slide 1) Rating at 5.5"</b>
	26	☒	☒	☒	<b>Outer (Slide 1) Rating at 6.0"</b>
<b>6</b>	<b>0</b>				<b>Die-related Setup Parameters</b>
	1	☒	☒	☒	<b>Outer Die (Slide 1) Maximum Limit</b>
	2	☒	☒	☒	<b>Outer Die (Slide 1) Minimum Limit</b>
	3	☒	☒	☒	<b>Outer Die (Slide 1) Plus Autotrak Margin</b>
	4	☒	☒	☒	<b>Outer Die (Slide 1) Minus Autotrak Margin</b>
	5	☒	☒	☒	<i>Inner Die (Slide 2) Maximum Limit</i>
	6	☒	☒	☒	<i>Inner Die (Slide 2) Minimum Limit</i>
	7	☒	☒	☒	<i>Inner Die (Slide 2) Plus Autotrak Margin</i>
	8	☒	☒	☒	<i>Inner Die (Slide 2) Minus Autotrak Margin</i>
	9	☒	☒	☒	<i>Fill Cycles</i>
	10	☒	☒	☒	<i>Auto Cycle Time (for Automatic AutoTrak)</i>
	11	☒	☒	☒	<i>AutoTrak Cycle Count Preset</i>
	12	☒	☒	☒	<i>AutoTrak Off Delay</i>
	<b>13</b>	☒	☒	☒	<b>Slide 1 AutoTrak Window Begin Angle (0-359)</b>
	<b>14</b>	☒	☒	☒	<b>Slide 1 AutoTrak Window End Angle (0-359)</b>
	<b>15</b>	☒	☒	☒	<i>Slide 2 AutoTrak Window Begin Angle (0-359)</i>
	<b>16</b>	☒	☒	☒	<i>Slide 2 AutoTrak Window End Angle (0-359)</i>
	<b>17</b>	☒	☒	☒	<b>TrakMode for both Slides –see TM90 Manual</b>

<b>7</b>	<b>0</b>				<b>Shutheight setup data</b>
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Outer/Slide 1 Shutheight # Bits
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Outer/Slide 1 Shutheight Transducer Type
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Outer/Slide 1 Shutheight Transducer Length (Low word, see Note 13)
	4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Outer/Slide 1 Shutheight Transducer Length (High word, see Note 13)
	5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Outer/Slide 1 Shutheight Transducer Bias
	6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Inner/Slide 2 Shutheight # Bits
	7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Inner/Slide 2 Shutheight Transducer Type
	8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Outer/Slide 2 Shutheight Transducer Length (Low word, see Note 13)
	9	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Outer/Slide 2 Shutheight Transducer Length (High word, see Note 13)
	10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Inner/Slide 2 Shutheight Transducer Bias
	11	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Minimum Slide Separation
<b>8</b>	<b>0</b>				<b>Shutheight Readout data</b>
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outer (Slide 1) Shutheight (Low word) See Note 13
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outer (Slide 1) Shutheight (High Word) See Note 13
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Inner(Slide 2) Shutheight (Low word) See Note 13
	4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Inner (Slide 2) Shutheight (High Word) See Note 13

					<b>CURRENT SIGNATURE DATA</b>
<b>11</b>	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature Data, <b>Channel 1</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature Data, <b>Channel 1</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
<b>12</b>					
	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature Data, <b>Channel 2</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature Data, <b>Channel 2</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
<b>13</b>					
	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature Data, <b>Channel 3</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature Data, <b>Channel 3</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature Data, <b>Channel 3</b> , Words 121-128
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
<b>14</b>					
	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature Data, <b>Channel 4</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature Data, <b>Channel 4</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
<b>15</b>					
	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature Data, <b>Channel 5</b> , Words 1-60
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature Data, <b>Channel 5</b> , Words 61-120
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature Data, <b>Channel 5</b> , Words 121-128
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
	4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
<b>16</b>					
	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature Data, <b>Channel 6</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature Data, <b>Channel 6</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
<b>17</b>					
	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature Data, <b>Channel 7</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature Data, <b>Channel 7</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
<b>18</b>					
	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature Data, <b>Channel 8</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature Data, <b>Channel 8</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
<b>19</b>					
	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature, <b>SLIDE 1 TOTAL</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature, <b>SLIDE 1 TOTAL</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved

<b>20</b>	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature, <b>Slide 2 Total</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Current Signature, <b>Slide 2 Total</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
					<b><u>AutoTrak Average SIGNATURE DATA</u></b>
<b>21</b>	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Average Data, <b>Channel 1</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Average Data, <b>Channel 1</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
<b>22</b>	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Average Data, <b>Channel 2</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Average Data, <b>Channel 2</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
<b>23</b>	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Average Data, <b>Channel 3</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Average Data, <b>Channel 3</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
<b>24</b>	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Average Data, <b>Channel 4</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Average Data, <b>Channel 4</b> , Words 128-256
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
<b>25</b>	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Average Data, <b>Channel 5</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Average Data, <b>Channel 5</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
<b>26</b>	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Average Data, <b>Channel 6</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Average Data, <b>Channel 6</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
<b>27</b>	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Average Data, <b>Channel 7</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Average Data, <b>Channel 7</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
<b>28</b>	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Average Data, <b>Channel 8</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Average Data, <b>Channel 8</b> , Words 128-256
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved

<b>AutoTrak 3-Sigma DATA</b>					
<b>31</b>	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak 3-Sigma Data, <b>Channel 1</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak 3-Sigma Data, <b>Channel 1</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
<b>32</b>	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak 3-Sigma Data, <b>Channel 2</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak 3-Sigma Data, <b>Channel 2</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
<b>33</b>	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak 3-Sigma Data, <b>Channel 3</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak 3-Sigma Data, <b>Channel 3</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
<b>34</b>	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak 3-Sigma Data, <b>Channel 4</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak 3-Sigma Data, <b>Channel 4</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
<b>35</b>	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak 3-Sigma Data, <b>Channel 5</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak 3-Sigma Data, <b>Channel 5</b> , Words 128-256
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
<b>36</b>	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak 3-Sigma Data, <b>Channel 6</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak 3-Sigma Data, <b>Channel 6</b> , Words 128-256
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
<b>37</b>	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak 3-Sigma Data, <b>Channel 7</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak 3-Sigma Data, <b>Channel 7</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
<b>38</b>	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak 3-Sigma Data, <b>Channel 8</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak 3-Sigma Data, <b>Channel 8</b> , Words 128-256
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AutoTrak Reserved
<b>Historical DATA</b>					
<b>40</b>	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Prior Cycle Pointer: points to data for cycle of specified age

<b>41</b>	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Historical Data, <b>Channel 1</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Historical Data, <b>Channel 1</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
<b>42</b>	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Historical Data, <b>Channel 2</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Historical Data, <b>Channel 2</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
<b>43</b>	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Historical Data, <b>Channel 3</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Historical Data, <b>Channel 3</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
<b>44</b>	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Historical Data, <b>Channel 4</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Historical Data, <b>Channel 4</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
<b>45</b>	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Historical Data, <b>Channel 5</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Historical Data, <b>Channel 5</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
	4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>46</b>	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Historical Data, <b>Channel 6</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Historical Data, <b>Channel 6</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
<b>47</b>	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Historical Data, <b>Channel 7</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Historical Data, <b>Channel 7</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
<b>48</b>	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Historical Data, <b>Channel 8</b> , Words 1-128
	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Historical Data, <b>Channel 8</b> , Words 129-256
	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved
	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reserved

50	0				<b>General Purpose Shared Memory (60 words max)</b> TM90 RAM, accessible from ControlNet & Modbus ports
	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 01: Modbus Register 40501
	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 02: Modbus Register 40502
	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 03: Modbus Register 40503
	4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 04: Modbus Register 40504
	5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 05: Modbus Register 40505
	6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 06: Modbus Register 40506
	7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 07: Modbus Register 40507
	8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 08: Modbus Register 40508
	9	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 09: Modbus Register 40509
	10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 10: Modbus Register 40510
	11	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 11: Modbus Register 40511
	12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 12: Modbus Register 40512
	13	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 13: Modbus Register 40513
	14	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 14: Modbus Register 40514
	15	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 15: Modbus Register 40515
	16	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 16: Modbus Register 40516
	17	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 17: Modbus Register 40517
	18	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 18: Modbus Register 40518
	19	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 19: Modbus Register 40519
	20	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 20: Modbus Register 40520
	21	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 21: Modbus Register 40521
	22	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 22: Modbus Register 40522
	23	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 23: Modbus Register 40523
	24	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 24: Modbus Register 40524
	25	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 25: Modbus Register 40525
	26	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 26: Modbus Register 40526
	27	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 27: Modbus Register 40527
	28	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 28: Modbus Register 40528
	29	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 29: Modbus Register 40529
	30	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 30: Modbus Register 40530
	31	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 31: Modbus Register 40531
	32	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 32: Modbus Register 40532
	33	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 33: Modbus Register 40533
	34	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 34: Modbus Register 40534
	35	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 35: Modbus Register 40535
	36	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 36: Modbus Register 40536
	37	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 37: Modbus Register 40537
	38	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 38: Modbus Register 40538
	39	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 39: Modbus Register 40539
	40	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 40: Modbus Register 40540
	41	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 41: Modbus Register 40541
	42	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 42: Modbus Register 40542
	43	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 43: Modbus Register 40543
	44	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 44: Modbus Register 40544
	45	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 45: Modbus Register 40545
	46	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 46: Modbus Register 40546

47	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 47: Modbus Register 40547
48	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 48: Modbus Register 40548
49	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 49: Modbus Register 40549
50	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 50: Modbus Register 40550
51	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 51: Modbus Register 40551
52	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 52: Modbus Register 40552
53	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 53: Modbus Register 40553
54	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 54: Modbus Register 40554
55	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 55: Modbus Register 40555
56	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 56: Modbus Register 40556
57	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 57: Modbus Register 40557
58	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 58: Modbus Register 40558
59	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 59: Modbus Register 40559 As of CN0015, contains TM90 clock time: minutes in low byte, hours in high byte
60	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shared Memory, Word 60: Modbus Register 40560 As of CN0015, contains TM90 clock time: hundredths of seconds in low byte, seconds in high byte

## ***Diagnostic Indicators***

As the ControlNet adapter is mounted in the TM90, there are 4 diagnostic LEDs at the bottom edge of the boards – see photo below:

For a system operating on a ControlNet network, the normal state for these indicators is RDY, RUN and CH\_A continuously ON. Any other condition is abnormal, and may be evaluated from the following table.

LED	COLOR	STATE	MEANING
RDY	Yellow	ON	Power On test OK
		Steady Flash	Bootstrap Loader at work
		Irregular Flash	Hardware or system error
		OFF	Hardware error
RUN	Green	ON	Communications running (and connected to network)
		Steady Flash	Ready to communicate (but Node ID inactive)
		Irregular Flash	Parameter Error (consult IDC)
		OFF	No communications
CH_B	Green	ON	Channel B active (redundant channel)
		Flashing	Channel B testing for activation
		OFF	Channel B not communicating
CH_A	Green	ON	Channel A active (primary channel)
		Flashing	Channel A testing for activation
		OFF	Channel A not communicating

One particular error combination has been recognized as useful: a flashing RUN light with a steady CH\_A light may indicate that the unit's MAC ID is not programmed in the ControlNet configuration, or there is an address conflict between this unit and some other node.