GENERAL ELECTRIC 70-TONNER SWITCHGEAR TRANSFER SEQUENCE (TRANSITION)

The descriptions provided in the General Electric Operating Instructions for this locomotive lack detail and the sequencing chart can be intimidating without some additional description, so here is the information in the sequencing chart written out in plain language. To simplify the explanation, only the relays that are involved in the operating sequence are listed in this description.

LIST OF RELAYS AND CONTACTORS:
V1 - (GE P/N 17LC18K7) – Transfer Relay
V2 – (GE P/N 17LC18K8(- Traction Motor Shunting Relay
TD2 – (GE 17LV30H6) – Time Delay Relay (0.7 to 1.0 sec. delay on dropout)
EF – (GE P/N 17CH15CC61) – Exciter Field Contactor
GF – (GE P/N 17CH15CC69) – Generator Field Contactor
P1 – (GE P/N 17CM43D2) - #1 Traction Motor Parallel Contactor
P2 – (GE P/N 17CM43D2) - #2 Traction Motor Parallel Contactor
P3 – (GE P/N 17CM43D2) - #3 Traction Motor Parallel Contactor
P4 – (GE P/N 17CM43D2) - #4 Traction Motor Parallel Contactor
S1 – (GE P/N 17CM43D2) - #1 and #2 Traction Motor Series Contactor
S2 – (GE P/N 17CM43D2) - #3 and #4 Traction Motor Series Contactor
M1 – (GE P/N 17CM15HH60) - #1 Traction Motor Field Shunting Contactor
M2 – (GE P/N 17CM15HH60) - #2 Traction Motor Field Shunting Contactor
M3 – (GE P/N 17CM15HH60) - #3 Traction Motor Field Shunting Contactor
M4 – (GE P/N 17CM15HH60) - #4 Traction Motor Field Shunting Contactor

SEQUENCE EXPLANATION:

STEP 1 – LOCOMOTIVE POWER OPERATION IN SERIES-PARALLEL (S-P) MOTOR CONNECTION.
ENERGIZED: S1, S2, EF, GF, V1
DE-ENERGIZED: P1, P2, P3, P4, V2, M1, M2, M3, M4

STEP 2 – LOCOMOTIVE POWER OPERATION IN S-P, SPEED/VOLTAGE INCREASING.
ENERGIZED: TD2 (TD2 pickup will initiate transfer), S1, S2, EF, V1
DE-ENERGIZED: GF (GF dropout removes generator excitation and continues transfer sequence), P1, P2, P3, P4, V2, M1, M2, M3, M4

STEP 3 – LOCOMOTIVE NOT UNDER POWER, TRANSFER SEQUENCE CONTINUES.
ENERGIZED: P1 (continues transfer sequence), S1, S2 (will drop out in next step), EF, TD2, V1.
DE-ENERGIZED: GF, P2, P3, P4, V2, M1, M2, M3, M4

STEP 4 – LOCOMOTIVE NOT UNDER POWER, TRANSFER SEQUENCE CONTINUES:
ENERGIZED: P4 (P4 pickup results in S1 and S2 dropping out), P1, EF. TD2, V1
DE-ENERGIZED: GF, P2, P3, S1, S2 (S1, S2 dropout will cause P2 and P3 and GF to pick up as next step), V2, M1, M2, M3, M4

STEP 5 – SEQUENCE COMPLETION, LOCOMOTIVE RECOVERS POWER
ENERGIZED: P2, P3 (Completes switchgear transfer), GF (Restores power), EF, V1
DE-ENERGIZED: TD2 (Completes switchgear time delay), S1, S2, V2, M1, M2, M3, M4

OPERATION IN PARALLEL, NO FIELD SHUNTING:
ENERGIZED: P1, P2, P3, P4, EF, GF, V1
DE-ENERGIZED: TD2, S1, S2, V2, M1, M2, M3, M4

MOTOR FIELD SHUNTING:
Locomotive operating in parallel, increasing voltage calls for field shunting.
ENERGIZED: V2 (V2 pickup initiates field shunting), M1, M2, M3, M4 (M1,M2,M3,M4 all picked up directly by V2), P1, P2, P3, P4, EF, GF, V1.
DE-ENERGIZED: TD2, S1, S2,

RETURN TO OPERATION IN PARALLEL, NO FIELD SHUNTING:
Locomotive operating in parallel, decreasing voltage calls for ending field shunting.
ENERGIZED: P1, P2, P3, P4, EF, GF, V1
DE-ENERGIZED: V2 (V2 dropout terminates field shunting), M1, M2, M3, M4, (M1,M2,M3,M4 operated directly by V2, they drop out when V2 drops out) TD2, S1, S2

STEP 6 – INITIATING BACKWARD TRANSFER:
ENERGIZED: P2, P3, EF, GF
DE-ENERGIZED: V1 (V1 dropout initiates backward transfer), P1, P4 (P1 and P4 dropout as a result of V1 dropout), TD2, S1, S2, V2, M1, M2, M3, M4

STEP 7 - CONTINUING BACKWARD TRANSFER
ENERGIZED: S1, S2, P2, P3 (P2 and P3 to be dropped out in the next step), EF, GF
DE-ENERGIZED: V1, TD2, P1, P4, V2, M1, M2, M3, M4

STEP 8 - COMPLETION OF BACKWARD TRANSFER
ENERGIZED: S1, S2, EF, GF
DE-ENERGIZED: V1, TD2, P1, P2, P3, P4, V2, M1, M2, M3, M4
If V1 is picked-up by increasing system voltage, forward sequence will be initiated again starting from Step 1.

SEQUENCE BASED ON GE CONNECTION DIAGRAM LL-8831188