169.4.4 MPSE state diagram

The MPSE shall implement the behavior of the state diagram shown in Figure 169–3 and Figure 169–4.

169.4.4.1 Conventions

The notation used in the state diagram follows the conventions of state diagrams as described in 145.2.5.2.

169.4.4.2 Variables

The MPSE state diagram uses the following variables:

mpse_enable
: A variable that selects MPSE operation. This variable may be set by the MPSE at any time.
Values:
FALSE: All MPSE functions disabled (behavior is as if there was no MPSE functionality).
TRUE: Normal MPSE operation.

mpse_ready
: A variable that is asserted in an implementation-dependent manner. This variable may be set by the MPSE at any time.
Values:
FALSE: The MPSE is not ready to discover the mixing segment.
TRUE: The MPSE is ready to discover the mixing segment.

mpd_type0_discovered
: A variable that indicates at least one valid MPD supporting only Type 0 is connected to the mixing segment.
Values:
FALSE: No valid MPDs supporting only Type 0 are connected to the mixing segment.
TRUE: At least one valid MPD supporting only Type 0 is connected to the mixing segment.

mpd_type1_discovered
: A variable that indicates at least one valid MPD supporting only Type 1 is connected to the mixing segment.
Values:
FALSE: No valid MPDs supporting only Type 1 are connected to the mixing segment.
TRUE: At least one valid MPD supporting only Type 1 is connected to the mixing segment.

mpd_mixed_discovered
: A variable that indicates at least one valid MPD supporting both Type 0 or Type 1 is connected to the mixing segment.
Values:
FALSE: No valid MPDs supporting both Type 0 and Type 1 are connected to the mixing segment.
TRUE: At least one valid MPD supporting both Type 0 or Type 1 is connected to the mixing segment.

discover_fault
: A variable indicating if $I_{Discovery}$ measured by the MPSE during the most recent discover_high or discover_low state is equal to or greater than $I_{Discovery\_LIM}$ as defined in Table 169–3. This variable is set per this description.

Values:

FALSE: Measured $I_{Discovery}$ was less than $I_{Discovery\_LIM}$ during the most recent discover_high or discover_low state.

TRUE: Measured $I_{Discovery}$ was equal to or greater than $I_{Discovery\_LIM}$ during the most recent discover_high or discover_low state.

overload_detected

A variable indicating if the MPSE output current has been in an overload condition; see 169.4.9. This variable is set per this description.

Values:

FALSE: The MPSE has not detected an overload condition.

TRUE: The MPSE has detected an overload condition.

power_stable

A variable that is asserted when the MPSE completes inrush and is ready to source full operating power to MPD loads.

Values:

FALSE: The MPSE is either not applying full operating voltage or has begun applying full operating voltage but is still in the INRUSH state

TRUE: The MPSE has begun steady-state operation and is ready to enter the POWER_ON state.

short_circuit_detected

A variable indicating if the MPSE output has been in a short circuit condition; see 169.4.10. This variable is set per this description.

Values: FALSE: The MPSE has not detected a short circuit condition.

TRUE: The MPSE has detected a short circuit condition.

tci_powered

A variable that controls the circuitry that the MPSE uses to power the TCI.

Values: FALSE: The circuitry that applies operating power to the TCI is disabled.

TRUE: The circuitry that applies operating power to the TCI is enabled.

169.4.4.3 Timers

All timers operate in the manner described in 14.2.3.2 with the following addition: a timer is reset and stops counting upon entering a state where "stop_x_timer" is asserted.

mpse_inrush_timer

A timer used to limit the duration of the inrush event. See Table 169–5.

tdiscover_high_timer

A timer used to limit the discovery_high event time. See Table 169–3.

tdiscover_low_timer

A timer used to limit the discovery_low event time. See Table 169–3.

ted_timer

A timer used to regulate a subsequent attempt to power a MPD after an error condition causes power removal. See T_{ED} in Table 169–5.

ttpsdo_timer

A timer used to monitor the dropout of the TPS. See 169.4.11.1 and Table 169–5.

169.4.4.4 Functions

The variable formed by the function name appended with "_done" is used to indicate when the function has completed. This variable is set to FALSE when the function is called and is set to TRUE once the function is complete and its output variables are valid.

do_discovery_high

This function produces the discovery mark voltage. This function returns the following variables:

discover_short: A variable indicating if I_{Mark} measured by the MPSE during do_discovery_high is greater than I_{Mark_short} as defined in Table 169–3. This variable is set per this description.

Values:

FALSE: Measured I_{Mark} is less than I_{Mark_short} during do_discovery_high.

TRUE: Measured I_{Mark} is equal to or greater than I_{Mark_short} during do_discovery_high.

discover_high_var: Measured I_{Mark} during the most recent discovery_high_mark event.

do_discovery_low_all

This function produces the discovery low voltage and measures $I_{Discovery}$. $I_{Discovery}$ is compared against I_{Mark} from the previous discovery_high_mark event to determine if MPDs are present (see Table 169-3). This function returns the following variable:

mpd_discovered: This variable indicates the presence or absence of a valid MPD on the mixing segment.

Values:

open_circuit: The MPSE has detected an open circuit.

valid: The MPSE has discovered at least one MPD is connected to the mixing segment.

do_discovery_low_tare

This function produces the discovery event voltage and determines if MPDs are responding to the slot by measuring $I_{Discovery}$. This function measures the baseline $I_{Discovery}$ when MPDs are receiving power from the discovery algorithm, but not issuing a discovery response. This baseline $I_{Discovery}$ will be compared against later discovery_low $I_{Discovery}$ measurements to determine which types of MPDs are connected to the mixing segment. This function returns the following variable:

discover_low_tare_var: Measured $I_{Discovery}$ during the most recent discovery_low_tare event.

do_discovery_low_evx

This function produces the discovery event voltage and determines if MPDs are responding to the slot by measuring $I_{Discovery}$. The variable discover_low_tare_var is subtracted from the measured $I_{Discovery}$ to determine if an MPD is responding to this discovery_low event. This function returns the following variable:

mpd_type_discovered: This variable indicates the presence or absence of a valid MPD corresponding to the discovery slot being probed.

Values:

TRUE: At least one MPD responded to the most recent discovery event.
FALSE: No MPDs responded to the most recent discovery event.

do_discovery_eval

This function evaluates the results from the previous discovery states to determine if at least one MPD is requesting power that is compatible with the MPSE's system type.
This function returns the following variables:

discover_compatible_mpd:
Values:
TRUE: At least one MPD is requesting power that is compatible with the MPSE system type.
FALSE: No MPDs are requesting power that is compatible with the MPSE system type.

do_MPSE_reset

This function produces the reset event voltage (V_{MPSE_reset}) at the the TCI.

169.4.4.5 State diagrams

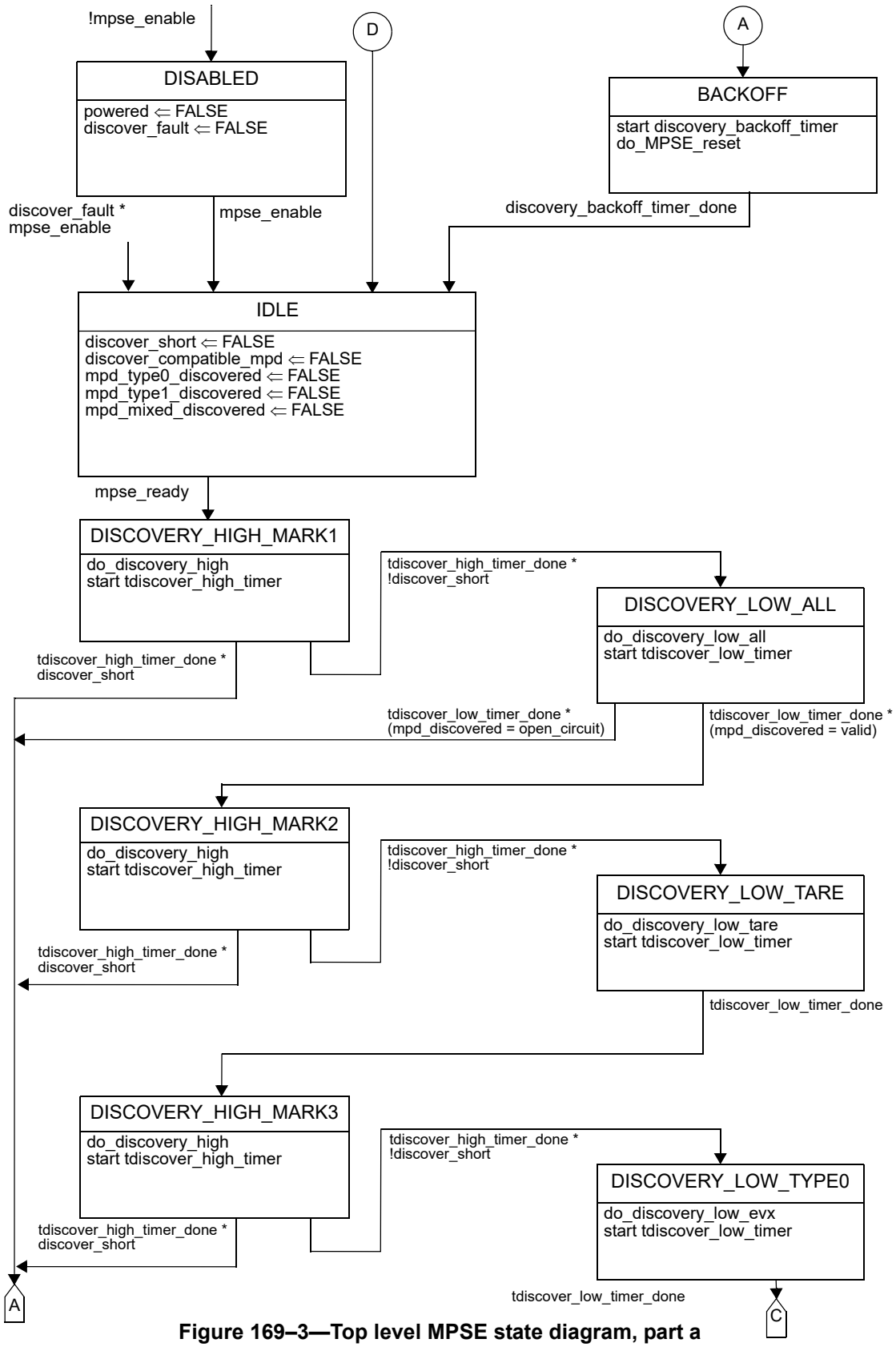

Figure 169–3—Top level MPSE state diagram, part a

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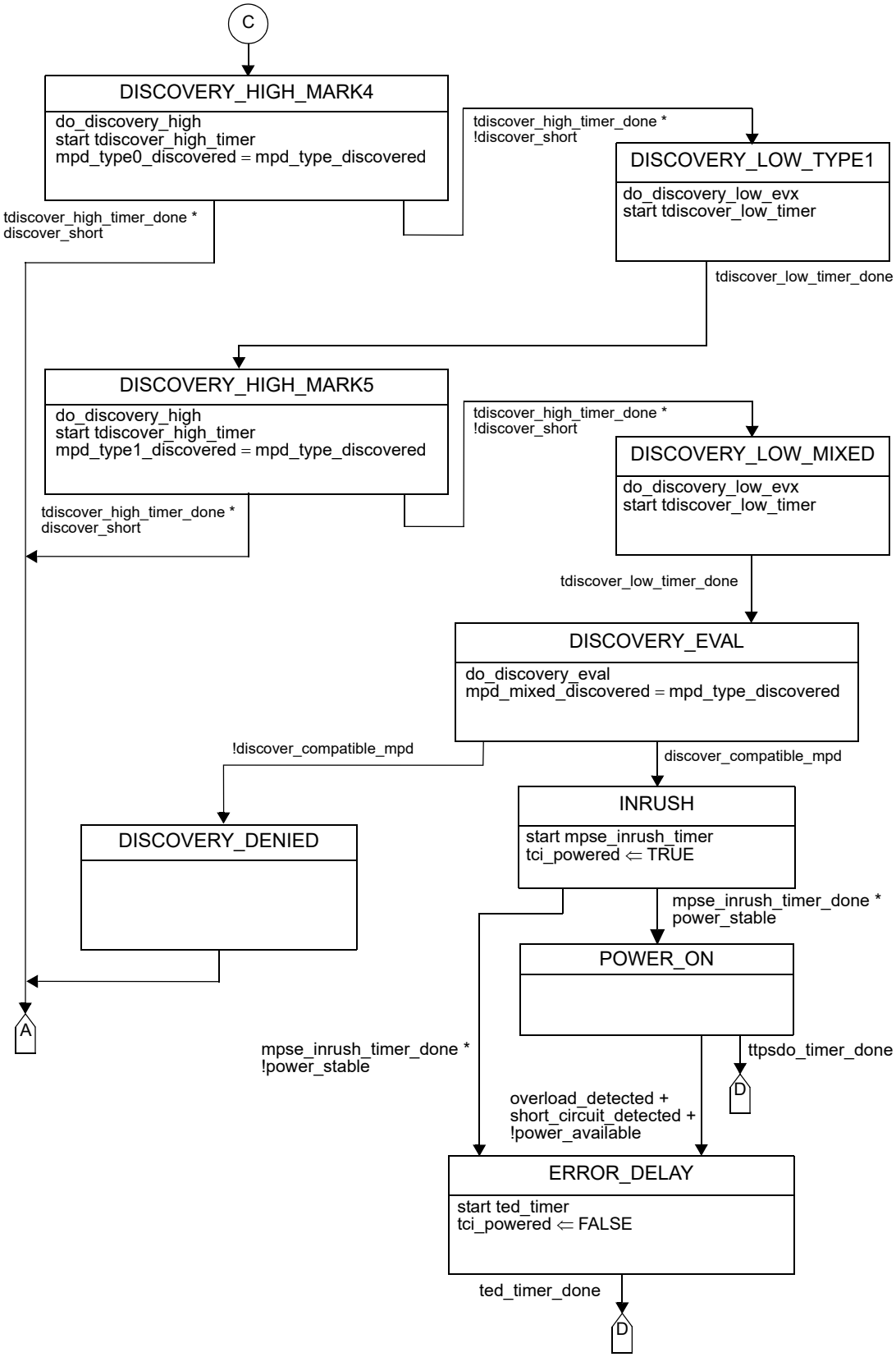

Figure 169–4—Top level MPSE state diagram, part b