OVERVIEW

Peer-to-peer communications can be defined as the ability to digitally share data between two or more like devices, without the need of a master/slave relationship. Peer-to-peer allows selected data points to be shared continuously without the need to request and read data. YS170 (Style 3 or higher) has an option for peer-to-peer communications, model suffix /A33. YS-Net is the name for the communications network. Any address in a YS170 program can be transmitted via YS-Net to other YS170’s. YS-Net peer-to-peer is pre-configured, allowing four (4) YS170 controllers to transmit up to four (4) analog values and sixteen (16) status points each to up to sixteen (16) controllers resident on the network. Refer to Figure 1.

YS-NET (PEER-TO-PEER)

This new network incorporates state-of-the-art communications using Echelon® LONWorks. In the pre-configured peer-to-peer mode, YS-Net operates at 78.125 Kbps over a single twisted pair of wires (nominal AWG 22) at a cable length up to 4000 feet. The Neuron® chip, the brains of LONWorks, can be configured to operate in many desired manners using a software development kit. The pre-configured peer-to-peer format described above is the standard offering, but alternative configurations may be designed for specialized applications.

WHY LONWorks?

LONWorks has been selected by more than 1000 companies to meet the communications needs in their specific equipment. The Neuron® chip is manufactured by both Motorola and Toshiba, guaranteeing availability. A PROM used with the Neuron® chip can be modified for unique requirements. And the chip is inexpensive to purchase and implement! Future considerations may be digital communications to external devices, e.g., relay or signal conditioning modules.

WHY USE PEER-TO-PEER?

Peer-to-peer communications allows analog and status values in up to four YS170’s to be transmitted to others. This cross-talk allows more sophisticated control and interaction within a “system” of YS170 controllers. Analog or discrete inputs/outputs can be distributed, extending I/O capabilities. Installation and wiring costs are lowered.

IMPLEMENTING YS-NET

Style 3 and higher YS170 Dual Loop Programmable Controllers are offered with YS-Net peer-to-peer communications as an option (/A33). The actual communications instructions are written into the YS170 custom program. New addresses are available: CY01-16: analog outputs CX01-04: analog inputs CO01-16: status inputs CI01-64: status outputs CF01-04: communications failure

No other configuration is required. Upon commissioning, the YS170 controller identifies the presence of a YS-Net card (/A33) and the communications configuration is automatically installed.

YS-NET ADDRESSES

Both analog and status (digital) data can be transmitted via peer-to-peer. YS170 controllers with addresses 1 to 4 serve as transmitters and receivers. Addresses 5 to 16 serve as receiving devices only. The communications address number must be set on the CONFIG 1
display of the YS170 controller. Each controller must have a different
YS-Net address, 1-16. Refer to Figure 2.

COMMUNICATION ADDRESSES

Analog data from YS170 address 1 can be read by another device using
communications input registers CX01-04 in the receiving controller
program. CX05-08 are parameters sent from controller 2, CX09-12 for
3, and CX13-16 for 4. Remember, only the first four controllers on the
YS-Net highway can transmit data, YS170 addresses 1-4.
EXAMPLE:
LD CX01 Analog data from CY01, controller #1
ST MV1 Data stored to receiving
YS170 control output 1
LD CX06 Analog data from CY02, controller #2
ST SV1 Stored to set point 1

The transmitting YS170 analog data
is written to output registers CY01-
04. The registers are the same for all
four sending devices. The receiving
controllers can differentiate the data
from each controller using CX01-16,
as described above.
EXAMPLE:
LD SV2 Set point value
ST CY01 YS-Net send data
LD MV1 Control Output
ST CY02 YS-Net send data

Status inputs are identified as CI01-
CI64. The same logic applies as
described with analog values, i.e.,
CI01-16 are status inputs from
controller 1, CI17-32 from controller
2, etc. Inversely, CO01-16 are
status outputs from each of the
transmitting controller, addresses 1-
4.
EXAMPLE:
LD CI01 YS-Net status input
controller 1
ST CAMF1 Auto/manual status
receiving YS170
LD CAMF1 Auto/manual status
ST CO01 YS-Net status output

Communications failure flags (CF01-
04) are available. Each flag
number designates the transmitting
device address where
communications has been
interrupted. The flag is activated
after 2 seconds and can be used in
the receiving controller program to
initiate a shutdown sequence or
other fail-safe condition. The last
transmitted data is retained or a
dummy value can be installed to
allow continued operation.
EXAMPLE:
LD CF01 Comm flag #1
ST DO1 Discrete Output 1
GIF @SHUTDOWN
Begin shutdown logic

Refer to Table 1 for quick reference.

<table>
<thead>
<tr>
<th>Address</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CX01-04</td>
<td>Analog inputs from #1</td>
</tr>
<tr>
<td>CX05-08</td>
<td>Analog input from #2</td>
</tr>
<tr>
<td>CX09-12</td>
<td>Analog inputs from #3</td>
</tr>
<tr>
<td>CX12-16</td>
<td>Analog inputs from #4</td>
</tr>
<tr>
<td>CY01-04</td>
<td>Analog outputs from #1-#4</td>
</tr>
<tr>
<td>CI01-16</td>
<td>Status inputs from #1</td>
</tr>
<tr>
<td>CI17-32</td>
<td>Status inputs from #2</td>
</tr>
<tr>
<td>CI33-48</td>
<td>Status inputs from #3</td>
</tr>
<tr>
<td>CI49-64</td>
<td>Status inputs from #4</td>
</tr>
<tr>
<td>CO01-16</td>
<td>Status outputs from #1-#4</td>
</tr>
</tbody>
</table>

Table 1

YS170 PROGRAMMING SOFTWARE

The YS170 programming software
package, Model YSS10-210, used
to write custom control programs, is
required. The version level must be
3.03 or higher. This allows the
communications registers (CX, CY,
CI, CO & CF) to be included in the
program. Earlier software versions
do not allow use of these registers.

SUMMARY

YS-Net peer-to-peer communications provides the
ability of interactive control and
input/output expansion. It is easy to
implement with no special
configuration requirements. The
YS10-210 Version 3.03 or higher
Programming Software Package is
used to include the communications
registers in the YS170 controller
program. Peer-to-peer configuration is
automatically installed. Simple to
use and implement: YS-Net peer-to-
peer communications.