1. INTRODUCTION

The Basic Interface to Remote Terminal, or BIRT, is an INCOM Network Master. BIRT gives users an economical way of getting information from their INCOM-compatible devices since it connects directly between a user's external MODEM or personal computer and the INCOM network.

BIRT can directly replace Westinghouse MINTs, talking to all INCOM-based communication devices. BIRTs also include a special high-speed mode for communicating with SADIs – allowing users to collect data from other manufacturer's relays more rapidly than ever before.

BIRTs are built to handle the abuse of substation environment; their “hardened” RS-232 serial port can handle surges and sustained high voltages that would destroy ordinary serial ports, and BIRTs can run on a wide range of voltages, from 48 to 250 Vdc or even 120 Vac, with no jumpers or adjustments needed.

2. FEATURES

BIRT is designed to be very flexible in its RS-232 communications options:

- Data Bit Length can be set to 5, 6, 7, or 8 bits.
- Even, Odd, or No Parity.
- 1 or 2 Stop Bits.
- Data Rates from 1200-9600 bps.

- Has a standard, 25 pin, DCE (Data Communication Equipment) serial port connector.

BIRT includes non-volatile memory for storing RS-232 settings, and responses from the host; more than 2 Kbytes of host data may be stored.

BIRT conforms to all applicable ANSI and IEC specifications.

Westinghouse MINTs can be upgraded to BIRTs without changing host computer software, cables, or power supply.
4. INSTALLATION

Installation and operation of the BIRT involves four steps:

1. Setting BIRT INCOM switches
2. Making electrical connections
3. Setting software parameters
4. Physically mounting BIRT

4.1. Setting BIRT’s INCOM Switch

BIRT contains one internal, four position DIP switch, SW4, that specifies the INCOM network data rate and type of signal modulation. BIRT’s DIP switch configuration must match the configuration of your other network devices. There are two possibilities:

- Older, low speed INCOM networks are 1200 bps, ASK modulation,
- Newer, high speed networks are 9600 bps, FSK modulation.

Use Table 1 to set DIP switch S4 to the correct configuration.

<table>
<thead>
<tr>
<th>INCOM NETWORK TYPE</th>
<th>S4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1200 bps, ASK</td>
</tr>
<tr>
<td>1</td>
<td>closed (down)</td>
</tr>
<tr>
<td>2</td>
<td>closed (down)</td>
</tr>
<tr>
<td>3</td>
<td>closed (down)</td>
</tr>
<tr>
<td>4</td>
<td>open (up)</td>
</tr>
</tbody>
</table>

Switch 4 settings for INCOM network parameters

Table 1:

4.2. Making Electrical Connections

BIRT has three connection groups: power, the INCOM Network, and the RS-232 serial port.

4.2.1 Connecting Power

BIRT can be powered by 48-250 Vdc or 120 Vac. This power is connected to pins 3 and 4 of the green connector P3 on BIRT’s Front Panel; either polarity is ok. Use 14-22 AWG stranded wire for the power supply. About a second after applying power, you should notice BIRT’s LED slowly flashing green; this indicates it is passing all internal tests.

4.2.2 Connecting To The INCOM Network

For the twisted pair network wire, we recommend using Belden Broadcast and Computer Cable, 20 AWG, part number 9463. This cable will perform more reliably than many other types, especially when the network has many devices or is longer than a few dozen feet.

The INCOM network connections are directly above the power connections. Connect the twisted pair wire to pins 1 & 2 of the connector, P3. Polarity isn’t important here either. Connect the twisted pair’s shield to BIRT’s ground stud.

4.2.3 Connecting To BIRT’s RS-232 Serial Port

RS-232 communication devices come in two varieties: DTE (Data Terminal Equipment) and DCE (Data Communication Equipment) types. Loosely speaking, DCE devices can be considered as “slaves” and DTE devices as “masters.” You can usually tell whether a serial port is a DCE or a DTE type by glancing at the connector: DCE devices are always supposed to have female connectors, and DTE devices are supposed to have male connectors. Personal computers (PCs) are normally DTE devices or masters, and external modems are DCE devices or slaves. The original intent was to allow DTE devices, like computers, to plug directly into DCE devices, like modems, with a straight cable -- that is, pin 1 of the computer to pin 1 of the modem, pin 2 to pin 2, and so on.

BIRT is a DCE device: it will connect directly to your host Personal Computer using a standard, straight cable with a 25 pin female connector at one end and a 25 pin male connector at the other. These cables are probably the most common communication cables around and can be found in computer and electronic stores.

Sometimes personal computers have a 9 pin DTE connector instead of a 25 pin connector. In this case simply buy a cable with a female 9 pin connector at one end and a male 25 pin connector at the other.

4.2.4 External MODEM Connection

External modems are stand-alone boxes that have a
telephone connection and an RS-232 serial port connection. External modems differ from the more common internal modems which are just printed circuit boards that plug directly into your PC, eliminating the RS-232 serial port connection.

Since the BIRT needs to plug into a device with an RS-232 port, you must use an external modem. You’ll also need an adapter called a Null modem. This simple device lets two DCE devices, like BIRT and a modem, talk together. Null modems swap input and output connections so that the outputs of one DCE device feed into the inputs of the other and vice-versa. Like straight cables, these are also very common and can be purchased at any computer store. Try to buy a null modem that has male connectors on both ends. Then you can use the same cable as you would with a direct computer to BIRT connection.

To use the Null modem, simply plug it into the BIRT or the modem, in either direction, then connect the cable between the Null modem and the other device. Remember the BIRT and modem are both DCE devices and have female connectors so your cable and Null modem combination must end up with the male 25 pin connectors on both ends.

Since RS-232 communications are susceptible to interference, keep the cable as short as possible, preferably ten feet or less. If you have to use a longer cable, you should use a shielded cable.

4.3. RS-232 Configuration

BIRT’s RS-232 configuration specifies how the BIRT will communicate using its RS-232 serial port. You will need to set this configuration to match the modem or local computer to which BIRT will be connected. These settings are made with software rather than DIP switches, and are maintained in BIRT’s non-volatile memory even after power is removed.

4.3.1 BIRT RS-232 Configuration Options

You can set BIRT’s communication settings to enable it to talk with virtually any RS-232 host device. Since these devices are quite diverse in their communication parameters, BIRT enables you to set:

- Data Rate – the speed at which the host communicates through its RS-232 port. BIRT can handle all standard common data rates from 1200 to 9600 baud; default is 1200 baud.

- Number of Stop Bits – RS-232 communications break up bytes of data with a stop bit or bits. Allowable values are 1 or 2; default is 2 bits.

- Data Bits per character – using the complete or extended ASCII set requires 8 data bits, but some RS-232 devices use a subset of this set, and communicate with 5, 6, or 7 data bits. BIRT can be set from 5 to 8 bits to accommodate all lengths. Default is 8 bits.

- Parity bit – an error detection bit, known as a parity bit, is used by some RS-232 devices. This option can be set for even, odd, or no parity. The default is No Parity.

4.3.2 Setting RS-232 Configuration

BIRT’s RS-232 configuration can be changed using a computer that has ABB’s Remote Communications Program, RCP, installed. For details on how to use RCP, see the RCP instruction Leaflet, 40-603. If you are already familiar with RCP, you can perform the following steps:

1. Start RCP and Enter the initial Password.
2. Enter ALT + C – this will display the communications options.
3. Configure RCP’s RS-232 port to match the current BIRT configuration. If this is a new BIRT, the default parameters are 1200 baud, 8 data bits, 2 stop bits, and no parity. To change RCP’s configuration, select “SETTINGS” then set the bit rate (baud); RCP automatically uses 8 data bits, 2 stop bits and no parity so normally you won’t have to change these.
4. Select “Local Mode” – this will display the RS-232 and modem options.
5. Select “RS-232”
6. Type “###” – don’t hit the carriage return or “enter” key. BIRT recognizes the “#” character sent three times as a signal to stop what it’s doing and enter SETUP MODE. BIRT will then send its Setup Menu to your host’s screen.
Command: ___

To select a parameter to change, type the letter in parenthesis.
For example to change Baud, type “b” or “B”.

**Set (B)aud** – prompts you for the data rate you want between the host computer or modem and the **BIRT**. Set **BIRT** for the highest data rate that works with your modem or computer. In general if you are using a modem, select the highest speed of the modem or 9600 baud, whichever is lower. If you’re connecting directly to a computer, select 9600 baud.

**Set (W)ord length** – prompts you for the number of bits per ASCII character. Unless you know otherwise, select 8 bits.

**Set (P)arity** – most applications don’t use parity so you’ll usually select No Parity.

**Set (S)top Bits** – allows you to toggle between 1 and 2 stop bits. Most modern applications use 1 stop bit, but **BIRT** and the original Westinghouse MINT use 2 stop bits, so the **BIRT** factory default is 2 stop bits. As a general rule, use 2 stop bits unless you have a good reason to use only 1 stop bit.

**Report NOVRAM settings** – this option will display the latest setting changes you have entered. These settings will take effect when you select the **Initialize NOVRAM** settings command.

**Initialize NOVRAM settings** – settings you may have changed do not take effect until you select this option. This feature allows you to continue making all setting changes without having to reconfigure your host’s RS-232 serial port after each change.

After you have selected this option, you may see garbled characters appear on your screen. At this point you’ll need to change your host’s communication configuration to match the changes made in the **BIRT**. If you’re using **RCP**, back out to the RS-232 settings options, and change them to match **BIRT**. You can then re-enter local mode and continue making setting changes, or proceed to some other operation.

**Start (A)SCII mode** – selecting this will cause **BIRT** to leave Setup mode and enter ASCII mode. ASCII mode is used strictly by SADIs and allows a very rapid transfer of data between the SADI’s host RS-232 device, like a GE DLP, and your host computer. See the section on ASCII mode for more information.

**Toggle Setup Menu (E)cho** – when the echo is “on” **BIRT** echoes back any Setup Menu Command you enter. If you see two characters for every one you enter, for example, “**BB**” instead of “**B**”, turn the echo off, and if you don’t see a character when you enter a command, turn the echo “on”.

**Note that if you do not enter any characters for fifteen (15) seconds, BIRT will automatically resume INCOM mode.**

### 4.3.3 RS-232 Communication Problems

If you can’t get the **BIRT** to communicate, set your local computer to 1200 Baud, 8 data bits, 2 stop bits, and no parity. Then power the **BIRT** off then on. **BIRT** will automatically set itself for this RS-232 configuration for ten seconds after power up. Immediately after power up, send “###” to **BIRT**. That will take you into Setup mode where you will see the Setup Menu.

**BIRT** will continue to communicate at this data rate until you either exit Setup mode or force a change in **BIRT**’s RS-232 configuration. You can now go ahead and make your setting changes.
If you miss the first seconds after power-up, the **BIRT** will take up to one minute to initialize the RS-232 port with its current NOVRAM settings.

Sometime in the future you may forget the settings in the **BIRT** and not be able to communicate with it. At that point you have two options:

1. You can power the **BIRT** on and off like above, then after you get the Setup Menu, type “R” to see **BIRT**’s current settings. You can then either change your **RCP** settings to match the **BIRT** or update the **BIRT** settings.

2. You can also experiment with different **RCP** serial settings, typing “###” after each trial, and observing if the **BIRT** sends its Setup Menu.

### Recommended Settings

Although **BIRT**s can be set in a wide variety of ways, we have found good performance with most systems can be achieved by using the following settings:

**BIRT** Settings for Local Computer Connection

When you use **BIRT** with a local computer, we recommend setting **BIRT** for the fastest transfers possible; these settings are: 9600 Baud, 8 data bits, 2 stop bits, and no parity.

**BIRT** Settings for MODEM Connection

If you use **BIRT** with a modem, set **BIRT** to the highest data rate the modem can use or 9600 Baud, whichever is lower. For example, if you have a 2400 baud modem, set the **BIRT** to 2400 baud; if you have a 14.4 k baud modem, set **BIRT** to 9600 baud. In both cases the other settings can be 8 data bits, 2 stop bits, and no parity.

### Mounting

**BIRT**s can be mounted in any position and just about any location that’s clean and dry, and free from excessive vibration, corrosive fumes, and heat.

**BIRT** can either be panel mounted or installed on the back of FT-type cases using special mounting hardware kit #9656A94G01 (see figure 1).

Before performing acceptance tests make sure you have configured **BIRT**s INCOM DIP switch and set the RS-232 configuration in software. The **BIRT** INCOM switch must be set the same as your INCOM network – either 1200 bits/sec, ASK modulation like the original INCOM network, or 9600 bits/sec, FSK modulation for high speed INCOM Networks. The RS-232 should be set to some known configuration, for example, 9600 baud, 8 data bits, no parity, and 2 stop bits.

### GENERAL TESTS

Connect **BIRT** to power and the INCOM twisted pair. The twisted pair shield should be connected to **BIRT**’s ground stud. After power is connected you should see **BIRT**’s LED begin slowly flashing green; this shows **BIRT** is passing all its self-tests.

Connect the serial port of a local computer to the **BIRT** serial port – this is “COM PORT” on the front panel, using a straight 25 pin cable.

ABB’s Remote Communications Program, **RCP**, will be used to test **BIRT** (for more details on using **RCP**, see the **RCP** I.L. 40-603).

To use **RCP** to communicate with **BIRT**:

1. Enter the password.
2. Select the Substation File (**ALT + S**).
3. Select the Device.
4. Select Communicate Initiate (**ALT + C – Initiate**).
5. If you need to change the default Com Port or baud to match the **BIRT** (shown in lower-right corner of screen), then select Communicate-Settings (**ALT + C – Settings**) to select Connect Settings, and change your Com Port or baud as needed.
6. For any device selected (e.g., MDAR, MMCO, RONI, etc.) press **ALT + R** – Relay Commands, and select commands from the menu that you want to execute.

**RCP** will communicate with the selected device through the **BIRT**; it sends commands formatted in INCOM’s 10 byte ASCII protocol to **BIRT** which converts commands into a normal INCOM network message format and sends them to the network devices. The specific device selected by the command replies to **BIRT**, which translates the information back to the 10 byte protocol, and sends it back to **RCP**. **RCP** then displays the device’s reply on your screen.

Communicate with your network devices using several commands to verify **BIRT** and **RCP** are operating properly.
5.1. MODEM Tests

If BIRT is connected to an external modem, you need to set the modem and make sure the BIRT is configured properly to work with the modem. Connect a PC, with RCP installed, directly to BIRT (no modem or telephone lines in between) to initially configure BIRT. See Section 4.3 for information on configuring BIRT.

BIRT should be configured at the highest modem data rate or 9600 baud, whichever is lower (see Section 4.3.4 Recommended Settings). Also make sure BIRT is set for 8 data bits, 2 stop bits, and no parity.

After you have configured BIRT, disconnect it from your PC, and connect the BIRT to its modem with a cable and a Null modem. Then connect this modem to the telephone line. For more information on how to connect BIRT to a modem, see Section 4.2.4.

Connect your RCP computer's modem to another telephone line; note that this modem can be either an external or internal modem since no direct BIRT connection is needed at this end.

Start up RCP in your PC and set your PC's modem or serial port to communicate at the same baud as the BIRT. For example if the BIRT is set to 2400 baud set your PC's modem the same.

Using RCP, call BIRT's telephone number. From RCP, select the substation and device you want to communicate with. Initialize the Com port, then, following menu options, select “Communicate”, “Local Mode”, and “RS-232”. The screen will clear, and allow typing in a telephone number, e.g. ATDT 5551212. The modem will then dial this number, and wait for a connection in BIRT's modem.

Once this connection is established, you will be able to communicate through BIRT to your substation device in the same way as you would if your computer was connected directly to the BIRT. Send several commands to the device to confirm everything is working properly.

6. OPERATION

BIRT has four modes of operation: Power-up, Setup, INCOM, and ASCII mode.

6.1. Power UP

When power is first applied, the LED on the front panel should begin flashing green at a rate of about one second on and one second off; this shows that BIRT is passing all internal tests and is operating normally. A rapid flashing amber LED indicates a self-test failure.

BIRT remains in Power-up mode for ten seconds. During that time, the default RS-232 communication settings are in effect – 1200 baud, 8 data bits, no parity, and 2 stop bits. If you enter “###” using these default communication settings, BIRT will immediately enter Setup mode. Otherwise BIRT will take one minute to initiate the RS-232 port with its current NOVRAM settings. The BIRT will not necessarily power up to the normal (INCOM) mode. It will power up to either the normal or ASCII mode, whichever mode it was in when it was powered down.

![POWER UP Diagram]

6.2. INCOM Mode

INCOM mode is the most commonly used BIRT mode. While in INCOM mode, BIRT functions much like a Westinghouse MINT: it will respond to RCP issued INCOM commands the same way the MINT does, however it has considerably larger memory dedicated to holding INCOM response messages from the slaves, thus eliminating the need to slow down the network during lengthy responses.

If you have used RCP and a MINT before, you can continue doing things the way you have been.
If you haven’t used RCP, see the RCP manual on how to communicate on the INCOM network.

If you attempt to communicate to network relays is unsuccessful, it is possible the BIRT’s Setup mode (see section 4.3.2) and press the “ESC” key to allow the BIRT to communicate to network relays in the Normal mode.

6.3. Setup Mode

Setup mode lets you change the RS-232 settings in the BIRT or enter ASCII mode. Setup mode can be entered at any time by sending “###” to the BIRT while using the correct RS-232 settings. These three characters can be sent by RCP in Local mode. See Setting RS-232 Configuration 4.3.2 for more details on using Setup mode.

6.4. ASCII Mode

Many relay manufacturers are using RS-232 serial communications as a means of transferring information from their relays to host computers. Depending on the particular relay, there are two common ways that users access this RS-232 data: using a terminal emulation program like Procomm, BitCom, or Mirror, or by using an application program written by the relay manufacturer.

When users communicate with the Procomm method, they type specific commands like “EVENTS” to get target data from the relay, and when they are using the manufacturer’s program, they may be selecting commands from menus with arrow keys, or some other method.

ASCII mode enables you to communicate with these relays as through you were connected directly to the relay. It will work with Procomm-type relays and many application programs as well.

ASCII mode requires that the host relay be connected to SADI so that RS-232 data can be converted into INCOM data. When ASCII mode is initiated, a transparent link is created between the BIRT and SADI, allowing data to free flow between the two devices. This link not only greatly increases the data rate, but it allows you to talk with the RS-232 relay as though you were connected directly to it. Figure 2 shows a typical BIRT/SADI connection.

To start ASCII mode:

1. Start RCP and select “Communications” (ALT + C) – “Local mode – RS-232”
2. Change BIRT’s mode to Setup mode by typing “###”. After that you should see BIRT’s Setup Menu.
3. Select “A” for (A)SCII mode.
4. BIRT will then prompt you for the INCOM address of the specific SADI that you wish to link to. Enter this address.

BIRT will check and verify whether or not a SADI is at the address, and if one is found it will establish the link. If the BIRT cannot establish communications to the SADI address given, it will enter the ASCII mode anyway.

If the relay uses Procomm-type communications, you can simply enter commands as though you were connected directly to the relay. To break the BIRT-SADI link, type “###”. That will return you to Setup mode. Cycling power while BIRT is in the ASCII mode, will not revert it to the Normal (INCOM) mode. It will power up in the ASCII mode.

If the relay uses an application program for communications:

1. Start RCP and start BIRT’s ASCII mode as above.
2. Press F2 – “Return to Main Program”.
3. Select SADI as the device.
4. Press ALT + R – Relay Commands, and select “Load an External Application Program”. Be sure to include the full path name of the application program.

After the program is loaded, you should be able to communicate normally. If a problem occurs, like no returned data, check SADI settings to its host RS-232 device.

There are some limitations to this scheme – some application programs have a very rigid time frame in which to accomplish data transfers. They cannot accommodate the occasional delay introduced by this scheme, thus they cannot use this mode.
In some cases these relays are able to use "Procomm" type communications in addition to the relay manufacturer's application program, and so you may still be able to take advantage of ASCII mode.

A second limitation is that the host relay must have left at least one "spare" ASCII character. There are 256 possible characters in the extended ASCII set; all the keys on a keyboard, graphics characters, and command codes have unique ASCII codes. Usually relays only use a portion of these, say the alphabet, all numbers, and some punctuation, to say everything they need. That leaves quite a few unused characters. The SADI and BIRT require at least one character, called the End of Command Character, to help control the flow of data on the twisted pair.

Some relays, particularly those that use a manufacturer's application program, use many of these normally spare characters for their own data formatting and command codes. Finding a spare ASCII code can be trial and error, although we have often found that fe hex works well. If this code doesn't work, you can usually find a spare character by starting with the code ff hex and working your way down.

To search for a spare character, use RCP to select the specific SADI you need to setup. Modify SADI's settings to use the new End of Command byte, then attempt to communicate with SADI's host using ASCII mode. No BIRT changes are needed for this new End of Command byte since it automatically gets the latest byte from SADI each time you start ASCII mode. For more information on updating settings like the End of Command Byte, see the RCP I.L., 40-603, and the SADI I.L., 40-609.

6.5. ABB Bulletin Board

The ABB Power Automation and Protection Division Bulletin Board (BBS) is now on line. To obtain the latest version of RCP software, please call the ABB BBS via modem at:

(800) 338-0581 or (954) 755-3250

Using configuration settings 300-14,400 bits/second, 8 data bits, 1 stop bit, no parity and full duplex. Once the connection is established and login is completed, choose L - Library of Files from the TOP menu. Next, Select D - Down Load File, from the Library of Files, RCPxxx.EXE (where xxx is the most recent version number e.g., 180 for version 1.80). RCPxxx.EXE is a compressed, self extracting file which is expanded and installed by simply typing RCPxxx and following the instructions.

7. COMMUNICATION

7.1 RS-232 SERIAL COMMUNICATION

Serial communication between two RS-232 machines is done in a character by character fashion. To transmit one character, the transmitting machine first sends a start bit, then the bits of the character, followed by some number of stop bits. The number of bits per character and number of stop bits are somewhat variable, depending on the particular machine. In this fashion strings of characters may be transmitted, each character containing start, data, and stop bits.

In some schemes a parity bit is included immediately after the character's bits. This parity bit is used to help catch errors in the transmission of the character. Parity is said to be either even or odd. In even parity, the sum of all data bits plus the parity bit must add up to an even number. The transmitting device adds up all the data bits of a character it is preparing to send; if they are odd, it will set the parity bit to one, otherwise it will set it to zero. At the receiving device all data bits and the parity are added, and if the sum is not even, the receiver knows an error has occurred during transmission. It can subsequently signal the transmitter to take some action such as "re-send the character".

In odd parity the same technique is used except that the sum of all bits plus the parity bit must be an odd number.

Occasionally the receiving device may either not be ready to receive data or may be approaching the limit it can receive without overflowing the available storage space. To control these situations, the receiver is generally given a means of telling the transmitting device to stop sending data; this is called handshaking. Handshaking is done by two basic techniques: hardware handshaking and software handshaking.

In hardware handshaking one or more control lines are connected to the two devices. These lines tell the transmitting device when it's ok to send more data, and when to hold. In software handshaking, there are no actual control lines linking the two machines. Instead, when the receiver feels it is about to be overwhelmed, it will transmit an XOFF character; this XOFF character can be any character so long as it is
understood by both machines to mean “Stop”. A second character, XON, is sent by the receiver when it is able to take more data.

Most manufacturers use the Extended American Standard Code for Information Interchange (ASCII) character set for their RS-232 devices. In Extended ASCII, every possible character has a unique code, and there are 256 different characters. It’s convenient to use base 16 when working with ASCII codes; for example the character "A" has an ASCII code 41 base 16 or “hex”, usually written 41h – this is equivalent to 61 base 10, and XON and XOFF usually use the codes 11h and 13h, respectively.

The RS-232 standard specifies two types of communication devices: Data Terminal Equipment (DTE), and Data Circuit-Terminating Equipment (DCE). The original intent was to connect a DTE to a DCE: this was convenient because you could connect the two machines with a simple cable: pin 1 to pin 1, pin 2 to pin 2, and so on. Typically machines like computers are provided with DTE connectors, and modems with DCE connectors.

Frequently, however, we need to connect two DTE machines together such as when we want two computers to share data. Since both computers transmit on pin 2, we would have data collisions, and neither would receive anything. To correct that, we can connect the two computers with a null modem in between. A null modem is a simple device that routes the transmitting line to one machine into the receiving line of the other; usually handshaking lines are re-routed similarly (See Table 4).

7.2 PIN DEFINITIONS AND RS-232 CABLES

The RS-232 standard defines a standard connector for serial communications, the 25 pin D-shell connector or DB25 connector. These are made in both male and female versions, and according to the RS-232 standard, male DB25 connectors are used by DTEs, and female DB25 connectors by DCEs.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Name</th>
<th>DCE</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CG</td>
<td>---</td>
<td>Chassis Ground</td>
</tr>
<tr>
<td>*2</td>
<td>RD</td>
<td>input</td>
<td>Receive Data</td>
</tr>
<tr>
<td>*3</td>
<td>TD</td>
<td>output</td>
<td>Transmit Data</td>
</tr>
<tr>
<td>4</td>
<td>CTS</td>
<td>input</td>
<td>Clear to Send</td>
</tr>
<tr>
<td>5</td>
<td>RTS</td>
<td>output</td>
<td>Request to Send</td>
</tr>
<tr>
<td>6</td>
<td>DTR</td>
<td>output</td>
<td>Data Terminal Ready</td>
</tr>
<tr>
<td>*7</td>
<td>SG</td>
<td>---</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>8</td>
<td>DCD</td>
<td>output</td>
<td>Data Carrier Detect</td>
</tr>
<tr>
<td>20</td>
<td>DSR</td>
<td>input</td>
<td>Data Set Ready</td>
</tr>
</tbody>
</table>

* BIRT supported pin

Table 2:
Pinouts for a standard DB25 DCE connector. RTS, CTS, DSR, DCD, and DTR are handshaking lines.

<table>
<thead>
<tr>
<th>Male DB25 Pin</th>
<th>Female DB25 Pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
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</tr>
<tr>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

Table 3:
Null Modem Connections

RS-232 Cable Connections. If constructing a cable, do not connect unused pins and try to keep cable length less than 10 feet; if longer cables are needed, use shielded cable.
Figure 1. BIRT can be rear mounted to any FT case.
**Figure 2. Typical BIRT Network**

**Figure 3. Typical BIRT Network with a modem**
Figure 4. Power Supply and INCOM Circuit Board Schematic.
Figure 5. Power Supply and INCOM Component Location.
Figure 6. RS-232 Circuit Board Schematic
* Denotes change since previous issue

Figure 7. RS-232 Circuit Board Component Location.
Figure 8. Logic Circuit Board Schematic
* Denotes change since previous issue

figure 9. Logic Circuit Board component Location.
BIRT Ordering/Style Description

BASIC INTERFACE TO REMOTE TERMINAL

Supersedes MINT Style Number 1610C08G01

BASE UNIT

Power Supply capable of 48/60/110/
125/250 Vdc, 120 Vac nominal supply voltages
RS 232C Port 300-9600 bps

NETWORK INTERFACE

9600/1200 bps INCOM®

Typical Catalog Number

© INCOM is a registered trademark of the Westinghouse Electric, Corp.

ABB Power T&D Company Inc.
4300 Coral Ridge Drive
Coral Springs Florida 33065
PHONE: 954-752-6700
FAX: 954-345-5329
BIRT  Basic Interface to Remote Terminal

USER’S GUIDE

WRELCOM™
Intelligent Family of Relay Communication Products

Substation Control and Communications
ABB Power T&D Company Inc.
Power Automation and Protection Division
4300 Coral Ridge Drive
Coral Springs, Florida 33065
(954) 752-6700

OCTOBER 1996
We recommend the user of this equipment to become acquainted with the information in this instruction leaflet before energizing the system. Failure to do so may result in injury to personnel or damage to the equipment, and may affect the equipment warranty.

All integrated circuits used on the modules are sensitive to and can be damaged by the discharge of static electricity. Electrostatic discharge (ESD) precautions should be observed when handling modules or individual components.

ABB does not assume liability arising out of the application or use of any product or circuit described herein. ABB reserves the right to make changes to any products herein to improve reliability, function, or design. Specifications and information herein are subject to change without notice. All possible contingencies which may arise during installation, operation, or maintenance, and all details and variations of this equipment do not purport to be covered by these instructions. If further information is desired by the purchaser regarding a particular installation, operation, or maintenance of equipment, the local ABB representative should be contacted.

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**BIRT Ordering/Style Description**