1 PRI, 16 BRI Intelligent ISDN Concentrator:
ISU2001-16

2 PRI, 32 BRI Intelligent ISDN Concentrator:
ISU2002-32

19 MAR 2001

2 PRI, 16 BRI Intelligent ISDN
Concentrator with drop and Insert option:
ISU2002-16

Remote Control Upgrade Option:
ISU2000-RC
Bandwidth reservation option:
ISU2000-BR
Busy Out Option:
ISU2000-Busy
Port-to-port switching option:
ISU2000-PPS

Intelligent ISDN Concentrator

How To Contact your Local Black Box

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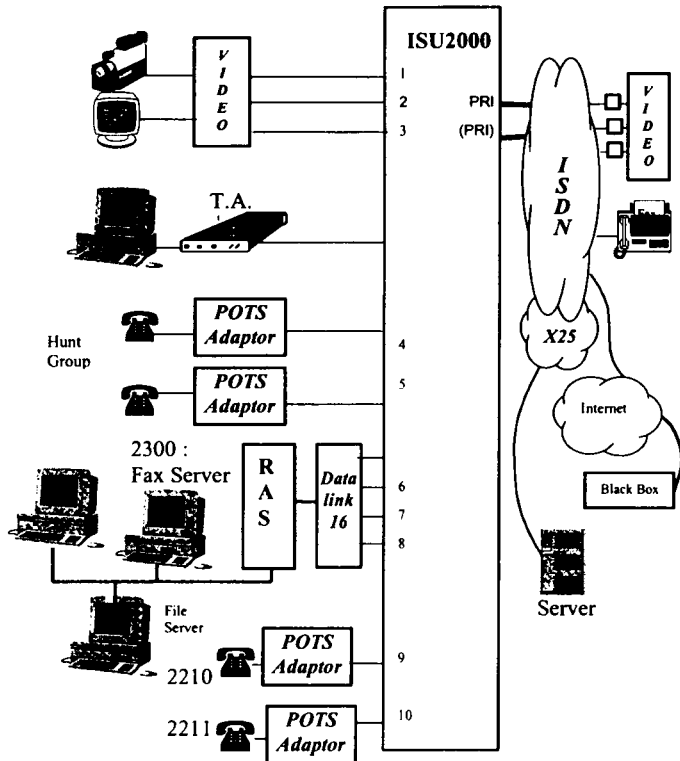Fax: 724-746-0746
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Contents

Introduction

The Intelligent ISDN Concentrator is a Primary Rate ISDN (PRI - T2) device, which connects Basic Rate ISDN (BRI – S0) terminal equipment. The following example describes a possible application for the Intelligent ISDN Concentrator. It will be referred to throughout this manual.

Port	FUNCTION (Application example)
PRI	Primary Rate Port to the public ISDN network 1 PRI port on the ISU2001-16 model 2 PRI ports on the ISU2002-32 model
BRI	Connections to BRI terminal equipment 16 BRI ports on the ISU2001-16 model 32 BRI ports on the ISU2002-32 model
	S0 1 - 3 Video conferencing equipment with aggregation of 6 B channels (384 Kbps)
	S0 4 An adapter dedicated to data transfer
	S0 5 - 6 Two lines in a hunt group (accessed by one number). Telephone help desk, for example
	S0 7 - 10 Lines grouped for a fax Server with multiple subscriber numbers (MSN) for 20 users and Internet access
	S0 11 – 12 Dedicated lines

Terminal Adapters connecting to the Basic Rate ports of the Intelligent ISDN Concentrator must comply with the following:
- Connection to a B channel: the D channel is reserved for the ISDN signalling.
- Balanced bus has a maximum length of 150m.
- Network protocols: ETSI / Euro–ISDN or France VN6.
- En-bloc dialling - overlap dialling.
- No BRI power feeding.

Range of products

The following table summarises the features of the different versions of the Intelligent ISDN Concentrator.

Product Code	ISU2001-16	ISU2002-32	ISU2002-16
Public primary access	1	2	1
Private primary access	0	0	1
Private basic accesses	16	32	16
Number of MSN filters per Port	3	3	3
Continuous power supply 48V	option	option	option

Options

The following picture summarises features of the different options of the ISU2000 :

Option	Description	Type
ISU2000-xxV	Continuous power supply (xx Volts)	Hardware
ISU2000-RC	Remote control (Modem or ISDN/V120)	Hardware
ISU2000-BR	Bandwidth reservation	Software
ISU2000-BUSY	Busy out / Call forwarding	Software
ISU2000-PPS	Internal switch	Software

Installing the Intelligent ISDN Concentrator

Unpacking the Intelligent ISDN Concentrator.

The following items should all be in your Intelligent ISDN Concentrator box:

- The Intelligent ISDN Concentrator - 19" chassis.
- Screws and nuts for installation in a 19 " bay.
- 4 adhesive feet.
- 1 mains power cord for 230VAC version.
- User and Installation manual.
- A floppy disk with the Intelligent ISDN Concentrator configuration software.
- A configuration cable (one RJ45/RJ45 cable and one RJ45/DB25 adapter).
- One (or two for ISU2002-32) PRI network RJ45/RJ45 cable (CA601370).
- One private PRI RJ45/RJ45 cable (ISU2002-16 only) (CA601371)

Installing the unit

Desk Top:

Attach the four adhesive feet on the Intelligent ISDN Concentrator's lower face. The front panel T-square may be removed.

In a Rack:

Use the screws 6x16 (and small discs) to fix T-square on the front panel of your 19 " rack. The front panel T-square is not sufficient to assure reliable support of the Intelligent ISDN Concentrator in the bay. Another support must be used at the rear of the unit. Ensure a provision of a free 1/2 U is left above the unit to assure an optimal air convection.

Connecting the unit

- Connect the ISDN public network to "TRUNK 1" and "TRUNK 2" with RJ45 cables. The pinning at the network end of these cables will depend on the operator's wiring.
- The BRI ports can be connected to by using a Cat 5 RJ45 patch cable. Its length must be less than 150 m. The remote end must be terminated by a set of 100 Ohm resistors. The following diagram describes this connection.

Power feeding   Control   Trunk 1 / 2   BRI S0
230Vac or 48Vdc   PRI   (16 or 32)

Control port
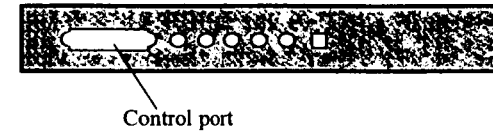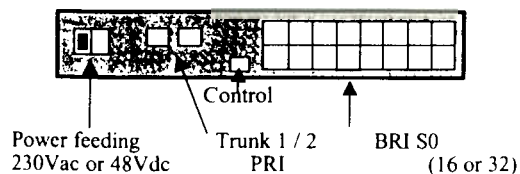
The S0 cable must avoid all electromagnetic sources, such as fluorescent lights. Avoid close contact with any mains power cable over more than 2 meters.

2 x 100 Ohms

< 150 m
Category 5 cable

Wall S0 plug
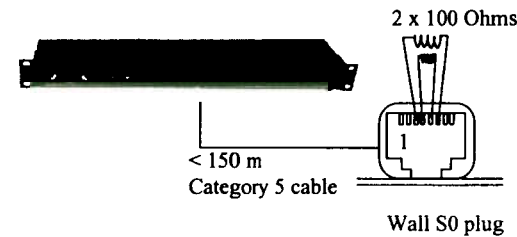
- ISU2002-16 only: Connect the PRI terminal equipment to TRUNK2 with the supplied cable CA601371.
- Connect the Intelligent ISDN Concentrator to the 230 VAC mains.
- Now connect a RS232 terminal or PC running the Intelligent ISDN Concentrator's configuration software to the DB25 "Control" port on the front panel or to the RJ45 control port on the back panel with the supplied RJ45/RJ45 cable and the RJ45/DB25 adapter.. This will allow you to fully configure the Intelligent ISDN Concentrator.

Start up and self - test

Connect the power supply cord and turn on the Intelligent ISDN Concentrator (flick the switch to the " I " position). The LED will light up and a self test will begin.

Progress of the self-test:

- LED for test results: The four LEDs light quickly and turn off from the right to the left.
- Memory test 1: TRUNK 1 LED lights and and turns off.
- Memory test 2: TRUNK 2 LED lights and and turns off.
- Memory test 3: CTRL LED lights and and turns off.
- End of the self - test: the 4 LEDs toggle.

Operating the unit

Front panel LEDs

The front panel supports five LED indicators :
(1) Power   Unit is powered on (green = OK)
(2) TRUNK 1:   First PRI network access activation (red = failed).
(3) TRUNK 2:   Second PRI network access activation (red = failed).
(4) CTRL: At least one B channel is active
(5) TEST: Bad self - test or alarm (red = failed).

The front panel also supports a push button reserved for maintenance purposes.

Factory configuration

The factory default configuration of the Intelligent ISDN Concentrator is as follows:

- Synchronization of the Intelligent ISDN Concentrator is extracted from the first Primary Rate Port.
- Presentation for incoming calls is on the first free private access (PRI, BRI 2, BRI 2…).
- S0 Ports have a capability of two B channels.
- S2 Ports has a capability of thirty B channels.

Configuring the unit

The configuration of the Intelligent ISDN Concentrator is achieved through the control port by means of AT commands.

The control port must be configured thus:

- Speed: 19200 bps
- Data: 8 bits
- Parity: none
- Stop bit: 1

You can configure the Intelligent ISDN Concentrator through online commands with an asynchronous terminal or using the Windows software. You can configure a remote unit, see appendix - D "Remote control option".

Configuration software

This software « ISUCfg » allows you to:

- View the current Intelligent ISDN Concentrator parameters.
- Modify and write all the parameters.
- Save the Intelligent ISDN Concentrator parameters in a file.
- Display diagnostics.
- View and save the log.
- Manage the port's password.
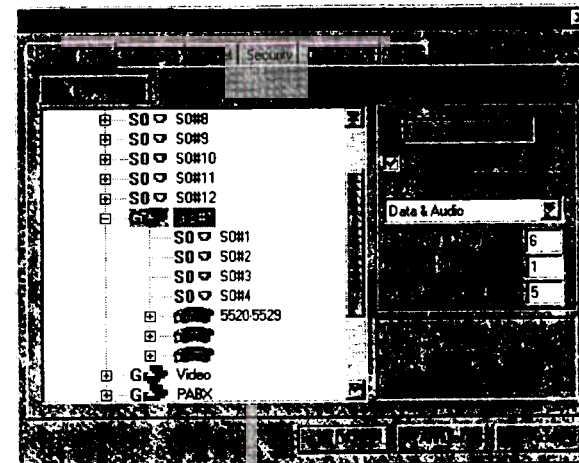
Run « A:\SETUP.EXE » from the floppy disk to install the configuration software on your PC.
The help file that may be read through the Help button (or F1) provides useful information on the configuration software.

System requirements:
- PC with a 486/100 MHz (or higher processor)
- Operating system: Windows® 95/98 or Windows NT®
- 8 MB of RAM (16 MB for NT)
- Hard disk space: 1MB
- One free COM port (COM1 to COM39)

Commands are preceded by the AT characters and are finished by <CR>.

Commands do not take affect until the Intelligent ISDN Concentrator re-booted or by a re-initialisation command: AT#Z <CR>.

I3   Display product type and software revision:
ISU2001-16 1.20 0154AF18

I252   Display product identification (serial number, options..):
59804001-9850-ISU2000-1.2
The fields separated with a dash are: the serial number, the manufacturing date code, optional id and option numbers separated with commas.

#Z   Reset the system and activates the configuration from the non-volatile memory.

$Z   Reset the system and erases the non-volatile memory: Return to factory configuration.

#HELP or #H or #I   displays some help on the AT# commands
These commands display help pages on # commands in literal (#H) or short (#I) form. Several pages are accessible by specifying the page number in the command:
#Hn   n of 0 to 9 according to the product.
#In   n of 0 to 9 according to the product.

#L or #V   Displays the current parameter values.
These commands display pages of parameter values in literal (#L) or short (#V) form. Several pages are accessible by specifying the page number in the command:
#Ln   n of 0 to 9 according to the product.
#Vn   n of 0 to 9 according to the product.

#ppppppp   The # type command can be used in the following four syntax:
• #PARAMETER?   to get the current value of the parameter.
• #PARAMETER-   to restore the factory value.
• #PARAMETER =?   to get help on the PARAMETER
• #PARAMETER=value   to define a new value. Note: this value is saved automatically in the non-volatile memory. It will not be active until the unit is powered on again or until it is reset by an AT#Z command.

Configuring the primary ports

#PLL: network synchronisation source:
1   first port (TRUNK#1) (default value).
2   second port (TRUNK#2)
4   internal synchronisation clock.

#C4_n: CRC4 mode (n = 1 or 2 for each primary port):
0   no CRC4.
1   CRC4 used
2   Automatic detection. (Default value).

#PCOn: Country code (n = 1 or 2 for each primary port):
33   France (Euro Numeris).
1000   Europe (Euro ISDN) (default value).

#PNChn   Number of B channels (n = 1 or 2 for each primary port):
0 to 30
30 default value.

#PFgn   Function (n = 1 or 2 for each primary port):
4   Terminal (Facing a Network Termination)
8   Network (Facing a terminal)
If you change the default values you can corrupt calls especially if these calls use the Overlap sending or receiving mode.

#PDigNn   Minimum digit number to take in account an overlap receiving incoming call on a PRI connected to the network (*n = 1 or 2 for each primary access*).
0 to 20
20 default value.

#POvrn   Incoming calls processing for PRI connected to the network (*n = 1 or 2 for each primary access*).
2 (default value) : "En-bloc" incoming calls processed; Overlap receiving calls processed only when #PDigNn digits are received else these calls are not processed and are nod logged.

130 : "En-bloc" incoming calls processed; Overlap receiving calls processed according #PDigNn value:

if #PDigNn=0 the called number is processed on each incoming digit and take in account when there is a match in the MSN table.
if #PDigNn=1 to 20 the called number is processed when this number of digits is received. These calls are logged even if the number of digit is less than #PDigNn.

#PBIDn   Dialling mode common for PRI connected to the network:
0 (default value) calls are sent "en-bloc" or in overlap sending according to the private access dialling.
1 à 20 : calls are always "en-bloc"; If the private access is in overlap sending mode, the ISU2000 wait this number of digits to dial the number on the PRI access.

Configuring the Basic Rate (S0) ports.

It is necessary to configure, for every port:

- The incoming call data type that the connected terminal adapter can process: digital or audio (modem, fax, voice) or both. See the #IBC command.
- The number of B channels that the terminal adapter can process at the same time: 1 or 2. See the #NC command.
- Dial numbers which the terminal adapter should be called: see the #MSN commands (multiple subscriber numbers or MSN).

The Intelligent ISDN Concentrator handles ranges of MSN numbers to provide you with a very sophisticated and easy configuration. An example is provided at the paragraph 01 to help configuring the Intelligent ISDN Concentrator.
Every command includes the S0 port number - 01 to 32: this number is referred to as "nn" in the command description.

#IBCnn=x Compatibility of service (Bearer Capability) or nature of data on the B channel that the terminal adapter can process. This parameter is used to filter the incoming calls, or to reject them:

- Values:
  X=0: accept any type of call
  X=1: accept digital type of calls only
  X=2: accept audio type of calls only
  X=3: does not accept any incoming call. The port can still support dialling but does not receive any incoming calls.

- Factory value: 0
- Example:
  AT#IBC10=2 <RC>
  The S0 port number 10 only accepts audio type calls.
  AT#IBC13=3 <RC>
  S0 port number 13 does not receive any incoming call.

#Ncnn=x Number of B channels that the terminal adapter can process on the S0 port. This parameter is used in call and in answer. The incoming calls are not being presented anymore on a port when this number of channels is already used.
- Value:
  1: 1 B channel
  2: 2 B channels
- Factory value: 2
- Example:
  AT#NC08-1 <RC>
  S0 port number 8 uses only one B channel.

#MSN1_nn= "Nmin-Nmax, SAmin-SAmax"
#MSN2_nn
#MSN3_nn

Ranges of numbers and sub-addresses, which affect S0 ports.

These parameters are used to direct the incoming calls towards S0 ports. If these fields are left blank then the incoming calls are presented sequentially to the first available S0 port.

- Values of Nmin-Nmax: 1 to 4 last 4 digits of the numbers affect the S0 port. Ensure the minimum and maximum values are in the correct order. Nmin and Nmax must always include the same number of digits.
- Values of SAmin-SAmax: 1 to 4 digits of sub-address affect the port. The sub-address is a method for selecting a terminal connected to an ISDN port that cannot be generated from plain old telephone network subscriber. Ensure the minimum and maximum values are in the correct order.
- Special case: If these parameters are all left blank then the port can answer any called number (none = any number)
- Factory value: none
- Example for port 1:
  AT#MSN1_01 = "090-110,10-50 " <RC>
  The S0 port number 1 will receive calls toward numbers ending in 090 to 110 with an obligatory sub-address of 10 to 50.
- Example for BRI port 10:
  AT#MSN1_10 = "2300-2320 " <RC>
  The S0 Port number 10 will receive calls toward numbers ending by 2300 to 2320 whatever the sub-address (even blank).
- Example for BRI port 11:
  AT#MSN1_11 = "2210 " <RC>
  This Port only answers to the number 2210 whatever the sub-address.
- Reset of the Port 14.
  AT#MSN1_14 = " " <RC>
  AT#MSN2_14 = " " <RC>
  An empty string resets the parameter to none. All numbers are then valid.

#Grnn=x linked group for this port:
0 independent access (default value).
1 to 8 number of one of the eight groups.

#Co Country code for the signalling protocol of all S0 ports
1000: Europe (ETSI)
33: France

#Iver ISDN version for all S0 ports
11: Europe ETSI (default value.
2: France VN3 (set also #Co=33).
3: France Euro Numéris

#BchO B channel allocation order when a call is delivered to a terminal:
1   B1 channel first
2   B2 channel first (default value)

Configuring the Private Primary Rate port.

It is necessary to configure the following, for every port:
- The incoming call data type that the connected terminal adapter can process: digital or audio (modem, fax, voice) or both. See the #PIBC command.
- The number of B channels that the terminal adapter can process at the same time: 1 to 30. See the #PNc command.
- Dial numbers which the terminal adapter should be called: see the #PMSN commands (multiple subscriber numbers or MSN).

The Intelligent ISDN Concentrator handles ranges of MSN numbers to provide you with a very sophisticated and easy configuration.

#PIBC2=x Compatibility of service (Bearer Capability) or nature of data on the B channel that the terminal adapter can process. This parameter is used to filter the incoming calls, or to reject them:
- Values:
  X=0: accept any type of incoming call
  X=1: accept digital type of incoming calls only
  X=2: accept audio type of incoming calls only
  X=3: does not accept any incoming call. The port can still support dialling but does not receive any incoming calls.
- Factory value: 0

#PNc2=x Number of B channels that the terminal adapter can process on the S2 port. This parameter is used in call and in answer. The incoming calls are no longer presented on this port when this number of channels is already used.
- Value:
  1 to 30 B channels
- Factory value: 30

#PMSN1_2= "Nmin-Nmax,SAmin-SAmax "
#PMSN2_2
#PMSN3_2

Ranges of numbers and sub-addresses, which affect the S0 port.
These parameters are used to direct the incoming calls toward the S2 port. If these fields are left blank then the incoming calls are presented sequentially to the first available port.
- Values of Nmin-Nmax: 1 to 4 last 4 digits of the numbers affect the S0 port. Ensure the minimum and maximum values are in the correct order. Nmin and Nmax must always include the same number of digits.
- Values of SAmin-SAmax: 1 to 4 digits of sub-address affected to the port. The sub-address is a selection method of a terminal on an ISDN port, which cannot be generated from plain old telephone network subscriber. Ensure the minimum and maximum values are in the correct order.
- Special case: If these parameters are all left blank then the port can answer any called number (none = any number)
- Factory value: none

#PGr2=x linked group for this access:
0 independent access (default value).
1 to 8 number of one of the eight groups.

Groups

Private ports can belong to a group (see #Grx and #PGrx commands). They inherit the group's capabilities (bandwidth allocation, call forwarding). There are eight groups. A group can contain one port, several ports or all private ports.

Bandwidth allocation option

The Intelligent ISDN Concentrator offers the possibility to reserve channels for selected ports. This allows important applications (PABX, Router.) to be assured of getting channels that are reserved for his group. A parameter defines the number of reserved channels for every group. A port gets a channel if the number of free network channels (calculated from #PNCh) is greater than the sum of the reserved channels. A call (incoming or outgoing) can be rejected if it needs one of the reserved channels. This function is an option (OPT 01 - BW) and is active only if a 1 is displayed in the ATI252 command's result.

#NcGrn=x   Number of reserved channels for the n group (n=1 to 8)
                        0 default value.
                        0 to 30 reserved channels.

Call forwarding option

The Intelligent ISDN Concentrator gives the capability to forward an incoming call through a group of BRI ports if it not connected after a programmable delay. The call is then forwarded to another BRI in the group. This function is useful for a multiple line system behind the Intelligent ISDN Concentrator: if sometimes a port or card is unavailable (failure...) the incoming call is not lost. A port is selected (by MSN, SA, service..) on the incoming call. If this port does not connect and belongs to a group with the #idt parameter set to n seconds (n is not equal to 0), then the call is forwarded to another compatible BRI port of the group until a connection or a network release of the call. The call is never forwarded on the same BRI with another channel number. This function is optional (OPT 02 – BO) and is active only if a 2 is displayed in the ATI252 command's result.

#IdtGrn=x   Group forwarding time (in seconds) for the n group (n=1 to 8)
                        0 (default value) no call forward.
                        1 to 90 seconds before forwarding the call.

#AdtGrn=x   Group supplementary forwarding time (in seconds) for the n group (n=1 to 8)
                        0 (default value) no call forward.
                        1 to 90 seconds before forwarding the call.

Forwarding time

If the called equipment is not connected after this time (in seconds) then the incoming call is forwarded to another compatible BRI in the group. The 0 value disables this function.
Supplementary forwarding time
This time (in seconds) allows you a more flexible time management in association with the "Forwarding time" parameter. You can forward an incoming call to more BRI within the public network incoming call duration.

- Forwarding time = n and Supplementary forwarding time = 0

Wait n seconds for a connection to thee equipment on each of the BRI ports in the group before forwarding to the next BRI. Typically n is the maximum response time of the connected application (5 to 10 seconds).

    -    Forwarding time = n and Supplementary forwarding time = m

Wait n seconds the alert phase of the connected ISDN equipment (Ringing phase) before forwarding to the next BRI. If there is any alerting equipment the Intelligent ISDN Concentrator waits m seconds the connection before forwarding the incoming call to the next BRI. Typically n is the maximum ISDN reaction time (1 or 2 seconds) and m is the maximum application response time (5 to 10 seconds).

Internal switch

The Intelligent ISDN Concentrator gives the capability to switch calls between private ports (BRI or PRI). These calls do not use the public network; they do not cause any charge from your ISDN provider. This function can be used without connection to the network. The Intelligent ISDN Concentrator can be used in stand-alone mode for exhibitions, tests, development...

If the number of dialled digits matches the #DDn parameter, the calls from private ports are compared to the programmed MSN to select a private port. Sub-addressing and services are also used in internal calls. If there is no match the call is routed to the public network. The overlap sending calls are routed to the public network when n digits are dialled (#DDn=n). Overlap sending calls with less than n digits never reach the public network.

The call forwarding option does not apply to the internal calls.

This function is optional (OPT 03 – SW) and is active only if a 3 is displayed in the ATI252 command's result.

#DDn=x   Number of digits used for internal calls
                    0 default value: no internal switch.
                    1 to 4 digits used for all internal calls.

Password security

Parameter changes can be protected by a password. The other functions (get parameter value, start log, view diags) are optionally protected. The security commands are:

#PASS="xxxxxx"	Password (1 to 6 character)
	"" (empty) default value: no protection.
	This parameter cannot be read.
#Passlvl	Protection level
	0 **Password required to change a parameter value (commands #xxx=yyy)**
	1 Password required to change a parameter value (commands #xxx=yyy), read a parameter value (commands #xxx ? ,#V and #L), get the log and the diagnostics (commands ATOn).
+LOGIN="xxxxxx	Logging in to the system to allow parameter change. (1 to 6 characters compared with #PASS characters).
+LOGOUT	Close session.
+LOGIN ?	Current login status :
	0 No read parameters set parameters, logs and diagnostics possible.
	1 No change authorised but reads, logs and diagnostics are still possible.
	2 Session is open or no password protection.

Log

The Intelligent ISDN Concentrator updates its call log each time

. It sends one log line on the completion of a call (disconnection or reject).

O   Open log mode(ATO). Any character aborts the log mode (CR,ESC..)

O5   Open log mode(ATO5). Any character aborts the log mode (CR,ESC..) This extended mode give an additional line as soon as the ISU2000 can route a call.

There are several fields in a log line separated with commas. The line end with (CR,LF).

Pnn or Bnn,	Number of the PRI network access used (01 or 02). If nn = 00 no network access is used (call rejected ...) or internal call destination side (P PRI, B BRI).
Pnn or Bnn,	Number of the private access used (P PRI, B BRI). If nn = 00 no network access is used (call rejected ...). For internal call this is the originator side.
I or O or X,	Call direction : I incoming call (from the network) , O outgoing call (from a private access), X internal call between private accesses.
C or R or P,	Call state : C connected call or R rejected call. P progress message (only in extended log mode) , there is another line at the end of the call.
A or D,	Service A = Audio or D = Data .
00000,	Call charging information (number of tax units) on 5 digits. Only significant for outgoing calls.
016,	Clearing cause: 3 decimal digits.
1234*8,	Calling number optionally with the calling sub-address separated by a * This field can be empty.
5678*9,	Called number optionally with the called sub-address separated by a *.
65,	Call duration in seconds (only in extended log mode).
10	Call identification number (only in extended log mode). This number allows to link the progress line (P) and the ending line (C or R).

Diagnostics

The Intelligent ISDN Concentrator allows you to display counters or statuses. The command syntax is ATOn (n=1 to 3). The commands are:

O1	PRI ports statuses
	The result is a line of values separated with commas. These values are:
	Number of established calls (used channels),
	Number of free network channels,
	Number of currently reserved channels,
	reserved,
	reserved,
	PRI port number (1)
	reserved,
	PRI state: 32 = active frames,
	Error code when the port is not active.
	Number of used channels on this PRI.
	Number of physical activations since last reset.
	PRI port number (2 optional)
	reserved,
	PRI state: 32 = active frames,
	Error code when the port is not active.
	Number of used channels on this PRI.
	Number of physical activations since last reset.
O2	BRI port activation status
	The result is a line of values separated with commas. These values are the BRI physical G states (16 or 32). G3 is the active state
O3	BRI access channel status
	The result is a line of values separated with commas. These values are the number of used channels for each BRI ((16 or 32).

Parameter setting example:

PORT	#IBC	#NC	MSN1_	MNS2_	REMARK
1	1	2	"2201-2202"		Videoconferencing
2	1	2	"2203-2204"		Videoconferencing
3	1	2	"2205-2206"		Videoconferencing
4	1	1	"2208"		Unique number
5	2	1	"2209"		Grouping of 2 lines
6	2	1	"2209"		Grouping of 2 lines
7	0	2	"2300-2320"	"8901-8905,10-50"	Grouping of 4 lines
8	0	2	"2300-2320"	"8901-8905,10-50"	
9	0	2	"2300-2320"	"8901-8905,10-50"	
10	0	2	"2300-2320"	"8901-8905,10-50"	
11	2	1	"2210"		Unique number
12	2	1	"2211"		Unique number
13..16	3				No incoming call to these ports

Every block in the table corresponds to an AT command for the Intelligent ISDN Concentrator.

The following script describes these commands for the ports 1, 7 and 13:

```
AT#IBC01=1
AT#NC01=2
AT#MSN1_01 = "2201-2202 "
AT#IBC07=0
AT#NC07=2
AT#MSN1_07 = "2300-2320 "
AT#MSN2_07 = "8901-8905,10-50 "
AT#IBC13=3
AT#Z
```

This last initialisation command resets the Intelligent ISDN Concentrator and activates the configuration parameters.

Maintenance and Problem Resolution.

Maintenance

The Intelligent ISDN Concentrator firmware is stored in re-programmable Flash memory. Loading of the firmware can be done at the control port. Pushing the front panel button during the self-test activates the firmware loading procedure of the Intelligent ISDN Concentrator. The four LEDs blink for 5 seconds. Trunk#1 and Trunk#2 light up showing that it is ready to receive a new program.

The current version of the firmware is displayed by the command ATI3.
Operating parameters are stored in a non-volatile memory (EEPROM). To erase this memory and to restart the Intelligent ISDN Concentrator in factory configuration, the AT$Z command can be entered on the control port.

In case of problems

IMPORTANT NOTE: all configuration commands are not active until the unit is re-booted (powered off/on) or until it is reset by an AT#Z command.

The following table lists some possible problems and solutions.

SYMPTOM	SOLUTION
No LED's on power-up	Verify the connection of the power supply cord. Check the fuses in the power supply of the Intelligent ISDN Concentrator
The LED TRUNK remains alight...	Verify the pinout of the cable connecting the Intelligent ISDN Concentrator to the ISDN Check the ISDN network : ask the ISDN operator.
Incomming calls fail on certain ports	Check the configuration of the port. Check that the unused ports are disabled by the AT#IBCnn=3.

Appendix A - Specifications

General
Mechanical:	W: 443 mm (19 "), H: 44 mm (1U), D: 318 mm.
Weight:	4.3 kg
Consumption:	230V +/-10% 50 Hz 150 mA Max.
Operating temperature:	0 to 40 °C.
Storage temperature:	-25 to +75 °C.
Relative humidity:	10 to 90% without condensation.

Certified compliant to European safety standards EN 60950.
Certified compliant to European EMC standards EN 55022, EN 50082.

1 or 2 primary access - 2 MBPS G703 - G704:
- 1 public network port: ISU2001-16
- 2 public network ports: ISU2002-32
- 1 public network port and 1 private network port: ISU2002-16
- Female RJ45 connector.
- Impedance 120 Ohms
- 30 x 64 KBPS.

16 or 32 basic S0 ISDN ports - S0 IUT I430:
- Female RJ45 connector.
- 2 B channels (2 x 64 KBPS)
- D channel for ISDN signalling
- Point to point (LT-S)

Signalling
- Independent signalling protocols between PRI and BRI.
- Outgoing data calls: BC unrestricted digital information.
- Outgoing audio calls: BC Speech/G711 A law.
- Incoming data calls: BC unrestricted digital information (no octet 5).
- Incoming audio calls: BC Audio 3.1 KHz/G711 A law.
- Calling and called sub address (up to 8 digits).
- Calling and called number (up to 20 digits).
- User to user information (UUI) (up to 32 characters).
- No HLC or LLC transparency.
- Advise of charge carried forward the private PRI.
- No charge carrier forward BRIs.
- Clearing causes carried forward.
- No other ISDN facilities supported.
- B channels connected at the connection time.
- Overlap and en-bloc sending supported.

Appendix B - Cables and Connectors

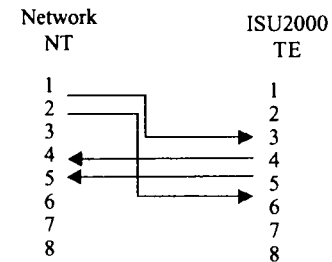### Primary ISDN cable (as an option)

This cable depends on the ISDN provider, installation wiring and connected equipment.
The cable will usually be one of the following models :
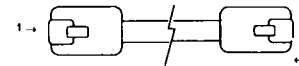
Network PRI wiring

This wiring is used on TRUNK#1 (all models) and TRUNK#2 (ISU2002-32).

- The connected equipment provides an international standard PRI NT interface (RJ45)
 (cable CA601370 supplied)

- The connected equipment provides a PRI NT interface on a specific connector or a
terminal block: wire its transmit pair to the Intelligent ISDN Concentrator's contacts 3 and 6,
wire its receive pair to the Intelligent ISDN Concentrator's contacts 4 and 5.
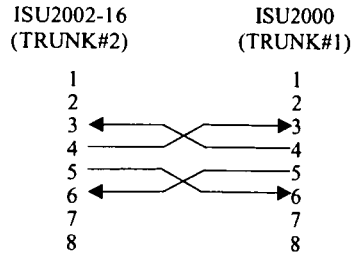
Private PRI wiring

This wiring is used on ISU2002-16 TRUNK#2.

- The connected equipment provides an international standard PRI TE interface (RJ45) (cable CA601371 supplied)
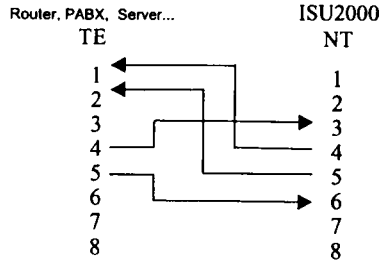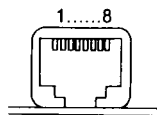

Router, PABX, Server...   ISU2000
TE   NT

- ISU2000/ISU2000 Wiring.

ISU2002-16   ISU2000
(TRUNK#2)   (TRUNK#1)

Pin	Signal	I/O	Description
1	N.C.	-	Not connected
2	N.C.	-	Not connected
3	IN A	I	Receive
4	OUT A	O	Transmit
5	OUT B	O	Transmit
6	IN B	I	Receive
7	N.C.	-	Not connected
8	N.C.	-	Not connected

The 8 pins are numbered as described on the following diagram.

1......8

Basic access Connector S0 1 - 32

Pin	Signal	I/O	Description
1	N.C.	-	Not connected
2	N.C.	-	Not connected
3	IN A	I	Receive
4	OUT A	O	Transmit
5	OUT B	O	Transmit
6	IN B	I	Receive
7	N.C.	-	Not connected
8	N.C.	-	Not connected

The 8 pins are numbered as described on the following diagram.

1......8
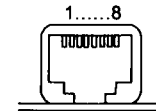
CONTROL connector

The front panel "Control " port is an asynchronous V24 interface on a SUB-D 25 pin female connector

Pin N°	Name	ITU circuit	Function
1		101	Protective ground
2	TXD	103	Transmit data
3	RXD	104	Receive data
4	RTS	105	Request to send
5	CTS	106	Clear to send
6	DSR	107	Data set ready
7	GND	102	Signal Ground
8	CD	109	Carrier detect
20	DTR	108/2	Data terminal ready

Front view

13 12 11 10 9 8 7 6 5 4 3 2 1

14 15 16 17 18 19 20 21 22 23 24 25
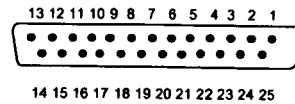
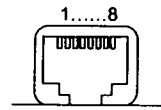This interface is also provided at the rear face of the Intelligent ISDN Concentrator on an RJ45 connector. Only one of these ports can be used at a time.

The rear panel control port assignment is as described :

Pin	Name	ITU circuit
1	DSR	107
2	CD	109
3	DTR	108
4	GND	102
5	RXD	104
6	TXD	103
7	CTS.	106
8	RTS	105

The 8 pins are numbered as described on the following diagram.

1......8

Appendix C – Clearing Causes

Hex. Value	Dec. Value	Description
01	1	Unassigned number
02	2	No route in the network
03	3	No route to the destination
06	6	Channel unacceptable
07	7	call awarded and being delivered in an established channel
10	16	normal call clearing
11	17	user busy
12	18	no user responding
13	19	no answer from user (user alerted)
15	21	call rejected
16	22	number changed
18	24	Unassigned number
1A	26	non-selected user clearing
1B	27	destination out of order
1C	28	invalid number format
1D	29	facility rejected
1E	30	response to STATUS INQUIRY
1F	31	normal, unspecified
22	34	no circuit/channel available
26	38	network out of order
29	41	temporary failure
2A	42	switching equipment congestion
2B	43	access information discarded
2C	44	requested circuit/channel not available
2F	47	resources unavailable, unspecified
31	49	quality of service unavailable (UUI)
32	50	requested facility not subscribed
39	57	bearer capability not authorized
3A	58	bearer capability not presently available
3B	59	Call restriction
3F	63	Service or option not available, unspecified
41	65	bearer capability not implemented
42	66	channel type not implemented
45	69	requested facility not implemented
46	70	only restricted digital information bearer capability is available
4F	79	service or option not implemented, unspecified
51	81	invalid call reference value
52	82	identified channel does not exist
53	83	a suspended call exists, but this call identity does not
54	84	call identity in use

Hex. Value	Dec. Value	Description
55	85	no call suspended
56	86	call having the requested call identity has been cleared
58	88	incompatible destination
5B	91	invalid transit network selection
5F	95	invalid message, unspecified
60	96	mandatory information element is missing
61	97	message type non-existent or not implemented
62	98	message not compatible with call state or message type non-existent or not implemented
63	99	information element non-existent or not implemented
64	100	invalid information element contents
65	101	message not compatible with call state
66	102	recovery on timer time-out
67	103	Bad length of the information element
6F	111	protocol error, unspecified
71	113	Unavailable bearer service
72	114	Data transfer not possible
7E	126	Passing in conversation mode
7F	127	Interworking, unspecified
FF	255	normal call clearing

The Intelligent ISDN Concentrator carries the clearing causes from the network or from terminals. In some cases it can clear calls for the following reasons:

10(Hex)	16	normal call clearing

- Aborted incoming call when the call is forwarded to another BRI port.

11(Hex)	17	user busy

- Incoming call; port selected by the number (MSN) and the service but the number of supported B channels is exceeded.
- Incoming call; Intelligent ISDN Concentrator number of calls exceeded.

15(Hex)	21	call rejected

- Incoming call; No corresponding Number in the MSN programmed.
- Incoming call; no bandwidth allocation possible
- Outgoing call; B channels supported on the private PRI overtaken

1C(Hex)	28	invalid number format

- Outgoing call; more then 20 digits.

22(Hex)	34	no circuit/channel available

- Outgoing call; No channel available on network PRI.
- Outgoing call; There are free channels but they are reserved for other groups (bandwidth allocation).

Outgoing call; Exclusive B channel 0 required

26(Hex)	38	network out of order

- Outgoing call; There is no active PRI.

2A(Hex)	42	switching equipment congestion

- Outgoing call; B channels supported on the private BRI exceeded.

2C(Hex)	44	requested circuit/channel not available

- Outgoing call; the exclusive B channel required is not free.

39(Hex)	57	bearer capability not authorized

- Incoming call; the selected port (MSN) is not programmed for this service (Data or audio).

Appendix D - Remote Control Option

An ISDN terminal adapter can be added to manage a remote Intelligent ISDN Concentrator.
The remote management terminal must have an ISDN TA (V120) or a Modem (V34 or
V32bis) and the ISU2000 configuration software " ISUCfg ".

The "Remote Control" kit includes:
* An ISDN terminal adapter with its power supply.
* An RJ45/RJ45 cable for ISDN S0.
* A Mini Din / DB25.cable
* An RJ45/DB25 adapter and an Rj45/RJ45 cable.

To connect this ISDN terminal adapter:
* Connect the TA to a free BRI (S01 to S016) port on the Intelligent ISDN Concentrator
  with the RJ45/RJ45 cable.
* If necessary disconnect the local terminal local from the front or the rear control port. The
  remote control equipment and a local terminal cannot be simultaneously connected to the
  Intelligent ISDN Concentrator.
* Connect the DTE cable to the TA Mini Din.
* Connect the TA to the ISU2000 rear control port with the RJ45/DB25 adapter and the
  RJ45/RJ45 cable.
* Power up the TA

Intelligent ISDN Concentrator Configuration:

Set an MSN number on the BRI used to connect the remote control equipment. Set the
number of supported B channels to 1 on this port. You can type the following line for
example: AT#MSN1_16="5516"#Nc16=1#Z to select the BRI #16 when the xxx5516 is
called.

Terminal Adapter configuration:

The TA is now configured for the Intelligent ISDN Concentrator remote control. If you alter
this configuration you must send the following commands with a 19200,8,n, 1 terminal:

```
AT$Z                         factory reset.
AT#SAV120=#SAMDM=Z           no sub address filter.
AT&O4S0=1&O10S0=1            automatic answer in Modem and V120.
ATE0Q1&W           DTE mode. This command does not respond. OK.
```