



Connexions 2



User & Installation Manual
RS-232 Radio Paging System

PREFACE

Important Installation Information

It is the purchasers' responsibility to determine the suitability of this equipment and its derivatives for any given application, Scope cannot give specific advice in this manual, as each use will require independent evaluation.

Scope has, wherever possible, employed extra safeguards or designed optional equipment to further monitor the system's performance. Certain system installations, operational requirements or budgets may, however, limit the effectiveness of these safeguards. Again, the suitability of the system for any given application must therefore be decided by the installer and their customer, relative to the application and risk.

Licence

This equipment is cleared for use within the USA under a license assigned to the exclusive importer, PIPS Holdings Inc. License No. 950415906. Certain restrictions apply in respect of power output and antenna installations.

Alternative frequencies are available by formal license application (Form 600) via the FCC. These will not be subject to the same restrictions as the standard assigned license. You should obtain the FCC Rules and Regulations, Title 47, Part 80 to End, including Parts 90 and 95, available from the US Gov. Printing Office, GPO Bookstore, FCC Office or www.fcc.gov/oet/info/rules/

Important Safety Information

Scope products are designed to operate safely when installed and used according to general safety practices. The following requirements should be observed at all times.

Do NOT subject this equipment to:

- Mechanical shock
- Excessive humidity or moisture
- Extremes of temperature
- Corrosive liquids

This equipment is designed for indoor use, unless expressly stated otherwise, and must not be used in classified Hazardous Areas, including areas containing explosive or flammable vapors, unless express authorization has been given in writing by the manufacturer. If in doubt, consult your local product dealer for further information.

Do not obstruct any slots or openings in the product. These are provided for ventilation to ensure reliable operation of the product and to protect it from overheating.

Only use a damp cloth for cleaning (not liquid or aerosol based cleaners), and ensure that any power is removed from the unit prior to beginning the cleaning operation.

Removal of covers from the equipment must only be undertaken by authorized service personnel, who must ensure that power is isolated prior to removal.

PREFACE

Equipment Applications

It is the user's responsibility to determine the suitability of the Scope products for any given application. Scope, including its subsidiaries and Distributors, cannot provide specific advice within this manual, as each application will require independent evaluation. Common sense dictates that certain applications may require back up systems to cover in the event of mains or equipment failure. All applications should be thoroughly assessed by the installer in conjunction with the customer so as to minimize risk. Scope has no control of the use and application of the frequencies issued by the FCC. Some equipment that is individually licensed may have a greater degree of protection than other equipment that is operated on a FCC License Assignment basis. The following information, however, may be of benefit.

Equipment Testing.

Range tests should be carried out at least once a week on portable radio equipment, more often when critical criteria apply. This should involve testing the unit past the limit of its required working range. Good working practice dictates that a suitable system installation log, covering both portable and fixed equipment must be generated, together with a record of the dates when the system has been manually checked and/or serviced, (with the aid of suitable test equipment etc.) enabling the system performance to be compared with the original installation data.

The frequency of the tests required will vary between applications. If portable equipment has been dropped or is worn by a person involved in an accident, the unit should be tested again before re-use. It must be stressed that the physical range tests are essential and that any construction work or movement of plant or equipment could alter the signaling capability of the unit. Radio equipment, like any other requires servicing from time to time to ensure that it is operating to its optimum performance. It is therefore essential that equipment is inspected and tested by authorized service centers at least once a year.

Literature

Scope Marketing (Communications UK) Ltd, the manufacturer, in conjunction with its distributors operates a policy of continual improvement, and therefore reserve the right to modify or change any specifications without prior notice.

While every possible care has been taken in the preparation of this manual, Scope does not accept any liability for technical or typographical errors or omissions contained herein, nor for incidental or consequential damage arising from the use of this material.

Installation

Installation must only be undertaken by an Approved contractor, who shall ensure that all work is carried out in compliance with the appropriate State and Federal Regulations. For mains powered equipment, a readily accessible isolating fuse or socket must be located within 1 meter of the equipment.

Liability

Scope does not accept liability for any damage or injury, howsoever caused as the result of misuse of this equipment. It is the responsibility of the user to ensure that the equipment is operated in the manner for which it was intended and that it is the correct item of equipment for the required task.

PREFACE

Warranty

This product is warranted as free from defects of workmanship and materials for a period of one year from the original purchase date. During this time, if there is a defect or malfunction of this product, Scope will, with proof of purchase, repair or replace at its discretion any defective parts, free of charge. This does not include where the adjustments, parts and repair are necessary due to circumstances beyond the control of Scope, including but not limited to fire or other casualty, accident, neglect, abuse, abnormal use or battery leakage damage.

There are no other expressed or implied warranties except as stated herein, and those excluded include those of merchantability and fitness for a particular purpose. In no event will Scope or any of its agents be liable for direct, indirect, special incidental or consequential damages resulting from any defect in the product, even if advised of the possibility of such damages.

The warranties and remedies set forth above are exclusive and in lieu of all others, oral or written, expressed or implied. No Scope distributor, dealer, agent or employee is authorized to make any modification, extension or addition to this warranty.

Some states do not allow limitations on how long an implied warranty may last and some states do not allow exclusions or limitation of incidental or consequential damages.

Warning ! No User Serviceable Parts

Alteration or modification to any part of this equipment, without the prior written consent of the manufacturer, will invalidate all manufacturer approvals and warranties. No adjustments can be undertaken except by qualified and licensed persons as defined by the FCC Rules and Regulations. Operation of altered equipment can result in fines, imprisonment, and/or confiscation of such equipment.

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System Overview

The Scope ConneXions II is a POCSAG data display radio paging system which can be used to transmit both text and numeric messages direct to pocket pagers carried by individuals or entire groups. Information is input by way of three RS232 serial ports. The unit can also be used in conjunction with an optional telephone interface, thereby enabling any telephone within the building or complex of buildings to access the paging system. Up to 9,999 pagers can be supported on any one system.

Base Equipment type & description:	Connexions II Multi Port, Mains Paging Transmitter with 10 Dry Contacts
Transmitter FCC ID:	JRNUSASERILINK
Transmitting Frequency:	457.575 or 457.550 MHz*
Effective Range:	Up to 1 mile with standard antenna♦

*or as specified on separate configuration sheet

♦optional external aerials and amplifiers available for greater range

Section 1: Installation

The information contained in this Section is intended for use by authorized system installation engineers only. Unqualified personnel should not undertake installation of this equipment under any circumstances whatsoever.

Sitting of the hardware

Before locating the hardware in any given location, it is important to take into account the range of operation that you require to obtain from your system. The standard transmitter can quite easily provide ranges of up to a mile or more and will provide excellent propagation on most industrial sites, covering a considerable area with just a quarter wave antenna (BNC terminated) connected directly to the unit.

For coverage of very large sites, or where exceptionally difficult operating conditions exist, it may be advantageous to install an external antenna. Installing the transmitter on the second or third floor of a building will more often than not boost overall range. However, horizontal range is not always required as much as propagation through a multi-storey building. Here it may be more useful to use a small external antenna mounted outside the building at half the building height. Sometimes range is required more in one direction than in the other: moving the aerial to one side of the building can provide a bias in the required direction, which may overcome the range difficulties. (See section: **Other Antennas**).

Important: coaxial feeds over 5 metres must employ low loss 50 ohm coax. We normally do not recommend feeds of more than 15 metres for standard applications. However, we suggest you contact our technical department where other considerations may prove this to be impractical.

A further consideration is the distance between the transmitter and the source of the data feeding the transmitter. With a standard RS232 serial interface, data cables should not exceed **15 metres**. These cables should be screened/shielded and must be kept clear of sources of induced magnetic or electrical noise. In the event that distances of over 15 metres are required, additional drivers or amplifiers must be installed at both ends of the data link.

Some major points to consider when installing equipment:

- 1 Never install antennas near or adjacent to telephone, public address or data communication lines or overhead power cables.
- 2 Avoid, where ever possible, running antenna coax alongside other cables.
- 3 Avoid mounting the transmitter in suspended ceiling voids, or in the immediate vicinity of telephone exchanges or computer equipment.
- 4 Always use proprietary 50 ohm coaxial cable between the antenna and the transmitter. If cable runs exceed 5 metres, always use low loss 50 ohm cable such as RG213, UR67 or equivalent.

Coaxial cable intended for TV, Satellite or CCTV installations is normally 75 OHM and therefore totally unsuitable for any transmitter installation manufactured by Scope.

- 5 Also remember that the performance of the system will be affected by the type of material the unit is mounted on and its surroundings.

The following is a list of materials that this transmitter will be adversely affected by if mounted on or if mounted in close proximity to:

- a) Foil back wall board
- b) Metal mesh or wire reinforced glass
- c) Metal sheeting, large mirrors or suspended ceilings
- d) Lift shafts

All of the above can reflect radio waves and thereby reduce the capability of the transmitter to perform its desired functions.

- 6 The circuit boards within this equipment may be harmed by Electrostatic Discharge (ESD). Installers should avoid touching the circuitry wherever possible, and should ensure that adequate anti-static procedures are adhered to at all times (earth bonding with wrist straps, etc).
- 7 **Warning!** Never transmit without an aerial attached to the transmitter
- 8 **Warning!** Carefully check the **Installation** section in this manual covering data pin connections prior to installation. Damage caused by incorrect connection is the responsibility of the installer!

Installation

The following procedure must be adhered to when installing the ConneXions paging system. Ensure you have taken into consideration all of the above information before selecting the location for your transmitter. If in doubt, contact the supplier for further advice.

- 1 Remove the cover from the ConneXions II transmitter unit by slackening the four Pozi head screws located at the top and bottom of the unit (see Diagram 1).
- 2 Carefully lift off the cover and set aside.
- 3 The transmitter should be fixed to an even wall surface using suitable screws fitted through the holes provided in the chassis plate. Hold the chassis up to the chosen location and with the aid of a pencil mark the position of the mounting holes.

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Warning: Do not use the chassis plate as a template for drilling the holes into the wall. Hammer drills vibrating through the chassis may irreparably damage the quartz crystals on the printed circuit boards.

- Place the ConneXions transmitter over the mounting holes and secure the unit with suitable screws. Check that the chassis plate does not bend and that the screws do not snag or pinch any of the internal cables.
- Connect the antenna to the unit via the BNC connector located at the top of the housing. If the antenna is an external antenna, or an antenna which is separate from the transmitter unit itself, ensure that the previous criteria covered under the section headed **Siting of the Hardware**, have been strictly adhered to (also see section headed **Other Antennas**).
- It is important to note that due to the number of interfaces brought out to the 9-way 'D' connector, great care should be taken to use only the lines which are applicable to your installation. Failure to comply with this instruction will almost certainly DESTROY the unit.
In your application the transcoder has been configured for a total of three RS232 inputs.

PL3 and PL2 SERIAL PORTS (9 way D type plug)

PIN	SIGNAL	DIRECTION
1	N/C	
2	RECEIVE DATA	(RX) IN
3	TRANSMIT DATA	(TX) OUT
4	DATA TERMINAL READY (DTR)	OUT
5	GROUND	(GND)
6	N/C	
7	REQUEST TO SEND	(RTS) OUT
8	CLEAR TO SEND	(CTS) IN
9	+5V	(for Scope peripherals)

PL1 SERIAL PORT (25 way D type plug)

PIN	SIGNAL	DIRECTION
2	TRANSMIT DATA	(TX) OUT
3	RECEIVE DATA	(RX) IN
4	REQUEST TO SEND	(RTS) OUT
5	CLEAR TO SEND	(CTS) IN
7	GROUND	(GND)
19	+5V	(for Scope peripherals)
20	DATA TERMINAL READY (DTR)	OUT

As information passes only from the host equipment to the ConneXions transcoder, you will only need to read the DTR line which if high shows that power is applied to the ConneXions unit. The RTS line will be high at the ConneXions port when the transcoder is ready to receive data. The ConneXions RTS line should be connected to the host CTS line to facilitate correct handshaking. Prior to connecting the data cable(s), thoroughly check the system pin connections as shown above.

Note: the default comms Baud rate settings are as follows:

PL3 = 9600 Baud

PL1 and PL2 = 1200 Baud

(these are factory set in software and are not hardware adjustable)

PL1 DRY CONTACTS (25 way D PLUG)

<u>PIN</u>	<u>DESCRIPTION</u>	<u>DEFAULT STATE</u>	<u>DEFAULT MESSAGE</u>
21	DRY CONTACT NO. 1	NORMALLY OPEN	ALARM 1
9	DRY CONTACT NO. 2	NORMALLY OPEN	ALARM 2
13	DRY CONTACT NO. 3	NORMALLY OPEN	ALARM 3
25	DRY CONTACT NO. 4	NORMALLY OPEN	ALARM 4
12	DRY CONTACT NO. 5	NORMALLY OPEN	ALARM 5
24	DRY CONTACT NO. 6	NORMALLY OPEN	ALARM 6
11	DRY CONTACT NO. 7	NORMALLY OPEN	ALARM 7
23	DRY CONTACT NO. 8	NORMALLY OPEN	ALARM 8
10	DRY CONTACT NO. 9	NORMALLY OPEN	ALARM 9
22	DRY CONTACT NO. 10	NORMALLY OPEN	ALARM 10

Switching any of the above pins to the Common (Ground) pin 7 will trigger the respective alarm.

Note: the pre-programmed messages required for each contact, if different from the default, must be specified at time of ordering.

- 7 If the unit is supplied with a sealed lead acid battery, connect the battery leads to the terminals marked BATT+ and BATT- on the power supply

+ (Positive) = Black+White stripe - (Negative) = Black

- 8 Replace the cover and re-tighten the four retaining screws.
- 9 Finally, after checking all connections, insert the mains cable supplied into the **IEC** type connector located at the base of the unit and plug in to a suitable earthed, switched wall outlet. With mains power applied, the red LED on the base of the unit should be lit.
- 10 The system is now ready to accept calls from the host terminal. When a call is transmitted, the green LED on the base of the unit will light momentarily.

Radio Transmission Baud Rate

This is fixed at the factory to suit the pagers supplied and will normally be set at either 512 or 1200 baud. Please refer to the separate configuration sheet and/or delivery note supplied with your unit.

Cable Diagram for 9-Pin Communication Ports

<u>Pin #</u>	<u>Pin #</u>
1-N/C	1-N/C
2	3
3	2
4	6
5	5
6	4
7	8
8	7
9	9

9Pin to 25Pin Direct Connect

Computer Serial Port to ConneXions 9Pin Port

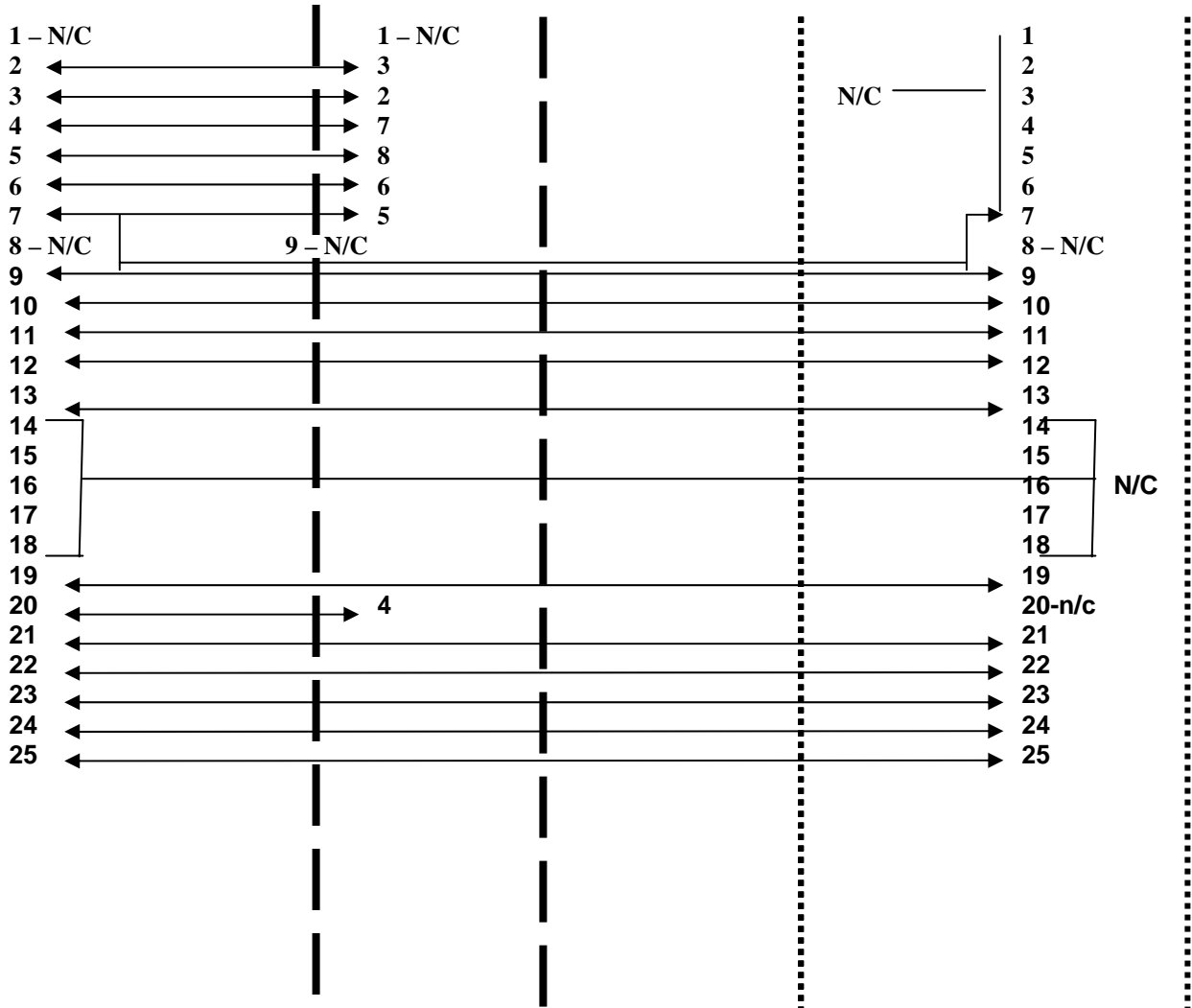
<u>9Pin</u>	<u>25Pin</u>
2	2
3	3
4	6
5	7
7	5
8	4

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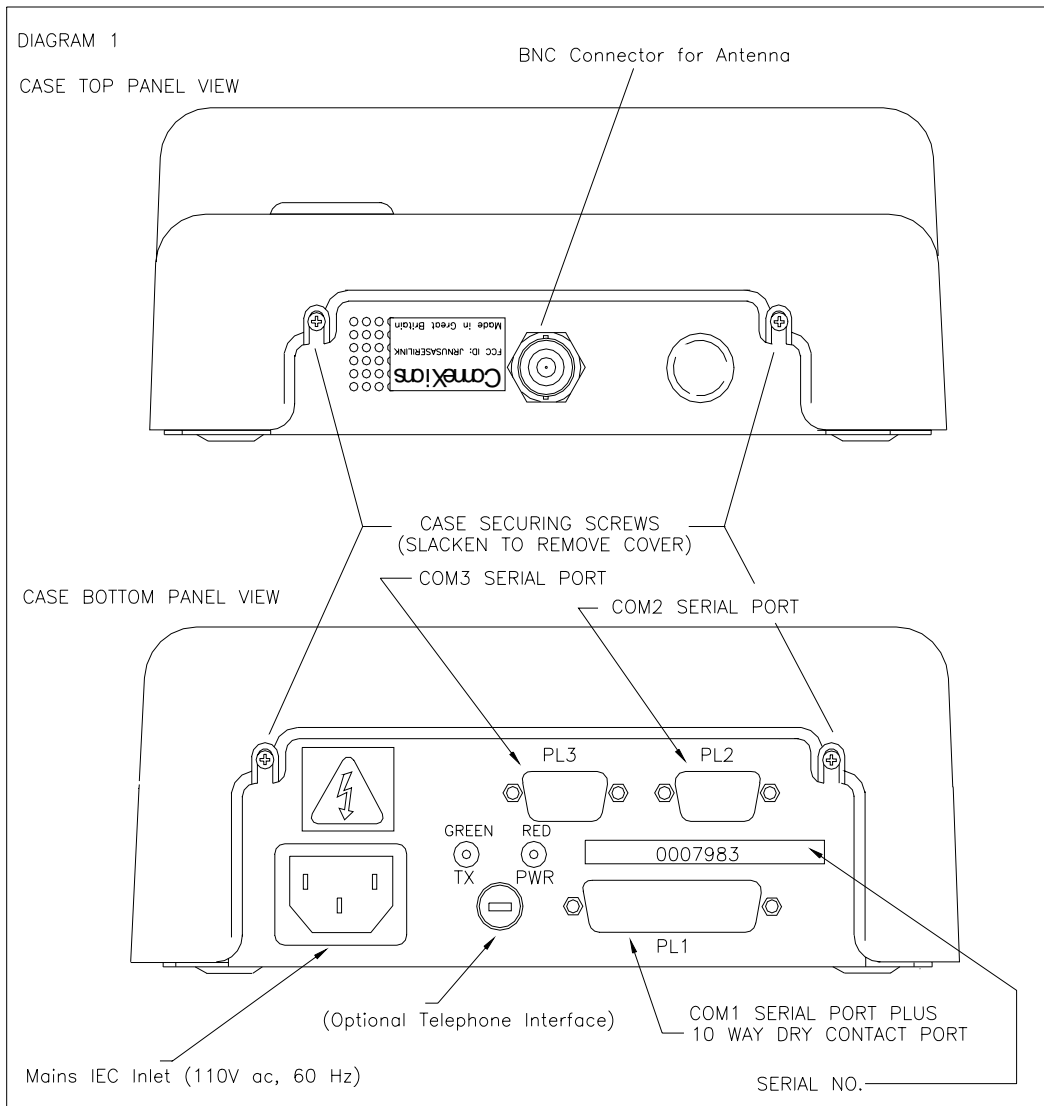
**25-Pin D-Shell
On ConneXions**

**9-Pin Connector
for Paging data input**

**25-Pin Connector
for Dry Contact Input**



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Section 2: System Operation.

Confirmation of power connection is by way of the red LED on the base of the transcoder console.

Confirmation of transmit is provided by way of the momentary green LED on the base of the transcoder console.

Sending data in the correct format (see Technical Section, **Calling Pagers**) will invoke transmitted messages to the relevant pagers.

Problems and Fault Finding.

- 1 Check and re-check the data cable connections. This, together with an incorrect signalling format, result in more faults than any other problem.
- 2 Check that the communications Baud rate of the host equipment matches that of the relevant RS232 port (see page 7 for settings).
- 3 Check that the pagers are at least 3 metres from the transmitter and aerial. Under certain conditions it is possible to flood the pager receivers and corrupt the data received.
- 4 Check that the pagers have the battery installed with the correct polarity and are correctly powered up.
- 5 Check that the red power LED on the base of the ConneXions is lit. If not, isolate the power and check the fuse in the mains plug. The Scope mains input fuse on the integral power supply and the low voltage output fuse may also be checked by a suitably qualified technician.
- 6 Check that the green LED lights for the duration of the transmission. If not, go back to the data cabling and re-check the signal format.
- 7 Check that the aerial is correctly installed.

Dry Contacts

The contacts are provided with default messages "Alarm 1" through "Alarm 10" and will call logical pager number 1 unless the messages have been customized at the time of placing the order.

Warning! Voltages applied to any of these contacts will cause irreparable damage!

This unit supports 10 dry (volt-free) contacts, which, when switched to Common (Pin 7), will send a pre-programmed message to a particular pager address (which could be to an individual, a group or all pager operatives at the same time). These messages are pre-programmed and can only be changed by qualified service personnel. See page 7 for D connector pin out details.

The trigger time required to send a message must be greater than **1 second**.

Individual messages can be sent upon both changes of state with a maximum alphanumeric length of 80 characters or 20 numeric digits.

As a default, contacts are programmed as Normally Open (N/O), with a repeat transmission every 15 seconds if still active. The repeat time can be incremented in ten second intervals up to a maximum of 15 intervals.

Note: repeats not available where contacts are programmed as Normally Closed or Change of State.

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DRY CONTACT MESSAGES (must be specified when ordering)

No.	MESSAGE (max 80 characters alphanumeric or 20 characters numeric)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

For information on individual pager types, refer to the appropriate pager manual
For information on use with the telephone I/F, refer to the separate Telephone Interface manual.

System Specification

Mains Input:	110V 60Hz
Mains Power Consumption:	10W max
System Operating Voltage:	13.8V dc
System Power Consumption:	less than *50mA standby, 300mA (transmit)

Transmitter:

Frequency Range:	450-470 MHz
Channel Spacing:	25 KHz
TX Baud Rate:	512 or 1200 (default 1200)
FCC ID No.	JRNUSASERILINK

General:

Ports:

Serial Ports:	PL1,PL2 & PL3
Data Rate:	300, 600, 1200, 2400, 4800, or 9600 (default 9600)
Port configuration:	8,N,1 (default)
Protocol:	Scope (default)
Footprint (mm):	♦328 (L) x 190 (W) x 75 (D) max

*dependent on system configuration

♦excluding aerial

Scope's policy is one of continuous development and specifications are subject to change without notice

Section 3: Technical Information

This section provides a more in depth understanding of how messages are formatted for serial communication from a host. It need only be studied by those intending to write their own serial communication software.

Calling Pagers

Pagers all use 7 digit numeric addresses which enables the system to support thousands of pagers without identity clashes. Most pagers will support multiple addresses (sometimes referred to as CAP codes, RIC's or identities). This enables the pager not only to respond to its own unique address but also to respond to group or global addresses.

These **real** 7 digit numeric codes are often substituted for shorter **logical** numbers which are easier to remember. Under these conditions the host or speciality program within the transcoder will perform an algorithm on the data string received to convert the simpler **logical** number back into a **real** 7 digit number for transmission.

For improved data recovery without error the **real** 7 digit pager numbers are always spaced 8 digits apart.

To avoid system identity clashes, transcoders are provided with a base number within the range of 1000 to 1,999,000. If for example a base address of 0100,000 is applied to a transcoder, the first **real** pager number will 0100,008 followed by 0100,016 and so on.

Logical pager numbers are normally used on systems fitted with the telephone interface and those which are interfaced to personal computers. The algorithm would perform the following function:-

For example take the **logical** pager number of 123

The **logical** pager number 123 will be multiplied by 8 and then added to the base number to provide the 7 digit **real** number

Logical No					Base No				Real No
123	x	8	=	984	+	0100,000	=		0100984

Pager address 1 is normally reserved as the personal identity for that specific pager. Other addresses, of which there can be 6 or more, can be tagged to specific pagers to form selected groups. Address 2 could, for example, be used for all pagers to formulate a global call.

Address codes can be divided between full addresses and sub addresses. Full addresses can allow four different beep types, A, B, C or D, whereas sub-addresses will only accommodate a fixed beep type. A status line of information will normally be provided on the pager screen which will highlight the type of beep sent together with other status information.

Numeric Pagers

Example serial message string:-

N0012300A1234567890<CR>

The 'N' informs the transcoder that this message is destined for a Numeric pager. Any data not preceded by this will be ignored.

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Next follows the 7 digit pager identity number. All seven digits must be used.

The letter following the identity is the beep type of which there are four valid characters, A, B, C or D.

Next follows the message to be transmitted, which can include:

0-9, space, -(hyphen), 'U' (letter U for 'U'rgent), [,] open/close square brackets, (open square brackets can also be used to identify the letter 'C' for 'C'ancel). The final character sent is 'carriage return' which is not transmitted but represents the end of message marker.

On sending a message to the unit in the correct format the transcoder will immediately recompose the string into the POCSAG format and transmit the same at the pre-programmed baud rate. This will be accompanied by the green LED lighting for the same period to show that data is being transmitted. The time taken to transmit the message is dependent upon the pager baud rate. For 512 baud this is approximately 4 seconds, whilst at 1200 baud the time is approximately 2 seconds. The unit can accept sequential data at 9600 baud which will be buffered and dealt with as soon as the preceding transmission has ended. The RTS line from the transcoder will only go high in the unlikely event that the message buffer is full.

Alphanumeric Pagers

Example serial message string:- A0012300A This is a message <CR>

The data format is exactly as for numeric pagers, except that the recognition character at the front of the message is changed from an 'N' to an 'A'.

Transmission baud rate: in the above example, the default baud rate is sent. To change the transmission baud rate in a message string, placing a letter "N" after the "A" will alter it to 512 baud. Placing a letter "F" after the "A" will alter it to 1200 baud.

The default setting for the ConneXions V7 is 1200 baud.

Appendix A

Industry Communications Protocols

This section deals with the serial data formats commonly used within the On-site Paging Industry. Scope has its own proprietary protocol, but can for certain systems provide a number of other industry-recognized protocols. **Warning!** Check the protocols available for any given unit before quoting for a specific application. Maximum permissible message lengths will apply. Numeric will always limit to 20 digits. Alphanumeric will depend upon the product in question or the software issue employed. Check before quoting or ordering.

Scope Protocol

Numeric Pagers

Example serial message string transmitted from the host to the transceiver:-

```
N0012300A1234567890<CR>
```

The 'N' informs the transcoder that this message is destined for a Numeric pager. Any data not preceded by this will be ignored. The maximum message length within the characters allowed for the Numeric transmission format is 20.

Next follows the 7digit pager identity number. All seven digits must be used.

The letter following the identity is the beep type of which there are four valid characters, A, B, C or D.

Next follows the message to be transmitted, which can include:

0-9, space, -(hyphen), 'U' (letter U for 'U'rgent), [,] open/close square brackets, (open square brackets can also be used to identify the letter 'C' for 'C'ancel). The final character sent is 'carriage return' <CR>, which is not transmitted but represents the end of message marker.

On sending a message to the unit in the correct format the transcoder will immediately recompose the string into the POCSAG format and transmit the same at the pre-programmed baud rate. The time taken to transmit the message is dependent upon the pager baud rate and the length of the message string.

Alphanumeric Pagers

Example serial message string:- A0012300A This is a message <CR>

The data format is exactly as for numeric pagers, except that the recognition character at the front of the message is changed from an 'N' to an 'A' and the data can include the ISO 646 character set (full alphabet including both upper and lower case). The maximum message length will be from 512 to 2,000 characters depending on the software issue installed.

Transmission baud rate: in the above example, the default baud rate is sent. To change the transmission baud rate in a message string, placing a letter "N" after the "A" will alter it to 512 baud. Placing a letter "F" after the "A" will alter it to 1200 baud.

The default setting for transmission to pagers on Scope transmitters is 1200 baud

Appendix A

Comp 2 or People Finder Protocol

The system must be programmed with valid pager types or ranges. The system can be configured as Numeric, Alphanumeric or mixed. In the case of mixed systems the ranges must be defined at the time of ordering within the overall range 1 through 9,999. E.g. this could be ID 1 to 1000 reserved for numeric and 1001 to 9,999 for Alphanumeric. Remember that the range selected must allow for Group Calls as well as individual pager ID's. The reason for the range requirement is due to the change in the transmitted data word format under the POCSAG standard, coupled with the fact that the serial data provided by the host under this format does not allow the transcoder to differentiate between numeric and alphanumeric data formats.

Example Numeric serial message string transmitted from the host to the transceiver:-

1234A<CR>1234567890U[-] <CR>

The data starts with a one to four digit number followed by a beep type, (A,B,C or D) and then a 'carriage return' <CR>. This is then followed by the message (20 digits max) and another 'carriage return' <CR>.

On sending a message to the unit in the correct format the transcoder will immediately recompose the string into the POCSAG format and transmit the same at the pre-programmed baud rate. The time taken to transmit the message is dependent upon the pager baud rate and the length of the message string.

Example Alphanumeric serial message string:-

1234A<CR> This is a message <CR>

The sequence is exactly the same as for Numeric data except that the information transmitted can include the ISO 646 character set (full alphabet including both upper and lower case).

Comp 2 can also provide message prioritization on certain Scope systems equipped with message buffering. This utilizes the A,B,C,D beep type to set the level of priority. Certain Scope products will also accept this format without the beep type included in the message string. This will invoke a default beep type being inserted by the transcoder.

Comp 1 Protocol

This is a simplistic interface which accepts a serial data string from the host and adds a single cap ID or address to the string enabling it to be transmitted to pagers globally.

Example Alphanumeric serial message string:-

This is a message <CR>

On receiving a valid message string the transcoder will immediately add the pre-programmed ID and beep type, recompose it into the POCSAG format and transmit the same at the pre-programmed baud rate. The time taken to transmit the message is dependent upon the pager baud rate and the length of the message string.

Appendix A

TAP - (T)elocator (A)lphanumeric (P)rotocol:

TAP is commonly used in the wide-area paging industry, generally between remote transmitting stations via a modem. Its' advantage lies in the two-way nature of the communications link, and using checksums, the ability to request retransmissions in the event that an error is detected by the receiving station.

There are two optional parameters: the **password** and a **sign-off text message**, and either or both of these can be included.

Scope TAP implementation adheres strictly to the Version 1.8 specification, and will allow both of these parameters to be defined or left out. If a password is not programmed into the system, it will not expect one, the same goes for the sign-off string, if the entry is blank it will not appear.

A typical TAP transaction is as follows:

- 1 The caller makes sure the receiving station is connected by requesting a response.
- 2 The receiving station responds with a request for the identity of the caller, in this case the enquiry consists of the text string 'ID='.
- 3 The caller then sends a string to identify the protocol it intends to use, and a password if this is required.
- 4 If the receiving station accepts the response and password it acknowledges the fact and then requests the sender deliver the message it is holding for transmission.
- 5 The sender transmits the pager number and text message to deliver, and attaches a checksum based on the contents of the data transmitted. (see example below).
- 6 The receiving station computes the checksum from the received data and if it matches the appended checksum of the received data, acknowledges the fact or requests a re-transmission of the data if this is not the case.
- 7 The sending station will then either request another message block is transmitted, or indicate to the remote station that the transaction is complete.
- 8 Once all the data has been sent, and the sending station indicates this fact, the receiving station will optionally send a sign-off message, and instruct the sender to terminate the link. If no sign-off message is included, only the link termination command is issued.

On a modem-connected link, this would be the point at which the line is dropped by both sides. On a permanent link, the sender and receiving station return to their normal handshake exchanges to verify the link, or cease communication until another transaction is required.

These steps are normally limited to a set number of attempts, due mainly to the requirement that a telephone or modem link should not be maintained indefinitely. For this reason there are also time constraints which specify how long to wait for a given response.

These 'retry' numbers and time limits are the other 'flexible' options in the TAP protocol. The Scope system allows the installer to specify these values for themselves to suit the application to which the protocol is applied.

Appendix A

Example of typical Command-Acknowledge Sequence:

<p>CALLER</p> <p><CR> every 1 second unit.....</p> <p><ESC>PG1<CR></p> <p><STX>1<CR>TEST<CR><ETX>190<CR> ("TEST" is the message) ("190" is the Checksum)</p>	<p>RECEIVING STATION</p> <p>ID=</p> <p><ESC>[p<CR></p> <p>Processing-Please Wait<CR><ACK><CR></p> <p>+++,,,,,,,,,ATHO<CR> Carrier Drop</p>
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Example Checksum:

The following table shows an example of a complete block containing a correct checksum which is :
 <STX>123<CR>ABC<CR><ETX>17;<CR>

STX	*	000	*	0010	*
1		011	*	0001	
2		011	*	0010	*
3	*	011		0011	*
CR	*	000	*	1101	*
A	*	100		0001	*
B	*	100	*	0010	*
C	*	100	*	0011	*
CR		000	*	1101	*
ETX	*	000	*	0011	*
	*				
	*	1 0111		1011	
	*	1 7		;	*

Checksum = 17

