

**ascom**

*Fax Router*

***USER GUIDE***

# ascom Fax Router

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## 1. General Description

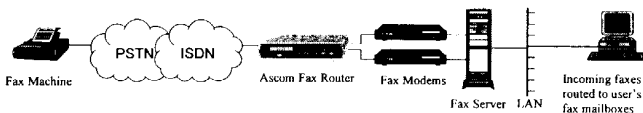
### 1.1 Application

The Ascom Fax Router is a self contained unit which is designed to front end any Fax server in order to provide direct faxing to the desk.

### 1.2 Functions

The Fax Router gives everyone on a network their own fax number. It does this by translating the unique DDI number provided by the phone network into a routing<sup>1</sup> code for that user that the Fax Server understands.

The Fax Router achieves this by using the DDI facility of the ISDN network connection, to obtain the number the caller dialled. This is provided by the ISDN network when either MSN (Multiple Subscriber Number) or DDI (Direct Dialling Inwards) services of the ISDN networks are subscribed to.



The person sending the fax does not need to be attached to ISDN. He can use any fax machine in the World. He dials a genuine fax number and the fax goes automatically through, direct, to that user's fax mailbox.

Depending on the LAN fax server in use, and the way it is set up, the user will immediately be alerted to the presence of the incoming, confidential fax message.

It may help to understand the operation of the fax router if you bear in mind that actually it isn't a FAX router at all, but a CALL router. The unit does not know it is a fax call that it is routing, and does not interfere with the fax transmission in any way.

### 1.3 Features

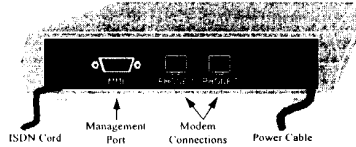
The Ascom Fax Router has an RJ45 connection to the ISDN network and two analogue (phone) sockets for the attachment of two fax cards or external fax modems. There is a 9-way RS232 connector provided for PC attachment for engineering purposes for configuration and control as necessary, and an LCD front panel for basic configuration and monitoring.

### 1.4 ISDN Network Requirements

The Ascom Fax Router requires a Basic Rate ISDN circuit, typically this will be BT's ISDN-2 service (See Appendix E for details). This must be ordered to support either DDI or MSN, to present the information required for call routing to the AFR.

<sup>1</sup> Only spelled, and pronounced, "routing" in *American* English.

## 2. Hardware Specifications



<b>ISDN Connection</b>	The ISDN cord is terminated with a standard RJ45 connector for connection to Basic Rate ISDN circuits.
<b>Modem Connections</b>	The rear of the Ascom Fax Router has sockets labelled 'PHONE 1' and 'PHONE 2'. The Ascom Fax Router is supplied with two cables to convert these to local PTT telephone connections. (e.g. British Telecom 'Nuplan' in the UK)
<b>Management Port</b>	(labelled MMI, Management and Maintenance Interface). This is for engineering use for PC connection for management, diagnostics, software upgrade, etc.
<b>Front Panel</b>	LCD display and control buttons to allow configuration changes.

### General

Power supply; Mains voltage to country requirement - 50/60Hz

Power consumption 25VA

Operating environment

Temperature: 5 deg to 40 deg C.

Humidity: 5% to 85% non-condensing.

Dimensions: 250 mm wide

275 mm deep

60 mm high

Weight: 2.8kg

### 3 Installation

The Ascum Fax Router's operation is very straightforward, but because the system it is used in is likely to be complex, it is **strongly recommended** that the Fax Router and the Fax Server be independently proved, before connecting the two together.

#### 3.1 Checkout of the Fax Router operation

The correct operation of the Fax Router can be verified independently of the Fax Server by the simple attachment of a telephone:

Connect the telephone to Phone 1, connect the ISDN cord to the PTT-supplied NT1 wall unit, plug in the power cord, and switch on the power.

Always be sure to make the connection to the ISDN network *before* powering up the unit (the power-up initiation routine in the AFR advertises its presence to the network). There is no danger to either the network or the unit if this guidance is not followed, but it can take the ISDN exchange longer to "notice" the Fax Router's existence if the connection is made from an already powered-up unit.

All LED's will now illuminate for a few seconds, flash once and then extinguish. If all is correct, you will now see that the Ready and Network lights are illuminated. You should also have an LCD display of 'IDLE IDLE'.

- Check that you get Dial Tone, and can make outgoing calls.
- Set up the appropriate Preamble, number of digits, etc. to create the content and length of routing code your Fax Server needs.
- Make a call into the fax Router and listen to the DTMF tones delivered when you pick up the ringing phone<sup>2</sup>, and watch the same composite routing code be scrolled through on the LCD display.
- Make calls to the Fax Router to a variety of numbers in your MSN/DDI number range in order to verify that the BT network is set up correctly.

#### 3.2 Checkout of the Fax Server's "DTMF Routing" operation

The correct operation of your Fax server's DTMF Routing facility can be verified independently of the Fax Router. Call into the Fax Server from a regular phone line, or PABX, and manually enter the DTMF Touch Tone keys. Only when you have done this, and have thus confirmed the routing configuration in the Fax Server, does it make sense to test the system as a whole.

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<sup>2</sup> British Telecom delivers calls alternately to each port; if you have only a single telephone attached you may have to dial a second time for it to ring for this test.

### 3.3 System Checkout

A common error is not allowing enough delay (the RDelay parameter) from when the Fax Router sees the Fax Server answer the call to when the Fax Router starts to send in the DTMF routing code. Some fax cards answer the call with a “beep” and are not listening for the DTMF digits for several seconds. For this reason the default RDelay will be factory set to what may seem a rather long delay of 4 seconds.

## 4 Front Panel Indicators and Controls

### 4.1 LCD Display

A 16 character LCD is provided for configuration and diagnostics. In its default state it displays information about channel activity. When in this passive monitoring mode, the LCD is divided into two independent, 8-digit halves. The left for channel one, the right for channel two. The tables below show the display messages and meanings.

#### Incoming call Sequence

Display	Comments
IDLE . . . .	This channel is available.
RINGING .	An incoming call from ISDN is being presented to the fax modem. The flashing is as per the cadence.
ANSWER . .	The Fax modem goes “Off Hook” when told to by the Fax Server. The caller is not yet answered, and would continue to hear ringing.
RT . 12345	After RDelay (secs), the composite DTMF Routing Code that is being sent is horizontally scrolled.
LINKED . .	RHlast (secs) after the last DTMF digit, the ISDN call is answered, and the channel is opened end to end. The calling fax machine hears the fax tone and links up to the fax modem, and the fax transfer follows.
DISCON . .	When the incoming ISDN call is clearing from the network, or the fax modem goes On Hook, this message shows for a few seconds.
IDLE . . . .	The channel is again available.

(the dots shown indicate blank character positions in the display)

**Outgoing Call Sequence**

Display	Comments
IDLE . . .	This channel is available.
OFFHOOK .	Preparing to dial (normally only briefly seen).
DL. 7123 .	Dialling - Number dialled scrolled horizontally through 4 char field.
LINKED . .	Fax transfer in progress
DISCON . .	Call cleared by fax modem going On Hook.
IDLE . . . .	The channel is again available.

**4.2 LED Displays**

Five LED's are provided for confirmation of the operation of the Ascom Fax Router, their functions are as follows;

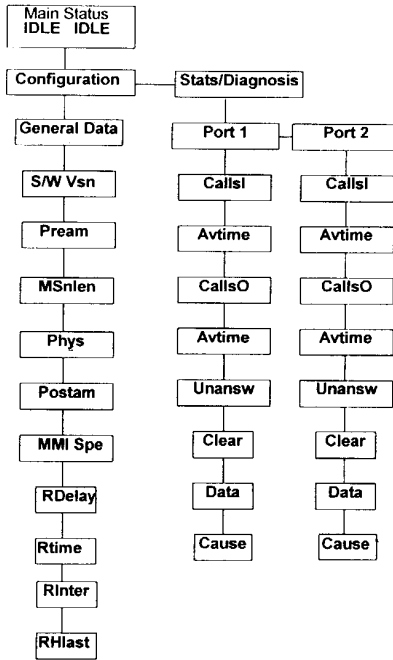
Designation	State	Operation
Ready	Off On Flashing	<ul style="list-style-type: none"> <li>• non operational</li> <li>• operational</li> <li>• fault</li> </ul>
Network	Off On Flashing	<ul style="list-style-type: none"> <li>• ISDN not connected</li> <li>• ISDN connected</li> <li>• ISDN idle, connected but not established</li> </ul>
Port 1, Port 2	Off On Flashing	<ul style="list-style-type: none"> <li>• Ready to send/receive fax</li> <li>• Sending/receiving fax<sup>3</sup></li> <li>• ringing (incoming call)</li> </ul>
Service	Off On Flashing	<ul style="list-style-type: none"> <li>• normal operation</li> <li>• service mode active</li> <li>• system configuration being updated</li> </ul>

<sup>3</sup> During an outgoing call, the lamp only lights when the call is answered.



## 5. Front panel Configuration/Diagnostics

The following diagram shows the path through the menus.



## 5.1 Use of the front panel

To activate the front panel you must press the 'Service' button on the far right hand side of the front panel. This will move you from the status display to the configuration level of the menu tree. The 'Service' LED will illuminate to confirm that you have entered service mode. Navigation through the menus is by means of the cursor buttons on the front panel, with the 'Select' button used to select parameters to change, and as an enter key. For example, to set a preamble of '12'

Action	Display
Initial display	IDLE IDLE
'Service' to enter service mode.	CONFIGURATION
Down Arrow twice, to reach preamble field (already set here to 33)	PReam = 33
'Select', resetting the parameter to its default value of 'OFF'.	PReam = OFF
Set first digit using up and down arrows (i.e. '1')	PReam = 1
'Select' button to fix first digit.	PReam = 1
'Select' again, confirming you want to enter another digit.	PReam = 1
Set next digit using up/down arrows (i.e. '2')	PReam = 12
'Select' button to fix the second digit.	PReam = 12
Down Arrow moves on to the next field in the menu (set to '01' already).	MSnlen = 01
'Service' to leave Configuration Mode. Lamp flashes as update is done.	IDLE IDLE

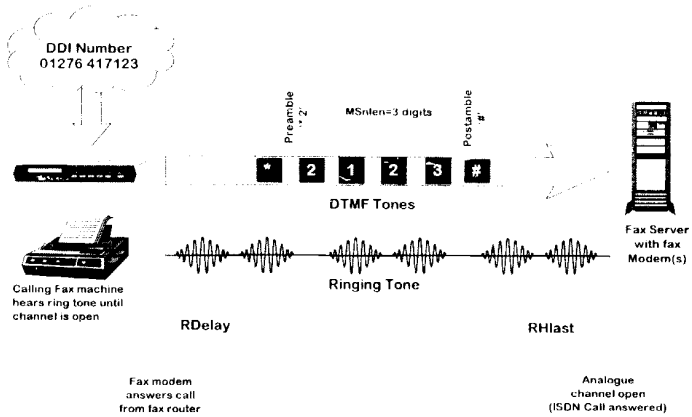
The same basic method is used to set all user-accessible parameters.

## 5.2 General Data Menu

<b>PRcam</b>	Preamble - This is a digit string which may be needed by the host fax system to identify that the number following is a routing address, or just to pad it out to a certain length.	0 to 15 digits
<b>S/W Vsn</b>	Software version number	
<b>Postam</b>	Postamble - This is a digit string which may be needed by the host fax system to indicate the end of the routing address.	0 to 15 digits
<b>MMI Spe</b>	The speed at which the Fax Router communicates with a PC	
<b>MSnlen</b>	MSN Length - This is the number of trailing digits sampled from the incoming number for routing purposes.	0 to 15
<b>Phys<sup>4</sup></b>	Port number that incoming calls go to: 1, 2, or next available ("0").	0, 1, or 2
<b>RDelay</b>	The delay the Fax Router puts between seeing the fax modem going Off Hook, and issuing the first routing digit. (units of 100msec)	0 to 25 s
<b>RTime</b>	Specifies duration of DTMF tones issued by the AFR. Defaults to 90mSec. (009 on display, units of 10msec)	70 ms to 2.5 s
<b>RInter</b>	Specifies duration of pause between DTMF digits sent. Defaults to 90mSec. (009 on display, units of 10msec)	70 ms to 2.5 s
<b>RHlast</b>	The delay the Fax Router puts between issuing the last DTMF tone and answering the ISDN call, thereby opening the analogue channel to the caller. Default is 007 (i.e. briefest, 70msec delay).	0 to 2.5 s

RTime, RInter and RHlast values are in 10msec units. For example, the default setting of 90mSec for 'RTime' is shown as 009. However, 'RDelay' is measured in 100mSec increments, therefore, the default of 4 seconds is shown as 040.

<sup>4</sup> Early versions do not have this option fitted.



The default values for the parameters RDelay, RTime, RInter, and RHlast are correct for most LAN fax packages. Check with your LAN fax supplier if you have problems.

Note from the above that even if your fax server is set to, “answer after two rings” [say], the calling fax machine will hear more than two rings. Exactly how many more rings depends on the user settings of the above shown delay parameters.

### 5.3 Stats/Diagnostics Menu

Statistics and diagnostics are gathered on a per port basis. Therefore, the menu is split into two halves. The parameters are detailed below;

<b>CallsI</b>	This is a count of total number of incoming calls recorded since the AFR was last reset.
<b>Avertime</b>	This shows the average duration of incoming calls.
<b>CallsO</b>	This is a count of total number of outgoing calls recorded since the AFR was last reset
<b>Avertime</b>	This shows the average duration of outgoing calls.
<b>Unansw</b>	This is a count of the total number of incoming calls that have not been answered i.e. user busy, incompatible destination etc.
<b>Clear</b>	This is a count of calls cleared for reasons other than normal call clearing. This should be cross-referenced with the 'Cause' parameter described below.
<b>Data</b>	This is a count of all data calls made.
<b>Cause</b>	This is the last recorded clearing cause value. This is useful when trying to determine why a call has failed.

These statistics will be reset each time the Fax Router is powered off/on.

Cause codes.....

Cause Code	Description
1	unassigned number
2	no route to specific network
3	no route to destination
4 or 6	channel unacceptable
7	call awarded delivered
8	call is proceeding
16	normal call clearing
17	user busy
18	no user responding
19	no answer from user
21	call rejected
22	number changed
25	call resumed
26	invalid destination address
27	destination out of order
28	invalid number format
29	requested facility rejected
30	response to status enquiry
31	cause unspecified
34	no channel available
35	destination not obtainable
36	out of order
38	network out of order
41	network failure
42	network congestion
43	access information discarded
44	requested channel not available
47	resource unavailable
49	quality service unavailable
50	requested facility not subscribed to
51	incompatible bearer capability
52	outgoing calls barred

Cause Code	Description
53	service operation violated
54	incoming calls barred
57	bearer capability not authorised
58	bearer capability not available
63	service not available
65	bearer service not implemented
66	channel type not implemented
68	message not implemented
69	requested facility not implemented
70	restricted digital only
79	service not implemented
81	invalid call reference number
82	id channel does not exist
83	call has no call id
84	call identity in use
85	digit invalid
86	call with call id cleared
88	incompatible destination
90	destination address missing
91	transit network does not exist
95	invalid message
96	mandatory missing
97	message bad or not implemented
98	message bad in call state
99	information element bad or not implemented
100	bad information element
101	message incompatible with call state
102	recovery on timer expiry
111	protocol error
118	invalid calling number
127	cause unknown

- A. UK Statutory Requirements
- B. British Telecom Pricing and ordering requirements
- C. Trouble-Shooting

## Appendix A. UK Statutory Requirements

The ASCOM Fax Router has no mains isolating switch and the mains plug must be removed from the mains socket to isolate the device from the mains. Always ensure that the socket is safe by first isolating the socket by placing the socket switch in the OFF position.

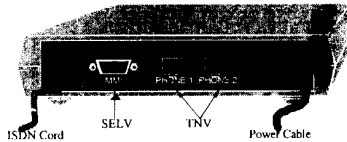
### A1.1 Safety Extra-Low Voltage (SELV) and Telecom Network Voltage Ports

The two analogue ports, as illustrated below, are declared as TNV ports. They provide interconnection points for connection of TNV circuits.

The RS232 connector is approved as a safety extra-low voltage (SELV) accessory port which is solely for connection of accessories that do not use or generate voltage greater than that defined for a SELV circuit.

Descriptions of these connection points are given in sections A2.1.0 and A2.2.0. The following diagram shows the location of all the TNV and SELV ports.

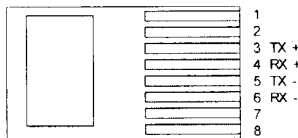
The mains supply is declared as an excessive voltage port. The fuse in the mains plug should only be changed with a standard 3amp fuse.



### A1.2 Connection Points - Main Board

#### J1-ISDN Interface Connector

A 4 pin connector provides connection to the ISDN network. The other end of the integral cable has a RJ45 plug. The following diagram describes the pinout of the RJ45 plug.



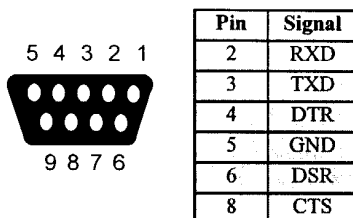
ISDN Cord - RJ45 Plug End





#### J4-RS232 Connector

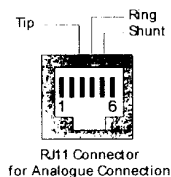
The RS232 connector is a DB9 female type connector and the interface supports RXD, TXD, DTR, DSR and CTS signals.



#### A1.3 Connection Points - Analogue Board

J5-RJ11 Connector #1

J7-RJ11 Connector #2



Analogue device connection is via these RJ11 connectors. A converter cable is provided for the RJ11 with the necessary standard BT socket.

Extension Apparatus is defined as:

- apparatus approved for direct connection to PSTN exchange line; or
- apparatus approved to DTI requirement 83/009; or
- any other apparatus where approval authorises it to be connected to PBX extension apparatus ports.

Appendix B - British Telecom's ISDN-2 Pricing

Note: these must be confirmed by the customer

		Connection Charge	Quarterly Rental	
Basic Charges	2 channels	£400	£84	
Call Charges <i>per channel</i>	Voice calls to any destination	Normal telephone charges		
	Inland data calls	Normal telephone charges		
DDI Charges (i.e. Two or more ISDN-2 lines)	Direct Dialling In (DDI)	£400 (one number range) £700 (two or more number ranges - max. 5)	N/A N/A	
	<i>The DDI charge, that is connection/rental, is for the number range opened, not just for the number used</i>	Per DDI number block (10 DDI numbers per block)	£23	£11
Facility Charges	Calling Line Identification	£10	£3.40	
	<i>Facility charges apply to each telephone number group or each DDI number range provided.</i>	Multiple Subscriber Numbering (single ISDN-2 line)	£20	£10
	Sub-addressing (Network Address Extension)	£10	£3.40	
	Permanent Call Barring	£13	N/A	
Call Diversion provided by BT	Basic	£10	£3.40	
	On engaged/failure	£10	£3.40	
	On ring tone no reply	£10	£3.40	
Call Diversion controlled by customer	Bypass number (per number)	N/A	£3.40	
	Three-way calling	£10	£3.40	
Extension Wiring	Visit charge	£18		
	Up to 150 metres	£62		
	150 to 400 metres	£240		
	Over 400 metres	Subject to estimate		

Appendix B (Cont'd) - British Telecom's ISDN-2 Ordering Requirements

	Complete this column for MSN			Complete this column for DDI
Exchange line configurations	1 Directory number per line. (Auxiliary Working)	1 Directory number per channel	Line Hunting (1 directory number per group of lines, see note 2)	DDI on ISDN-2 lines (DDI) ranges per group of lines, see notes 3, 4, 5)
Exchange line service				
Both way Exchange line	<input type="radio"/> tick	CH1 <input type="radio"/> CH2 <input type="radio"/>	<input type="radio"/>	<input type="radio"/> tick
Permanent Outgoing Call Barring	<input type="radio"/>	CH1 <input type="radio"/> CH2 <input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Permanent Incoming Call Barring	<input type="radio"/>	CH1 <input type="radio"/> CH2 <input type="radio"/>	<input type="radio"/>	N/A
Exchange line facilities				
Selective Outgoing Call Barring	<input type="radio"/>	CH1 <input type="radio"/> CH2 <input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Admin. provided diversion				
- Basic	<input type="radio"/>	CH1 <input type="radio"/> CH2 <input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- No reply	<input type="radio"/>	CH1 <input type="radio"/> CH2 <input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Engaged	<input type="radio"/>	CH1 <input type="radio"/> CH2 <input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Three way calling	N/A	CH1 <input type="radio"/> & CH2 <input type="radio"/>	N/A	N/A
Multiple Subscriber Numbering	<input type="radio"/> tick (see note 1)	N/A	N/A	N/A
By-pass Number	CH1 <input type="radio"/> CH2 <input type="radio"/>	CH1 <input type="radio"/> CH2 <input type="radio"/>	<input type="radio"/>	N/A
Sub-Addressing (Network address extension)	<input type="radio"/>	CH1 <input type="radio"/> CH2 <input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Calling Line Identity Presentation	<input type="radio"/>	CH1 <input type="radio"/> CH2 <input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Calling Line Restriction	<input type="radio"/>	CH1 <input type="radio"/> CH2 <input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Connected Line Identity Restriction	<input type="radio"/>	CH1 <input type="radio"/> CH2 <input type="radio"/>	<input type="radio"/>	<input type="radio"/>

1. The Multiple Subscriber Number (MSN) facility is provided within the exchange as a DDI hunt group supporting the same facilities as for Auxiliary Working. Each facility will be applied against individual MSNs.
2. Incoming calls hunt over a number of ISDN-2 channels. This hunt group is formed from a number of ISDN-2 lines, each line used contributing two channels to the total number of channels available. Exchange line facilities for a hunt group can only be allocated against the group and not the individual ISDN-2 lines.
3. A group of ISDN-2 lines can be provided with up to 5 DDI number ranges. Each range will be allocated with contiguous numbers and with a minimum of 10 numbers. Exchange line facilities will be provided against the group of ISDN-2 lines.
4. The number of digits forwarded by BT is 1-6, but is dependent on Customer Requirement and size of DDI number range.

BT will deliver incoming calls to the group of channels *cyclically* by default, but will deliver them *sequentially* on request (only relevant to DDI, for MSN the two are the same, of course).

Appendix C. Trouble-Shooting

Problem	Possible Cause	Remedy
Power LED does not light		Check mains cable
Network LED does not light	ISDN-2 cable has been disconnected from wall socket.  ISDN-2 line faulty	Power off the Fax Router, ensure ISDN cable is connected to the wall socket, power on the Fax router.  Connect a telephone to one of the analogue ports and check to see if you get a dial tone, if there is no dial tone contact your ISDN-2 supplier.
Fax Router only answering 1 in every 4 calls.	DDI hunting group set to cyclical.	Contact your ISDN-2 supplier and ask for hunt group to be changed to sequential
Fax Modem not answering incoming call	The delay between the fax modem going off hook and the fax router issuing the first routing digit is too short.	Change the RDELAY setting from 4 seconds to a longer time delay.

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