Westinghouse

HUMA-LOGIC

COMMUNICATION MODULE

(DUAL PORT)

Catalog No. NCMZ-798

PERFORMANCE DATA

Communication	RS232C / V24
Channels per module	2 ports 20 mA current loop (optional)
Baud Rate	150, 300, 600, 1200, 2400, 4800 and 9600
I/O Rack Positions Req'd	2
Memory	Total size 12K X 8
Battery Back-up Capacity	10 days
Power Requirements	1 unit from Logic Power Supply 1 external power supply (1)
Opto Isolation	2500 V momentary
Temperature Rating	0 to 60 C 32 to 140 F
Humidity Rating	0 to 95 %
Power connections Wire Size	AWG No. 14 max.

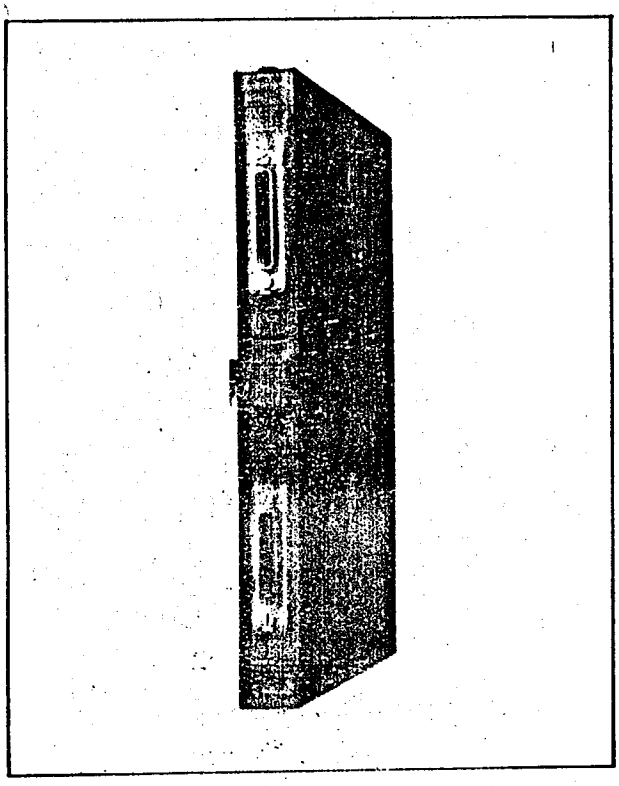

Figure 1 - Communication Module

(1) Recommended power supply Westinghouse equipment ref. nr. NCMPS 798

INTRODUCTION

The function of the Dual Port Communication Module is to accomplish exchange of information between PC700/900 control systems and all asynchronous RS232C/V24 devices, such as computers, Data Terminal Equipment, Data Communication Equipment Stepper Motor Control Units etc.
The connected peripherals communicate with the PC through interactive prom resided standard or customized software.

The Communication Module is a "double height" type. External power supply wiring to the Module is through terminals on the I/O Rack. For all applications the following power supplies are required.

- + 5.7 VDC - 0.5 A
- — 12 VDC - 30 mA
- + 12 VDC - 50 mA
- DC common for the +5.7V, —12V and +12V supplies.

The recommended power supply unit to provide these voltages is:

Westinghouse ref.nr. NCMPS 798.

If the EIA/RS232C to Current Loop Interface is installed (optional) the loop power can be provided by the communication Module or by an external power supply (jumper selectable).

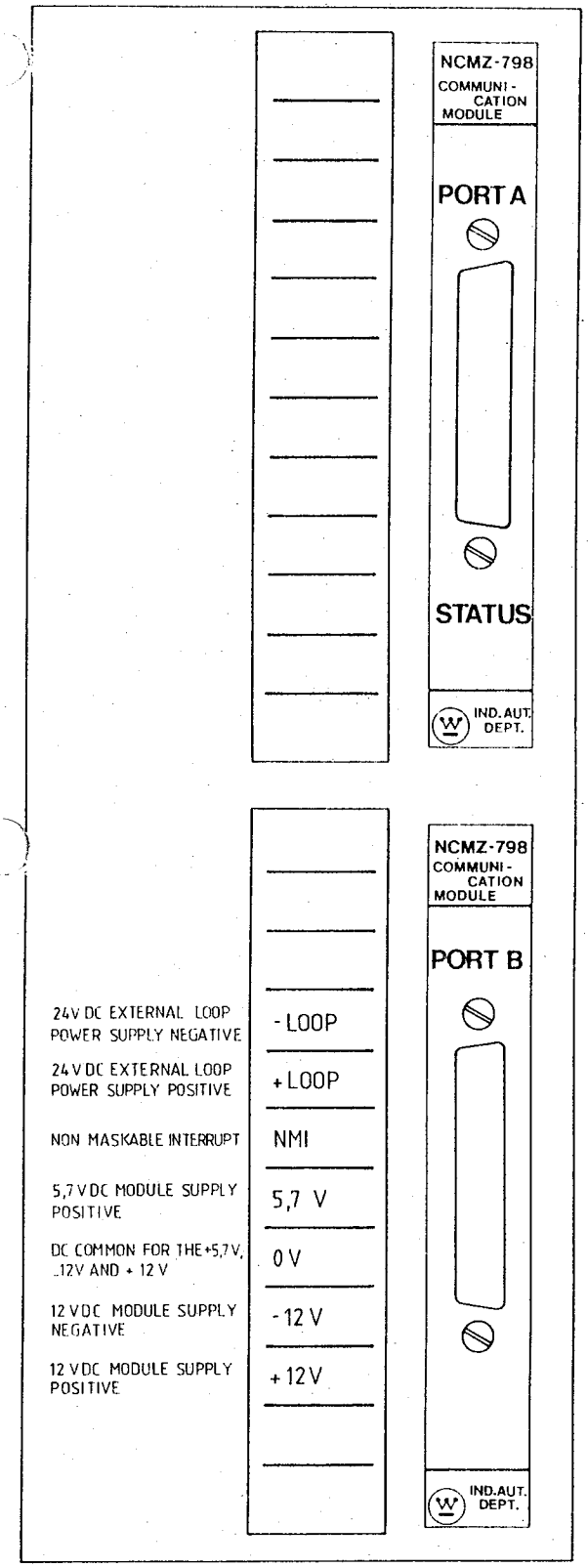

Figure 2 - Terminal Identification

For external loop supply, power connections shall be made for the terminals marked with "—loop" en "+ loop". More detailed information is presented later in this publication at 'Current Loop Option'.

The Module includes a pictorial lens which identifies the A and B port and the status indicator.

Also supplied with the module is a user Terminal Identification Strip which is to be filled in with wire numbers and applied to the I/O Rack next to the terminals.

MODULE USE

The Module-to-peripheral communication can be accomplished in 3 ways:

- Module-to RS232C/V24 standard Data Terminal Equipment
- Module-to RS232C/V24 standard Data Communication Equipment
- Module-to 20 mA Current Loop standard Equipment.

The set-up for Module to DTE or DCE connections is strapping selectable and individual for the two ports.
Detailed information for strap settings is described in section "Module related set-up notes".
If the current loop option is required, an EIA/RS232C to Current Loop interface module is inserted in board mounted sockets inside the Module.
Detailed information concerning installation and strap settings is described in section "Current Loop Option".

INSTALLATION

Proper Sequence — This installation procedure is divided into 3 distinct parts; refer to the following sections:

- Module Related Set-Up Notes
- Physical Placement
- Module-to Peripheral Connections

Prior to physical Module placement the various strapping selections must be made. For all these activities it is necessary to remove the module cover.

Removal of Module Cover

Step 1 — Remove the screw indicated with an arrow (see figure 3).

Step 2 — Lift the pvc snap-in plugs.

Step 3 — Lift the module gently from its enclosure.

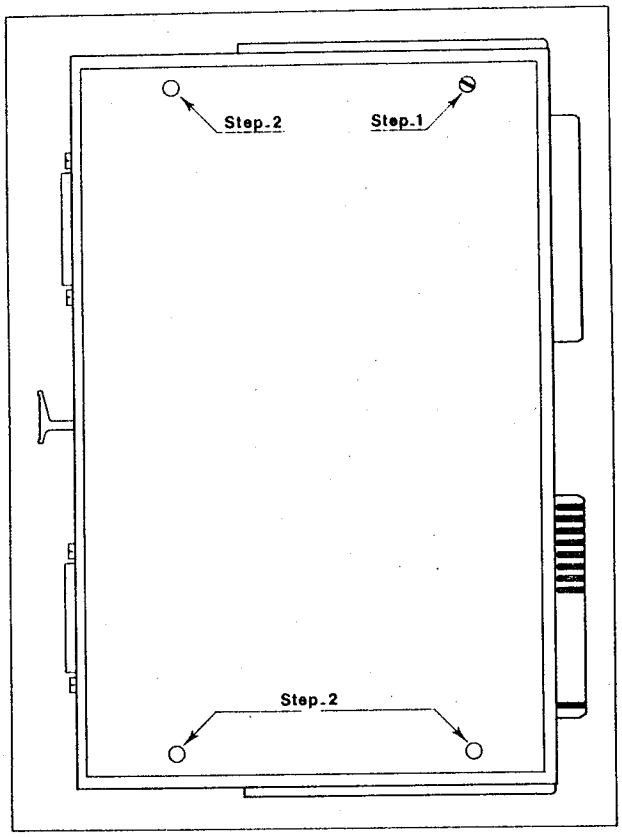

Figure 3 - Cover and Snop in Plug Locations

★ Caution ★

Protect the module hardware from metal chips and conductive particles which could cause short circuits and subsequent failure of the system when power is applied. Failure to observe this precaution may void the warranty.

Module Related Set-Up Notes

This section provides adequate information to adopt the Module Set-Up conform to the application requirements.

Baud Rate Selection — The Baud Rate is individually selectable for both communication channels (port A and B).

The Baud Rate Selection Strappings are located in the centre of the Module in the vicinity of U40. (See figure 4) The strappings are marked P-A and P-B for port A and B respectively.

The following Baud Rates can be selected:

150, 300, 600, 1200, 2400, 4800 and 9600 Baud.

On the module the Baud Rate range steps are indicated in Kilo Baud. To select the desired Baud Rate the two-pole shunt shall be placed on the relevant strappings thereby interconnecting the two strapping pins.

DTE - DCE Selection — The communication ports can accomodate both Data Terminal Equipment (DTE) and Data Communication Equipment (DCE).

The selection for communication with DTE or DCE can be made by strappings J-A and J-B for port A and B respectively.

These strappings are located in the vicinity of the communication port connectors. (see figure 4)

Figure 5 shows the electrical connections between the communication port connector and line driver/receiver circuitry when the strappings are set for Module-to DTE communication.

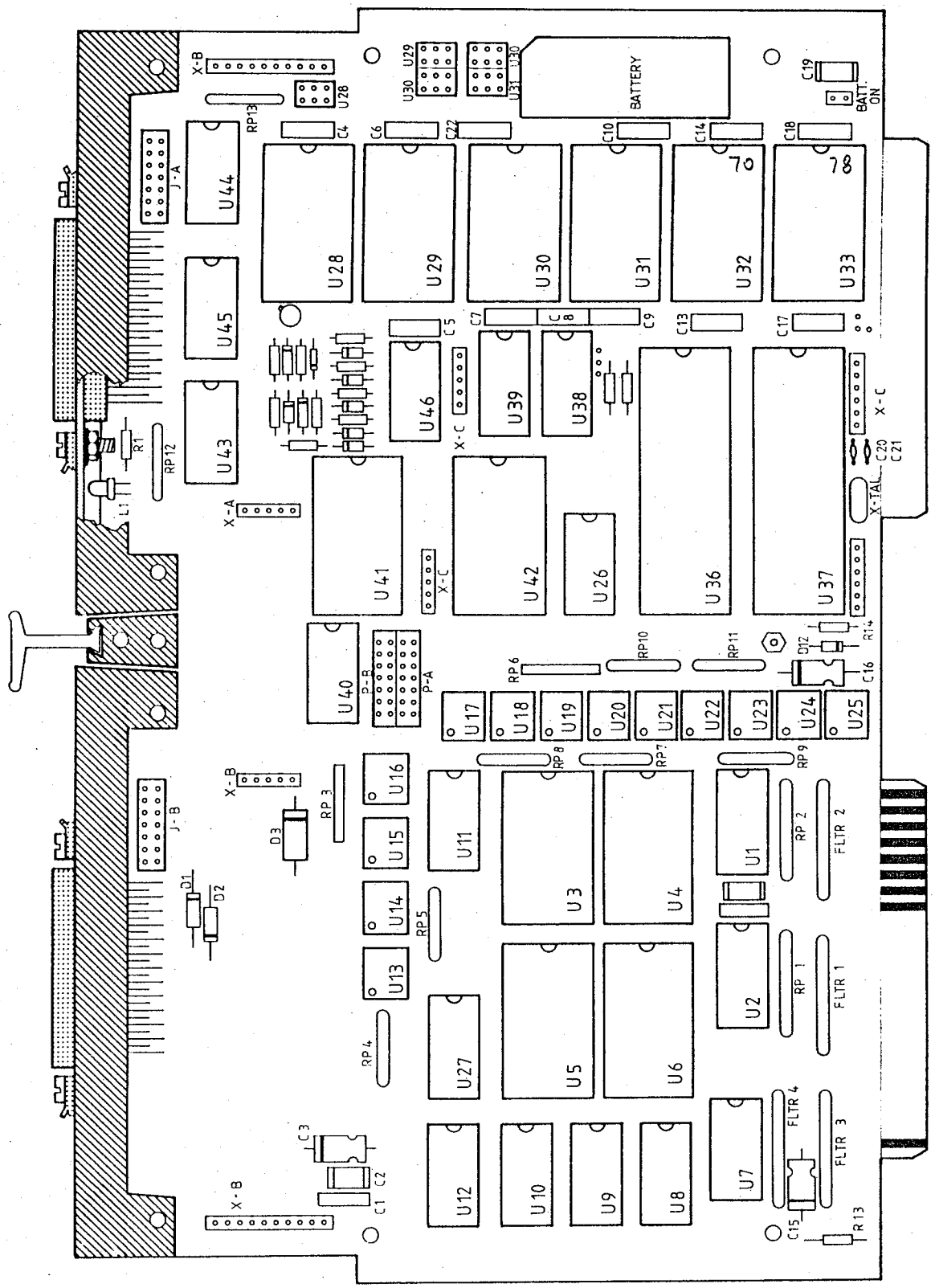

Figure 4 - Module Layout Drawing

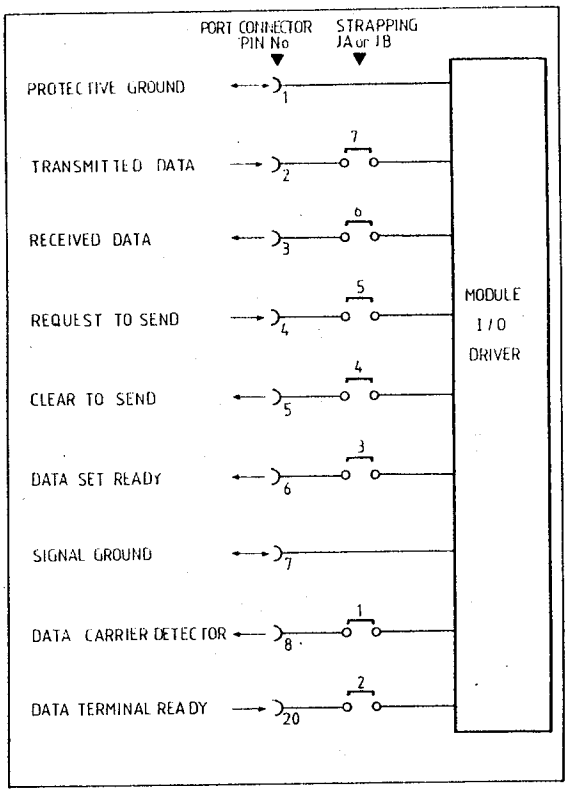

Figure 5 - Module-to-DTE Communication

As shown in figure 5, all shunts shall be placed on the J-A or J-B strappings to select Module-to-DTE communication.

Figure 6 shows the physical shunt locations associated with the connections for Module-to-DTE communication.

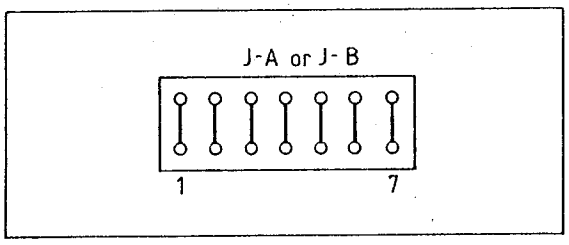

Figure 6 - Strapping Shunt Locations for Module-to-DTE Communication

Figure 7 shows the electrical connections between the communication port connector and line driver/receiver circuitry when the strappings are set for Module-to-DCE communication.

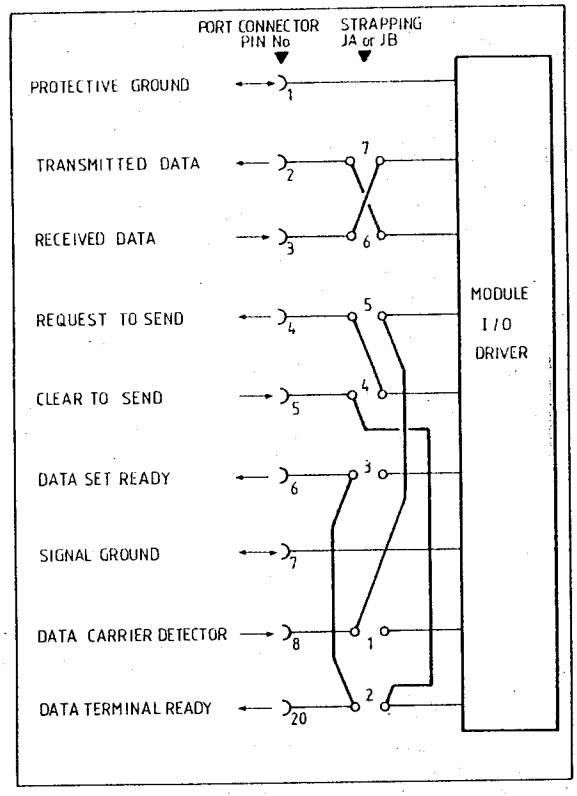

Figure 7 - Module-to-DCE Communication

As shown in figure 7 cross connections must be made on the J-A or J-B strappings to select Module-to-DCE connection.
Miniwrap technique is recommended to accomplish the required cross connections.
Figure 8 shows the physical strapping cross connection as required for Module-to-DCE communication.

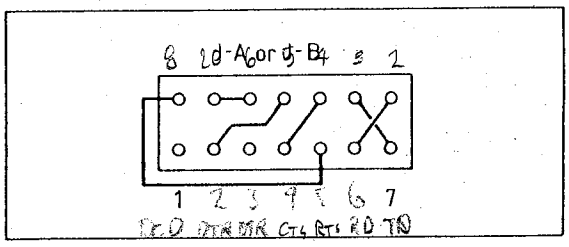

Figure 8 - Strapping cross connections for Module-to-DCE communication

Battery Back-Up Selection — To retain the RAM data in the event of a power outage the Module is provided with a Nickel-Cadmium battery. The battery can maintain the C-Mos memory for a period of minimal 10 days.
For shipment and storage and to facilitate maintenance the battery can be disconnected by removal of the shunt on the strapping marked "Batt On".
This strapping is located on the bottom right side of the module below the battery. (See fig. 4)

Current Loop Option — The EIA/RS232C to Current Loop Interface provides for opto-isolated communication with 20 mA Current Loop devices. This interface can be mounted for both communication channels individually. The interface must be placed in sockets X-A or X-B for port A or port B respectively.
These sockets are located near the Module front. (See figure 4)

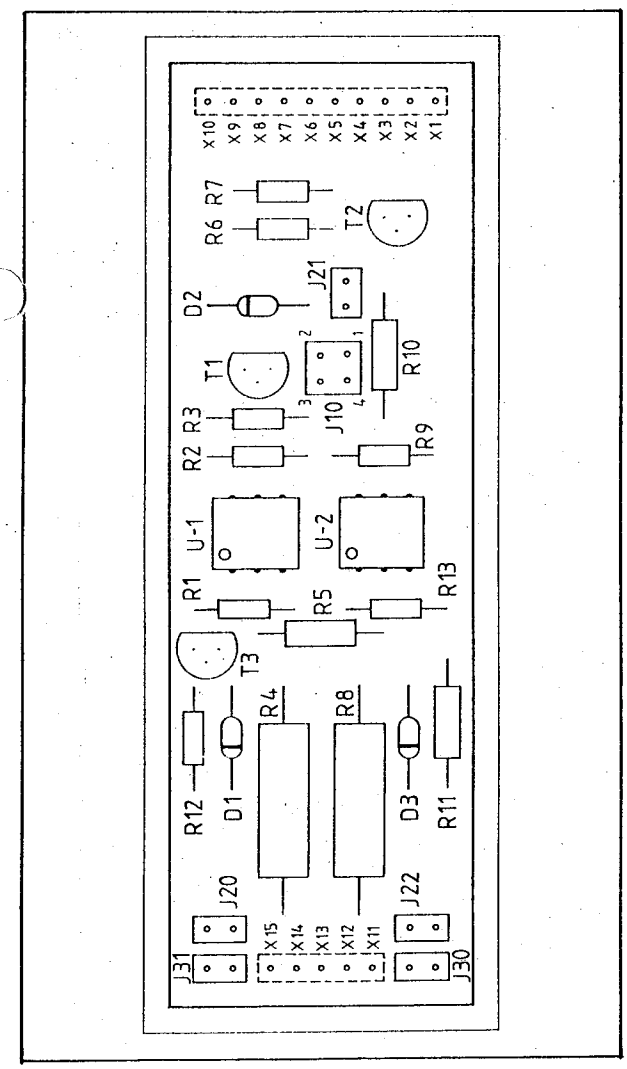

Figure 9 - EIA/RS232C to Current Loop Interface Component Layout

The interface is equipped with various two-pole strappings (see figure 9) to allow four different modes of operation:

- Module provided Loop Power
- External provided Loop Power
- Active Receiver Mode
- Passive Receiver Mode

The selection for **Module provided Loop Power** is made by placement of shunts on the following strappings:
J-30
J-31
No wiring shall be connected to the I/O Rack Terminals indicated '—Loop' and '+Loop' (see figure 2) in this mode of operation.
(Module provided Loop Power set-up shall not be applied when the communication cable length exceeds 70 feet)

The selection for **External provided Loop Power** is made by removal of the shunts from strappings J-30 and J-31.
The I/O Rack terminals indicated '—Loop' and '+Loop' must be connected to an appropriate 12Vdc Power supply in this mode of operation.

The selection for Module-or External provided Loop Power is always common for both the Transmit- and Receive circuit of one communication channel. (See figure 12)

*** Caution ***

If the selection is made for Module Provided Loop Power the 20 mA current loop communication cable is electrically connected to the Module power supply and consequently to the Module circuitry. Undue coupled surges in the communication cable caused by environmental noise sources may cause damage to the Module.
Therefore External Provided Loop Power shall be selected if the communication cable runs in high ambient noise environments.

The Transmit circuit is always 'active' i.e. it supplies the Loop Power. (See figure 12)
Consequently it can only communicate with 'passive' receive circuits.

The Receiver circuit can be selected to 'active' (providing the Loop Power) or 'passive' (receiving the Loop Power from the connected active transmitter).

Active Receiver Mode — is selected by placing two-pole shunts on strapping J-20 en J-21 (see figure 9) and 1 shunt on strapping J-10, as shown in figure 10.

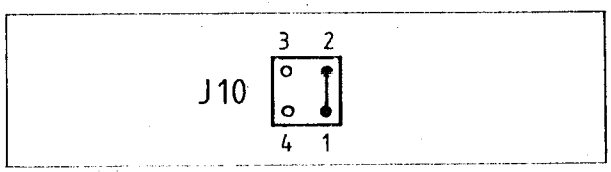

Figure 10 - Active Receiver Mode Shunt position for J-10

Passive Receiver Mode — is selected by removal of the shunts on strapping J-20 and J-21 and by placement of 2 shunts on strapping J-10, as shown in figure 11.

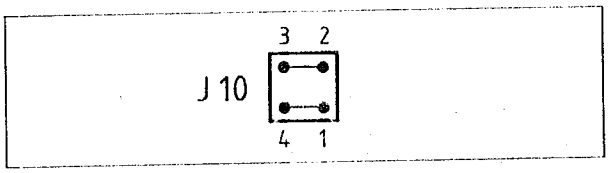

Figure 11 - Passive Receiver Mode Shunt position for J-10

Extended information concerning the Standard Software Packages for the Communication Module is described in the relevant "Communication Module Software Manuals".
If it is necessary to exchange the Software Packages, follow these steps:

Step 1 — Remove the Module enclosure. To do so, follow the steps described in section "Removal of Module Enclosure". (sh 3)

Step 2 — Remove the Proms containing the present Software Package, using an appropriate I.C. extraction tool. These two Proms are resided in the sockets marked U-32 and U-33.

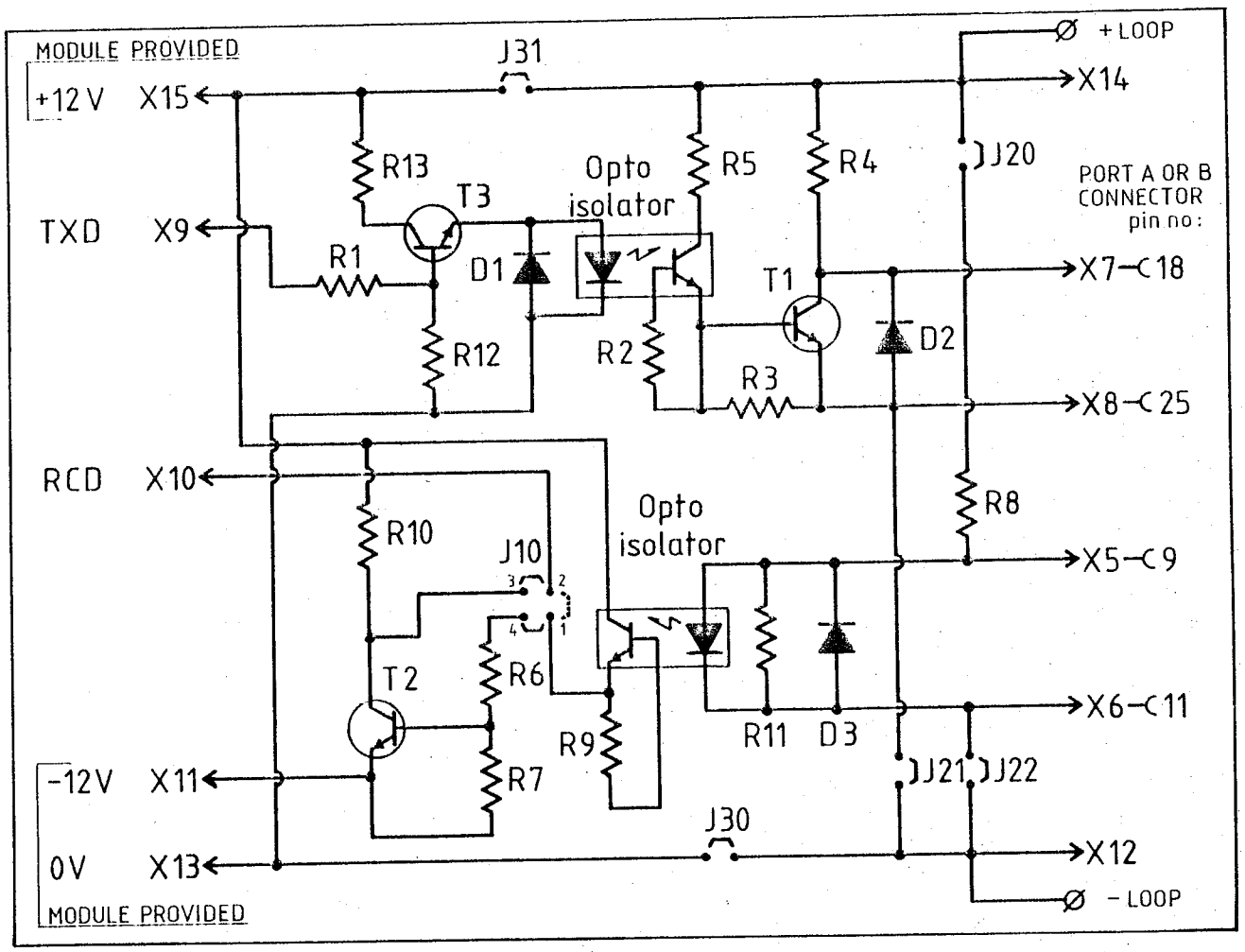

Figure 12 - EIA/RS232C to Current Loop Interface Circuit

Installation of the Software Package — Various Software Packages have been developed to support most customers Data Terminal Equipment Protocols.
Westinghouse can also provide user-specified programs.

Step 3 — Insert the new Software Package in the sockets for U-32 and U-33.
Be sure that the Prom number indicated on the attached label corresponds with the Prom socket number.
Pay attention to the polarity: the Proms must be inserted with the notch pointing at the Data Sentry Battery. (See figure 4)

Physical Placement — Verify that the module is set-up conform to the application requirements (Refer to section 'Module Related Set-Up Notes"). Installing the module is a simple process: slide it into 2 of 4 positions on an I/O Rack. To do so, follow these steps:

Step 1 — Refer to system drawings and determine which I/O Rack and which position in the Rack the module is to be placed.
(Although a module can be placed in either the upper 2 positions or the lower 2 positions it may not straddle positions B and C. See figure 13)
Also it is important that it is placed according to the user program Reference Number scheme.

Step 2 — Connect the power supply wiring to the I/O Rack terminals. (See figure 2)
For power requirements refer to section 'Introduction'.

Step 3 — Apply AC power to the entire application and verify that the voltage between the 5.7 VDC terminal (+) and the OV terminal (DC common) is + 5.7 V (± 0.25 V).
Also verify that the voltage between the —12V terminal (—) and the OV terminal is 12V (± 0.6V) and that the voltage between the + 12V terminal (+) and the OV terminal is 12V (± 0.6V).
If the Current Loop option with external loop power is applied, also verify that the voltage between the '—Loop' (—) and '+Loop' (+) is 12 VDC (± 1.2V).

Step 4 — If necessary adjust the external power supply's outputs to the required voltages.

Step 5 — Remove AC power from the entire application.

Step 6 — Move the appropriate Locking Bars on the I/O Racks built-in terminal blocks to the left in order to uncover the guide slots on the blocks. (See figures 13 and 14)

Step 7 — Align the module's guide pins with corresponding slots on the I/O Rack. Gently press the Module into the edge connectors on the Rack. Make sure the edge pins on the Module align and mate with the Rack connectors.

Step 8 — When the module is properly seated, snap the Rack's Locking Bars over the module's guide pins in order to hold it in place.

Step 9 — Apply the self adhesive Terminal Identification Strips, supplied with the Module to the terminal block's face.

Switch Settings — The module communicates with the PC700/900 processors through an Input- and an Output Register.
To assign the required Input- and Output Register Reference Number to the Module it is necessary to physically set the switches on the I/O Rack.

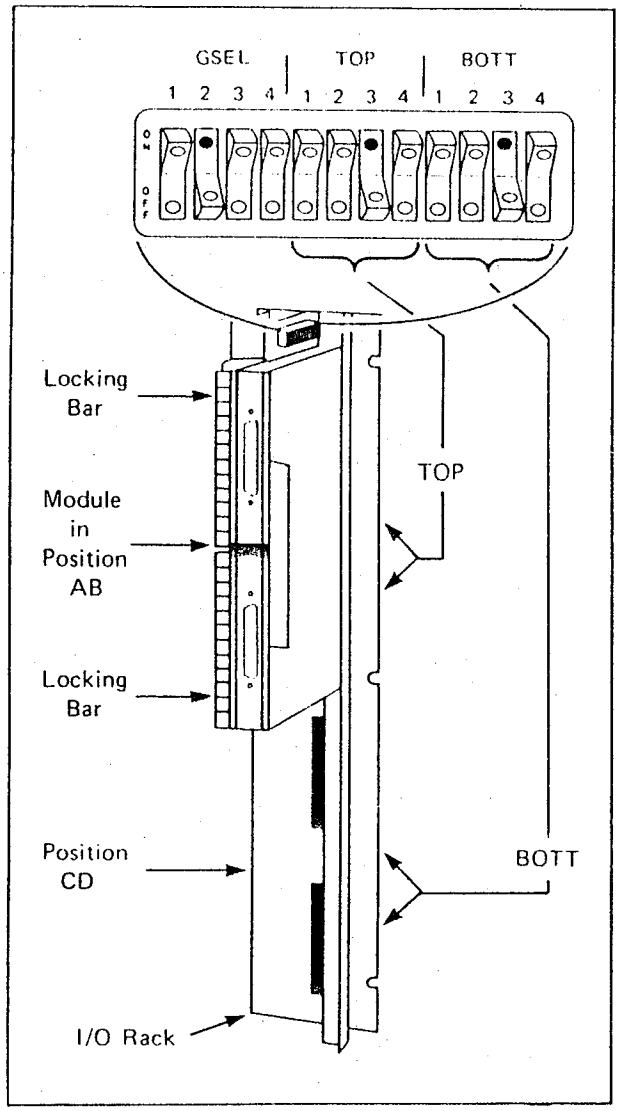

Figure 13 - Rack Switch Location

The switch setting procedure is different for the vertical type I/O Rack (NLR. 704) and the horizontal High Density I/O Racks (NLRH-704/708). If the module resides in a vertical I/O Rack, follow the steps under "NLR-704 SWITCH SETTINGS'.
If the Module resides in a horizontal High Density I/O Rack, follow the steps under "NLRH-704/708 SWITCH SETTINGS".

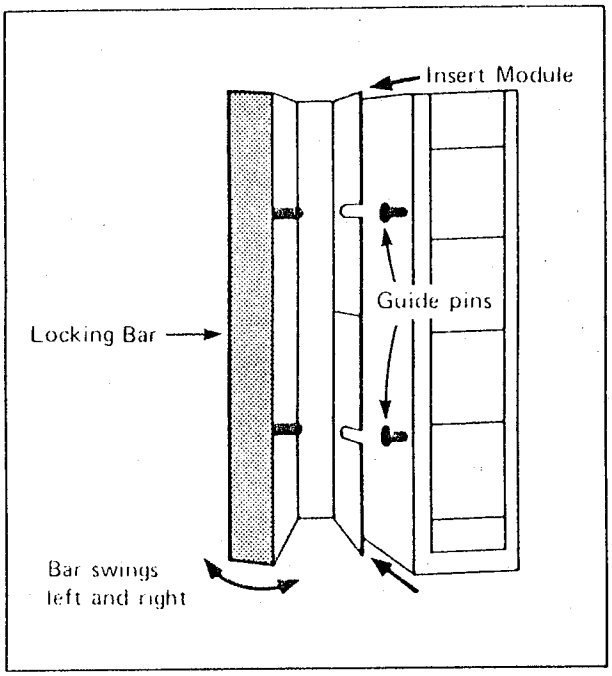

Figure 14 - Guide Slots

NLR-704 SWITCH SETTINGS

Step 1 — Determine which Input- and Output register have been assigned for the Module-to Processor communication. The system drawings should show this information.

Step 2 — Locate the first-used Communication Module on the system drawings and on the I/O Rack.

Step 3 — At the top right-hand side of that I/O Rack, locate the Rack Switch assembly. (See figure 13)
Note that it is divided into 3 groups of 4 rocker switches each. Locate those that make up the GSEL area.

It is necessary to set one of the 4 switches on the ON position according to the specific Reference Number.
Relate the number to Table A for the first Communication Module and for all other Communication Modules of this type in subsequent I/O Racks.

Step 4 — As indicated on the right column of Table A, set the proper switch to the ON position.

Table A

RACK SWITCH GSEL SETTING

If the Reference Number is:	Press ON GSEL Switch:
IR0001 thru 0008	1
IR0009 thru 0016	2
IR0017 thru 0024	3
IR0025 thru 0032	4

Step 5 — Set the remaining 3 switches in GSEL to the OFF position. (The 4 switches may be thought of as a type of selector switch)

Step 6 — Set 1 of the 8 rocker switches in the TOP and BOTT areas to the ON position. To determine which to press, use the Register Reference Number of the Module as determined in Step 1.
For example: IR and OR 1. Relate this number to table B and read across.

Step 7. — As indicated in Table B's center colomn set the proper switch to ON.

Example: What are the proper settings for a Communication Module placed in position CD if it has the Reference Numbers IR0008 and OR0008? Answer: GSEL 1 and BOTT 4 are set ON.

Step 8 — Place all remaining 10 switches in the OFF position. (As a trouble shooting aid, mark the settings on tape and place it near the assembly)

Step 9 — If a second Communication Module is used in the Rack, set the appropriate switch in the remaining TOP or BOTT area to ON. (Steps 6 and 7)

Table B

RACK SWITCH TOP/BOTT SETTINGS (1)

If the Reference Number is:	Press ON: Group	Press ON: Switch	Affects Position:
IR0001, 0009, 0017, 0025	TOP	1	AB
IR0002, 0010, 0018, 0026	BOTT	1	CD
IR0003, 0011, 0019, 0027	TOP	2	AB
IR0004, 0012, 0020, 0028	BOTT	2	CD
IR0005, 0013, 0021, 0029	TOP	3	AB
IR0006, 0014, 0022, 0030	BOTT	3	CD
IR0007, 0015, 0023, 0031	TOP	4	AB
IR0008, 0016, 0024, 0032	BOTT	4	CD

(1) In a correctly written program the Reference Numbers will be related to the Positions as shown here. (Thus IR0002 will never be in Position AB.)

NLRH-704/708 SWITCH SETTINGS

Step 1 — Determine which Input and Output Register have been assigned for the Module-to Processor Communication. The system drawings should show this information.

Step 2 — Locate the Communication Module on the system drawings and on the I/O Rack. This may be anywhere in the layout.

TABLE C

REGISTER FUNCTION SWITCH SETTINGS

Set left Rack Switch to position:	Registers automatically assigned to Rack slots: 1	2	3	4
1	0001	0002	0003	0004
2	0009	0010	0011	0012
3	0017	0018	0019	0020
4	0025	0026	0027	0028

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Set right Rack Switch to position:	Registers automatically assigned to Rack slots: 1	2	3	4
1	0005	0006	0007	0008
2	0013	0014	0015	0016
3	0021	0022	0023	0024
4	0029	0030	0031	0032

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Step 3 — Locate the I/O Rack Selector Switch. This switch is mounted on the I/O Rack base board and is only accessible when the Modules are removed.

Step 4 — Set the I/O Rack Selector Switch to the position corresponding with the In- and Output Register Reference Number as determined in step 1. (See Table C)

Example: What is the proper Selector Switch setting for a Communication Module placed in the third slot of a Horizontal Rack if it has the Reference Numbers IR 0011 and OR 0011?
Answer: position 2.

MODULE TO PERIPHERAL CONNECTIONS

In order to complete installation of the Communication Module, the electrical connection between Module and Peripheral must be made, as described earlier in this publication at "Module Use".
There are three methods to establish the Module-to Peripheral connection.
These methods are successively described in this section.

Module-to RS232C/V24 Standard Data Terminal Equipment Connection — When the Module has been set for communication to DTE (refer to section "Module Set-Up Notes"), the connection to Printers VDU's etc. can be made by simply interconnecting the Peripherals to the Module's Communication Port Connector by means of a standard RS232/V24 communication cable. In this set-up the Module communication function is comparable to a configuration where a VDU is connected to a computer, the Module acting as the computer. The Module's Communication Port Connectors accept male type communication cable connectors.
For maximum communication cable lengths and cable routings refer to section "Communication Cable Considerations".

★ Caution ★

RS232C/V24 standard Data Terminal Equipment may have minor deviations to the official RS232C/V24 definitions. Duly verify that the applied DTE communication connector signals are concurrent to the pin assignments and signal descriptions as shown in Table D.

Module-to DTE Communication Start-Up Sequence
-- For a proper start-up procedure follow these steps:

Step 1 — Verify that the DTE is set-up in accordance with the system requirements, and concurrent to the Module set-up.

Step 2 — Verify that the installation procedures as described earlier in this publication have been carried out.

Step 3 — Connect the communication cable to the DTE and to the Module Port (A or B) connector. The system drawings should show to which Port the DTE must be connected.

Step 4 — Apply power to the DTE.

Step 5 — Apply power to the entire application.

Module-to RS232C/V24 Standard Data Communication Equipment Connection — When the Module is used for communication to computers or remote Communication Modules (refer to section "Module Related Set-Up Notes") the Module-to Computer or Module-to Module connection can be established simply by interconnecting the equipment by a standard RS232/V24 communication cable.

In this set-up the Module communication function is comparable to a configuration where a VDU is connected to a computer, the Module acting as the VDU.

The Module's Communication Port Connectors accept male-type communication cable connectors only.

For maximum communication cable lengths and cable routings refer to section "Communication Cable Considerations".

*** Caution ***

RS232C/V24 standard Data Communication Equipment may have minor deviations to the official RS232C/V24 definitions.
Duly verify that the applied DCE communication signals comply with the pin assignments and signal descriptions as shown in Table E.

Module-to Module Communication — Only if the communication cable length does not exceed 15 meter, Module-to Module communication is possible using the RS232C/V24 connection without application of Modems or Current - Loop Interfaces. Obviously in such a configuration one of the Modules must be set-up for communication to DTE, the other Module must be set-up for Module-to DCE communication. The communication cable must interconnect pins 1 thru 8 and pin 20 of Communication Port Connectors of the modules concerned.

Module-to 20 mA Current Loop Standard Equipment Connection. — To connect the Module to 20 mA Standard Equipment follow the typical connection diagram in figure 15.

Note that for "Current - Loop Communication" the handshake signals inherent to the "RS232C/V24 Communication" are unused.
Communication Port Pin 4, 8 and 20 must therefore be interconnected, thus providing the Module Communication Port with the proper signal levels, which are essential for Data Communication through this Port.

For Module-to 20 mA Current Loop Standard Equipment communication, the related Communication Port must be set-up for "Module-to DTE Communication". (See figure 5 and 6)

For maximum communication cable lengths refer to section "Communication Cable Considerations".

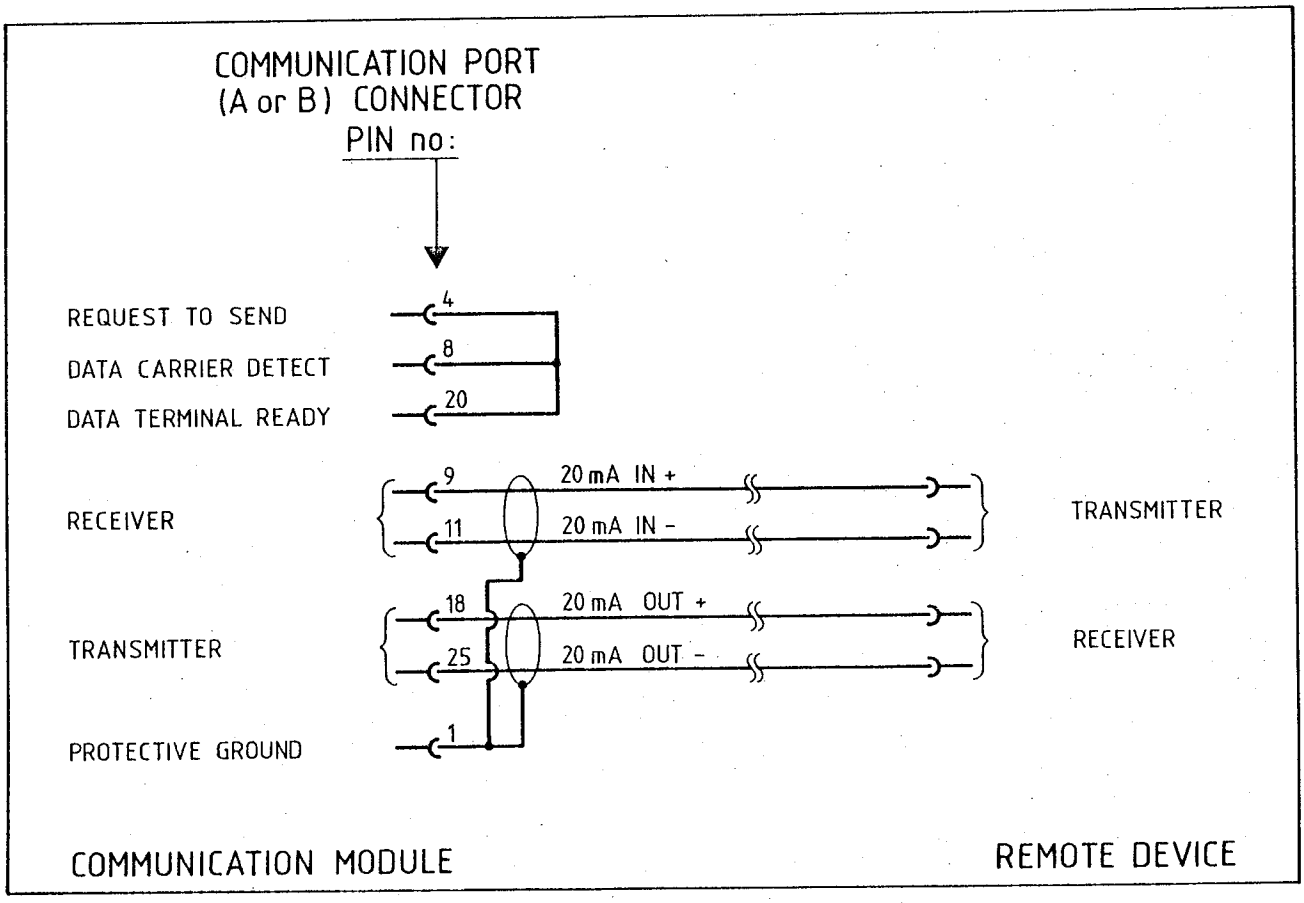

Figure 15 - Module-to Current Loop Equipment Communication Connection Diagram

Module-to DCE communication start-up sequence
— For a proper start-up procedure follow the same procedure as described for Module-to DTE communication start-up procedure. Substituting "DEC" each time "DTE" is read.

Table D

Communication Port (A or B) Pin Assignments

(Set-up for Module to DTE communication)

PIN NO	SIGNAL DESCRIPTION	V24 CIRCUIT	DESCRIPTION
1	Protective Ground		This conductor is electrically bonded to the Module enclosure.
2	Transmitted Data	103	This conductor transfers Data from the DTE to the Module.
3	Received Data	104	This conductor transfers Data from the Module to the DTE.
4	Request to Send	105	The signal on this circuit, when high, prepares the Module for Data transfer.
5	Clear to Send	106	The signal on this circuit, when high, indicates the Module is ready to transmit Data.
6	Data Set Ready	107	The signal on this circuit is a high level when the Module is operating and indicates to the DTE that the Module is ready.
7	Signal Ground	102	This connector establishes the signal common return.
8	Data Carrier Detector	109	This signal on this circuit is a high level when the module is in operation.
20	Data Terminal Ready	108	The signal on this circuit, when high, indicates to the Module that the connected Data Terminal Equipment is ready.

Table E

Communication Port (A or B) Pin Assignments

(Set-up for Module to DCE communication)

PIN NO	SIGNAL DESCRIPTION	V24 CIRCUIT	DESCRIPTION
1	Protective Ground		This conductor is electrically bonded to the Module enclosure.
2	Transmitted Data	103	This conductor transfers Data from the Module to the DCE.
3	Received Data	104	This conductor transfers Data from the DCE to the Module.
4	Request to Send	105	The signal on this circuit, when high, indicates the Module is ready to transmit Data.
5	Clear to Send	106	The signal on this circuit, when high, indicates to the Module that the connected Data Communication Equipment is ready.
6	Data Set Ready	107	The signal on this circuit is a high level when the Module is connected to the DCE and indicates to the Module that the DCE is ready.
7	Signal Ground	102	This conductor establishes the signal common return.
8	Data Carrier Detector	109	The signal on this conductor, when high, prepares the Module for Data transfer.
20	Data Terminal Ready	108	The signal on this circuit is a high level when the Module is connected to the DCE and indicates the DCE that the Module is connected.

Module-to Current Loop Standard Equipment Communication start-up procedure — For a proper start-up procedure follow these steps:

Step 1 — Verify that the DTE is set-up in accordance with the system requirements and concurrent to the Module set-up.

Step 2 — Verify that the installation procedures as described earlier in this publication have been carried out.

Step 3 — Connect the communication cable as prepared in accordance with figure 15 to the DTE and to the Module Port (A or B) connector. The system drawings should show to which Port the DTE must be connected.

Step 4 — Apply power to the DTE.

Step 5 — Apply power to the entire application.

Communication Ports of the Local and the Remote Communication Module must be set-up for "Module-to DTE Communication". (See figure 5 and 6)
The communication cable shield(s) must be connected to pin 1 of one of the Modules only.

For maximum communication cable lengths refer to section "Communication Cable Considerations".

20 mA Current Loop Module-to Module Communication start-up procedure — For a proper start-up procedure follow these steps:

Step 1 — Verify that the Modules are set-up in accordance with the system requirements.

Step 2 — Check that the relevant Communication Port Baud Rate settings of the Local and Remote Module are identical and that the mode of Communication is set for "Module-to DTE Communication". (See figure 5 and 6)

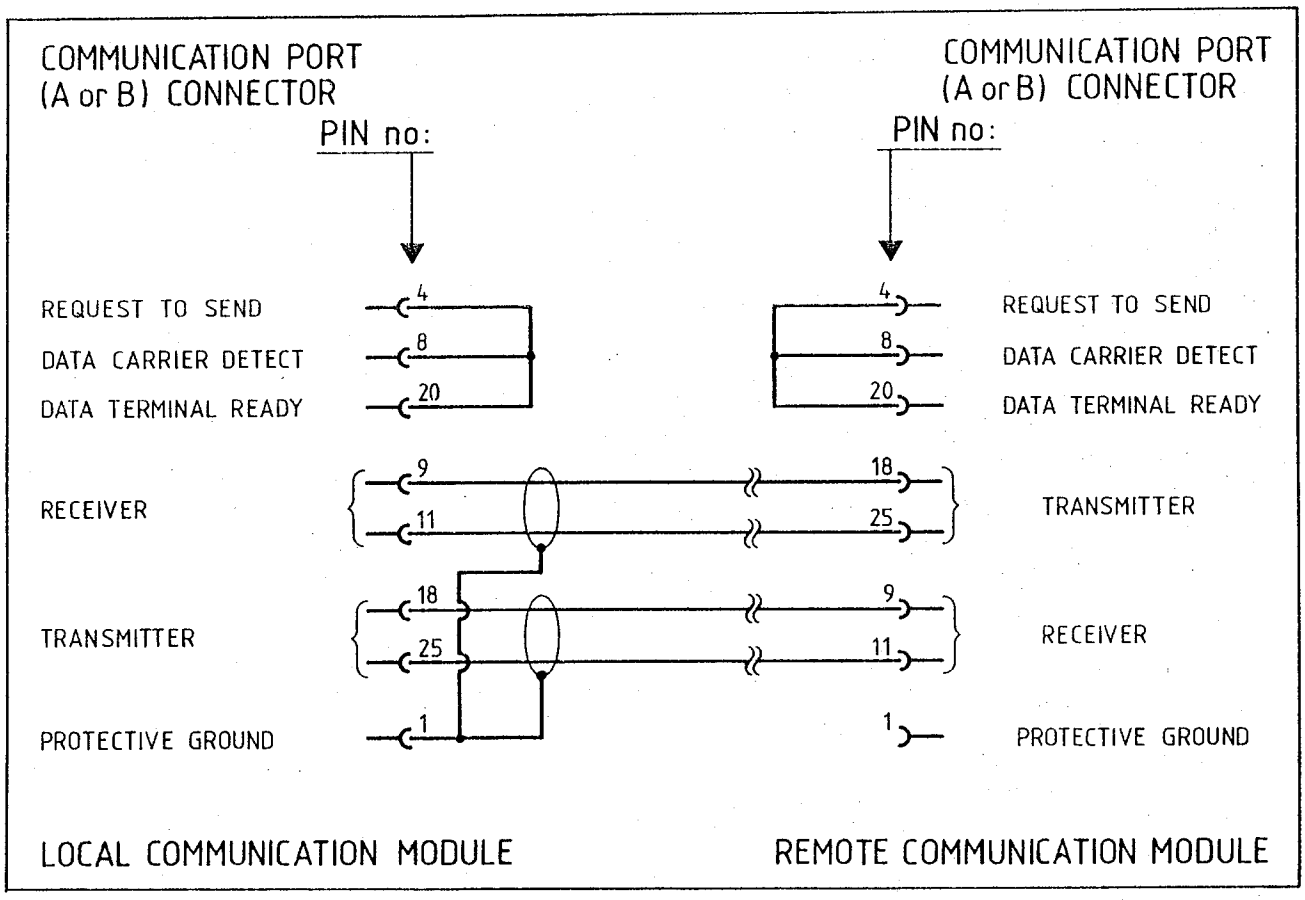

Figure 16 - 20 mA Current Loop Module-to Module Communication Connection Diagram

20 mA Current Loop Module-to Module Communication — Mutual exchange of information between two remote PC systems can be established using a Communication Module with Current - Loop Option at both sides.
To interconnect the two Communication Modules follow the typical connection diagram in figure 16. The relevant

Step 3 — Connect the communication cable as prepared in accordance with figure 16 to both Communication Module Port (A or B) Connectors. (The system drawings should show to which Port).

Step 4 — Apply power to the entire application.

Communication Cable Considerations

Normally the Data Terminal Equipment is located adjacent to the Communication Module, so that length of cabling between the DTE and the Communication Module is less than 50 feet.
Occasionally however a user specifies a remote location for the DTE, some distance away from the PC system itself.
Considerably greater distances than 50 feet are possible: the exact maximum distance is dependent upon the data rate, the amount of ambient noise present in the environment. the type of cable used, the DTE detailed circuit design and the application. Certainly printer or CRT output containing a good deal of text which would be read by an operator is much less sensitive to occasional data transfer errors than control type inputs to the PC system from a data terminal keyboard or from a remote PC System's Communication Module.
Normally the only error correction in such applications is that of the individual character parity, plus whatever functional application error checking is done within the PC System itself.

Since the ambient noise and exact detail application are never fully known, it is difficult to specify a maximum distance where the remote DTE or Communication Module may be located.
Officialy RS232C is limited to a 50 - foot cable length, while the 20 mA Current Loop has no formal official standard.
Practically RS232C generally is applied within its formal 50-foot limitation; if greater distances are required, additional equipment in the form of Modulator - Demodulator devices ('Modems') is used.
The situation is not as clear with the 20 mA Current Loop option. A conservative set of rules for Current Loop operation are maximum cable lengths of 1000 Feet at 110 Baud, 400 Feet at 300 Baud and 100 Feet at 1200 Baud. Generally, a Baud is one bit/second and 10 bits are used to transmit one character so that Baud/10 = characters/second).
These rules are admittedly conservative, however, much greater distances (a factor of 10 in some instances) being achievable under the right conditions. A reasonable approach is to exceed the above guidelines dependent on the application and the options to correct a poor error rate.
For instance, can the Baud Rate easily be reduced (as far as the Communication Module is concerned it can) and is the lower Baud Rate satisfactory?
Can questionable data be recalled for a second look? In any event, Modems can always be added in the field to upgrade the communication link.

Cabling practices naturally depend upon the length of the cable. Twisted, shielded cable can be used in lengths of about 25 feet or less to connect the Communication Module and the DTE located next to it.
A typical selection is a 10 conductor, 22 AWG, seven strand by 30, shielded, all twisted together audio cable.

For longer lengths involving locating the DTE outside the immediate area of the Communication Module, subject to the above restrictions and comments, 22 AWG shielded twisted pair is recommended.

In applying these cables, normal quiet wiring techniques apply. The shield should be grounded solidly at one point only and the cable should not be run in the same conduit or trays with high power, noise generating conductors.
Several twisted pairs serving different 20 mA Current Loop or nine wire RS232C devices may be located in the same cable, however. All these cables are normally terminated at the DTE and Communication Module end by a so called "EIA 25-pin connector".

APPLICATION NOTES

As for as the Module hardware is concerned, Communication Port A en B are indentical.
In most Software Packages Port A is designated to communicate with a Video Display Unit with keyboard while Port B is designated for a printer or casette loader.

PROGRAMMING NOTES

The ultimate performance of a PC system along with a Communication Module depends on the interaction between the Module resided Software Package and the PC user program.
Without a PC user program no communication between the Module and the PC is possible. The PC user program criteria for communication with the Module are described in the respective software documentation.

FUNCTIONAL THEORY

When power is applied to the Module the micro processor starts to execute the prom resided program.
During the PC I/O update cycle, the address of the Module assigned In- and Output register appears on the PC I/O bus.
This event is detected by the decode logic in consequence of which an interrupt is given to the micro processor.
When an interrupt is recognized by the micro processor, it completes its current instruction and the executes a routine in which it updates the latches containing the assigned In- and Output register data. When the update routine is completed it resumes execution of the previous interrupted program. When no interrupt routine is serviced and no peripheral In- and Output data are processed, the micro processor utilizes the idle time for extra integrity checks.

Power requirements — Regardless of whether the PC 700 or PC 900 is used, the Module's circuitry uses 1 unit of power from the logic Power Supply.
This supply powers the Register Decode Logic and the I/O bus latches. The Module also requires an external +5,7 VDC, + 12 VDC and — 12 VDC supply as specified earlier in this publication at "Introduction".
The 5,7 VDC supply powers the control area, memory and I/O drivers.
The + and — 12 VDC supply powers the RS232 (line drivers and receiver) and optional the Current Loop Interface if it is selected for "Module Provided Loop Power".

CIRCUIT DESCRIPTION

This description provides a quick overview of the Module's major circuit components and their functions. It is not necessary to read this information in order to install or use the unit. (See figure 16)

Decode Logic — This circuitry yields a digital signal when the Module assigned Input and Output Reference number is present on the PC I/O bus. This digital signal interrupts the micro processor and controls the storage latches to prevent that the PC updates the storage latch data while the Micro processor reads these data and conversely.

Storage Latches — These devices receive binary data from the Processor's Output Register during the I/O updata scan and hold the data for use by the Micro Processor.
They are also used to receive and hold data from the Micro Processor for transfer to the Processor's Input Register during the I/O update scan.

Opto Isolators — Electrically isolate the data transfer between the Storage Latches and the Micro Processor's I/O driver and also transfer and electrically isolate the Decode Logic output signal to the Micro Processor.

Control Area — Actually is a micro computer that, executing the installed program, acts as an interface between the peripherals and the PC I/O bus.
It communicates with the peripherals through the Peripheral Interface Adapters and RS232C Voltage Level Interfaces. It communicates with the PC I/O bus through the I/O driver, Opto couplers and Storage Latches.

Current Loop Interface — Converts the standard EIA RS232C voltage Level Interface to a 20 mA Current Loop Interface.

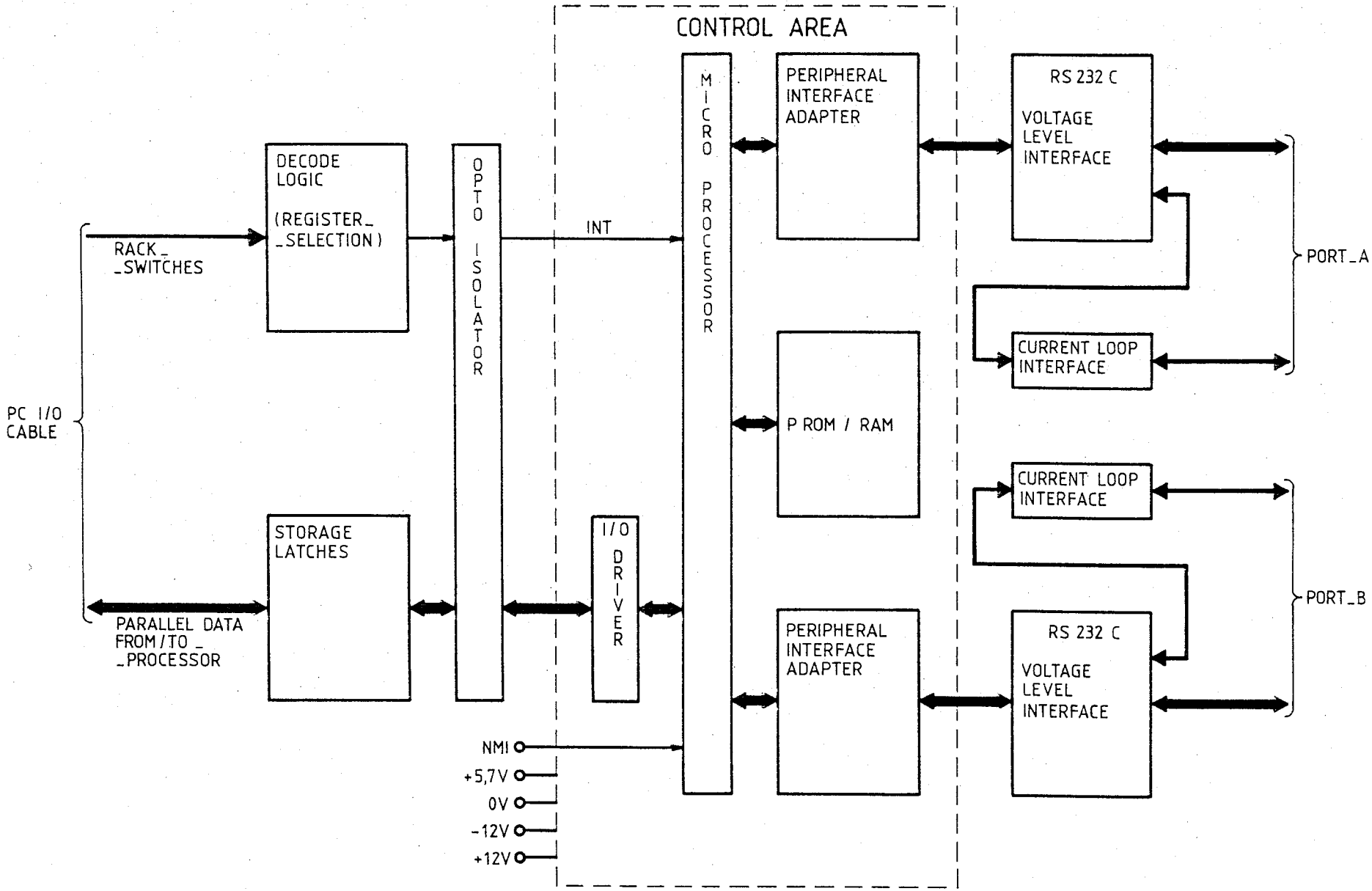

Figure 17 - Communication Module: Conceptual Block

ORDER INFORMATION

The complete ordering code for the communication module is derived as follows:

NCMZ—798—.—..

Ram Battery Back-Up

Capacity for 10 days — A
Capacity for 10 years— B

Sofware Packages

Ref.Nr.		
SP-798-11.	128 alarmtext monitor with 40 character messages.	-11
SP-798-12.	256 alarmtext monitor with 25 character messages.	-12
SP-798-41.	Basic interpreter	-41
SP-798-51.	Event recording interface, 128 messages of 57 char.	-51
SP-798-52.	Event recording interface, 256 messages of 27 char.	-52
SP-798-61.	Radial communication network.	-61
SP-798-71.	Personal computer interface	-71
Sp-798-81.	Multidrop network masterinterface	-81
SP-798-82.	Multidrop network slave interface	-82
Sp-798-91.	Interface to Modicon Modbus System	-91

The NCMZ-798 module is shipped with the following baud rate/communication settings:

Baud rates : refer to the appropriate software manual.
Communication modes: Module to DTE.

Order No. Current Loop Interface: NCMCL-798

Order No. Powersupply : NCMPS-798-(Specify primary voltages, 240, 220, 120 or 110VAC).

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Supersedes all previous issues

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