INSTRUCTIONS

DLP3****C0005

DLP WITH PROGRAMMABLE OUT OF STEP FUNCTION, CT FAILURE DETECTION CIRCUIT, AND ADDITIONAL CONFIGURABLE OUTPUT INPUTS

Introduction

These instructions, GEK-105558 together with GEK-100623, constitute the complete instructions for the DLP3***AC0005 and DLP3***CC0005.

Description

This relay has the following difference from the standard DLP relay described in GEK-100623.

Each zone for an out-of-step condition can be set to trip or for blocking. The out-of-step pickup timer has been changed to a setting with a range of 30 - 80 milliseconds. The pilot signal and carrier-start signals have been added to the list of inputs to the configurable outputs. CT Failure Detection Circuit has been added with an user selectable option to block or not block tripping. The output of the CT Failure Detection Circuit has been added to the list of inputs to the configurable outputs. The dropout time for the TRIP INTEGRATOR (TL1) has been increased from 50 ms to 100 ms.

Attachments (If you place these sheets in their appropriate places in GEK-100623, be sure to keep the original pages, for the information on their reverse sides.

1. In the **CALCULATION OF SETTINGS** section, change setting 803 in Table CS-1 to reflect the zone programmability for the Out-of-Step condition. Add the setting, 804 OSBPUT, for the Out-of-Step pickup timer. Add the setting, 1004 SELCTFB, for the block tripping due to CT Failure option.

2. In the **PRODUCT DESCRIPTION** section, update the Out-of-Step logic diagram to show TL1 as programmable from 30 to 80 ms for the pickup time of the first slip cycle. Updated the POTT/PUTT Logic Diagram, the BLOCKING Logic Diagram, and the HYBRID logic diagram to reflect the change from 50 to 100 ms in the dropout time of the Trip Integrator Timer (TL1). Added a text description of the CT Failure Detection Circuit and the CT Failure Detection Circuit logic diagram.

3. In the **INTERFACE** section, change setting 803 to reflect the zone programmability for the Out-of-Step condition. Add the setting, 804 OSBPUT, for the Out-of-Step pickup timer. Add the setting, 1004 SELCTFB, for block tripping due to CT Failure option. Add three new items to the list of inputs for the configurable outputs.

4. In the **SERVICING** section, add CT Failure message to Failure Messages list.

TABLE CS-1 - (CONTINUED)

RANGE #	DESC.	5 AMP	1 AMP	UNITS	SETTING DEFAULT 5 AMP	1 AMP
CURSUPVIS						
0501	PUIPT	0.50-5.00	0.10-1.00	amps	0.50	0.10
0502	PUIPB	0.25-3.75	0.05-0.75	amps	0.25	0.05
0503	PUIT	0.20-4.00	0.04-0.80	amps	0.20	0.04
0504	PUIB	0.20-4.00	0.04-0.80	amps	0.20	0.04
OVERCUR						
0601	SELPH4	YES, NO		NA	YES	
0602	PUPH4	2.0-100.0	0.4-20.0	amps	20.0	4.0
0603	SELIDT	YES, NO		NA	YES	
0604	SELDIDT	YES, NO		NA	YES	
0605	PUIDT	0.5-80.0	0.1-16.0	amps	10.0	2.0
0606	SELTOC	YES, NO		NA	YES	
0607	SELDTOC	YES, NO		NA	YES	
0608	PUTOC	0.20-15.00	0.04-3.00	amps	1.00	0.20
0609	TDTOC	0.5 - 10.0		NA	5.0	
0610	PUTTM	0.5 - 30.0		sec.	1.0	
0611	SELCURV	0 [INV] 1 [V-INV] 2 [E-INV] 3 [CUSTOM] 4 [DEFT]		NA	1	
0612	KDCONST	0.0, 0.3		NA	0.3	
BLK RECLOS						
0701	SELALL	YES, NO		NA	YES	
0702	RBOSB	YES, NO		NA	NO	
0703	RB3PH	YES, NO		NA	NO	
0704	RBTOC	YES, NO		NA	NO	
0705	RBZ2T	YES, NO		NA	NO	
0706	RBZ3T	YES, NO		NA	NO	
0707	RBZ4T	YES, NO		NA	NO	
0708	RBZ1PH	YES, NO		NA	NO	
0709	RBZ2PH	YES, NO		NA	NO	
OUTOFSTEP						
0801	SELPTZ	0 (ZONE 2) 1 (ZONE 3) 2 (ZONE 4)		NA	0 (ZONE 2)	
0802	MOBANG	30 - 130		deg.	70	
0803	SELOSB	0 (BLKALL) 1 (BLKDIST) 2 (BLKNONE)		NA	0 (BLKALL)	
For 0 (BLKALL) or 1 (BLKDIST) add the following values to enable that Zone for tripping:						
	Add 16 to enable Zone 1 to trip			Add 32 to enable Zone 2 to trip		
	Add 64 to enable Zone 3 to trip			Add 128 to enable Zone 4 to trip		
0804	OSBPUT	30 - 80		ms.	30	

TABLE CS-1 - (CONTINUED)

SETTING #	DESC.	RANGE 5 AMP	RANGE 1 AMP	UNITS	DEFAULT 5 AMP	DEFAULT 1 AMP
LINEPU						
0901	SELLPU	YES, NO		NA	YES	
0902	SELTBP	YES, NO		NA	YES	
0903	PUI1	1.0-15.0	0.2-3.0	amps	5.0	1.0
REMOTEOPEN						
1001	SELROD	YES, NO		NA	YES	
1002	PUTL20	10 - 100		msec.	100	
1003	SELFFB	YES, NO		NA	YES	
1004	SELCTFB	YES, NO		NA	NO	
LINE OVRLD						
1101	SELOVL	YES, NO		NA	NO	
1102	PULV1	2.5-20.0	0.5-4.0	amps	10.0	2.0
1103	PULV2	5.0-40.0	1.0-8.0	amps	20.0	4.0
1104	PUTL31	10-990		sec.	200	
1105	PUTL32	10-99		sec.	20	
SCHEMESEL						
1201	SELSCM	0 (STEPDST) 1 (POTT) 2 (PUTT) 3 (HYBRID) 4 (BLOCK) 5 (ZNE1EXT)		NA	0 (STEPDST)	
1202	NUMRCVR	0, 1, 2		NA	0	
SCHEMETIM						
1301	PUTL1	1 - 50		msec.	1	
1302	PUTL5	0 - 200		msec.	50	
1303	DOTL5	0 - 200		msec.	50	
1304	PUTL6	0 - 200		msec.	50	
1305	DOTL6	0 - 200		msec.	50	
1306	PUTL4	0 - 50		msec.	0	
1307	DOTL4	0 - 50		msec.	0	
1308	PUTL16	8 - 80		msec.	8	
LINE QTY						
1401	POSANG	45-90		deg.	85	
1402	ZERANG	45-90		deg.	75	
1403	ZP	0.01-50.0	0.01-250.00	ohms	6.00	30.00
1404	K0	1.0 - 7.0		NA	3.0	
1405	LINELEN	0.0 - 200.0 0.0 - 322.0		miles km	100.0 161.0	

that MOBANG be set for 20° less than the characteristic angle of the associated phase-distance functions. A lower limit on MOBANG is that MOB should not operate for the maximum load (minimum load impedance). MOBANG may be set over the range of 30° - 130°.

Select Block Trip Actions, SELOSB (0803)

This setting determines which trip functions are blocked from tripping when the Out-of-Step function operates. SELOSB can be set to:

0 (BLKALL)	-	Block all tripping
1 (BLKDIST)	-	Block all distance function and channel tripping
2 (BLKNONE)	-	No tripping functions are blocked

To enable one or more Zones to trip the following values can be added to 0 (BLKALL) or 1 (BLKDIST):

- Add 16 to enable Zone 1 to trip
- Add 32 to enable Zone 2 to trip
- Add 64 to enable Zone 3 to trip
- Add 128 to enable Zone 4 to trip

When SELOSB = 1, only the instantaneous overcurrent and time overcurrent functions can produce a trip unless one of the above values is added to the setting which will also enable that Zone for tripping.

Out-of-Step Pickup Timer, OSBPUT (0804)

This setting determines the amount of time necessary for the out-of-step to be present for the function to pickup. The range is between 30 and 80 milliseconds or approximately 2 to 5 cycles.

Example Settings (based on Figure CS-1):

It is assumed that swing-impedance locus information for the out-of-step condition is not available. Zone 2 will be selected as the coordinating function, and zone 2 will have a 90° circular characteristic.

SELPTZ	= 0 (ZONE 2)
MOBANG	= 90 - 20 = 70
SELOSB	= 1 (BLKDIST) + 16 (Enable Zone 1) + 32 (Enable Zone 2) = 49
OSBPUT	= 32 (2 cycles)

BLOCK RECLOSING, BLK RECLOS

These settings determine which function or logic outputs are used to block the Reclose Initiate (RI) output and operate the Reclose Cancel (RC) output in addition to Line Pickup. Refer to the OR9 input labelled "BLOCK RECLOSING" in Figures PD-1,2,3,4, and 5.

Select All (of the below)	**SELALL** (0701)
Out-of-Step Block,	**RBOSB** (0702)
3-Phase Faults,	**RB3PH** (0703)
Ground Time Overcurrent,	**RBTOC** (0704)
Zone 2 Timers,	**RBZ2T** (0705)
Zone 3 Timers,	**RBZ3T** (0706)
Zone 4 Timers,	**RBZ4T** (0707)
Any Zone 1 Phase Distance,	**RBZ1PH** (0708)
Any Zone 2 Phase Distance,	**RBZ2PH** (0709)

All of the above can be set to either YES or NO. YES means that the signal blocks RI and operates RC. NO means that the signal has no affect on RI or RC operation.

Example Settings (based on Figure CS-1):

SELALL = YES (This setting value will override all other settings in this category.)

GENERAL ELECTRIC (AC)	0286A4816 CONT. ON SH. F SH. NO. 1
0286A4816 CONT. ON SH. F SH. NO. 1	TITLE R-X DIAGRAM FOR OSB FIRST MADE FOR DLPI

OUT-OF-STEP BLOCKING

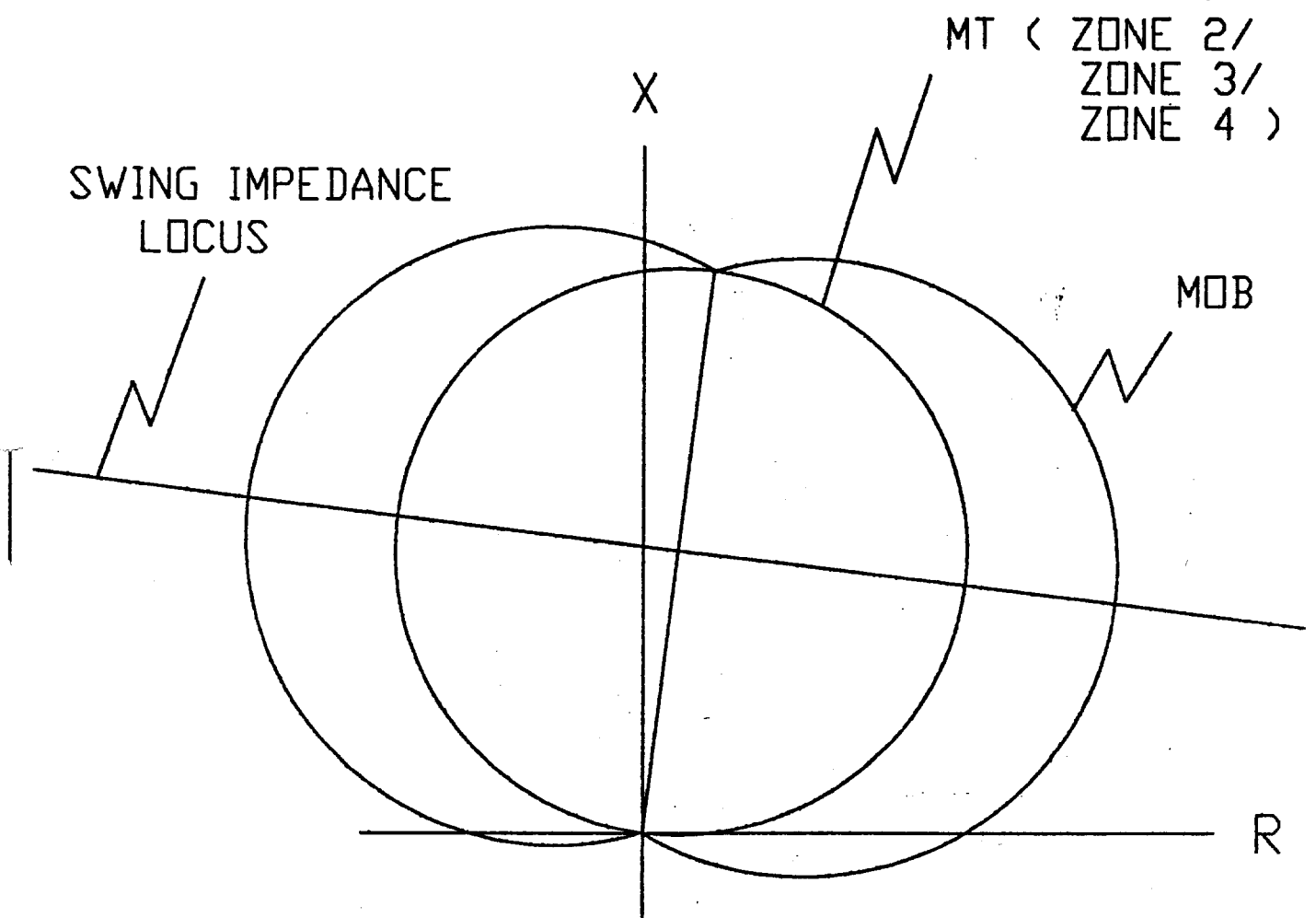


Figure PD-8 (0286A4816) Out-of-Step Block R-X Diagram GEK-105558

MADE BY M. THOMAS DATE 10 DEC 92	APPROVALS	M&CBD MALVERN, PA.	0286A4816 CONT. ON SH. F SH. NO. 1
ISSUED 12-23-92			

REV NO. 0215B8670
CONT ON SHEET SH NO.

TITLE
DLP3 OUT-OF-STEP FUNCTION
FIRST MADE FOR DLP3 REV. C-SPECIAL FOR KEPCO

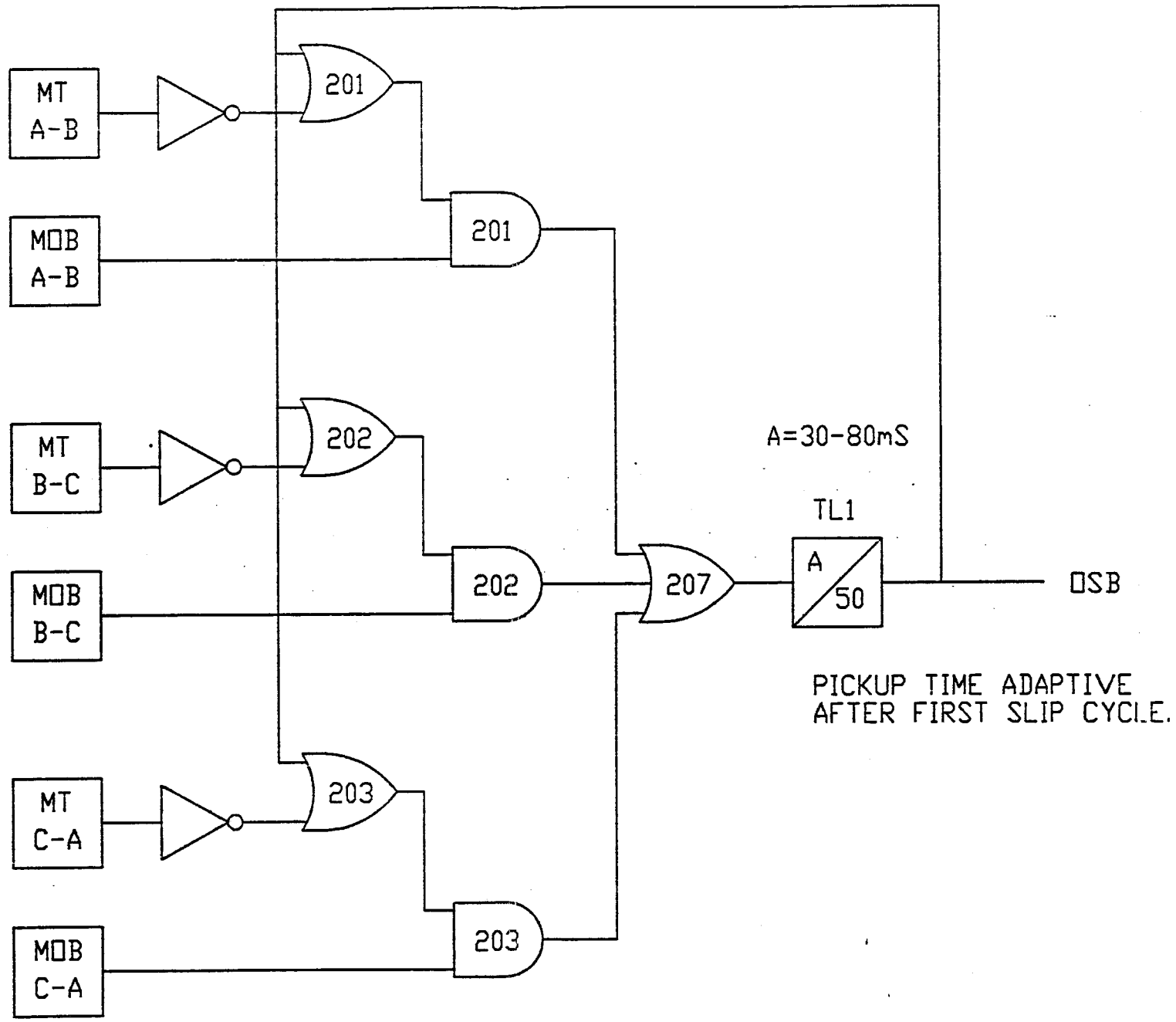


Figure A (0215B8670) Out-of-Step Block Logic Diagram

REV | MADE BY: F. MAC CLINTOCK | DATE ISSUED: 10-4-93 | APPROVALS | M&CBD MALVERN, PA. | 0215B8670 CONT ON SHEET SH NO.

CATEGORY: BLK RECLOS -- Reclosing

CSETT #	DESCRIPTION	ABBREV.	UNITS	RANGE (LOW-HIGH)	FORMAT
0701	All of the above	SELALL	N/A	YES/NO	YES/NO
0702	Out-of-step block	RBOSB	N/A	YES/NO	YES/NO
0703	All zone 2 phase units	RB3PH	N/A	YES/NO	YES/NO
0704	Gnd. time OC (TOC)	RBTOC	N/A	YES/NO	YES/NO
0705	Zone 2 Timers	RBZ2T	N/A	YES/NO	YES/NO
0706	Zone 3 Timers	RBZ3T	N/A	YES/NO	YES/NO
0707	Zone 4 Timers	RBZ4T	N/A	YES/NO	YES/NO
0708	All zone 1 phase units	RBZ1PH	N/A	YES/NO	YES/NO
0709	All zone 2 phase units	RBZ2PH	N/A	YES/NO	YES/NO

CATEGORY: OUTOFSTEP -- Out-of-step blocking

SETT #	DESCRIPTION	ABBREV.	UNITS	RANGE (LOW-HIGH)	FORMAT
0801	Select phase trip unit to coordinate with	SELPTZ	N/A	0 - 2	x
	- zone 2	ZONE2		0	
	- zone 3	ZONE3		1	
	- zone 4 (forward only)	ZONE4		2	
0802	Characteristic angle	MOBANG	DEGS	30 - 130	xxx
0803	Select block trip actions	SELOSB	N/A	0 - 2	x
	- block all tripping	BLKALL		0	
	- block: channel trip +zone 1 trip +zone 2 trip +zone 3 trip +zone 4 trip	BLKDIST		1	
	- Add 16 to enable Zone 1 tripping			- Add 32 to enable Zone 2 tripping	
	- Add 64 to enable Zone 3 tripping			- Add 128 to enable Zone 3 tripping	
	- block none	BLKNONE		2	
0804	Out-of-Step Pickup Timer	OSBPUT	MS	30 - 80	xx

CATEGORY: LINEPU -- Line Pickup

SETT #	DESCRIPTION	ABBREV.	UNITS	RANGE (LOW-HIGH)	FORMAT
0901	Select line pickup	SELLPU	N/A	YES/NO	YES/NO
0902	Select timer bypass	SELTBP	N/A	YES/NO	YES/NO
0903	Pos. seq. OC setting (I1)	PUI1	AMPS	1.0 - 15.0 5 AMP	xx.x
				0.2 - 3.0 1 AMP	xx.x

CATEGORY: REMOTEOPEN -- Remote Open Detector

SETT #	DESCRIPTION	ABBREV.	UNITS	RANGE (LOW-HIGH)	FORMAT
1001	Select remote open detect	SELROD	N/A	YES/NO	YES/NO
1002	Time delay setting (TL20)	PUTL20	MSEC	10 - 100	xxx
1003	Fuse failure block	SELFFB	N/A	YES/NO	YES/NO
1004	CT failure block	SELCTFB	N/A	YES/NO	YES/NO

TABLE IN-2 INPUT CONDITION CODE TABLE

Input Signal	Relay Test Number	Input Number	MMI Mnemonic
ZONE 1 AG	2	1	Z1 AG
ZONE 1 BG	3	2	Z1 BG
ZONE 1 CG	4	3	Z1 CG
ZONE 2 AG	5	4	Z2 AG
ZONE 2 BG	6	5	Z2 BG
ZONE 2 CG	7	6	Z2 CG
ZONE 3 AG	8	7	Z3 AG
ZONE 3 BG	9	8	Z3 BG
ZONE 3 CG	10	9	Z3 CG
ZONE 4 AG	11	10	Z4 AG
ZONE 4 BG	12	11	Z4 BG
ZONE 4 CG	13	12	Z4 CG
ANY ZONE1 GRND	14	13	Z1 GRN
Z2 GRND TIMR,TL2G	15	14	Z2GTMR
Z3 GRND TIMR,TL3G	16	15	Z3GTMR
Z4 GRND TIMR,TL4G	17	16	Z4GTMR
ZONE 1 AB	18	17	Z1 AB
ZONE 1 BC	19	18	Z1 BC
ZONE 1 CA	20	19	Z1 CA
ZONE 2 AB	21	20	Z2 AB
ZONE 2 BC	22	21	Z2 BC
ZONE 2 CA	23	22	Z2 CA
ZONE 3 AB	24	23	Z3 AB
ZONE 3 BC	25	24	Z3 BC
ZONE 3 CA	26	25	Z3 CA
ZONE 4 AB	27	26	Z4 AB
ZONE 4 BC	28	27	Z4 BC
ZONE 4 CA	29	28	Z4 CA

TABLE IN-2 INPUT CONDITION CODE TABLE (Contd.)

Input Signal	Relay Test Number	Input Number	MMI Mnemonic
ANY ZONE1 PHASE	30	29	Z1 PHS
Z2 PHASE TIMER (TL2P)	31	30	Z2PTMR
Z3 PHASE TIMER (TL3P)	32	31	Z3PTMR
Z4 PHASE TIMER (TL4P)	33	32	Z4PTMR
IT DETECTOR	34	33	IT DET
IB DETECTOR	35	34	IB DET
GRD DIR TRIP (IPT + NT)	36	35	GRDTRP
GRD DIR BLOCK (IPB + NB)	37	36	GRDBLK
FAULT DETECTOR (FD)	38	37	FLTDET
REM OP DETCT (ROD)	39	38	REMOPN
OUT OF STEP (OSB)	40	39	OUTSTP
V1 DETECTOR	41	40	V1 DET
LINE OVERLOAD	42	41	LNOVLD
INST PHS OVRC, PH4 (50P)	43	42	INPOVR
INST GND OVRC (IDT)	44	43	INGOVR
TIM DLY GD OC (TOC)	45	44	TMGOVR
LINE PICKUP	46	45	LPCKUP
FUSE FAILURE		46	FUSEFL
GRND FORWARD (NT)		47	GR FWR
GRND REVERSE (NB)		48	GR RVR
RCLOSE CANCL (RC)		49	RECCAN
CNFG INPUT 1		50	CNFIN1
CNFG INPUT 2		51	CNFIN2
CNFG INPUT 3		52	CNFIN3
NON-CRITICAL ALARM		53	NOCALM
ANY Z2 PH.OR GND		54	ANY Z2
ANY Z3 PH.OR GND		55	ANY Z3
ANY Z4 PH.OR GND		56	ANY Z4
TRIP BUS/BFI		57	TRPBFI
MAN CLOSE (BRKR.1)		58	BKCLS1
CT FAILURE		59	CTFAIL
RCLOSE INIT 3P		60	RECIN3
PILOT SIGNAL		61	PLTPU
CARRIER START		62	CHSTRT

NOTE: Add 100 to the configurable input number to use as a NOT input.

Locating the defective module

Use the table below, or the "Information Status" command, to isolate the cause of the failure. When the suspected module is found, power down the unit and replace it. Re-apply power. If the "FAIL" message is gone then the unit has been successfully repaired. If the message has changed it is possible that another module requires replacement.

TABLE 7-5 Failure Messages

CODE	Description
	DAP BOARD
100	PROM: PROM Failure
101	LOCAL RAM: Local RAM Failure
102	SYSRAM CRC: DSPRAM CRC Failure
103	SYSRAM: DSPRAM Failure
104	INTERRUPT: SYSRAM Failure
105	EEPROM: Interrupt Failure
106	TIMER: Timer Failure
124	VERSION NUM: Version no. Failure
-	NO DSP INT: No DSP interrupt
-	NO SSP INT: No SSP interrupt
	DSP BOARD
207	PROM: PROM Failure
208	LOCAL RAM: Local RAM Failure
209	DSPRAM: DSP RAM Failure
210	INTERRUPT: Interrupt Failure
225	VERSION NUM: Version no. Failure
-	FUSE FAILURE: Fuse Failure
-	CT FAILURE ALARM CT Failure
-	TRIP BUS CHK FAIL: Auto trip bus check failure
-	BKR1 TRP CIR OPN: BKR 1 Trip Circuit Open
-	BKR2 TRP CIR OPN: BKR 2 Trip Circuit Open

CODE	Description
	ANI BOARD
311	CONTROLLER: Controller Failure
312	SERIAL MEM: Serial NVM Failure
313	REFERENCE: Reference Failure
-	NO DMA INT: No DMA interrupt
	MGM Module
414	SERIAL MEM: Serial NVM Failure
422	MODEL NUMBER: Model No.
	SSP BOARD
515	PROM: PROM Failure
516	LOCAL RAM: Local RAM Failure
517	SYSRAM CRC: SYSRAM CRC Failure
518	SYSRAM: SYSRAM Failure
519	INTERRUPT: Interrupt Failure
520	EEPROM: EEPROM Failure
523	VERSION NUM: Version Number
-	NO DAP INT: No DAP Interrupt
	MMI BOARD
621	DIG OUT: Digital Output Failure

SERVICING A NON-CRITICAL FAILURE "WARN"

A non-critical failure indicates an interruption in the relay's protection, but not a total loss. When a "WARN" condition occurs, the DLP system's non-critical alarm contact will close. The LED will remain green. Turn off the DC input power, then re-apply. The "WARN XXX" message should appear if the failure still exists.

The Warn message has the format "WARN xxx". The "xxx" field following the word "WARN" is the numeric code that indicates the nature of the failure. The WARN message remains on the display until a key is pressed or until the DLP system restarts successfully (with no self-test failures). See Table 7-6 for the list of Warning codes and their meanings.

NOTE: As an alternative to using the table of warnings, the "Information Status" command can be used to display the warning type directly on the MMI.

CT Failure Detection Circuit

Since a distance or overcurrent function may operate for a partial loss of current caused by one or more CT failures, CT Failure Detection Circuit is provided to block all tripping when a CT failure is detected. Figure B shows the functional logic for the CT Failure Detection function.

If the currents are unbalanced as indicated by the fault detector FD picking up, the upper input will be present at AND1. The lower input to AND1 is present if the voltages are balanced as indicated by the positive sequence voltage detector V1.

If the currents are unbalanced for any reason, including CT failures, and the voltages are balanced, AND1 will produce an output that will cause timer TL1 (after 60 seconds) to time out and produce a CT Failure Detection output via OR2. The output of OR2 is routed to AND2 to seal-in the CT Failure Detection output based on the output of the fault detector FD so that CT Failure Detection output will be maintained as long as the currents are unbalanced. When the currents return to a balanced condition, FD will reset to remove the seal-in, allowing the CT Failure Detection output to reset.

When CT Failure Detection Circuit operates, a critical alarm is issued whether or not CT Failure Detection has been selected to block tripping.

Block Tripping for CT Failure, SELCTFB (1004)

SELCTFB can be set to either YES or NO. When SELCTFB = YES, the output of the CT Failure Detection function will block all tripping. When SELFFB = NO, the CT Failure Detection function will not block tripping when it operates for a CT failure(s). It is suggested that SELCTFB = YES.

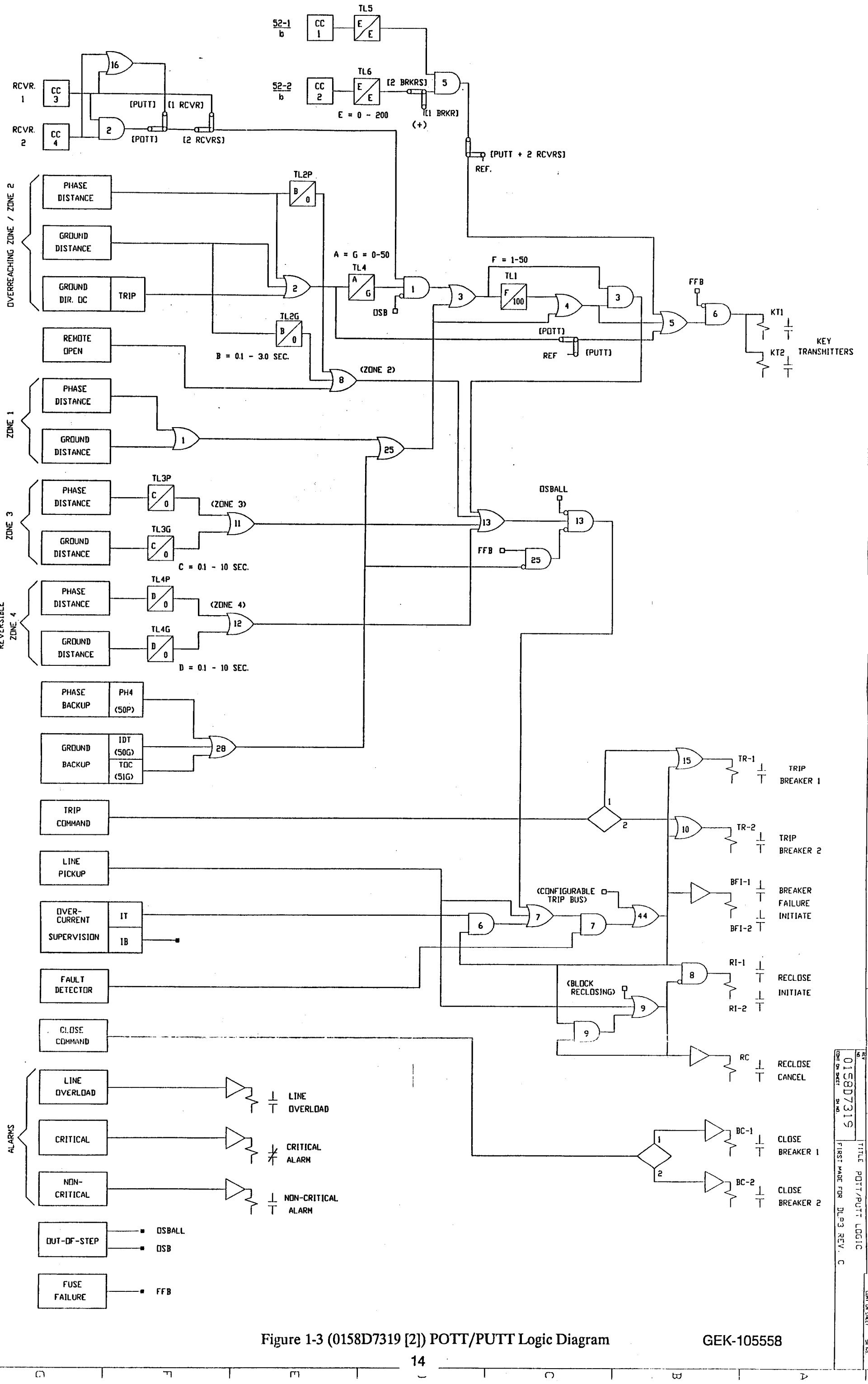


Figure 1-3 (0158D7319 [2]) POTT/PUTT Logic Diagram GEK-105558

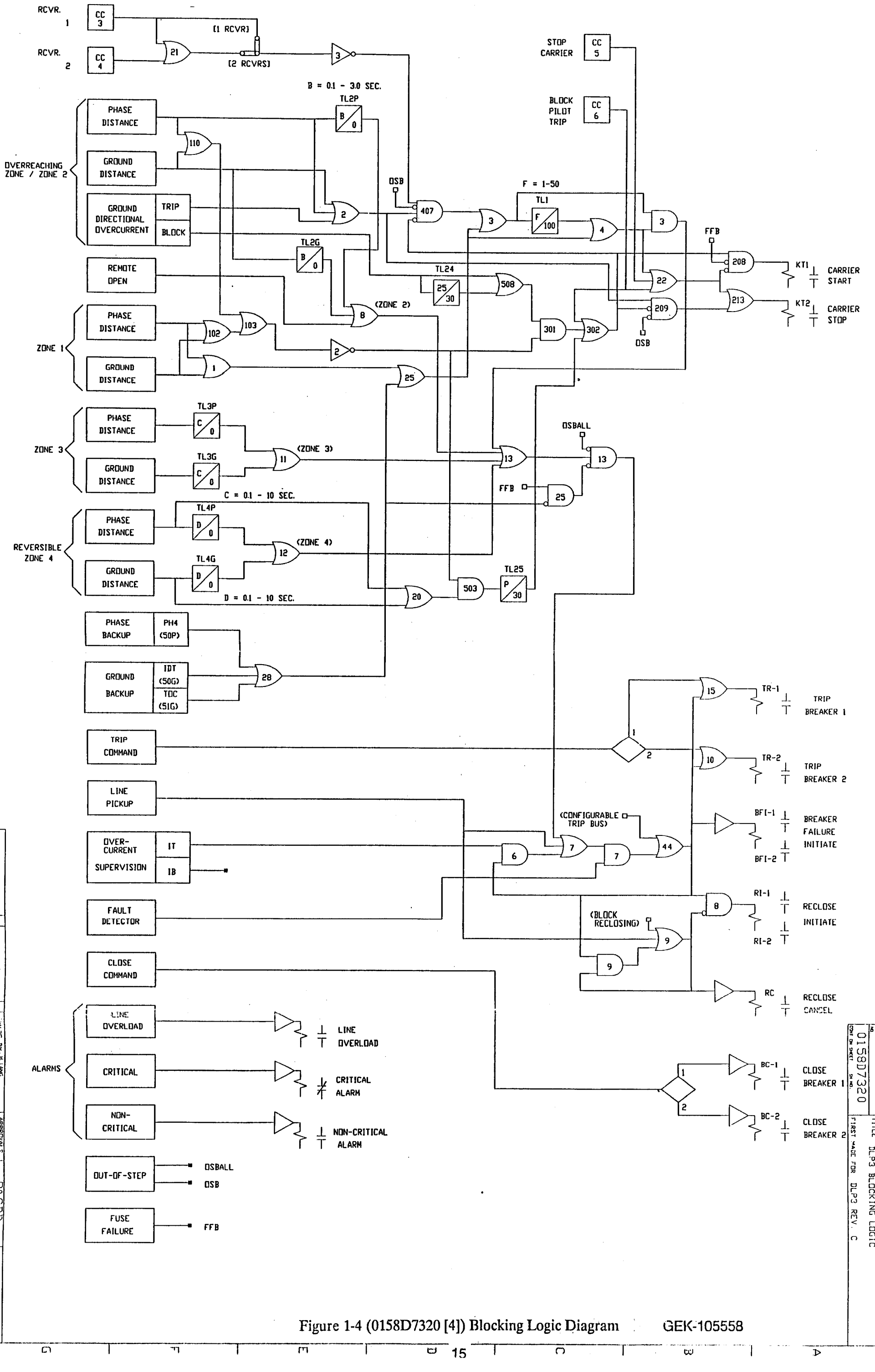


Figure 1-4 (0158D7320 [4]) Blocking Logic Diagram GEK-105558

GENERAL ELECTRIC (AC)

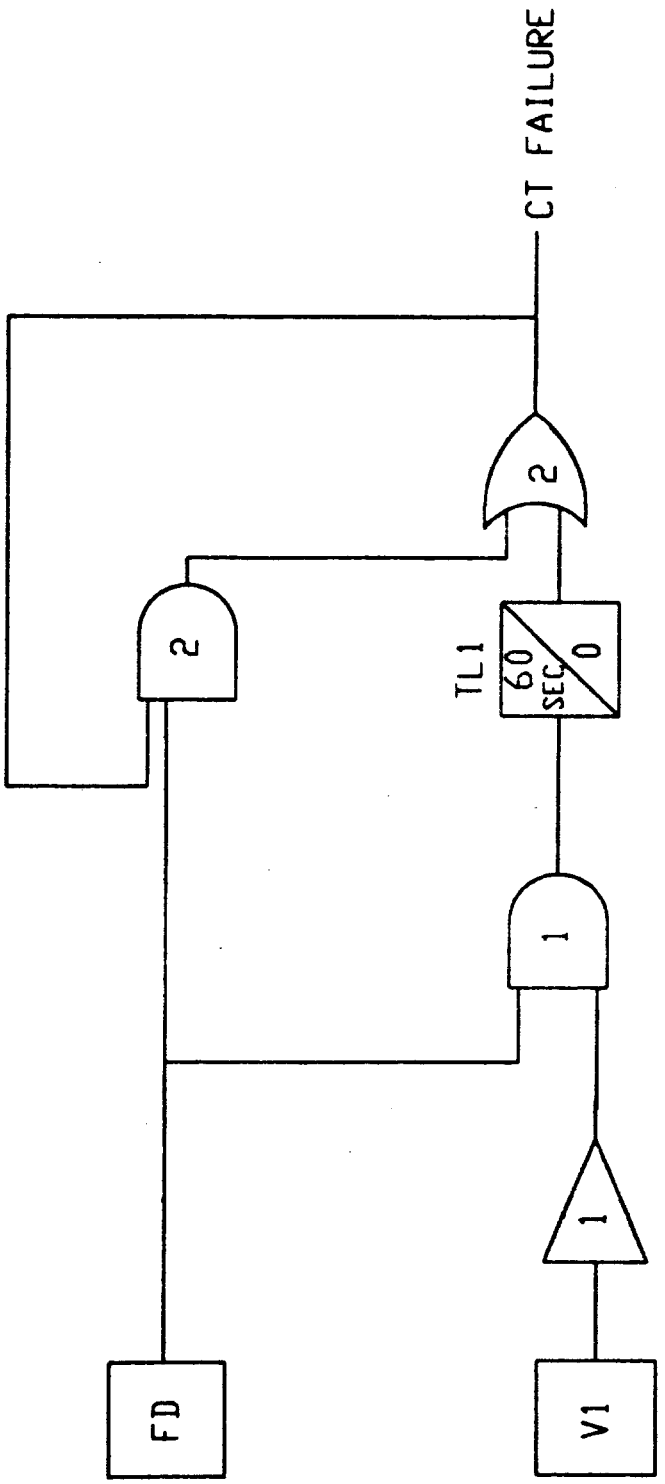
0355A3491
CONT'D ON SHEET SHEET NO.

REV NO.

0355A3491
CONT'D ON SHEET SHEET NO.

TITLE CT FAILURE DETECTION CIRCUIT LOGIC DIAGRAM

FIRST MADE FOR DLP3 REV C



GEK-105558

Figure B (0355A3491) CT Failure Detection Circuit

17

MADE BY: H. LANG 12-14-95	APPROVALS	P&CBD MALVERN, PA.	0355A3491 CONT'D ON SHEET SHEET NO.	CODE 999
DATE ISSUED:				

Protection and Control
Business Department

(12/95) (25)

General Electric Company
205 Great Valley Parkway
Malvern, PA 19355