

**Recommendation T/CS 49-06 (Vienna 1982, revised in Montpellier 1984)****SYSTEM L1 MULTIFREQUENCY PUSH-BUTTON BIDIRECTIONAL CALL CONTROL  
SIGNALLING PROCEDURES**

Recommendation proposed by Working Group T/WG 11 "Switching and Signalling" (CS)

*Revised text of the Recommendation adopted by the "Telecommunications" Commission:*

"The European Conference of Postal and Telecommunications Administrations,

*considering*

- that multifrequency push-button (MFPB) subscriber's line signalling may provide faster call set-up than decadic pulsing signalling,
- that equipment located at subscriber's premises and used in private networks employs MFPB signalling techniques more and more,
- that MFPB interregister signals, as specified in Recommendation T/CS 49-04 [1], may be used either in the forward direction only or in both the forward and the backward direction,

*recommends*

to the members that the call control signalling procedures specified below are used when MFPB interregister signalling is applied in both the forward and backward direction (bidirectional) between private automatic branch exchanges (PABXs) in different countries."

1. **GENERAL**

1.1. **Field of application**

In System L1 MFPB bidirectional call control signalling procedures, MFPB interregister signals are used in the forward and backward direction of call set-up. The MFPB character set of the 16-button array, according to Recommendation T/CS 46-02 [2], is applied for address signalling and service control. The signalling procedures specified in this Recommendation cover the interchange of additional information possible as compared with System L1 MFPB unidirectional signalling.

Interworking with System L1 MFPB unidirectional is inherent in system L1 MFPB bidirectional, providing that System L1 MFPB unidirectional user appropriate options.

1.2. **Signals**

On international leased lines, System L1 MFPB bidirectional in accordance with Recommendation T/CS 49-04 [1] is used in conjunction with System L1 line signalling as specified in Recommendation T/CS 49-01 [3].

The signals actually used with System L1 MFPB bidirectional call control procedures, contained in this Recommendation, are given in Table 1 (T/CS 49-06). The meanings of the signals comply with Recommendation T/CS 41-01 [4]. The requirements for the transmission of the signals are set-out in Recommendation T/CS 49-01 [3], T/CS 49-02 [5] and T/CS 49-04 [1].

Signals	Recommendation
Seizing	T/CS 49-01
Proceed-to-send	T/CS 49-02
Address	T/CS 49-04
Clear-request	T/CS 49-01
Address-complete	T/CS 49-02
Answer	T/CS 49-01
Clear-forward	T/CS 49-01
Clear-back	T/CS 49-01
Cleared	T/CS 49-01
Busy-extension-changed-to-free	see Section 2.6.
Forward-service-request-recall	T/CS 49-01
Forward-link-recall	T/CS 49-01
Backward-service-request-recall	T/CS 49-01
Backward-link-recall	T/CS 49-01
Proceed-to-send-on-recall	T/CS 49-02 and T/CS 49-04
Type-of-call	T/CS 49-04
Class-of-service	T/CS 49-04
Calling-line-identity	T/CS 49-04
End-of-block	T/CS 49-04
Call-refusal	T/CS 49-04
Called-line-identity	T/CS 49-04
State-of-destination	T/CS 49-04

Table 1 (T/CS 49-06). Signals used in system L1 MFPB bidirectional call control signalling procedures.

## 2. SIGNALLING PROCEDURES

### 2.1. General

The description of the call and service control signalling procedures are described by means of SDL diagrams, in accordance with CCITT Recommendations Z.101 [6], Z.102 [7] and Z.104 [8], and narrative comments. Table 4 in Recommendation T/CS 49-04 includes abbreviations used in System L1 MFPB SDL diagrams.

*Note:* The SDL diagrams are included in this Recommendation to assist in the understanding of the technical text, and must only be used in association with the text.

2.1.2. In System L1 MFPB bidirectional, the use of backward MFPB signals begins with the dialogue phase. In multi-link connections, the address-complete signal will cause the registers of the transit switches to release and switch through the speech paths, preparing for the subsequent end-to-end transmission of MFPB codes in both directions. The registers of the originating and the terminating PABXs will not yet be released. When a service demand requires inter-PABX MFPB signalling, the request is handled by the responding PABX on an accept or reject basis, depending upon the availability of the service at that PABX.

### 2.2. Duplex and semi-duplex transmission mode

If (national) two-wire links are included in a given inter-PABX network, the interchange of the dialogue phase signals will be in either a duplex or a semi-duplex transmission mode. This requires mutual agreement by the parties involved (the line signalling for two-wire links is not covered by System L1 Recommendations).

In the duplex mode, the outgoing PABX will continue sending dialogue phase forward signals, without awaiting the backward end-of-block signal.

In the semi-duplex mode, the outgoing PABX refrains from sending en-bloc dialogue phase forward signals until the outgoing PABX has indicated the end of the dialogue phase backward en-bloc signal sequence by the transmission of the end-of-block signal. Separate SDL diagrams are included for semi-duplex mode (see Section 2.4.).

### 2.3. Signalling compatibility check

By means of the signalling compatibility check (see Recommendation T/CS 49-04 [1]) the outgoing PABX determines whether the incoming PABX is capable of System L1 MFPB bidirectional, or only System L1 MFPB unidirectional signalling. If the outgoing PABX receives MFPB dialogue phase backward signals, the result of the signalling compatibility check is positive.

If the incoming PABX is not capable of System L1 MFPB bidirectional signalling, it would have already released the register and not reacted to the dialogue phase forward signals. This state is shown on the SDL diagrams as the *post-dialling state*.

If the outgoing PABX does not recognise a first dialogue phase backward signal in accordance with Recommendation T/CS 49-04 [1], it changes to its post-dialling state, too.

2.4. **Interchange of additional information** (dialogue phase)

Figures 1 (T/CS 49-06) and 2 (T/CS 49-06) show the signalling sequence at the outgoing and incoming PABXs' line interfaces for the duplex mode of signal transmission. Figures 9 (T/CS 49-06) and 10 (T/CS 49-06) refer to the semi-duplex mode. The four state transition diagrams start with the end of selection state and include the signalling compatibility check.

The additional information interchange shall be based on the dialogue phase signals specified in Recommendation T/CS 49-04 [1].

Upon recognition of the end of the dialogue phase (i.e. upon transmission of the relevant forward and backward end-of-block signals), the originating and terminating PABXs shall release their registers, and change to the state referred to as post-dialling state in the SDL diagrams.

2.5. **Register-recall**

Figures 5 (T/CS 49-06) to 8 (T/CS 49-06) show the register-recall procedures at the PABX line interfaces. The form of proceed-to-send-on-recall signal (2,280 Hz signal or MFPB signal) indicates that the responding transit switch is capable of System L1 MFPB unidirectional or bidirectional interregister signalling. In System L1 MFPB bidirectional working, the initiating PABX will continue with the signalling compatibility check.

2.6. **Intrusion**

The called-party-changed-to-free signal in the intrusion procedure after call set-up requires the use of the backward-service-request-recall signal. Upon recognition of the MFPB proceed-to-send-on-recall signal sent in response, the called-party-changed-to-free signal, coded as the character ★, is transmitted backwards, Figures 3 (T/CS 49-06) and 4 (T/CS 49-06) refer.

2.7. **Clear-request on non-receipt of address information**

After recognition of a seizing signal, if no address information or incomplete address information is received, the incoming PABX shall time-out and dissociate the inter-PABX circuit from any common equipment.

Under these conditions, the incoming PABX shall:

- (a) apply the clear-request signal;
- (b) bar access to the inter-PABX circuit for outgoing calls until a clear-forward signal is recognised.

2.8. **Clear-request on encountering congestion or an engaged extension**

Due to supplementary services providing the possibility of changing from an unsuccessful to a successful call situation, this procedure is not foreseen with System L1 MFPB interregister signalling. It may, however, still occur when the incoming PABX has indicated that it is capable of System L1 MFPB unidirectional signalling only, and executes the procedure specified in Recommendation T/CS 49-05 [9]. The outgoing PABX has to comply with that procedure after the signalling compatibility check.

2.9. **Audible indications**

Provisions must be made by the parties involved to ensure that the correct audible indications are returned to the caller when Sections 2.7. or 2.8. above apply.

## REFERENCES

- [1] Recommendation T/CS 49-04. *System L1 multifrequency push-button interregister signalling.*
- [2] Recommendation T/CS 46-02. *Multifrequency signalling system to be used for push-button telephones.*
- [3] Recommendation T/CS 49-01. *System L1 line signalling over international inter-private automatic branch exchange lines.*
- [4] Recommendation T/CS 41-01. *Signal and signalling message names and meanings.*
- [5] Recommendation T/CS 49-02. *System L1 decadic pulsing interregister signalling.*
- [6] CCITT Recommendation Z.101. *General explanation of the specification and description language (SDL).*
- [7] CCITT Recommendation Z.102. *Symbols and rules.*
- [8] CCITT Recommendation Z.104. *Semantics.*
- [9] Recommendation T/CS 49-05. *System L1 MFPB unidirectional signalling procedures.*

)

)

)

**SDL CHARTS**

For the call set-up preceding the procedures shown, Recommendation T/CS 49-05 [5] applies.

*Note:* The connector and state indications refer to the signalling sequence SDL charts of Recommendation T/CS 49-05.

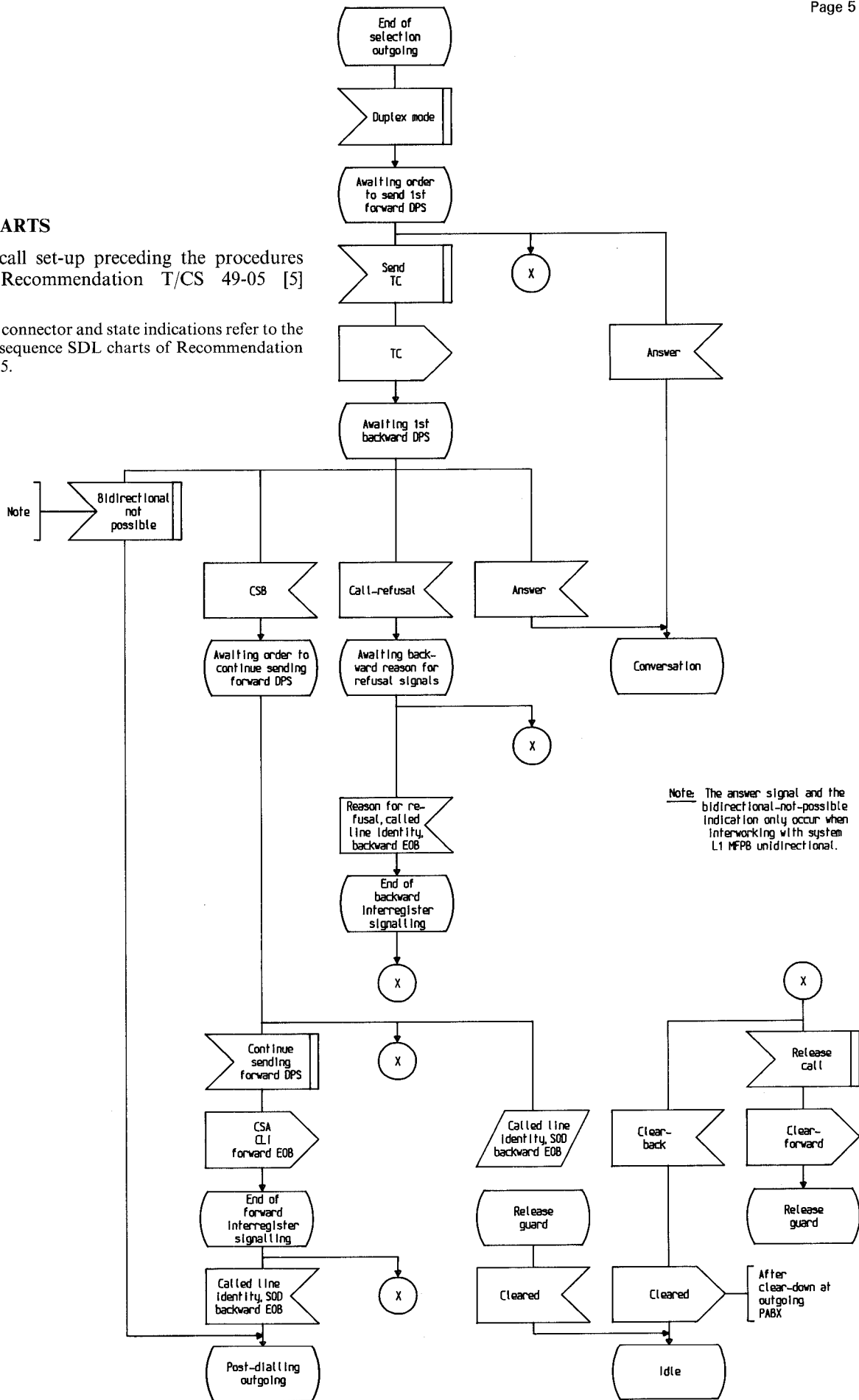


Figure 1. (T/CS 49-06). Signalling compatibility check and duplex interchange of dialogue phase signals (outgoing PABX).

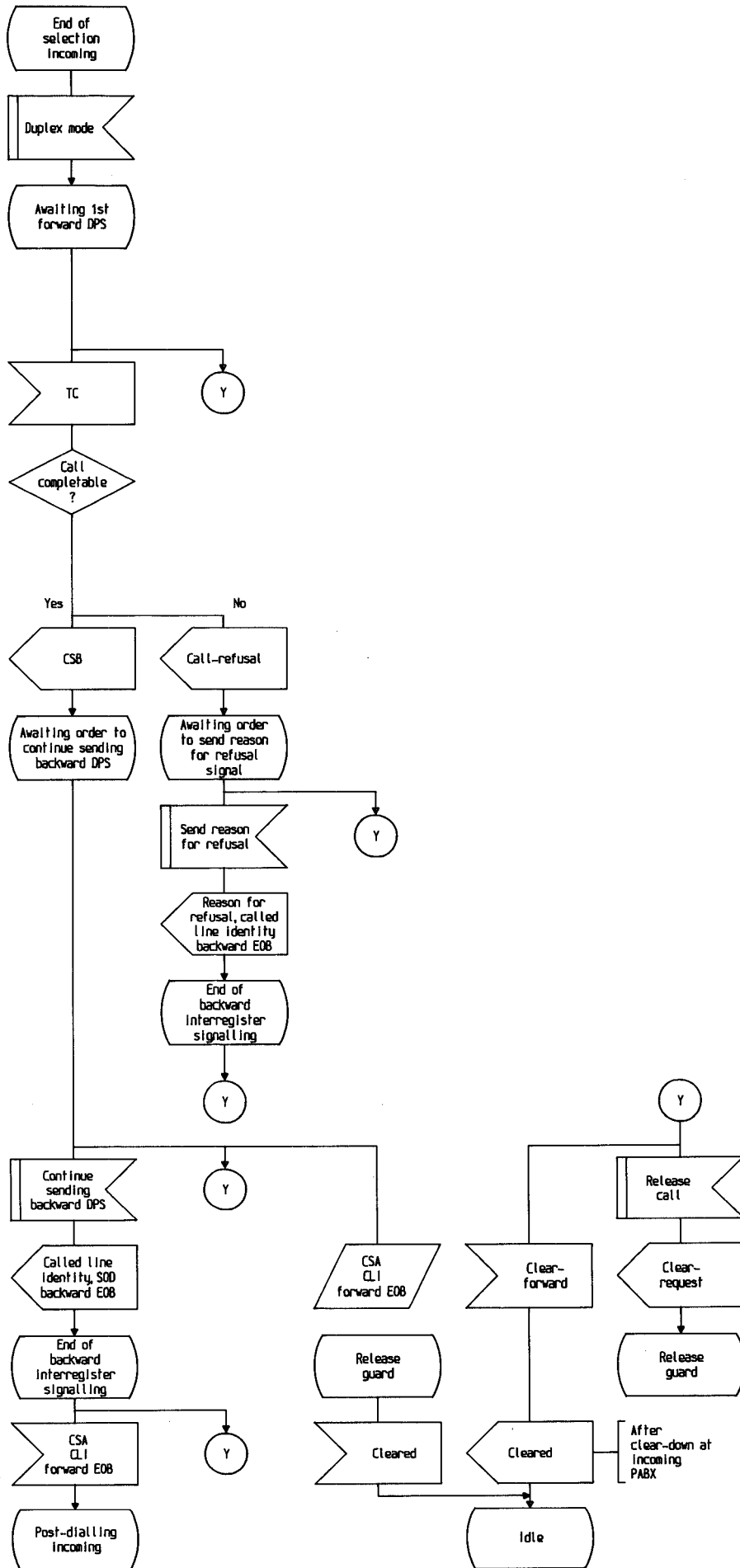


Figure 2 (T/CS 49-06). Signalling compatibility check and duplex interchange of dialogue phase signals (incoming PABX).

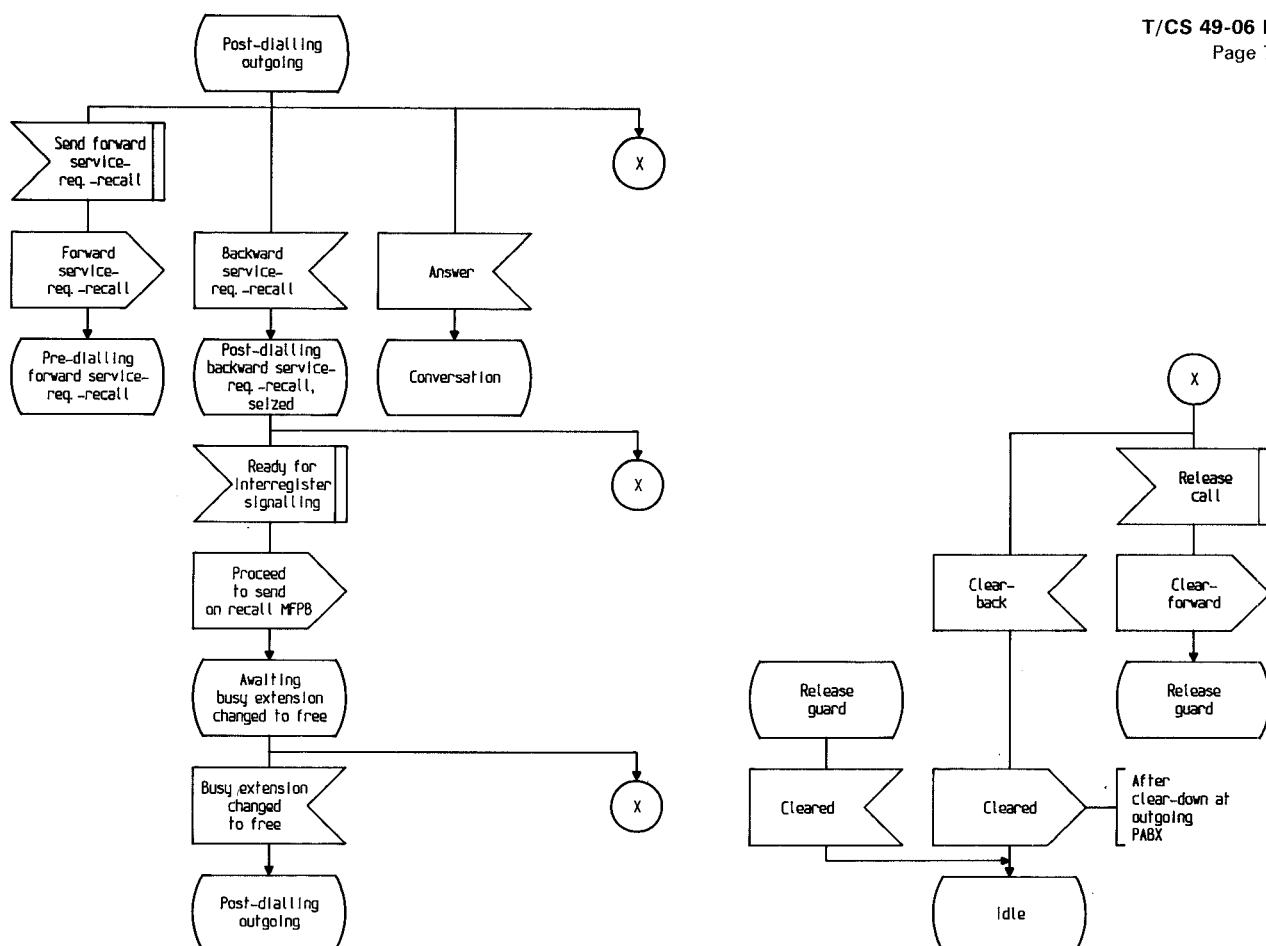


Figure 3 (T/CS 49-06). Transfer of busy-extension-changed-to-free signal during an unsuccessful call situation (outgoing PABX).

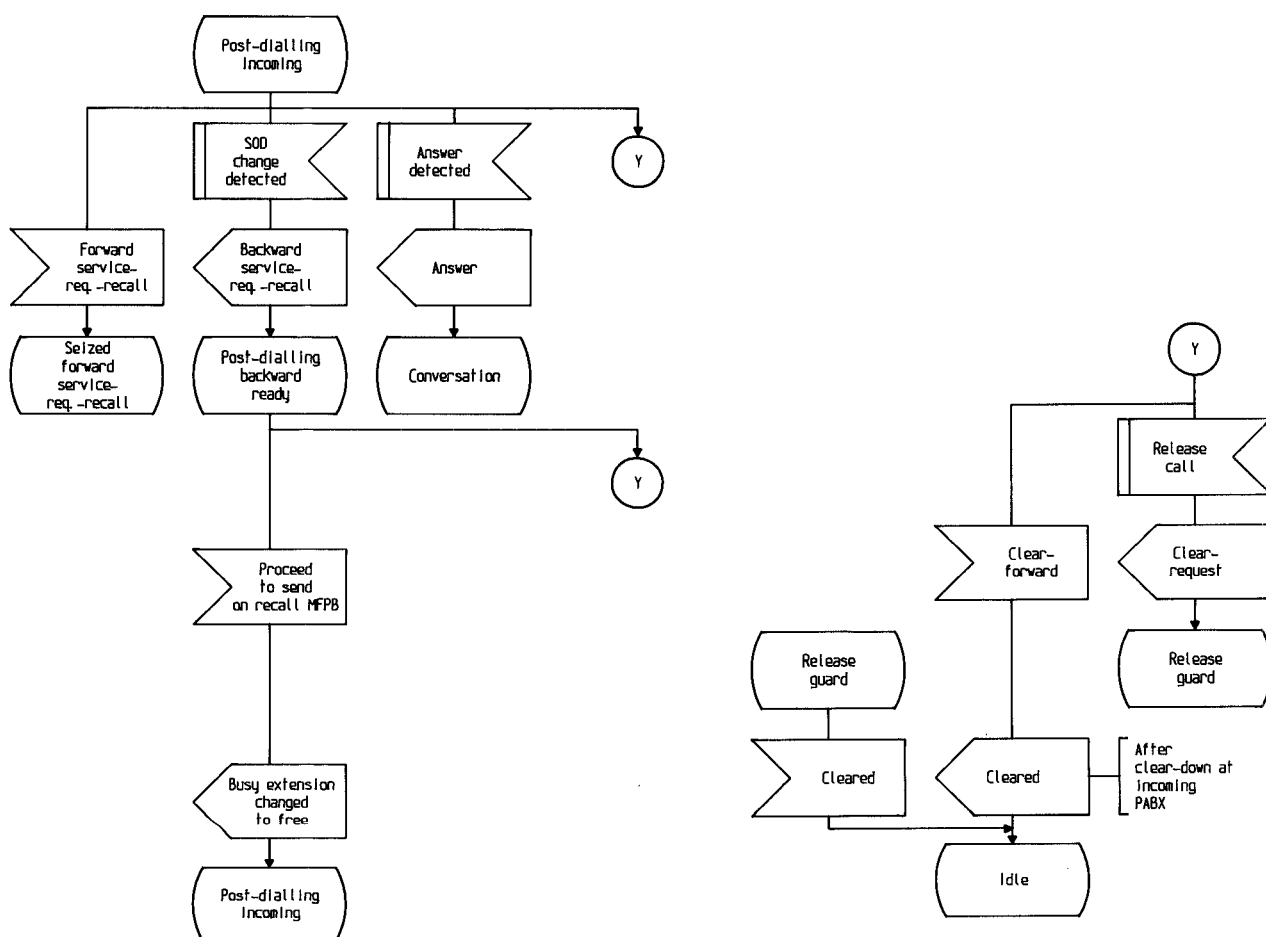


Figure 4 (T/CS 49-06). Transfer of busy-extension-changed-to-free signal during an unsuccessful call situation (incoming PABX).

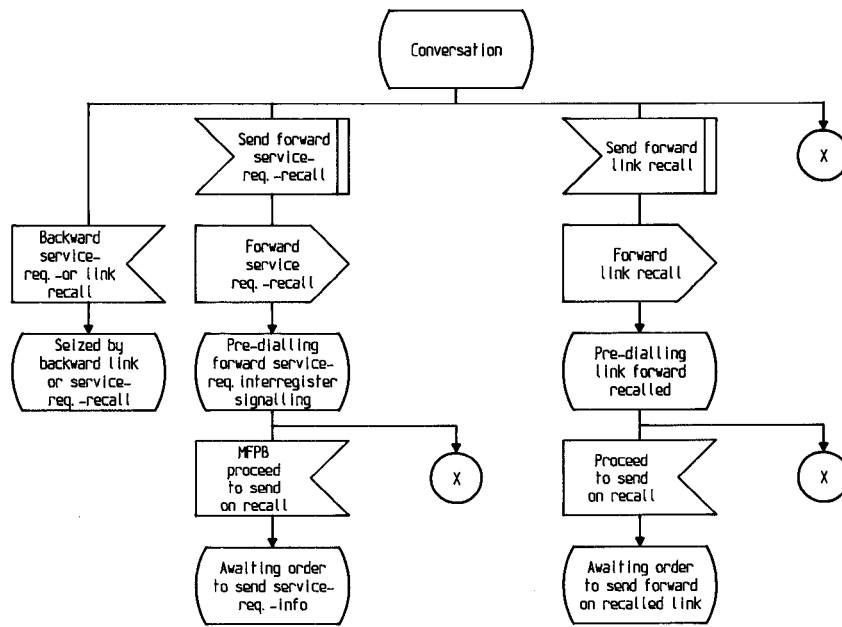


Figure 5 (T/CS 49-06). Forward register-recall (outgoing PABX).

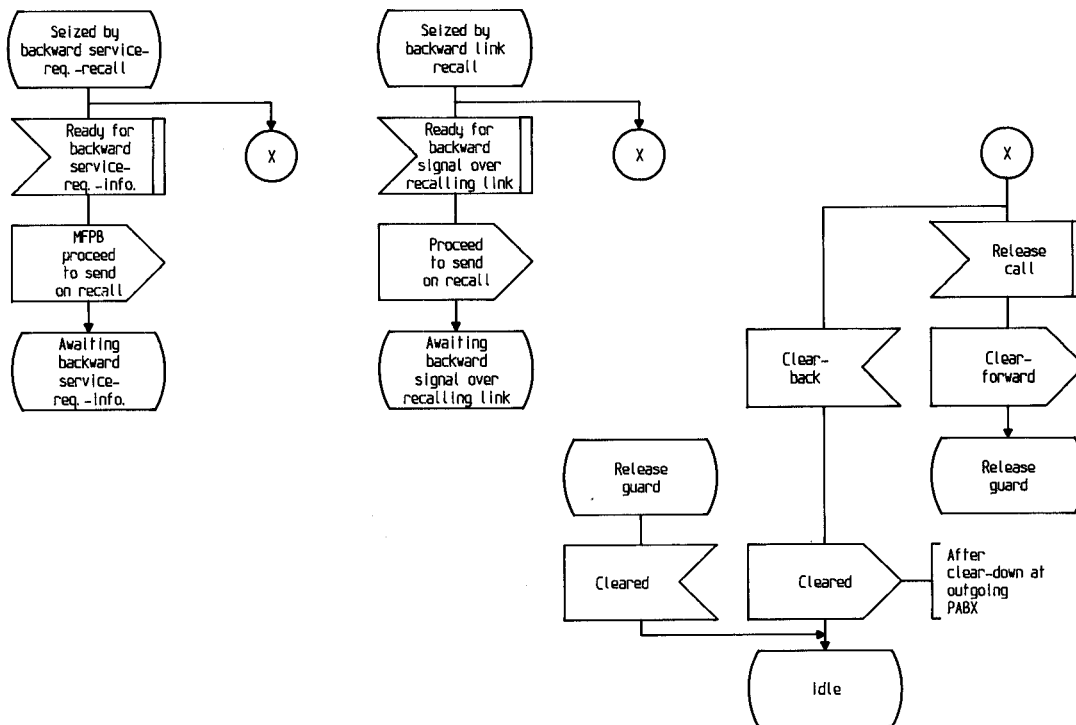


Figure 7 (T/CS 49-06). Backward register-recall (outgoing PABX).



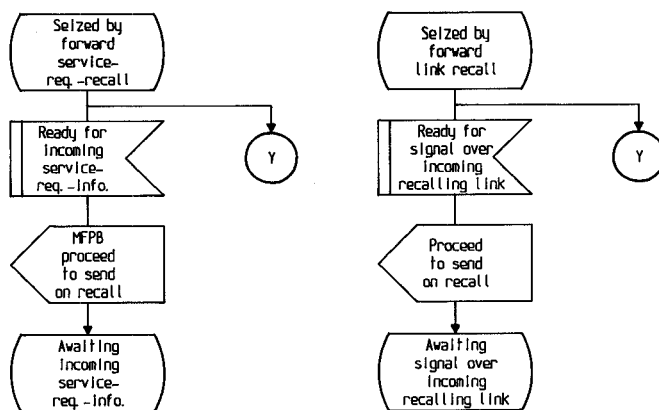


Figure 6 (T/CS 49-06). Forward register-recall (incoming PABX).

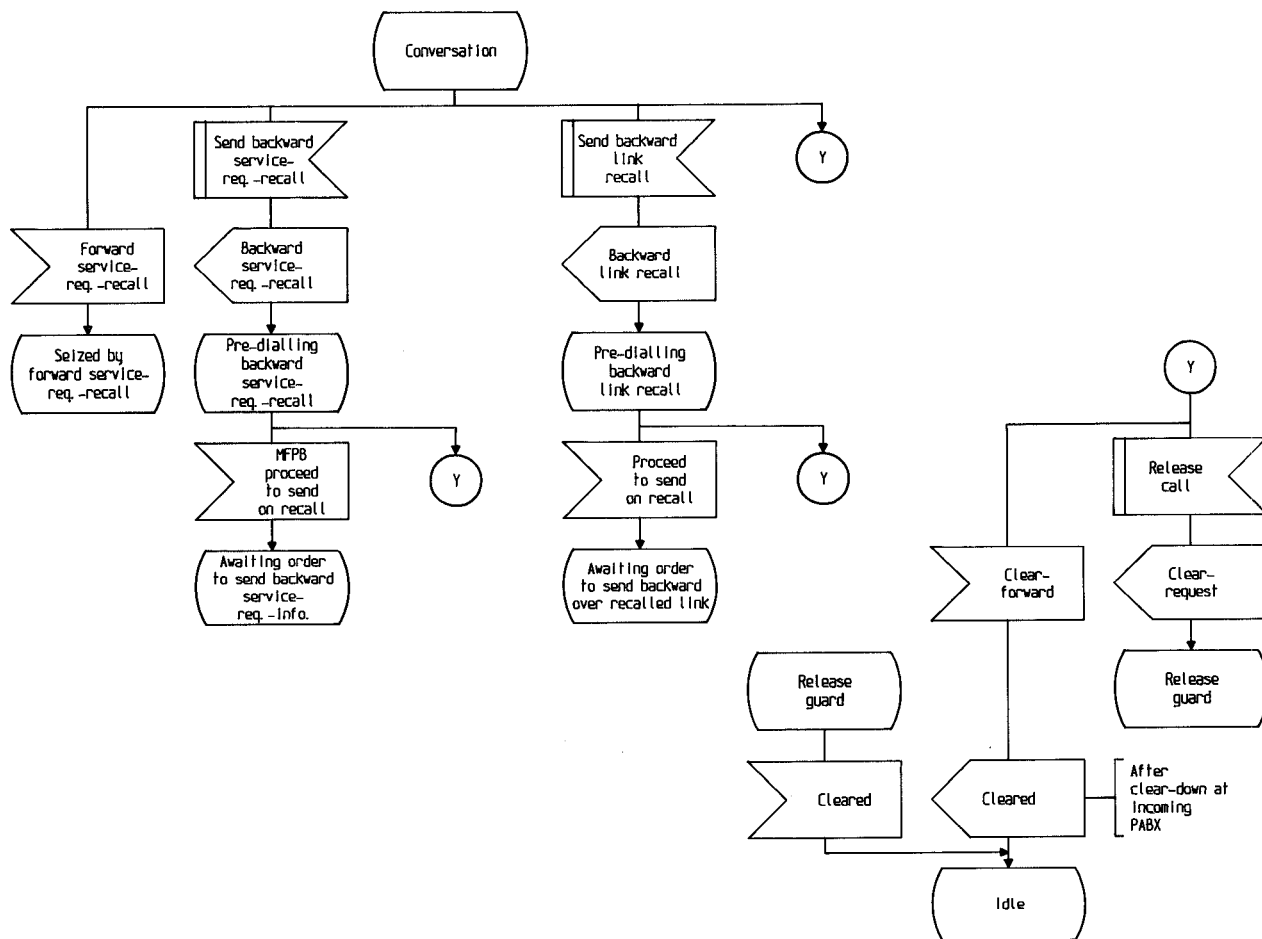


Figure 8 (T/CS 49-06). Backward register-recall (incoming PABX).

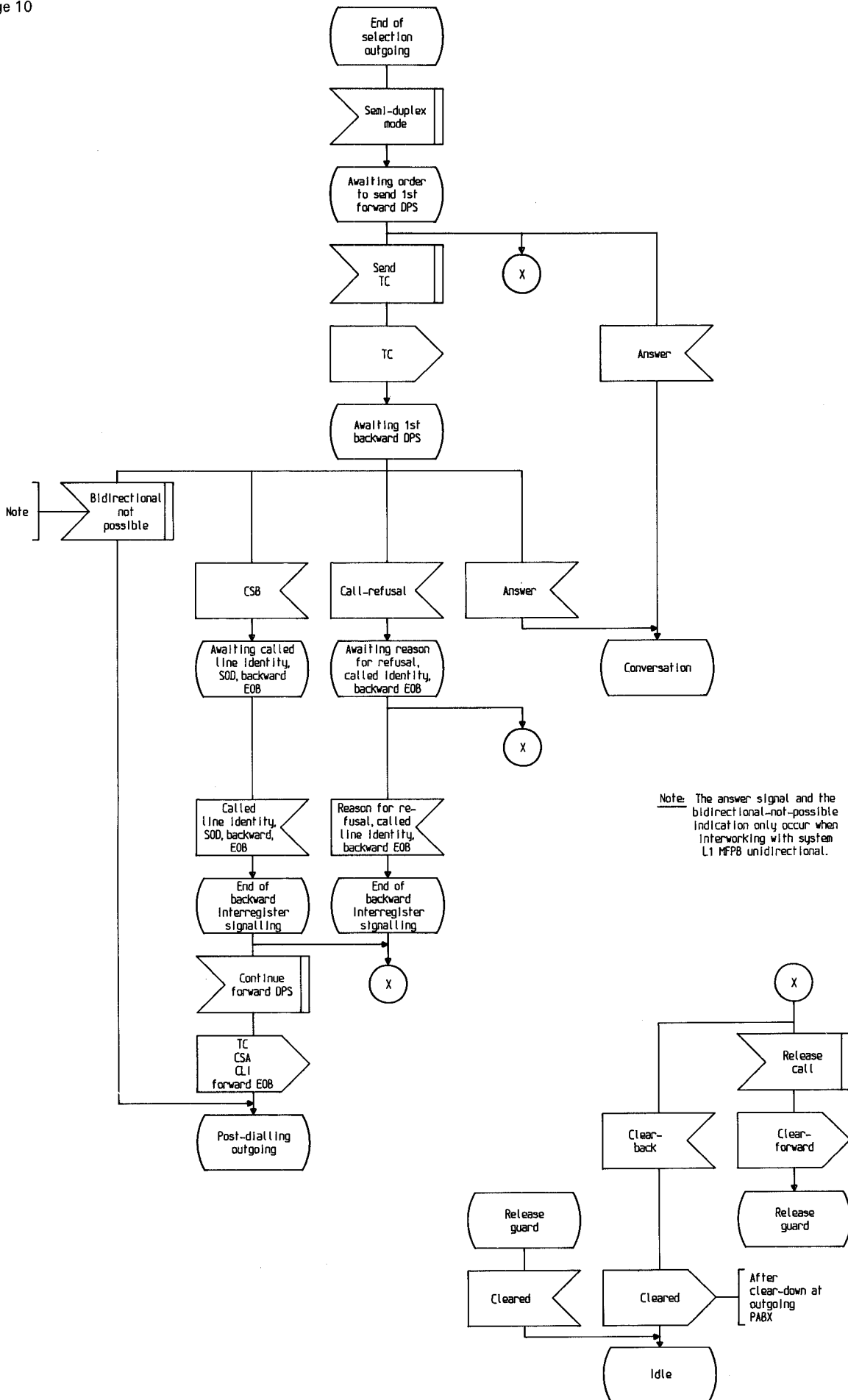


Figure 9 (T/CS 49-06). Signalling compatibility check procedure and semi-simplex interchange of dialogue phase signals (outgoing PABX).

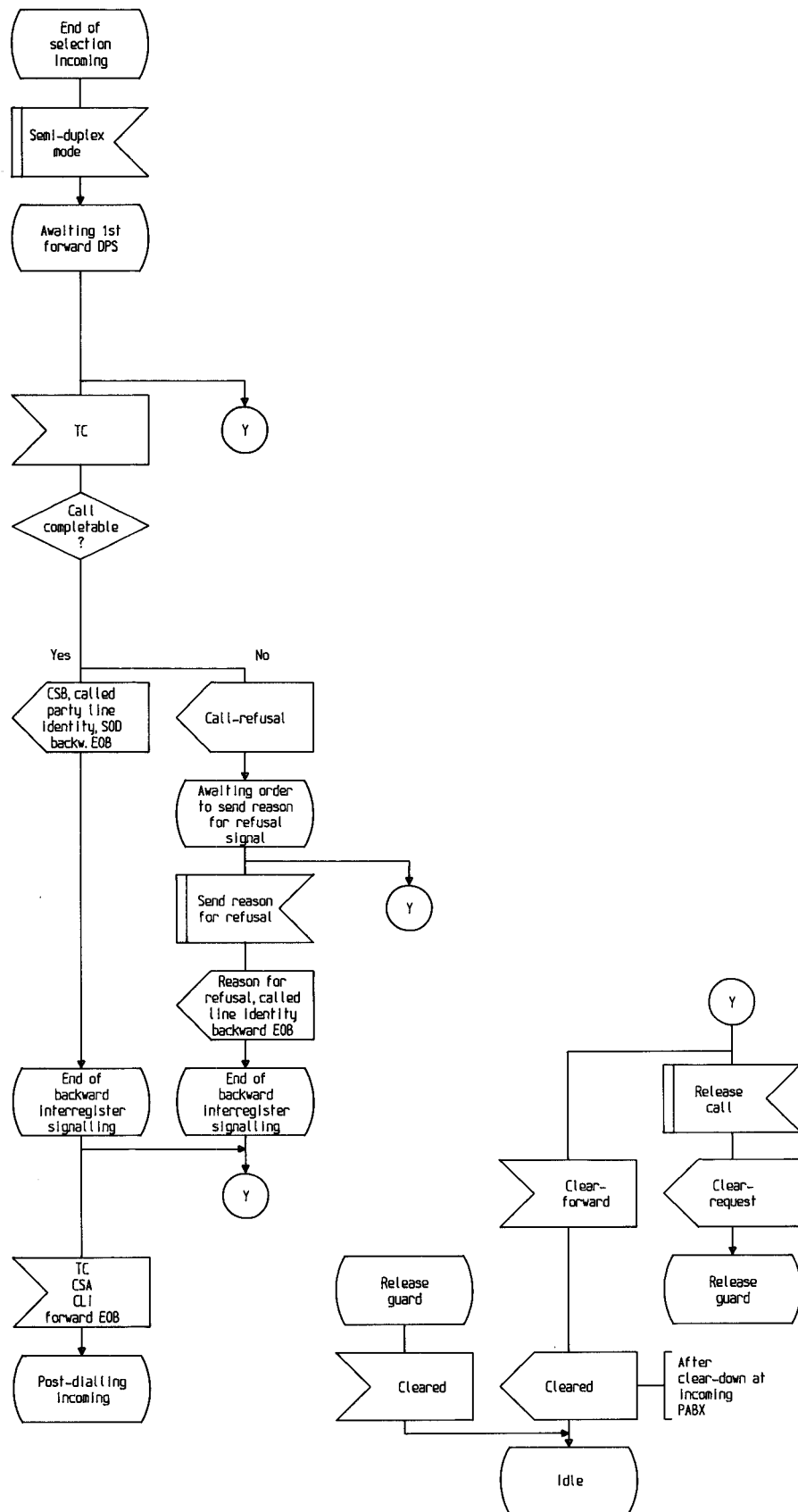


Figure 10 (T/CS 49-06). Signalling compatibility check and semi-duplex interchange of dialogue-phase signals (incoming PABX).



**Recommandation T/CS 49-06 (révisée en 1984)**

**Information de la suite donnée**

- a = La Recommandation est appliquée.  
 b = L'application de la Recommandation est prévue.  
 c = L'application de la Recommandation n'est pas prévue.

N°	Pays	Information	Remarques
1	2	3	4
1	<i>Allemagne (Rép. féd. d')</i>	c	
2	<i>Autriche</i>	c	
3	<i>Belgique</i>		
4	<i>Chypre</i>		
5	<i>Danemark</i>	a	
6	<i>Espagne</i>		
7	<i>Finlande</i>	c	
8	<i>France</i>	b	
9	<i>Grèce</i>		
10	<i>Irlande</i>		
11	<i>Islande</i>		
12	<i>Italie</i>		
13	<i>Liechtenstein</i>		
14	<i>Luxembourg</i>		
15	<i>Malte</i>		
16	<i>Monaco</i>		
17	<i>Norvège</i>		
18	<i>Pays-Bas</i>		
19	<i>Portugal</i>		
20	<i>Royaume-Uni</i>		
21	<i>Saint-Marin</i>		
22	<i>Suède</i>	c	
23	<i>Suisse</i>	c	
24	<i>Turquie</i>		
25	<i>Vatican (Cité)</i>		
26	<i>Yougoslavie</i>	c	Pas pour le moment.