

FIG. 1

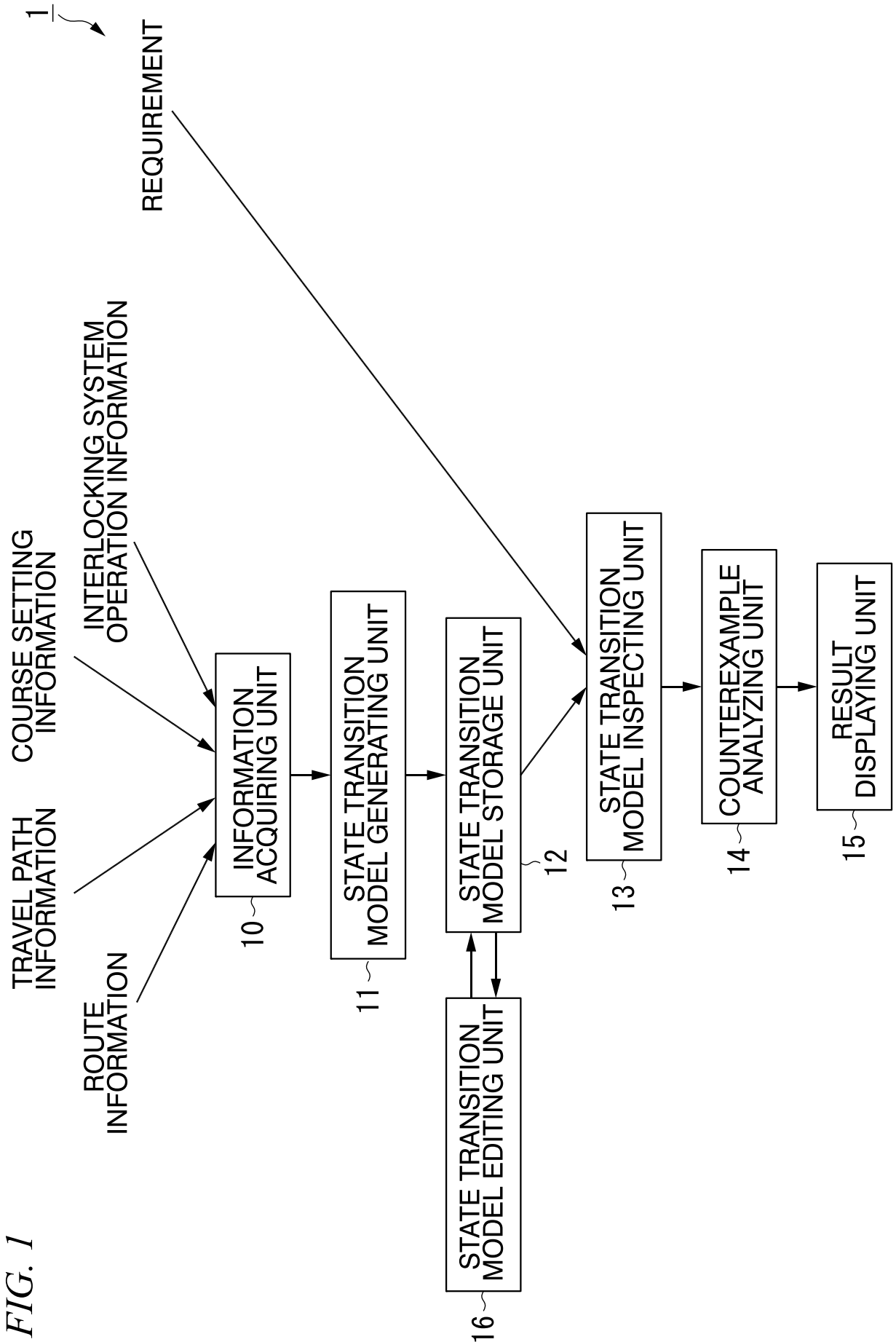


FIG. 2

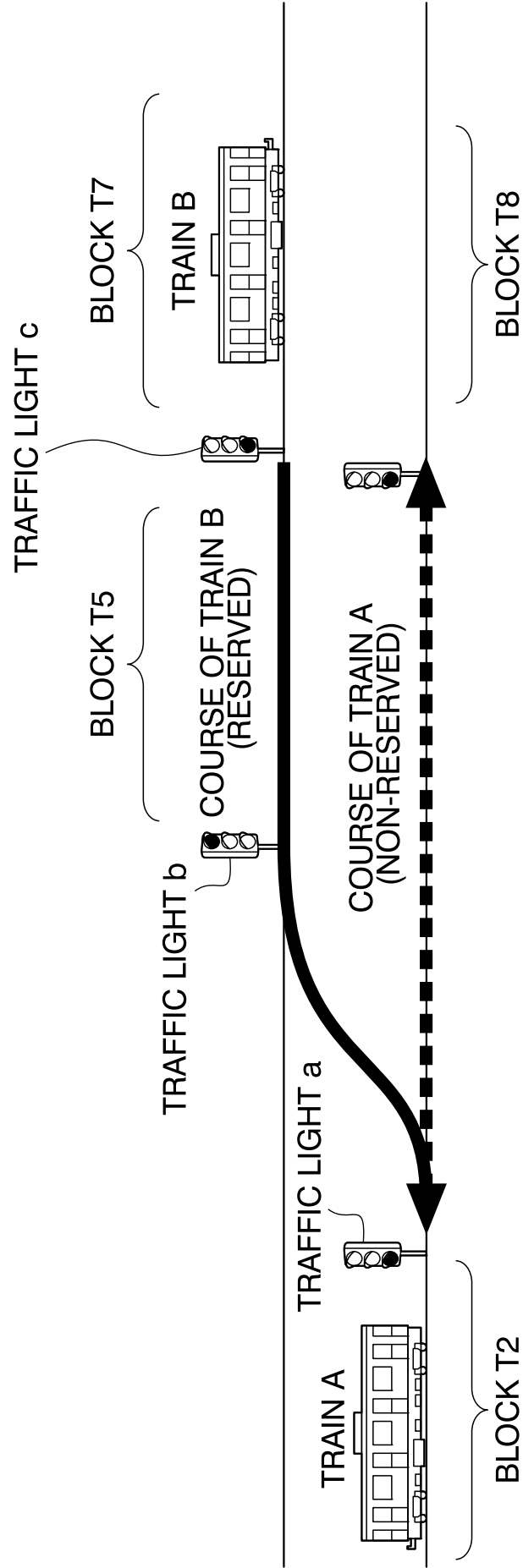


FIG. 3A

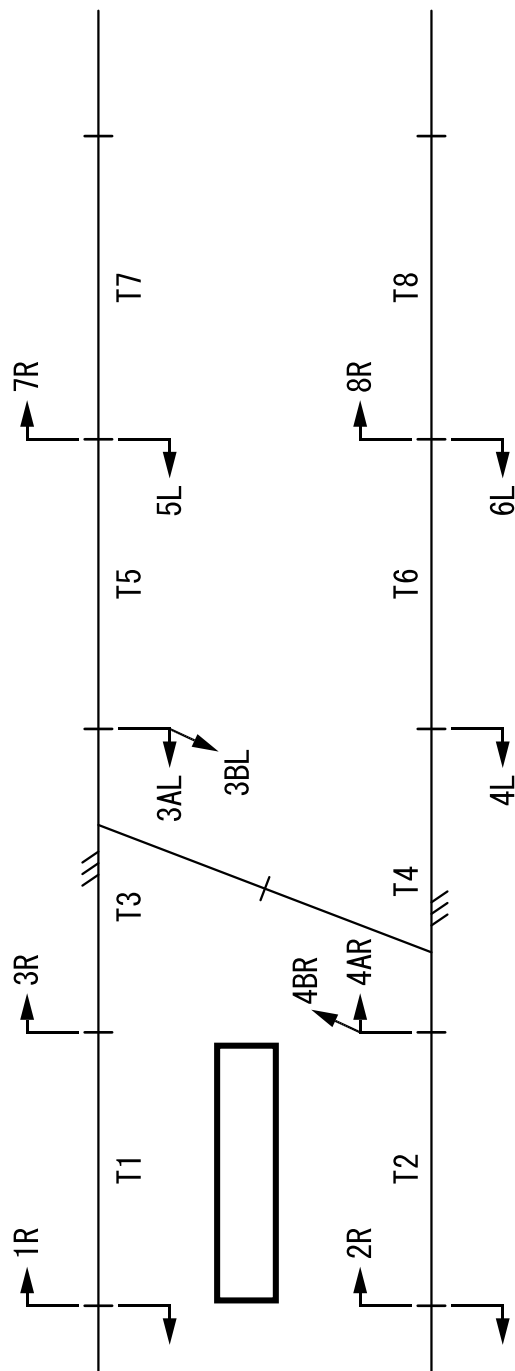


FIG. 3B

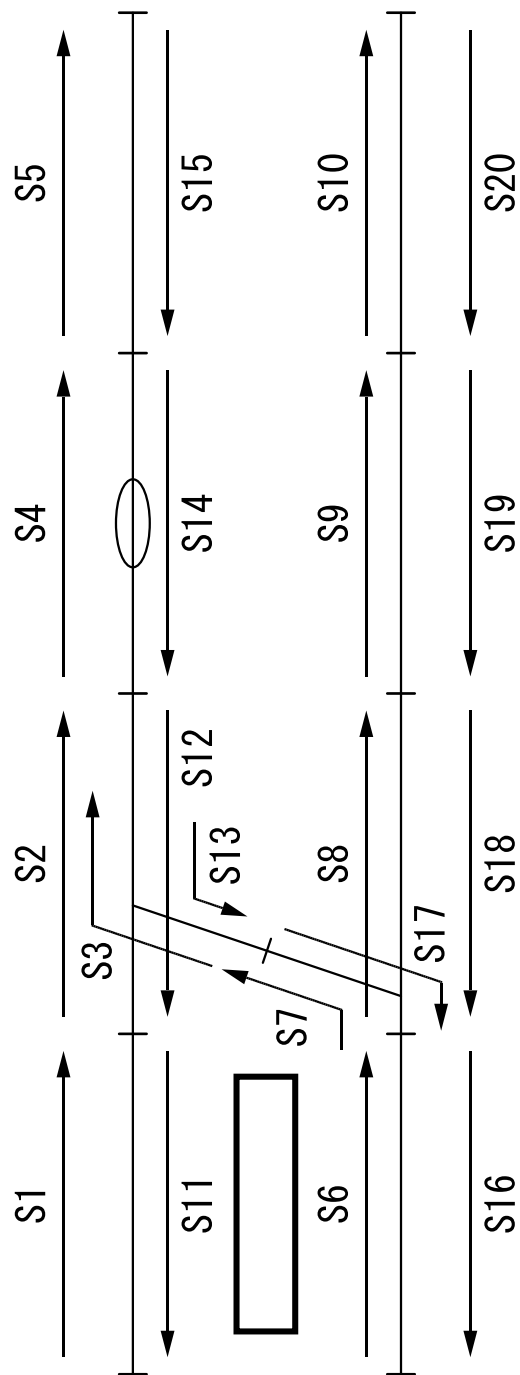


FIG. 4A

<ROUTE INFORMATION 1 – COURSE ELEMENT>

COURSE ELEMENT	BLOCK	DIRECTION	SUBSEQUENT COURSE ELEMENT	REVERSE COURSE ELEMENT
S1	T1	→	S2	S11
S2	T2	→	S4	S12
S3	T2	→	S4	S13
⋮	⋮	⋮	⋮	⋮

FIG. 4B

<ROUTE INFORMATION 2 – COURSE SECTION>

COURSE SECTION	COURSE ELEMENT
1R	S1
3R	S2,S4
4AR	S8,S9
4BR	S7,S3,S4
⋮	⋮

FIG. 5A

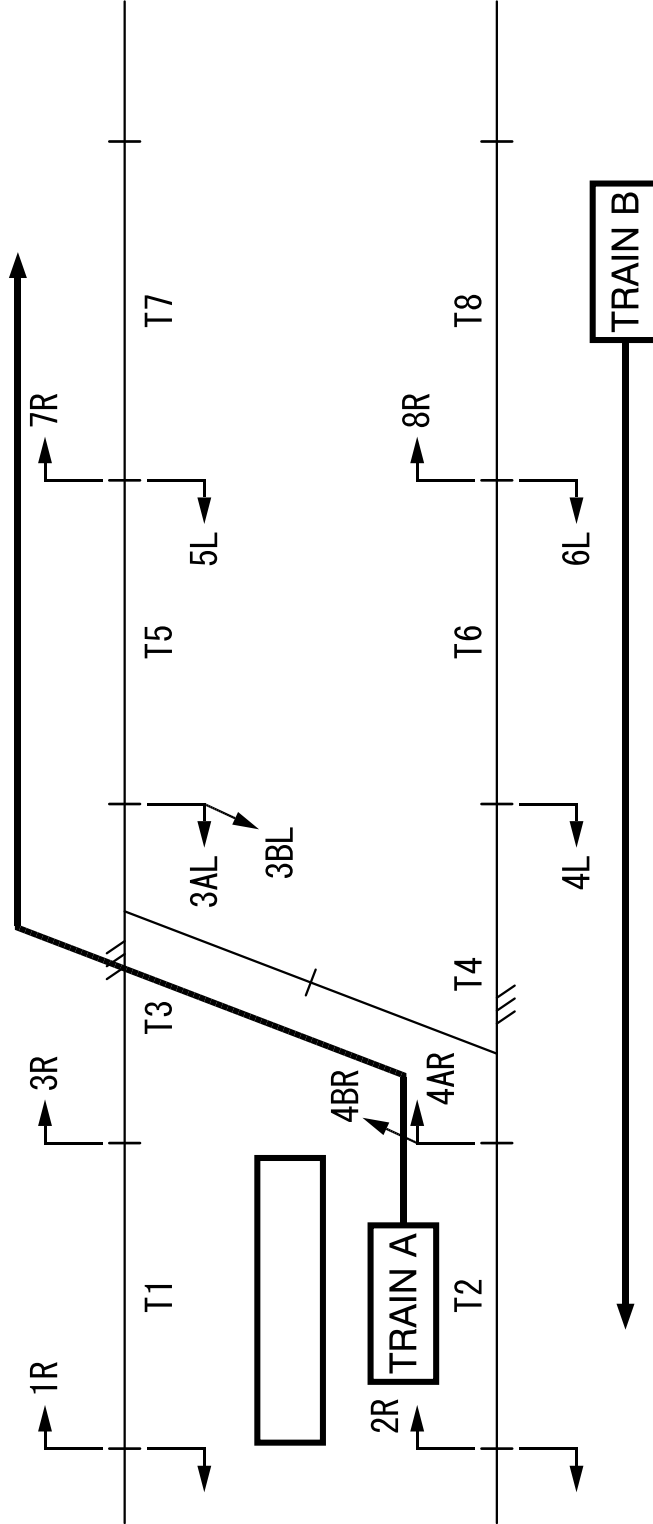


FIG. 5B

<TRAVEL PATH INFORMATION>

TRAIN	INITIAL COURSE ELEMENT	COURSE
A	S6	ABR,7R
B	S20	6L,4L
⋮	⋮	⋮

FIG. 6

<COURSE SETTING INFORMATION>

COURSE SECTION	COURSE REQUEST CONDITION	REQUEST CANCELLATION CONDITION
3R	<u>T1</u> & T3	<u>T1</u> & <u>T3</u>
7R	<u>T5</u> & T7	<u>T5</u> & <u>T7</u>
6L	<u>T8</u> & T6	<u>T8</u> & <u>T6</u>
4L	<u>4AR</u> & <u>4BR</u> & <u>T6</u> & T4	<u>T6</u> & <u>T4</u>
⋮	⋮	⋮

FIG. 7

<INTERLOCKING SYSTEM OPERATION INFORMATION>

COURSE SECTION	LOGICAL EXPRESSION
3R	!3AL * !3BL * !5L * !4BR * 3RX
3AL	!1R * !3R * !3BL * !4BR * 7R * 3ALX
3BL	!2R * !3R * !3AL * !4AR * !4BR * !4L * 7R * 3BLX
⋮	⋮

FIG. 8

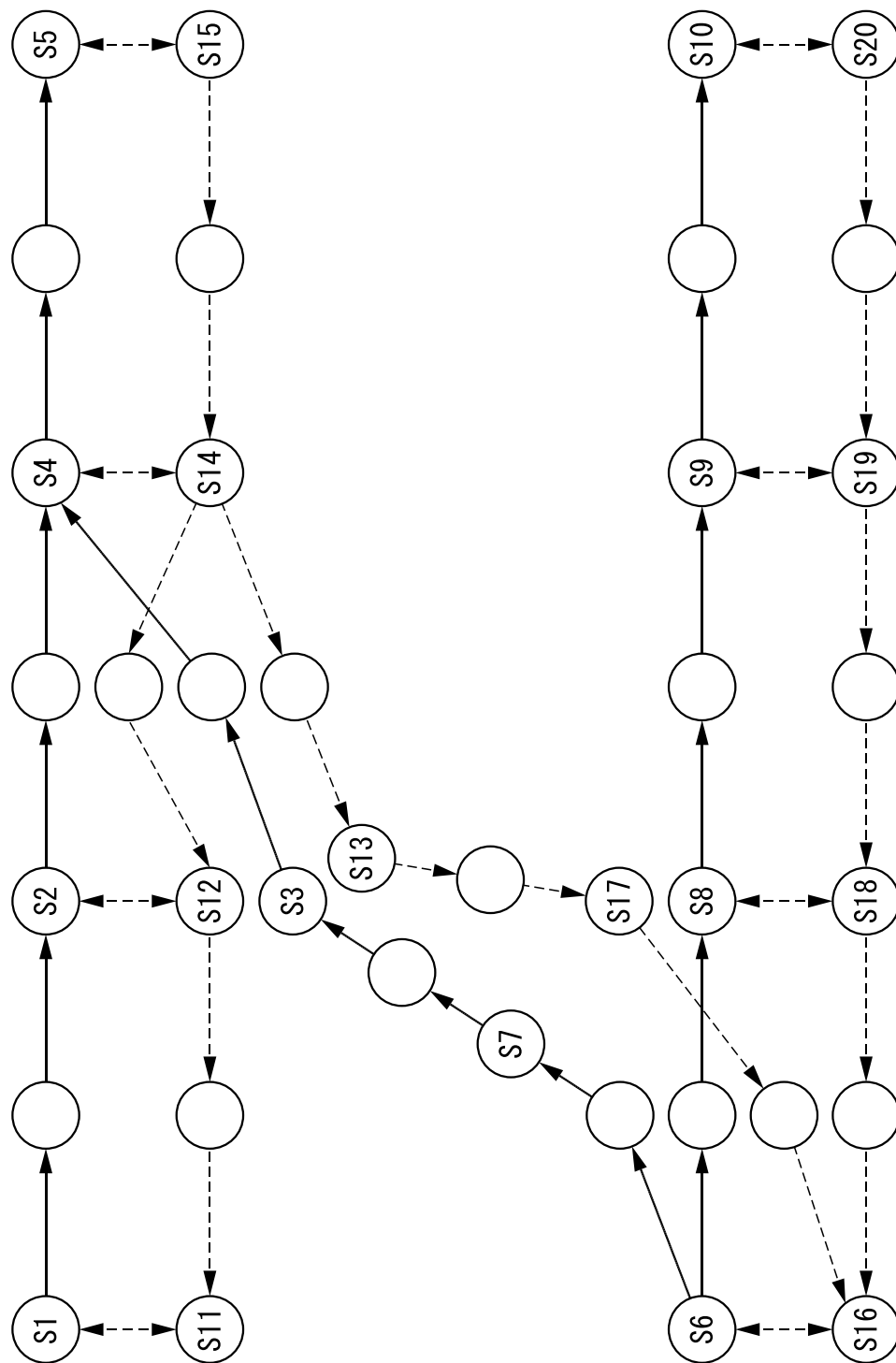


FIG. 9

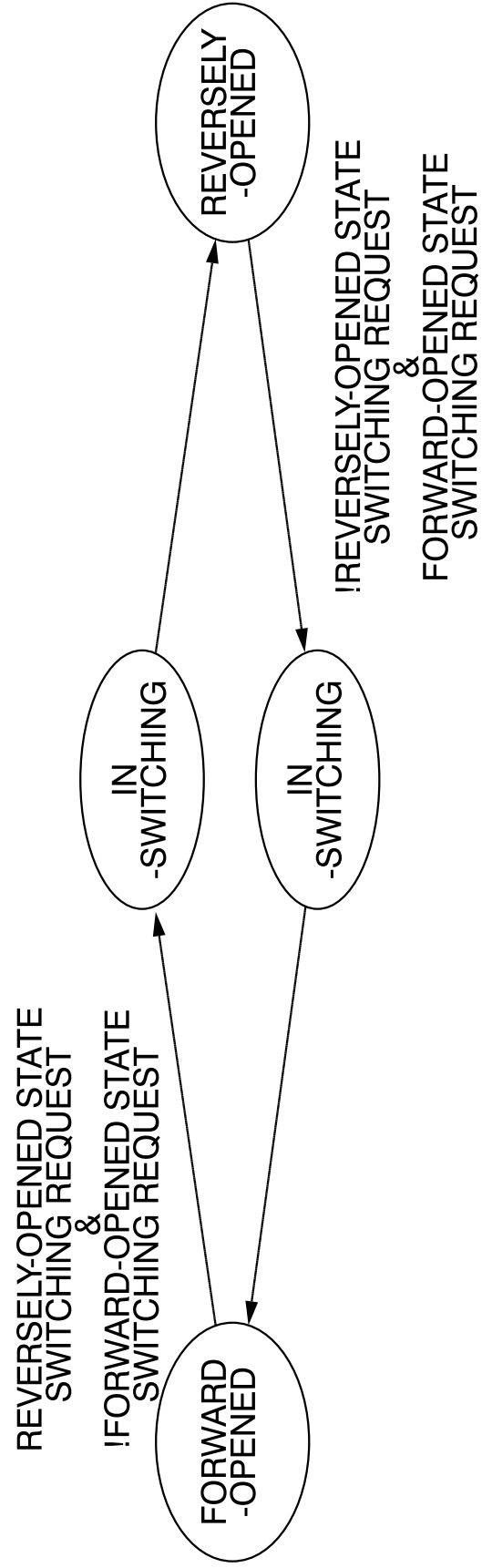


FIG. 10A

STATE TRANSITION MODEL OF COURSE LEVER RELAY
(COURSE SECTION 3R)

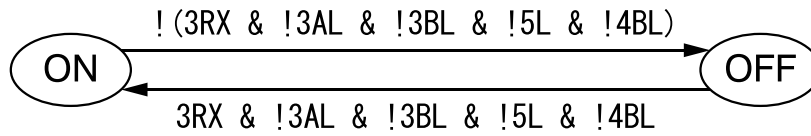


FIG. 10B

STATE TRANSITION MODEL OF TRAIN PRESENCE DETECTION RELAY
(BLOCK T1)

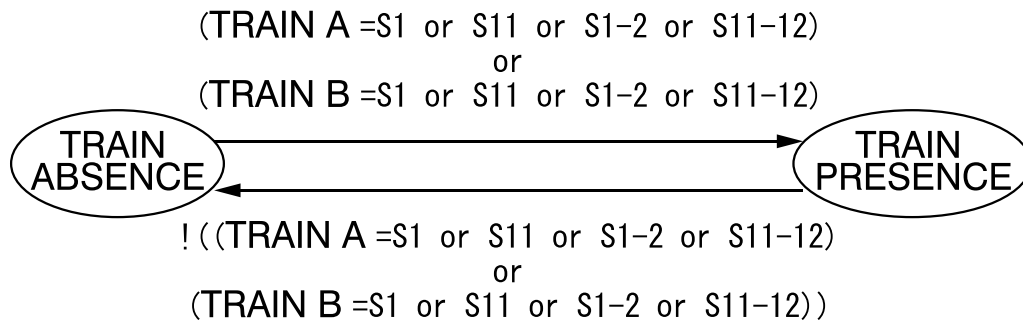


FIG. 10C

STATE TRANSITION MODEL OF BRANCH DETECTION
(FORWARD-OPENED STATE) RELAY

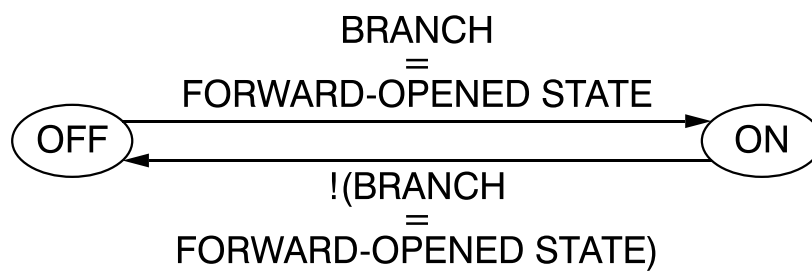


FIG. 10D

STATE TRANSITION MODEL OF BRANCH DETECTION
(REVERSELY-OPENED STATE) RELAY

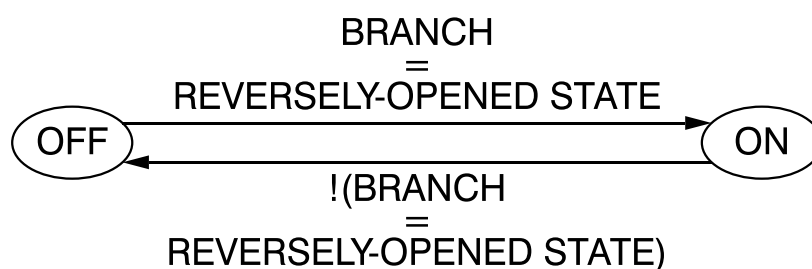
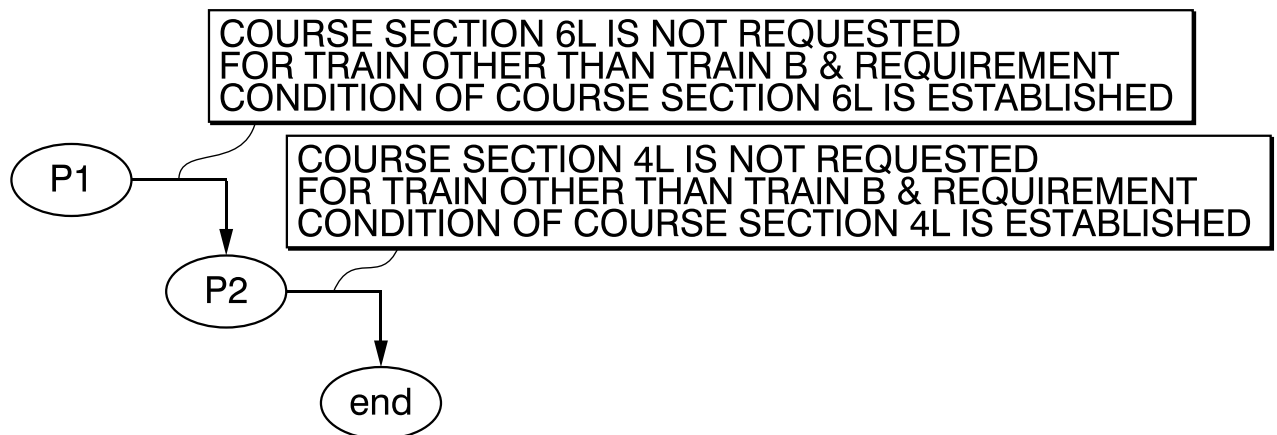


FIG. 11A

STATE TRANSITION MODEL OF COURSE REQUEST STEP (TRAIN B)

*FIG. 11B*

STATE TRANSITION MODEL OF COURSE REQUEST
(COURSE SECTION 6L)

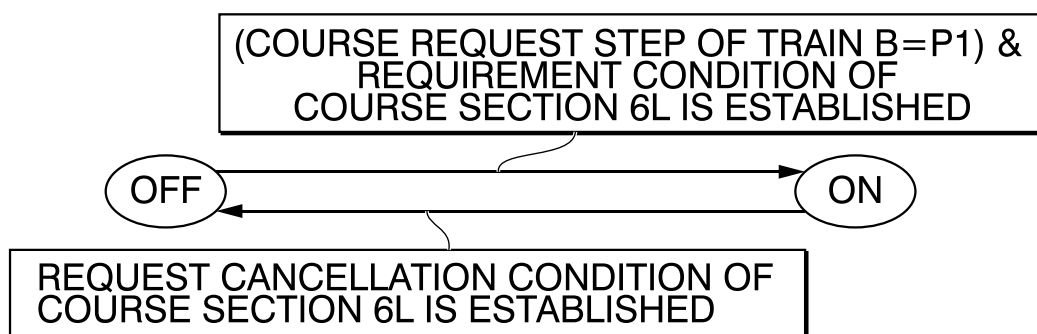


FIG. 12

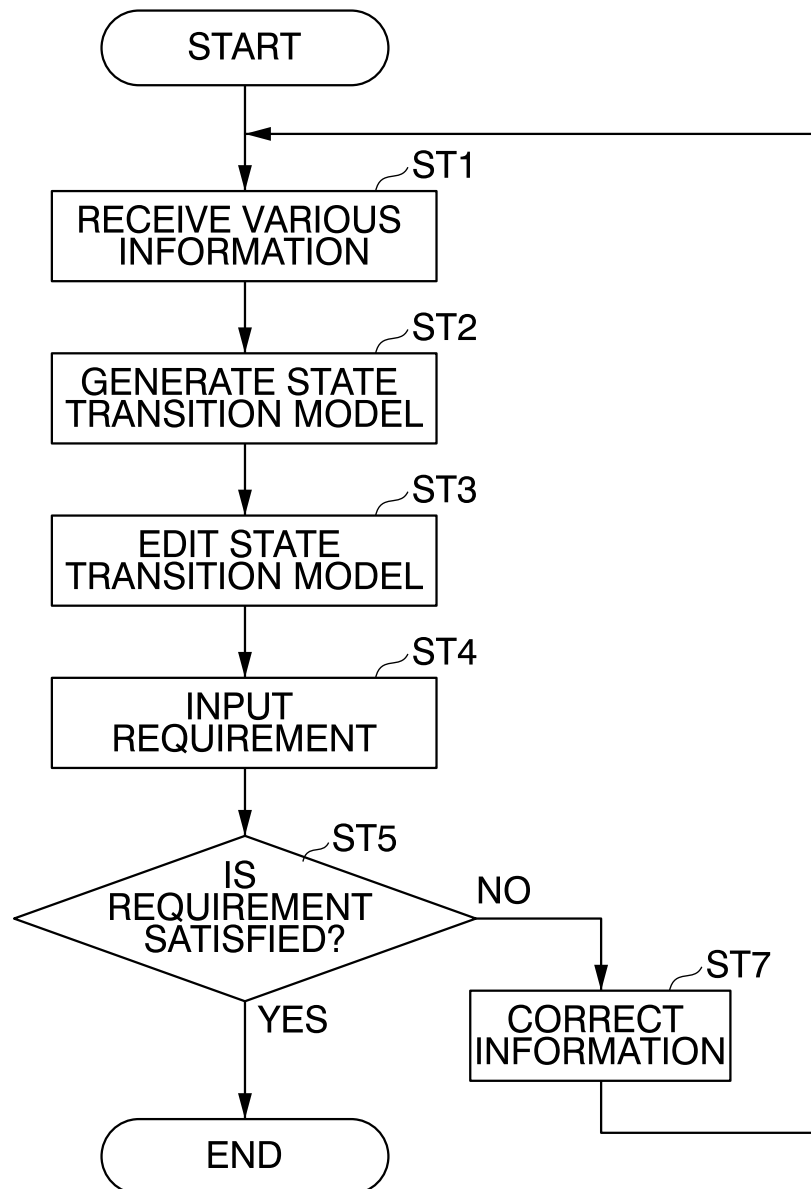


FIG. 13

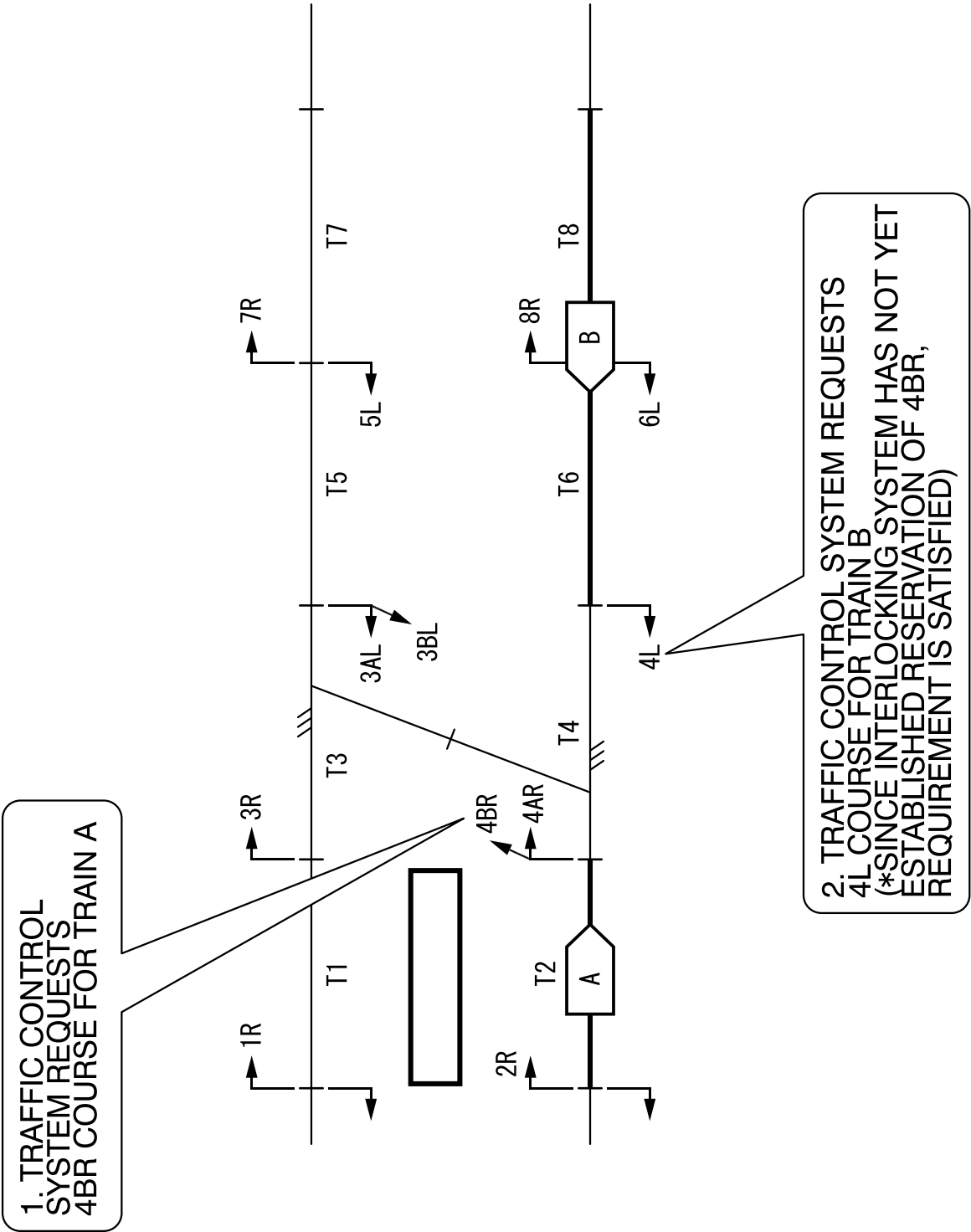


FIG. 14

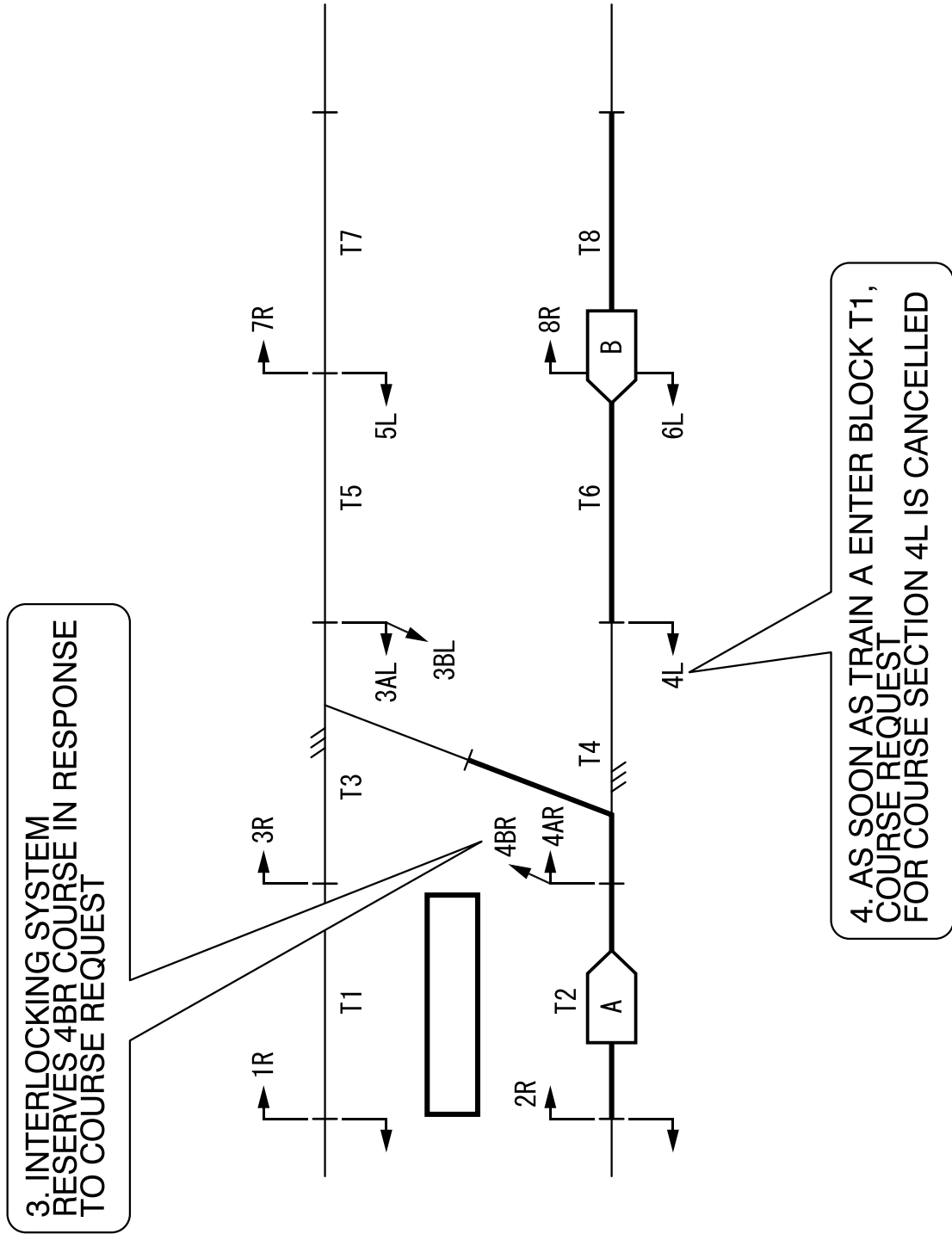


FIG. 15

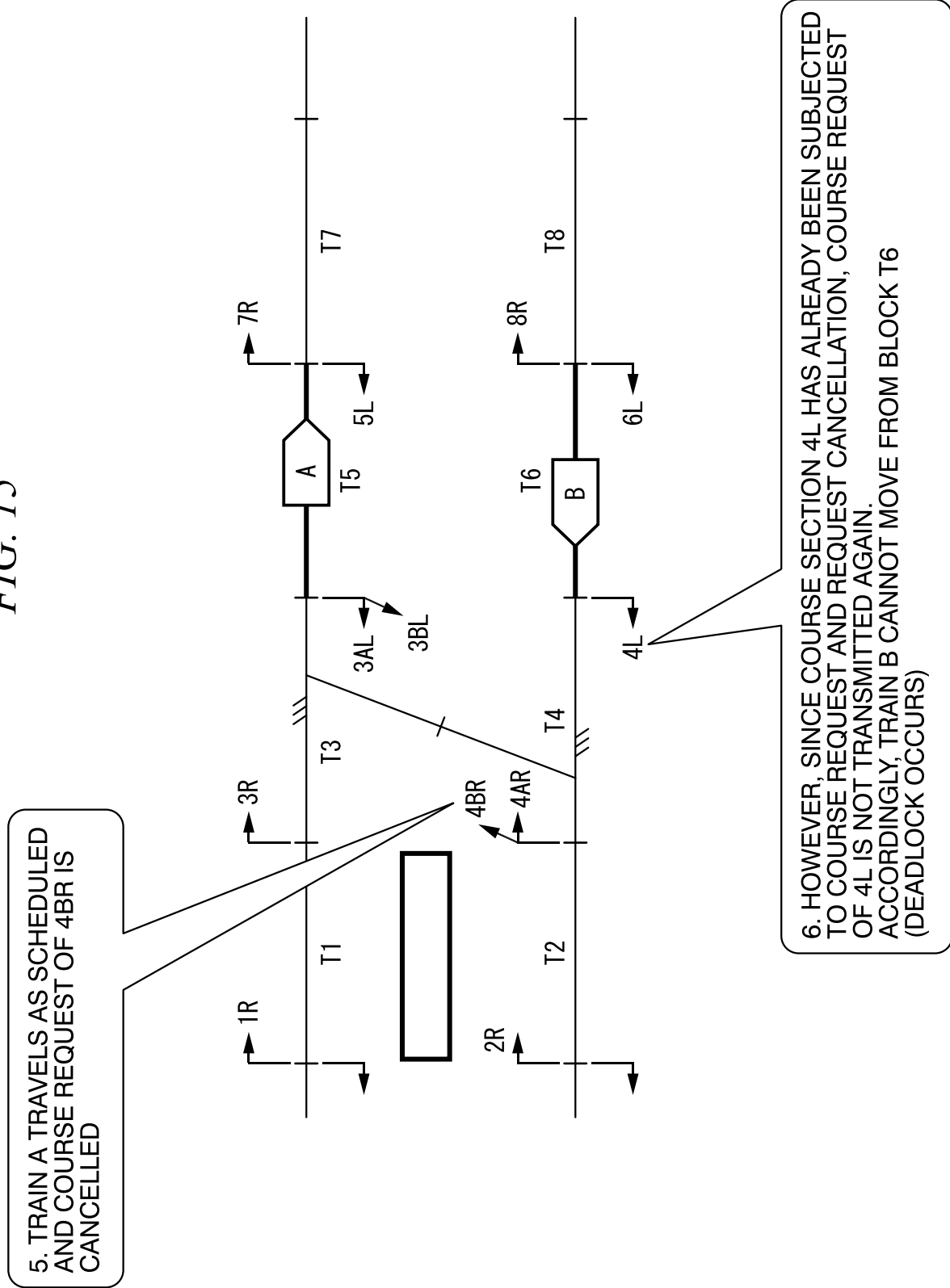


FIG. 16A

<EXAMPLE IN WHICH STATE TRANSITION MODEL IS GENERATED
USING MODEL INSPECTION LANGUAGE OF INTERLOCKING SYSTEM
(COURSE LEVER RELAY)>

```
next(_113R_113R) := next(_113R_113R_X) & !_114L_114R & !_112L_112R &
!_113L_113R & !_113L_113N & !_112L_112N;
next(_114L_114R) := next(_114L_114R_X) & !next(_113R_113R) & !_CSCSR &
!_114R_114R & !_114R_114N;
next(_111R_111R) := next(_111R_111R_X) & !_112L_112R & !_111L_111R &
!_111L_111N & !_8L2L;
next(_112L_112R) := next(_112L_112R_X) & !next(_113R_113R) &
!next(_111R_111R) & !_113R_113N & !_112R_112R & !_112R_112N;
```

FIG. 16B

<EXAMPLE IN WHICH STATE TRANSITION MODEL IS GENERATED
USING MODEL INSPECTION LANGUAGE OF INTERLOCKING SYSTEM
(TRAIN PRESENCE DETECTION RELAY)>

```
next(_8L2T) :=
    case
        train1.pos = _8L2#R |
        train1.pos = _8L2#L |
        train1.pos = _111#R-8L2 |
        train1.pos = _111#N-8L2 |
        train1.pos = _8L2-111#R |
        train1.pos = _8L2-111#N |
        train2.pos = _8L2#R |
        train2.pos = _8L2#L |
        train2.pos = _111#R-8L2 |
        train2.pos = _111#N-8L2 |
        train2.pos = _8L2-111#R |
        train2.pos = _8L2-111#N
            : FALSE;
    TRUE : TRUE;
esac;
```

FIG. 16C

<EXAMPLE IN WHICH STATE TRANSITION MODEL IS GENERATED
USING MODEL INSPECTION LANGUAGE OF INTERLOCKING SYSTEM
(BRANCH DETECTION RELAY)>

```
next(_113_NK) :=  
  case  
    _113_NW & !_113_RW & !_113_NK : { TRUE, FALSE };  
    !_113_NW & _113_RW & _113_NK : { TRUE, FALSE };  
    TRUE : _113_NK;  
  esac;
```