

R96DFXL-CID
MONOFAX[®] Modem
Designer's Guide Addendum
(Preliminary)

Rockwell International
Digital Communications Division

ROCKST06

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1. INTRODUCTION

1.1. SUMMARY

The Rockwell R96DFXL-CID MONOFAX modem is a synchronous 9600 bits per second (bps) half-duplex modem with error detection, DTMF reception, and Caller ID. It has low power consumption and requires only a single +5 VDC power supply. The modem is packaged in a single 100-pin plastic quad flat pack (PQFP).

The modem can operate over the public switched telephone network (PSTN) through line terminations provided by a data access arrangement (DAA).

The modem is designed for use in Group 3 facsimile machines, satisfies the requirements specified in CCITT recommendations V.29, V.27 ter, V.21 Channel 2, and T.4, and meets T.30 binary signaling requirements.

The modem can operate at 9600, 7200, 4800, 2400, or 300 bps, and includes the V.27 ter short training sequence option. The modem can also perform HDLC framing according to T.30 at the above telco line speeds.

The modem features a programmable DTMF receiver and three programmable tone detectors which operate concurrently with the V.21 channel 2 receiver.

The voice mode allows the host computer to efficiently transmit and receive audio signals and messages.

The modem can receive Caller ID information in V.23 receive mode. Caller ID information (date, time, calling number, and name) can be acquired from the telephone line. This information is accessible by the host in parallel operation mode.

General purpose input/output (GPIO) and general purpose input (GPI) pins are available for host assignment.

The modem's small size, single voltage supply, and low power consumption allow the design of compact system enclosures for use in both office and home environments. The engineering part number for the R96DFXL-CID is R6686.

This designer's guide addendum and the R96DFXL-CID Data Sheet Addendum (Order No. MD92A) provide information about the Caller ID capability of the R96DFXL-CID.

The R96DFXL MONOFAX Modem Data Sheet (Order No. MD92) and Designer's Guide Addendum (Order No. 820A) describe capabilities and application information unique to the R96DFXL modem.

Consult the 9600 bps MONOFAX Modem Designer's Guide (Order No. 820) for detailed information common to the R96XFX modem family (R96MFX, R96EFX, R96DFX, and R96VFX) and the R96DFXL modem.

1.2. FEATURES

- Group 3 facsimile transmission/reception
 - CCITT V.29, V.27 ter, T.30, V.21 Channel 2, T.4
 - HDLC framing at all speeds
- V.27 ter short train
- Concurrent DTMF, FSK, and tone reception
- Voice mode transmission/reception
- Half-duplex (2-wire)
- Caller ID reception (V.23 receive - 1200 bps)
- Programmable maximum transmit level:
 - 0 dBm to -15 dBm
- Programmable transmit analog attenuation:
 - 0 dB to 14 dB in 2 dB steps
- Receive dynamic range: 0 dBm to -43 dBm
- Programmable dual tone generation
- Programmable tone detection
- Programmable turn-on and turn-off thresholds
- Programmable interface memory interrupt
- Diagnostic capability
 - Allows telephone line quality monitoring
- Equalization
 - Automatic adaptive equalizer
 - Fixed digital compromise equalizer
- DTE interface: two alternate ports
 - Selectable microprocessor bus (6500 or 8085)
 - CCITT V.24 (EIA-232-D compatible) interface
- TTL and CMOS compatible
- Low power consumption: 250 mW (typical)
- Single 100-pin PQFP package
- Single +5 VDC power supply
- Software compatible with R96MFX, R96EFX, R96DFX, R96VFX, and R96DFXL modems

2. CALLER ID

2.1. INTRODUCTION

Calling Number Delivery (CND), better known as Caller ID, is a telephone service intended for residential and small business customers. It allows the called Customer Premises Equipment (CPE) to receive a calling party's directory number and the date and time of the call during the first silent interval in the ringing cycle. The customer must contact a Bellcore Client Company to initiate CND service.

2.2. CALLING NUMBER DELIVERY SPECIFICATION

All of this CND information, according to BellCore, is sent between the first and the second ring and starts as early as 300 ms after the first ring burst and ends at least 475 ms before the second ring burst.

The following information summarizes the CND information provided by BellCore.

2.3. PARAMETERS

The data signaling interface has the following characteristics:

Link Type:	2-wire, simplex
Transmission Scheme:	Analog, phase-coherent FSK
Logical 1 (mark):	1200 + 12 Hz
Logical 0 (space):	2200 + 22 Hz
Transmission Rate:	1200 bps
Transmission Level:	13.5 + 1 dBm into 900 ohm load

2.4. PROTOCOL

The protocol uses 8-bit data words (bytes), each bounded by a start bit and a stop bit. The CND message uses the Single Data Message format shown below.

Channel Seizure Signal	Carrier Signal	Message Type Word	Message Length Word	Data Word(s)	Check-sum Word
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2.4.1. Channel Seizure Signal

The channel seizure signal is 30 continuous bytes of 55h (01010101). This provides a detectable alternating function to the CPE (i.e., the modem data pump).

2.4.2. Carrier Signal

The carrier signal consists of 130 ± 25 ms of mark (1200 Hz) to condition the receiver for data.

2.4.3. Message Type Word

The message type word indicates the service and capability associated with the data message. The message type word for CND service is 04h (00000100).

2.4.4. Message Length Word

The message length word specifies the total number of data words to follow.

2.4.5. Data Words

The data words are encoded in ASCII and represent the following information:

- The first two words represent the month.
- The next two words represent the day of the month.
- The next two words represent the hour in local military time.
- The next two words represent the minute after the hour.
- The calling party's directory number is represented by the remaining words in the data word field.

If the calling party's directory number is not available to the terminating central office, the data word field contains an ASCII "O." If the calling party invokes the privacy capability, the data word field contains an ASCII "P."

2.4.6. Checksum Word

The Checksum word contains the twos complement of the modulo 256 sum of the other words in the data message (i.e., message type, message length, and data words). The receiving equipment may calculate the modulo 256 sum of the received words and add this sum to the received checksum word. A result of zero generally indicates that the message was correctly received. Message retransmission is not supported.

2.4.7. Example CND Single Data Message

An example of a received CND message, beginning with the message type word, follows:

04 12 30 39 33 30 31 32 32 34 36 30 39 35 35 35 31 32 31 32 51
 04h = Calling number delivery information code (message type word).
 12h = 18 decimal; Number of data words (date, time, and directory number words).
 ASCII 30, 39 = 09; September
 ASCII 33, 30 = 30; 30th day
 ASCII 31, 32 = 12; 12:00 PM
 ASCII 32, 34 = 24; 24 minutes (i.e., 12:24 PM)
 ASCII 36 30 39 35 35 35 31 32 31 32 = 609-555-1212; calling party's directory number.
 51h = Checksum Word.

2.5. DAA REQUIREMENTS

To receive CND information, the modem monitors the phone line between the first and second ring bursts without causing the DAA to go off hook in the conventional sense, which would inhibit the transmission of CND information by the local central office. A simple modification to an existing DAA circuit (as shown in Figure 2-1) easily accomplishes the task.

With the addition of Q1 and K2, the DAA is AC-coupled to the phone line through the ring detect capacitor, C1, allowing the CND signal to pass to the modem while blocking DC loop current that would place the line off hook.

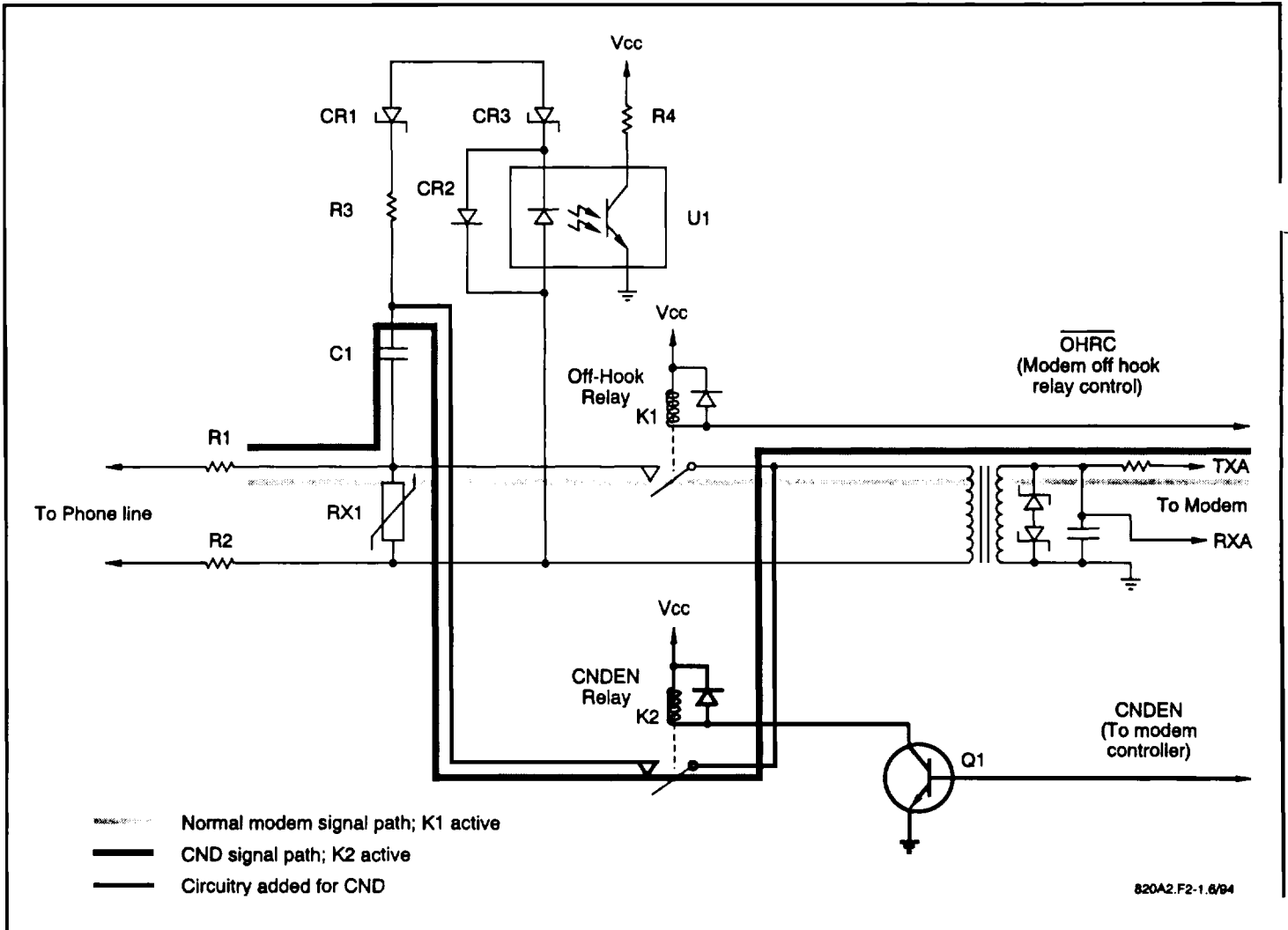


Figure 2-1. DAA Circuit Supporting CND

2.6. MODEM REQUIREMENTS

Although the data signaling interface parameters match those of a Bell 202 modem, the receiving CPE need not be a Bell 202 modem. A V.23 1200 bps modem receiver may be used to demodulate the Bell 202 signal.

2.7. SOFTWARE REQUIREMENTS

The ring detection circuit and firmware routine, both provided by the host, allow the host to activate and deactivate the CNDEN relay to monitor the telephone line for receiving the CND information.

After the first ring burst is detected by the host, the host waits for 250 ms of silence, and then activates the CNDEN line (see Figure 2-1). The host then configures the modem for CND reception as follows:

CONF = 22h

PDM = 1

SETUP = 1 and wait until SETUP = 0

Wait until CDET = 1

The received data is now available via DBUFF (10:0-7).

CNDEN must be deactivated by the host prior to the reception of the second ring burst, and prior to activation of the Off-Hook relay.

Flowcharts corresponding to the above process are shown in Figure 2-2.

2.8. APPLICATIONS

Once CND information is received, the user may process the information in a number of ways.

1. The date, time, and calling party's directory number can be displayed.
2. Using a look-up table, the calling party's directory number can be correlated with his or her name and the name displayed.
3. CND information can also be used in additional ways such as for:
 - a. Bulletin board applications,
 - b. Black-listing applications,
 - c. Keeping logs of system user calls, or
 - d. Implementing a telemarketing data base.

2.9. REFERENCES

For more information on Calling Number Delivery (CND), refer to Bellcore publications TR-TSY-000030 and TR-TSY-000031.

To obtain Bellcore documents, contact:

Bellcore Customer Service
60 New England Avenue, Room 1B252
Piscataway, NJ 08834-4196
(201) 699-5800

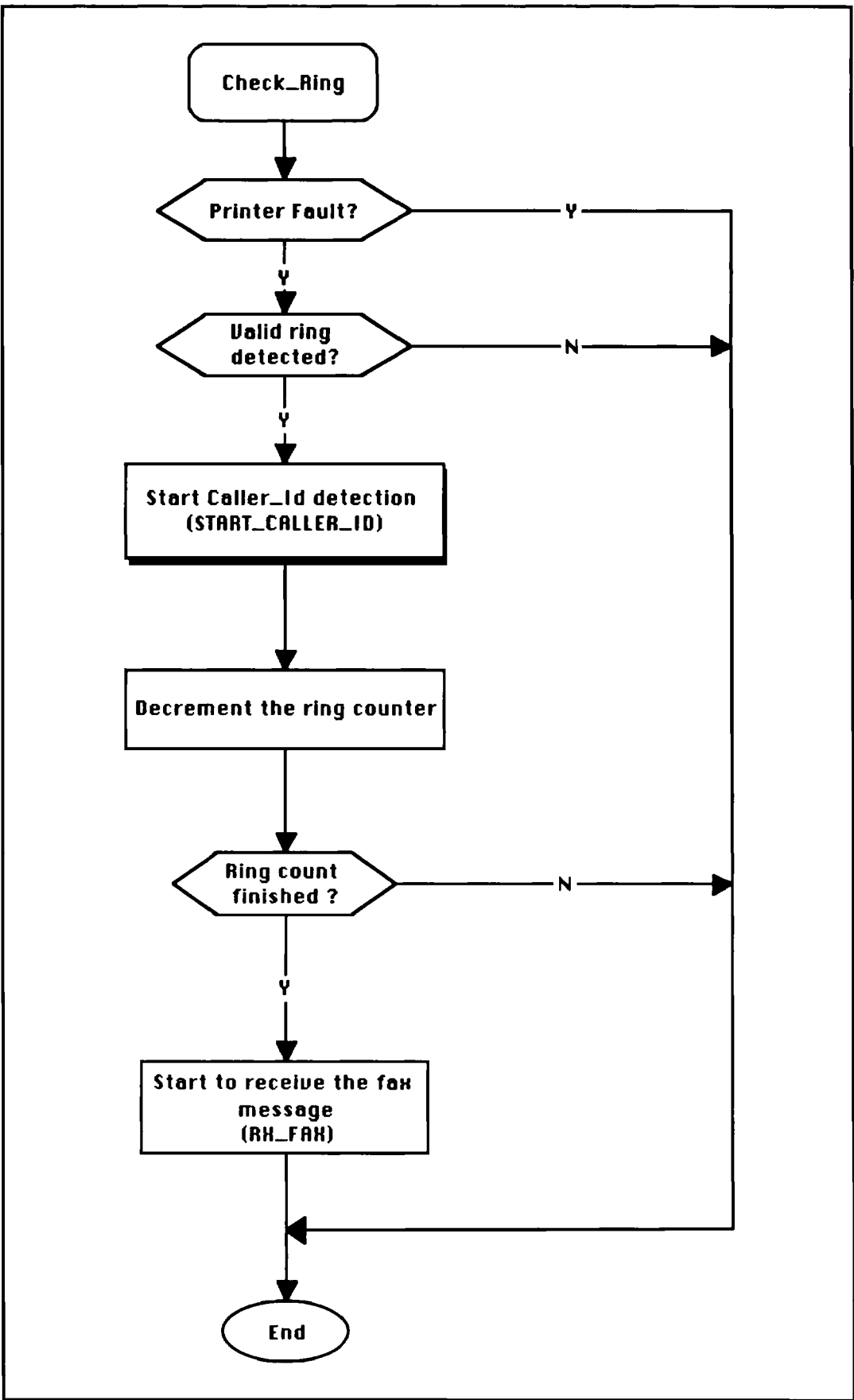


Figure 2-2. Caller ID Example Flowchart

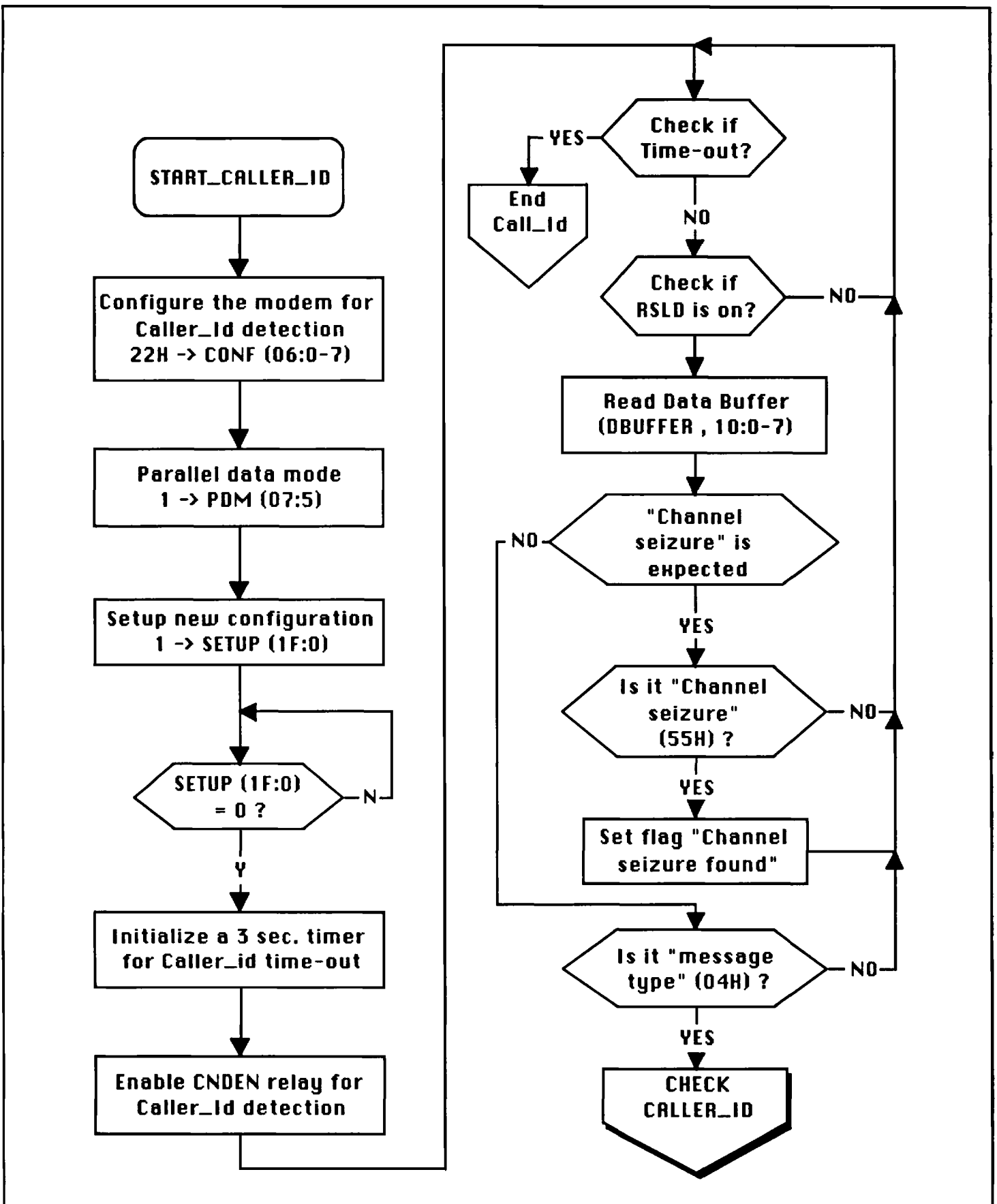


Figure 2-2. Caller ID Example Flowchart (Continued)

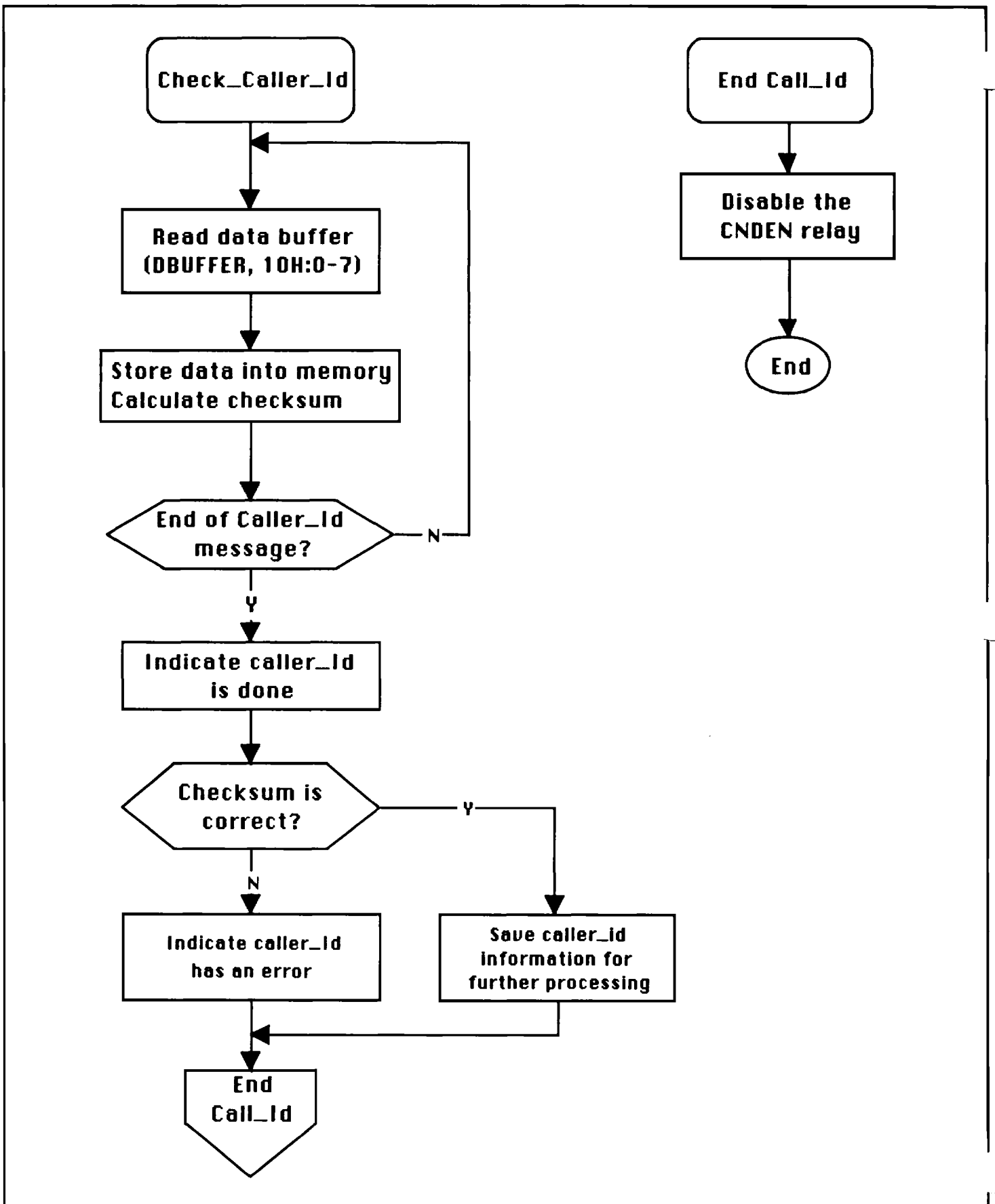


Figure 2-2. Caller ID Example Flowchart (Continued)

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