VOLTAGE 2800 5

SC#1 LOCOMOTIVE MODULE

PIN #	VOLTAGE	FUNCTION	WIRE #
1	+74v	For Output Signals - PM String	
2	+74v	Input Signal - Self Load Test Switch L.T.#1	TEA7
3	+15v	Output Signal - To SW-11 (Lock off Super Series) & To DG 28 (Grid Protection in Self Load)	TEAX1 TEAX
4	+74v	Input Signal - Self Load Test Switch L.T.#2	TEB7
5	+15v	Output Signal - To LC-11 (Raise KW Ref Signal) & To DG-29 (Grid Protection in Self Load)	TEBX1 TEBX
6	+74v	Input Signal - WSR12 & 34 (Wheel Slip)	TBV6
7	+15v	Output Signal - To SW-15 (Limit Wheel Slip Correct)	TBY
8	+74v	Input Signal - BR1-D2 (Braking)	
9	±15v	Output Signal - To FM19 (Amm) To SW29 (SSLockout) LC13 (Load Control) & RA18 & DG27 (Grid Blower Fail Enable)	TBBX's
10	+74v	Input Signal - BR1-J2 (Braking)	TBC6
11	+15v	Output Signal - To MS-10 (Motor Simulator)	TBCX
12		Blank	
13		Blank	
14	-74v	Negative - NM String	
15	+15v	Input Signal - WO-11 (Fed by SC2#3(MR-P.U.) EN-16 (S.S. on) or DP-24 (Braking enable)	6GV
16	+74v	Output Signal - EL-15 (To EQP thru Q in EL Module)	PMS
17	+15v	Input Signal - SW-9	PMRY
18	+74v	Output Signal - To LPR Ø thru MCO SW - Feeds AN low power light)	PMR9
19		Blank	
20	+15v	From PS-11 #1 (Left Power Supply module)	
21	+15v	Input Signal - DG-19 (BO Grid Blower Motor)	DGY
22	+74V	Output Signal - To DGX (P.U.)	DGX6
23	+15v	Input Signal - DP-2 (Overcurrent Braking)	TBZY
24	+74v	Output Signal - OCP - NO3 (P.U. OCP)	TBZX6
25	-15v	Ground Bus - Common	
26		Blank	
27	+15v	Input Signal - FM-10	EBB
28	+74v	Output Signal - OMCR (Thru MCO Sw) feeds AN - Open motor Circuit	PMU9
29		Blank	
30		Blank	

SC#2 LOCOMOTIVE MODULE

PIN#	VOLTAGE	FUNCTION	WIRE#
1	+74v	For Output Signals - 13T String	
2	+74v	Input Signal - MR-A2	6GY6
3	-15v	Output Signal - To FM-29 (Eventually to EQP-Motor)	6GW
4	±74v	Input Signal - AR-NO1 (AV Signal)	15AX6
5	-15v	Output Signal - To LC-1 (Process AV Signal as KW Reference)	15C
6	+74v	Input Signal - ERD-NC3 (BV Signal)	12A3
7	+15V	Output Signal - To LC-2 (Process BV Signal as KW Reference)	12B
8	+74v	Input Signal - ERD-NC2 (CV Signal)	7D#3&6
9	+15v	Output Signal - To LC-3 (Process CV Signal as KW Reference)	7C
10	+74v	Input Signal - BR1-L2 (DV Signal)	3C6
11	+15v	Output Signal - To LC-4 (Process DV Signal as KW Reference)	3B
12	+74v	Input Signal - GFX-A2 (Load Signal)	6GX6
13	+15v	Output Signal - To LC-5 (Process I,KW, & V Ref)	6GT
14	-74v	Negative N String	
15	+15v	Input Signal - DP-17 (Brake warning Signal)	EAJX
16	+74v	Output Signal - To BWR-Y (Pick up relay)	20A6
17	+15v	Input Signal - SW-22 (Operate ORS Signal)	13VX
18	+74v	Output Signal - To BC-4 (P.U. ORS Relay thru GC Module)	13V
19	+15v	Output Signal - To DR-4 (+15v for DR Functions) (Input Signal - see pin 26)	15D
20	+15v	XXXXXX Positive output from PS11 (Left Module)	
21	+15v	Input Signal - SW-14 (Cutout Man Sand SW Signal)	13GW
22	+74v	Output Signal - To SA-19 (Prevents manual sand operation)	13GX3
23	+15v	Input Signal - To SW-27 (Apply Sand Signal)	13GZ
24	+74v	Output Signal - To SA-2 (Apply Sand if GFC Picked up	13GY3
25	-15v	Ground Bus - Common	
26	+74v	Input Signal - 13T31 (Control & Fuel Pump Sw on) (Output Signal - see pin 19)	13T31
27	+15v	Input Signal - FM-9 (Locked Wheel Signal)	10B
28	+74v	Output Signal - To WL-Y (Lights Wheel Slip Light)	10A6
29		Blank	
30		Blank	

SC#3 LOCOMOTIVE MODULE

PIN #	VOLTAGE	FUNCTION	WIRE #
1	+74v	For Output Signals - PM String	
2		Blank	
3		Blank	
4	+74v	Input Signal - BR1-E2 (Braking & IPS	TBAY6
5	+15v	Output Signal - To DE-29 (On logic control & Time Delay function)	TBAX
6	+74v	Input Signal - DC1-F (PM Feed Extended Range Dynamics #1)	TBM3
7	+15v	Output Signal - To DE=10 (Logic Feed DE Module)	TBMX
8	+74v	Input Signal - DC2-F (PM Feed Extended Range #2)	TBN1
9	+15v	Output Signal - To DE=11 (Logic Feed DE Module)	TBNX
10		Blank	
11		Blank	
12		Blank	
13		Blank	
14	-74v	Negative - NM String	
15	+15v	Input Signal - DE-1 (Extended Range #1 Signal)	TBTX
16	+74v	Output Signal - To DP1-Y (Pick up relay0	TBT6
17	+15v	Input Signal - DE-2 (Extended Range #2 Signal)	TBUX
18	+74v	Output Signal - To DP2-Y (Pick up relay	TBU6
19		Blank	
20	+15v	Positive Output from PS11 (Left Module)	
21		Blank	
22		Blank	
23		Blank	
24		Blank	
25	-15v	Ground Bus - Common	
26		Blank	
27		Blank	
28		Blank	
29		Blank	
30		Blank	

MD 102A

ELECTRO-MOTIVE

Inter-Organization
Electro-Motive Division
General Motors Corporatic
LaGrange, Illinois 60525

To: M E M O R A N D U M

Date: August 17, 1983
FILE: 116-0

From: J. O. Slezinger III

Subject: EN103 MODULE

A new EN module will become standard beginning with the GP49 units for the Alaska Railroad built in August, 1983.

New features of this module are:

1. Total absolute creep varies with traction motor current (adhesion) as well as speed.

2. An indicating LED (EN Regulation) operates whenever the EN module regulates the main generator by taking control of the Sensor input current. (ie if EN9 is high)

3. Test switch 1 will cause EN9 to go high and operate the EN REG LED. If the unit is in throttle 1 stall and test switch 1 is operated, the unit will unload.

4. Test switch 2 will provide inputs of speed (approximately 10mph) and current (I_L 22 = 300 amps inside the module) to produce a V+ΔV signal which falls between a specified set of limits (V+ V approximately equal to 1.65V). If V+ΔV is between these limits an indicating LED labled V+ΔV will operate. This LED will also light during normal road operation whenever V+ΔV is approximately equal to 1.65 volts. N+ΔN (EN pin 18) should equal 1V(10mph) if N = .15V(EN pin 23) and $I_L \geq$ 22 = 7 to 9 volts(EN pin 2).

5. Certain important test points are identified on the module face-plate. ($I_L \geq$ 22 = pin 2, V + Δ V = pin 6, VMG = pin 11, common = pin 25)

Variable Creep Function

The concept of variable creep is somewhat difficult to understand; however, an attempt will be made here to explain it. The reason for variable creep is to allow more creep with poor rail conditions which will not allow high tractive effort. Under these conditions tractive effort can be increased by allowing more creep. If this higher amount of creep were allowed under heavy drag conditions with good rail, sufficient torque could be developed to cause damage due to torsional vibration. Therefore, the amount of creep allowed under high adhesion conditions is lower than under low adhesion conditions. The amount of creep allowed has been determined empirically to allow the most tractive effort with no torsional vibration.

In previous EN modules the amount of creep varied from 0.2 mph at no track speed to 3 mph total. A similar function exists on the EN103 except that creep varies with another function which varies with the product of traction motor current multiplied by speed. Although the creep varies between the same two limits (0.2 mph at standstill to 3 mph maximum) it rises faster than on the EN102 module. See Fig. 1.

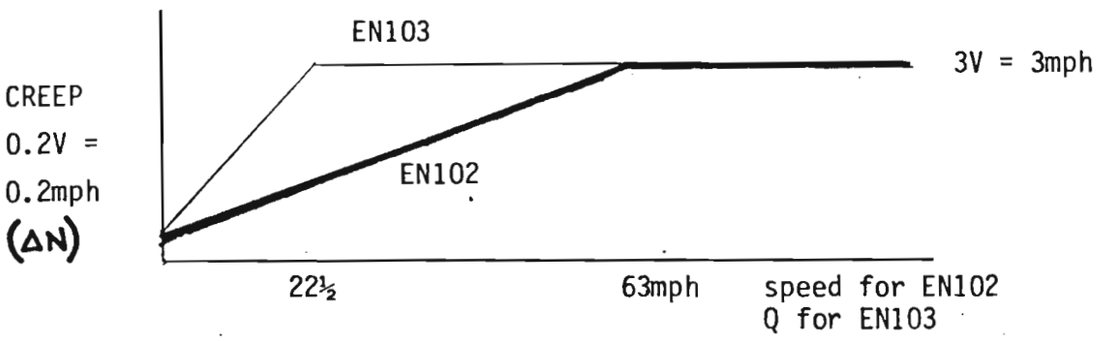


FIG. 1

In the EN103 there are two inputs for the Δ N circuit, N (speed) and IL≥ 22 (lowest motor current) instead of one (N only) in the EN102. IL≥ 22 is operated on by a circuit represented by ⌒ . Output of this circuit is called I_Z. This allows maximum I_Z if current is below 875 amps and reduces I_Z to a minimum for any current above 1250 amps. I_Z and N are then multiplied together to produce an output called Q. Q becomes the input to the Δ N circuit. In the EN103 Q replaces what would be N on the EN102 (Δ N can be modified by the CM module as before). Δ N is compared to 2½% of N. Whichever of these two is higher is a added to N to produce N + Δ N (EN pin 18). See Fig. 2.

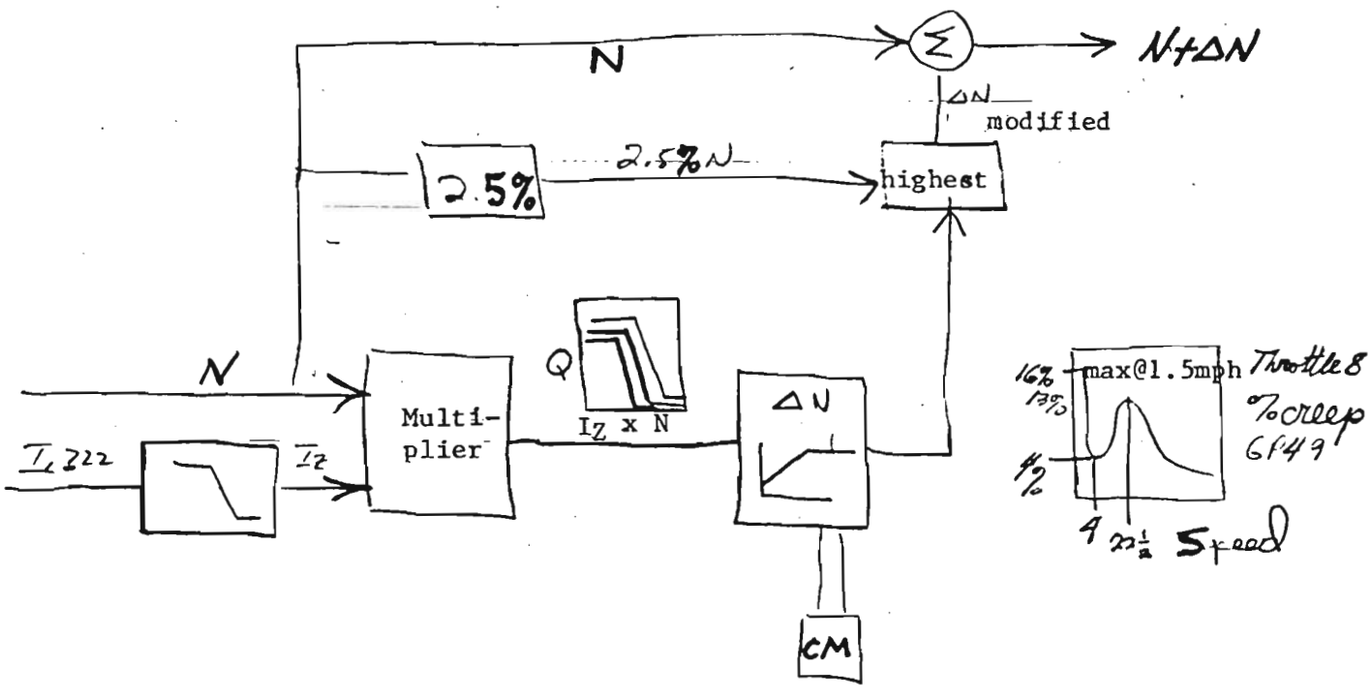


FIG. 2

ELECTRO-MOTIVE

Inter-Organization
Electro-Motive Division
General Motors Corporatio
LaGrange, Illinois 60525

To: P. W. Moy

Date: January 30, 1985
FILE: 35-7586
SUBJ: 035
SR# - 344Q

From: J. A. Elfter

Subject: ALASKA GP49's
ORDER NUMBER 837049

The GP49 locomotive with the 12-645F3B engine should not be run at throttle one engine speed whether loaded or unloaded because of the possibility of engine torsionals.

On this particular order, the engine could operate at throttle one engine speed if the SDR relay is energized at the same time the LITS switch is requiring higher engine speed. This condition can be prevented by inserting a normally closed interlock of the SDR relay in the circuit from the LITS switch.

An additional change should be made to prevent energizing the governor D-valve (3T) trainline being energized by the drop-out of the FPCR relay on a single unit. This change requires the addition of a control rectifier in the SDR relay coil circuit.

Both of these modifications should be made to bring this order up to the latest GP49 specifications.

Instructions To Complete This Modification:

A. Equipment required on main control panel per locomotive:

1)

Quantity	Description	Part Number	Label
1	Rectifier Asm.	8421017	CR65

2) Mount new CR65 control rectifier assembly to the right of existing CR69.

B. Wiring Modifications

1) Remove Wires:

Tag	Running From	Running To
13MB4 (J1)	NVR-B CR63-BLK	CR61-RED CR60-BLK

B. Wiring Modification Cont'd

2) Add Wires:

Tag	Run From	Run To	Wire Size
13MB4	NVR-B	SDR-2C	18E
13MC	SDR-2NC	CR61-RED	18E
3G2	SDR-Y/Coil	CR65-RED	18E
(J1)	CR60-BLK	CR65-BLK	18E

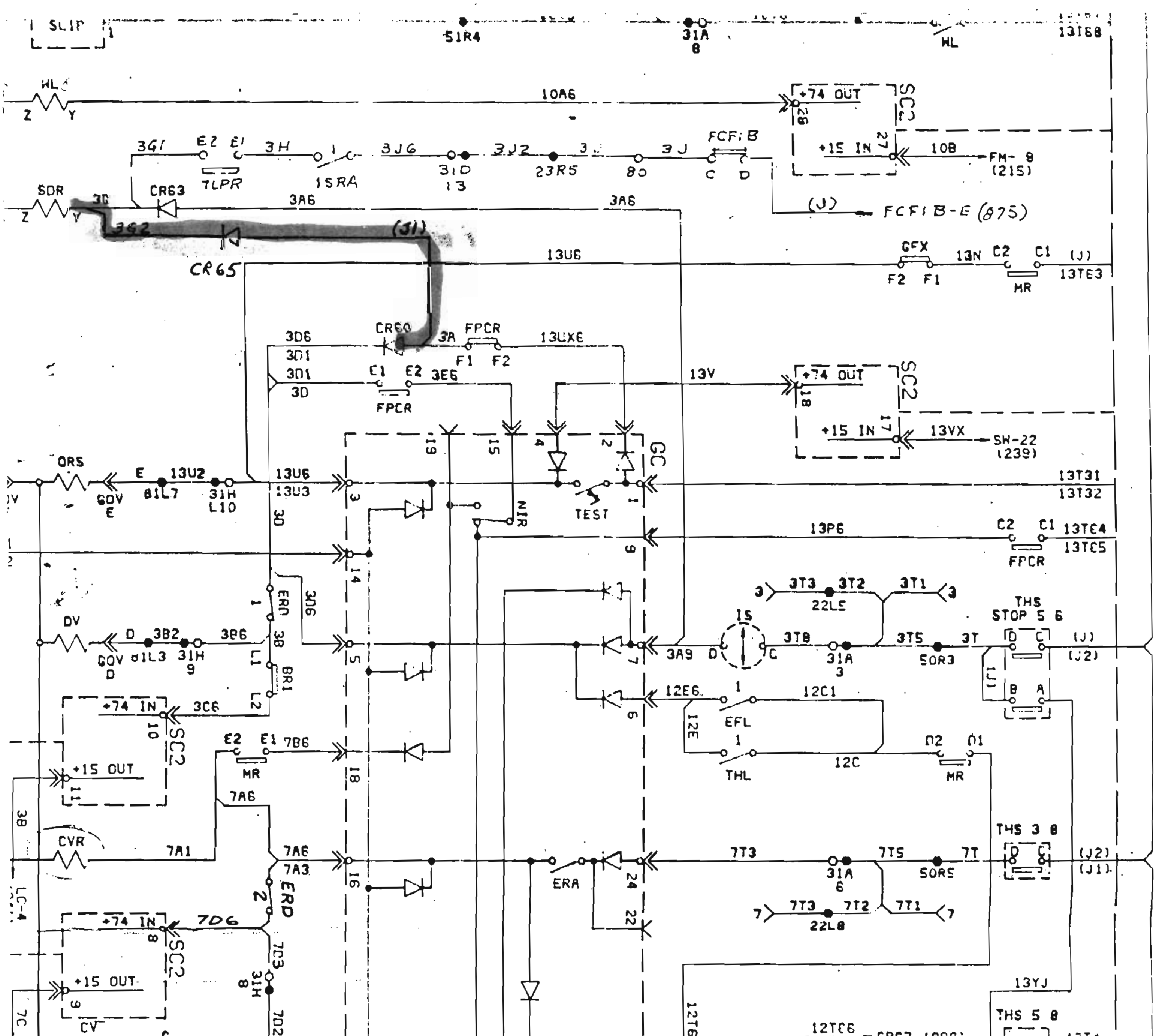
Accompanying this letter are four pieces of part number 8421017 rectifier, and a wiring diagram with areas of rework highlighted. Estimated man hours to modify each locomotive is one (1) hour, therefore, no labor allowance will be given.

Please contact us if you have any questions.

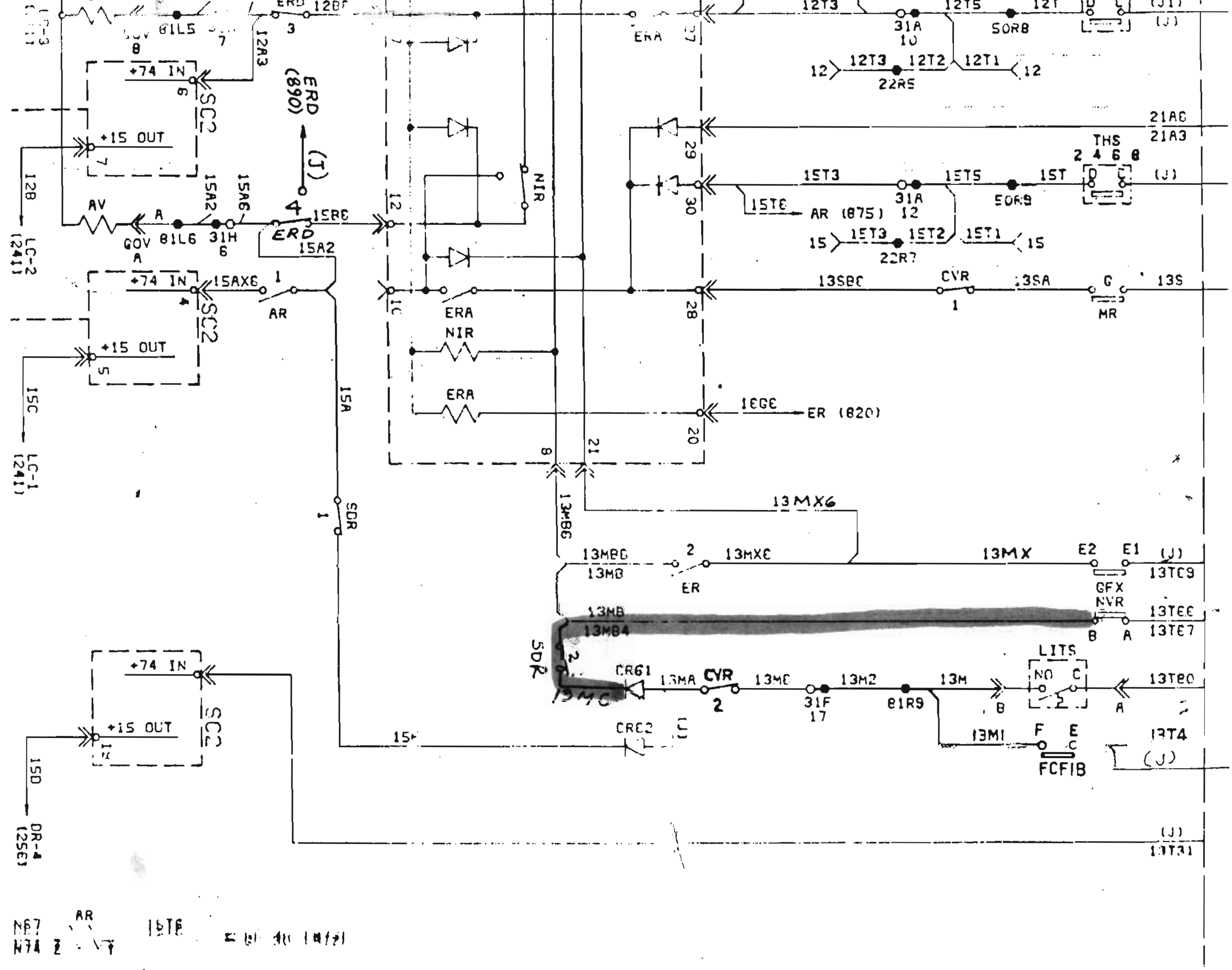
J. A. Elfter
Technical Service
SERVICE DEPARTMENT

JAE/dmm 2Y
cc: B. L. Collecchia
R. P. Hodgson
D. J. Kozak
E. R. Niemeyer

Enclosure



SLIP
51R4
31A 8
HL
13T68
HL
Z Y
10A6
+74 OUT
SC2
28
27
+15 IN
10B
FM- 8 (215)
3G1 E2 E1 3H
TLPR
1SRA
3J6
31D 13
3J2
23R5
80
3J
FCF1B
C D
SDR
3D
CR63
3A6
3A6
(J)
FCF1B-E (875)
3G2
(J1)
CR65
13U6
GFX
F2 F1
13N C2 C1
MR
(J)
13T63
3D6
3D1
3D1
3D
CR60
3A
FPCR
F1 F2
13UX6
E1 E2 3E6
FPCR
13V
+74 OUT
SC2
18
17
+15 IN
13VX
SW-22 (239)
19
15
GC
ORS
GOV E
E
13U2
81L7
31H L10
13U6
13U3
TEST
NIR
13T31
13T32
13P6
C2 C1
FPCR
13TE4
13TE5
3T3 3T2
22L5
3T1
THS STOP 5 6
DV
GOV D
D 3B2
81L3
31H 9
3B6
ERD
BR1
L1 L2
1S
3T8
31A 3
3T5
50R3
3T
(J) (J2)
3A9
12E6
EFL
12C1
12E
THL
12C
D2 D1
MR
+74 IN
3C6
10
SC2
+15 OUT
11
E2 E1 7B6
MR
7A6
CVR
7A1
7A6
7A3
ERD
ERA
7T3
31A 6
7T5
50R5
7T
THS 3 8
(J2) (J1)
7T3 7T2
22L8
7T1
+74 IN
7D6
SC2
+15 OUT
7D3
31H 8
7D2
CV
13YJ
THS 5 8
12T6
12TC6



SC2
+74 IN
+15 OUT
ERD
(890)
(J)
AV
GOV
81L6
31H
15A2
15A6
15RE
12B
LC-2
(241)
15AX6
AR
15C
LC-1
(241)
15A
SDR
ERA
NIR
ER (820)
13MX6
13MB6
13MX
13MXE
13MB
13MB4
5DR
CR61
13MA
CVR
13ME
13M2
13M
31F
81R9
LITS
NO
13TE0
13TE6
13TE7
13TC9
GFX
NVR
CRE2
15D
DR-4
(25E)
13M1
FCF1B
13T4
13T31
13SBC
13SA
13S
MR
15TE
AR (875)
15T3
15T5
15T
31A
50R8
22R7
22R5
THS
21AC
21A3
12T3
12T2
12T1
12T5
12T

Two Speed Dynamic Brakes parts & Labor

Wire	#50.00
screws, Ty-Wraps, Markers	#70.00
Lugs	#05.00
Total	#125.00 per locomotive

Removal of old wire and parts 8 hrs

Run New wire and Mounting of New Parts 32 hrs

Trouble shooting and Testing 8 hrs

Total of — 3 days for Two Men

#1296. LABOR
125.- XTRA MATERIAL
1150.- KIT.
#2571 EA, #41,136 FOR 16 EA.