S&C Recommended Practice 1061
Hot Box Detector Site Settings

1.0 Scope

a. This Recommended Practice provides the site specific dip-switch and other settings for hot box detector systems.

b. The systems specifically covered are:
   i. Servo 9000 System.
   ii. Servo / Harmon WCO-75 Overlay System.

c. This Recommended Practice describes the recommended way to perform certain tests. The intervals at which these tests are to be performed are specified in the S&C Requirements Documents. In the case of a disagreement between this Recommended Practice and the Requirements Documents on the interval between tests, the S&C Requirements document shall govern.

d. This Recommended Practice applies to both Canada and SOO, where the equipment is in service, except where it applies to only a specific area, the item is marked "Canada only" or "SOO only". Note: SOO refers to the former St. Paul and Chicago Service Areas.

e. This Recommended Practice applies to the NEUS and the DM&E as information only.

f. It is recommended that Signals and Communications (S&C) employees engaged in the installation, testing, maintenance and inspection of S&C systems on Canadian Pacific follow these procedures.

2.0 Contents

3.0 General

a. Work that could impact the movement of trains must not be started until train movements have been fully protected. Installation, maintenance, test and repair work must not interfere with the safe operation of trains.

b. The following hot box detector systems and hot wheel detectors were in service on Canadian Pacific in 2010. Please note that Servo was bought by Harmon, and then Harmon was bought by GE Transportation Global Signalling (GETS). In 2010 GETS sold their HBD product line to Progress Rail. To avoid confusion, the original Servo equipment is referred to as "Servo".

	Canada	SOO	NEUS
Servo System 9000 HBD Single Port Configurations	X		
Servo System 9000 HBD Dual Port Configurations	X		
Servo / Harmon WCO-75 Overlay		X	
Harmon Model 32			X
GETS (Harmon) Micro Hot Bearing Detector	X		X
Servo Analog Hot Wheel Detector	X	X	
Servo Digital Hot Wheel Detector	X		

c. There are also several STC (Southern Technologies Corporation) hot box detector systems under test or in service on Canadian Pacific; however they aren't covered in this document.

d. Alarm level and other settings for hot box detector and hot wheel detector systems must be in accordance with the tables of settings at the end of S&C Requirements Section 14 – Inspection & Test Intervals Hot Box Detector Systems. Any deviation from the standard setting shall require written approval from the General Manager ES S&C.

e. Where applicable, please also refer to S&C Requirements Section 15 – Hot Box Detector Testing after a Replacement, Repair, or Change.

f. Please refer to S&C Recommended Practice 1055 Hot Box Detector Calibration Procedures for information on calibration procedures for hot box detector systems, including hot wheel detectors and dragging equipment detectors.

g. Please refer to S&C Recommended Practice 1058 Hot Box Detector Installation for information on the installation of transducers, scanners, hot wheel detectors, etc.

h. Please refer to S&C Recommended Practice 1057 Hot Box Detector Inspection & Test Record Form for a hot box detector system inspection and test check list.

i. Record of Work Done - Record the work done in the site logbook and detail any problems found and corrective action taken. This will:
   i. Assist with investigating future problems.
   ii. Assist with investigating recurring problems.
   iii. Assist other S&C personnel, who didn't carry out the work but are called to the site later to investigate a reported problem, in knowing what has happened.

4.0 Servo 9000 System Dipswitch Settings

4.1 Dipswitch Map Setting Summary

a. Set all DIP switch settings in accordance with the DIP Switch Map settings in this section.

4.1.1 SP Command Returns

a. When the SP command is entered, properly configured System 9000 HBD will return the following. This information corresponds directly to the dipswitch settings on the circuit boards.

SP Command	Response Displayed	Description
A1	18.0	Absolute Roller Alarm Threshold
A2	10.0	Absolute Plain Alarm Threshold
A3	10.0	Roller Differential Alarm Threshold
A4	8.0	Plain Differential Alarm Threshold
A5	01011011	Car Alarm Roller Bearing Ratios
A6	10100000	Post Train Analysis
A7	01001000	Integrity Heat Time
A8	00XXXX10	Temperature Compensation
B1	2.0	Bearing ID & Speed Dependent Transducer Thresholds
M1	00010100	Talker Parameters
M2	01000010	Absolute Threshold Offset for Unidentified Cars
M3	1XXXXXXX	Track Assignments
M4	XXXX1110	Subdivision Voice Table
W1	600	Digital Hot Wheel Detector Switch Bank 1
W2	600	Digital Hot Wheel Detector Reverse Direction
W3	000XXX00	Digital Hot Wheel Detector Scanner Orientation
V1	0.5	Roller Ratio Alarm
V2	12.0	Roller Minimum Bearing Heat for Car Alarm
V3	4.0	Roller Offset for Unidentified Car Absolute Alarm
V4	14.0	Roller Absolute Threshold for Unidentified Car
V5	2.0	Plain Ratio Alarm
V6	6.0	Plain Minimum Bearing Heat for Car Alarm
V7	2.0	Plain Offset for Unidentified Car Absolute Alarm
V8	8.0	Plain Absolute Threshold for Unidentified Car

Notes:
- The items V1 to V8 are displayed values only. Dipswitches on the Alarm Level Select card adjust the values.
- A8, M3 and M4 are site-specific settings.
- " X " means site specific settings
- A5 to A8 correspond to switches in the order: 87654321
- M1 to M4 correspond to switches in the order: 12345678
- W3 corresponds to switches in the order: 87654321

4.2 Switch Setting Locations

Dual Port Version "K" Single Port Version "I"			
Card	**Description**	**Location**	**See Section**
Alarm Level Select Absolute & Differential Alarm Levels	Absolute Roller Threshold	A1	4.3.1
	Absolute Plain Threshold	A2	4.3.1
	Differential Roller Threshold	A3	4.3.1
	Differential Plain Threshold	A4	4.3.1
	Car Alarm Ratios	A5	4.3.2
	PTA Switches	A6	4.3.3
	Integrity Heat Time	A7	4.3.4
	Temperature Compensation	A8	4.3.5
Bearing ID / Heat Test Generator	Bearing Threshold ID	B1	4.4.0
	Speed Dependent Transducer Threshold		
Mode Selector	Scanner Locations	M4	4.5.2
	Track Assignment	M3	4.5.3
	Absolute Threshold Offset for unidentified cars	M2	4.5.4
	Talker Parameters	M1	4.5.5
Digital Hot Wheel Detector (Dual Port) Configuration only	Alarm Level - Normal Direction	W1	4.6.1
	Alarm Level - Reverse Direction	W2	4.6.2
	Scanner Orientation	W3	4.6.3, 4.6.4
CPU Baud Rate	Single & Dual Configurations	S1	4.7.1, 4.7.2
Modem Setup			4.8.0

4.3 Alarm Level Select Card

4.3.1 DIP Switch Settings Switch Bank 1 Rev. H - Confirm Current Rev

DIP Switch Bank Settings for Alarm Thresholds										
Switch Bank 1	**Sw.**	**Range**	**DIP Switch Position**							
Servo Logic Closed = 1			1	2	3	4	5	6	7	8
Servo Logic Open = 0			Z	Y	X	W	V	U	T	S
Absolute Roller Alarm Threshold	A1	0 to 25.5mm **CP = 18.0mm**	0	0	1	0	1	1	0	1
Absolute Plain Alarm Threshold	A2	0 - 25.5 mm **CP = 10.0mm**	0	0	1	0	0	1	1	0
Roller Differential Alarm Threshold	A3	0 - 25.5 mm **CP = 10.0mm**	0	0	1	0	0	1	1	0
Plain Differential Alarm Threshold	A4	0 - 25.5mm **CP = 8.0mm**	0	0	0	0	1	0	1	0

DIP switch settings converted to a value in millimeters (mm). Available Settings As Seen On Card																			
DIP Switch Position										**DIP Switch Position**									
mm	**1**	**2**	**3**	4	**5**	**6**	**7**	**8**		**mm**	**1**	**2**	**3**	4	**5**	**6**	**7**	**8**
0.0	0	0	0	0	0	0	0	0		11.0	0	1	1	1	0	1	1	0
0.2	0	1	0	0	0	0	0	0		12.0	0	0	0	1	1	1	1	0
0.4	0	0	1	0	0	0	0	0		13.0	0	1	0	0	0	0	0	1
0.6	0	1	1	0	0	0	0	0		14.0	0	0	1	1	0	0	0	1
0.8	0	0	0	1	0	0	0	0		15.0	0	1	1	0	1	0	0	1
1.0	0	1	0	1	0	0	0	0		16.0	0	0	0	0	0	1	0	1
2.0	0	0	1	0	1	0	0	0		17.0	0	1	0	1	0	1	0	1
3.0	0	1	1	1	1	0	0	0		**18.0**	**0**	**0**	**1**	**0**	**1**	**1**	**0**	**1**
4.0	0	0	0	1	0	1	0	0		19.0	0	1	1	1	1	1	0	1
5.0	0	1	0	0	1	1	0	0		20.0	0	0	0	1	0	0	1	1
6.0	0	0	1	1	1	1	0	0		21.0	0	1	0	0	1	0	1	1
7.0	0	1	1	0	0	0	1	0		22.0	0	0	1	1	1	0	1	1
8.0	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**		23.0	0	1	1	0	0	1	1	1
9.0	0	1	0	1	1	0	1	0		24.0	0	0	0	0	1	1	1	1
10.0	**0**	**0**	**1**	**0**	**0**	**1**	**1**	**0**										

4.3.2 A5 Car Alarm Ratios

A5 Switch Bank 5 Servo Logic Closed = 1 Servo Logic Open = 0							
Car Alarm Plain Bearing Ratios CP Ratio = 2.0				Car Alarm Roller Bearing Ratios CP Ratio = 0.5			
1	2	3	4	5	6	7	8
1	1	0	1	1	0	1	0
C	C	O	C	C	O	C	O
Z	**Y**	**X**	**W**	**Z**	**Y**	**X**	**W**

A5 Switch Bank 5 Available Settings As Seen On Card				
DESCRIPTION	**Z**	**Y**	**X**	**W**
Disabled	0	0	0	0
0.1	1	0	0	0
0.2	0	1	0	0
0.3	1	1	0	0
0.4	0	0	1	0
CP = 0.5	**1**	**0**	**1**	**0**
0.6	0	1	1	0
0.8	1	1	1	0
1.0	0	0	0	1
1.2	1	0	0	1
1.5	0	1	0	1
2.0	1	1	0	1
2.5	0	0	1	1
3.0	1	0	1	1
4.0	0	1	1	1
5.0	1	1	1	1

4.3.3 A6 Post Train Analysis Switches

A6 Switch Bank 6 Servo Logic Closed = 1 Servo Logic Open = 0							
Automatic Post Train Analysis	Addition of Alarms Due to Bid Correction	Post Train Heat Compensation/ Car Alarms	Correction of Real Time Alarms Due To Bearing ID Correction	Minimum Roller Bearing Heat Required Car Alarm		Minimum Plain Bearing Heat Required Car Alarm	
1	2	3	4	5	6	7	8
0	0	0	0	0	1	0	1
O	O	O	O	O	C	O	C
0=ENABLE				X	**W**	**Z**	**Y**

Minimum Roller Bearing Heat Required Car Alarm			**Minimum Plain Bearing Heat Required Car Alarm**		
Description	X	**W**	**Description**	**Z**	**Y**
10.0 mm	0	0	4.0 mm	0	0
11.0 mm	1	0	5.0 mm	1	0
CP = 12.0 mm	**0**	**1**	**CP = 6.0 mm**	**0**	**1**
13.0 mm	1	1	7.0 mm	1	1

4.3.4 A7 Integrity Heat Time

A7 Switch Bank 7 As Seen On Card Servo Logic Closed = 1 Servo Logic Open = 0							
	Integrity Heat Time		**Bearing Default 0=Plain 1=Roller**	**Minimum Heat Test 0=Enable 1=Disable**	**Early Gate Timer T1 Bearing ID**		**Analog Chart Recording Trains and Integrity Tests 1 = Enable 0 = Disable**
1	2	3	4	5	6	7	8
0	0	0	1	0	0	1	0
O	**O**	**O**	**C**	**O**	**O**	**C**	**0**

Integrity Heat Time				**Early Gate Timer T1 Bearing ID**			
1	**2**	**3**		**6**	**7**	**Norm**	**Rev**
1	0	0	1 Sec.	0	0	T1 = (52%)	T1 = (48%)
0	1	0	2 Sec.	1	0	T1 = (54%)	T1 = (46%)
1	1	0	3 Sec.	**0**	**1**	**T1 = (55%)**	**T1 = (45%)**
0	0	1	4 Sec.	1	1	T1 = (57%)	T1 = (43%)
1	0	1	5 Sec.				
0	1	1	6 Sec.				
1	1	1	7 Sec.				
0	**0**	**0**	**8 Sec.**				

4.3.5 A8 Temperature Compensation

A8 Switch Bank 8 Servo Logic Closed = 1 Servo Logic Open = 0							
Car Alarm Differential: 0 = Enable 1 = Disable	**Auto calibration Failures: 0 = Fatal 1 = Non-Fatal**	**Digital Hot Wheel Detector Site-specific: 1 = Enable 0 = Disable**	**Not Used**	**Not Used**	**Not Used**	**Temperature Compensation**	
1	2	**3**	4	5	6	7	8
0	1	X	X	X	X	0	0
O	C	X	X	X	X	O	O

Temperature Comp		
Description	**7**	**8**
None – CP setting	0	0
Temperature Comp. For Calibration **ONLY**	1	0
Temp. Comp. For Calibration and Train	0	1
Temp. Comp. For Calibration and Train	1	1

4.4 B1 Bearing ID & Speed Dependent Transducer Thresholds

B1 Switches Note: Below Servo Logic is opposite from other switches Servo Logic Closed = 0 Servo Logic Open = 1			
			Speed Dependent Transducer Thresholds (Not Displayed) 0 = Enable 1 = Disable
1	2	3	4
1	**0**	**0**	**0**
O	C	C	C

B1 Switch Settings Available				
1	2	3	Values	
0	0	0	1.5 mm	0.60 V
1	**0**	**0**	**2.0 mm**	**0.80 V**
0	1	0	2.5 mm	1.00 V
1	1	0	3.0 mm	1.20 V
0	0	1	3.5 mm	1.40 V
1	0	1	4.0 mm	1.60 V
0	1	1	4.5 mm	1.80 V
1	1	1	5.0 mm	2.00 V

a. Notes: The ASC Card must be Harmon part number 400073-05-02 or equivalent.
b. To set the speed-dependent transducer processing:
   i. Set Speed Dependent transducer threshold switch 4 in the bearing ID card to 1 = disable.
   ii. Adjust potentiometer R38 to 2.5Vdc at TP3 on the ASC Card.
   iii. Set Speed Dependent transducer threshold switch B1 S4 to 0 = enable.

4.5 Mode Selector Card

4.5.1 M4 Scanner Location Generic Settings

M4 Switch Bank 4 Note: Below Servo Logic is opposite from other switches Servo Logic Closed = 0 Servo Logic Open = 1							
Scanner Locations Subdivision Voice Tables See Tables 5.2 Below				Periodic Self Test Interval CP – Disabled 11		Self Test: 0=Long 1= Short	Clock : 0=24 Hour 1=12 Hour
1	2	3	4	5	6	7	8
X	X	X	X	1	1	1	0
X	X	X	X	O	O	O	C

Periodic Self Test Intervals Available		
5	6	Values
0	0	1 / HR
0	1	2 / HR
1	0	3 / HR
1	1	CP - Disabled

4.5.2 M4 Subdivision Voice Table

Subdivision Voice Table				
	SERIES 1	**SERIES 2**	**SERIES 3**	**SERIES 4**
KIT NO:	280202-03-058	280202-03-063	280202-03-064	280202-03-057
SWITCH **1 2 3 4**	VANCOU1	VANCOU2	VANCOU3	WINNIP1
0 0 0 0	BROOKS	LAGGAN	CASCADE	CARBERRY
0 0 0 1	ALDERSYDE	LEDUC	SHUSWAP	INDIAN HEAD
0 0 1 0	MAPLE CREEK	RED DEER	CRANBROOK	KAMINISTIQUIA
0 0 1 1	CROWSNEST	WILLINGDON	MOUNTAIN	BROADVIEW
0 1 0 0	EMPRESS	WETASKIWIN	NELSON	IGNACE
0 1 0 1	STIRLING		THOMPSON	KEEWATIN
0 1 1 0	TABER		WINDERMERE	SWIFT CURRENT
0 1 1 1	MACLEOD		BOUNDARY	WEYBURN
1 0 0 0	BURSTALL		FORDING RIVER	
1 0 0 1	MONTANA		MOYIE	

Subdivision Voice Table				
	SERIES 5	**SERIES 6**	**SERIES 7A**	**SERIES 7B**
			English Only	French and English
KIT NO:	280202-03-061	280202-03-056/206	280202-03-059	280201-03-207
SWITCH **1 2 3 4**	WINNIP2	TORONT1	TORONT2	
0 0 0 0	ESTEVAN	BELLEVILLE	ADIRONDACK	ADIRONDACK
0 0 0 1	EMERSON	GALT	LACHUTE	LACHUTE
0 0 1 0	LANIGAN	NEMEGOS	PARK AVENUE	PARK AVENUE
0 0 1 1	WYNYARD	MACTIER	SHERBROOKE	SHERBROOKE
0 1 0 0	WILKIE	WINDSOR	TROIS RIVIERES	TROIS RIVIERES
0 1 0 1	SUTHERLAND	WINCHESTER	VAUDREUIL	VAUDREUIL
0 1 1 0	MINNEDOSA	WEBBWOOD	NEWPORT	NEWPORT
0 1 1 1	BREDENBURY	PARRY SOUND	HAMILTON	
1 0 0 0		CHALK RIVER	LACOLLE	
1 0 0 1				

4.5.2 M4 Subdivision Voice Table (continued)

Subdivision Voice Table				
	SERIES 7C	**SERIES 8**	**SERIES 9**	**SERIES 10**
	French and English			
KIT NO:	280201-03-346	280202-03-060	280201-03-533	280202-03-353
	VP#800201-03-535#A			
SWITCH **1 2 3 4**	TORONT2	TORONT3	VANCOU3	WINNIP3
0 0 0 0	ADIRONDACK	MATTAWAMKEAG	MACDONALD TK	HARDISTY
0 0 0 1	LACHUTE	NIPIGON	CONNAUGHT TK	WEYBURN
0 0 1 0	PARK AVENUE	MCADAM		
0 0 1 1	SHERBROOKE	LYNDONVILLE		
0 1 0 0	TROIS RIVIERES	MOOSEHEAD		
0 1 0 1	VAUDREUIL	HERON BAY		
0 1 1 0	NEWPORT	WHITE RIVER		
0 1 1 1		NORTH BAY		
1 0 0 0		CARTIER		

Subdivision Voice Table				
	SERIES 11	**SERIES 12**		
KIT NO:	200088-40-93 Rev B	200090-03-01		
SWITCH 1 2 3 4	P/N: 800201-03-537	PRAIRIE NORTH		
0 0 0 0	YARBO	SCOTFORD		
0 0 0 1	TINSDALE	EXPANSE		
0 0 1 0	LLOYDMINSTER	VANGUARD		
0 0 1 1		OUTLOOK		
0 1 0 0		McCREADY		

4.5.3 M3 Track Assignments

M3 Switch Bank 3 Note: Below Servo Logic is opposite from other switches Servo Logic Closed = 0 Servo Logic Open = 1							
Auto Dial: Enable=1 Disable=0 See Note	**North or East Rail: Rail 1=1 Rail 2=0**	**Single=0 Multiple=1 (Also Handshake Enable=1)**	**Normal Direction of Train : 0=S/W 1=N/E**	**Track Designation: North, South, East, West**		**Rail 1: 0=Phase 1 1=Phase 2**	**Rail 2: 0=Phase 1 1=Phase 2**
1	2	3	4	5	6	7	8
1	X	X	X	X	X	X	X
0	**X**	**X**	**X**	**X**	**X**	**X**	**X**
NOTES: The setting of all "X" switches depends on location of the HBD bungalow and local equipment.							

Track Designation		
5	6	Values Available
0	**0**	**NORTH - (CP) for East – West direction**
0	1	SOUTH
1	**0**	**EAST - (CP) for North – South direction**
1	1	WEST

a. Note: If Modem and Communication link are present:
   i. "The dipswitch on the Mode Select card M3 - S1 must be set to 1 to enable dial-out. No central number is currently in place for the HBD to call except for sites that include a SDM (Serial Data Manager), in which case the call is placed to a number provided by the Mechanical department. The first HBD number (PH N1) is optional, set to report trains with alarms or HBD faults only to the local S&C shop. When the second phone number is used (PH N2) the HBD dials out a summary report on every train.

b. To enter the phone numbers, use the PH command, a space, then enter the first number. Repeat for the second phone number. A PH command by itself displays the numbers"

4.5.4 M2 Absolute Threshold Offset for Unidentified Cars

M2 Switch Bank 2 Note: Below Servo Logic is opposite from other switches Servo Logic Closed = 0 Servo Logic Open = 1							
Car Summary Report 0=Enable 1=Disable1	Roller Bearing Offset			Not used	Plain Bearing Offset		
1	2	3	4	5	6	7	8
0	1	0	0	0	0	1	0
C	O	C	C	C	C	O	C

Roller and Plain Bearing Offsets Available						
Roller Bearing Offset CP = 4 mm				Plain Bearing Offset CP = 2 mm		
2	3	4		6	7	8
0	0	0	0 mm	0	0	0
0	0	1	1 mm	0	0	1
0	1	0	2 mm	0	1	0
0	1	1	3 mm	0	1	1
1	0	0	4 mm	1	0	0
1	0	1	5 mm	1	0	1
1	1	0	6 mm	1	1	0
1	1	1	7 mm	1	1	1

4.5.5 M1 Talker Parameters

M1 Switch Bank 1 Note: Below Servo Logic is opposite from other switches Servo Logic Closed = 0 Servo Logic Open = 1							
	NOT USED		Post Train Temperature Announcement 0 = Disable 1 = Enable	Post Train Bearing ID Vote: 0 = Plain 1, Roller 3. 1 =Equal Weight for Both	Post Train Summary Dump to Datagraph 0= Enable for All Trains 1= Alarm Only	Talker Language : 1= English and French 0= English Only (most sites)	Voice Card Type : 1= Bilingual 0= English (most sites)
1	2	3	4	5	6	7	8
0	0	0	1	0	1	X	X
C	C	C	O	C	O	X	X

4.6 Digital Hot Wheel Detector Card (Dual Port Only, if equipped)

a. Note: Alarm Level Select Card; Switch Bank A8 - S3 must be Enabled (Closed)

4.6.1 W1 Switch Bank 1

W1 Switch Bank 1 – U6 - NORMAL DIRECTION Servo Logic Closed = 1 Servo Logic Open = 0							
1	2	3	4	5	6	7	8
0	0	1	1	1	1	0	0
O	**O**	**C**	**C**	**C**	**C**	**O**	**O**
Z	Y	X	W	V	U	T	

4.6.2 W2 Reverse Direction

W2 Switch Bank 2 – U8 - REVERSE DIRECTION Servo Logic Closed = 1 Servo Logic Open = 0							
1	2	3	4	5	6	7	8
0	0	1	1	1	1	0	0
O	**O**	**C**	**C**	**C**	**C**	**O**	**O**
Z	Y	X	W	V	U	T	

Dipswitch Conversion to Degrees Fahrenheit	
T	640 Deg. F.
U	320 Deg. F.
V	160 Deg. F.
W	80 Deg. F.
X	40 Deg. F.
Y	20 Deg. F.
Z	10 Deg. F.
For CP : U + V + W + X = 600 Deg. F.	

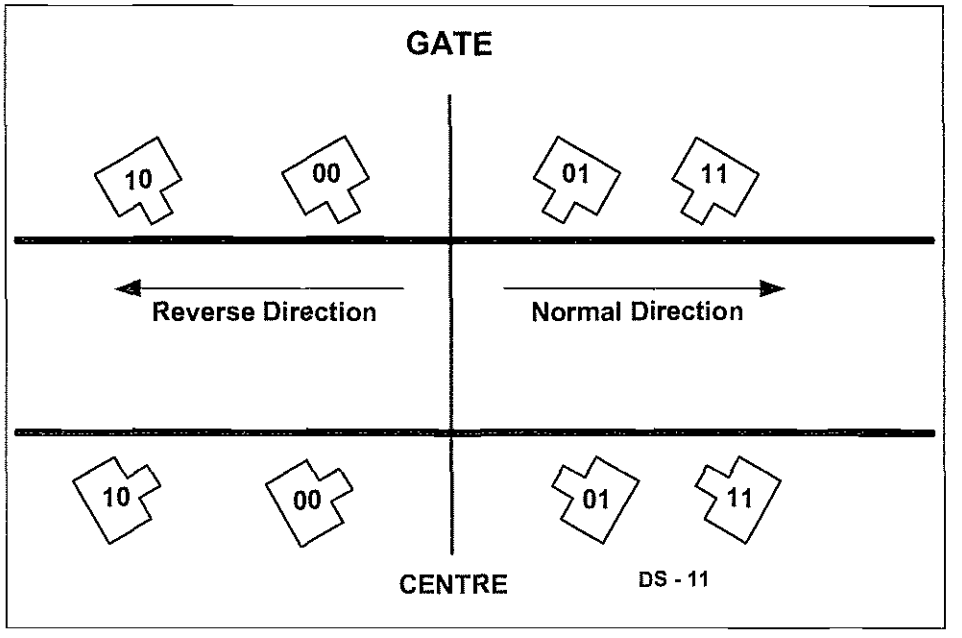
4.6.3 W3 HWD Scanner Orientation

HWD SCANNER ORIENTATION W3 SWITCH BANK 3 – U7 (See DS-11 of CP Software Supplement) Servo Logic Closed = 1 Servo Logic Open = 0							
Near and Far Gate, Normal and Reverse Direction		Near Rail 0 = Rail 1 1 = Rail 2	0 = Single Scanner 1 = Dual Scanner	Not Used	Near / Far Rail Ratio Percentage		
1	2	3	4	5	6	7	8
X	**X**	**X**	0	**X**	**X**	**X**	**X**
Z	Y	**X**	W	V	U	T	S

SCANNER ORIENTATION	Z	Y
Near Gate, Normal Direction Used with 31 degree and for 90 degree Look Angle	0	0
Near Gate, Reverse Direction	1	0
Far Gate, Normal Direction	0	1
Far Gate, Reverse Direction	1	1

NEAR / FAR RAIL RATIO PERCENTAGE			
U	**T**	**S**	**Ratio**
0	0	0	1.00
1	0	0	1.05
0	1	0	1.10
1	1	0	1.15
0	0	1	1.20
1	0	1	1.25
0	1	1	1.30
1	1	1	1.35
Note: Ratio 1.00 is used with 90 Degree Look Angle			

4.6.4 HWD Scanner Orientation For a 31 degree look angle



4.7 CPU Card

4.7.1 S1 Single Port Configuration

CPU S1 - BAUD RATE FOR CPU PORTS Servo Logic Closed = 1 Servo Logic Open = 0			
D	C	B	A
1	2	3	4
1	1	0	0
C	C	O	O

BAUD RATE FOR CPU PORTS				
1	2	3	4	Baud Rate
1	1	1	0	9600
1	1	0	0	2400
0	0	1	0	1200
0	1	0	0	300
Note: Set the Baud rate to match the MODEM baud rate. If no Communication link is available, set the Baud Rate to 2400				

4.7.2 S1 Dual Port Configuration

CPU S1- BAUD RATE FOR CPU PORTS Servo Logic Closed = 1 Servo Logic Open = 0							
D	**C**	**B**	**A**	**D**	**C**	**B**	**A**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	1	1	0	1	1	1	0
C	C	C	O	C	C	C	O

BAUD RATE FOR CPU PORTS Local Port (to Datagraph) 9600 baud				
1	**2**	**3**	**4**	**Baud Rate**
1	**1**	**1**	**0**	**9600**
1	1	0	0	2400
0	0	1	0	1200
0	1	0	0	300
Note: Set the Baud rate to match the MODEM baud rate. If no Communication link is available, set the Baud Rate to 2400				

BAUD RATE FOR CPU PORTS Remote Port (to DRU) 9600 baud				
5	**5**	**7**	**8**	**Baud Rate**
1	1	1	0	9600
1	1	0	0	2400
0	0	1	0	1200
0	1	0	0	300
Note: Set the Baud rate to match the MODEM baud rate. If no Communication link is available, set the Baud Rate to 2400				

a. Notes:
   i. Set the baud rate to the maximum as permitted by the quality of the phone line.
   ii. System must be powered down (RESET) after the switches are changed for new parameters to take effect.
   iii. If Tandy 102 PC is used "STAT" configuration must be 67I1E for 2400-baud MODEM and/or DATAGRAPH operation. See SERVO SUMMARY OF TERMINAL COMMANDS - Tandy 102 configuration.

4.8 SYSTEM 9000 Modem Configuration

a. Following is a listing of modems in use at hot box detector sites in Canada. The information in the following sections covers the setup for several of these modems

Manufacture	Model	Count Of Manufacture or used on:
AOpen	FM56-EXV	SSA
Aspen	14.4	1
AT&T Paradyne	Comsphere 3910 19.2	2
Best Data Products	Smart One 2400X	13
Blue Tree	BT-1000 Standard CDMA Cellular Modems	6
GVC	Super Modem 2400	4
Micom	Cellular	2
Mitsubishi	Cellular	7
Motorola	14.4	10
Motorola	28.8	9
Motorola	Fastalk	6
Motorola	Fastalk 2	4
Motorola	Fastalk II 14.4	25
Motorola	FastalkII	1
Motorola	Lifestyle	1
Motorola	Surfr	1
Multitech		5
Multitech	CELLULAR	1
Multitech	MNP10(1200)	1
Multitech	MT1932ZDX	8
Multitech	MT224	5
Multitech	MT2834ZDX	1
Multitech	MT2834ZDX-CP	1
Multitech	MUL 2400	6
Multitech	Smart One 2400X	2
Packard Bell	1200	2
US Robotics		16
US Robotics	1200	7
US Robotics	14.4	14
US Robotics	2400	3
US Robotics	33.6	1
US Robotics	Sportster 1200	8

4.8.1 Introduction

a. This document concerns the dipswitch configurations and the AT command strings for the modem types listed below, specifically the modem which is directly attached to the System 9000. The Office modem (remote) should be configured with the recommended default settings and command strings. Regardless of its intended use, on the 9000 or in the Office, the modem must first be connected to a terminal or PC (with Procomm or equivalent) and configured via the "AT" command set. After verification that the modem is operating properly, use the supplied instructions to configure the modem that is directly connected to the System 9000.

b. Modem Types
   i. MultiTech 224E
   ii. MultiTech 224EH
   iii. MultiTech 224BA
   iv. MultiTech 1932 ZDX (no dipswitches available)

4.8.2 Programming Modem via Terminal Commands

a. Prepare the laptop (terminal) to communicate with the selected modem. Once the modem is serially connected with the dipswitches in the default position, issue AT&F repeatedly until the modem responds with OK. If there is no response, your terminal may require a forced CD/DSR signal from the modem.

b. Model 224E and EH: Switch # 6 DOWN

c. Model 224BA Switch #15 DOWN

d. After the modem responds with OK, it can now be configured for operation. A comment regarding the notation in this document:
   i. An operator enters the AT commands.
   ii. The "response" is the characters transmitted by the modem in response to the AT command.
   iii. <enter> is the ENTER key on your keyboard.
   iv. <baud> represents the Baud rate setting of the System 9000 remote port, e.g. 2400

4.8.3 Configuring the 224 Series of Modems

a. The following commands apply to the MT224E, MT224EH, and MT224BA modems.

b. For the modem connected to the System 9000, enter the following:

AT&F&D2X0S0=1<enter>	OK response
AT$MB<baud>$SB<baud> <enter>	OK response
ATE0V0Q0&W0<enter>	0 response (zero)

c. Note: Further programming or interrogation of the modem will result in a 0 (zero) result code.

d. For the remote (office) modem, enter the following:

AT&FS0=0<enter>	OK response
AT$MB<baud>$SB<baud> <enter>	OK response
AT&W0<enter>	OK response

4.8.4 Modem Dipswitch Maps - Recommended settings

MultiTech 224E & 224EH - 8 Position Dip
#1 - UP(***) DTR will follow interface
#2 - UP Not applicable, default
#3 - UP Suppress responses
#4 - DOWN Disable echo
#5 - UP Auto answer on
#6 - UP Carrier Detect/DSR default
#7 - UP Not applicable, default
#8 - UP Disable command mode

MultiTech 224E & 224EH - 4 Position Dip
#1 - UP/DOWN Dip is driven by Terminal type, default is UP
#2 - UP Dialup operation
#3 - DOWN Blind dialing method
#4 - DOWN Asynchronous operation

MultiTech 224BA - 16 Position Dip
#1 - UP DTR will follow interface
#2 - UP Not applicable, flow control
#3 - UP Not applicable, dB for lease line
#4 - Unused
#5 - UP Auto answer on
#6 - UP Through put, Office modem must be up

#7 - DOWN RTS forced on
#8 - UP Disable command mode
#9 - UP Not applicable
#10- UP Dial up line
#11- UP AT Command set
#12- DOWN Asynchronous
#13 & 14 Baud rate (Both UP for 2400)
#15- DOWN Carrier detect and DSR forced on
#16- Unused

4.8.5 Configuring the 1932 ZDX Series of Modem

a. The following commands apply to the MT1932 ZDX modem.

b. For the modem connected to the System 9000, enter the following:

AT&F&E0&E3&E14S0=1<enter>	OK response
ATQ0X0&D2<enter>	OK response
AT$MB<baud>$SB<baud> <enter>	OK response
ATE0V0&W0	0 response (zero)

c. Note: Further programming or interrogation of the modem will result in a 0 (zero) result code.

d. Terminal Commands in Support of Dial-out Interface

e. Refer to the "Installation Instructions, Single and Dual Port System 9000 HBD's" for a complete explanation of these commands.

Parameter	Command
Phone number	'PH'
Number of Redials	'PH'
Customized Initialization Commands (secondary string)	'MO'
Customized Modem Connect Indication	'MC'

f. NOTE: Current dialup parameters can be read via the PH and MO commands. cpmodin4.doc

5.0 Servo / Harmon WCO-75 Overlay System Site Setting Card

HBD SERVO OVERAY V3.3 DCP V3.1
Location_____

a. Note: X shows standard settings for all hot box detectors on SOO, except as noted.

DIP Switch S1								
	0	1	2	3	4	5	6	7
UP	X		X		X	X		
DN		X					X	X

DIP Switch S2								
	0	1	2	3	4	5	6	7
UP		X				X		
DN	X		X	X			X	X

Front Panel DIP Switch S1		
S1.0	UP	Train Length Spoken
S1.0	DN	Not Spoken
S1.1	UP	North / South Direction
S1.1	DN	East / West Direction
S1.2	UP	Single Track No Trk Msg
S1.2	DN	Multiple Track Trk Msg
S1.3	UP	Eastward
S1.3	DN	Westward
S1.4	UP	DCP on
S1.4	DN	DCP off
S1.5	UP	NO Max Alarm
S1.5	DN	NO Max Alarm on Test Train
S1.6	UP	Train Arv Msg Spoken
S1.6	DN	Train Arv Msg Not Spoken
S1.7	UP	HWD Scan not installed
S1.7	DN	HWD Scan installed

Front Panel DIP Switch S2		
S2 . 0	S2 . 1	*Allow Cold Train (Max # of cold trains)
DN	DN	0
DN	UP	1
UP	DN	2
UP	UP	3
S2 . 2	S2 . 3	
DN	DN	High Load not reported
DN	UP	High Load. East Bound
UP	DN	High Load West Bound
UP	UP	High Load. E+W Bound
S2.4	UP	Not Used
S2.4	DN	Not Used
S2.5	UP	Temperature Spoken & Printed
S2.5	DN	Temperature not Spoken or Printed
S2.6	UP	Train Speed Spoken
S2.6	DN	Train Speed not Spoken
S2.7	UP	Track Number
S2.7	DN	Track Direction

b. *Note: Cold-trains-allowed is generally (1) but where the HBD is just outside a terminal may be increased.

c. Note: there are some differences for multi-track, HI-Wide detector option, etc

d. DCP-3 Settings 4 Position DIP Switch S1 on back of card used in combination:
   i. Switch to the right is ON

DCP DIP Switch			
Sw 1	**Sw 2**	**SOO**	**(Sw 3&4 not used)**
OFF	OFF		300 BAUD, 7, ODD, 1
ON	OFF		300 BAUD, 7, EVEN, 1
OFF	ON		1200 BAUD,8, N, 1
ON	ON	X	9600 BAUD 8, N, 1

e. Speech Board Setting 2 - 8 Position Switches on card; example MP _258.3__
   i. The X beside the numbers would represent the Mile Post. Switch to the right is on.

Speech Board DIP SW1			
	Value	**Sw #**	**SOO**
10	1	1	X
	2	2	
	4	3	X
	8	4	
100	1	5	
	2	6	X
	4	7	
	8	8	
			ON

Speech Board DIP SW2			
	Value	**Sw #**	**SOO**
0.10	1	1	X
	2	2	X
	4	3	
	8	4	
Unit	1	5	
	2	6	
	4	7	
	8	8	X
			ON

f. CPU Board 4 Position DIP Switch S1 on back of card used in combination.
   i. (CP/SOO uses safety message and SERVO) Switch to the right ON

Universal Processor Board DIP SW			
			SOO
S1	ON	Transmit Safety Message	X
S1	OFF	No Safety Message	
S2	ON	Transmit Subdivision	
S2	OFF	No Subdivision	X
S3	S4	Scanner Type	SOO
OFF	OFF	Servo	X
OFF	ON	Servo	
ON	OFF	GE	
ON	ON	Harmon	

Voltages on Servo Overlay Card	
TB2-10	+200VDC
TB2-12	-200VDC
TB4-9	+15VDC

g. Modem String for Multitech. For other Modems, see user manual

h. STRING &F,E0Q1X0V0, S0=1M1&C1&D3&S1&R1,&E1&E14$BA0$SB9600,&W0

i. Note: Turn Mode Switch to: display OFF position BEFORE leaving shelter