

GEO MAINTAINER'S HANDBOOK

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A guide to GEO module LED indications, troubleshooting and using the GEO CPU III with WebUI to view or set site parameters.

Central Processing Units

CPU II+ and CPU III are the Central Processing Units used with the GEO system. Descriptions of indicators and connectors are available in Table 1

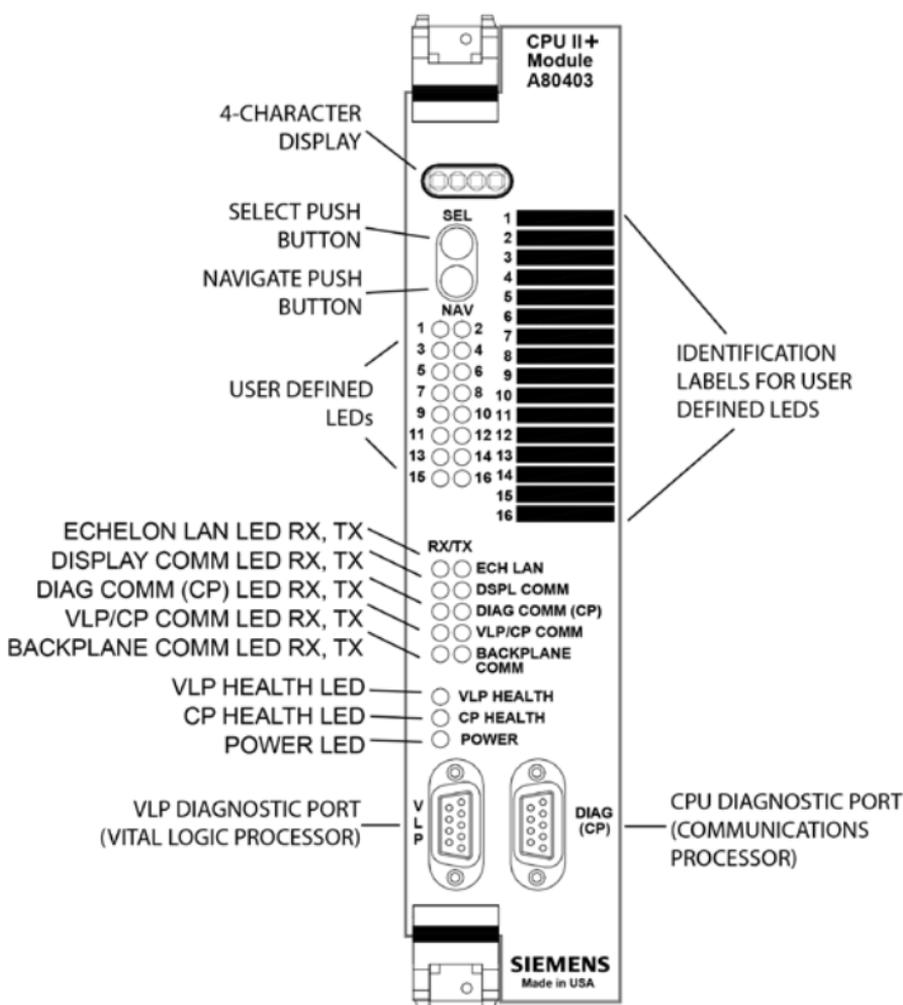


Figure 1 CPU II+ Module A80403

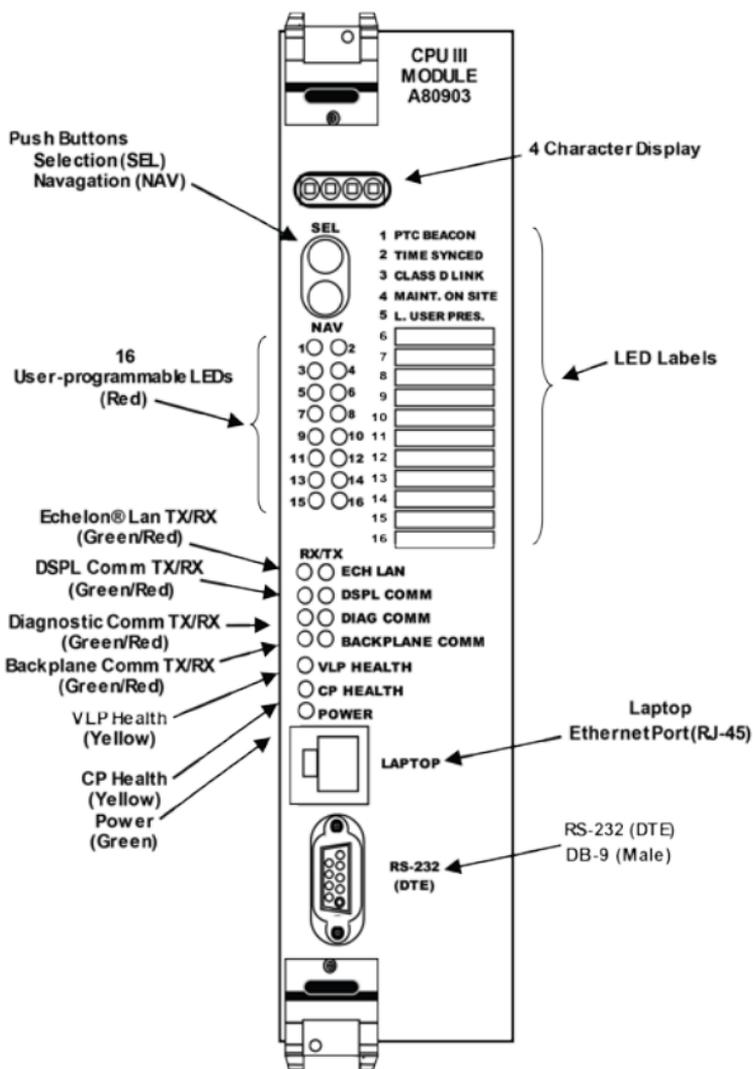


Figure 2 CPU III Module A80903

Table 1 CPU Module (A80403 & A80903) Indicators and Connectors

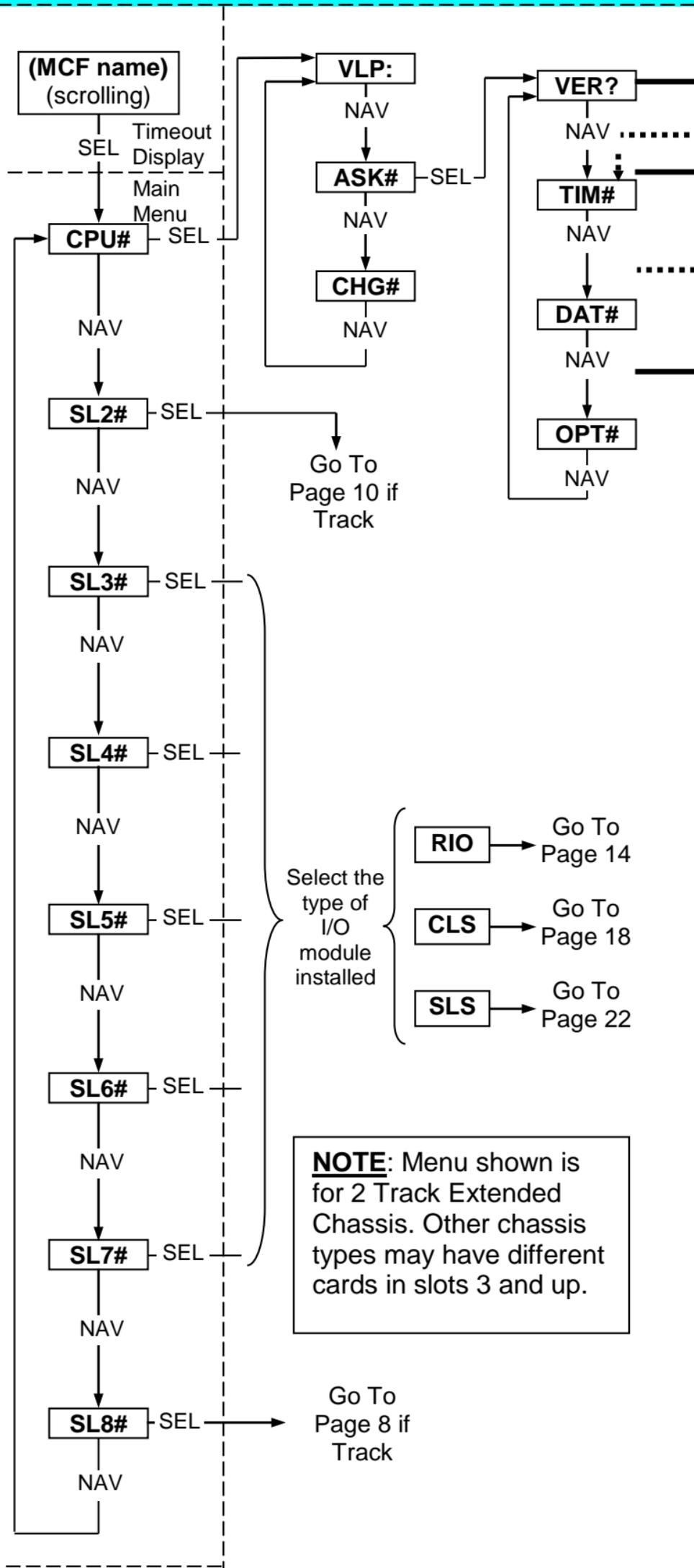
Item	Function
DIAG (CP) DT Serial Port (DB-9)	RS-232 port used to interface CPU Communication Processor with a computer. Provides access to external communication configuration files via GEO [®] DT software.
VLP Serial Port (DB-9)	RS-232 port used to interface the CPU Vital Communication Processor with a computer.
4-character display	Used in conjunction with SEL and NAV pushbuttons to view menus and data.
16 user-programmable LEDs (red)	Not currently implemented in the GEO system. The first five LEDs are pre-defined for use with PTC, but are not applicable to GEO operation.
RX ECH LAN LED (green)	Lights to indicate a message is being received on the Echelon [®] interface.
TX ECH LAN LED (red)	Lights to indicate a message is being transmitted on the Echelon [®] interface.
RX/TX DSPL COMM LED (green/red)	Not currently implemented in the GEO system (Display Module).
RX DIAG COMM (CP) LED (green)	Lights to indicate a message is being received on the DIAG(CP) serial port.
TX DIAG COMM (CP) LED (red)	Lights to indicate a message is being transmitted on the DIAG(CP) serial port.

Item	Function
RX VLP/CP COMM LED (red)	Lights as message is received from the Communication Processor by the Vital Logic Processor on the CPU module.
TX VLP/CP COMM LED (red)	Lights as message is transmitted from Vital Logic Processor to Communication Processor on the CPU module.
RX BACKPLANE COMM LED (green)	Lights to indicate data activity on bus. (Received I/O card status)
TX BACKPLANE COMM LED (red)	Lights to indicate data activity on bus. (Transmitted I/O commands)
VLP HEALTH LED (yellow)	<u>Continuous 1 Hz flash</u> indicates CPU Vital Logic Processor is performing properly. <u>Illuminated steady</u> or <u>off</u> indicates either a malfunction, or the module is booting. Four-digit display will indicate if the module is booting.
CP HEALTH LED (yellow)	<u>Continuous 1 Hz flash</u> indicates the CPU Communication Processor is performing properly. <u>Illuminated steady</u> or <u>off</u> indicates either a malfunction, or the module is booting. Four-digit display will indicate if the module is booting.
POWER LED (green)	Illuminates green to indicate that power is applied to the CPU module.
VLP Serial Port (CPU II+ Only)	9-pin diagnostic serial port for Vital Logic Processor.
DIAG (CP) Serial Port (CPU II+ Only)	9-pin diagnostic serial port for Communications Processor.
LAPTOP Port (CPU III Only)	Ethernet port for WebUI access via Ethernet cable.
RS-232 (DTE) (CPU III Only)	9-pin serial port for software upload to I/O modules via WebUI.

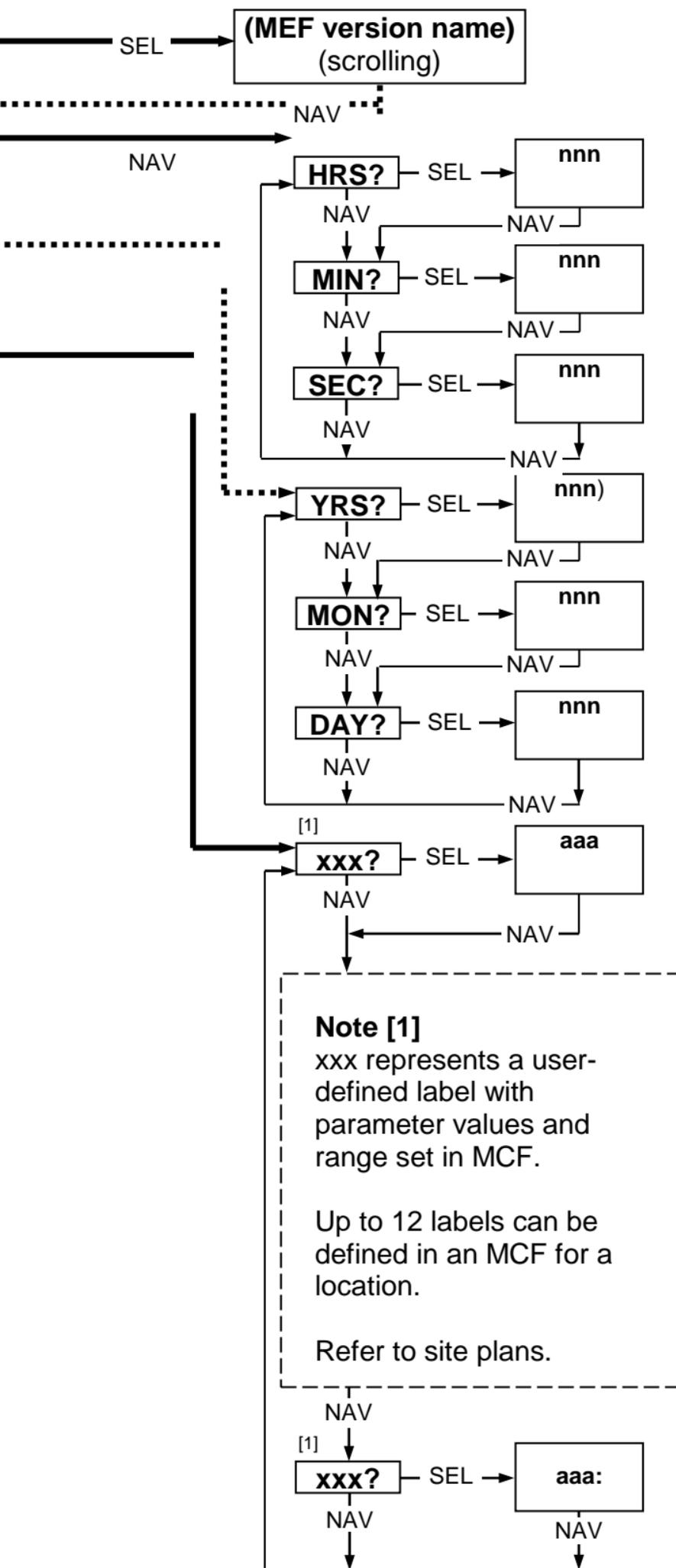
NOTE:

The CPU III is not compatible with Pre-appliance GEO units.

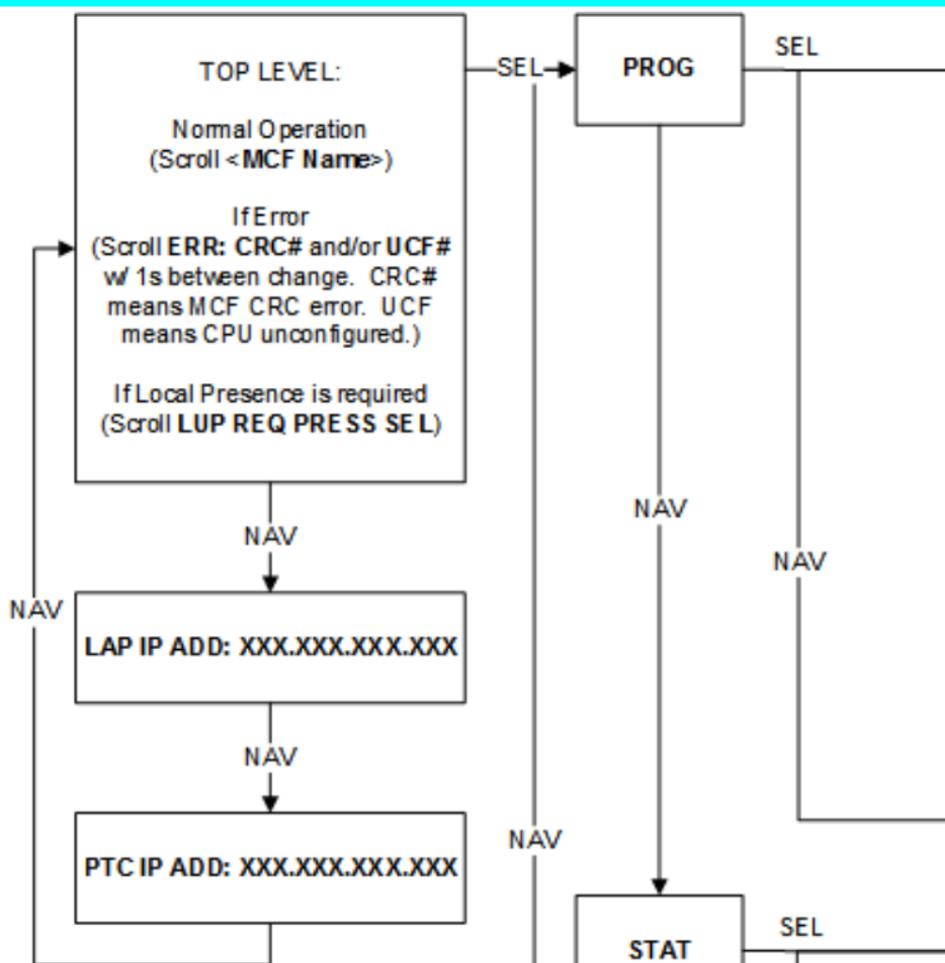
GEO MENU FLOWCHART CPU II+ MODULE (QUERY MODE)



GEO MENU FLOWCHART CPU II+ MODULE (QUERY MODE)



GEO MENU FLOWCHART CPU III MODULE



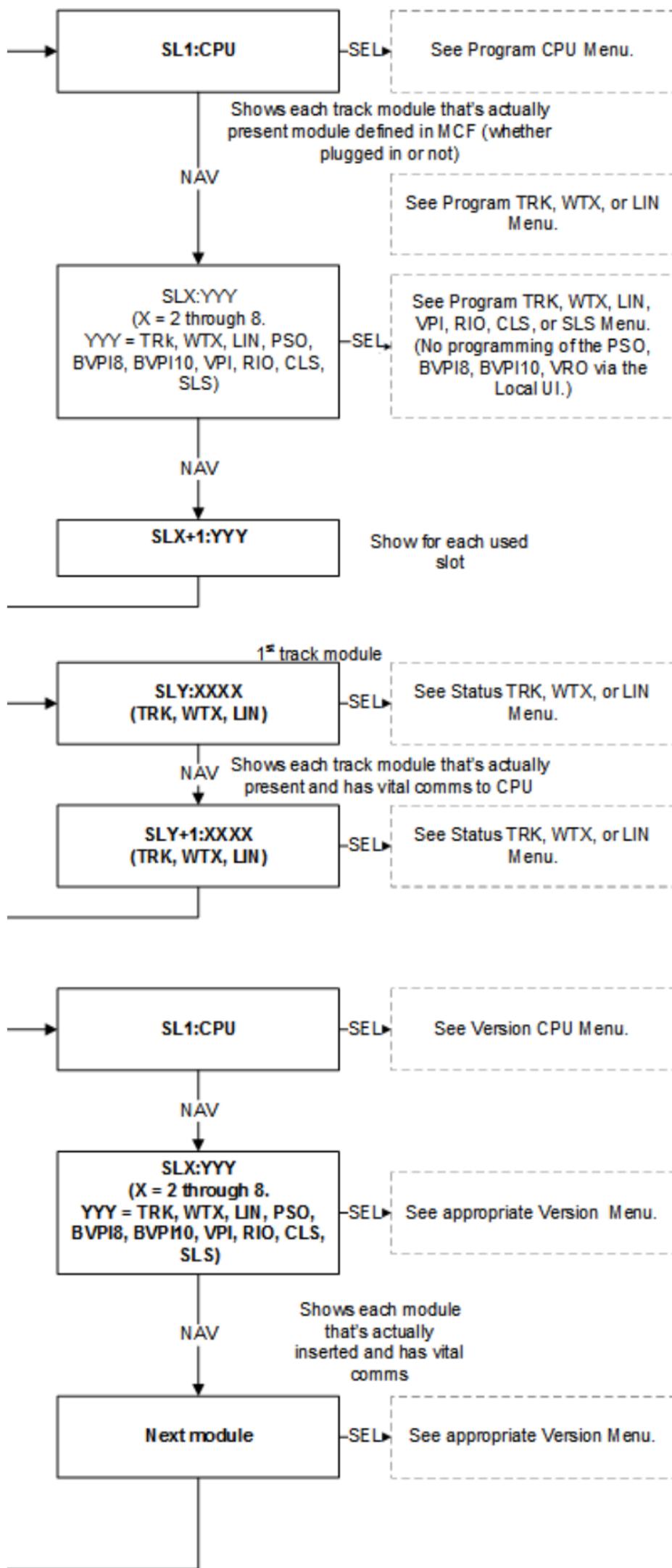
Notes that apply to the entire document.

- 1- Text in **BOLD** will be displayed.
- 2- If text is greater than 4 characters the text will scroll.
- 3- After 6 minutes of no button activity the UI will go back to the TOP LEVEL.
- 4- Double click NAV escapes and moves back to the previous menu.
- 5- When Local User Presence is required, the Local UI will go to the TOP LEVEL: menu and display "LUP REQ PRESS SEL" to allow remote changes. The User can wait 30s or press NAV to prevent remote changes.
- 6- Hide menu items that are not configured in the MCF configuration database.

Revision History:

- A1 – Removed the Hold NAV for 3s to go back to the Top Menu. Removed the ability to default the PTC Ethernet port.
- A2 – Changed Note 3 from 30s to 6m, and Note 5 to clarify LUP behavior.
- A3 – Added MOS to Prog CPU Menu in place of PTC IP ADD:, and added note 6 above.
- A4 – Removed OP1 status from LIN module on pg 5.
- A5 – Removed VRO references in the Prog. Menu.
- A6 - renamed GTK to WTX
- A7 – change for generic backplane and add PSO/BVPI

GEO MENU FLOWCHART CPU III MODULE



Coded Track Module

Track Module A53285 is the Coded Track Unit available for use with the GEO System. Descriptions of indicators and connectors are available in Table 2.

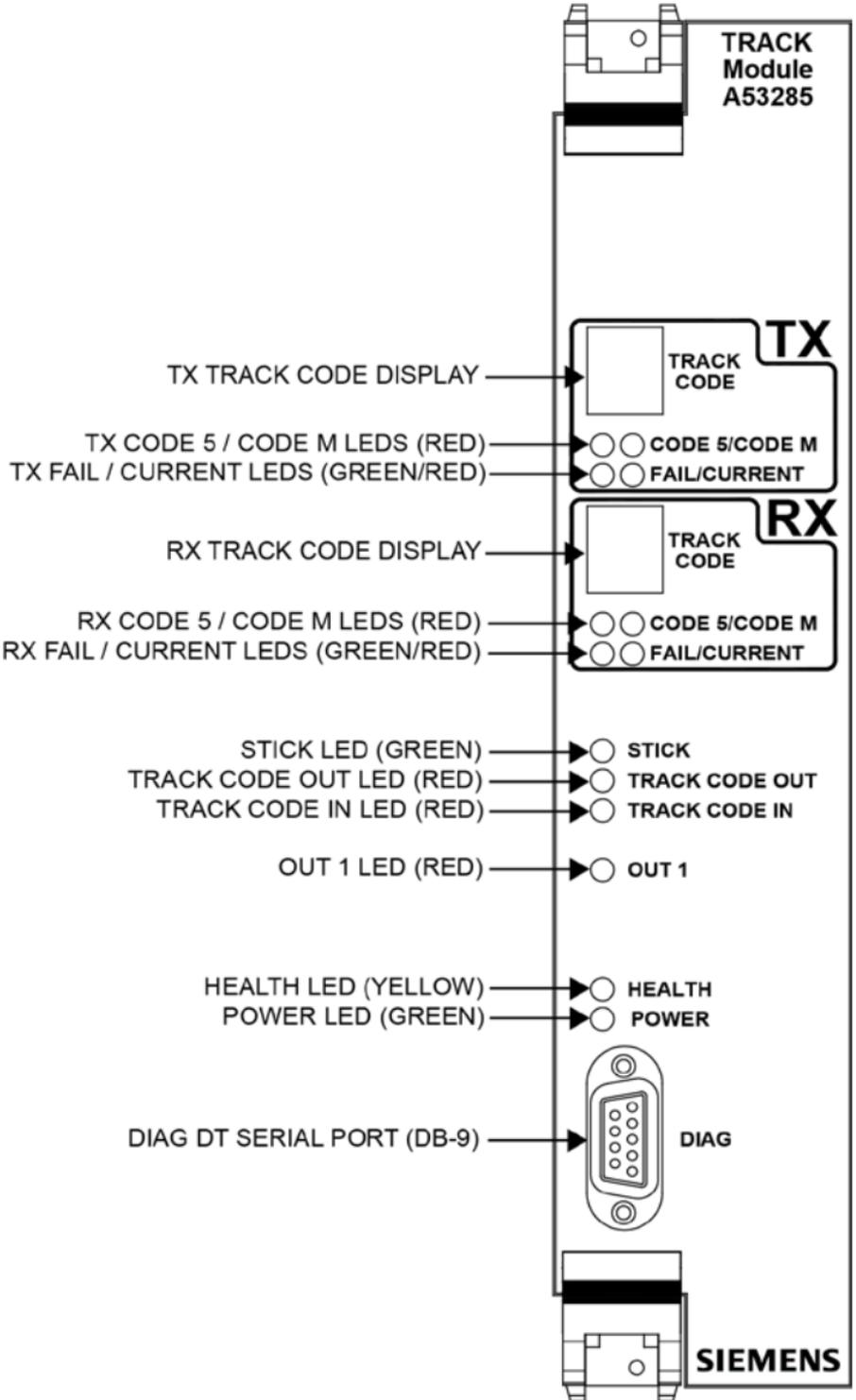


Figure 3 Track Module A53285

Table 2 Track Module (A53285) Indicators and Connectors

Item	Function (Track Module)
<p align="center">TX TRACK CODE Display</p>	<ul style="list-style-type: none"> • Displays vital code being transmitted. • Only one vital code transmitted per code cycle. • If only code 1 is transmitted, display will show 1. If code 1 and vital code are transmitted, display shows vital code. • Displays “F” during failure condition. Module could not send code (code alternates with F). • Displays “E” during error condition. Module attempting to transmit illegal combination of track codes. • Displays “d” when module disabled (can not transmit). • Blank display = module fault or rebooting.
<p align="center">RX TRACK CODE Display</p>	<ul style="list-style-type: none"> • Displays the vital code being received. • Only one vital code received per code cycle. • If only code 1 is received, display will show 1. If code 1 and vital code are received, display shows vital code. • Displays “F” during failure condition. Module received code it could not understand. • Displays “E” during error condition. Module is receiving illegal combination of track codes. • Displays “d” when module disabled (can not receive). • Blank display = no code received.
<p align="center">TX CODE 5/CODE M LEDs (red/red)</p>	<p><u>TX CODE 5 LED:</u></p> <ul style="list-style-type: none"> • Lights while Code 5 is being transmitted. <p><u>TX CODE M LED:</u></p> <ul style="list-style-type: none"> • Lights while Code M is being transmitted.
<p align="center">TX FAIL / CURRENT LEDs (green/red)</p>	<p><u>TX FAIL LED:</u></p> <ul style="list-style-type: none"> • Flashing indicates Track condition fault. • Lit solid indicates Track module transmitter fault. <p><u>TX CURRENT LED:</u></p> <ul style="list-style-type: none"> • Flashes at a rate proportional to current being transmitted. • Low current = long flash period. • High current = short flash period. • Current limiting = on solid. • Open track (current < 0.5 Amp) = off.

continued next page

Item	Function (Track Module) continued
RX CODE 5/CODE M LEDs (red/red)	<u>RX CODE 5 LED:</u> <ul style="list-style-type: none"> • Lights while Code 5 is being received. <u>RX CODE M LED:</u> <ul style="list-style-type: none"> • Lights while Code M is being received.
RX FAIL / CURRENT LEDs (green/red)	<u>RX FAIL LED:</u> <ul style="list-style-type: none"> • Flashing indicates Track condition fault. • On solid to indicate Track module receiver fault. <u>RX CURRENT LED:</u> <ul style="list-style-type: none"> • Flashes at a rate proportional to current being received. • Low current = long flash period. • High current = short flash period. • Overdrive condition: Current > 2.3 Amps for Rev A and later modules = on solid. • Shunt condition = off.
STICK LED (green)	Lights to indicate a Stick code is set for track circuit controlled by the module.
TRACK CODE OUT LED (red)	<ul style="list-style-type: none"> • Flashes when codes are being transmitted. • Single flash indicates a non-vital code is being transmitted. • Two rapid flashes indicate a vital and non-vital code are being transmitted.
TRACK CODE IN LED (red)	<ul style="list-style-type: none"> • Flashes when codes are being received. • Single flash indicates a non-vital code is being received. • Two rapid flashes indicate a vital code and non-vital code are being received.
OUT 1 LED (red)	Lights to indicate that a vital output is energized, or flashes to indicate the code rate being generated.
HEALTH LED (yellow)	<ul style="list-style-type: none"> • Flashes at the following rates: • 1Hz = Track module performing properly • 3Hz = communication with CPU module has failed • 6Hz = Track module fault
POWER LED (green)	Lit steady when external power is being supplied to the GEO [®] unit.
DIAG DT Serial Port (DB-9)	RS-232 port used to interface the Track module with a computer.

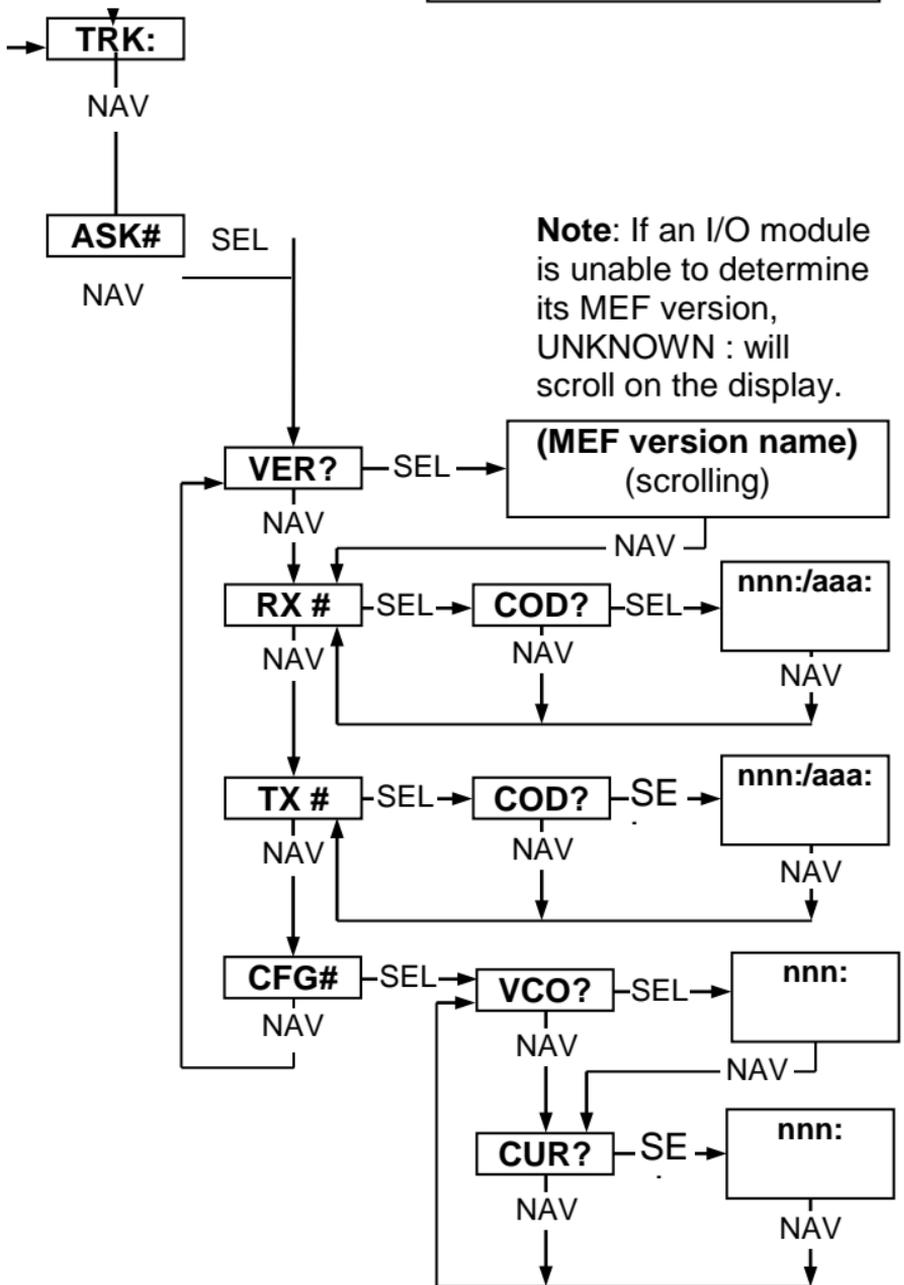
Table 3 Typical Vital & Non-Vital Track Code Definitions

Code	Definition
1	<ul style="list-style-type: none"> • Non-vital reference code that begins each message transmission • Usually followed by other vital and non-vital codes • Transmitted every 2.5 seconds • Also used to verify track integrity when no other codes are being transmitted
2	Vital code programmed for specific site requirements
3	Vital code programmed for specific site requirements
4	Vital code programmed for specific site requirements
5	Non-vital code indicating block occupancy
6	Non-vital code used as a Tumbledown code to set opposing signals to stop
7	Vital code programmed for specific site requirements
8	Vital code programmed for specific site requirements
9	Vital code programmed for specific site requirements
M	<ul style="list-style-type: none"> • Non-vital code used to indicate that a non-vital failure has occurred at the location • Programmed for specific site requirements

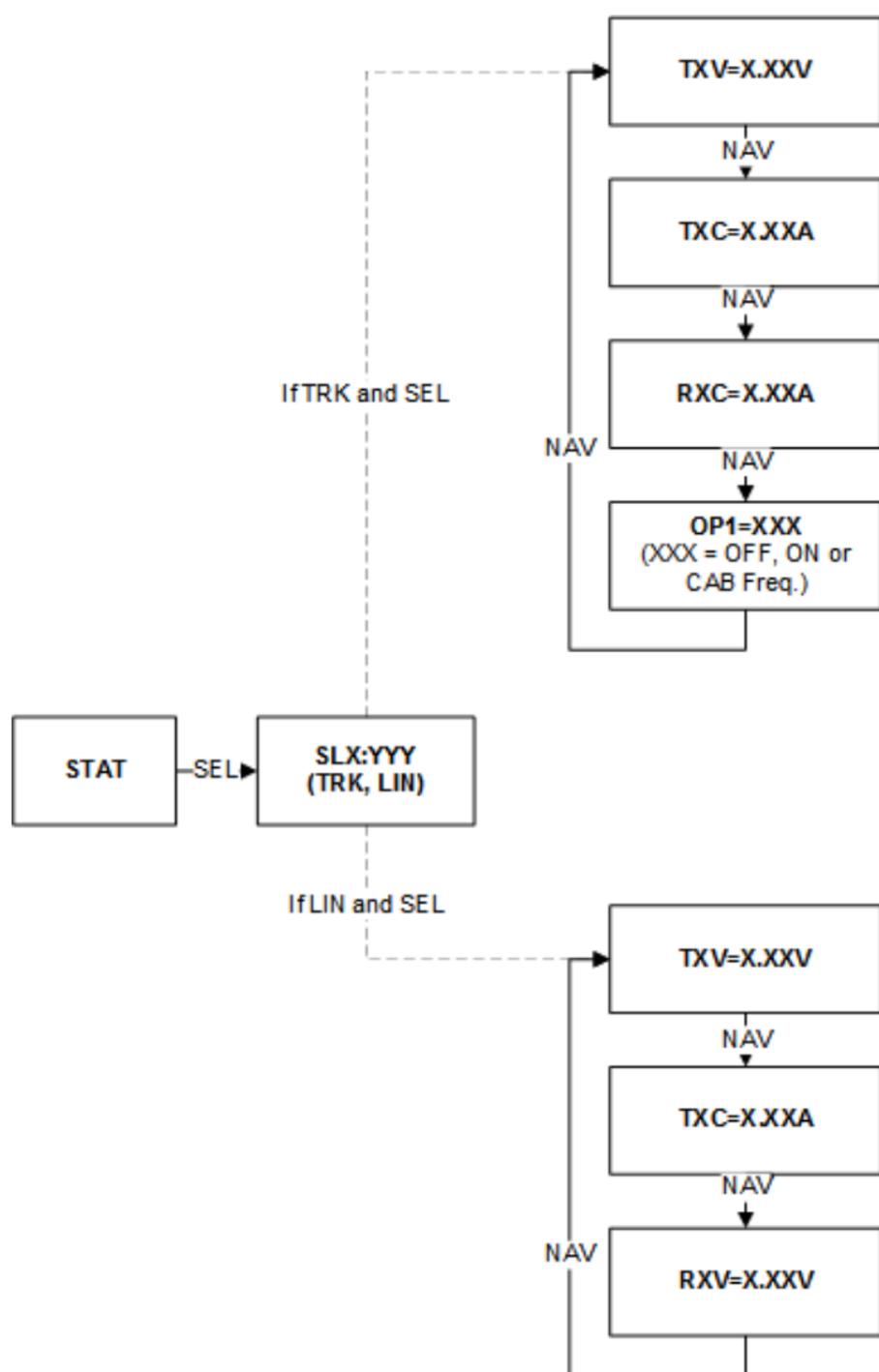
GEO MENU FLOWCHART TRACK (TRK) MODULE

SL2# - sel
continued

NOTE: This flow chart also used for **SL8# - sel**



GEO MENU FLOWCHART CPU III TRK/LIN STATUS MENU



Input / Output Module

RIO A80413 is the Input / Output Unit available for use with the GEO System. Descriptions of indicators and connectors are available in Table 4.

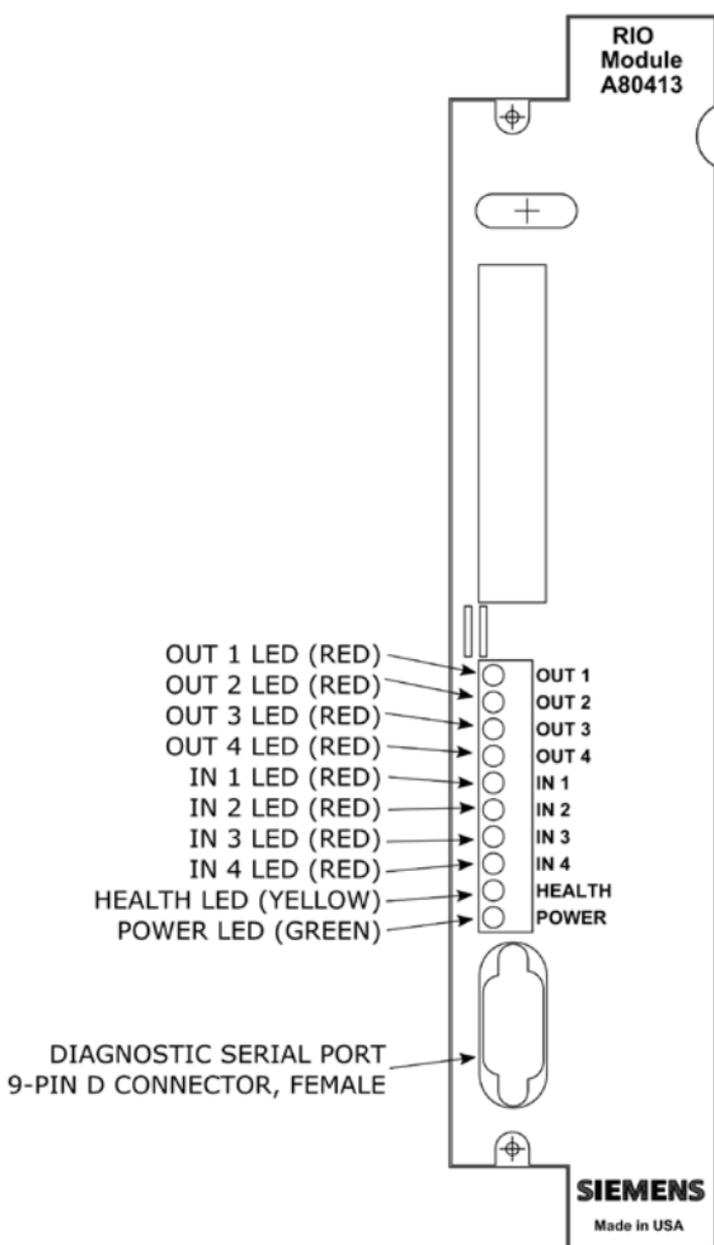


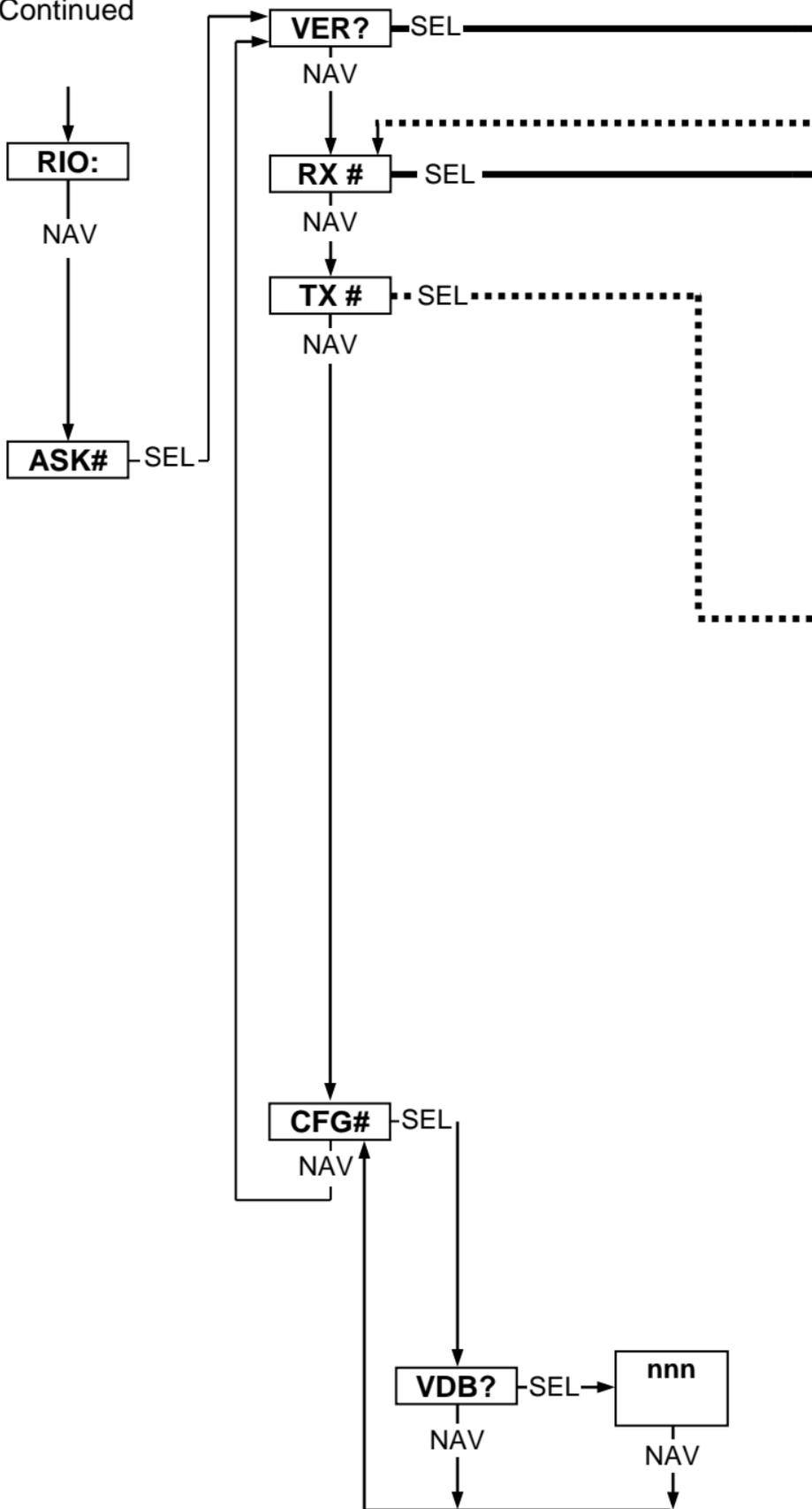
Figure 4 RIO Module A80413

Table 4 RIO Modules (A80413) Indicators and Connectors

Item	Function (RIO Module)
DIAG DT Serial Port (DB-9)	RS-232 port used to interface the RIO module with a computer.
OUT 1-4 LEDs (red)	<ul style="list-style-type: none"> Light steady when associated vital output is energized Flash to indicate a code rate is being generated.
IN 1-4 LEDs (red)	Light steady when associated vital input is energized.
HEALTH LED (yellow)	Flashes at the following rates: <ul style="list-style-type: none"> 1Hz = RIO module performing properly. 3Hz = communication with CPU module has failed. 6Hz = RIO module fault.
POWER LED (green)	Lit steady when external power is being supplied to the GEO® unit.

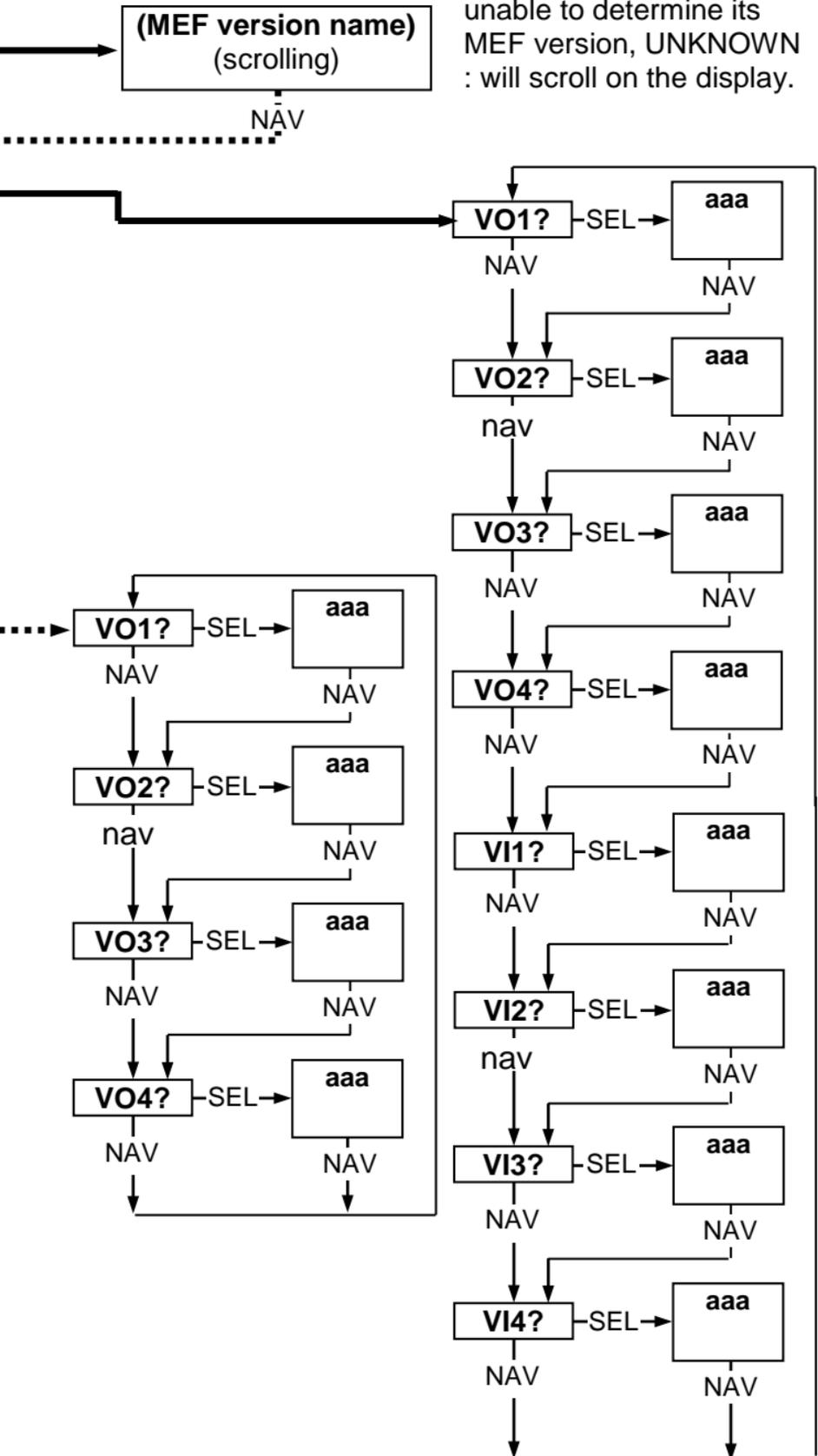
GEO MENU FLOWCHART RELAY INPUT / OUTPUT (RIO) MODULE

RIO
Continued

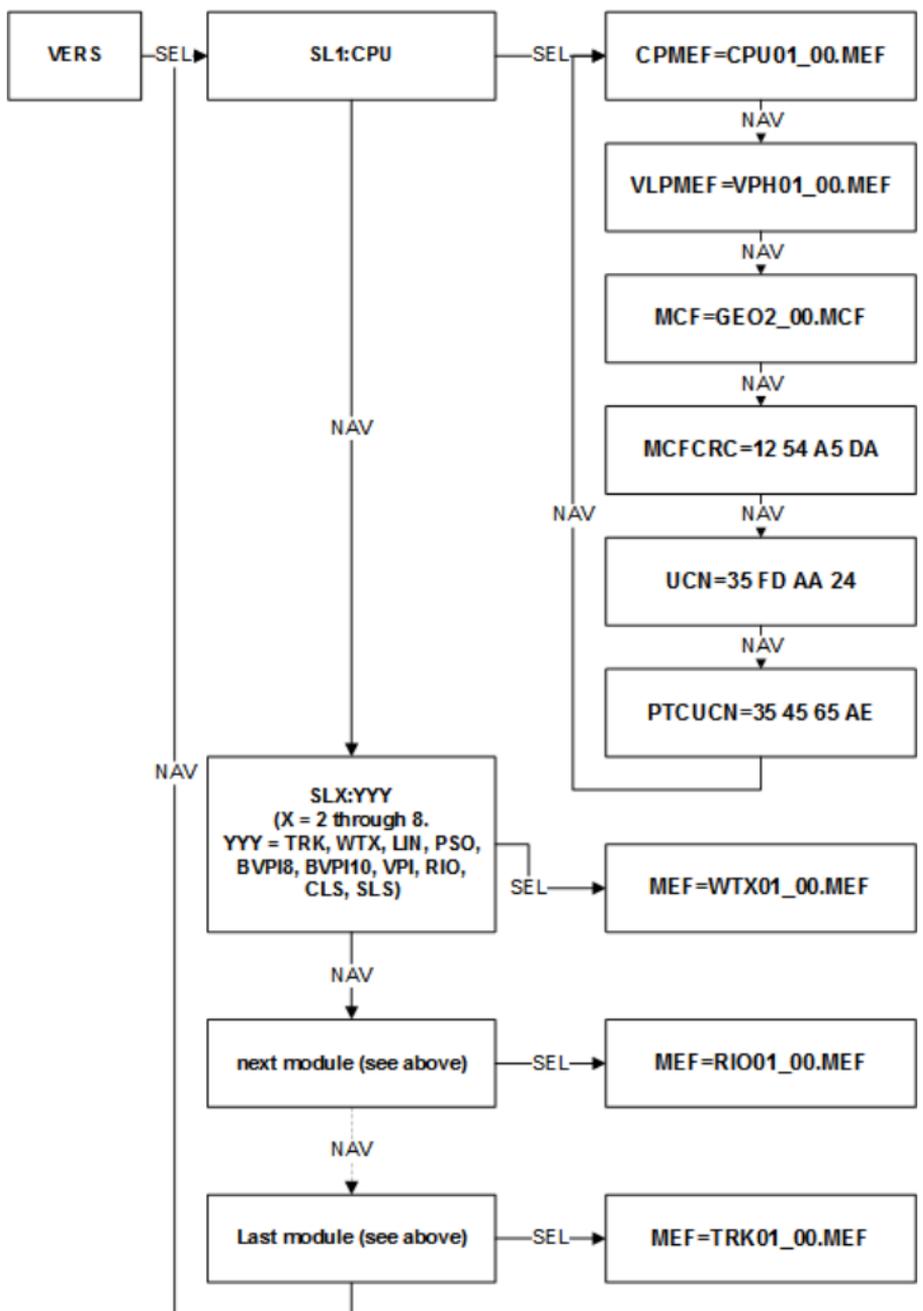


GEO MENU FLOWCHART RELAY INPUT / OUTPUT (RIO) MODULE

Note: If an I/O module is unable to determine its MEF version, UNKNOWN : will scroll on the display.



GEO MENU FLOWCHART CPU III VERSION MENU



Color Light Module

Color Light Signal A53284 is the light monitoring unit available for use with the GEO System. Descriptions of indicators and connectors are available in Table 5.

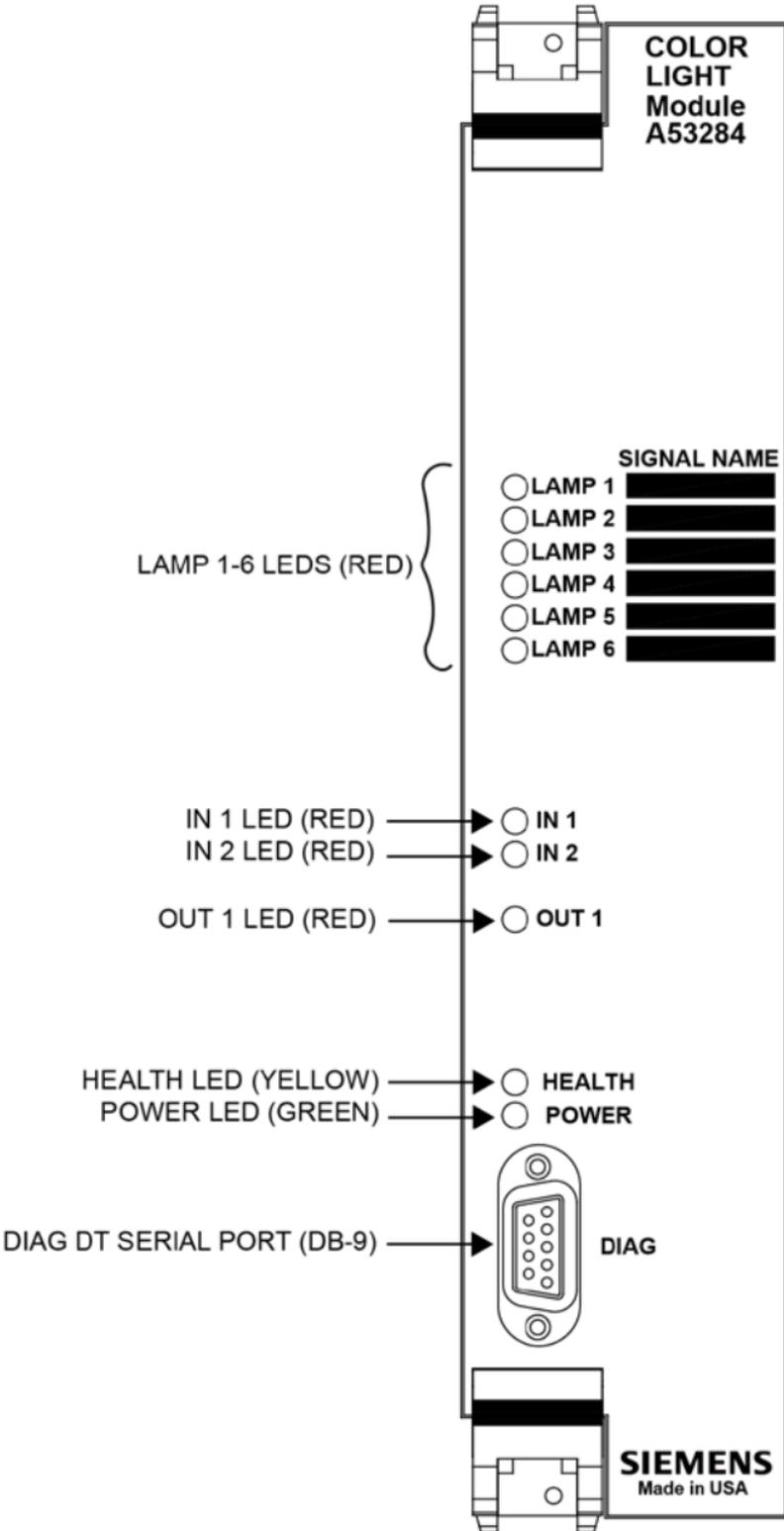


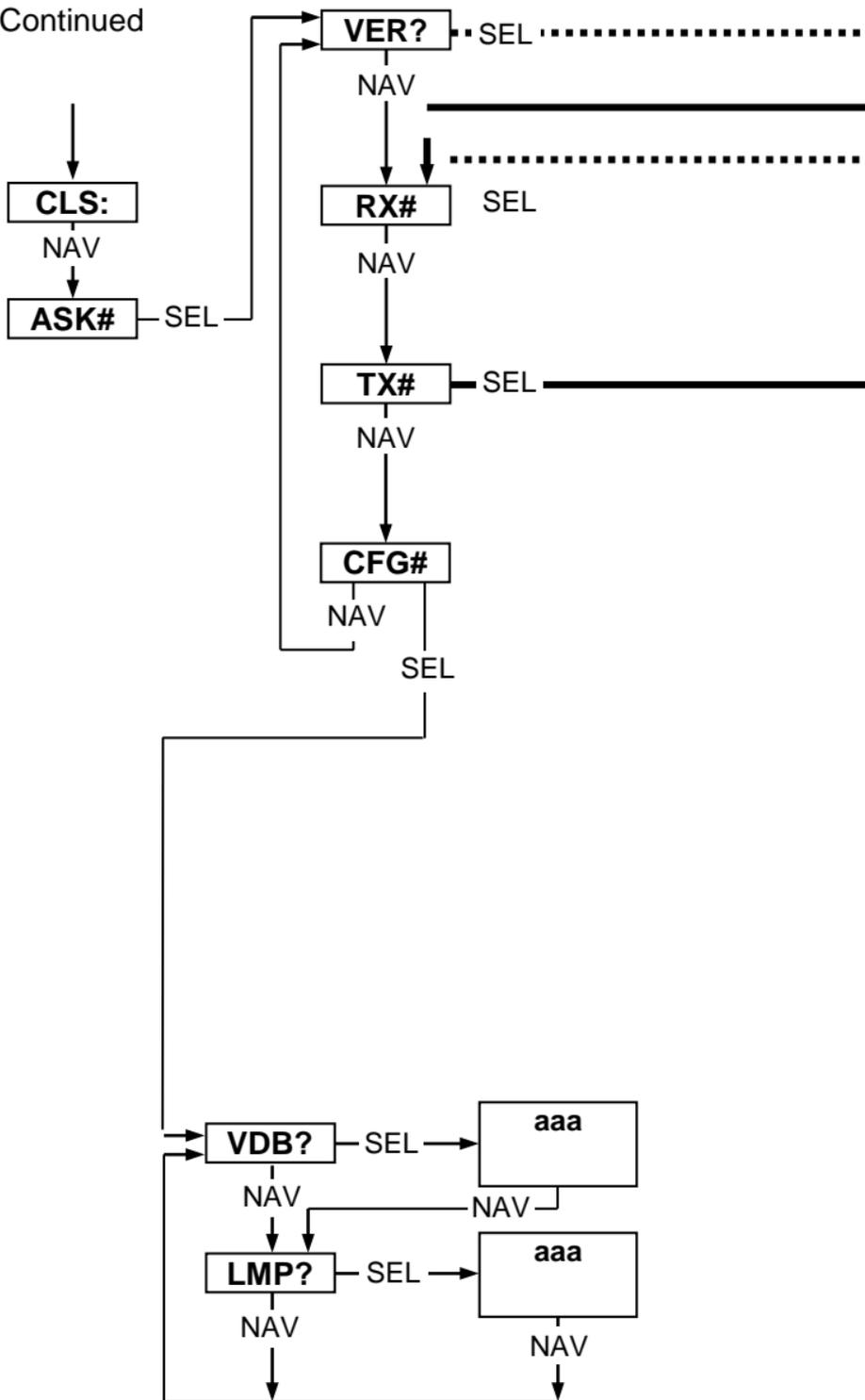
Figure 5 Color Light Signal Module A53284

Table 5 CLS Modules (A53284) Indicators and Connectors

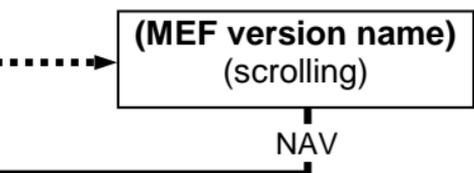
Item	Function (CLS Module)
DIAG DT Serial Port (DB-9)	RS-232 port used to interface the Color Light module with a computer.
LAMP 1-6 LEDs (red)	Light when associated lamp output is energized.
IN 1-2 LEDs (red)	Light when associated vital input is energized.
OUT 1 LED (red)	Lights when a vital output is energized, or flashes to indicate the code rate being generated.
HEALTH LED (yellow)	Flashes at the following rates: <ul style="list-style-type: none"> • 1Hz = Color Light module performing properly. • 3Hz = communication with CPU module has failed. • 6Hz = Color Light module fault, or external fault (foreign energy) detected.
POWER LED (green)	Lit steady when external power is being supplied to the GEO [®] unit.

GEO MENU FLOWCHART CPU II+ COLORLIGHT SIGNAL (CLS) MODULE

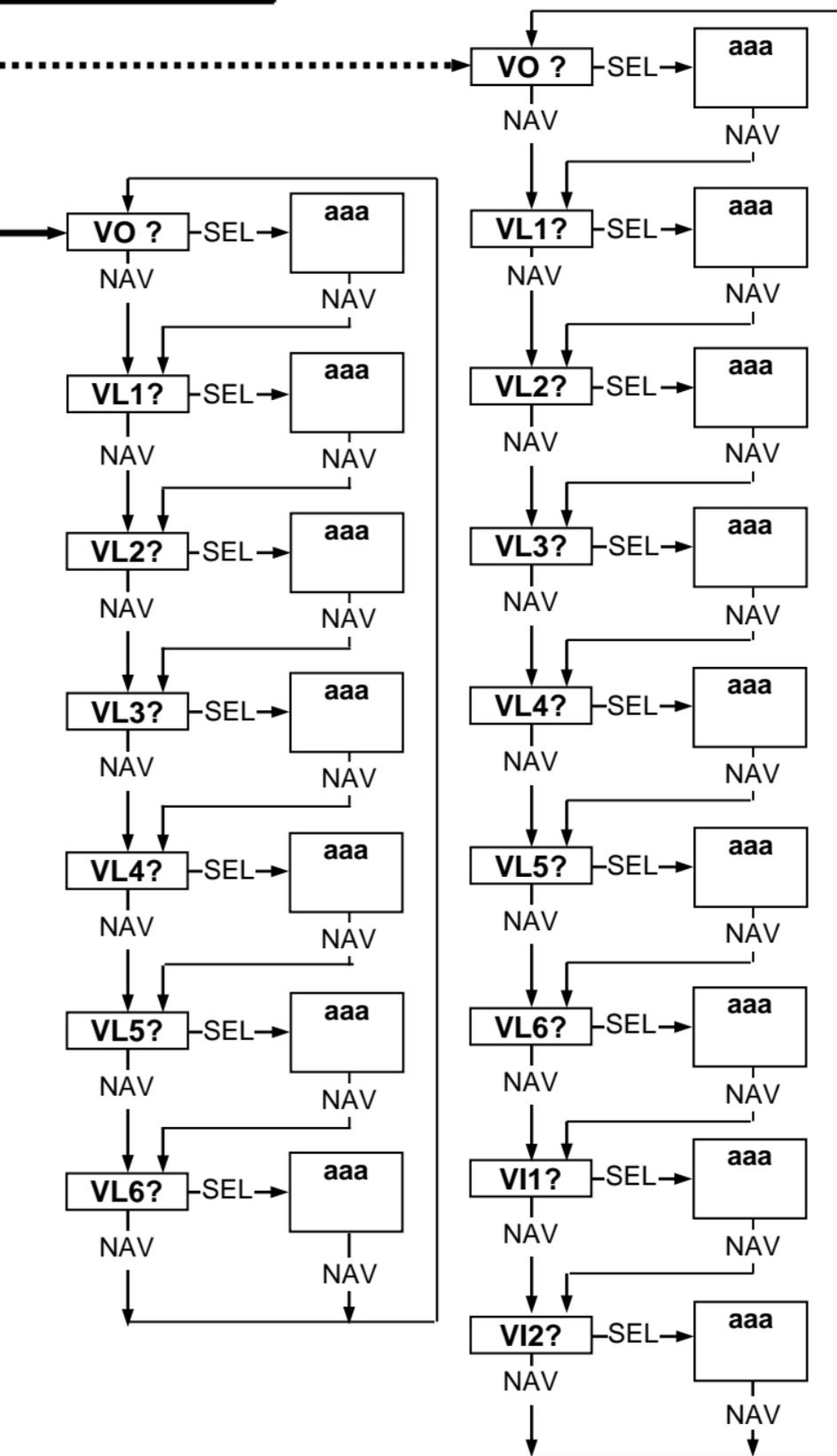
CLS
Continued



GEO MENU FLOWCHART CPU II+ COLORLIGHT SIGNAL (CLS) MODULE



Note: If an I/O module is unable to determine its MEF version, UNKNOWN : will scroll on the display.



Search Light Module

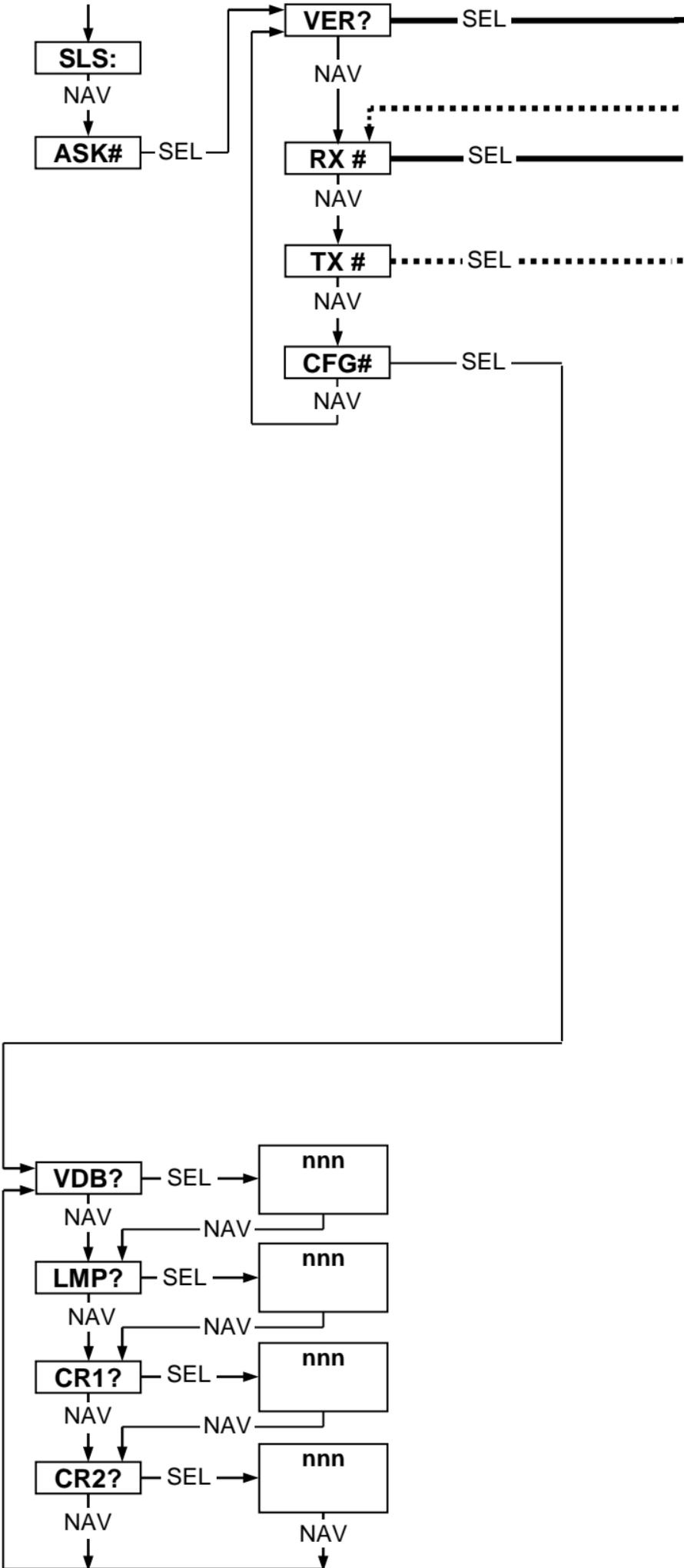
Search Light Signal A53263 is an obsolete unit no longer available for use with the GEO System.

Table 6 SLS Module Indicators and Connectors

Name	Function (SLS Module)
Lamp 1-2 LEDs (red)	On / Off / Flashing (aspect indication).
Mech 1-2 LEDs (red)	On / Off / Flashing <ul style="list-style-type: none"> • On = in correspondence. • Off = out of correspondence. • Flashing = pending.
IN 1-2 LEDs (red)	On = associated vital input is energized.
OUT 1 LED (red)	On steady for an energized vital output, or flashes at 60 Hz to indicate a 60 Hz flash rate or a cab signal output.
HEALTH LED (yellow)	Flashes at the following rates: <ul style="list-style-type: none"> • 1Hz = proper performance. • 3Hz = communication with CPU failed. • 6Hz = SLS module fault, or external fault (foreign energy / mech fail) detected.
POWER LED (green)	Lit steady when external power is being supplied to the GEO® unit.
DIAG DT Serial Port (DB-9)	RS-232 serial port used to interface the Searchlight module with a laptop / personal computer.

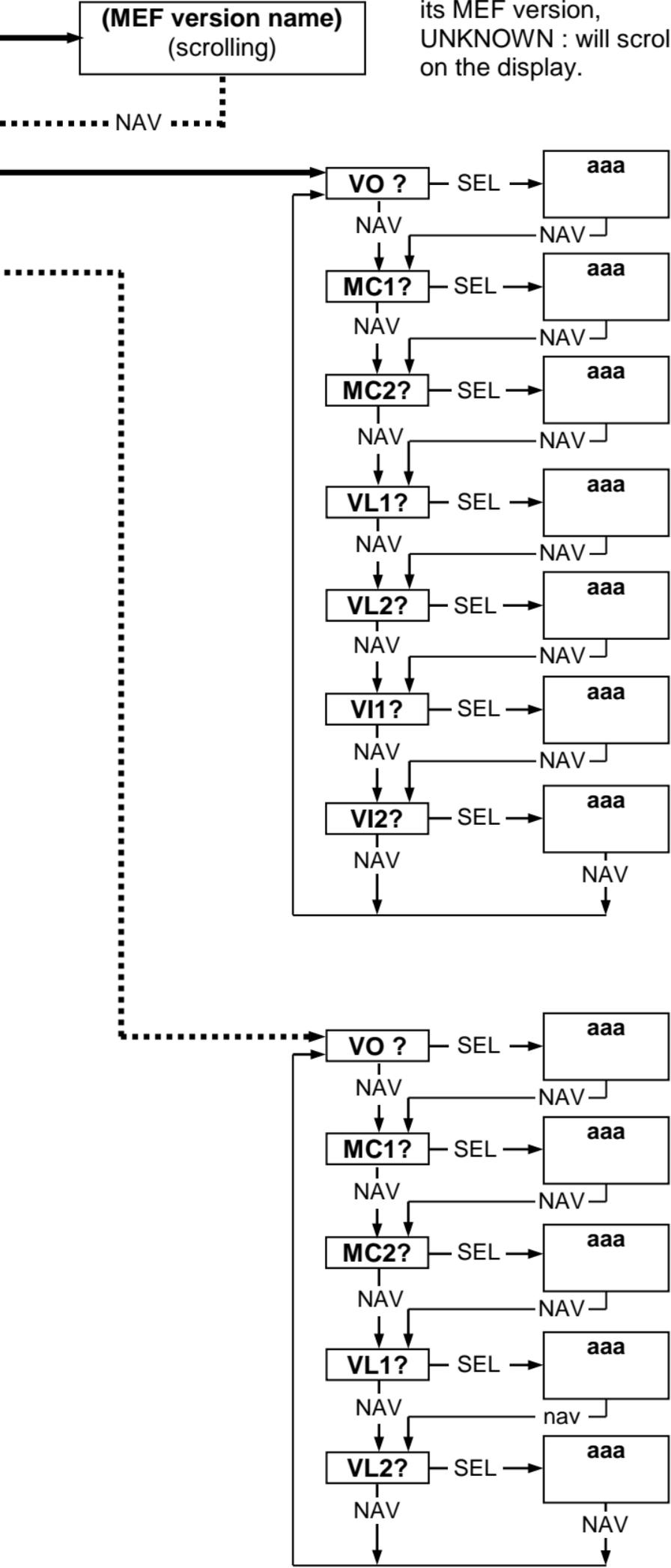
GEO MENU FLOWCHART CPU II+ SEARCHLIGHT SIGNAL (SLS) MODULE

SLS
continued



GEO MENU FLOWCHART CPU II+ SEARCHLIGHT SIGNAL (SLS) MODULE

Note: If an I/O module is unable to determine its MEF version, UNKNOWN : will scroll on the display.



Line Module

Line Module A53254 is an obsolete unit no longer available for use with the GEO System.

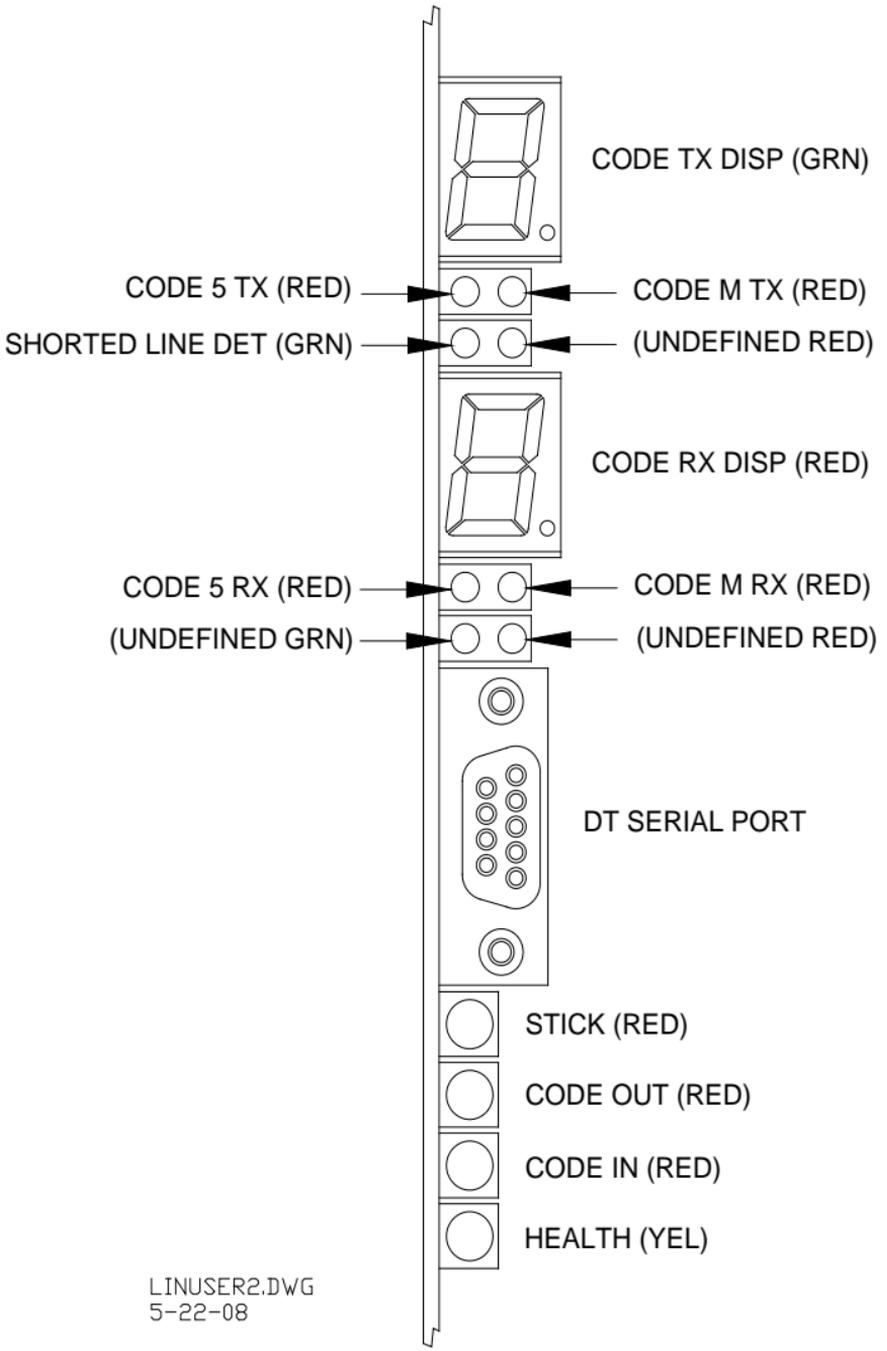


Figure 6 Line Module, A53254

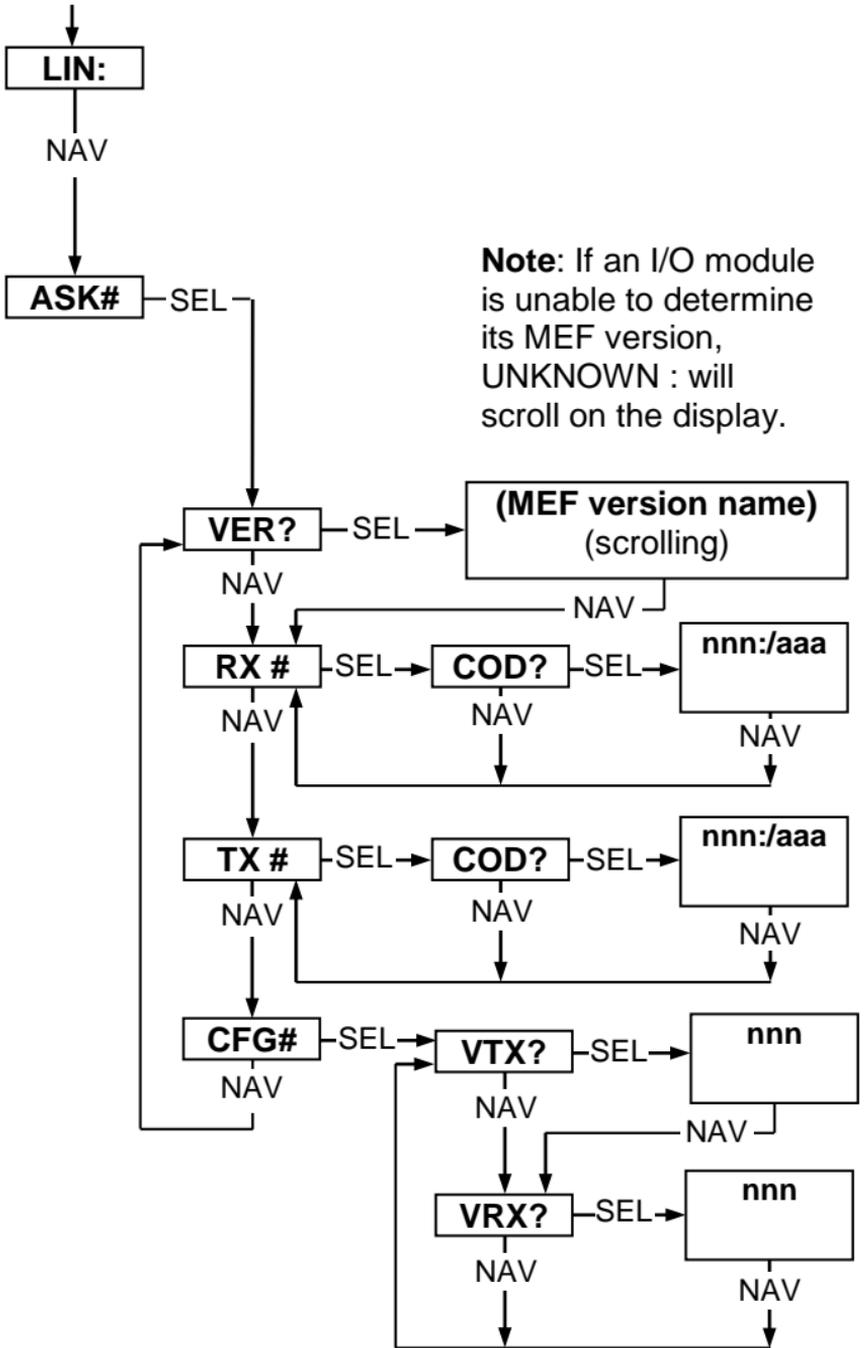
Table 7 Line Module, A53254 Indicators and Connectors

Name	Function (LIN Module)
CODE TX Display (green)	<ul style="list-style-type: none"> • Shows the vital code being transmitted. • Only one vital code per code cycle. • If only code 1 is transmitted, display will show 1. If code 1 and vital code are transmitted, display shows vital code. • Displays “d” when disabled. • Displays “E” during error condition. • Displays “F” during failure or fault. • Blank = module fault or booting up.
CODE 5 TX CODE M TX LEDs (red/red)	<u>CODE 5 TX LED:</u> <ul style="list-style-type: none"> • On = transmission of Code 5 message. <u>CODE M TX LED:</u> <ul style="list-style-type: none"> • On = transmission of Code M message.
TX SHORTED LINE DETECT / UNDEFINED LEDs (green/red)	<u>SHORTED LINE DETECT:</u> <ul style="list-style-type: none"> • On solid = Line module transmitter fault. <u>UNDEFINED LED:</u> <ul style="list-style-type: none"> • Not used.
CODE RX Display (red)	<ul style="list-style-type: none"> • Displays the vital code being received. • Only one vital code received per cycle. • If only code 1 is received, display will show 1. If code 1 and vital code are received, display shows vital code. • Displays “d” when disabled. • Displays “E” during error condition. • Displays “F” during failure or fault. • Blank = no code received.
CODE 5 RX CODE M RX LEDs (red/red)	<u>CODE 5 RX LED:</u> <ul style="list-style-type: none"> • On = Code 5 message being received. <u>CODE M RX LED:</u> <ul style="list-style-type: none"> • On = Code M message being received.
UNDEFINED (green/red)	LEDs not used.
DT Serial Port (DIAG) (DB9)	RS232 Diagnostic Terminal (DT) used to download logs from the Line module, or upload an MEF to the Line module using a laptop or personal computer.
STICK LED (red)	On = a Stick code is set for track circuit controlled by the module.
CODE OUT LED (red)	<ul style="list-style-type: none"> • Flashing = codes are being transmitted. • Single flash = non-vital code being transmitted. • Two rapid flashes = vital and non-vital codes being transmitted.
CODE IN LED (red)	<ul style="list-style-type: none"> • Flashing = codes are being received. • Single flash = non-vital code being received. • Two rapid flashes = vital and non-vital codes being received.
HEALTH LED (yellow)	Flashing continuously at different rates: <ul style="list-style-type: none"> • 1 Hz = proper performance • 3 Hz = communication with CPU failed. • 6 Hz = a Line module fault.

GEO MENU FLOWCHART CPU II+ LINE MODULE

SL2# - sel
continued

NOTE: This flow chart
also used for SL8# - sel



REFERENCE

Table 8 Main Menu Labels for an A53510 Unit

Slot Label	Card Cage Slot	Module Type
CPU#	1	CPU II+/CPU III module only (required - always in slot 1)
SL2#	2	Track or Line module only (optional)
SL3#	3	I/O module (optional) (VPI, VRO, RIO, Searchlight, Colorlight)
SL4#	4	I/O module (optional) (VPI, VRO, RIO, Searchlight, Colorlight)
SL5#	5	I/O module (optional) (VPI, VRO, RIO, Searchlight, Colorlight)
SL6#	6	I/O module (optional) (VPI, VRO, RIO, Searchlight, Colorlight)
SL7#	7	I/O module (optional) (VPI, VRO, RIO, Searchlight, Colorlight)
SL8#	8	Track or Line module only (optional)

Table 9 Module Types for Slots 1-8

Card Cage Slot	Module Type	Module-Type Label
1	CPU II+/CPU III module only (required) (always in slot 1)	VLP: (Vital Logic Processor)
2	Track or Line module only (optional)	TRK: (Track) LIN: (Line)
3, 4, 5, 6, 7	I/O module (optional) (VPI, VRO, RIO, Colorlight or Searchlight)	VPI: (Vital Parallel Input) VRO: (Vital Relay Output) RIO: (Relay Input/Output) CLS: (Colorlight) SLS: (Searchlight)
8	Track or Line module only (optional)	TRK: (Track) LIN: (Line)

Table 10 Query Mode Parameter Labels for CPU II+

Parameter Group Label	Module Type	Parameter Label	Description	Parameter Value Format ^[1]	Parameter Value Range/Option ^[3]
VER?	All	(n/a)	MEF version name (scrolling)	aaann_nnn:	XXXnn_nn where X = alpha chr and n = number
TIM#	CPU only	HRS?	System time – hours	nnn:	000 thru 023 (by 1's)
		MIN?	System time – minutes	nnn:	000 thru 059 (by 1's)
		SEC?	System time – seconds	nnn:	000 thru 059 (by 1's)
DAT#		YRS?	System date – year	nnn:	000 thru 099 (by 1's)
		MON?	System date – month	nnn:	001 thru 012 (by 1's)
		DAY?	System date – day	nnn:	001 thru 031 (by 1's)
OPT#	CPU only	xxx?	Status – Field-configurable option ^[2]	note [2]	note [2]
		.	(number of options & names are unique to each MCF)	.	.
		xxx?	Status – Field-configurable option ^[2]	note [2]	note [2]

Continued on next page

Table 10 CONTINUED

Parameter Group Label	Module Type	Parameter Label	Description	Parameter Value Format ^[1]	Parameter Value Range/Option ³
RX #	Track / Line	COD ?	Status – Track Code number	nnn:/aaa:	1 thru 9 /M/NON
	Color-light	VO ?	Status – Colorlight VRO output	aaa:	OFF/ON/CAB
		VL1?	Status – Colorlight lamp output #1	aaa:	OFF/ON/FLA/LOR /FEN
		VL2?	Status – Colorlight lamp output #2	aaa:	OFF/ON/FLA/LOR /FEN
		VL3?	Status – Colorlight lamp output #3	aaa:	OFF/ON/FLA/LOR /FEN
		VL4?	Status – Colorlight lamp output #4	aaa:	OFF/ON/FLA/LOR /FEN
		VL5?	Status – Colorlight lamp output #5	aaa:	OFF/ON/FLA/LOR /FEN
		VL6?	Status – Colorlight lamp output #6	aaa:	OFF/ON/FLA/LOR /FEN
		VI1?	Status – Colorlight VPI input #1	aaa:	OFF/ON
		VI2?	Status – Colorlight VPI input #2	aaa:	OFF/ON
		Search-light	VO ?	Status – Searchlight VRO output	aaa:
	MC1 ?		Mechanism position – Head 1	aaa:	RED/YEL/GRN
	MC2 ?		Mechanism position – Head 2	aaa:	RED/YEL/GRN
	VL1?		Status – Searchlight lamp output #1	aaa:	OFF/ON/FLA/LOR /FEN
	VL2?		Status – Searchlight lamp output #2	aaa:	OFF/ON/FLA/LOR /FEN
	VI1?		Status – Searchlight VPI #1	aaa:	OFF/ON
	VI2?		Status – Searchlight VPI #2	aaa:	OFF/ON
	RIO	VI1?	Status – Vital Parallel Input #1	aaa:	OFF/ON
		VI2?	Status – Vital Parallel Input #2	aaa:	OFF/ON
		VI3?	Status – Vital Parallel Input #3	aaa:	OFF/ON
		VI4?	Status – Vital Parallel Input #4	aaa:	OFF/ON

Table 10 CONTINUED

Parameter Group Label	Module Type	Parameter Label	Description	Parameter Value Format ⁽¹⁾	Parameter Value Range/Option ⁽³⁾
TX #	Track / Line	COD ?	Command – Track Code number	nnn:/aaa:	1 thru 9 /M/NON
	Color-light	VO ?	Command – Colorlight VRO output	aaa:	OFF/ON/CAB
		VL1?	Command – Colorlight lamp output #1	aaa:	OFF/ON/FLA
		VL2?	Command – Colorlight lamp output #2	aaa:	OFF/ON/FLA
		VL3?	Command – Colorlight lamp output #3	aaa:	OFF/ON/FLA
		VL4?	Command – Colorlight lamp output #4	aaa:	OFF/ON/FLA
		VL5?	Command – Colorlight lamp output #5	aaa:	OFF/ON/FLA
		VL6?	Command – Colorlight lamp output #6	aaa:	OFF/ON/FLA
	Search-light	VO ?	Command – Searchlight VRO	aaa:	OFF/ON
		MC1 ?	Command – Searchlight #1 position	aaa:	RED/YEL/GRN
		MC2 ?	Command – Searchlight #2 position	aaa:	RED/YEL/GRN
		VL1?	Command – Searchlight lamp output #1	aaa:	OFF/ON/FLA
		VL2?	Command – Searchlight lamp output #2	aaa:	OFF/ON/FLA

Continued on next page

Table 10 CONTINUED

Parameter Group Label	Module Type	Parameter Label	Description	Parameter Value Format ⁽¹⁾	Parameter Value Range/Option ⁽³⁾
TX#	RIO	VO1 ?	Command – Vital Relay Output #1	aaa:	OFF/ON/CAB
		VO2 ?	Command – Vital Relay Output #2	aaa:	OFF/ON/CAB
		VO3 ?	Command – Vital Relay Output #3	aaa:	OFF/ON/CAB
		VO4 ?	Command – Vital Relay Output #4	aaa:	OFF/ON/CAB
CFG #	Track	VCO ?	Configuration – Track output voltage (byte) (in volts). (Note: 000=0.00V, 400=4.00V, adjustable in 0.1V increments)	nnn:	000 thru 400 (by 10's)
		CUR ?	Configuration – Track output current (byte) (in amps). (Note: 110=1.1A, 990=9.9A, adjustable in 0.1A increments)	nnn:	110 thru 990 (by 10's)
	Line	VTX ?	Configuration – Line transmit voltage (in volts). (Note: 020=2.00V, 150=15.00V, adjustable in 0.2V increments). 150 (15.0V) recommended	nnn:	020 thru 150
		VRX ?	Configuration – Line receive threshold (in volts). (Note: 020=2.00V, 150=15.00V, adjustable in 0.2V increments). 075 (7.50V) recommended	nnn:	020 thru 150
	Color-light	VDB ?	Configuration – VPI debounce time (in ms). (Note: 020=20ms, 200=200ms, adjustable in 2ms increments)	nnn:	020 thru 200 (by 20's)

Continued on next page

Table 10 CONCLUDED

Parameter Group Label	Module Type	Parameter Label	Description	Parameter Value Format ^[1]	Parameter Value Range/Option ^[3]
CFG#	Color-light	LMP ?	Configuration – lamp voltage (in V) (Note: 090=09.0V, 135=13.5V, adjustable in 0.1V increments)	nnn:	090 thru 135 (by 1's)
	Search-Light	VDB ?	Configuration - VPI debounce time (in ms) (Note: 020=20ms, 200=200ms, adjustable in 20ms increments)	nnn:	020 thru 200 (by 20's)
		LMP ?	Configuration – lamp voltage (in V) (Note: 090=09.0V, 135=13.5V, adjustable in 0.1V increments)	nnn:	090 thru 135 (by 1's)
		CR1 ?	Configuration – PCO #1 correspond time (in ms) Note: 020=200ms, 200=2000ms, adjustable in 10ms increments)	nnn:	020 thru 200 on pre Rev A modules. 020 thru 300 on Rev A and later modules (by 10's)
		CR2 ?	Configuration – PCO #2 correspond time (in ms) Note: 020=200ms, 200=2000ms, adjustable in 10ms increments)	nnn:	020 thru 200 on pre Rev A modules. 020 thru 300 on Rev A and later modules (by 10's)
	RIO	VDB ?	Configuration - VPI debounce time (in ms) (Note: 020=20ms, 200=200ms, adjustable in 20ms increments)	nnn:	020 thru 200 (by 20's)

[1] Parameter value formats are indicated as follows: a = alpha characters, n = numeric characters

[2] Field configurable option, xxx represents user-defined label. Parameter values and range set in MCF.

[3] OFF = a dark signal. ON = a lighted signal. FLA = flashing lamp. LOR = Lamp Out Relay (lamp filament was tested with current and failed). M = Maintenance. NON = None (no code). NUL = no parameters exist. The event log may also show FEN (Foreign Energy Detected).

Table 11 Status Parameter Labels for CPU III

Module Type	Parameter Label	Description	Value Format
Track/Line	TXV	Transmit Voltage	n.nnV
Track/Line	TXC	Transmit Current	n.nnA
Line	RXV	Receive Voltage	n.nnV
Track	RXC	Receive Current	n.nnA
Track	OP1	VRO Output	aaa

Table 12 Fatal Error Codes

Error Code [1]	Type	Problem Indicated	Corrective Action
UCN*	Fatal	Configuration error - UCN incorrect	Correct UCN and reboot.
CRC*		Configuration error - MCF CRC incorrect	Correct MCF CRC and reboot.
SIN*		Configuration error – SIN incorrect	Correct SIN and reboot.
MCF*		Configuration error – MCF corrupted or invalid	Reload MCF and reboot.
MCI*		Configuration error – hardware and MEF configuration indexes do not match	Correct configuration and reboot.
ADR*		Invalid ATCS address	Correct the ATCS address by selecting the SIN, and reboot.
VOP*		MCF or other vital configuration options have changed. GEO® has reverted to default vital module parameters from MCF. Vital configuration options defined in MCF need to be changed/confirmed.	Change/confirm required vital option values and reboot.

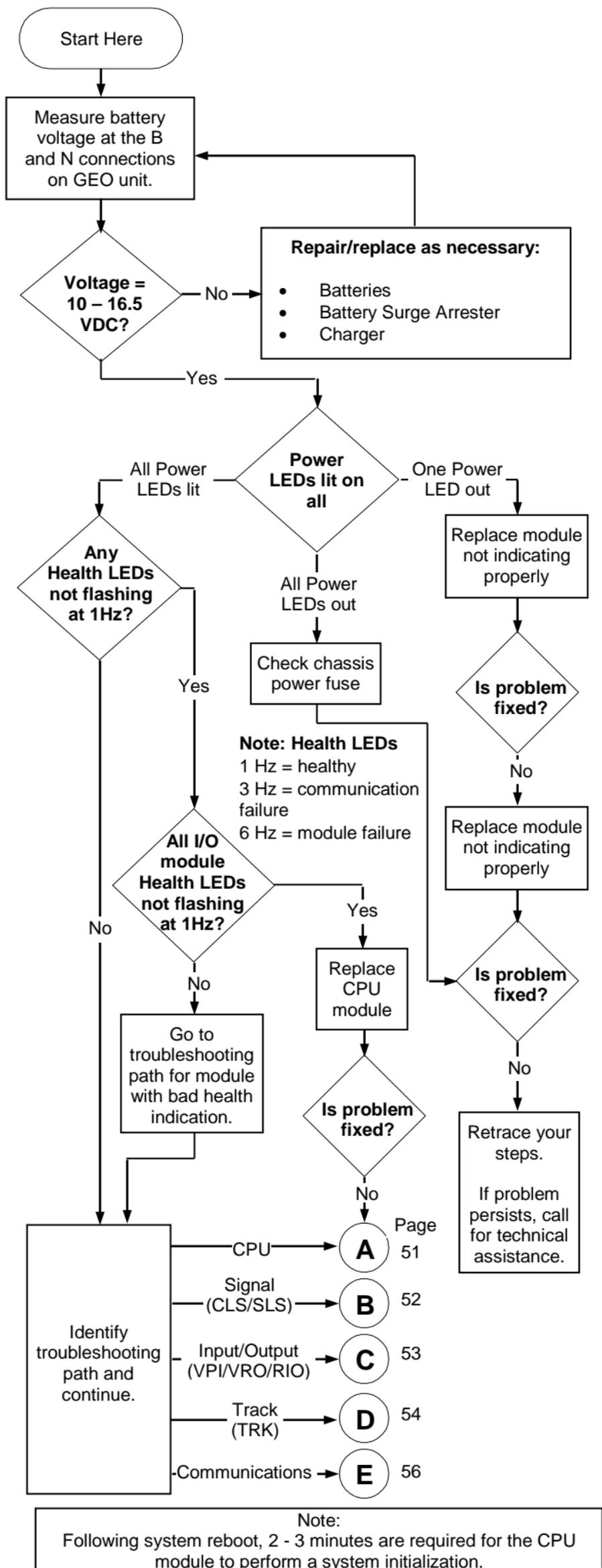
[1] When an error is detected, the display reads “**ERR:**”, followed by the applicable error code.

[2] Refer to site plans at the location and confirm correct CPU module vital and non-vital configuration settings. Adjust as necessary.

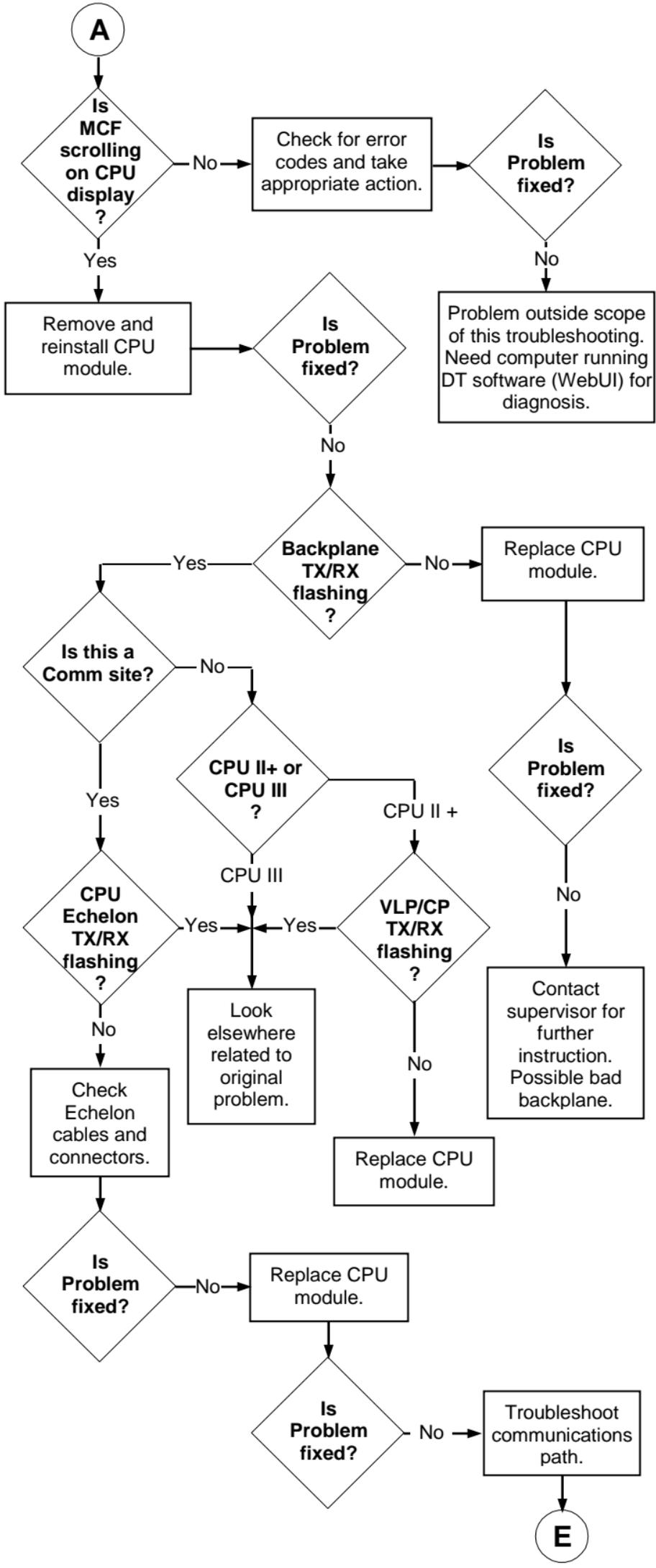
Table 13 Track Voltages

LENGTH (in feet)	Volts, Rail-to-Rail			
	3 Ohms Ballast – 140 lbs/yd		5 Ohms Ballast – 140 lbs/yd	
	Continuo us Welded Rail	Bonded Joints	Continuo us Welded Rail	Bonded Joints
5,000	1.1	1.3	1.1	1.2
6,000	1.2	1.3	1.1	1.3
7,000	1.2	1.4	1.2	1.3
8,000	1.3	1.5	1.2	1.4
9,000	1.3	1.7	1.2	1.5
10,000	1.4	1.8	1.3	1.6
11,000	1.5	1.9	1.3	1.7
12,000	1.5	2.1	1.4	1.8
13,000	1.6	2.3	1.4	1.9
14,000	1.7	2.5	1.5	2.0
15,000	1.8	2.7	1.5	2.1
16,000	1.9	3.0	1.6	2.3
17,000	2.0	3.3	1.7	2.4
18,000	2.1	3.6	1.8	2.6

TROUBLESHOOTING FLOWCHARTS

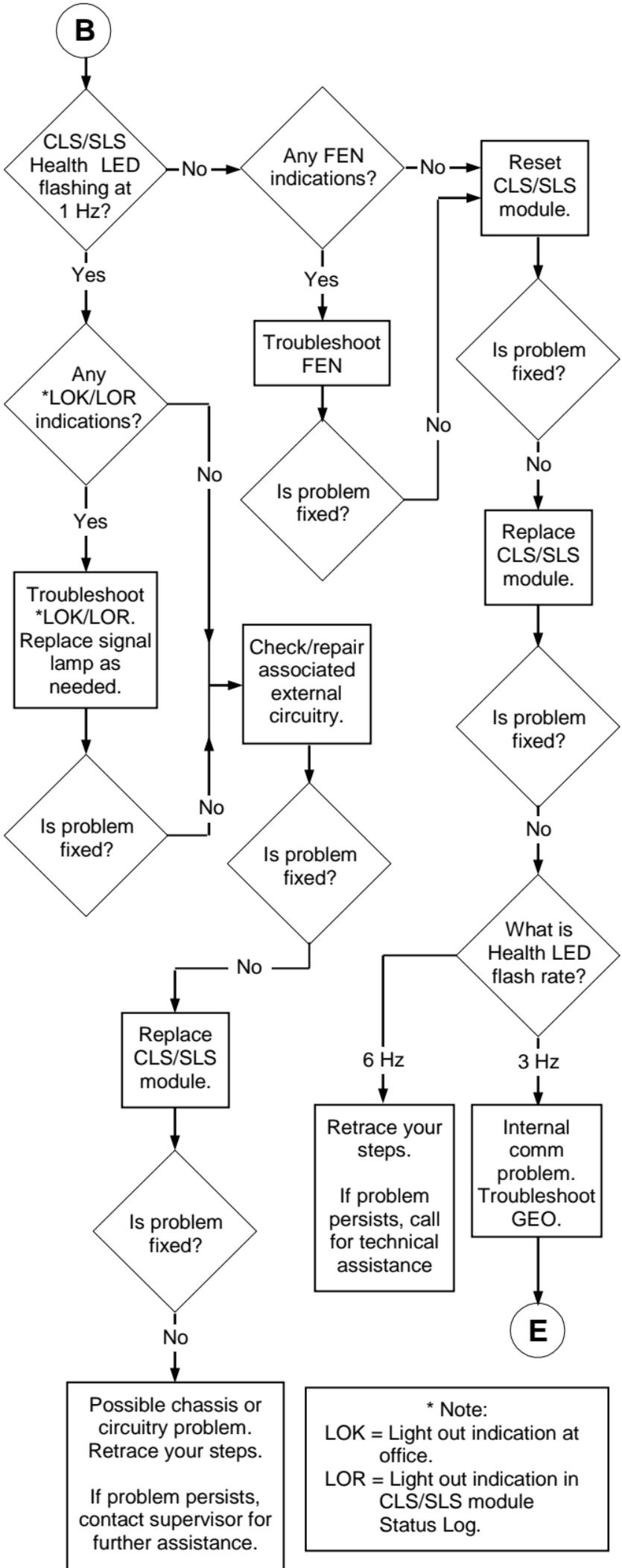


CPU TROUBLESHOOTING FLOWCHART



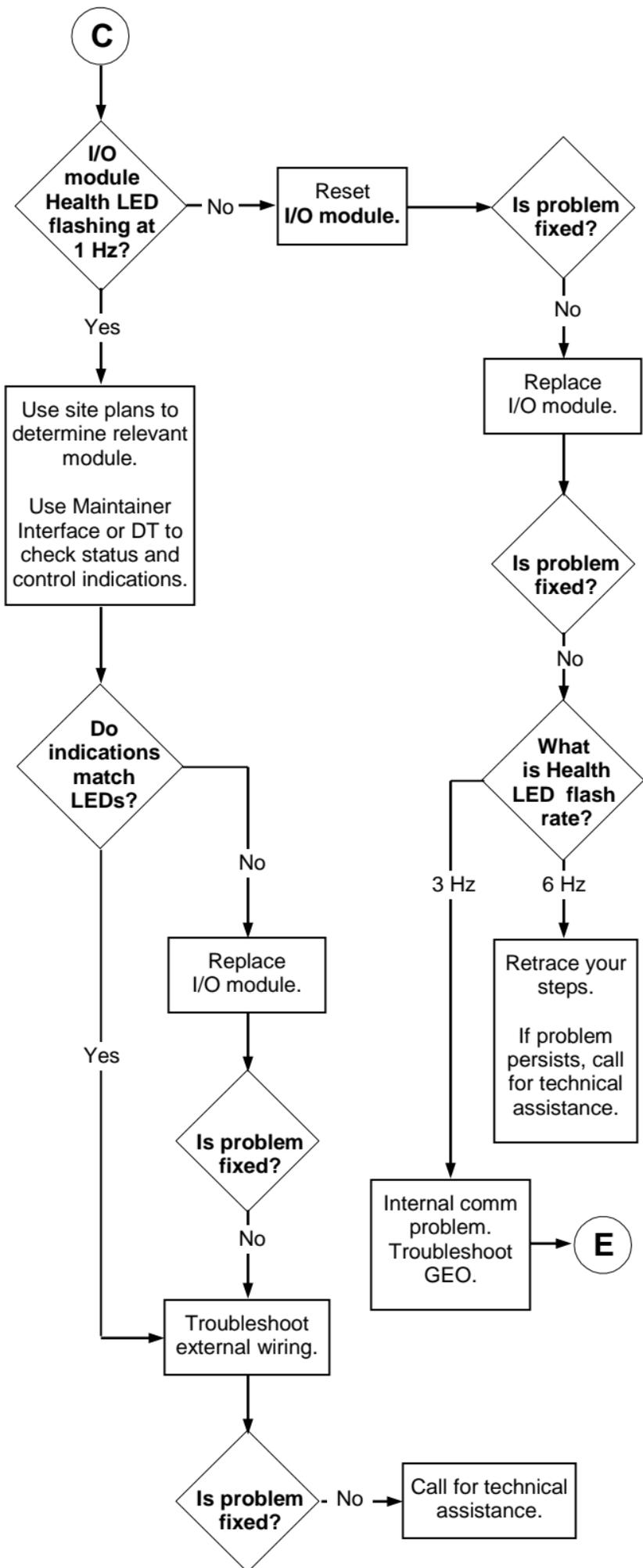
Note:
Following CPU module installation, 2-3 minutes are required for the module to perform a system initialization.

CLS/SLS TROUBLESHOOTING FLOWCHART

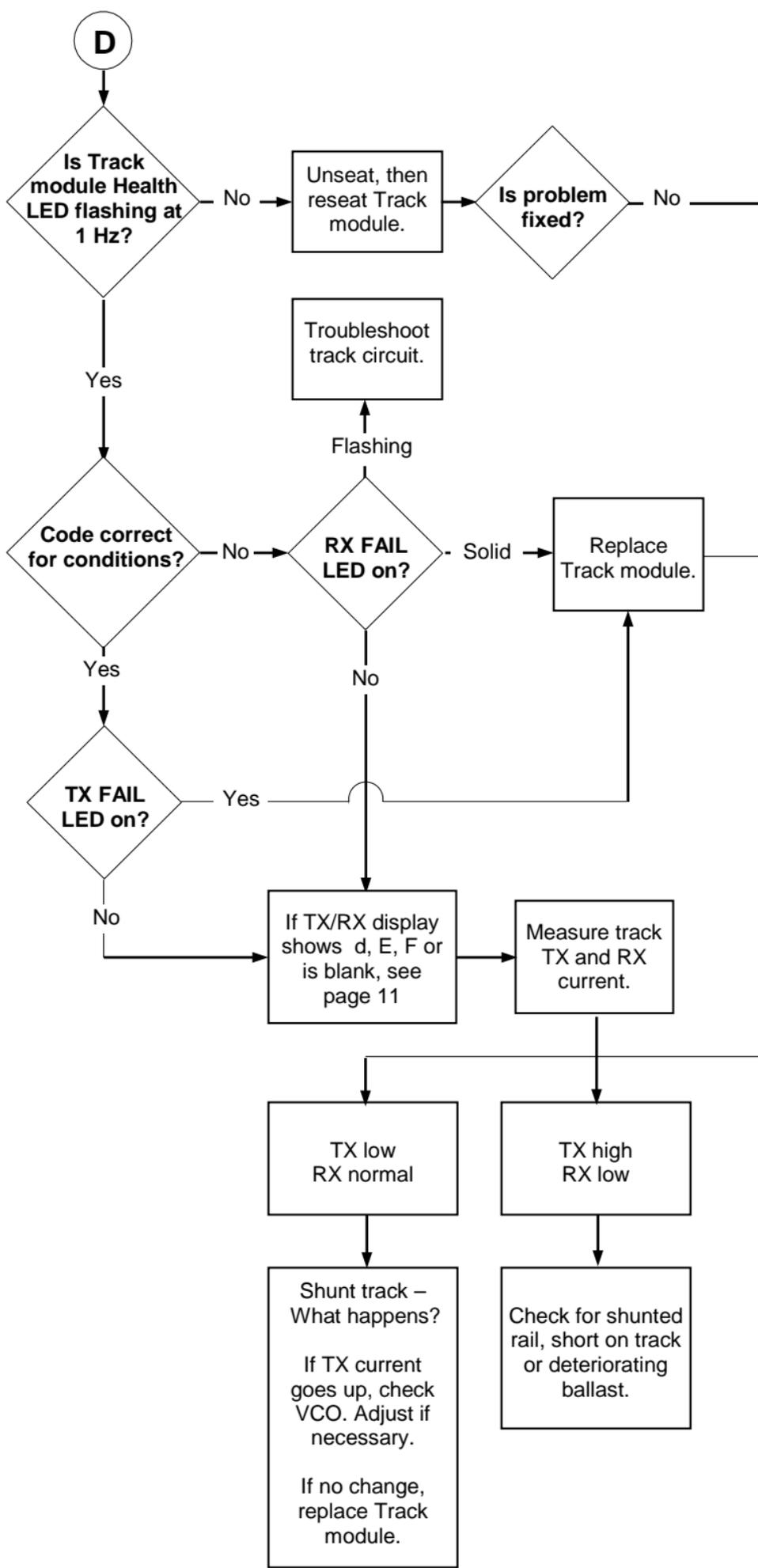


Note:
Following module installation, approximately 45 seconds are required for the module to perform a self test and report its status to the host CPU module.

I/O MODULE TROUBLESHOOTING FLOWCHART

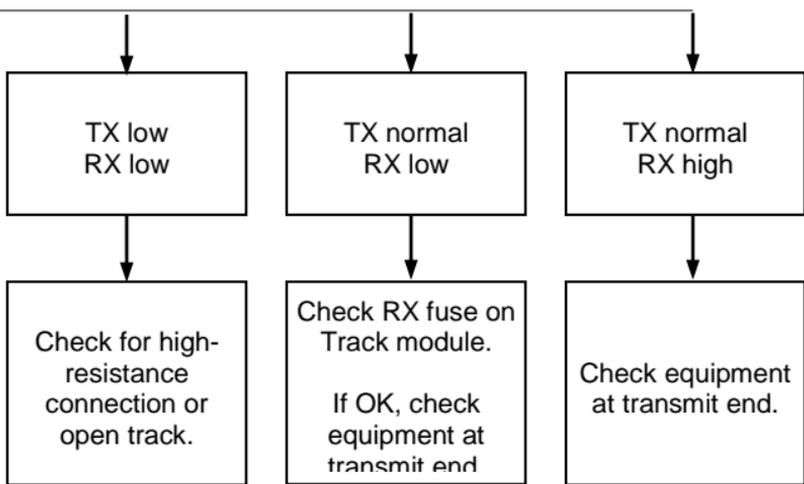
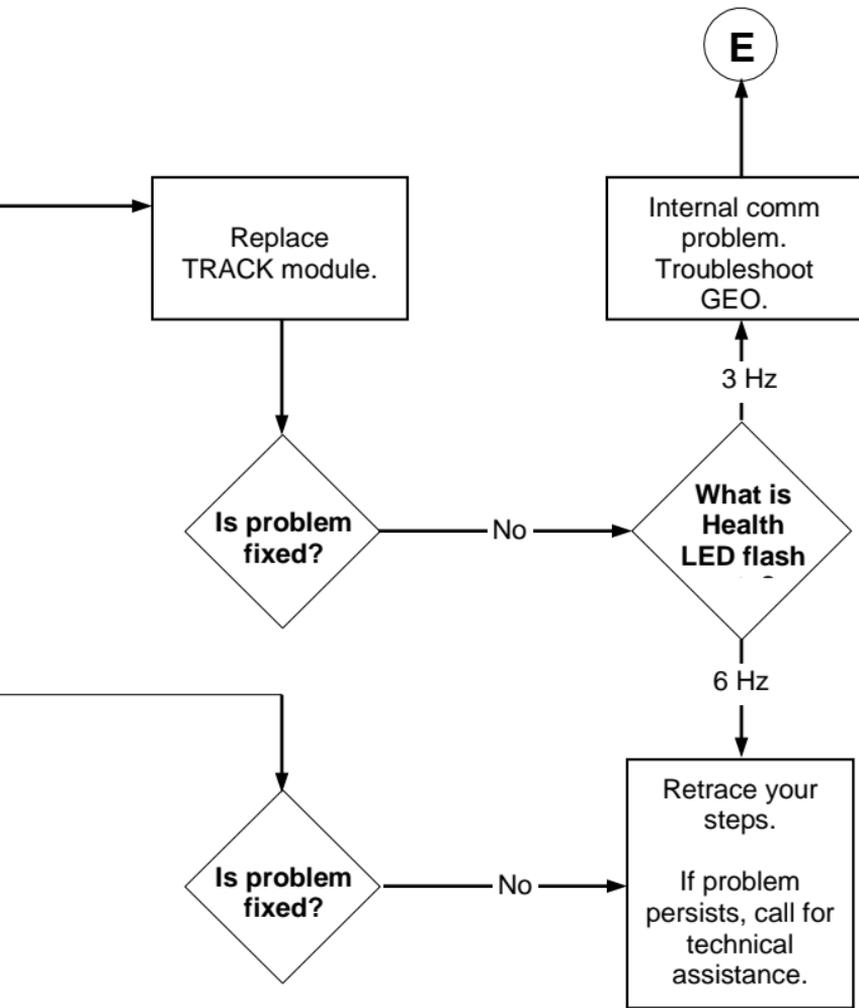


TRACK MODULE TROUBLESHOOTING FLOWCHART

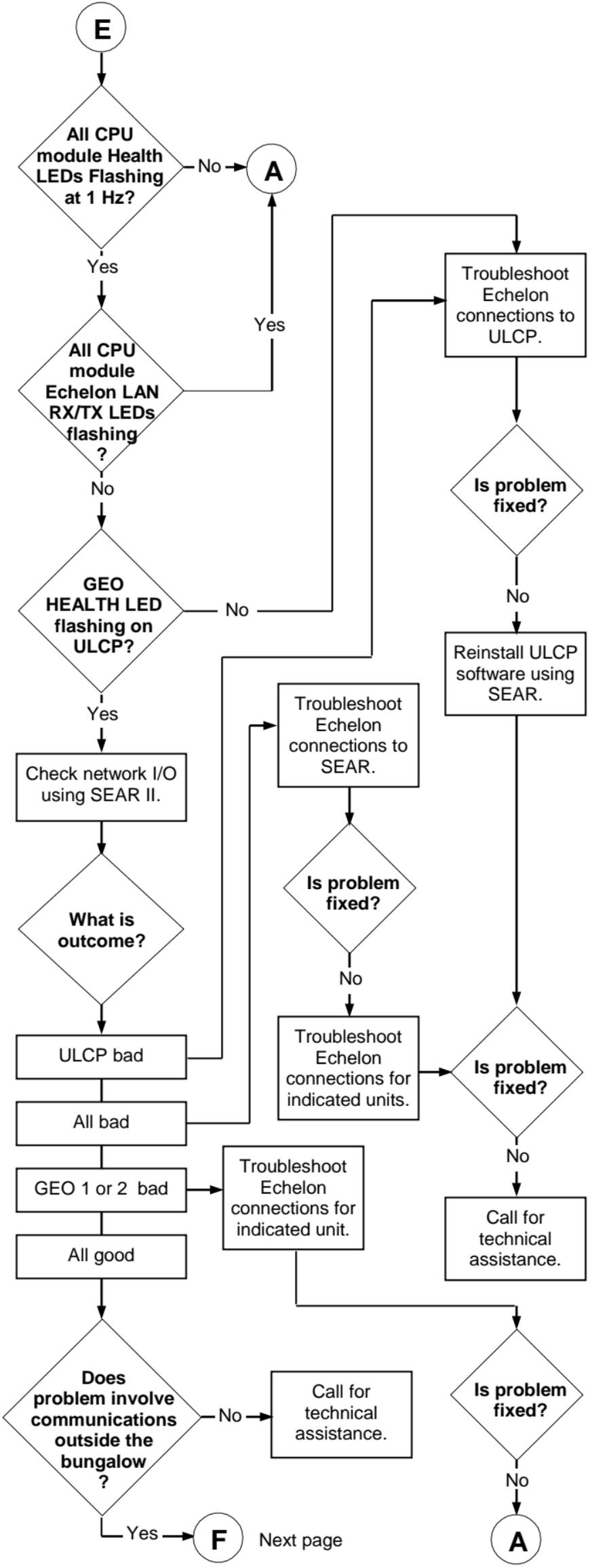


Note:
Following module installation, approximately 45 seconds are required for the module to perform a self test and report its status to the host CPU module.

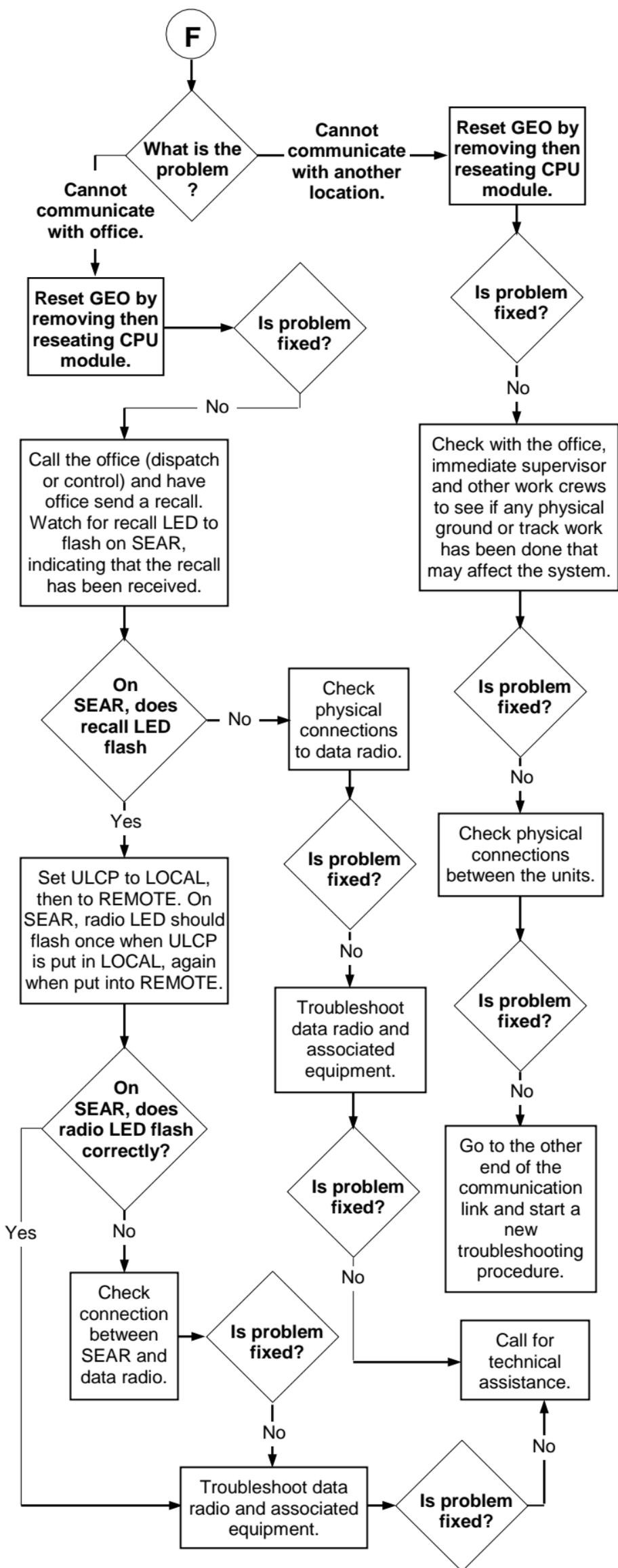
TRACK MODULE TROUBLESHOOTING FLOWCHART



COMMUNICATIONS TROUBLESHOOTING FLOWCHART



COMMUNICATIONS TROUBLESHOOTING FLOWCHART



GEO MODULE/MEF REPLACEMENT TEST PROCEDURES OVERVIEW

The following procedures provide minimum guidelines for testing a GEO unit after replacing a module or upgrading a module MEF (module executable file). These procedures outline the minimum testing that must be done to verify the GEO system and software are functioning as intended. The railroad and/or authority may require additional testing to be performed in support of changing the module or MEF(s).

USING THE WEBUI

The CPU III module provides a Web Interface which enables the user to configure the GEO locally as well as remotely through the Laptop/Ethernet port on the front of the CPU III module. The Laptop Port default protocol is set as DHCP Server. The CPU III will display an IP address scrolling across the four-character display. This can be accessed by using the Navigate (NAV) button to move between the scrolling displayed text. The WebUI uses the HTTP Secure (https) protocol. The CPU III DHCP Server protocol will assign the laptop an IP address and connect the user to the GEO. The WebUI supports the following web browsers:

- IE 10 and 11
- Firefox (version 46.x)
- Chrome (version 55.x)

Open a web browser and type in https:// followed by the IP address of the CPU III. The browser may give a connection warning. Click the Advanced option and select the option to proceed to the WebUI. The WebUI will then appear. Select the user name as Admin (default). The default password is Siemens (case sensitive) to open a session.

WARNING:

REPLACING A MODULE OR MEF WILL RESULT IN THE MODULE BEING RESET; THEREFORE, THE RAILROAD AND/OR AUTHORITY MUST MAKE THE NECESSARY ARRANGEMENTS TO ASSURE THE SAFE MOVEMENT OF TRAINS PRIOR TO REPLACING AND VERIFYING THE NEWLY INSTALLED MODULE OR MEF(S). IT IS RECOMMENDED THAT ONLY A QUALIFIED RAILROAD EMPLOYEE PERFORM THE TEST PROCEDURES HEREIN.

NOTE:

The use of the Siemens DT (Diagnostic Terminal) is required for units with a CPU II+. The use of Siemens WebUI is required for units with a CPU III.

TEST PROCEDURE 1: GEO TRACK MODULE / MEF REPLACEMENT / RX CURRENT CAL

Required Tools:	<ul style="list-style-type: none"> • Laptop computer with Siemens DT, Diagnostic Terminal utility installed (CPU II+). • GEO Diagnostic Terminal (DT) Handbook (Document no.SIG-00-04-17). • Laptop computer with Internet browser access for WebUI (CPU III) • SIG-00-15-04 (CPU III for GEO) • Triplet 2000 or equivalent. • 9-pin Female to Male straight through RS-232 Serial Cable. • 0.06 ohm test shunt.
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Table 14 Track Module MEF Replacement CPU II+ (A80403)

Step	Action
1	Connect the laptop to the DIAG (CP) port on the GEO CPU module. Launch the DT utility.
2	Using the DT utility, verify and record the transmit amps, transmit volts, and receive amps for the GEO Track Module to be replaced or updated.
3	Verify the Track Module field configurable options, V(TX) and current limit (10000 mA standard).
4	Verify the MEF version currently in use on the Track Module by selecting Software Information under the "VIEW" tab. Scroll through the system information display to locate the Track Module MEF information. Record the MEF version.
	<u>WARNING:</u> REPLACING A TRACK MODULE OR MODULE MEF WILL RESULT IN A MODULE RESET. DURING THIS INITIALIZATION PROCESS, THE GEO UNIT DOES NOT HAVE CONTROL OF THE ASSOCIATED TRACK. TAKE ADEQUATE PRECAUTIONS PER RAILROAD SAFETY AND OPERATING RULES PERTAINING TO THE SIGNAL SYSTEM.
5	If replacing MEF only, go to step 10.
6	Remove the GEO Track Module to be replaced and observe the position of the receiver jumper.
7	Prior to installing the new GEO Track Module, install the receiver jumper in the same position as it was on the previous module. Also verify the module hardware version. (Hardware version label located on backside of module on or near module serial number label.)

TEST PROCEDURE 1 for CPU II+ - Continued

Step	Action
8	Install the new Track Module.
9	<p>Verify that the “health” LED on the new Track Module is flashing at the proper rate (see chapter 3). Additionally, the “coded track” module label should turn green on the DT main display if the Track Module is communicating with the CPU module. If indications appear as stated, proceed to step 13.</p> <p>NOTE: If the health LED indicates a problem, the associated Track Module label is displayed red, or the CPU Module and/or Track Module display indicates an error, check the Track Module MEF version as described in step 4 above.</p>
10	If the MEF is to be changed, connect the laptop to the diagnostic port on the Track Module that will receive the MEF update.
11	<p>Install the MEF as follows:</p> <ol style="list-style-type: none"> Click the COMM button or menu, then select Install Software. A text box appears displaying boot messages until the Setup Program menu is displayed. Press the F4 function key on the PC keyboard or click the F4 button on the display to start the MEF change process. Select the correct MEF file for the module. Once the loading of the new MEF starts, the bar at the base of the text box shows progress. When the new MEF is completely loaded the text box will return to the Setup Program menu. <p>NOTE: If the module fails to reboot, or reboots and re-enters the Setup Program, check the boot messages to see if the correct MEF is listed. If not, repeat the MEF download process by clicking the MEF button or pressing F4.</p>

TEST PROCEDURE 1 for CPU II+ - Continued

Step	Action
	<p>NOTE: If the unit is without an MEF, Click the COMM button and select Reset Module from the menu. If “No Valid MEF” is displayed in the Text Terminal screen, then respond to “Change module setup (Y/N)?” by typing a “Y” from the keyboard, and then repeat steps c through e above.</p> <p>g. Select EXIT to reboot the module and exit the Setup Program.</p> <p>h. After observing that the module is rebooting, select EXIT again to close the text box.</p> <p>i. Wait until the GEO reboot is complete. Move the DB9 serial cable to the CPU module DIAG (CP) port if needed and reconnect DT.</p> <p>j. Right click on the label for the module just updated (label should be green), then select the Module Information function to check that the new MEF installation was successful.</p>
12	<p>NOTE: Siemens Rail Automation recommends notating new software on the location circuit plans.</p>
13	<p>Verify the “health” LED on the updated Track Module is flashing at the proper rate.</p>
14	<p>Using the GEO DT, verify the loaded MEF name and CRC number (see step 4 above).</p>
15	<p>Depending on track and weather conditions it may be necessary to readjust the GEO track circuit to meet manufacture’s recommended operating parameters. See tables below for recommended receive current settings.</p>
16	<p>Verify the Track Module is transmitting and receiving vital and non-vital track codes by observing TX and RX track code displays on the Track Module.</p>
17	<p>Perform an operational test of the track circuit by applying a 0.06-ohm shunt on both ends of the block and verify the loss of receive track codes and receive amps.</p>

TEST PROCEDURE 1 for CPU II+ - Concluded

Step	Action
18	Simulate broken rail by opening at least one track connection (test link) in the circuit and observe loss of receive track codes and receive amps. With track lead open an 'F' indication may be displayed on the Track Module TX code display.
19	Remove all test equipment, track shunts, ensure all connections are tight, and extinguish signal lamps where applicable and restore the signal system to service.

Table 15 Track Module MEF Replacement CPU III (A80903)

Step	Action
1	Connect the laptop via an Ethernet cable to the Laptop port. Launch the WebUI.
2	Using the WebUI I/O Views screen, verify and record the transmit amps, transmit volts, and receive amps for the GEO Track Module to be replaced or updated.
3	Verify the Track Module field configurable options, V(TX) and current limit (10000 mA standard).
4	Verify the MEF version currently in use on the Track Module by selecting System View > Module > Versions . Find the correct slot and record the MEF Version (under the column labeled Name).
	<u>WARNING:</u> REPLACING A TRACK MODULE OR MODULE MEF WILL RESULT IN A MODULE RESET. DURING THIS INITIALIZATION PROCESS, THE GEO UNIT DOES NOT HAVE CONTROL OF THE ASSOCIATED TRACK. TAKE ADEQUATE PRECAUTIONS PER RAILROAD SAFETY AND OPERATING RULES PERTAINING TO THE SIGNAL SYSTEM.
5	If replacing MEF only, go to step 10.
6	Remove the GEO Track Module to be replaced and observe the position of the receiver jumper.
7	Prior to installing the new GEO Track Module, install the receiver jumper in the same position as it was on the previous module. Also verify the module hardware version. (Hardware version label located on backside of module on or near module serial number label.)
8	Install the new Track Module.

TEST PROCEDURE 1 for CPU III - Continued

9	Verify that the “Health” LED on the new Track Module is flashing at the proper rate (see chapter 3). Additionally, the slot label should turn green on the IO Views display if the Track Module is communicating with the CPU module. If indications appear as stated, proceed to step 10.
10	If the MEF is to be changed, connect the CPU III to the diagnostic port on the Track Module that will receive the MEF update via a serial cable.
11	Install the MEF as follows: a. First, unlock the parameters for editing: the Unlock button must be selected and then either the SEL or NAV button on the front of the CPU to confirm user presence. b. The WebUI will then notify the user to check the serial port connection before uploading. c. Select OK to continue. The WebUI will then display the following message. Select OK to continue. d. The menu for updating the Track Module MEF will now be available. Select Change MEF to continue. The user can also note the current MEF on this screen. e. Once Change MEF has been selected, the WebUI will ask to confirm deletion of the current MEF (Erase the MEF (Y/N)?). Select Yes to continue. f. A Browse button will then appear allowing the user to navigate to the desired MEF. g. Once the correct file is selected, the WebUI will begin the upload. A status bar will appear indicating upload progress. h. At the end of the upload the WebUI will display the following message: Uploaded files successfully. The user can then select the Exit Setup option located above the progress bar. i. Wait until the GEO reboot is complete, then return to the System View menu and select Version to check that the new MEF installation was successful.
NOTE	If the module fails to reboot, or reboots and re-enters the Setup Program, check the boot messages to see if the correct MEF is listed. If not, repeat the MEF download process by clicking the MEF button or pressing F4.
NOTE	If the unit is without an MEF, Click the COMM button and select Reset Module from the menu. If “No Valid MEF” is displayed in the Text Terminal screen, then respond to “Change module setup (Y/N)?” by typing a “Y” from the keyboard, and then repeat steps c through e above.
NOTE	Siemens recommends recording this software change on the location circuit plans.

TEST PROCEDURE 1 for CPU III - Concluded

12	Verify the “Health” LED on the updated Track Module is flashing at the proper flash rate (see chapter 3).
13	Using the WebUI, verify the loaded MEF name and CRC number via the Reports & Logs menu on the Tool Bar, then select Reports > Configurations and click the Create button. This will display the MCF used on the GEO and the MEF versions used on each module.
14	Depending on track and weather conditions it may be necessary to readjust the GEO track circuit to meet manufacture’s recommended operating parameters. See tables below for recommended receive current settings.
15	Verify the Track Module is transmitting and receiving vital and non-vital track codes by observing TX and RX track code displays on the Track Module.
16	Perform an operational test of the track circuit by applying a 0.06-ohm shunt on at least one end of the effective track circuit and verify the loss of receive track codes and receive amps.
17	Simulate broken rail by opening at least one track connection (test link) in the circuit and observe loss of receive track codes and receive amps. With the track lead open an ‘F’ indication may be displayed on the Track Module TX code display.

Remove all test equipment, track shunts, ensure all connections are tight, and extinguish signal lamps where applicable and restore the signal system to service.

Table 16 GEO Track Module Receive Current Table

Ballast Conditions	DT or WebUI RX Current Target Reading
Frozen	Approx. 1350 mA
Dry (normal)	Approx. 1150 mA
Wet	Approx. 850 mA
Use the following RX Current ranges <i>only</i> if the GEO Track Module is A53285-0003 running software TRK01_15.MEF or later. See additional notes on following page.	
Extremely Dry or Frozen	1900 – 2100 mA
Dry (normal)	1450 – 1750 mA
Wet	0950 – 1150 mA

Table 17 GEO Track Circuit Rx Jumper Adjustment

Jumper Position	Assigned Resistance Value	Total Resistance w/Jmp in	Resistance Calculation
J-6	Zero Ohms	Zero Ohms	J6 only
J-5	0.15 Ohms	0.15 Ohms	J6+J5
J-4 (default)	0.15 Ohms	0.30 Ohms	J6+J5+J4
J-3	0.20 Ohms	0.50 Ohms	J6+J5+J4+J3
J-2	0.33 Ohms	0.83 Ohms	J6+J5+J4+J3+J2

NOTE: The final RX adjustment of the GEO track circuit is equal to the total resistance shown for the assigned jumper position. Total resistance is based on the sum of all prior resistances beginning with position J-6. For example, if the jumper is in position J-4 the sum of resistors J6+J5+J4 applied to the RX adjustment is equal to 0.30 ohms. To decrease the RX amp reading move the jumper from J-4 to J-3 or J-2. To increase the RX amp reading move the jumper from J-4 to J-5 or J-6.

TEST PROCEDURE 1 – Additional setup notes only for enhanced Track Module A53285-0003 with software TRK01_15.MEF or later.

If using a GE TIS-4

If using a GE TIS-4 unit to test the enhanced version of Track hardware and software, Siemens Rail Automation recommends the VCO on the Track module under test be adjusted to 2.0 volts.

Jumper Settings

The default setting for the RX jumper is position J-4 (0.30 ohms resistance). To decrease the RX amp reading move the jumper from J-4 to J-3 or J-2 (increasing resistance), and to increase the RX amp reading move the jumper from J-4 to J-5 or J-6 (decreasing resistance).

For Significant Ballast Swings

Only for those track circuits known to have significant ballast swings, after the final adjustment is made, Siemens Rail Automation recommends moving the RX jumper one position to the right to lower the resistance by one value. For example, if the jumper ends up in J-4, move it from J-4 (.30 ohms) to J-5 (.15 ohms), or from J-5 (.15 ohms) to J-6 (zero ohms) as a final setting.

Check for Foreign Energy

After RX adjustment, Siemens Rail Automation recommends opening each track circuit lead, TX and RX, one at a time to ensure the RX amperes is lost (0.0 ohms) to verify no foreign energy amperes is present.

GEO TRACK CIRCUIT SETUP CHECKLIST

Record all appropriate data on the GEO Track Circuit Setup Checklist located on the following page.

GEO Track Circuit Setup Checklist

Signal Location _____

Track Circuit Info		Track Conditions			GEO Battery Voltage	Track Circuit Measurements							Date	Initials		
Designation	Slot & Module#	Frozen	Dry	Wet		VCO	TX Amps Normal	TX Amps w/0.6	TX Amps Hardware	RX Amps Normal	RX Amps w/ 0.6	RX Amps Hardware	Jumper Setting			
Final Setting; No Shunt(s)																
Shunt(s) Applied Far End																
Shunt(s) Applied Near End																
Final Setting; No Shunt(s) Applied																
Shunt(s) Applied Far End																
Shunt(s) Applied Near End																

Siemens recommends each track lead in the track circuit be opened and ensure RX amperes are lost, 0.0 amps.

TEST PROCEDURE 2: CPU MODULE OR VLP / CP MEF REPLACEMENT

Use the following procedure when replacing a GEO CPU II+ or CPU III Module or the CPU Module MEF.

Required Tools:	<ul style="list-style-type: none"> • Laptop computer with Siemens DT, Diagnostic Terminal utility installed or Web Browser (WebUI) access. • CPU III for GEO and WayConneX (Document No. SIG-00-15-04) • GEO Diagnostic Terminal (DT) Handbook (Document no.SIG-00-04-17). • 9-pin Female to Male straight through RS-232 Serial Cable. <p>NOTE: Please ensure the use of the corresponding VLP and CP MEFs as identified by Siemens Mobility. Refer to the Railroad/User Software Configuration database to ensure proper MEF revision levels.</p>
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**Table 18 Replacing the CPU VLP/CP MEF
on CPU II+**

Step	Action
1	Connect the laptop to the DIAG (CP) port on the GEO CPU module. Launch the DT utility.
2	<p>Verify the MEF versions currently in use on the CPU module by selecting Software Information under the “VIEW” tab.</p> <p>Scroll through the system information display to locate the CPU module MEF information.</p>
	<p>WARNING: REPLACING A MODULE OR MODULE MEF WILL RESULT IN A MODULE RESET. DURING THIS INITIALIZATION PROCESS, THE GEO UNIT DOES NOT HAVE CONTROL OF THE SIGNAL SYSTEM. TAKE ADEQUATE PRECAUTIONS PER RAILROAD SAFETY AND OPERATING RULES PERTAINING TO THE SIGNAL SYSTEM.</p>

TEST PROCEDURE 2 for CPU II+ - Continued

Step	Action
3	If replacing MEFs only, go to step 6.
4	Disconnect the serial cable, remove the CPU Module and install the new CPU Module.
5	Verify the MEF versions of the new module (repeat steps 1 & 2).
6	If the MEFs are to be replaced, connect the laptop to the left VLP port to update the Vital Logic Processor MEF and the right DIAG (CP) port to update the Communications Processor MEF.
7	<p>Install the MEF as follows:</p> <ol style="list-style-type: none"> a. Click the COMM button or menu, then select Install Software. b. A text box appears displaying boot messages until the Setup Program menu is displayed. c. Press the F4 function key on the PC keyboard or click the F4 button on the display to start the MEF change process. d. Select the correct MEF file for the module. e. Once the loading of the new MEF starts, the bar at the base of the text box shows progress. f. When the new MEF is completely loaded the text box will return to the Setup Program menu. <p>NOTE: If the module fails to reboot, or reboots and re-enters the Setup Program, check the boot messages to see if the correct MEF is listed. If not, repeat the MEF download process by clicking the MEF button or pressing F4.</p>

TEST PROCEDURE 2 for CPU II+ - Continued

Step	Action
	<p>NOTE: If the unit is without an MEF, Click the COMM button and select Reset Module from the menu. If “No Valid MEF” is displayed in the Text Terminal screen, then respond to “Change module setup (Y/N)?” by typing a “Y” from the keyboard, and then repeat steps c through e above.</p> <p>g. Select EXIT to reboot the module and exit the Setup Program.</p> <p>h. After observing that the module is rebooting, select EXIT again to close the text box.</p> <p>i. Wait until the GEO reboot is complete. Move the DB9 serial cable to the CPU module DIAG (CP) port if needed and reconnect DT.</p> <p>j. Right click on the CPU module label (label should be green), then select the Module Information function to check that the new MEF installation was successful.</p>
	<p>NOTE: Siemens Rail Automation recommends recording this software change on the location circuit plans.</p>
8	Verify that all health and status LED's on the CPU module are indicating properly.
9	Verify the MCF name is scrolling in the CPU display.
10	Using the GEO DT, verify the loaded VLP and CP MEF names and CRC numbers (see step 2 above).
11	Using the DT, verify that all required GEO modules are in session and communicating with the CPU module by observing the CPU status/summary log. In addition, ensure each module displays a green module label on the main DT status display for the GEO unit. Any modules that show a red module label may be an indication that the module is not communicating with the CPU module. The Health LED on each module should be flashing at a 1 Hz rate.

TEST PROCEDURE 2 for CPU II+ - Concluded

Step	Action
12	Momentarily remove each module, one at a time, replacing one before removing the next, and observe loss of communication with the CPU module.
13	If the GEO unit is in an interlocking and or control point, verify that at least one indication can be sent and one control can be received and executed per the given application from the central office to the GEO unit, (i.e. vital switch and or signal/route request). For distributed GEO systems (multiple units), ensure such request(s) include logic execution associated with each GEO unit.
14	If the GEO unit is connected to signal equipment through echelon ports (other than the Local Control Panel), verify that at least one input to the GEO and one output from the GEO is functional.
15	For all locations utilizing a ULCP, (Universal Local Control Panel), verify the functionality of the ULCP by placing the location in local control and generating requests to the GEO system from the ULCP. Verify that corresponding ULCP indications are properly displayed.
16	For distributed GEO systems, momentarily disconnect the Echelon connection between the GEO units and verify the system responds accordingly, (e.g. display a signal for a given route spanning more than one GEO unit; remove the Echelon connection between units and observe that the clear signal displays stop). In addition, ensure each ATCS session displays a green color banner on the DT ATCS Communications status display for the GEO unit.
17	Using the DT, verify the CPU module is recording events from each module as well as itself.
18	Upon completion of this testing remove all test equipment, restore the ULCP to the office/remote position, and return control of the location to the railroad dispatcher/operator.

Table 19 Replacing the CPU III VLP/CP MEF via the WebUI

Step	Action
1	Connect the laptop via an Ethernet cable to the Laptop port. Launch the web browser and connect to WebUI (see Section on Using the WebUI).
2	Verify the MEF version currently in use by selecting System View > Module > Versions . Find the correct slot and record the CPU MEF Version (under the column labeled Name)
Warning	REPLACING A MODULE OR MODULE MEF WILL RESULT IN A MODULE RESET. DURING THIS INITIALIZATION PROCESS, THE GEO UNIT DOES NOT HAVE CONTROL OF THE SIGNAL SYSTEM. TAKE ADEQUATE PRECAUTIONS PER RAILROAD SAFETY AND OPERATING RULES PERTAINING TO THE SIGNAL SYSTEM.
3	If replacing MEFs only, go to step 6.
4	Disconnect the Ethernet cable, remove the CPU Module, and install the new CPU Module.
5	Verify the MEF versions of the new module (repeat steps 1 & 2).
6	If the MEFs are to be replaced, connect the laptop to the Laptop port to update the Vital Logic Processor MEF and the Communications Processor MEF.

Step	Action
7	Install the each MEF as follows: <ol style="list-style-type: none"> a. Click the Maintenance icon from the Tool Bar. b. From the left side menu, select either the CP MEF or VLP MEF. c. To confirm local user presence, click the Unlock button, confirm, then immediately following, press either the SEL or NAV button on the front of the CPU III. d. Once unlocked (screen will display Unlock Successful. System is in edit mode now.), click the Browse button and navigate to the desired MEF file. e. After selecting the correct file, click the Update button. f. Once the loading of the new MEF starts, an Uploading Status bar will show progress. g. Prior to finishing the upload the WebUI will display the following message: Reboot is required to load the new software. Press OK to continue. h. Select OK to continue. The new MEF is now completely loaded and the screen will display the following message: File uploaded successfully. System will reboot to load the new software. This may take several minutes. The module will then proceed to reboot. i. Using the WebUI, verify the loaded MEF name and CRC number via the Reports & Logs menu on the Tool Bar, then select Reports > Configurations and click the Create button. This will display the MEF used on the GEO and the MEF versions used on each module.
NOTE	If the module fails to reboot, or reboots and re-enters the Setup Program, check the boot messages to see if the correct MEF is listed. If not, repeat the MEF download process by clicking the MEF button or pressing F4.
NOTE	If the unit is without an MEF, Click the COMM button and select "Reset Module" from the menu. If "No Valid MEF" is displayed in the Text Terminal screen, then respond to "Change module setup (Y/N)?" by typing a "Y" from the keyboard, and then repeat steps c through e above.
NOTE	Siemens recommends recording this software change on the location circuit plans.
8	Verify that all health and status LEDs on the CPU module are indicating properly.
9	Verify the MCF name is scrolling in the CPU display.

Step	Action
10	Using the WebUI, verify that all required GEO modules are in session and communicating with the CPU module by observing the IO Views. In addition, ensure each module displays a green module label on the IO View display for the GEO unit. Any modules that show a red module label may be an indication that the module is not communicating with the CPU module.
11	Momentarily remove each module, one at a time, replacing one before removing the next, and observe loss of communication with the CPU module.
12	If the GEO unit is in an interlocking and or control point, verify that at least one indication can be sent and one control can be received and executed per the given application from the central office to the GEO unit, (i.e. vital switch and or signal/route request). For distributed GEO systems (multiple units), ensure such request(s) include logic execution associated with each GEO unit.
13	If the GEO unit is connected to signal equipment through echelon ports (other than the Local Control Panel), then verify that at least one input to the GEO unit and one output from the GEO unit is functional.
14	For all locations utilizing a ULCP, (Universal Local Control Panel), verify the functionality of the ULCP by placing the location in local control and generating requests to the GEO system from the ULCP. Verify that corresponding ULCP indications are properly displayed.
15	For distributed GEO systems, momentarily disconnect the Echelon connection between the GEO units and verify the system responds accordingly, (e.g. display a signal for a given route spanning more than one GEO unit; remove the Echelon connection between GEO units and observe that the clear signal displays stop). In addition, ensure each ATCS session displays a green color banner on the DT ATCS Communications status display for the GEO unit.
16	Using the WebUI, verify the CPU module is recording events (Event Log) from each module as well as itself.

Upon completion of this testing remove all test equipment, restore the ULCP to the office/remote position, and return control of the location to the railroad dispatcher/operator.

TEST PROCEDURE 3 for CPU II+: GEO I/O MODULE / MEF REPLACEMENT

Use the following procedure when replacing a GEO I/O Module or the Module MEF on CPU II+. For CPU III Modules, use Procedure 1 (Table 9) and connect serial cable to the desired I/O Module instead of Track Module. The remainder of the procedure is the same.

Required Tools:	<ul style="list-style-type: none"> • Laptop computer with Siemens DT, Diagnostic Terminal utility installed or Web Browser (WebUI) access. • CPU III for GEO and WayConneX (Document No. SIG-00-15-04) • GEO Diagnostic Terminal (DT) Handbook (Document no.SIG-00-04-17). • 9-pin Female to Male straight through RS-232 Serial Cable.
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Step	Action
1	Connect the laptop to the DIAG (CP) port on the GEO CPU module. Launch the DT utility.
2	Verify the MEF versions currently in use on the GEO module to be updated/replaced by selecting Software Information under the "VIEW" tab. Scroll through the system information display to locate the module MEF information.
	<u>WARNING:</u> REPLACING A MODULE OR MODULE MEF WILL RESULT IN A MODULE RESET. DURING THIS SOFTWARE UPGRADE, THE GEO UNIT DOES NOT HAVE CONTROL OF THE SIGNAL SYSTEM. TAKE ADEQUATE PRECAUTIONS PER RAILROAD SAFETY AND OPERATING RULES PERTAINING TO THE SIGNAL SYSTEM.
3	If replacing MEF only, go to step 5.
4	Remove the GEO I/O Module and install the new GEO I/O Module.

TEST PROCEDURE 3 for CPU II+ - Continued

Step	Action
5	<p>If the MEF is to be replaced, connect the laptop to the diagnostic port on the module that will receive the MEF update.</p>
6	<p>Install the MEF as follows:</p> <ol style="list-style-type: none"> a. Click the COMM button or menu, then select Install Software. b. A text box appears displaying boot messages until the Setup Program menu is displayed. c. Press the F4 function key on the PC keyboard or click the F4 button on the display to start the MEF change process. d. Select the correct MEF file for the module. e. Once the loading of the new MEF starts, the bar at the base of the text box shows progress. f. When the new MEF is completely loaded the text box will return to the Setup Program menu. <p>NOTE: If the module fails to reboot, or reboots and re-enters the Setup Program, check the boot messages to see if the correct MEF is listed. If not, repeat the MEF download process by clicking the MEF button or pressing F4.</p> <p>NOTE: If the unit is without an MEF, click the COMM button and select Reset Module from the menu. If “No Valid MEF” is displayed in the Text Terminal screen, then respond to “Change module setup (Y/N)?” by typing a “Y” from the keyboard, and then repeat steps c through e above.</p> <ol style="list-style-type: none"> g. Select EXIT to reboot the module and exit the Setup Program. h. After observing that the module is rebooting, select EXIT again to close the text box. i. Wait until the GEO reboot is complete. Move the DB9 serial cable to the CPU module DIAG (CP) port if needed and reconnect DT. j. Right click on the label for the module just updated (label should be green), then select the Module Information function to check that the new MEF installation was successful

TEST PROCEDURE 3 for CPU II+ - Concluded

Step	Action
	NOTE: Siemens Rail Automation recommends recording this software change on the location circuit plans.
7	Verify the “health” LED on the updated module is flashing at the proper flash rate
8	Using the GEO DT, verify the loaded MEF name and CRC number (see step 2 above).
9	Open the summary log under the “HIST” tab on the respective module and verify the module has re-established session with the VLP by observing the presence of the Rx Session Established message.
10	Open the CP and VLP summary log on the CPU module and confirm Rx Session has been re-established with the VLP.
11	Exit the DT utility.
12	Remove the laptop from the GEO unit and restore the signal system to service.

For replacing the I/O Module MEF via the WebUI, follow the procedure outlined in Table 9 and simply plug the serial cable into the desired I/O module and select the correct MEF for the module.

TEST PROCEDURE 4 for CPU II+: SEARCHLIGHT MODULE / MEF REPLACEMENT

Use the following procedure when replacing a GEO Searchlight Module or the module MEF on a GEO unit utilizing a CPU II+.

Required Tools:	<ul style="list-style-type: none"> • Laptop computer with Siemens DT, Diagnostic Terminal utility installed. • GEO Diagnostic Terminal (DT) Handbook (Document no.SIG-00-04-17). • 9-pin Female to Male straight through RS-232 Serial Cable. • 9-pin Female to 4-pin Female RS-232 Adapter for use with the Searchlight Module diagnostic connector J4 (if necessary). See note below. <p>NOTE: If the Searchlight module does not have an RS-232 front panel diagnostic port (SLS prior to Rev A), connect the laptop to the SLS module via connector J4 located in the center of the module's PCB. Use the 9-pin Female to 4-pin Female RS-232 Adapter to make the connection.</p>
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Table 20 Search Light Module MEF Replacement for CPU II+

Step	Action
1	Connect the laptop to the DIAG (CP) port on the GEO CPU module. Launch the DT utility.
2	<p>Verify the MEF version currently in use on the GEO Searchlight Module to be updated/replaced by selecting Software Information under the "VIEW" tab.</p> <p>Scroll through the system information display to locate the module MEF information.</p>

TEST PROCEDURE 4 for CPU II+ - Continued

Step	Action
3	After verifying the existing MEF, change the module verbosity to level 2. Do this by right-clicking on the module label and selecting Set Verbosity on the menu. When the Verbosity window appears, drag the cursor to the second position, and click the SET button.
	<p style="text-align: center;"><u>WARNING</u></p> <p>REPLACING A MODULE MEF WILL RESULT IN A MODULE RESET. DURING THIS SOFTWARE UPGRADE, THE GEO UNIT DOES NOT HAVE CONTROL OF THE SIGNAL SYSTEM. TAKE ADEQUATE PRECAUTIONS PER RAILROAD SAFETY AND OPERATING RULES PERTAINING TO THE SIGNAL SYSTEM.</p>
4	If replacing MEF only, go to step 6.
5	Remove the Searchlight Module and replace it with the new Searchlight Module.
6	To replace the MEF, connect the laptop to the GEO Searchlight Module via the front panel Diag port, or to J4 on the PCB using the RS-232 Adapter cable - as applicable. (See previous note below Required Tools)

TEST PROCEDURE 4 for CPU II+- Continued

Step	Action
7	<p>Install the MEF as follows:</p> <ol style="list-style-type: none"> a. Click the COMM button or menu, then select Install Software. b. A text box appears displaying boot messages until the Setup Program menu is displayed. c. Press the F4 function key on the PC keyboard or click the F4 button on the display to start the MEF change process. d. Select the correct MEF file for the module. e. Once the loading of the new MEF starts, the bar at the base of the text box shows progress. f. When the new MEF is completely loaded the text box will return to the Setup Program menu. <p>NOTE: If the module fails to reboot, or reboots and re-enters the Setup Program, check the boot messages to see if the correct MEF is listed. If not, repeat the MEF download process by clicking the MEF button or pressing F4.</p> <p>NOTE: If the unit is without an MEF, Click the COMM button and select Reset Module from the menu. If “No Valid MEF” is displayed in the Text Terminal screen, then respond to “Change module setup (Y/N)?” by typing a “Y” from the keyboard, and then repeat steps c through e above.</p> <ol style="list-style-type: none"> g. Select EXIT to reboot the module and exit the Setup Program. h. After observing that the module is rebooting, select EXIT again to close the text box.

TEST PROCEDURE 4 for CPU II+ - Continued

Step	Action
7	<ul style="list-style-type: none"> i. Wait until the GEO reboot is complete. Move the DB9 serial cable to the CPU module DIAG (CP) port if needed and reconnect DT. j. Right click on the label for the module just updated (label should be green), then select the Module Information function to check that the new MEF installation was successful.
	NOTE: Siemens Rail Automation recommends recording this software change on the location circuit plans.
8	Using the GEO DT, verify the loaded MEF name and CRC number (see steps 1 & 2 above).
9	Verify the “health” LED on the Searchlight module is flashing at the proper flash rate (see chapter 3). Additionally, the module label will turn green when displayed on the DT indicating that the module and newly installed MEF is communicating with the CPU module, as shown below.
10	Open the summary log under the “HIST” tab on the respective module and verify the module has re-established session with the VLP by observing the presence of the Rx Session Established message.
11	Open the CP and VLP summary log on the CPU module and confirm Rx Session has been re-established with the VLP.
12	Open the status log under the “HIST” tab on the respective module.
13	Verify the module has completed and passed the searchlight mechanism self test for both channel 1 and channel 2 .
14	Change the module verbosity setting back to level 1 (minimum).
15	Exit the DT utility.
16	Disconnect the laptop from the GEO unit.
17	Restore the signal system to service.

For replacing the Search Light Module MEF via the WebUI, follow the procedure outlined in Table 9 and simply plug the serial cable into the Search Light module and select the correct MEF for the module.

CHANGE NOTICE

The following changes have been made to the
GEO Maintainer's Handbook,
Document Number SIG-00-04-01.

July 2012 - Ver C.1

Page 63: In **GEO TRACK MODULE RECEIVE CURRENT TABLE**, changed reference to enhanced Track card from A53285-0001 Rev E to A53285-0003.

Page 64: At top of page changed reference to enhanced Track card from A53285-0001 Rev E to A53285-0003. Removed first paragraph under **Jumper Settings** and removed "As with the original jumper configuration," from the second paragraph.

April 2014 – Ver C.2

Rebrand document for Siemens

September 2018 – Ver. D

Removed obsolete content and added information pertaining to using a GEO module with a CPU III.



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