

SARQ Module

Reference Manual

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STATUTORY NOTICES



Case Technology Ltd declare that this product conforms with the protection requirements of Council Directive 89/336/EEC on the approximation of the laws of the member states relating to electromagnetic protection.

WARNING

The DCX 860 and 870 incorporate a panel in front of the plug-in modules. This panel may only be removed by suitably qualified personnel for installation or maintenance purposes, and must be replaced afterwards. Removal under any other circumstance would invalidate any RFI (Radio Frequency Interference) and Safety Type Approvals.

LITHIUM BATTERY

The lithium used in batteries in this equipment will react violently with water and most gases. Batteries must not be crushed or incinerated or disposed of in normal waste. Cells should be collected and disposed of in an approved land fill. The manufacturers and your local authority will give more detailed information about their use and disposal.

Accidental charging and short circuiting of the battery may cause overheating and possible rupture.

Replace only with the same or equivalent type recommended by the equipment supplier.

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Preface

This manual provides information for DCX network supervisors to operate, configure and test the SARQ module. It forms part of the DCX Systems Documentation. It assumes that you will already have some knowledge of the DCX system, obtained either from the System Documentation or from a Case Technology training course.

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1.1 Introduction

The SARQ provides a no-data-loss ARQ communication facility for the DCX 840/850/860/870 network multiplexer ranges, enabling up to 128 channels to be multiplexed onto one ARQ link.

The SARQ is a single card with physical interfaces for V.24 or V.11. Management of the SARQ is via a VDU-based user-friendly menu system.

Using the SARQ it is possible to connect to other DCX ARQ compatible devices such as DCX 818 or to interconnect DCX nodes such as 870.

1.2 Specification Summary

Interfaces	CCITT V.24/V.28, IHA RS-232-C, CCITT X.21/V.11, IUA RS-422
Transmission	Based on HDLC protocol as defined in CCITT X.25 Level 2 Optional Extended Window operating mode
Data Rates	
Internal clock	2400, 4800, 7200, 9600, 19200, 56000, 64000, 80000, 96000 bps
External clock	Any rate up to 96000 bps
Error Protection	Automatic repeat on request using cyclic redundancy check to CCITT V.41
Satellite Working	Single hop satellite link at 79200 bps, double hop satellite link at 19200 bps or less.

Link Protocol Compatibility

Normal Window:

ARQ1	Issue 7 onwards
ARQ2	Issue 1 onwards
ARQ4	Issue 1 onwards
ARQ5	Issue 1 onwards
812	Issue 1 onwards
815	Issue 5 onwards
815SE	Issue 1 onwards
817	Issue 1 onwards
825	CLP Issue 1 onwards
825	OLP Issue 2 onwards
842	Issue 1 onwards
844	Issue 1 onwards
818	Issue 1 onwards
832	Issue 1 onwards

Extended Window:

ARQ2	Issue 1 onwards
ARQ4	Issue 1 onwards
ARQ5	Issue 1 onwards
842	Issue 2 onwards
844	Issue 1 onwards
818	Issue 1 onwards
832	Issue 1 onwards

1.3 Hardware Overview

The SARQ card occupies a single slot within a DCX frame. It is a microprocessor based card, which performs all the functions necessary to interface a DCX 840/850/860 or 870 multiplexer to an ARQ network. The SARQ interfaces to other DCX modules within the card frame via the A-M-D bus and the buffer/BAT card as shown in Figure 1.

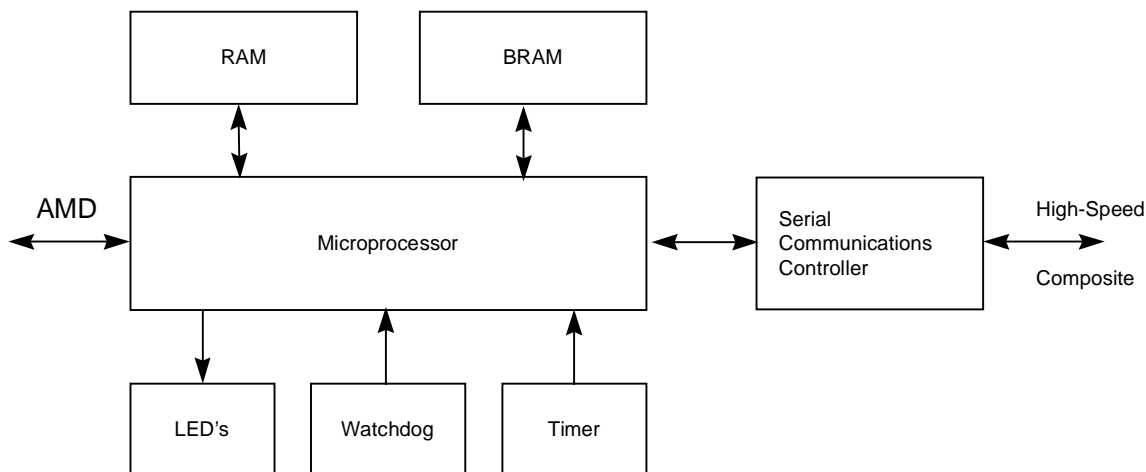


Figure 1 Hardware Overview

The SARQ module operates in full-duplex mode and performs a number of functions. The first is the assembly of low speed channel data into frames for transmission over the high speed link. This is done by a microprocessor, which also controls the overall operation of the module. The frame is constructed similar to the High-level Data Link Control (HDLC) format of CCITT Recommendation X.25 Level 2, in which each frame includes a frame check sequence (FCS) of 16 bits.

The second function is error control of frames being transmitted over the high speed link, using Automatic Repeat on Request (ARQ) 'go back to N' error control procedures, following CCITT recommendation V.41.

During normal operation each ARQ is sending frames to the other. Each transmitted frame includes its frame number, the data, the FCS and an acknowledgement of the last received frame.

The receiving end re-computes the FCS and, if correct, sends positive acknowledgement back to the transmitting end. However, if it detects an error (for example in Frame N), it sends a negative acknowledgement. This causes the transmitting end to retransmit frame N and all subsequent frames.

1.3.1 Timer and Watchdog Timer

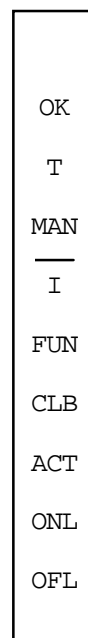
The timer provides clock interrupts to the processor. The Watchdog timer monitors the processor for malfunctions. Please contact your supplier if the SARQ is warm-started by the Watchdog timer.

1.3.2 BRAM

The BRAM is a special area of memory used to hold the configuration data. The BRAM is powered by a Lithium battery. The BRAM is 32K bytes in size. If the battery is fully charged, the BRAM should retain its contents for up to five years if the mains power fails.

1.3.3 LED Indicators

The SARQ has nine LED indicators arranged as listed below. The OK indicator is green; all the others are red.



1.3.3.1 OK Indicator

This is controlled by a Watchdog timer which monitors the software. If extinguished the software is not running and a serious problem has occurred.

1.3.3.2 T (Trap) Indicator

When this indicator is off, each LED below it has its own meaning. When lit, this indicates that a problem has arisen. The cause of the problem may be determined by which of the seven LED status indicators are blinking. This information should be quoted when reporting the fault.

1.3.3.3 Status Indicators

When T is off, the seven status indicators have the following meanings when lit:

MAN	Manager
	A user is logged into the management menus.
<u>I</u>	Indication absent
	The network is disconnected.
FUN	Special Functions *
	Lit when the special functions link is shorted (LK2).
CLB	Composite Loopback
	The card is in composite loopback (diagnostic) mode.
ACT	Link Active
	Lit when the card is receiving valid data-bearing frames.
ONL	On-line
	ARQ link has been established with remote device.
OFL	Off-line
	When blinking, this indicator shows that the ARQ protocol is not connected.

* With the card operational, if switches 2 and 3 are closed and link 2 is briefly shorted, a "Special Function" to erase the BRAM configuration data will be executed.

2. Operation and Configuration

2.1 SARQ Card

This card has a bank of eight miniature DIL switches, shown in Figure Figure 2. It has no straps.

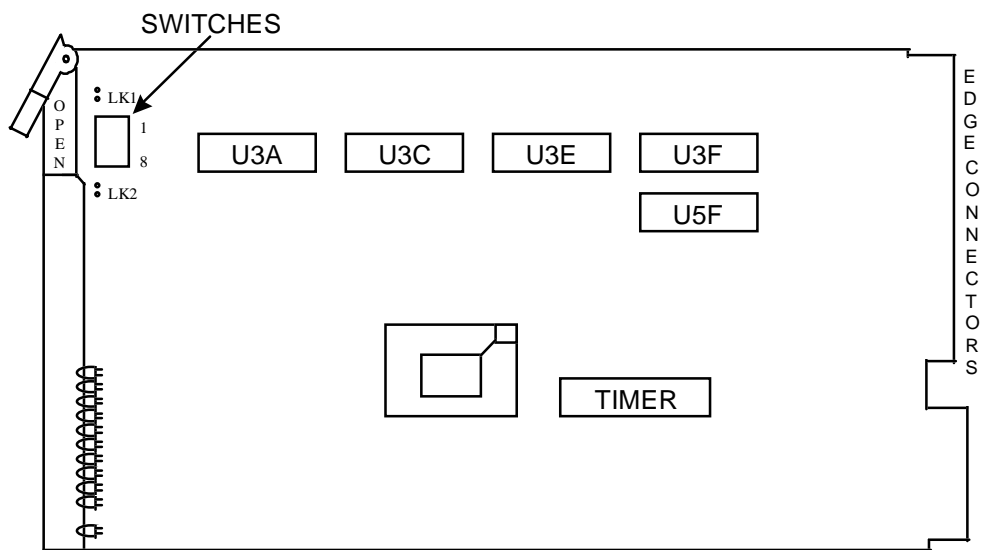


Figure 2 SARQ Switches

2.2 Switch Settings

The SARQ has a bank of eight miniature DIL switches located under the card extraction lever.

Switches 1, 2, 3 and 4 are only read during a warm or cold start. Switch 7 is not used. The actions of the other switches are as follows:

Switch	Open	Closed
1	Management via channel 1 enabled (See Section 2.3).	Manager disabled (SARQ channel 1 may be used to carry data).
2	Ignore switches 3 and 4	Use configuration of switches 3 and 4 in preference to soft configuration.
3	Select V.24 Interface	Select V.11 Interface
4	External clocking	Internal clocking (64Kbps for V.11 interface; 19.2Kbps for V.24 interface).
5	LED's show card status	LED's show utilisation bar graph. (Each red LED shows 10% utilisation)
6	No composite loopback	Apply composite loopback (local only).
8	Normal Operation.	Reset Card

2.3 Manager Facilities

The Manager assumes it is connected to an ANSI compatible terminal (such as a DEC VT100), or a PC running an ANSI emulation. The terminal which is connected to the Manager is known as the Manager Station. To become the Manager Station, it must be 'logged-on' to the Manager. Only one Manager Station can be logged-on at a time at any given node.

The SARQ manager is accessed by mapping a device such as a Soft Channel card to the first channel (x.1) of the SARQ. For remote management, this channel may be mapped through an ARQ channel or created as a port on the System Module or USO.

Once mapped, or connected the SARQ manager can be accessed by pressing the ↵ key. At which time, a prompt will be output requesting the Monitor Mode password.

2.3.1 Manager Station Monitor and Update Modes

A Manager Station may be in one of two modes, Monitor or Update. The modes control access to the Manager facilities, with Monitor providing the least access and Update allowing full access. Each mode has its own password and is accessible only from the immediately lower privileged mode.

When a Manager Station is logged-on, it automatically enters Monitor mode. In this mode the Supervisor can examine most of the parameters and characteristics of the card, but may not change them. The Supervisor may set the Monitor mode password. The Manager Station will be logged-off and disconnected either when requested to do so by the Supervisor, or after a thirty minute period of Manager inactivity.

While in Monitor mode, the Supervisor may switch the Manager Station to Update mode by entering the Update mode password. In Update mode the Supervisor has the same facilities as Monitor mode plus the ability to change the configuration. The Supervisor may set the Update mode password. The Manager Station will revert to Monitor mode either when requested to do so by the Supervisor, or after a ten minute period of Manager inactivity.

Once logged on, the following screen will be displayed:

```
SARQ Issue 1.1
```

```
ARQ Link is DOWN.
```

```
SARQ(009) [M] <
```

The bottom line of the screen is the command prompt. This shows the product name (SARQ) and the DCX device number (in the case shown above this is 009). The last field of the prompt shows the command mode. This will either be **M** for Monitor mode or **U** for Update mode.

3.1 Introduction

This section lists the commands that can be carried out by a Supervisor at a Manager Station.

These commands enable you to define, display and modify details of the configuration of the SARQ to which the supervisor is logged on.

3.1.1 Manager Interface

The Manager Interface provided by the SARQ is a user friendly screen-based system. It provides the Supervisor with an easy to use environment for the configuration of the operational parameters of the SARQ.

Because it is screen-based, it is a requirement that the terminal to be used for that procedure must conform to the addressing and formatting conventions defined by the ANSI standard. The most well known of such terminals is the DEC VT100, but many terminals and most PC-based terminal emulators can be configured to operate in this mode. The VT100 has four function keys, and for this Interface all four of these have been used. An alternative means of producing a function key press has been provided in the event that a particular terminal or emulator has no function keys at all.

The Manager provides on-line help. This is context sensitive and may be requested at any time.

Interaction with the Manager may take place in one of two ways:

1. Using the prompt line. This is used to configure simple items by entering the appropriate command. Some operations may consist of just the command, such as logging-off the Manager Station.
2. Using forms. Forms are entered by invoking the appropriate command at the prompt line. They are used to configure parameters with a single value, such as a password, and parameters consisting of a number of different values, such as the time. They are also used to enter data for a complex operation, such as the `LINK` command. The information presented by a form will always fit on the screen.

3.1.2 Using Forms

Forms consist of a number of fields, with each one holding a specific piece of data. In Monitor mode and for read-only tables, you can only view the information. In Update mode you can modify the information.

Note that Forms operate on copies of the SARQ configuration. They do not operate directly on the SARQ configuration. These are indicated in the relevant commands. The changes made using Forms do not replace the SARQ configuration until the Submit Data (<CTRL G>) key is pressed (see below) and the operation confirmed.

Movement around forms and tables is achieved using pre-defined keys and sequences. The operation of these keys may be modified at times where its normal mode of working would be inappropriate. The cursor motion keys fall into this category.

Keystroke Conventions

Non-literal characters are shown in angle brackets. For example, <CTRL C> means hold down the CONTROL key while pressing the 'C' key.

↵ means the RETURN or ENTER key.

Function keys are shown in full. For example, <PF 1> means press the PF1 key.

Movement Within the Screen

Next Field ↵

This key will advance the cursor to the next field irrespective of where it is within the field. The current field will be validated first if the data has been changed. If the field is invalid, an error will be displayed and the cursor re-positioned to the start of the field in error. If the field is valid, the cursor will move.

First Field <CTRL L>

If the <CTRL L> key is pressed, the cursor will move to the first field of a form or the first field of the current line in a table. The current field will be validated first if the data has been changed. If the field is invalid, an error will be displayed and the cursor re-positioned to the start of the field in error. If the field is valid, the cursor will move.

This key has additional functionality in tables. If the cursor is already at the first field in a table entry, pressing <CTRL L> will result in the cursor moving to the first field on the screen. If the cursor is already at the first field on the screen, pressing <CTRL L> will result in the cursor moving to the first field in the table, re-painting the screen as necessary.

Last Field <CTRL E >

If the <CTRL E> key is pressed, the cursor will move to the last field of a form or the last field of the current line in the table. The current field will be validated first if the data has been changed. If the field is invalid, an error will be displayed and the cursor re-positioned to the start of the field in error. If the field is valid, the cursor will move.

This key has additional functionality in tables. If the cursor is already at the last field in a table entry, pressing <CTRL E> will result in the cursor moving to the last field on the screen. If the cursor is already at the last field on the screen, pressing <CTRL E> will result in the cursor moving to the last field in the table, re-painting the screen as necessary.

Cursor Keys

The cursor keys are used to move within fields and between fields. They may also be used to move between items in a table scrolling if necessary. The ↑ and ↓ cursor keys will always attempt to move to an equivalent field in the previous or next item. The ↑ key will move to a field on the previous line if one is available otherwise just to the previous field. Note that this is not necessarily the physically previous field, since that one may not be appropriate for the current mode of working. Cursor movement to another field will always move to an appropriate field. If there is no previous field or the remaining previous fields are inappropriate, the cursor remains where it is. The ↓ key moves to a field on the next line if one is appropriate otherwise just to the next field, following all the same rules as ↑.

The ← and → keys may be used to move between fields, or to move within a field for correction purposes. If the ← key is struck when the cursor is at the start of a field then the cursor will move to the logically previous field. A particular problem occurs when the cursor is positioned at the start of a field. What is the action required by the Supervisor when the → key is struck? There are two possibilities. The first is that a move right through the field is desired. Alternatively a move to the start of the next field may be required. The Manager assumes the second case. Therefore to edit a

field, sometimes it may be necessary to over-type the first character to enable the Supervisor to continue to work on the same field.

Any key which would cause the cursor to leave a field will force the field to be validated if the data has been changed. If the field is invalid, an error will be displayed and the cursor re-positioned to the start of the field in error. If the field is valid, the cursor will move.

Advance Cursor <TAB>

In alphanumeric fields, such as the `TEXT` command, it is possible to advance the cursor rapidly using the `<TAB>` key. This will move the cursor to the next multiple of eight characters in the field.

Data Modification

When the cursor has been moved to a field, it may be modified. For a numeric field, entering a new value will replace the existing one on leaving the field. For an alphanumeric field, you have the choice of over-typing or inserting. This is selected using `<CTRL K>` which toggles between over-type and insert mode. The new mode will be displayed when `<CTRL H>` is pressed. When initially logged on, the Manager is in over-type mode.

Delete Previous <BACKSPACE>

This key deletes the character before the cursor. All subsequent characters are shifted one place left.

Delete Current <DELETE>

This key deletes the character under the cursor. All subsequent characters are shifted one place left.

Restore Field <CTRL R>

This key may be used to restore the original contents of a field that has been altered, but **ONLY** while the cursor remains in the field. Once the cursor has been moved to another field the local copy of the data has been updated.

Constrained Set Operations < and >

The constrained set operators `<` and `>` are used to select an option from a list which is pre-defined. The `>` operator advances through the options in a

forward direction whilst the < operator advances through the options in the reverse direction. It is not apparent looking at a given field whether it is a constrained set or not, but some obvious ones include the NO/YES at the end of prompts, and the LINK parameters. Although a field may be a constrained set, this does not prevent the Supervisor from typing the value instead of using the constrained set operators. The field validation functions know the correct values of constrained set data and will validate typed values.

Function Keys <PF1> to <PF4>

These keys have different functions depending on the form in which they are invoked. The detailed help for a given command will explain the action, if any, of the function keys.

Exiting Forms

Submit Data <CTRL G>

This key signals to the Manager that the data on the screen is complete. It invites the Manager to validate the data contained on the screen and to update the system configuration accordingly. In the event that no errors are detected in the data to be submitted, the submission of the form would overwrite system configuration. Since this is potentially dangerous, a confirmation request is made. The NO/YES at the end of the prompt is a constrained set, and you can use the constrained set operators to change this to its alternative value. Once the desired value is achieved, simply pressing ↵ will complete the operation and the system will be updated. The SARQ will be reset if YES was selected, or to the table or form if NO was selected.

Abort Operation <CTRL C>

This key is the global abort key. You can almost always abort any operation by pressing this key. The Manager records the fact that a change has been made, and if there are none, the system simply returns to the prompt. If there are changes, a message is output stating that changes are to be discarded and requesting a confirmation. The NO/YES at the end of the prompt is a constrained set, and you can use the constrained set operators to change this to its alternative value. Once the desired value is achieved, simply pressing ↵ will complete the operation. Control

will return to the prompt if **YES** was selected, or to the table or form if **NO** was selected.

Context Sensitive Help or '?'

On the prompt line, the word **HELP** or the character **?** may be used interchangeably. **HELP** or **?** on their own result in a display of the commands that are valid for the current mode e.g. commands that are valid in Monitor mode if the current mode is Monitor mode. If a parameter is provided to the **HELP** command, then this is used to request detailed help on one or more commands. For example if **HELP <SP>L** were typed, the Manager would display detailed help on all commands beginning with **L** i.e. **LINK**. **HELP <SP> IS** would yield detailed help on commands beginning with **IS** etc. **HELP *** yields detailed help on all commands valid for the current mode.

Within a form, help can be requested at any stage by pressing **?**. Help for the particular field under the cursor will be displayed on the Help Line.

Verbose Help

It is possible using the **VERBOSE** command to enable verbose help. The result of this operation is to display on the help line, the help text that would have been displayed had the **?** key been pressed in that field. The result of this is that as you move between fields the help pertinent to that field is automatically displayed.

3.1.3 Error Messages

Error messages which may be produced as a result of entering a command, fall into two categories:

- Errors common to all commands, which are:

Command [XXXX] is not recognised	Invalid command was entered
Syntax: <syntax description>	Illegal command syntax was entered
Read Only	No changes are allowed

- The command-specific errors, which are self explanatory.

3.1.4 Corrections

Corrections may be made to characters wrongly entered on the keyboard before ↵ is entered, by using any facility provided on the terminal for deleting a character (e.g. **Backspace** or **Delete** keys).

3.1.5 Summary of Commands

The commands are summarised in the following table, in alphabetical order (but they may, of course, be carried out in any sequence).

Command	Manual Section	Monitor Mode	Update Mode
BEEP	3.1.6	Yes	Yes
CLS	3.1.7	Yes	Yes
HELP	3.1.8	Yes	Yes
ISDN	3.1.9	Display Only	Update
KEY	3.1.10	Yes	Yes
LINK	3.1.11	Display Only	Update
LOGOFF	3.1.12	Yes	Yes
PASSWORD	3.1.13	Set Monitor mode password	Set Update mode password
UPDATE	3.1.14	Yes	No
VERBOSE	3.1.15	Yes	Yes

Figure 3 Command Summary

3.1.6 BEEP

This prompt line command is used to display or define the setting of the command warning **BEEP**. When the warning beep is enabled, an error message generated as a result of a bad command or entry of invalid data in a table will be accompanied by a beep (a <BELL> character). Note that the warning beep is enabled following a cold start.

Display Current Setting

BEEP ↵

The current setting (enable or inhibited) will be displayed.

Define Setting

BEEP <SP> **E** ↵

The warning beep will be enabled (**E**) or inhibited (**I**) and a message displayed to confirm this.

3.1.7 CLS

This prompt line command is used to clear all information and error status messages from the screen, leaving only the time and command prompt. This is useful for clearing sensitive information from the screen when returning to Monitor mode from Super mode.

CLS ↵

3.1.8 HELP

This command is used to obtain help information on commands.

HE [<sp> <command>] ↵

or

? [<sp> <command>] ↵

When **HE** is entered on its own, the list of commands available in the current mode are displayed. When **HE** is entered with a command name, help on the specific command is displayed. Note that if the command matches more than one available command (such as **HE** **LO** in **SUPER** mode), help for all the commands will be displayed in turn. Press <SP> to

request the next one. It is intended as an aide-memoire rather than a definitive detailing of the command.

Example:

? Displays list of commands available in current mode.

3.1.9 ISDN

The `ISDN` command is used to alter the SARQ ISDN characteristics for inter-working with an ISDN TA. The command can be entered from either Monitor or Update mode.

ISDN operation is only allowed via the V.11 interface, an error message will be displayed if the current interface type is set to V.24.

Once entered, the following fields will be displayed:

```
ISDN Configuration

Protocol operation      : Disabled      Operating mode          : End A
Connection attempts    : 5              Reattempt delay        : 1 min
```

3.1.9.1 Protocol Operation

This option enables or disables ISDN TA inter-working.

3.1.9.2 Connection Attempts

On expiry of the reattempt delay a counter will be incremented, if this counter reaches this value, no further connection attempts will be made and the link will be assumed to be “down”.

3.1.9.3 Operating Mode

This field sets the unit to either End-A or End-B operation. This facility is used to minimise call collisions when two SARQ cards are connected

together. If two SARQ cards are connected in this manner one should be set to End-A the other being End-B.

3.1.9.4 Reattempt Delay

This is the delay between consecutive connection attempts.

3.1.10 KEY

This command displays the keyboard functions available when a table or form is displayed.

3.1.11 LINK

The LINK command is used to alter the SARQ composite link characteristics.

The command can be entered from either Monitor or Update mode.

When entered the following fields will be displayed:

Link Configuration			
Clocking	: External	Link inactivity timeout	: 10 secs
Interframe delay	: 12 ms	Poll mode timeout	: 1 sec
Number of channels	: 10	Interface type	: V.11
Data inactivity timeout	: None	SARM burst length	: 100
Reset interval	: 1 sec	RR burst length	: 100
Extended window	: Disabled	Data limit	: 48
Reported Link Speed	: 2400		

3.1.11.1 Clocking

If internal clocking is required, this field may be set to a value between 1200 and 128000 bps. If an external clock source is to be used, set this field to External.

3.1.11.2 Interframe Delay

This is the time delay inserted after the transmission of an empty data frame. Decreasing this delay improves response time by a few milliseconds. Increasing the delay can decrease the number of empty data frames sent across the network.

3.1.11.3 Number of Channels

This is a read only field which shows how many DCX channels the SARQ is configured to carry. To change this value, the size of the SARQ device must be changed in the active System Module or STC configuration map.

3.1.11.4 Data Inactivity Timeout

This field allows a timeout to be set after which the SARQ will suspend transmission on the composite link. This will only occur if no data is being received or transmitted.

3.1.11.5 Reset Interval

This option allows the specification of a timeout interval after which the SARQ will reset and attempt to contact the remote device, if it fails to establish synchronisation after a reset or start-up.

3.1.11.6 Extended Window

When enabled this option increases the SARQ transmission window to be 64 frames. When disabled (default) the window size is 8 frames.

3.1.11.7 Reported Link Speed

If External clocking is used, this option is required to inform the USO or System Module of the current link speed.

3.1.11.8 Link Inactivity Timeout

If no activity is seen on the composite link for this timeout period, the link is indicated as “down”. The usual setting for this option is 10 seconds for non-extended window operation or 60 seconds for extended window.

3.1.11.9 Poll Mode Timeout

This option is usually set to 1 second. However, on long delay satellite links it may be advantageous to extend this time to prevent unnecessary error recovery activities.

3.1.11.10 Interface Type

This option allows the selection of either V.24 or V.11 interface types.

3.1.11.11 SARM Burst Length

This field allows the configuration of the maximum number of SARM frames which will be transmitted after each reset of the ARQ link. SARM frames are sent, in the ARQ protocol, to achieve synchronisation with the remote ARQ device, prior to the transmission of information frames.

3.1.11.12 RR Burst Length

This option allows the specification of the maximum number of RR frames to be sent when the ARQ has transmitted all of its information frames but none have been acknowledged by the remote device. After the maximum number of RR frames have been sent, then only the receipt of a frame from the remote device will re-initiate frame transmission.

3.1.11.13 Data Limit

The maximum number of data bytes assembled into a frame for each channel can be limited to 128 (i.e. full frame), 32, 16 or 8 bytes. Smaller frames give a steadier throughput to each channel. Limiting the data in this way will ensure that the data from a low volume device (e.g. a terminal) will not be held back by high volume devices (e.g. printers) filling every frame with their data.

3.1.12 LOGOFF

This prompt line command is used to disconnect the Manager Station.

LOGOFF ↵

3.1.13 PASSWORD

This command displays a form used to set or change the SARQ password for the two modes (Monitor and Update). When you invoke the `PASSWORD`

command, you will be changing the password for the current mode. A password consists of 1 to 12 alphanumeric characters.

PA ↵

Enter the current (old) password. Note that each character will be echoed as an asterisk. If the current password has not been set, just press ↵.

Now enter the new password. The characters will again be echoed as asterisks. Note that you can set the password to null, by pressing ↵.

You must now repeat the new password to confirm the value. This prevents setting an incorrect password due to typing errors.

When you have entered all three values, press <CTRL G> and confirm the operation. If any values were incorrect, you will be informed of this and given the chance to correct them. Otherwise the password will be changed and the command prompt displayed.

3.1.14 UPDATE

This prompt line command is only valid in the Monitor mode, and is used to switch the Manager Station to Update mode.

Update ↵

If the transition is from Monitor mode to Update mode, the SARQ will output the message:

```
Please enter Update mode password
```

The node's Update mode password should now be entered (as set by the PASSWORD command). The password will be echoed as asterisks as it is entered. If the password is correct, the Manager Station will enter Update mode and output the message:

```
Supervisor now in Update mode
```

3.1.15 VERBOSE

This prompt line command is used to display or define the setting of the Verbose help. When enabled, the context-sensitive help for a field will be displayed automatically as the cursor is moved from field to field within a form.

Display Current Setting

VE ↵

The current setting (Verbose or Quiet) will be displayed.

Define Setting

VE <SP> E ↵

The Help mode will be Enabled (Verbose) or Inhibited (Quiet) and a message displayed to confirm this.

4.

ISDN Functionality

4.1 Introduction

The SARQ is designed to be connected via the V.11 interface to an ISDN Terminal Adapter (TA). The SARQ deals automatically with ISDN calls, both incoming and outgoing.

4.2 Call Timing

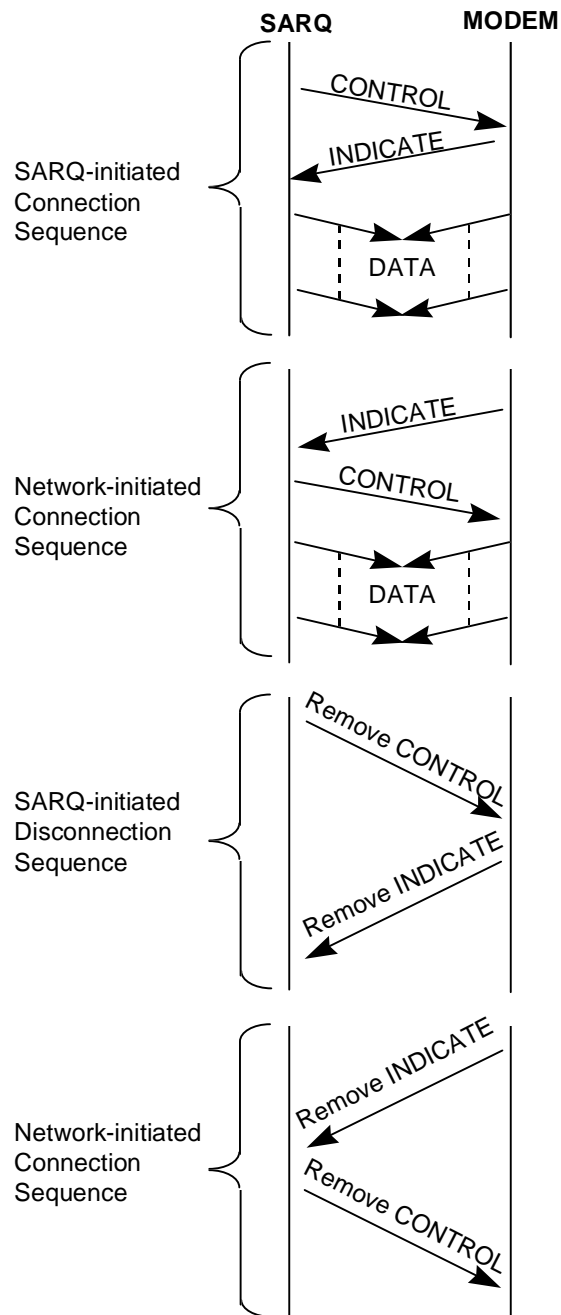


Figure 4 ISDN Call Sequence

4.3 ISDN Error Recovery

The SARQ provides error recovery routines which are used if the network is busy. These are illustrated in Figure 5. Two parameters for these routines, 'Connection attempts' and 'Reattempt delay' can be set via the ISDN command form.

If an attempt is made to initiate an outgoing call, but no acknowledgement from the network is received, then Phase 1 of the error recovery process begins. During this phase a number of attempts will be made at initiating the call, the number of attempts made will depend upon the setting of 'Connection attempts' in the ISDN form. The second attempt will be separated from the first one by either 15 or 25 seconds depending upon whether the card is set to end A or end B (this interval must be different so that in the event of a back-off from a call collision situation, the likelihood of further collisions is minimised). If no acknowledgement from the network is received, then further attempts will be made.

A response from the network during this phase will result in the call connecting successfully.

If no response from the network is forthcoming after these attempts have expired then Phase 2 of error recovery begins.

- If the ARQ is set for a 'Reattempt delay' of zero (as set via the ISDN command form), then no further attempts are made, link failure is reported and Phase 3 is entered. No action is taken during Phase 3, unless either the network provides some sort of response.
- Otherwise, Phase 2 of error recovery is begun. A single attempt is made to connect a call at m minute intervals. The link is reported as failed when Phase 2 is entered. A maximum of 50 connection attempts will be made at m minute intervals until either a response from the network is obtained, or the SARQ is reset, in which case the error recovery parameters are also reset. After 50 attempts have been made, Phase 3 is entered.

The link is maintained in a connected state whenever data flows across the network in either direction. The ARQ disconnects from the network if the 'data inactivity timeout' (as configured via the LINK command) expires.

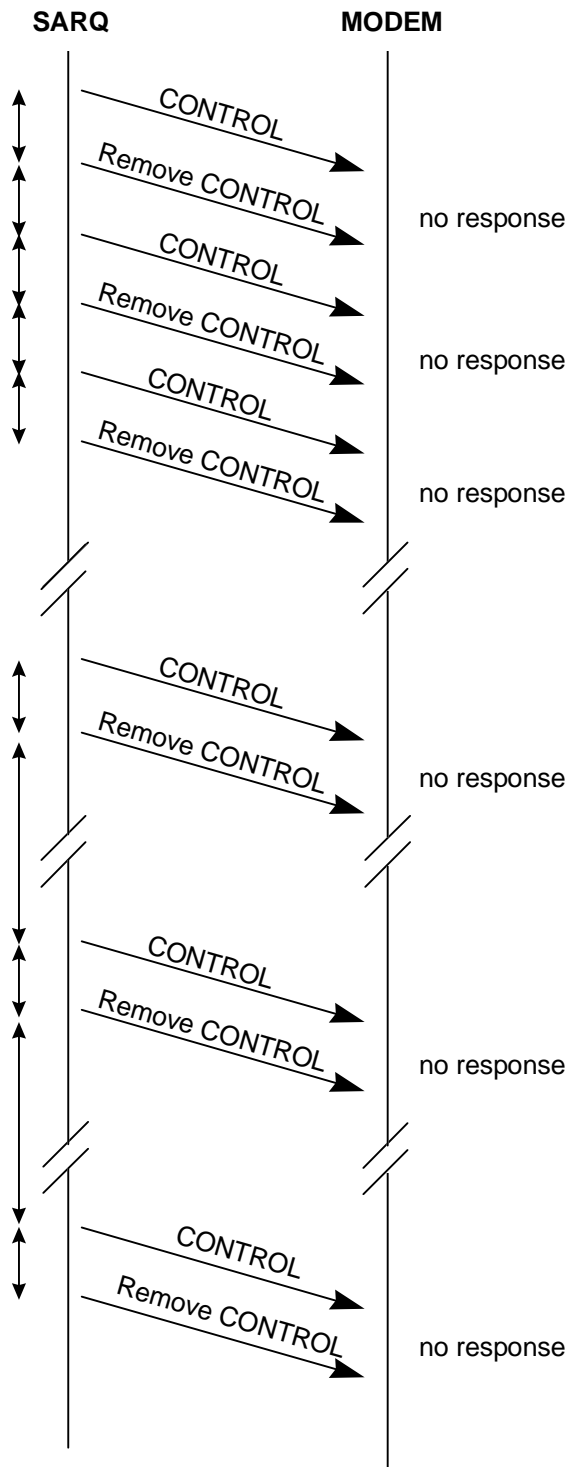


Figure 5 Error Recovery Procedures

5.

ARQ Interworking

5.1 Interworking Issues

The SARQ provides most of the functionality of an ARQ 5 (and its predecessors). The exception is that the SARQ does not have the NCAM monitoring facility on Channel 1.

In addition, when management is enabled on channel 1, this channel becomes unavailable for use as a data bearing channel. It is important therefore that if channel 1 management is to be used, the SARQ is given a DCX map size of: number of channels plus one (where the number of channels must be less than, or equal to 127). In this case the first usable channel on the SARQ will be 2. An example of this adjustment is shown in Figure 6 and Figure 7:

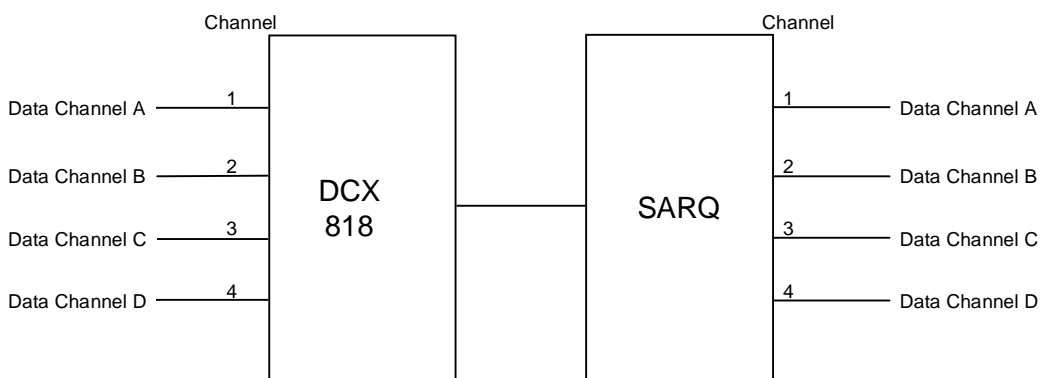


Figure 6 Channel Numbering (Manager Disabled)

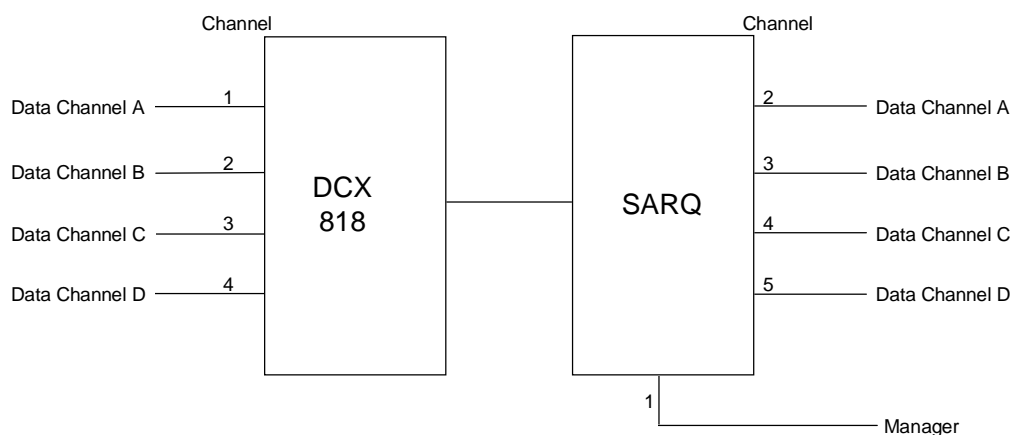


Figure 7 Channel Numbering (Manager Enabled)

The above mapping is only required if it is necessary to have the SARQ manager accessible at all times. It is recommended that the SARQ is first configured via the manager. Once the link has been verified as functioning, the manager can then be disabled (via switch 1), thus freeing this channel for data transfer.

5.2 Upgrading from ARQ to SARQ

The SARQ, as explained previously, has a different approach to configuration. The aim of this section is to aid the user who is configuring a SARQ but is more familiar with ARQ configuration.

All previous ARQ cards were configured by means of DIL switches and jumpers on the PCB.

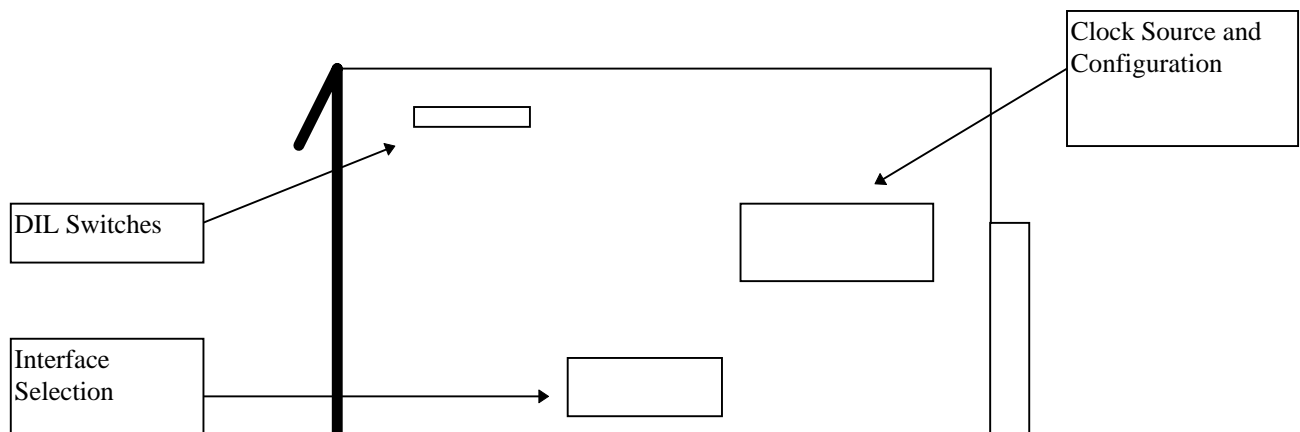


Figure 8 Classic ARQ Configuration

Referring to Figure 8 the following option mappings may be followed:

ARQ

DIL Switches

Interface Selection

Clock Source &
Configuration

SARQ

Interframe Delay, Data Limit and
Extended Window options within **LINK**
menu. All options within **ISDN** menu.

Interface Type field of **LINK** menu.

Clocking & Reported speed fields of **LINK**
menu.

6.1 Composite Loopback

The test places the composite link in local loopback at the SARQ card. The SARQ must be in INTERNAL clocking mode for this test to function.

All channels on the link are looped back when DIL switch 6 is initially closed. It is therefore wise to ensure that all users of the composite link are not actively working.

1. Close DIL switch 6 on the SARQ card. The **CLB** indicator should light to show loopback operation.
2. Check data flow under loopback conditions. The **ONL** indicator should come on if the SARQ is operating correctly.
3. Open DIL switch 6 to terminate loopback (**CLB** goes out).

If possible, do a similar loopback test at the remote SARQ.

Other methods of achieving composite loopback are described in the parent DCX and System Module manuals.

Using the option switches the SARQ may be quickly set-up for a number of popular configurations, two examples are shown in this section.

7.1 External Clock / V.11

Switch 1	As required
Switch 2	Closed
Switch 3	Closed
Switch 4	Open
Switch 5	Open
Switch 6	Open
Switch 8	Open

N.B. As this configuration specifies external clocking, the default reported speed is 64 Kbps. The manager channel should be used to set an appropriate reported speed, for correct bandwidth allocation.

7.2 External Clock / V.24

Switch 1	As required
Switch 2	Closed
Switch 3	Open
Switch 4	Open
Switch 5	Open
Switch 6	Open
Switch 8	Open

N.B. As this configuration specifies external clocking, the default reported speed is 19K2 bps. The manager channel should be used to set an appropriate reported speed, for correct bandwidth allocation.

8. Cables and Interconnections

8.1 Interconnections in an 840/850

This chapter gives details of the possible interconnection arrangements of the SARQ composite link.

8.1.1 Interface Ports

The SARQ has two interface ports on the back of the DCX frame as shown in Figure 9.

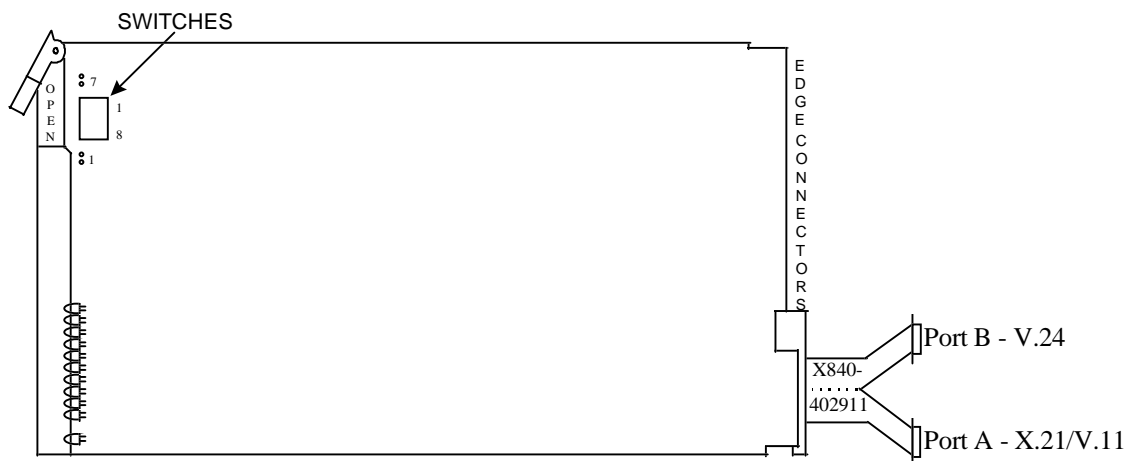


Figure 9 Interface Ports Definition

8.2 SARQ V.24 Interface

8.2.1 Interface Signals

The SARQ V.24 interface terminates in a 25-way D-type connector. The interface signals conform to CCITT V.24/V.28 and are listed in Figure 11.

PIN No.	CCITT CCT. No	Signal	Mnemonic
2	103	Transmitted Data	TxD
3	104	Received Data	RxD
4	105	Request To Send	RTS
5	106	Clear To Send	CTS
6	107	Data Set Ready	DSR
7	102	Signal Ground	SG
8	109	Carrier Detect	DCD
15	114	Transmitter Clock	TxC
17	115	Receiver Clock	RxC
20	108/2	Data Terminal Ready	DTR
22	125	Ring Indicator	RI
24	113	External Transmit Clock	XTxC

Figure 11 SARQ V.24 Composite Link Interface

8.2.2 Cables

The standard cable to connect the SARQ V.24 interface D-type connector to a synchronous modem (for operation over public telephone lines) is part number X840-400911, as illustrated in Figure 12.

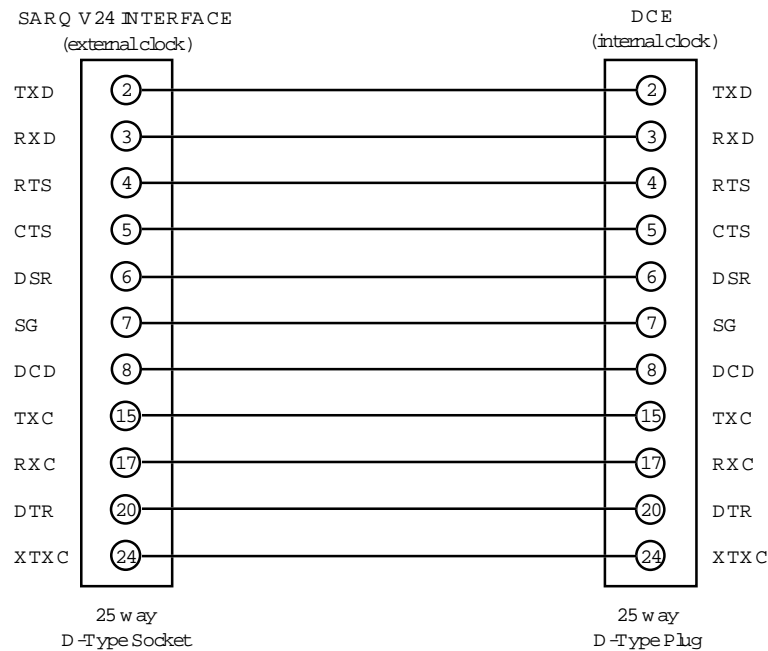


Figure 12 Standard X.21bis Cable - X840-400911

For DCE mode, a crossover cable is required. Part number X840-404411, as illustrated in Figure 13.

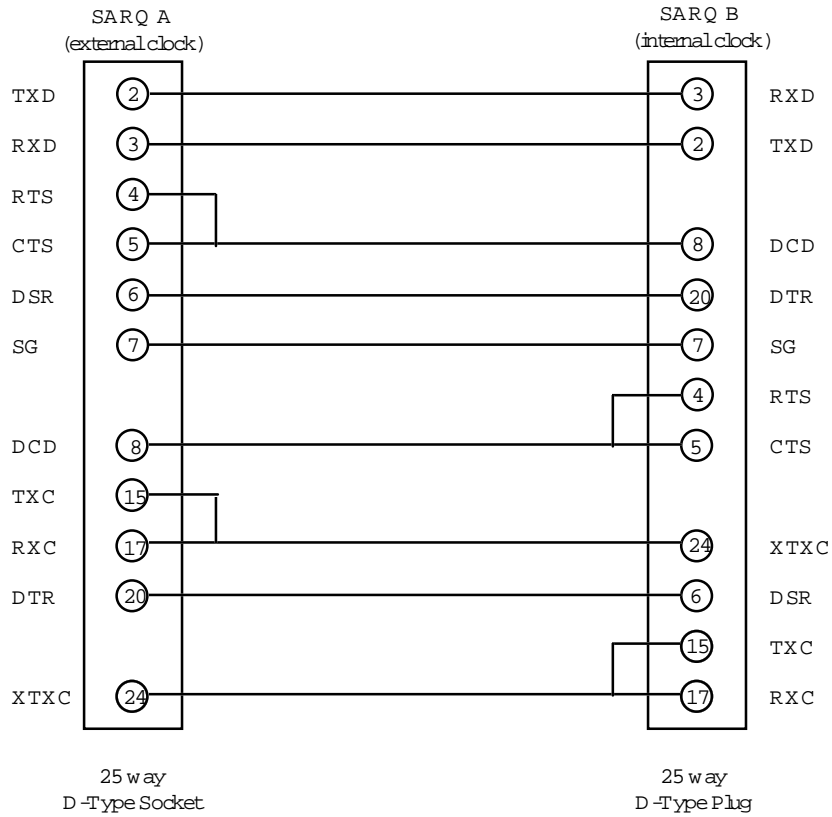


Figure 13 Crossover X.21bis Cable - X840-404411

8.3 SARQ X.21/V.11 Interface

8.3.1 Interface Signals

The SARQ V.11 interface terminates in a 25-way D-type connector. The interface signals conform to CCITT X.21 and are listed in Figure 14.

PIN No.	Interchange Circuit	Signal
5	C (A)	Control 1
6	T (A)	Transmit 1
7	G	Signal Ground or Common Return
11	S (A)	Signal Element Timing 1
12	R (A)	Receive 1
13	I (A)	Indication 1
18	C (B)	Control 2
19	T (B)	Transmit 2
23	I (B)	Indication 2
24	S (B)	Signal Element Timing 2
25	R (B)	Receive 2
4	S'(A)	Signal Element Timing 1
17	S'(B)	Signal Element Timing 2

Figure 14 SARQ X.21 Composite Link Interface

Note that pins 4 and 17, for DCE mode, replace pins 11 and 24 in DTE mode, in order to provide Signal Element Timing to the remote DTE. It is imperative that a correct interface cable is used.

8.3.2 Cables

The standard cable to connect the SARQ X.21 Interface to the X.21 synchronous modem is part number X840-402711, as illustrated in Figure 15.

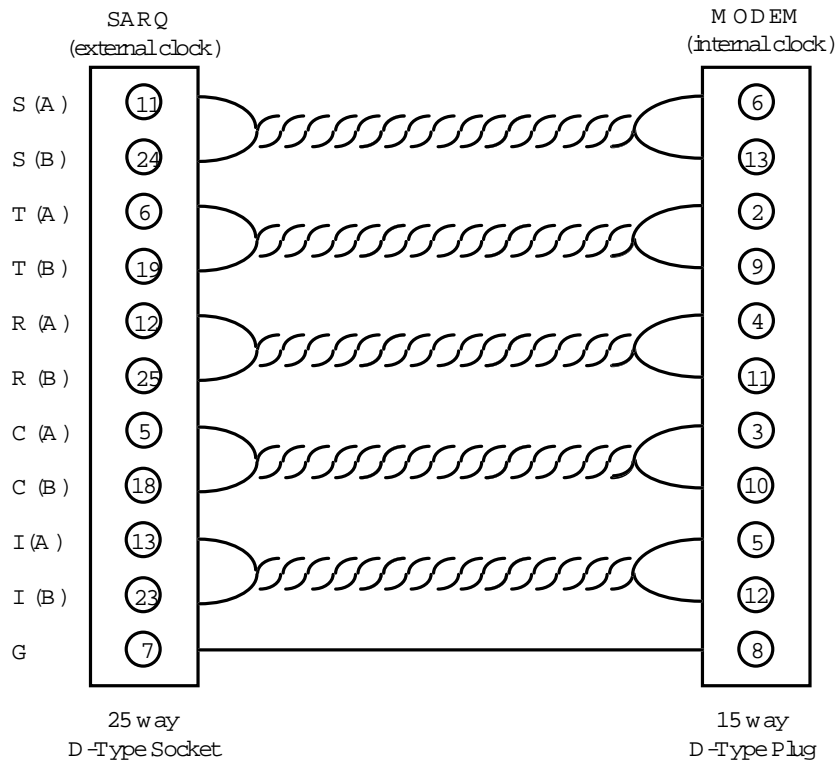


Figure 15 X.21 Interface Cable - X840-402711

The standard cable for SARQ X.21 interface point-to-point operation is part number X840-407811, as illustrated in Figure 16.

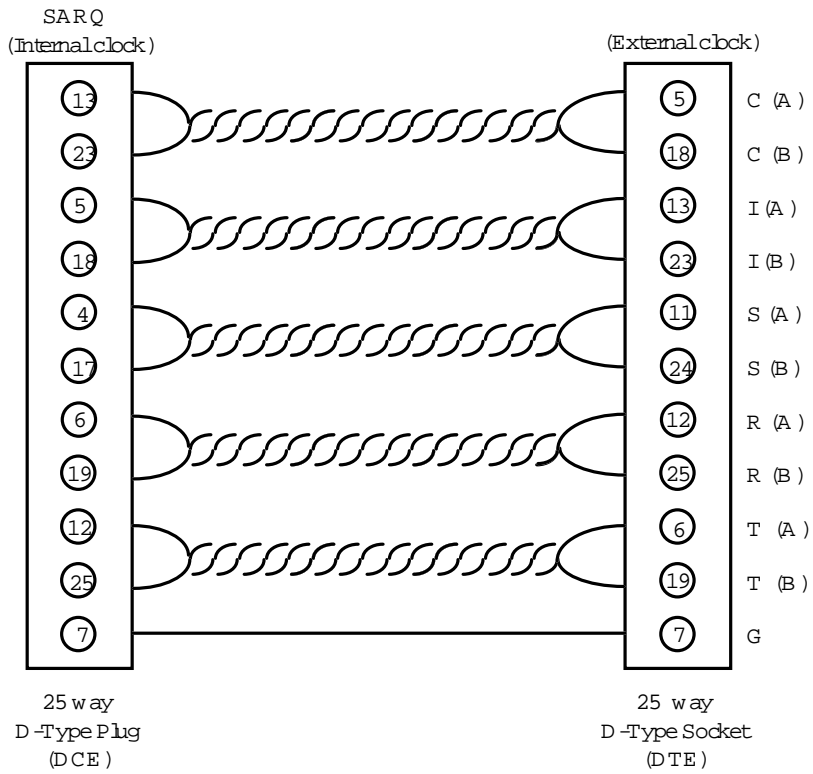


Figure 16 X.21 Crossover Cable - X840-407811

8.4 SARQ V.35 Interface

The SARQ card maybe converted to run a V.35 interface specified to 48000 bps via an X.21 to V.35 interface adapter which connects to the back of the card. The interface adapter to provide a DTE interface is part number X840-102711. The interface adapter to provide a DCE interface is part number X840-103411.

