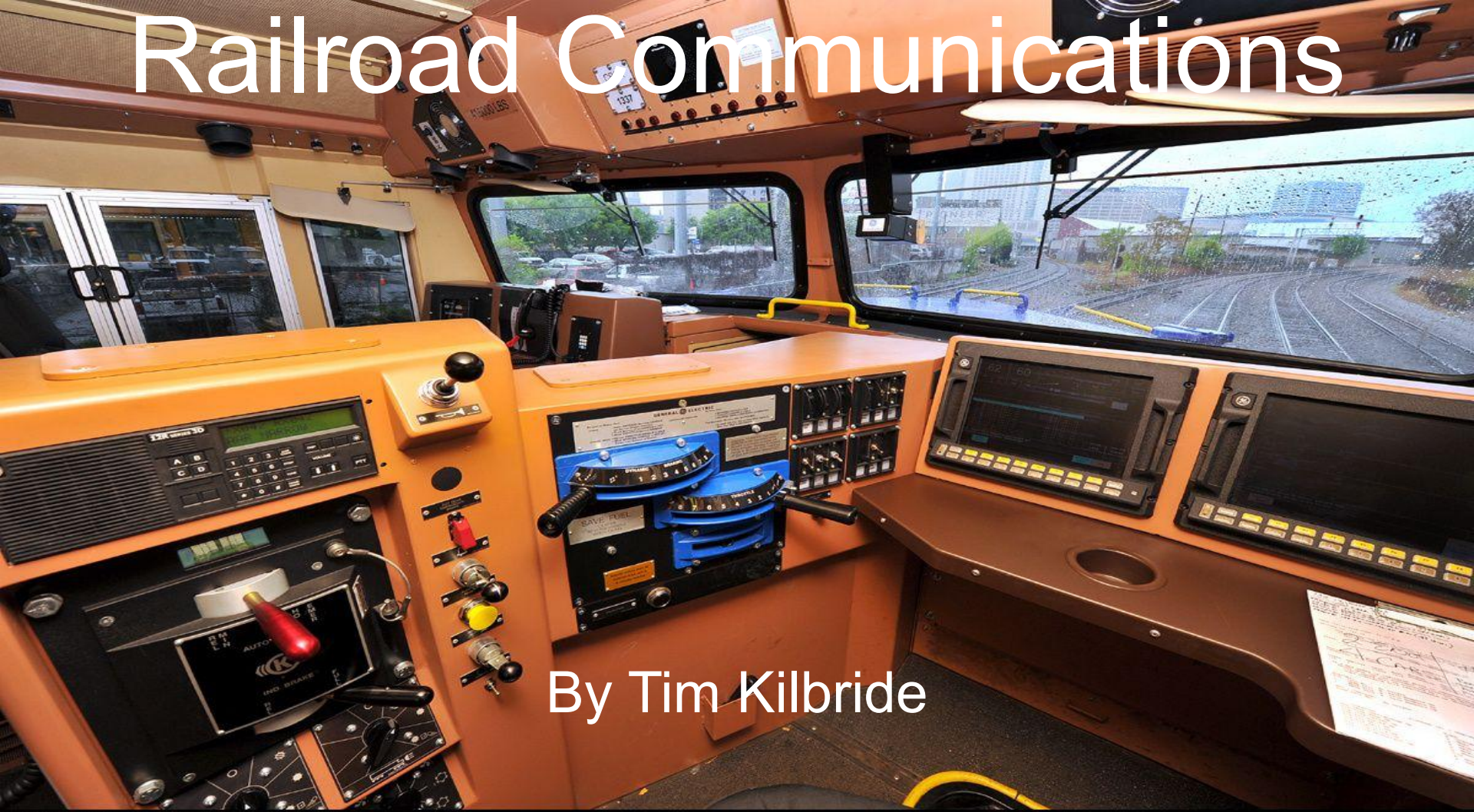
Railroad Communications



By Tim Kilbride

RF Bands In Use By Railroads In Iowa

- VHF-Lo (44.48MHz)
- VHF-Hi (160-162MHz)
- 220MHz
- UHF
- 900MHz

VHF-L 44.58MHz Half-Duplex Packet Radio System

What is communicated over this system?

- Locomotive Fuel Usage
- Position of company assets in relation to railroad geographics
- Wheel bearing temperatures
- Wind speed
- Track authority compliance


CHANNEL
32
MP
675.8

The MCC-545C radio is frequency synthesized and uses a GMSK modulation scheme with selectable data rates, as shown below.

Model No.	Modulation	Data rate
MCC-545C	GMSK	9.6 kbps


5503

VHF-H 160-162MHz Voice and Data RF Systems

What is communicated over 160 - 162 MHz?

- Railroad Voice Operations
- Data Control Signals

VHF-H 160-162MHz Voice and Data RF Systems

Modes used in railroad communications:

- Analog
- DMR (Digital Mobile Radio)
- NXDN (Next Generation Digital Narrowband)

VHF-H 160-162MHz Voice and Data RF Systems

Frequencies used locally:

- 160.890 - Union Pacific Boone Subdivision
- 161.175 - Union Pacific Jewell Subdivision
- 160.845 - Union Pacific Mason City Subdivision
- 160.245R - Boone Yard Operations
- 160.530R - Boone and Scenic Valley Railroad

AAR Channel	Frequency MHz
(1)	159.910?
2	159.930
3	160.025
4	160.085
5	160.115
6	160.170
7	160.215
8	160.230
9	160.245
10	160.260
11	160.275
12	160.290
13	160.305
14	160.320
15	160.335
16	160.350
17	160.365
18	160.380
19	160.395
20	160.410
21	160.425
22	160.440
23	160.455
24	160.470
25	160.485

AAR Channel	Frequency MHz
26	160.500
27	160.515
28	160.530
29	160.545
30	160.560
31	160.575
32	160.590
33	160.605
34	160.620
35	160.635
36	160.650
37	160.665
38	160.680
39	160.695
40	160.710
41	160.725
42	160.740
43	160.755
44	160.770
45	160.785
46	160.800
47	160.815
48	160.830
49	160.845
50	160.860

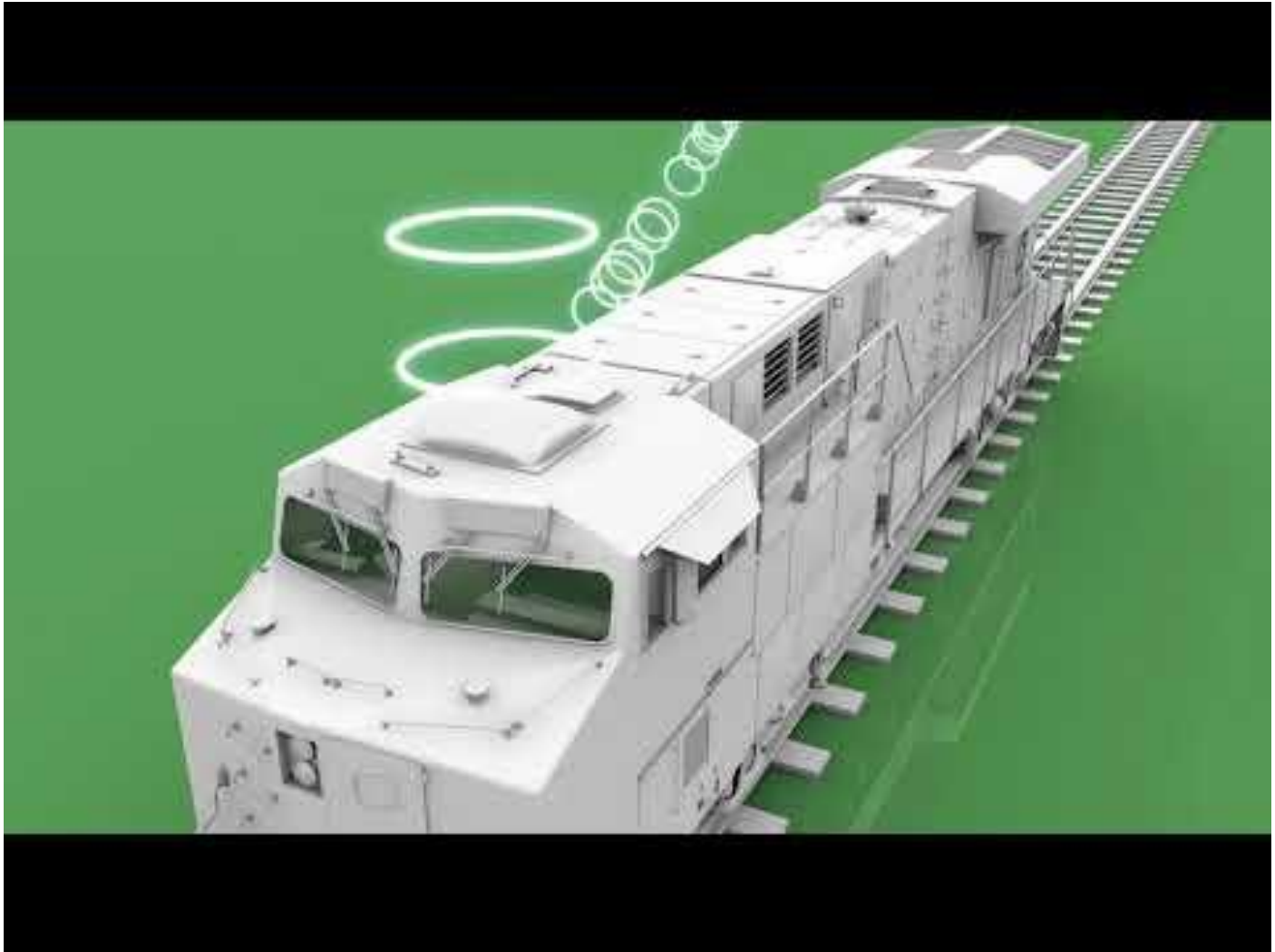
AAR Channel	Frequency MHz
51	160.875
52	160.890
53	160.905
54	160.920
55	160.935
56	160.950
57	160.965
58	160.980
59	160.995
60	161.010
61	161.025
62	161.040
63	161.055
64	161.070
65	161.085
66	161.100
67	161.115
68	161.130
69	161.145
70	161.160
71	161.175
72	161.190
73	161.205
74	161.220
75	161.235

AAR Channel	Frequency MHz
76	161.250
77	161.265
78	161.280
79	161.295
80	161.310
81	161.325
82	161.340
83	161.355
84	161.370
85	161.385
86	161.400
87	161.415
88	161.430
89	161.445
90	161.460
91	161.475
92	161.490
93	161.505
94	161.520
95	161.535
96	161.550
97	161.565

Railroad’s Use of 220MHz

PTC (Positive Train Control)

- 220.1275 - 221.7975MHz
- 4K00J2D Emission
- No Voice, All Data



Railroad’s Use Of 452/457MHz

What is used in the UHF band?

- Remote Control Locomotives (RCL)
- Distributed Power Units (DPU)
- Rear End Brake Pipe Pressure (EOT)
- RF Radio Linking or Remote Receive Site

Remote Control Locomotives

Remote Control Locomotives

Remote Control Locomotives

452.93125	457.93125
452.94375	457.94375
452.95625	457.95625
452.96250	457.96250
452.96875	457.96875

Distributed Power Units

Distributed Power Units

452.925	457.925
452.950	452.950

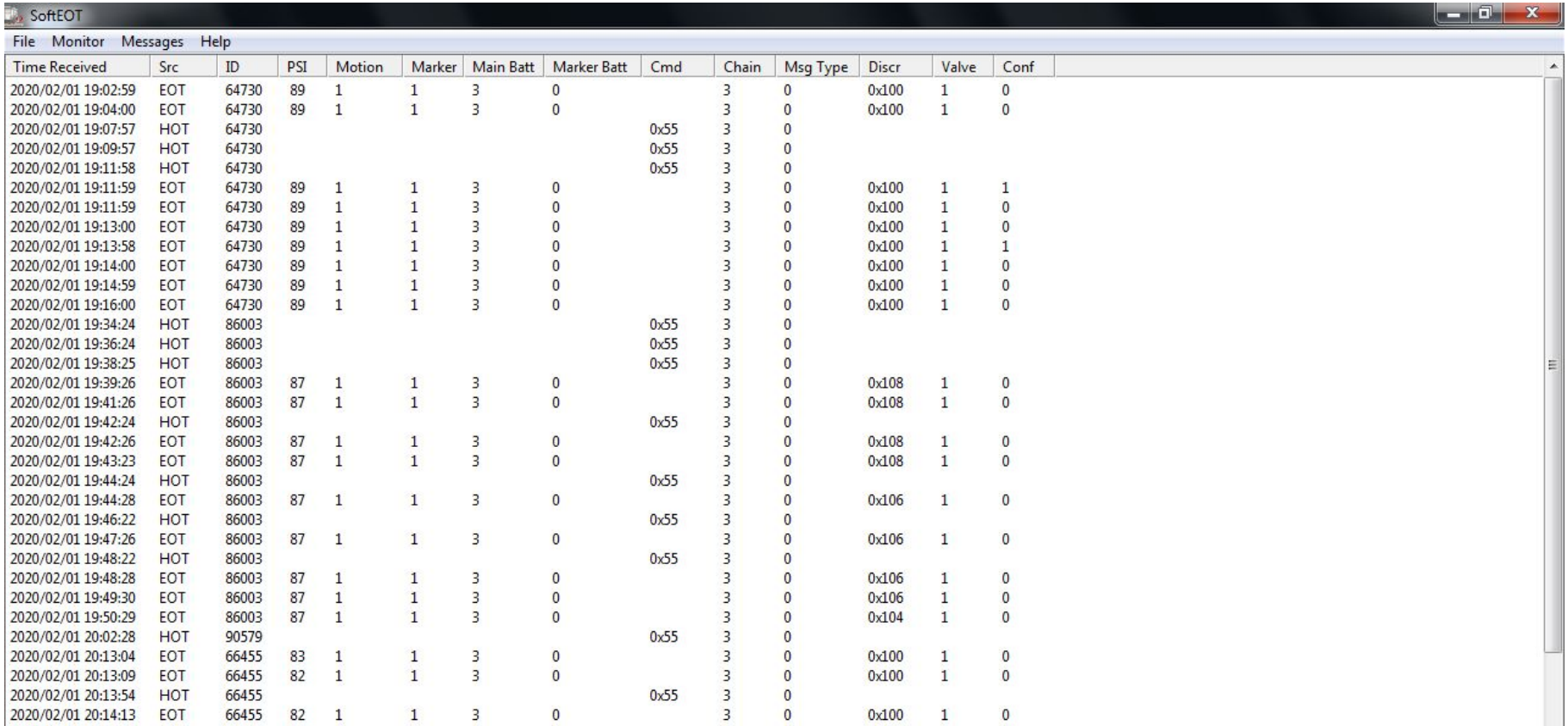
End Of Train Device

End Of Train Device

End Of Train Device

Rear End to Head End	457.9375
Head End to Rear End	452.9375

End Of Train Device


SoftEOT

File Monitor Messages Help

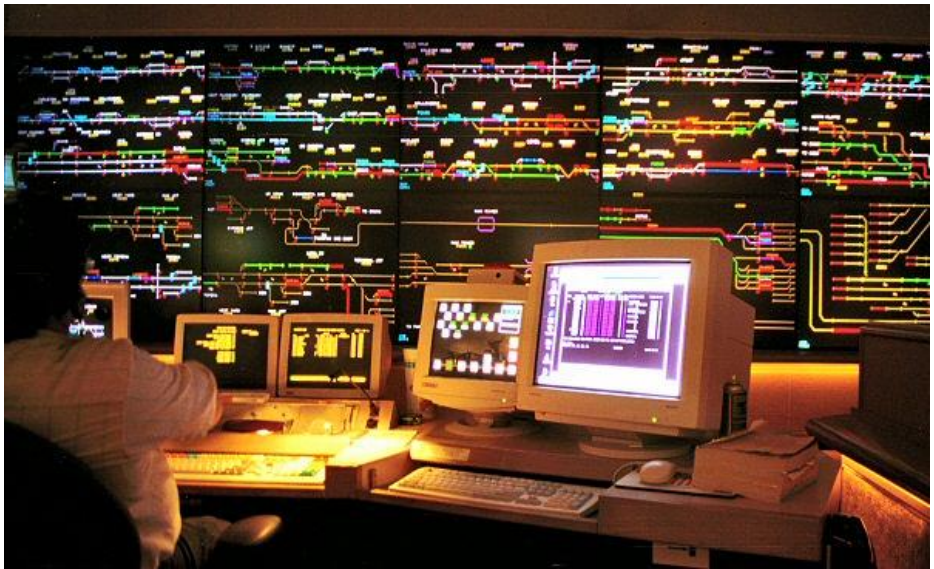
Time Received	Src	ID	PSI	Motion	Marker	Main Batt	Marker Batt	Cmd	Chain	Msg Type	Discr	Valve	Conf
2020/02/01 19:02:59	EOT	64730	89	1	1	3	0		3	0	0x100	1	0
2020/02/01 19:04:00	EOT	64730	89	1	1	3	0		3	0	0x100	1	0
2020/02/01 19:07:57	HOT	64730						0x55	3	0			
2020/02/01 19:09:57	HOT	64730						0x55	3	0			
2020/02/01 19:11:58	HOT	64730						0x55	3	0			
2020/02/01 19:11:59	EOT	64730	89	1	1	3	0		3	0	0x100	1	1
2020/02/01 19:11:59	EOT	64730	89	1	1	3	0		3	0	0x100	1	0
2020/02/01 19:13:00	EOT	64730	89	1	1	3	0		3	0	0x100	1	0
2020/02/01 19:13:58	EOT	64730	89	1	1	3	0		3	0	0x100	1	1
2020/02/01 19:14:00	EOT	64730	89	1	1	3	0		3	0	0x100	1	0
2020/02/01 19:14:59	EOT	64730	89	1	1	3	0		3	0	0x100	1	0
2020/02/01 19:16:00	EOT	64730	89	1	1	3	0		3	0	0x100	1	0
2020/02/01 19:34:24	HOT	86003						0x55	3	0			
2020/02/01 19:36:24	HOT	86003						0x55	3	0			
2020/02/01 19:38:25	HOT	86003						0x55	3	0			
2020/02/01 19:39:26	EOT	86003	87	1	1	3	0		3	0	0x108	1	0
2020/02/01 19:41:26	EOT	86003	87	1	1	3	0		3	0	0x108	1	0
2020/02/01 19:42:24	HOT	86003						0x55	3	0			
2020/02/01 19:42:26	EOT	86003	87	1	1	3	0		3	0	0x108	1	0
2020/02/01 19:43:23	EOT	86003	87	1	1	3	0		3	0	0x108	1	0
2020/02/01 19:44:24	HOT	86003						0x55	3	0			
2020/02/01 19:44:28	EOT	86003	87	1	1	3	0		3	0	0x106	1	0
2020/02/01 19:46:22	HOT	86003						0x55	3	0			
2020/02/01 19:47:26	EOT	86003	87	1	1	3	0		3	0	0x106	1	0
2020/02/01 19:48:22	HOT	86003						0x55	3	0			
2020/02/01 19:48:28	EOT	86003	87	1	1	3	0		3	0	0x106	1	0
2020/02/01 19:49:30	EOT	86003	87	1	1	3	0		3	0	0x106	1	0
2020/02/01 19:50:29	EOT	86003	87	1	1	3	0		3	0	0x104	1	0
2020/02/01 20:02:28	HOT	90579						0x55	3	0			
2020/02/01 20:13:04	EOT	66455	83	1	1	3	0		3	0	0x100	1	0
2020/02/01 20:13:09	EOT	66455	82	1	1	3	0		3	0	0x100	1	0
2020/02/01 20:13:54	HOT	66455						0x55	3	0			
2020/02/01 20:14:13	EOT	66455	82	1	1	3	0		3	0	0x100	1	0

RF Radio Linking

900MHz

What is used in the 900MHZ band?

- Train Traffic Control
- Automatic Equipment Identification (AEI)



AEI

AEI

902.250	Intermodal/Yard
903.750	Intermodal/Yard
910.000	Intermodal/Yard
911.500	Trackside
913.000	Intermodal/Yard
915.000	Intermodal/Yard
917.000	Intermodal/Yard
918.500	Trackside
920.000	Intermodal/Yard
921.500	Intermodal/Yard

UP Clinton Sub