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**Integrated Services Digital Network (ISDN);
Call Hold (HOLD) supplementary service
Functional capabilities and information flows**

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE

Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE

X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

Tel.: +33 92 94 42 00 - Fax: +33 93 65 47 16

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Signalling Protocols & Switching (SPS) Technical Committee of the European Telecommunications Standards Institute (ETSI) and was adopted having passed through the ETSI standards approval procedure.

In accordance with CCITT Recommendation I.130 [1], the following three level structure is used to describe the supplementary telecommunications services as provided by European public telecommunications operators under the pan-European Integrated Services Digital Network (ISDN):

- Stage 1: is an overall service description, from the user's stand-point;
- Stage 2: identifies the functional capabilities and information flows needed to support the service described in stage 1; and
- Stage 3: defines the signalling system protocols and switching functions needed to implement the service described in stage 1.

This ETS details the stage 2 aspects (functional capabilities and information flows) needed to support the Call Hold (HOLD) supplementary service. The stage 1 and stage 3 aspects are detailed in ETS 300 139 (1992) and ETS 300 141 (1992), respectively.

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1 Scope

This standard defines the stage two of the Call Hold (HOLD) supplementary service for the pan-European Integrated Services Digital Network (ISDN) as provided by European public telecommunications operators. Stage two identifies the functional capabilities and the information flows needed to support the service description. The stage two description also identifies user operations not directly associated with a call (see CCITT Recommendation I.130 [1]).

This standard is specified according to the methodology specified in CCITT Recommendation Q.65 [2].

This standard does not formally describe the relationship between this supplementary service and the basic call but, where possible, this information is included for guidance.

In addition this standard does not specify the requirements where the service is provided to the user via a private ISDN. This standard does not specify the requirements for the allocation of defined functional entities within a private ISDN; it does however define which functional entities may be allocated to a private ISDN.

This standard does not specify the additional requirements where the service is provided to the user via a telecommunications network that is not an ISDN.

The HOLD supplementary service allows a user to interrupt communications on an existing call and then subsequently, if desired, re-establish communications.

This standard is applicable to the stage three standards for the ISDN HOLD supplementary service. The terms "stage three" is also defined in CCITT Recommendation I.130 [1]. Where the text indicates the status of a requirement (i.e. as strict command or prohibition, as authorisation leaving freedom, or as a capability or possibility) this shall be reflected in the text of the relevant stage three standards.

Furthermore, conformance to this standard is met by conforming to the stage three standards with the field of application appropriate to the equipment being implemented. Therefore no method of testing is provided for this standard.

2 Normative references

This standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to, or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- [1] CCITT Recommendation I.130 (1988): "Method for the characterisation of telecommunication services supported by an ISDN and network capabilities of an ISDN".
- [2] CCITT Recommendation Q.65 (1988): "Stage 2 of the method for the characterisation of services supported by an ISDN".
- [3] CCITT Recommendation I.210 (1988): "Principles of telecommunication services supported by an ISDN and the means used to describe them".
- [4] CCITT Recommendation I.112 (1988): "Vocabulary of terms for ISDNs".
- [5] CCITT Recommendation Q.71 (1988): "ISDN 64 kbit/s circuit mode switched bearer service".
- [6] CCITT Recommendation Z.100 (1988): "Functional Specification and Description Language (SDL)".

3 Definitions

For the purposes of this standard, the following definitions apply:

Integrated Services Digital Network (ISDN): see CCITT Recommendation I.112 [4], § 2.3, definition 308.

Service; telecommunications service: see CCITT Recommendation I.112 [4], § 2.2, definition 201.

Supplementary service: see CCITT Recommendation I.210 [3], § 2.4.

4 Symbols and abbreviations

FE	Functional Entity
CC	Call Control, typically a LE
CCA	Call Control Agent, typically a TE
HOLD	Call Hold
FEA	Functional Entity Action
ISDN	Integrated Services Digital Network
LE	Local Exchange
PTNX	Private Telecommunications Network Exchange
SDL	Specification Description Language

5 Description

Not applicable.

6 Derivation of the functional model

6.1 Functional model description

The functional model for the HOLD supplementary service is shown in figure 1.

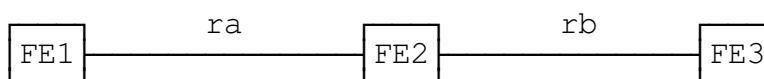


Figure 1

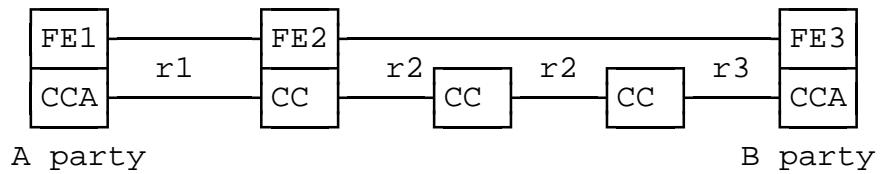
6.2 Description of the functional entities

The functional entities required by the HOLD supplementary service above those of the basic call are:

FE1	User's service agent
FE2	Hold service control entity
FE3	Held party agent

6.3 Relationship with a basic service

The relationship with a basic call is shown in figure 2.



NOTE: The basic call model is defined in CCITT Recommendation Q.71 [5], § 2.1, with the exception that r1 represents an outgoing call relationship from a Call Control Agent (CCA) and r3 represents an incoming call relationship to a CCA.

Figure 2

7 Information flows

7.1 Information flow diagrams

Figures 3 and 4 show the information flows for the holding and retrieval of a simple call.

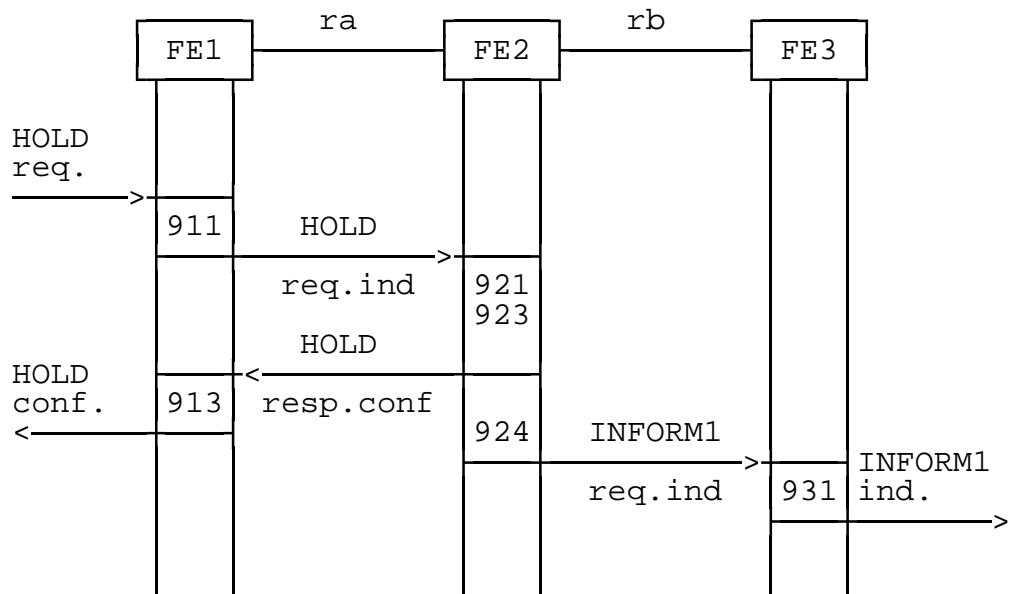


Figure 3: Holding a call

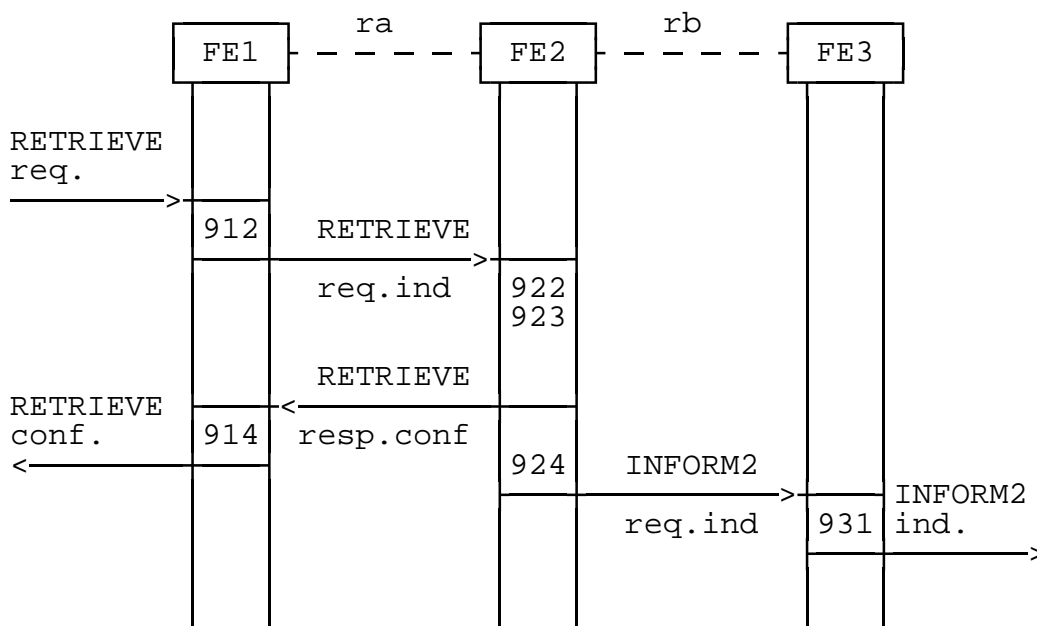


Figure 4: Retrieving a call

7.2 Definition of the individual information flows

7.2.1 Relationship ra

7.2.1.1 Contents of HOLD

HOLD is a confirmed request. It can only be sent by FE1 co-located with a CCA engaged in a call. It shall be an indication to FE2 that it shall perform those actions which shall allow the user to access a range of services as if he was not already engaged in a call, while retaining the possibility of re-establishing the original call.

There are no contents of the HOLD information flow.

7.2.1.2 Contents of HOLD REJECT

Table 1 shows the contents of the HOLD REJECT information flow.

Table 1

HOLD REJECT	req.ind
Reason	Mandatory

7.2.1.3 Contents of RETRIEVE

RETRIEVE is a confirmed request which can only be sent by FE1 co-located with a CCA which has a call on hold. It shall indicate to the Call Control (CC) that it shall re-establish the connection. If the user requesting the retrieval has established another call while the first was held, he may dispose of it by clearing or holding before he retrieves the first.

The contents of the RETRIEVE information flow are shown in table 2.

Table 2

RETRIEVE	req.ind	resp.conf
Channel identification	Optional	Optional

7.2.1.4 Contents of RETRIEVE REJECT

Table 3 shows the contents of the RETRIEVE REJECT information flow.

Table 3

RETRIEVE REJECT	req.ind
Reason	Mandatory

7.2.2 Relationship rb

INFORM1 shall be used to keep the B party informed when the B party has been put on hold, and INFORM2 shall be used when the B party has been retrieved again.

There are no contents of the INFORM1 and the INFORM2 information flows.

8 SDL diagrams for functional entities

All SDL diagrams for functional entities are described according to CCITT Recommendation Z.100 [6].

8.1 FE1

The SDL for FE1 is shown in figure 5.

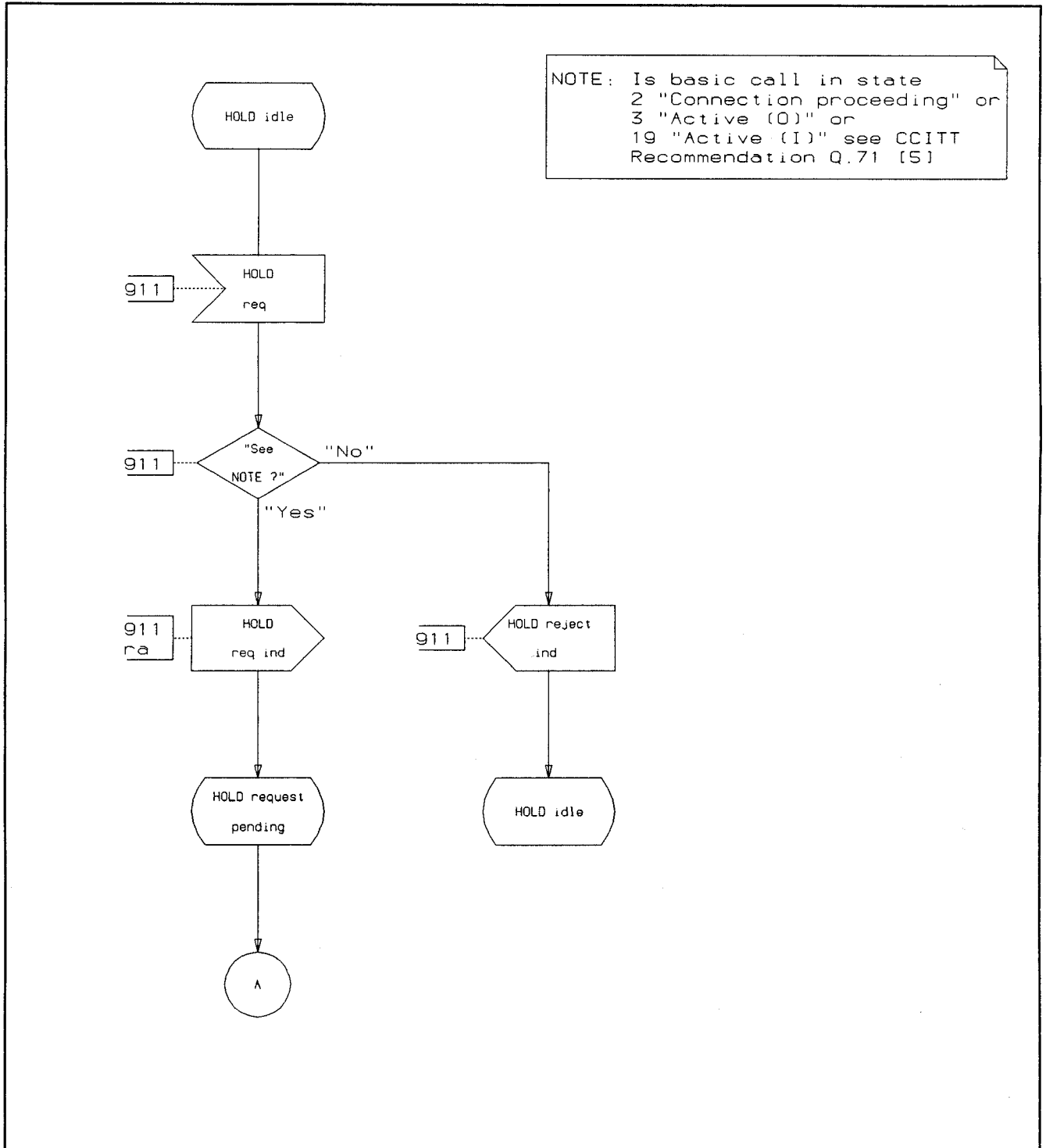
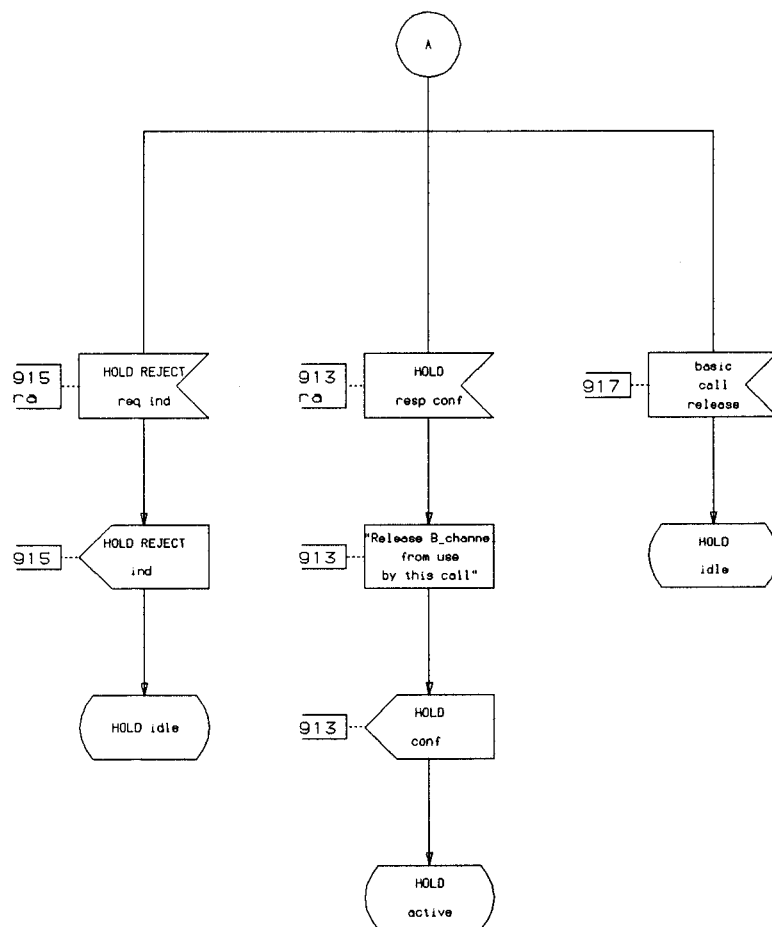


Figure 5 (sheet 1 of 5): SDL diagrams for FE1



NOTE: Is basic call in state
2 "Connection proceeding" or
3 "Active (O)" or
19 "Active (I)" see CCITT
Recommendation Q.71 [5]

Figure 5 (sheet 2 of 5): SDL diagrams for FE1

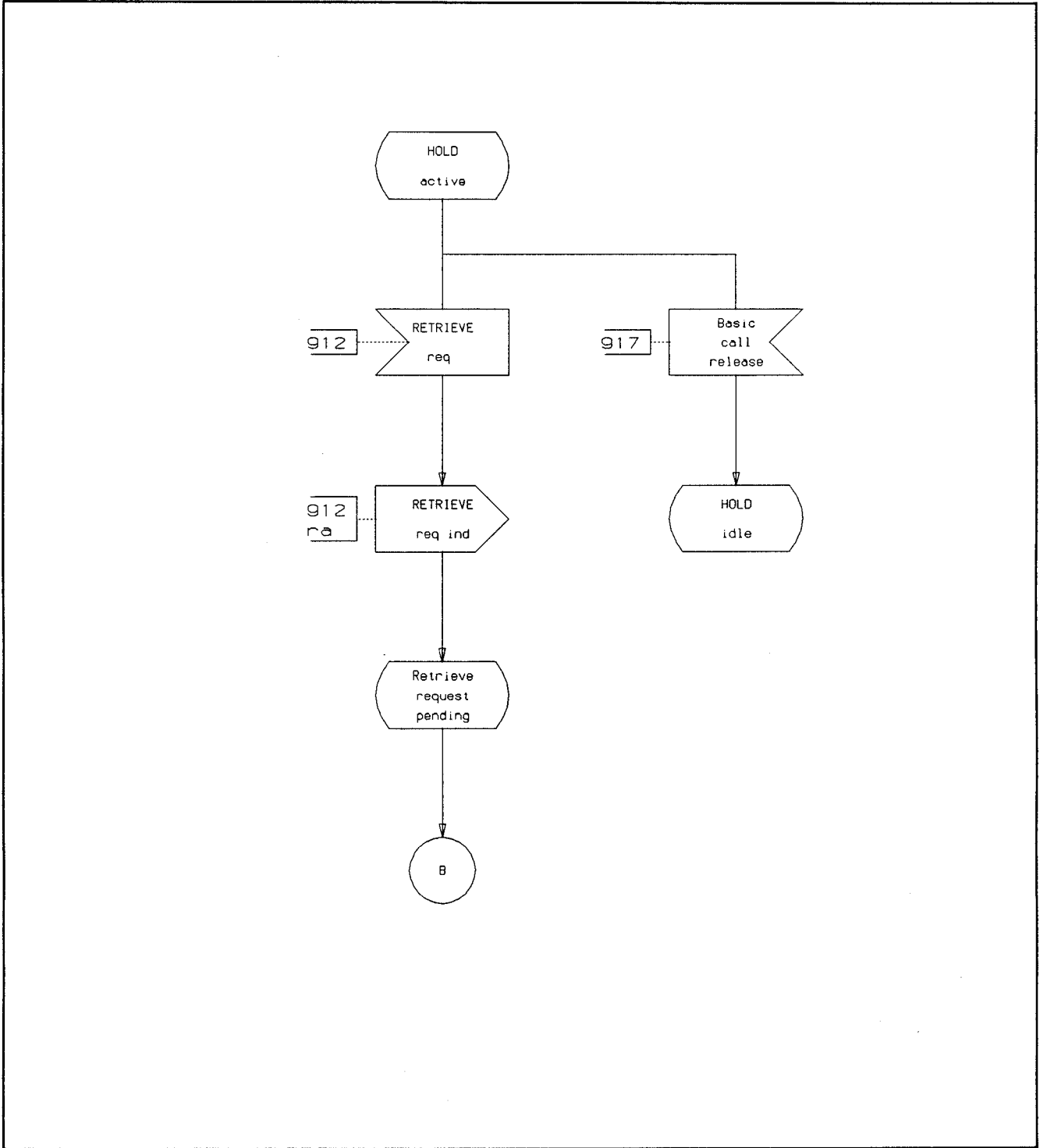


Figure 5 (sheet 3 of 5): SDL diagrams for FE1

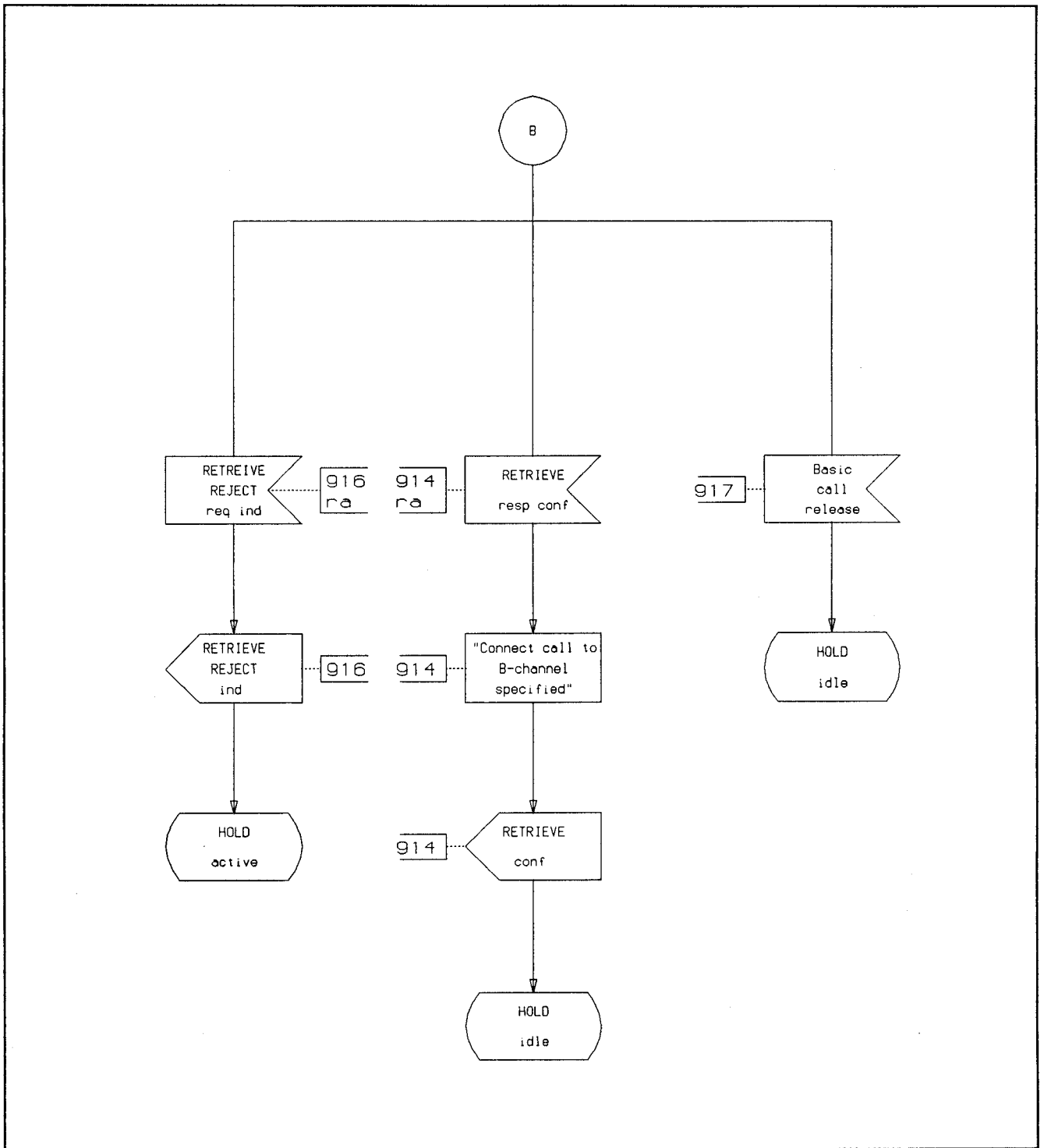


Figure 5 (sheet 4 of 5): SDL diagrams for FE1

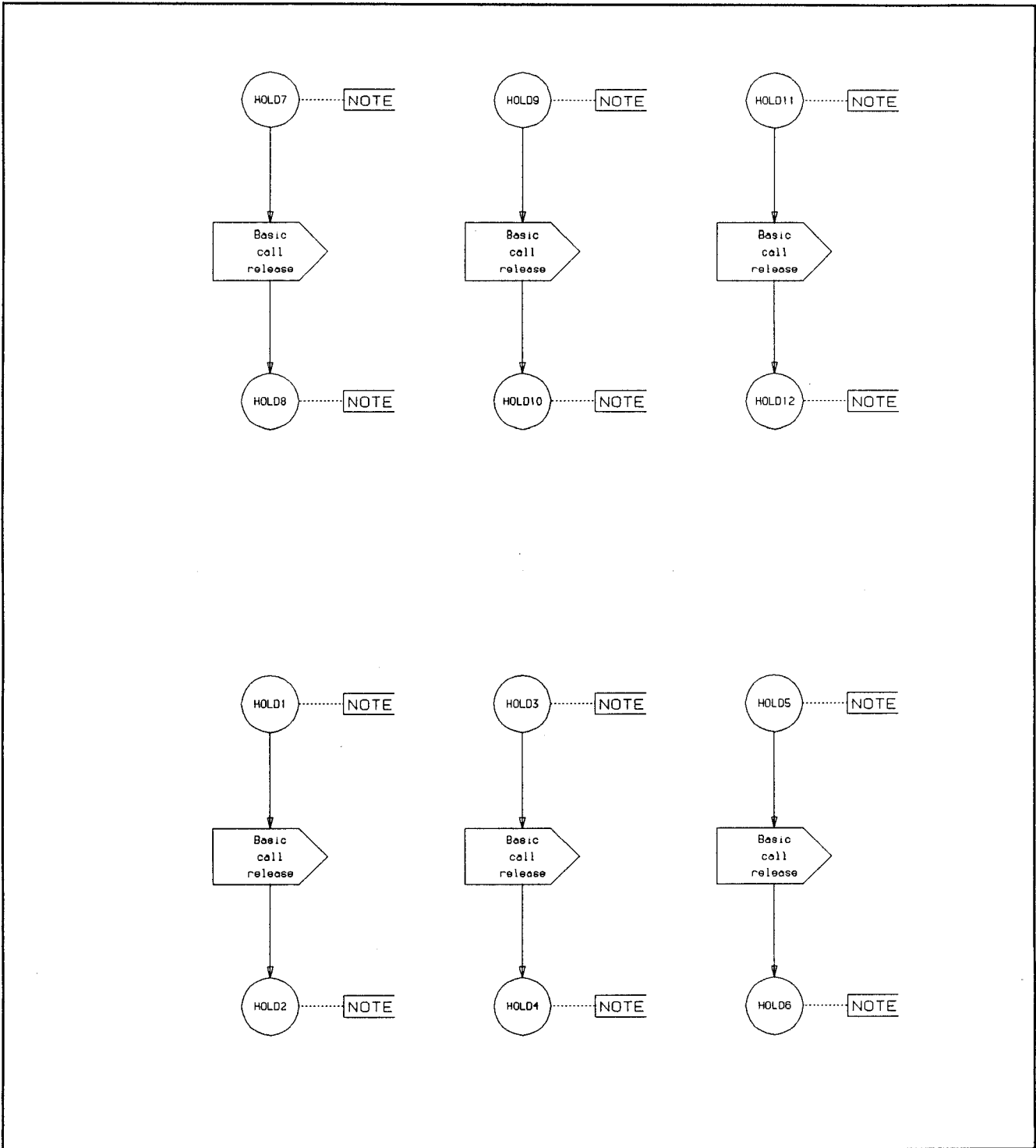


Figure 5 (sheet 5 of 5): SDL diagrams for FE1

NOTE: This breaks the basic call CCA functionality at the following points:

- for HOLD1 and HOLD2, in CCITT Recommendation Q.71 [5], figure 2-8/Q.71 (sheet 2 of 11), in state 11 "AWAIT USER DISCON (0)" following the input "DISCONNECT req.";
- for HOLD3 and HOLD4, in CCITT Recommendation Q.71 [5], figure 2-8/Q.71 (sheet 5 of 11), in state 5 "AWAIT RELEASE (0)" following the input "RELEASE req.ind" (see FEA312);
- for HOLD5 and HOLD6, in CCITT Recommendation Q.71 [5], figure 2-8/Q.71 (sheet 6 of 11), in state 7 "AWAIT RELEASE CONF (0)" following the input "RELEASE resp.conf" (see FEA413);
- for HOLD7 and HOLD8, in CCITT Recommendation Q.71 [5], figure 2-8/Q.71 (sheet 10 of 11), in state 15 "AWAIT RELEASE (T)" following the input "RELEASE req.ind" (see FEA452);
- for HOLD9 and HOLD10, in CCITT Recommendation Q.71 [5], figure 2-8/Q.71 (sheet 10 of 11), in state 12 "AWAIT USER DISCON (T)" following the input "DISCONNECT req.";
- for HOLD11 and HOLD12, in CCITT Recommendation Q.71 [5], figure 2-8/Q.71 (sheet 11 of 11), in state 17 "AWAIT RELEASE CONF (T)" following the input "RELEASE resp.conf" (see FEA353).

8.2 FE2

The SDL for FE2 is shown in figure 6.

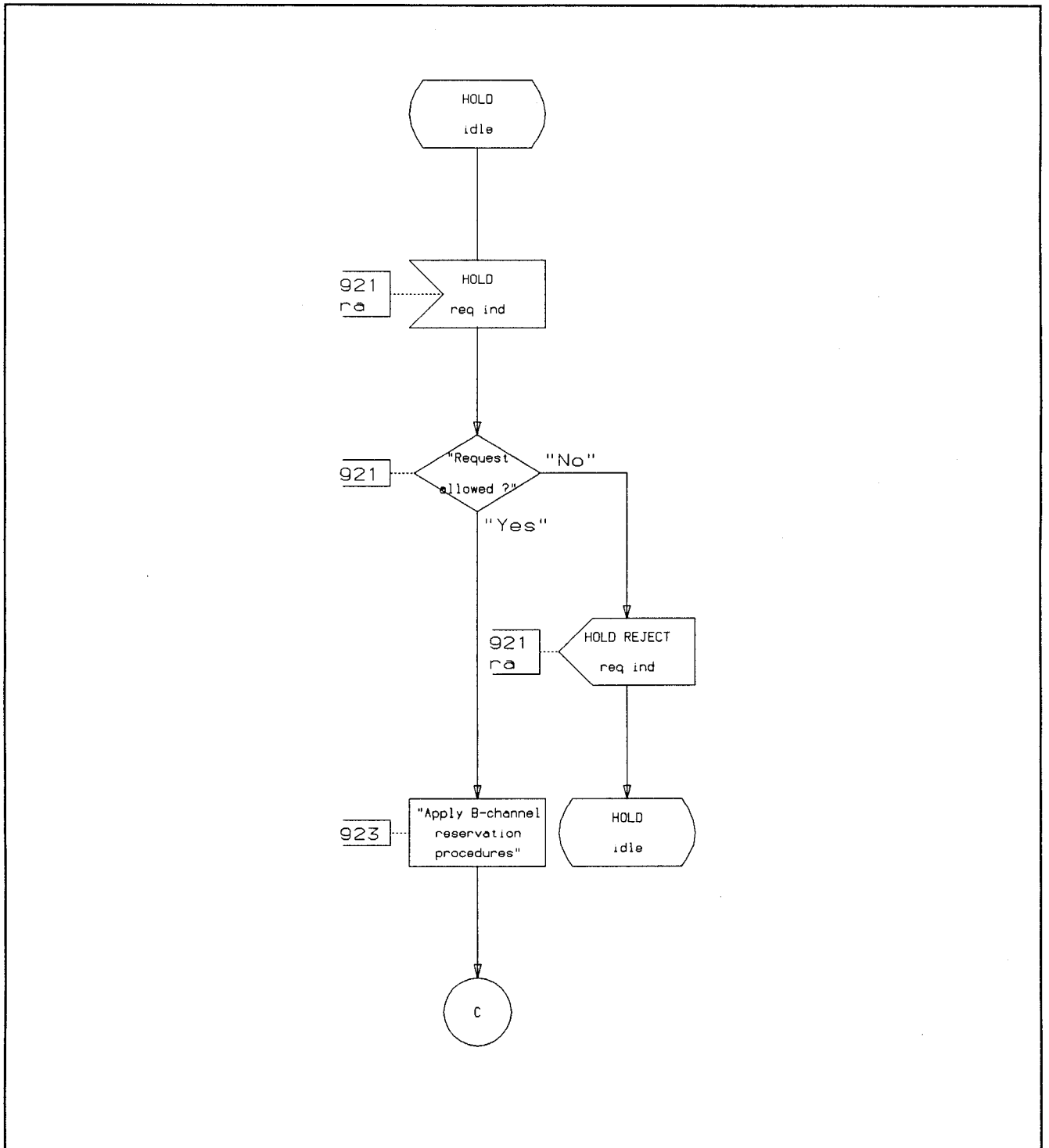


Figure 6 (sheet 1 of 6): SDL diagrams for FE2

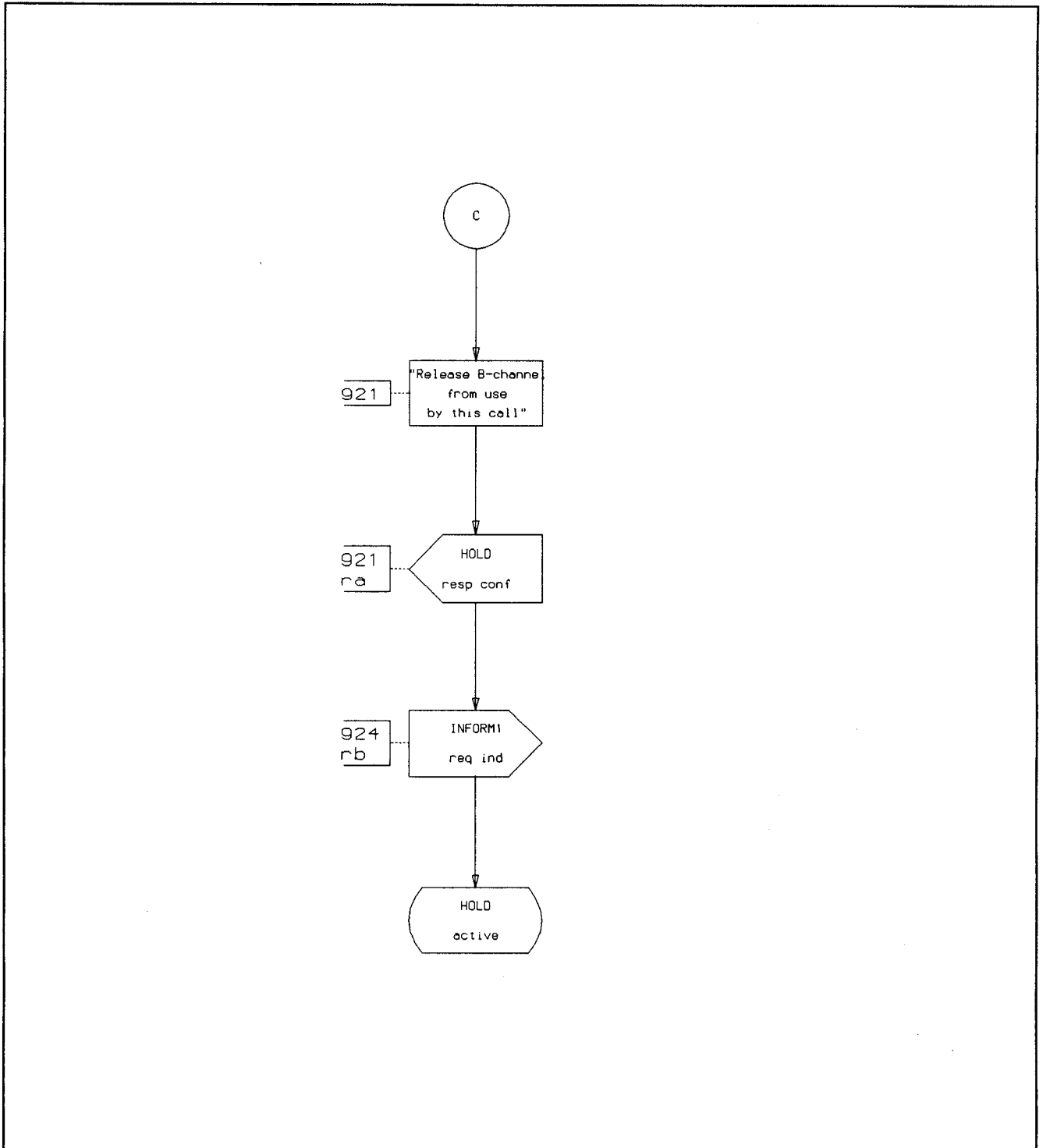


Figure 6 (sheet 2 of 6): SDL diagrams for FE2

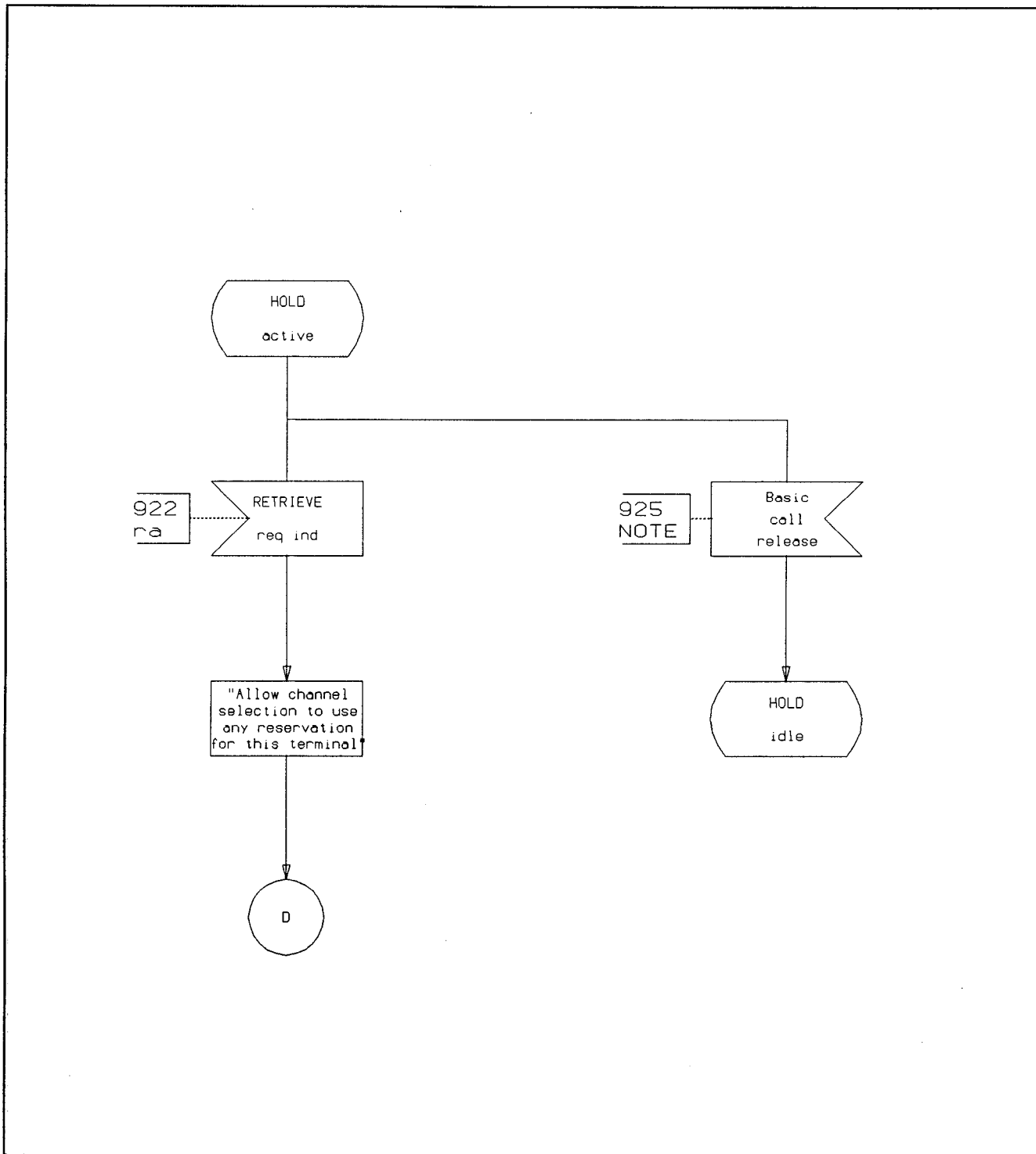


Figure 6 (sheet 3 of 6): SDL diagrams for FE2

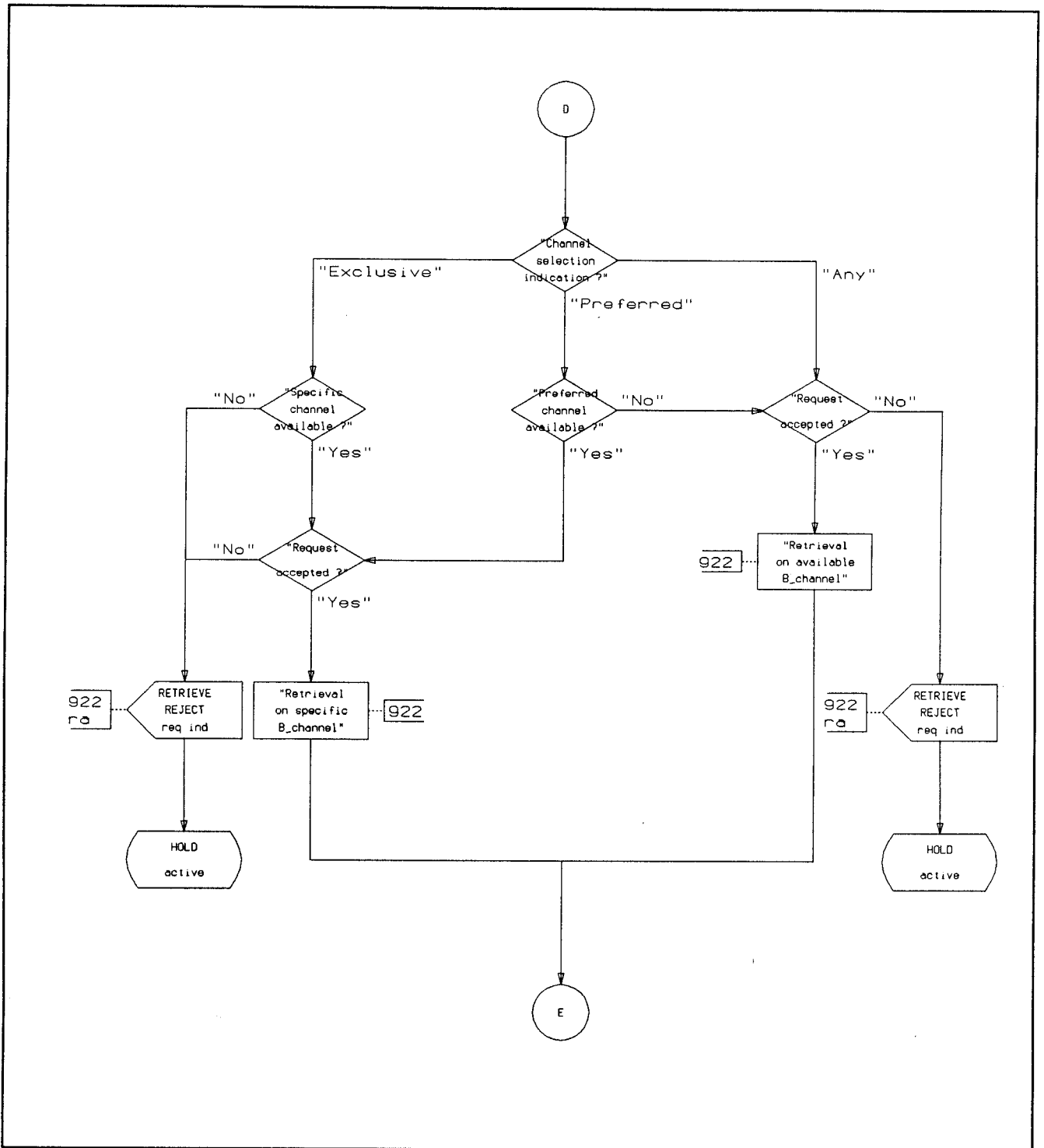


Figure 6 (sheet 4 of 6): SDL diagrams for FE2

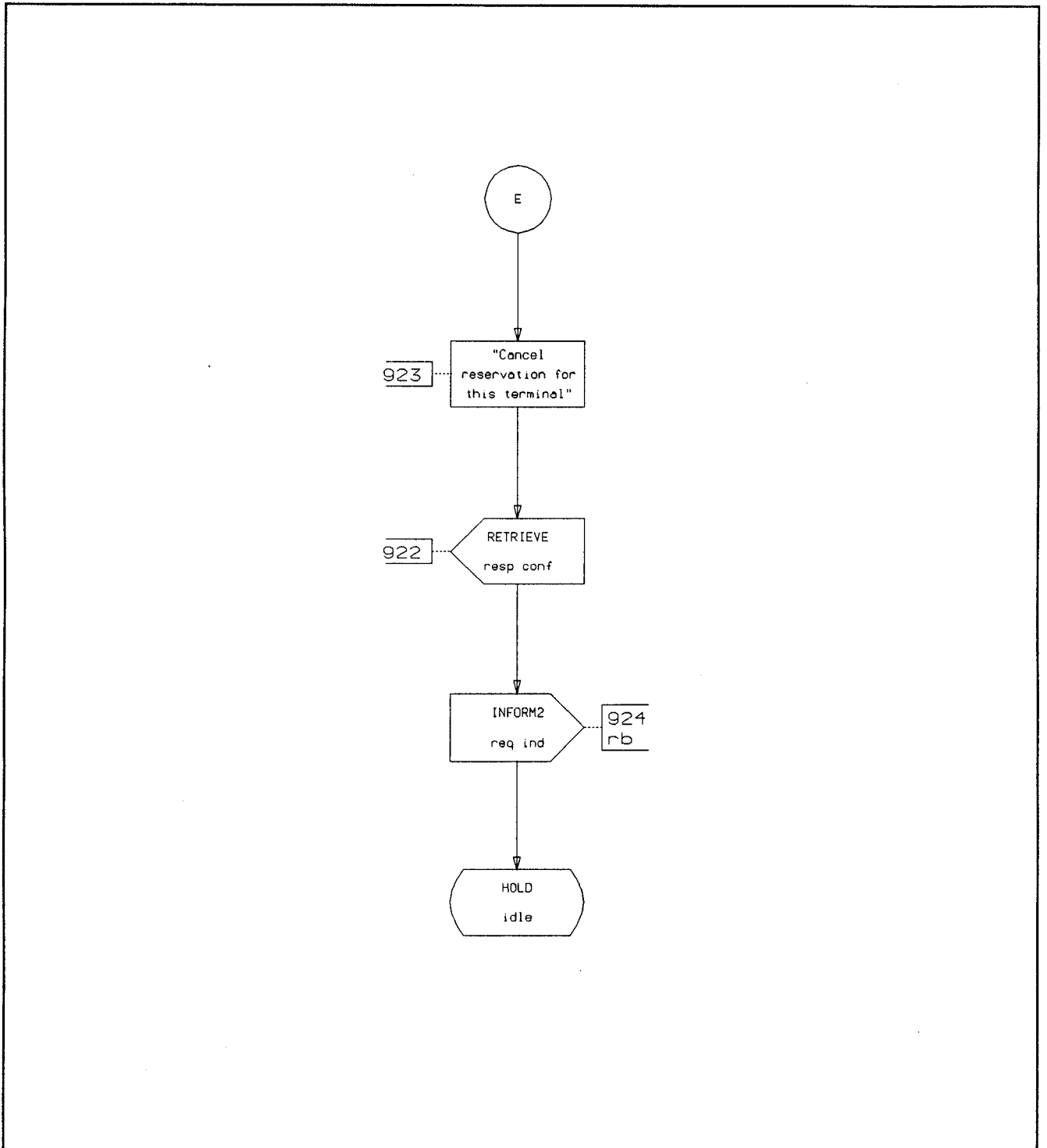


Figure 6 (sheet 5 of 6): SDL diagrams for FE2

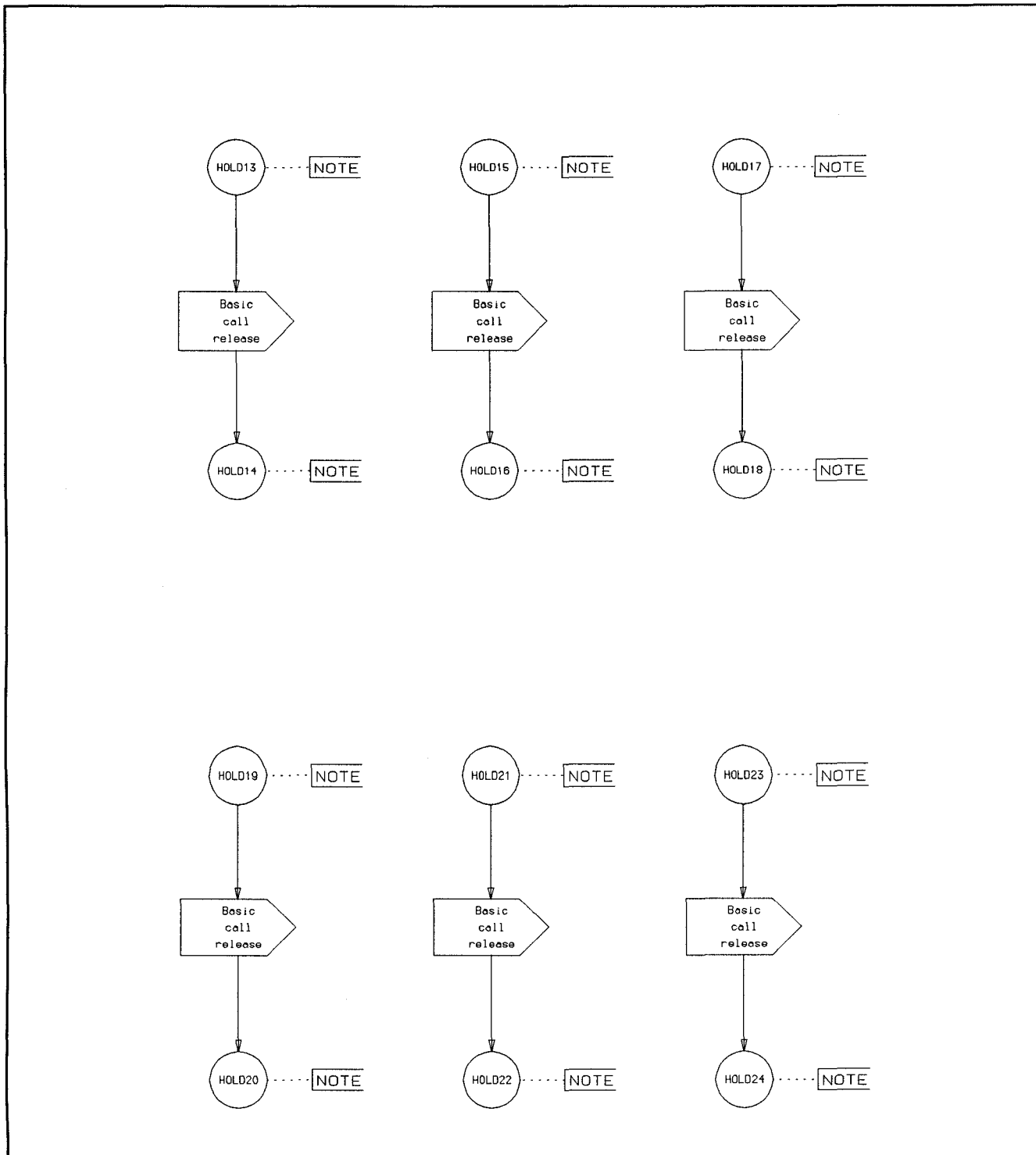


Figure 6 (sheet 6 of 6): SDL diagrams for FE2

NOTE: This breaks the basic call CC functionality at the following points:

- for HOLD13 and HOLD14, in CCITT Recommendation Q.71 [5], figure 2-9/Q.71 (sheet 6 of 19), in state 15 "r1-REL (B); r2-REL (F)" following the input "RELEASE resp.conf." from r1 (see FEA322);
- for HOLD15 and HOLD16, in CCITT Recommendation Q.71 [5], figure 2-9/Q.71 (sheet 6 of 19), in state 13 "r1 REL (B)" following the input "RELEASE resp.conf" (see FEA322);
- for HOLD17 and HOLD18, in CCITT Recommendation Q.71 [5], figure 2-9/Q.71 (sheet 6 of 19), in state 3 "r1-DISCON (B)" preceding the output "RELEASE resp.conf" to r1 in the transition commenced by input "RELEASE req.ind" (see FEA322);
- for HOLD19 and HOLD20, in CCITT Recommendation Q.71 [5], figure 2-9/Q.71 (sheet 10 of 19), in state 23 "r2-REL (B); r1-REL (F)" following the input "RELEASE resp.conf" from r1 (see FEA442);
- for HOLD21 and HOLD22, in CCITT Recommendation Q.71 [5], figure 2-9/Q.71 (sheet 10 of 19), in state 11 "r1-REL (F)" following the input "RELEASE resp.conf" (see FEA442);
- for HOLD23 and HOLD24, in CCITT Recommendation Q.71 [5], figure 2-9/Q.71 (sheet 10 of 19), in state 12 "r1-DISCON (F)" preceding the output "RELEASE resp.conf" to r1 in the transition commenced by input "RELEASE req.ind" (see FEA342).

8.3 FE3

The SDL for FE3 is shown in figure 7.

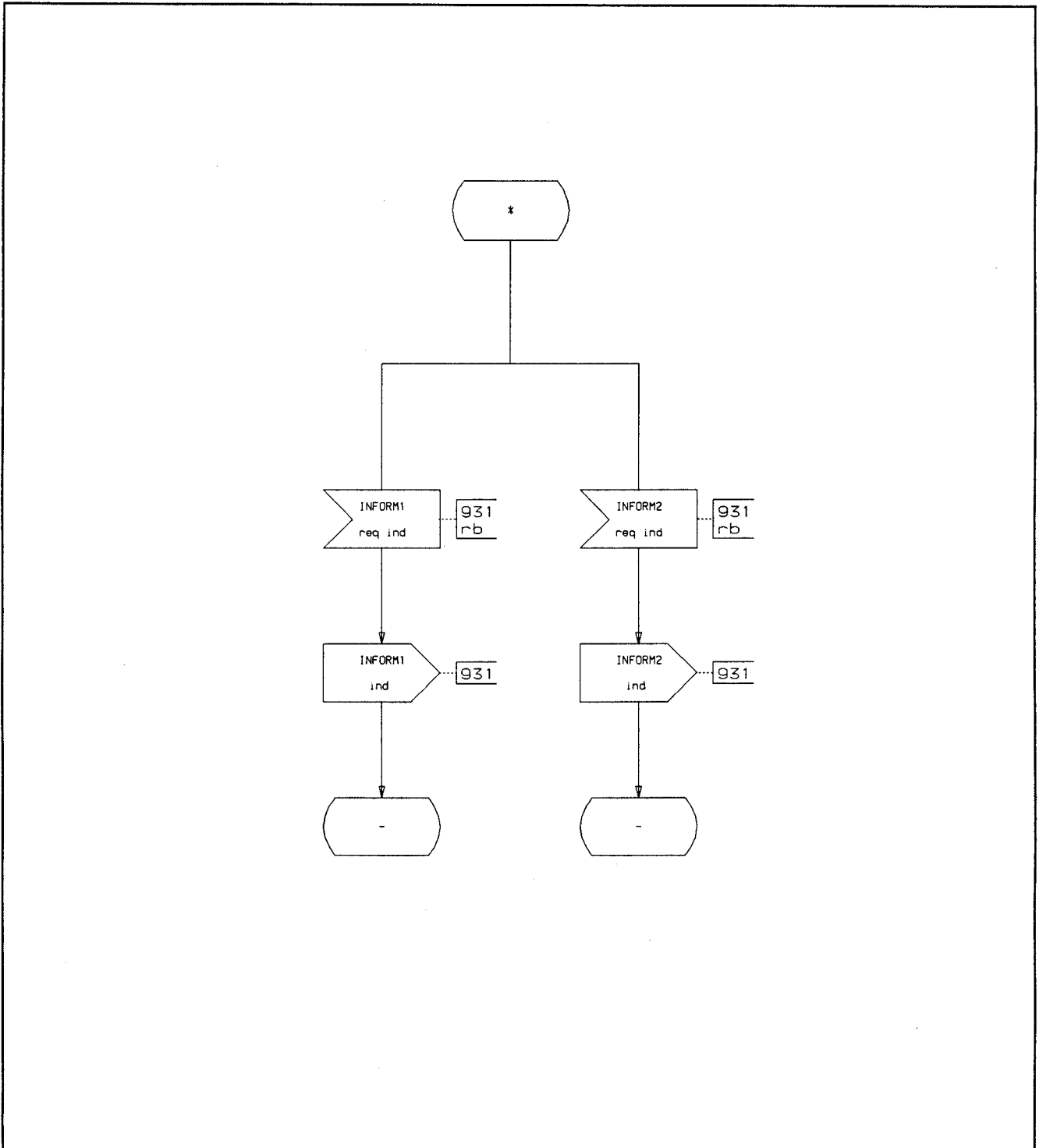


Figure 7: SDL diagrams for FE3

9 Functional Entity Actions (FEAs)

9.1 FEAs of FE1

- 911: The functional entity shall accept the user's request to hold the call; check the call is in a valid state; and send the HOLD req.ind or a HOLD REJECT ind. information flow.
- 912: The functional entity shall accept the user's request to retrieve the call; send the RETRIEVE req.ind information flow.
- 913: The functional entity shall receive the HOLD resp.conf information flow; release the B-channel; and inform the user of the success.
- 914: The functional entity shall receive the RETRIEVE resp.conf information flow; connect the B-channel; and inform the user of the success.
- 915: The functional entity shall receive the HOLD REJECT req.ind information flow; and inform the user of the failure.
- 916: The functional entity shall receive the RETRIEVE REJECT req.ind information flow; and inform the user of the failure.
- 917: The functional entity shall recognise a basic call release indication.

9.2 FEAs of FE2

- 921: The functional entity shall:
- receive HOLD req.ind information flow;
 - perform hold function;
 - generate the appropriate response (HOLD resp.conf or HOLD REJECT req.ind).
- 922: The functional entity shall:
- receive RETRIEVE req.ind information flow;
 - perform retrieve function within network;
 - generate the appropriate response (RETRIEVE resp.conf or RETRIEVE REJECT req.ind).
- 923: The functional entity shall perform reservation function.
- 924: The functional entity shall provide appropriate notification to held party.
- 925: The functional entity shall recognise a basic call release indication.

9.3 FEAs of FE3

- 931: The functional entity shall receive INFORM1 or INFORM2 and give the appropriate indication to the user.

10 Allocation of functional entities to physical locations

The possible locations of functional entities FE1, FE2 and FE3 are shown in table 4.

Table 4

	FE1 NOTE	FE2 NOTE	FE3
Scenario 1	TE	LE	TE
Scenario 2	TE	PTNX	TE

NOTE: FE1 and FE2 are located at opposite ends of the same access.

History

Document history	
May 1992	First Edition
May 1996	Converted into Adobe Acrobat Portable Document Format (PDF)