

TA750 Signaling State Information

This document describes the available voice signaling state machines in the TA750. With the information presented here, a technician can successfully troubleshoot signaling state machine problems/mismatches between the TA750, trunk, and end-user equipment. The following notation is as follows:

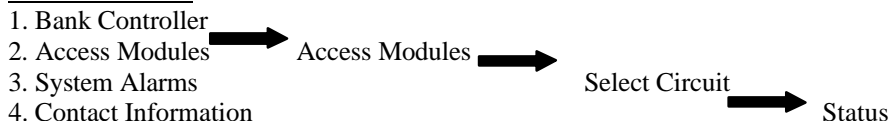
RA	The received A signaling bit as seen by the TA750 from the T1 interface
RB	The received B signaling bit as seen by the TA750 from the T1 interface
TA	The transmitted A signaling as sent by the TA750 into the T1 interface
TB	The transmitted B signaling as sent by the TA750 into the T1 interface

The A and B signal bit states on the DS-1 signal are as follows:

Signal	Comment
0	logic 0 from/to the DS-1 stream
1	logic 1 from/to the DS-1 stream
x	value is not significant
0/1	Signal changes between "1" and "0"
Loop Open	phone on-hook
Loop Closed	phone off-hook

The current state of the signaling bits can be observed on a per timeslot basis in the TA750 by selecting the status menu for a particular timeslot. The status menu for a timeslot found with the following navigation:

Total Access 750



The FXS Status menu contains the following information:

FXS Status

Tx Signaling (TA)	0
Tx Signaling (TB)	1
Rx Signaling (RA)	0
Rx Signaling (RB)	0
Tx Attenuation	6.0
Rx Attenuation	3.0
Active Circuit Type	FXS Loop Start
2 Wire Line Impedance	Auto:600 Ohm+2.16 uF
Service Mode	In Service
Digital Network Loopback	Disabled
Network On/Off Hook Test	No Test
Customer Ringing Test	No Test
1000Hz-0dBm0 Tone Gen	No Test

The TA750 supported FXS signaling modes are defined as follows:

FXS Loop Start Mode

<i>MODE</i>	<i>RA</i>	<i>RB</i>	<i>TA</i>	<i>TB</i>	<i>Comments</i>
Loop Open (LO)			0	1	
Loop Closure (LC)			1	1	
No ringing toward Loop	X	1	0	1	Silent interval of cadence
Ring toward Loop	X	0	0	1	Ringing interval of cadence
Talk (Ring Trip)	X	0	1	1	Phone off-hook; ring tripped; connection complete.
Talk	X	1	1	1	Phone off-hook; ring tripped; connection Complete.

Table 1: PUB 43801 FXS Loop Start State Definitions

<i>System Status</i>	<i>RA</i>	<i>RB</i>	<i>TA</i>	<i>TB</i>	<i>Comments</i>
1)Idle	0 (x)	1	0	1	Loop open, no ringing
2)Ringing	0 (x)	0/1	0	1	Ringing cadence follows RB
3)FXS senses off-hook	0 (x)	1 (x)	1	1	Ringing tripped, phone is off-hook
4)Connection complete	0 (x)	1 (x)	1	1	Talking
5)FXS senses on-hook	0 (x)	1 (x)	0	1	Disconnection, phone is on-hook

Table 2: FXS Loop Start Mode (Terminating Call Into FXS 2W Interface)

<i>System Status</i>	<i>RA</i>	<i>RB</i>	<i>TA</i>	<i>TB</i>	<i>Comments</i>
1)Idle	0 (x)	1	0	1	Loop open, no ringing
2)FXS goes off-hook	0 (x)	1 (x)	1	1	Off-hook, drawing dialtone
3)Dial address digits	0 (x)	1 (x)	0/1	1	Dial-pulsing or passing DTMF
4)Addressing complete	0 (x)	1 (x)	0	1	Dialing done, answered and talking
5)FXS goes on-hook	0 (x)	1 (x)	0	1	Disconnection

Table 3: FXS Loop Start Mode (Originate Call From FXS 2W Interface)

FXS Ground Start Mode

<i>Signaling Bit</i>	<i>General Definition</i>
RA	0: Ground the tip lead; 1: Open the tip lead;
RB	0: 20 hz ringing to the loop; 1: No ringing to the loop;
TA	0: Loop open; 1: Loop closure;
TB	0: Loop grounded the ring lead; 1: Loop has the ring lead open;

Table 4: FXS Ground Start State Definitions

<i>System Status</i>	<i>RA</i>	<i>RB</i>	<i>TA</i>	<i>TB</i>	<i>Comments</i>
1)Idle	1	1 (x)	0	1	On-hook, Tip open
2)Tip grounded	0	1	0	1	Tip gnd, line seized
3)Tip gnd & ringing	0	0	0	1	Ringing interval of ringing cadence; Cadence follows RB. Ring iff TA=0 & TB=1;
4)Tip gnd & not ringing	0	1	0	1	Silent interval of ringing cadence; Cadence follows RB.
5)Off hook (loop closed)	0	1 (x)	1	1	Loop closed; Ring trip, Connection Established;
6a)Far end (FXO) disconnect	1	1 (x)	1	1	Tip open; Call disconnected
7a)Idle	1	1 (x)	0	1	Ring open & loop open returned to far end
6b)Near end (FXS) disconnect	0	1 (x)	0	1	Ring open & loop open from far end
7b)Idle	1	1 (x)	0	1	Tip open and idle

Table 5: FXS Ground Start Mode (Terminating Call Into FXS 2W Interface)

<i>System Status</i>	<i>RA</i>	<i>RB</i>	<i>TA</i>	<i>TB</i>	<i>Comments</i>
1)Idle	1	1 (x)	0	1	Idle condition
2)Ring-gnd detected	1	1 (x)	0	0	Loop grounds ring lead; encoded on TB
3)Tip-gnd returned	0	1 (x)	0	0	Tip is grounded by RA in response to ring-gnd
4)Loop closed	0	1 (x)	1	1	After ring lead is released the tip ground causes loop closure; encoded on TA.
5)Dial pulsing	0	1 (x)	0/1	1	Passing address digits or DTMF
6)Connection Established	0	1 (x)	1	1	
7a)Far end disconnect	1	1 (x)	1	1	Open the Tip lead; call disconnecting
8a)Idle	1	1 (x)	0	1	
7b)Near end disconnect	0	1 (x)	0	1	Loop opens; ring lead & loop open
8b)Idle	1	1 (x)	0	1	No tip-gnd returned from far end

Table 6: FXS Ground Start Mode (Originating Call From FXS 2W Interface)

Tandem (E&M) Signaling

When optioned for Tandem (E&M) signaling, the TA750 converts E&M signaling received on the network T1 to either Loop or Ground Start mode of operation. The Tandem mode consists of the following options:

Tandem (E&M) Signaling

1. Conversion Mode	Ground Start / Loop Start
2. Supervision	Immediate / Wink
3. Dial Tone	Disabled / Enabled
4. Ring Back Tone	Disabled / Enabled
5. Answer Supervision	Disabled / Enabled
6. DNIS Options	Disabled, Enabled, Enabled w/No Answer Wink
7. DNIS Delay	Disabled, 0.5,1,1.5,2,2.5,3,5 second delay

<i>System Status</i>	<i>RA</i>	<i>RB</i>	<i>TA</i>	<i>TB</i>	<i>Comments</i>
1)Idle	0	x	0	0	On-hook
2)Incoming call	1	x	0	0	On-hook
3)Wink back to network*	1	x	1	1	Wink back for 200 mS
4)Wink done*	1	x	0	0	
5)Ringing FXS port ¹	1	x	0	0	Ringing 2S on 4S off
5a) Start No Answer Wink**	1	x	1	1	If no answer after two rings, wink back for 200 mS
5b)Stop No Answer Wink**	1	x	0	0	
5c)Idle	0	x	0	0	
6)Off hook (near end)	1	x	1	1	Ringing tripped, Connection Established
6a) DNIS request wink***	1	x	1	1	Wink back for 200 mS
6b)Finish DNIS wink***	1	x	0	0	Start receive DNIS digits from network
6c)DNIS delay***	1	x	0	0	Start programmable DNIS delay
6d)DNIS delay finish***	1	x	1	1	Customer Talking
7a)On-hook	1	x	0	0	Near end hangs up
8a)Disconnect (far-end)	0	x	0	0	Far end hangs up
9a)Idle	0	x	0	0	On-hook
7b)Disconnect (far-end)	0	x	1	1	Far end hangs up
9b)Near end hangs up	0	x	0	0	On-hook
10b)Idle	0	x	0	0	On-hook

Table 7: FXS Tandem (E&M) Signaling (Terminating Call Into FXS 2W Interface)

*If Wink supervision is enabled

**If DNIS No Answer Wink Enabled

***If DNIS is enabled

¹If Ring Back Tone is enabled, a ring back tone will be sent back into the network during the 2 second ring “On” period and turned off during the 4 second ring “Off” period.

<i>System Status</i>	<i>RA</i>	<i>RB</i>	<i>TA</i>	<i>TB</i>	<i>Comments</i>
1)Idle	0	x	0	0	On-hook
2) Ring gnd detected	0	X	0	0	If optioned for Ground Start, Ground Tip
2)FXS goes off-hook	0	x	1	1	Off-hook, If Enabled, start Dial Tone towards FXS loop. Dial Tone will automatically cut-off after 5 seconds
2a)Wait for Network Wink	0	X	1	1	If Wink Supervision is enabled
2b) Receive Network Wink	1	X	1	1	If Wink Supervision is enabled
2c) Network Wink Stop	0	X	1	1	If Wink Supervision is enabled
3)Dial address digits	0	X	0/1	0/1	Dial-pulsing or passing DTMF
4)Connection complete	1	x	1	1	Talking, If Answer Supervision is Enabled, reverse battery towards loop.
5a)On-hook	1	x	0	0	Near end hangs up
6a)Disconnect (far-end)	0	x	0	0	Far end hangs up
7a)Idle	0	x	0	0	On-hook
5b)Disconnect (far-end)	0	x	1	1	Far end hangs up
6b)Near end hangs up	0	x	0	0	On-hook
7b)Idle	0	x	0	0	On-hook

Table 8: FXS Tandem (E&M) Signaling (Originating Call from FXS 2W Interface)

When connected to a switch configured for TR-TSY-000008. The following signaling state machines are valid:

<i>Customer State</i>	<i>TA</i>	<i>TB</i>	<i>RA</i>	<i>RB</i>	<i>Channel State</i>
On-Hook	0	1	0	1	Channel Test
Off-Hook	1	0	1	0	Forward Disconnect
Unequipped	1	1	1	1	Idle (Normal Battery)
			1	1/0	Ringing
			1/0	1/0	Reverse Battery

Table 9: FXS TR08 Single Party

<i>Customer State</i>	<i>TA</i>	<i>TB</i>	<i>RA</i>	<i>RB</i>	<i>Channel State</i>
On-Hook	0	0	0	0	Ground Start
Ring Ground	0	1	0	1	Channel Test
Off-Hook	1	0	1	1/0	Ringing
Unequipped	1	1	0	1/0	Idle (Normal Battery)
			1/0	1/0	Reverse Battery

Table 10: FXS TR08 Universal Voice Grade

FXS DPO Mode

<i>Signaling Bit</i>	<i>General Definition</i>
RA	0: Normal Battery; 1: Reverse Battery;
RB	Ignore;
TA	0: Loop open; 1: Loop closure;
TB	0: Loop open; 1: Loop closure;

Table 9: DPO Signaling State Definitions

<i>System Status</i>	<i>RA</i>	<i>RB</i>	<i>TA</i>	<i>TB</i>	<i>Comments</i>
1)Idle	0	x	0	0	loop open, normal battery (LC,NB)
2)Loop goes off-hook	0	x	1	1	LC NB
3)Wink on	1	x	1	1	loop closure, reverse battery (LC,RB)
4)Wink off	0	x	1	1	LC NB
5)Dial address digits	0	x	0/1	0/1	Dial-pulsing or passing DTMF
4)Wait on Answer	0	x	1	1	Far end ringing station
5)Station goes off-hook	1	x	1	1	Connection established (LC, RB)
6a)Loop goes on-hook	1	x	0	0	loop open, reverse battery (LO,RB)
6b)Network disconnects	0	x	0	0	loop open, normal battery (LO,NB)
7a)Network disconnects	0	x	1	1	LC,NB
7b)Loop goes on-hook	0	x	0	0	LO,NB

Table 10: DPO Mode (Originating Call From FXS 2W Interface)

The TA750 supported FXS signaling modes are defined as follows:

FXO Loop Start Mode

<i>FXO VF Input</i>	<i>TA</i>	<i>TB</i>	<i>RA</i>	<i>RB</i>	<i>FXO VF Output</i>
No Ringing	0	1			
Ringing	0	0			
			0	x	Loop Open
			1	x	Loop Closure

Table 11: PUB 43801 FXO Loop Start State Definition

FXO Ground Start Mode

<i>FXO VF Input</i>	<i>TA</i>	<i>TB</i>	<i>RA</i>	<i>RB</i>	<i>FXO VF Output</i>
No Tip Gnd	1				
Tip Gnd	0				
No Ringing		1			
Ringing		0			
			0		Loop Open
			1		Loop Closure
				1	No Ring Gnd
				0	Ring Gnd

Table 12: PUB 43801 FXO Ground Start State Definitions

FXO DPT Mode

<i>FXO VF Input</i>	<i>TA</i>	<i>TB</i>	<i>RA</i>	<i>RB</i>	<i>FXO VF Output</i>
Normal Battery	0	0			
Reverse Battery	1	1			
			0	x	Loop Open
			1	x	Loop Closure

Table 13: PUB 43801 DPT Signaling State Definitions