

The Budd RDC Story

By Bram Bailey



CN RDC1 #D101 Gravenhurst, ON July 1968, Bram Bailey

Original Budd RDC Owners

AT&SF

DM&IR

NHRR

B&M

DSS&A

NP

B&O

DW&P

NYC

C&EI

GN

NYSW

C&NW

GTW

PGE*

CN*

LIRR

PRSL

CNJ

LV

RDG

CP*

M&StL

SP

CRI&P

MKT

WP

* Canadian Production built by CCF from kits supplied by Budd.

Evolution of the Budd Company

- Started in 1912 as Hale & Kilburn Co. Philadelphia
 - Originally a sheet metal forming shop.
- Purchased by Edward G. Budd ~1920.
 - Focused on truck and automobile bodies.
- Started Stainless Steel fabrication ~1920.
 - Attempted to apply this technology to aircraft.
- Entered the Rail Vehicle business.
 - Lightweight rail bus experiments in the early 1930's.
 - First su



B&Q.

Birth of the Rail Diesel Car (RDC)

- Edward Budd Jr. took over upon his father's death 11/46.
- Railroad passenger business was on the decline.
 - Budd decided to engineer a more cost-effective solution.
- In the summer of 1948, they decide to reinvent the Doodle bug.
- Gas Electrics use much floor space for power.
- MU through the nose is difficult.
- Design is inefficient.
- Failure in service required rescue by conventional equipment.



Burlington Railroad Diesel 9841 Doodlebug Train Galesburg Peoria IL

RDC Trivia

- How many brake shoes does an RDC have?
- How many traction motors does an RDC have?
- Where are the dynamic brake grids located on an RDC?
- How many lightweight coaches can an RDC haul?
- Do RDC cars use steam for heating?



RAIL DIESEL CAR

OPERATOR'S MANUAL

Budd Car Numbers 5701 and Up

RDC Design Parameters

1. Power unit and equipment not to encroach on revenue space.
 - a. Power must fit under floor.
 - b. Power must be redundant.
 - c. Must be accessible for maintenance.
 - d. Must be replaceable in under 2 hours without the use of a pit.
 - e. Must be capable of 85 MPH.
 - f. Acceleration to be $>$ or $=$ Electric MU cars.
2. RDC cars to be bidirectional and operable as single or MU trains.
3. Car must be attractive and easy to maintain inside and out.
4. Enough standard floor plans must be available to satisfy varied railway needs without impacting cost.
5. Cars must be produceable at minimum cost consistent with good quality.
6. RDC to weigh $<$ 125,200 lbs. with full load of fuel water and sand.



Train #603 from Sydney Arriving at Truro, NS 19Jul79, Bram Bai

RDC Power Design

1. Power unit and equipment not to encroach on revenue space.
 - a. Power must fit under floor.
 - b. Power must be redundant.
 - c. Must be accessible for maintenance.
 - d. Must be replaceable in under 2 hours without the use of a pit.
 - e. Must be capable of 85 MPH.
 - f. Acceleration to be \geq Electric MU cars.
- A. Two Detroit Diesel (GM) 6-110 engines each supplying 275HP (Later upgraded to 300).
- B. Power is supplied to the inside axle of each truck through an Allison Torque convertor (same model as used on the Patton Tank).
- C. Each engine has a separate cooling system.
- D. With each car a dolly is supplied to facilitate engine change on a flat concrete surface.
- E. Torque converter shifts to direct drive at 65 MPH.



VIA Rail RDC-1 #6143 at Fairview, Halifax, NS, 22Sep86, Bram Bailey

RDC Design Parameters

2. RDC cars to be bidirectional and operable as single or MU trains.
- A. The right side of the vestibule on each end converts to a control cab.
 - B. All cars are designed for walk through except RPO.



VIA RDC-1 #6127 March 1986 at Niagara Falls ON, Bram Bailey

RDC Design Parameters

3. Car must be attractive and easy to maintain inside and out.

A. Stainless steel body with dome.



RDC Design Parameters

- Enough standard floor plans must be available to satisfy varied railway needs without impacting cost.

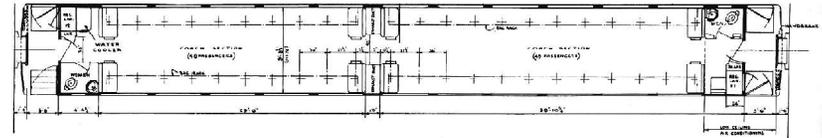


RDC-3 Interior

CONVENTIONAL RDC INTERIOR VIEWS

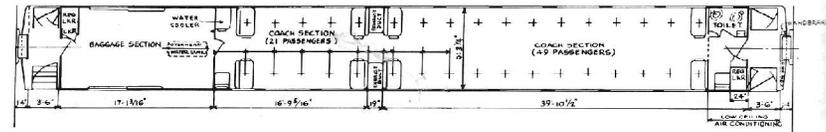
RDC-1

CAPACITY: 90 PASSENGERS



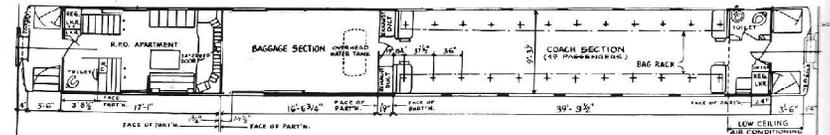
RDC-2

CAPACITY: 70 PASSENGERS



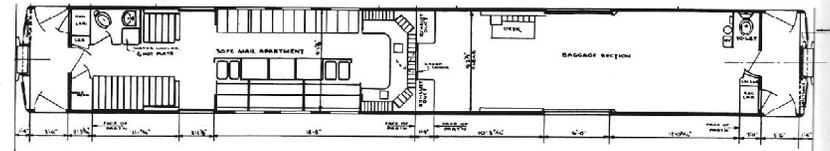
RDC-3

CAPACITY: 49 PASSENGERS



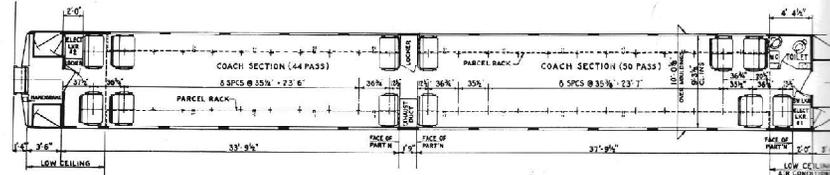
RDC-4

NO PASSENGER SEATING



RDC-9

CAPACITY: 94 PASSENGERS





RDC-1

Car Length: 85'

Passenger Capacity: 89

Baggage Capacity: Overhead only

RPO: N/A

193 Units built.

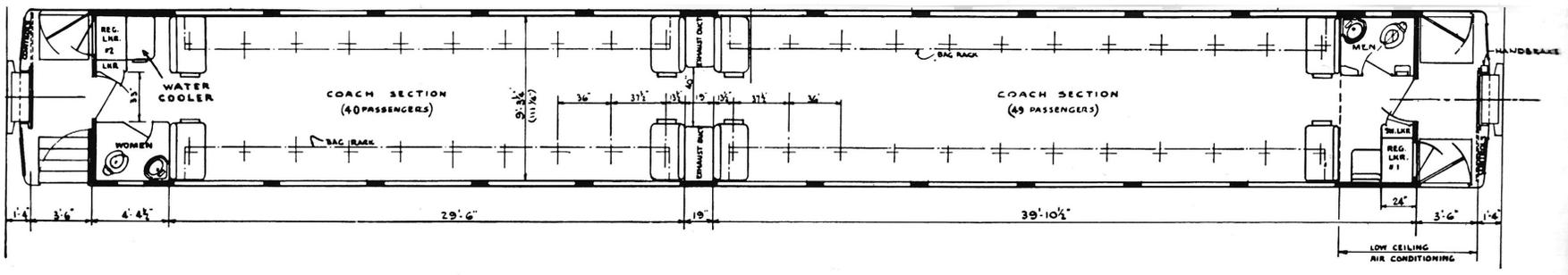
57% of NA production

VIA Rail RDC-1 6102 & 6107, Little Bras d'Or, NS, Bram Bailey ,

A-End



B-End





RDC-2

Car Length: 85'

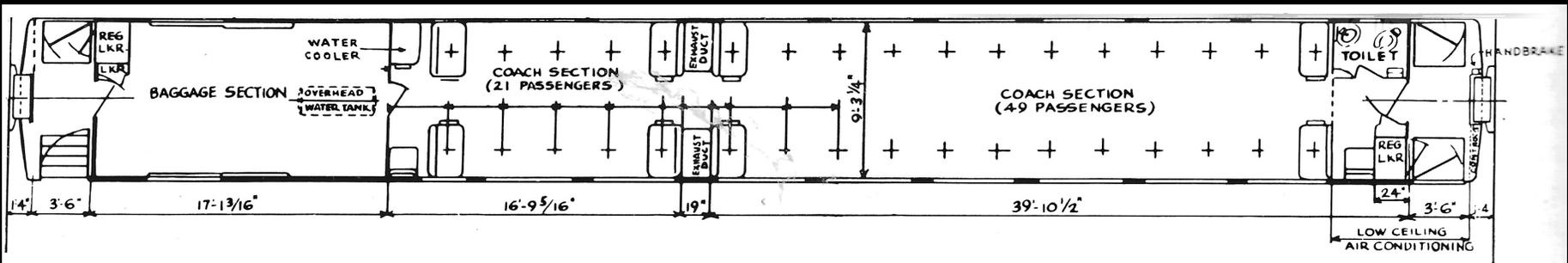
Passenger Capacity:
70

Baggage Capacity: 17'

RPO: N/A

56 units built.

16% of NA production.



RDC-3

Car Length: 85'

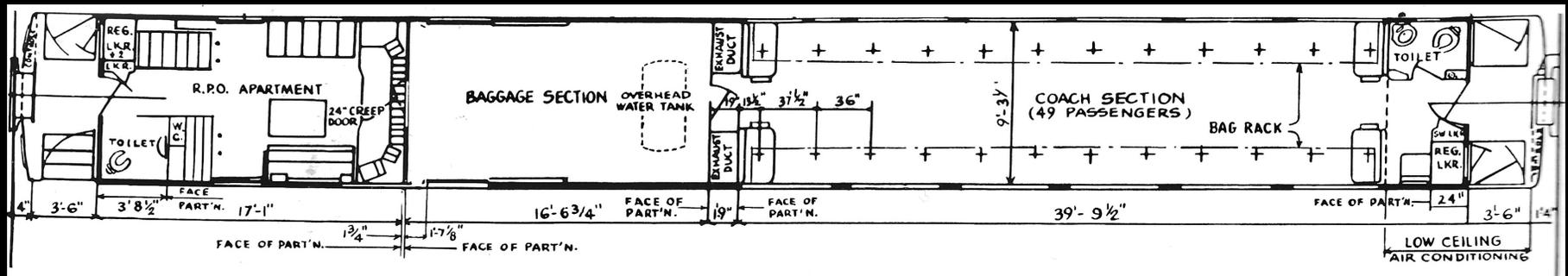
Passenger Capacity: 49

Baggage Capacity: 16'
6"

RPO: 17'

42 units built.

12% of NA production.



RDC-4

Car Length: 73' 6"

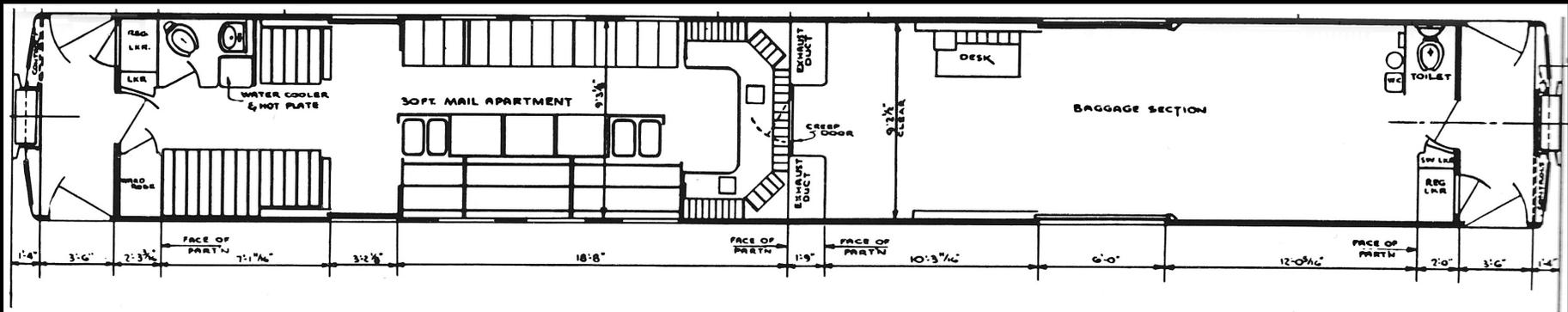
Passenger Capacity: 0

Baggage Capacity: 28' 3"

RPO: 29'

14 units built.

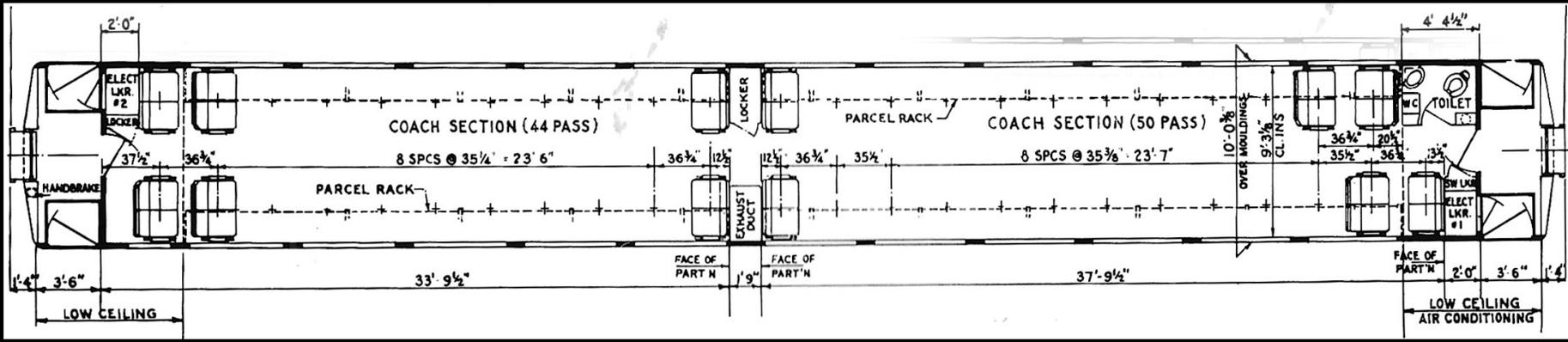
4% of NA production.





RDC-9

- Car Length: 85'
- Passenger Capacity: 94
- Baggage Capacity: Overhead only
- RPO: N/A
- 1 Motor (B-End)
- No Control Cab
- Should be paired with 2 RDC-1, RDC-2, RDC-3 or RDC-4 units.
- 30 Units built, all to B&M,
- 9% of NA Production



RDC Design Parameters

5. Cars must be produceable at minimum cost consistent with good quality.

A. RDC's cost ~\$150,000/car in 1952 when a lightweight coach cost ~\$165,000.



VIA RDC-2 #6219 & RDC-4 #6250 at Chapleau, ON Sept 18, 2018, Bram Bailey

RDC Design Parameters

6. RDC to weigh $< 125,200$ lbs. with full load of fuel water and sand.

A. Typical production weight of an RDC with a full load of fuel, sand and water was **112,800 lbs.**



Amtrak RDC-2 #32 Southbound crossing the Poquonock River Windsor, CT March 1984 Bram Baile

The Dome

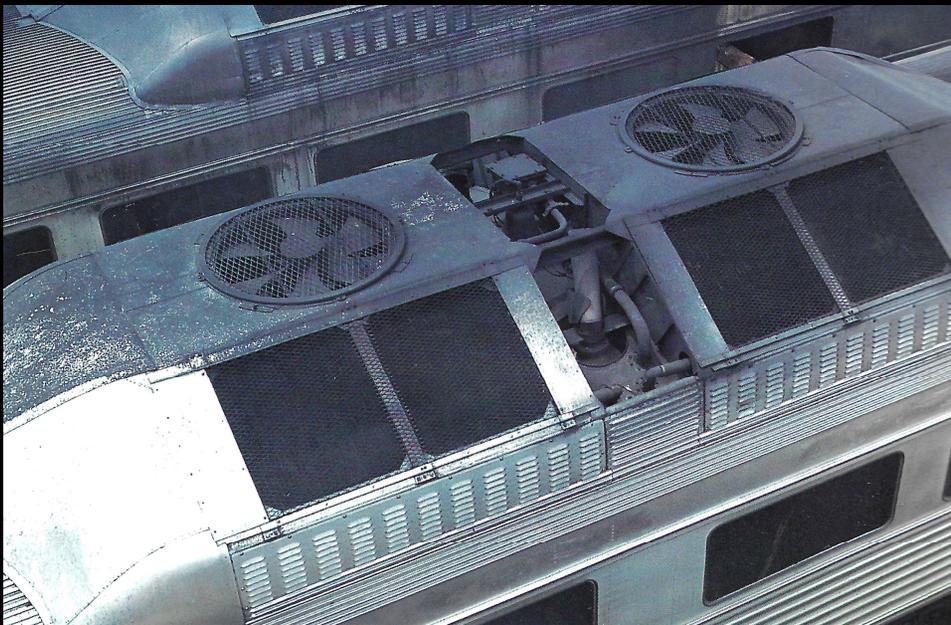


Photo by J. C. Smith



- Inspired by the Vista Dome.
 - Aesthetically pleasing.
 - Frees up revenue space.
- Engine Exhaust
- Combustion Air
- Redundant Radiators
 - Do not require antifreeze.
 - Water drained by gravity.
 - Stationary steam line used to heat in coach yards.
- Carbody was lowered 6" from normal to 14' 7" to accommodate eastern

RDC Production

- 410 total units built. (335 Domestic, 75 Export)
- Production from 1949-1962
- Phase I 1949-1955
- Phase II 1956-1962



Phase I RDC

224 Total Phase I Cars Built



Norton D. Clark photo 12/16/1961

Phase IB

- Step well changed to 4 step.
- Roof access ladder moved to A end adjacent to Engineer's door
- Fabricated Truck C

Phase IC

- Louvers on air intake replaced by extending radiator housing.
- Fabricated Truck D
- # Boards moved to Phase II location.

Phase I

- Demo #2960 only example.
- End sheets extended below buffer.
- Windshield wiper mounted on post.
- 5 tread step well.
- Fabricated Truck A unique to 2960.

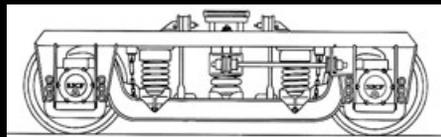
Phase IA

- First 10 Production units.
- Fabricated Truck B
- Roof access ladder near radiators

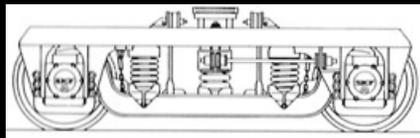


Photo Courtesy of Walthers Trains

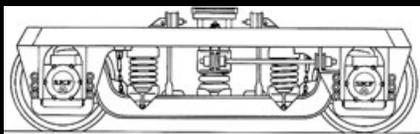
Phase I RDC Trucks



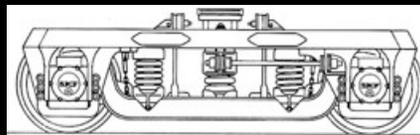
Truck A



Truck B



Truck C



Truck D

Trucks A-D were all fabricated, used 33" wheels equipped with inboard disc brakes E/W Rolokron anti-

wheel slip.
Truck A... Only used on Demo #2960.

Frame was made of Tube steel.

Proved to be too fragile, was replaced by Truck B in 4 months.

Truck B... Only used on first 10 Phase IA

Frame was made of Square Tube steel.

Truck C... Used on Phase IB cars

Ends of frame beveled for clearance.

Truck D... Used on Phase IC cars except B&M cars delivered 12/55 which received cast E trucks.

Frame was augmented by additional gussets.

Phase II RDC

186 Total Phase II Cars Built

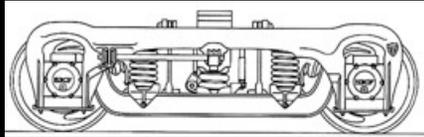


Phase II

- Cab windows smaller.
- Raised Headlight housing.
- Body mounted pilot
- Cast Truck E
- Wrap around fluting optional.

Photo Courtesy of Rapido Trains

Phase II RDC Trucks



Truck E

- Cast truck that used 34" wheels equipped with inboard disc brakes E/W Rolokron anti-wheelslip.
- Applied to B&M's 12/55 order of Phase IC cars.
- Applied to all Phase II cars as built.
- Modified version used on Roger Williams trains blt 2/57.



Phase I-Phase II RDC Comparison



Phase II-Phase I RDC Comparison



Phase II

- Number Boards on front.
- Cab windows smaller.
- Raised Headlight housing.
- Body mounted pilot.
- Cast Truck E.
- Wrap around fluting optional.

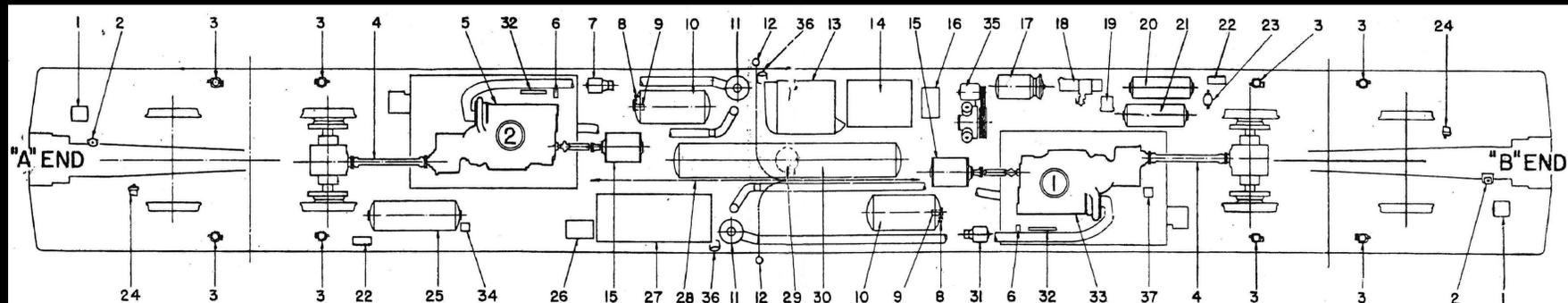
Phase I

- Number boards on side.
- Cab windows larger.
- Headlight housing over door.
- Frame mounted pilot.
- Fabricated Truck C.

RDC Underbody Components

"Short end"

"Long end"



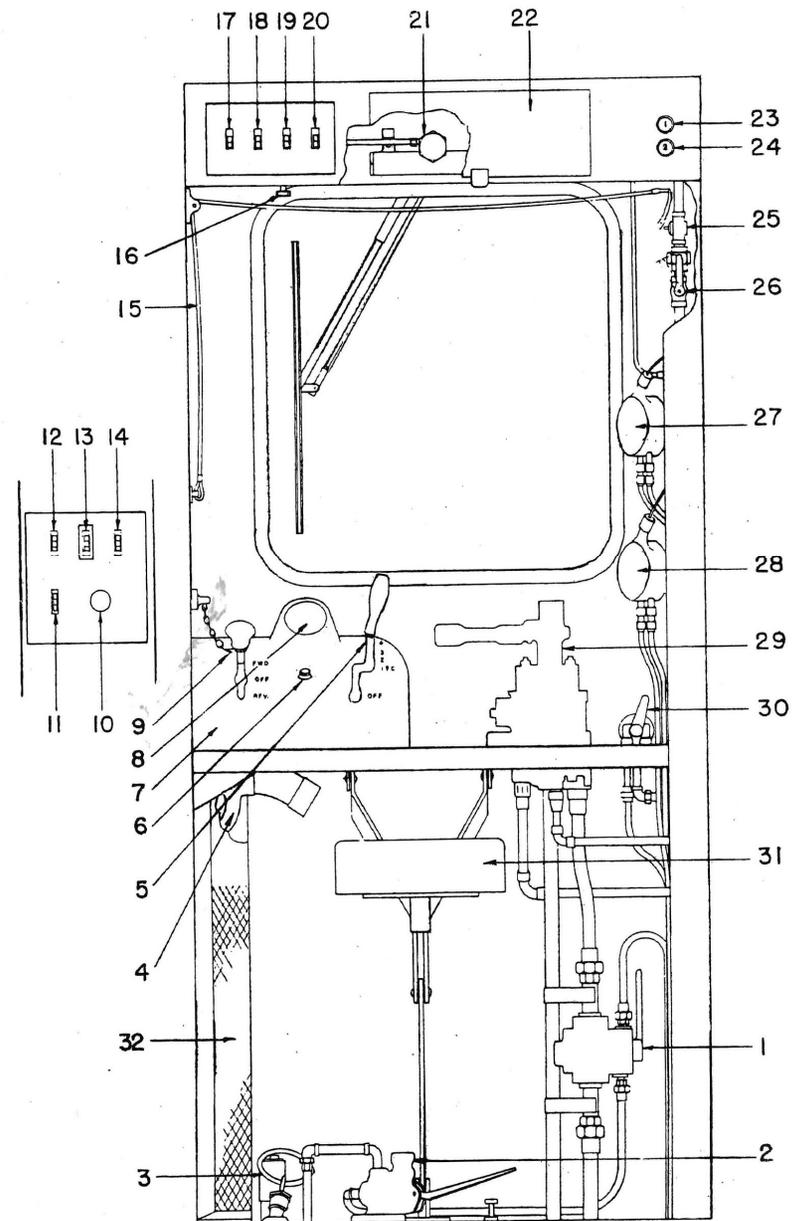
- | | |
|---|---|
| 1. Equalizer Reservoir. | 19. B-3 Relay Valve. |
| 2. C-2 Cut-off Valve. | 20. No. 2 Main Reservoir. |
| 3. Sanding Valve. | 21. Service Reservoir. |
| 4. Main Drive Shaft. | 22. Rolokron Control Box. |
| 5. No. 2 Engine. | 23. Type "J" Filter. |
| 6. Thermo-Pneumatic Control Valve. | 24. K-1 Brake Application Valve. |
| 7. Water Pump — Floor Heat. | 25. No. 1 Main Reservoir. |
| 8. Water Level Cocks — Engine Cooling. | 26. Battery Cut-out Switch and D. C. Charging Receptacle. |
| 9. By-pass Valve — Engine Cooling. | 27. Battery Box. |
| 10. Water Tank — Engine Cooling. | 28. Fuel Emergency Valve Cable to Cab. |
| 11. Engine Air Cleaner. | 29. Fuel Emergency Valve Toggle — See Fig. 3. |
| 12. Fuel Emergency Valve Ring. Pull in case of fire ONLY. | 30. Fuel Oil Tank. |
| 13. Air Conditioning Condenser. | 31. Overhead Heat Pump. |
| 14. Air Conditioning Compressor — Auto.-Manual Air Conditioning Control Switch. | 32. Emergency Air Reservoir. |
| 15. Generator. | 33. No. 1 Engine. |
| 16. Pull Box and D. C. Charging Receptacle. | 34. S-16 Compressor Governor. |
| 17. Combined Auxiliary, Emergency and Displacement Reservoir. | 35. Air Compressor and Motor. |
| 18. D-22-AR Control Valve. | 36. Fuel Fill and Sight Gauge. |
| | 37. Emergency Sanding Pressure Switch. |

RDC Controls

Figure 1
CONTROL CAB

The car is provided with duplicate controls at each cab operating station for operation from either end.

1. Double-Heading Cock.
2. Deadman Control Valve.
3. Red Emergency Fuel Cut-off Ring. Pull in case of fire ONLY.
4. Cab Heat Blower.
5. Throttle Lever.
6. Manual Sanding Button.
7. Controller — Engine Direction and Speed.
8. Speedometer.
9. Forward and Reverse Lever.
10. Master Plug Switch.
11. Cab Ceiling Light Switch.
12. Headlight Switch.
13. Headlight Emergency Switch. Close ONLY when one lamp is burned out.
14. Cab Heater Switch.
15. Horn Signal Cord.
16. Windshield Wiper Control Valve, Turn counter-clockwise to operate wipers.
17. Defroster Switch.
18. Instrument Lights Switch.
19. Classification Light Switch.
20. Number Sign Light Switch.
21. Windshield Wiper Motor.
22. Access Door — Classification Lights, Gauge Light Resistors, Signal Buzzer.
23. Generator Pilot Light — No. 1 Engine.
24. Generator Pilot Light — No. 2 Engine.
25. Horn Signal Valve.
26. Horn Signal Emergency Cut-out Cock.
27. Air Reservoir Gauge. (MR-ER)
28. Air Brake Gauge. (BP-BC)
29. M-23 Brake Valve.
30. Bell Signal Air Valve.
31. Operator's Seat.
32. Cab Heater.



RDC Operation

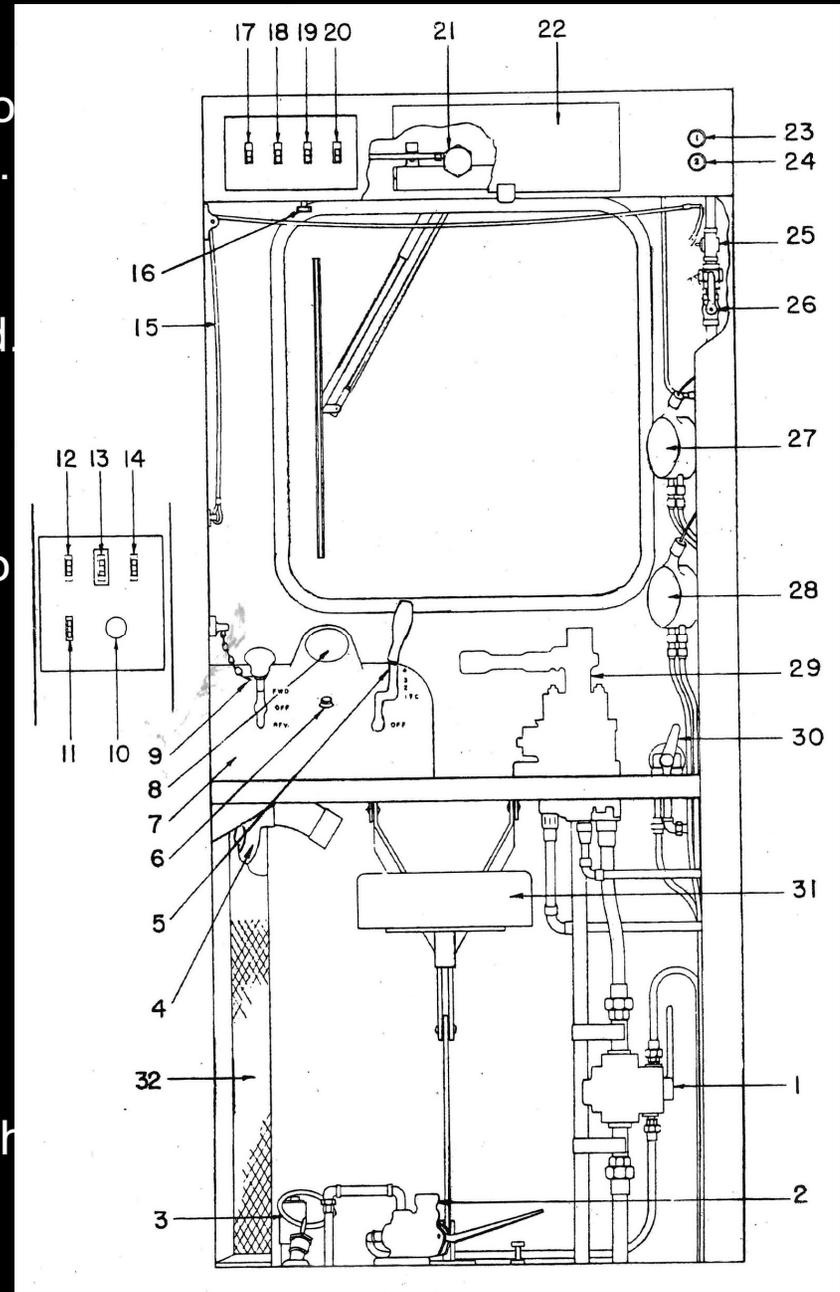
Note: To operate car from any specific Control Position, Master Plug (#10) Must be inserted.

Once brake test is completed:

1. Make brake application (29) to hold car.
2. Move reverse lever (9) to direction desired.
3. Move throttle (4) from off to #1 Position.
4. Release brakes (29).
5. Car will accelerate from 0 to 20-25 MPH.
6. For greater speeds increase Throttle (4) to positions #2-4 as necessary.

Station Stop Procedure:

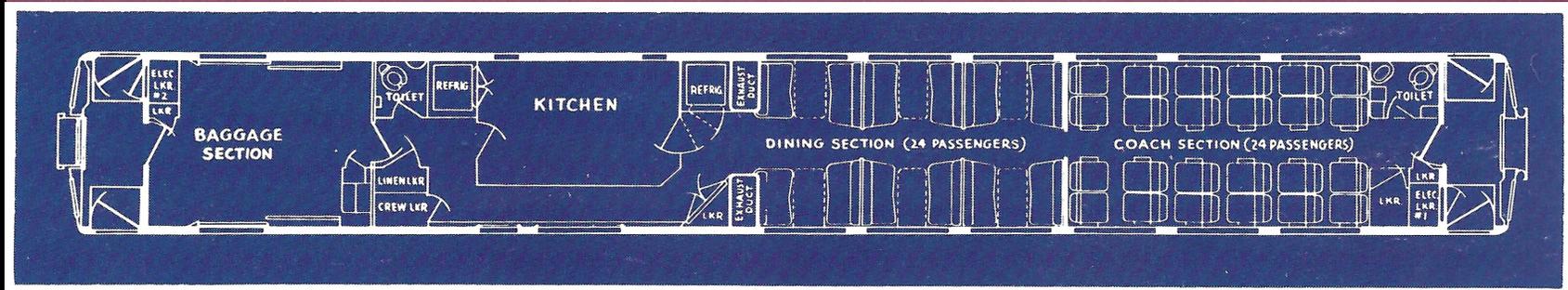
7. Move Throttle to #1 Position, NOT OFF.
8. Make full service brake application (60 PSI).
9. For final stop reduce brake application to 15-25 PSI to achieve smooth stop. Rolokron disc brake control will automatically cushion the transition.
10. Keep throttle in #1 position during stop with brake application holding car in place.
10. Repeat steps 4-6 to depart.
11. Do not use throttle OFF position until the



RDC Car...AKA

- Beeliner...NYC
- Chessieliner...C&O
PGE
- Higliner...B&M
- Pocket Streamliner...SP
- Shoreliner...NH
- Speedliner...NYSW
- Budd Car...GN
- Dayliner...CP &
- Libertyliner...CNJ
- Railiner...CN
- Capitoline...B&O
- Zephyrette...WP

Special RDC-2 Diner for B&O



Special RDC-4 for M&StL



- 2 Cars Built 1/57 #32 & 33.
- Built with 12 passenger compartment in the bagg end.
- Served Minneapolis-Des Moines.
- Later pulled trailers and blew out torque converters.
- Traded to C&O 12/58
- Sold to Krautkramer Ultrasonics 1967.
- #33 Sold to B&M 1972.
- Nicknamed "RDC-3 1/2."

Roger Williams



Photo by Joseph Grosser

- 2 RDC-A Cab cars.
 - Seats 64.
 - Crew cab.
- 4 RDC-B Mid-train units.
 - Seats 90.
 - 1 vestibule, B end.
 - No control (RDC-9).
 - 2 Diesel Motors.
- Built 2/57.
- Capable of 110 MPH.
- Traction motors for access to Grand Central Terminal.
 - 1 Traction Motor/Car.
 - 3rd Rail shoes.
- Capable of MU with other RDCs.

Roger Williams



Railway Modified RDCs



AT&SF Wreck Rebuilds DC192 & DC191



CN Track Inspection Car originally CN
RDC-1 #D108, Lineage: CN 6108...
VIA 6108...CN 15016...CN 1501 .
Photo by Mike Robin

Pride of the NYC



Photos courtesy of
Pinterest.com



Jet Powered test car M-497

- RDC-3 #497
- 2 GE J47 Jet Engines (B-36)
- US Rail Speed Record 183.85 MPH July 23, 1966
- M-497 returned to regular service as NYC 497

Next Generation RDCs



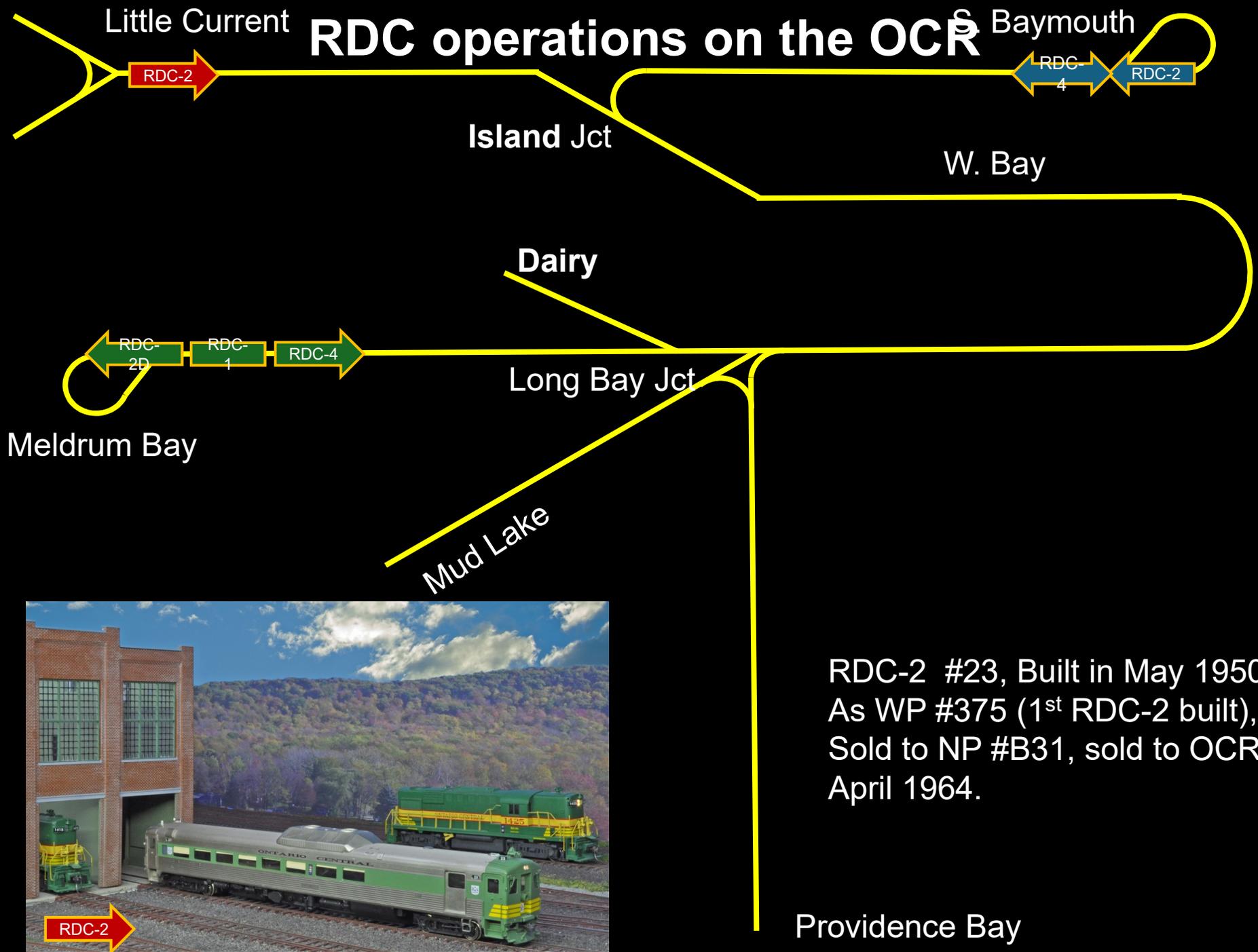
1967 Hawker-Siddeley RTC Railcars

- Aluminum Construction
- 15 built
- Depowered by mid-1980s

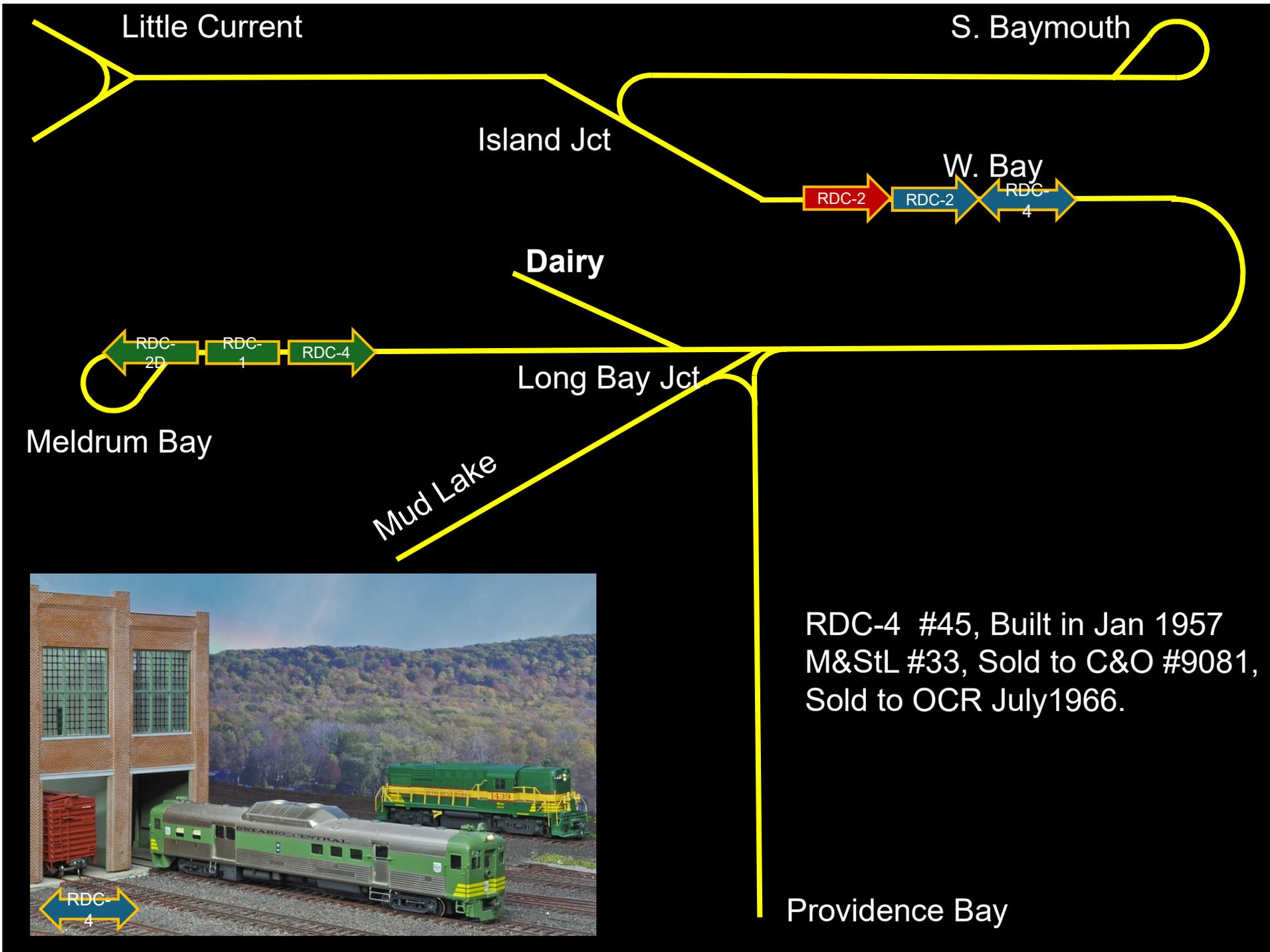
1978 Budd SPV-2000

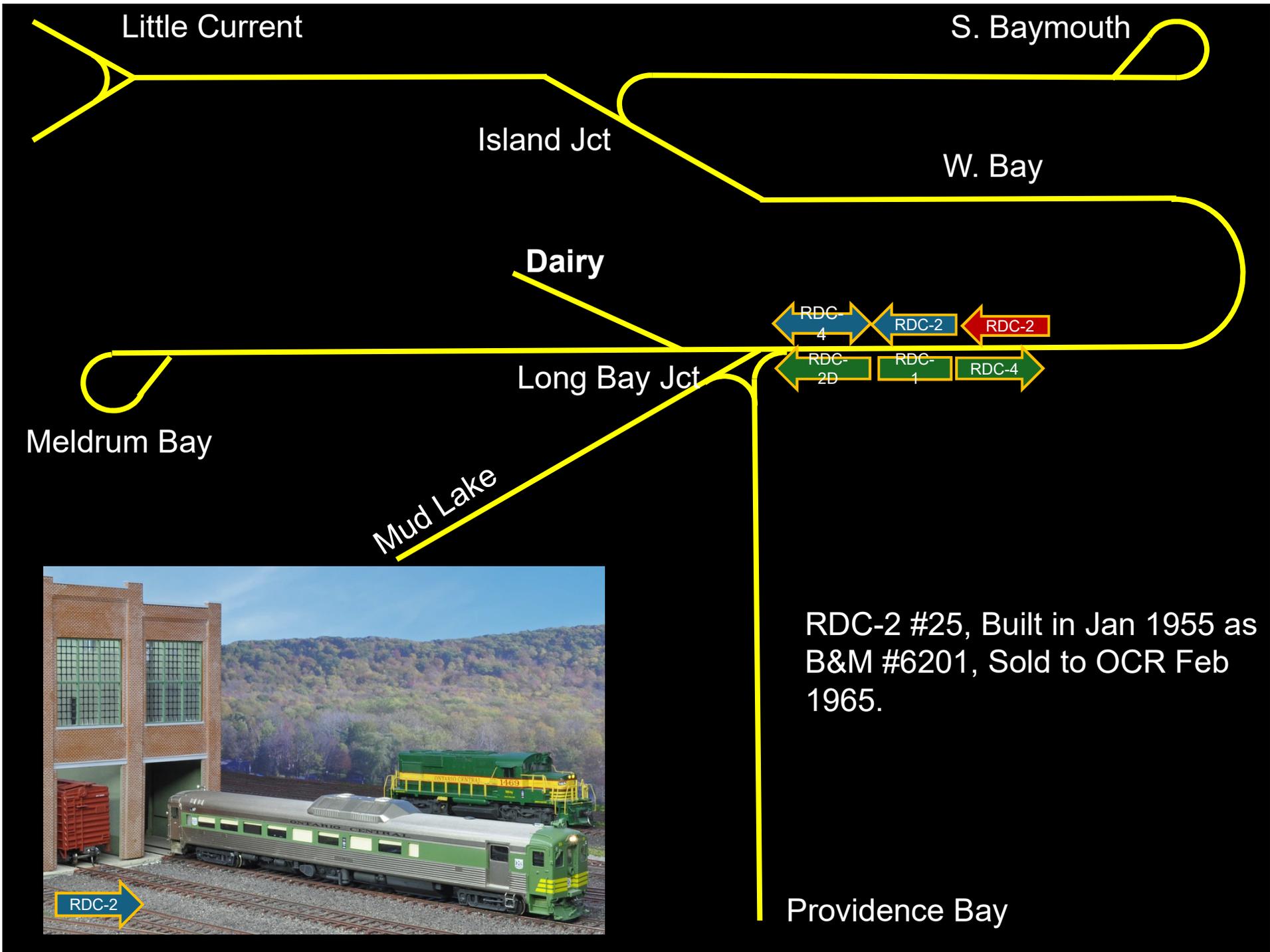
- 30 cars built
- Mechanical issues
- Most out of service by Late 80s



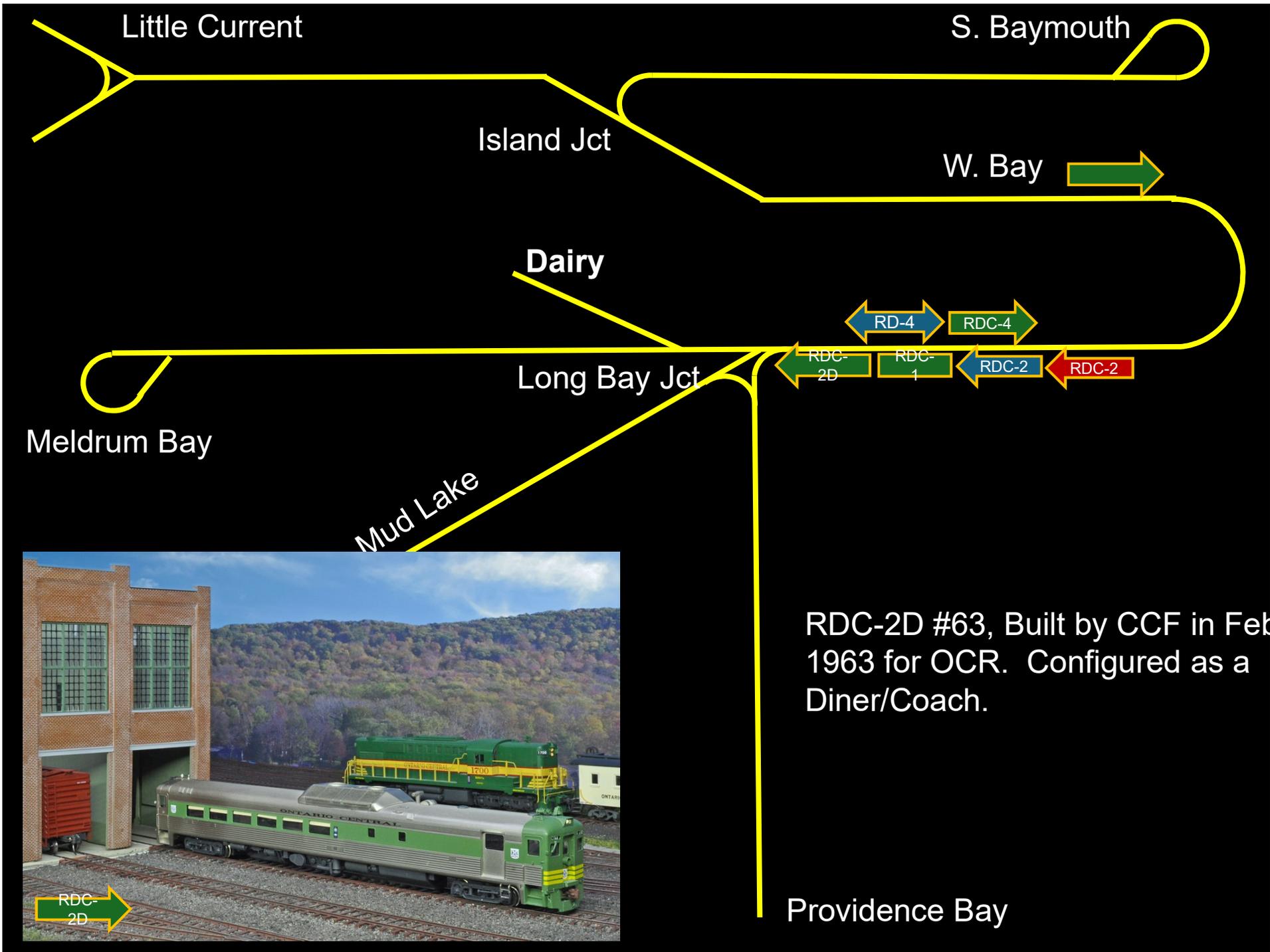


RDC-2 #23, Built in May 1950
 As WP #375 (1st RDC-2 built),
 Sold to NP #B31, sold to OCR
 April 1964.

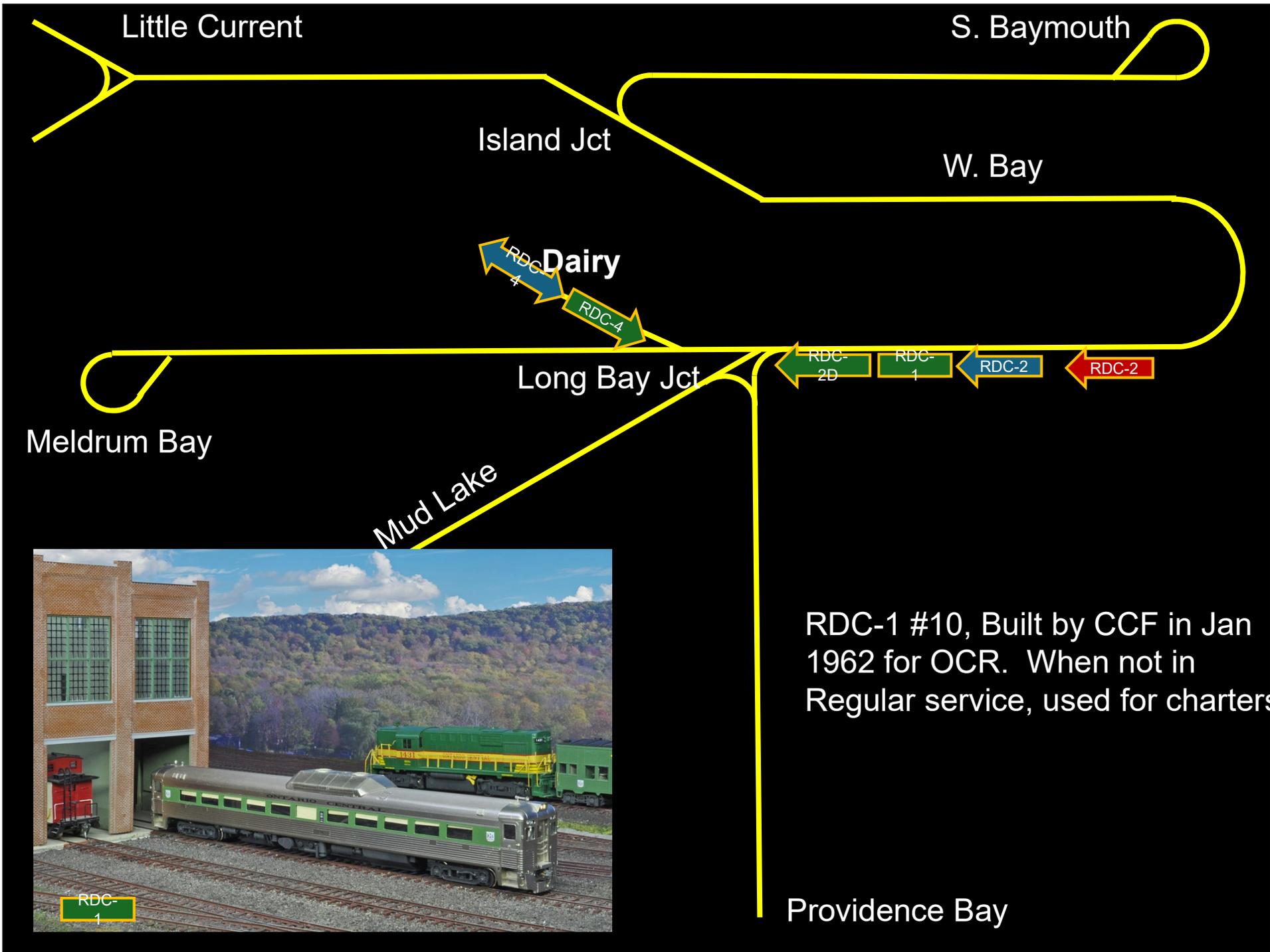


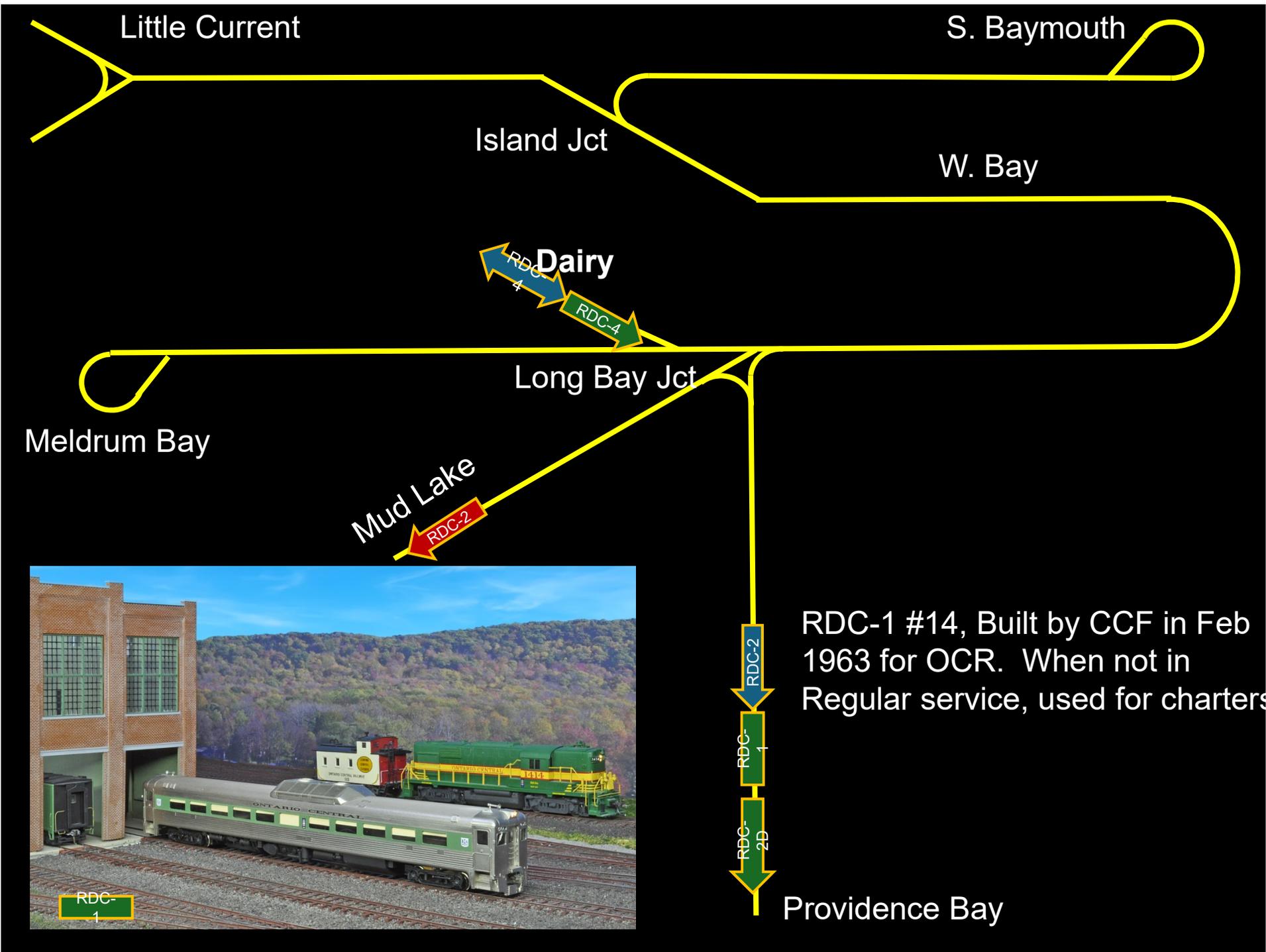


RDC-2 #25, Built in Jan 1955 as B&M #6201, Sold to OCR Feb 1965.



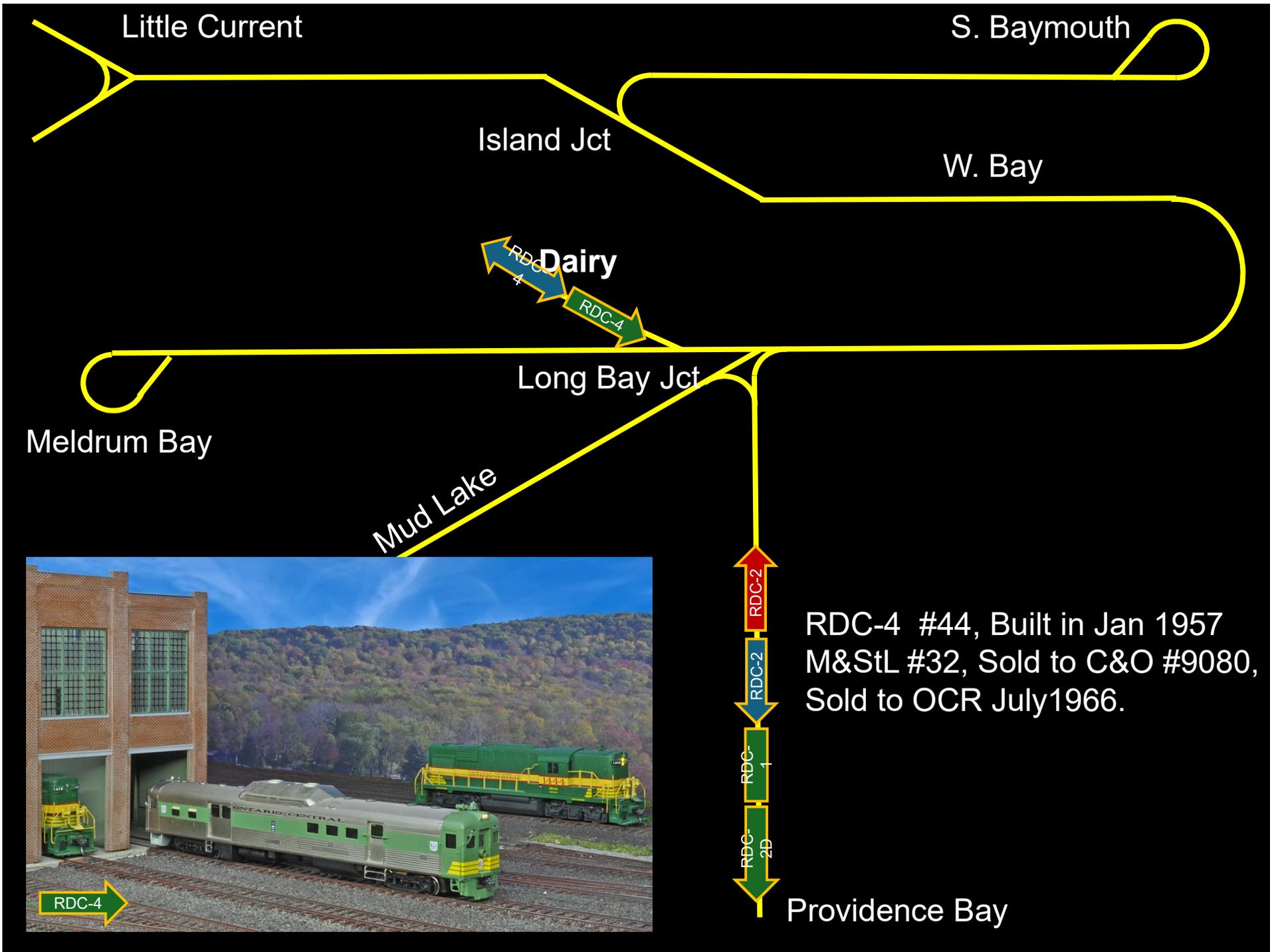
RDC-2D #63, Built by CCF in Feb 1963 for OCR. Configured as a Diner/Coach.

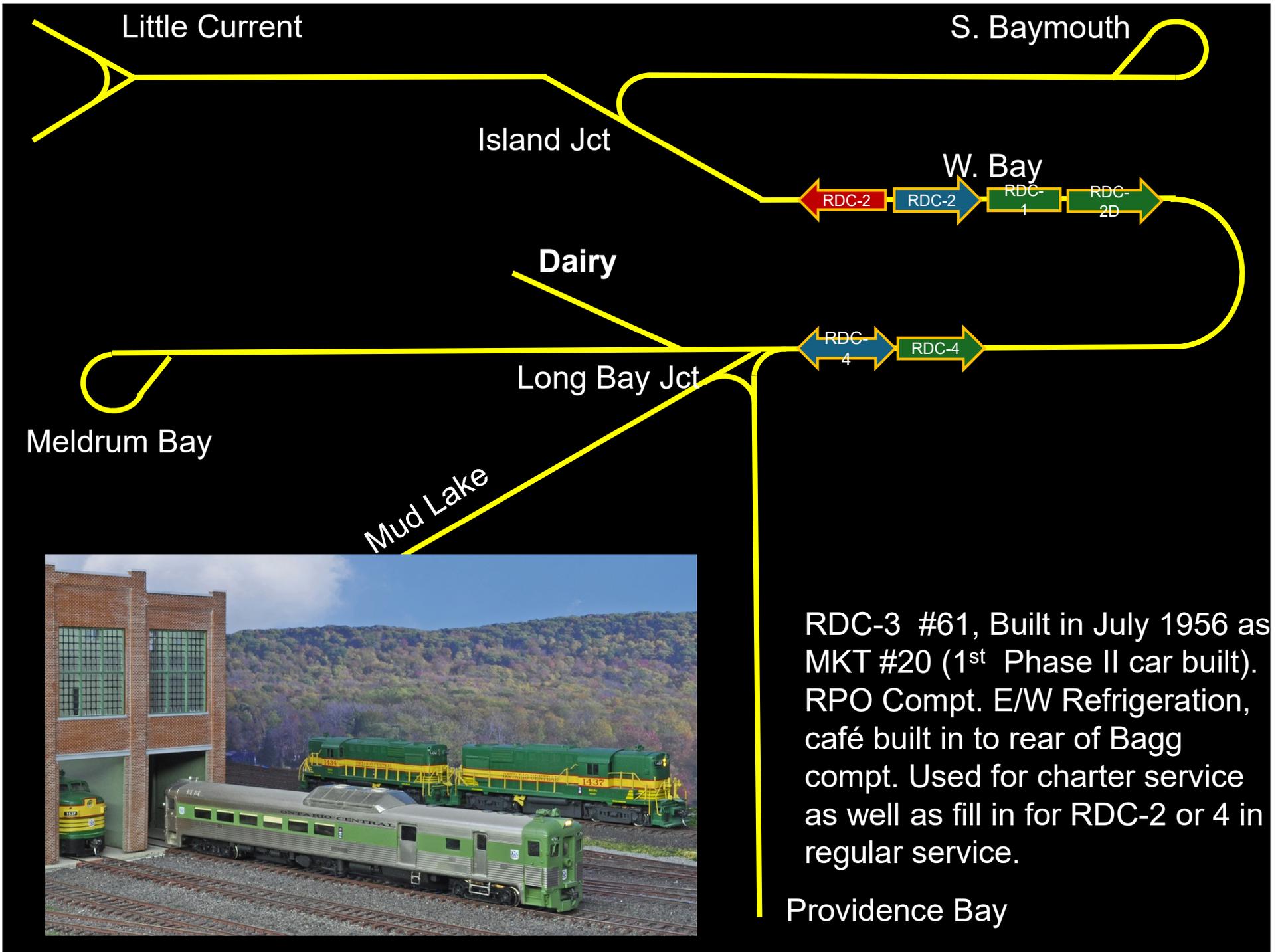


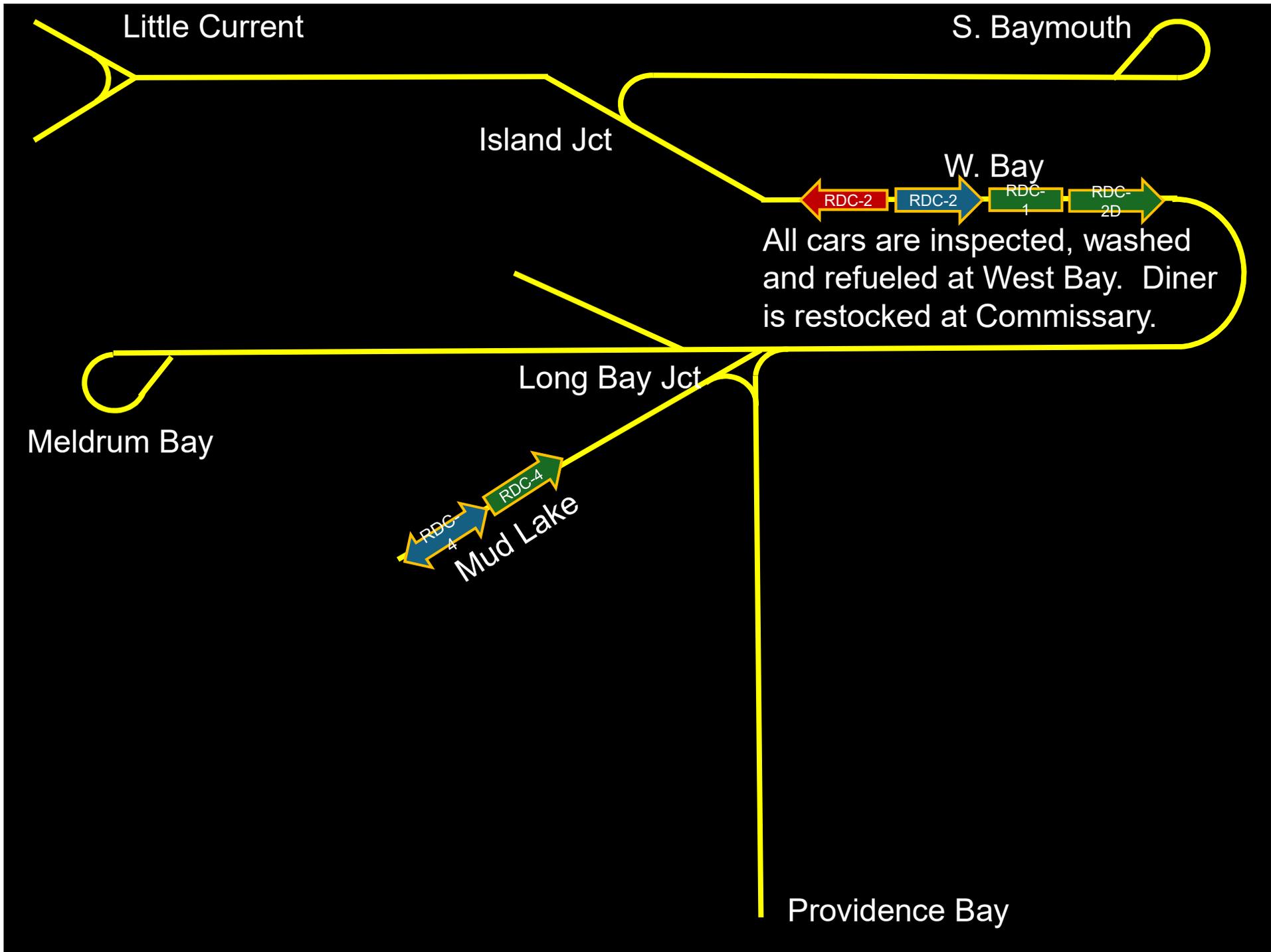


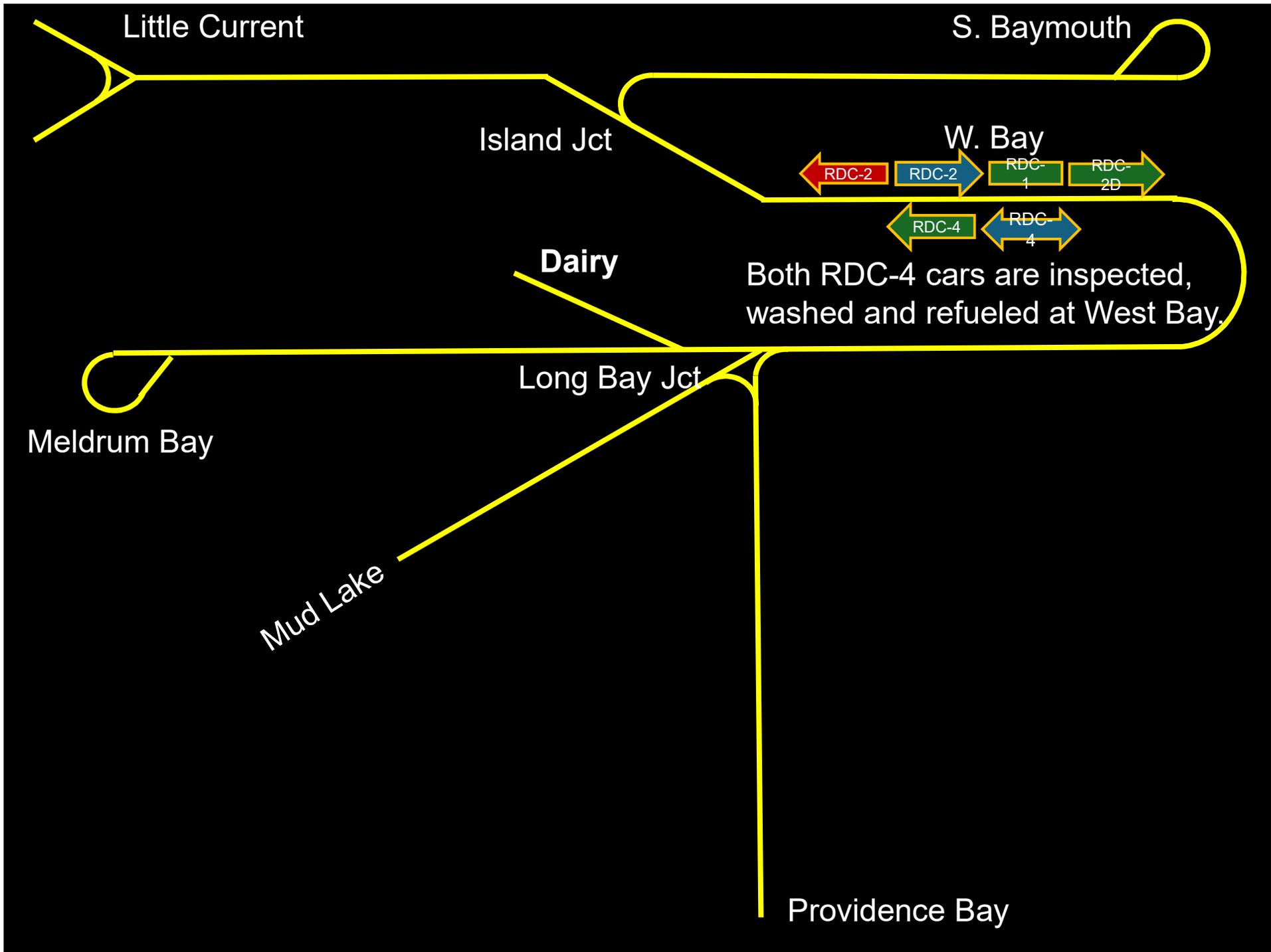
RDC-1 #14, Built by CCF in Feb 1963 for OCR. When not in Regular service, used for charters

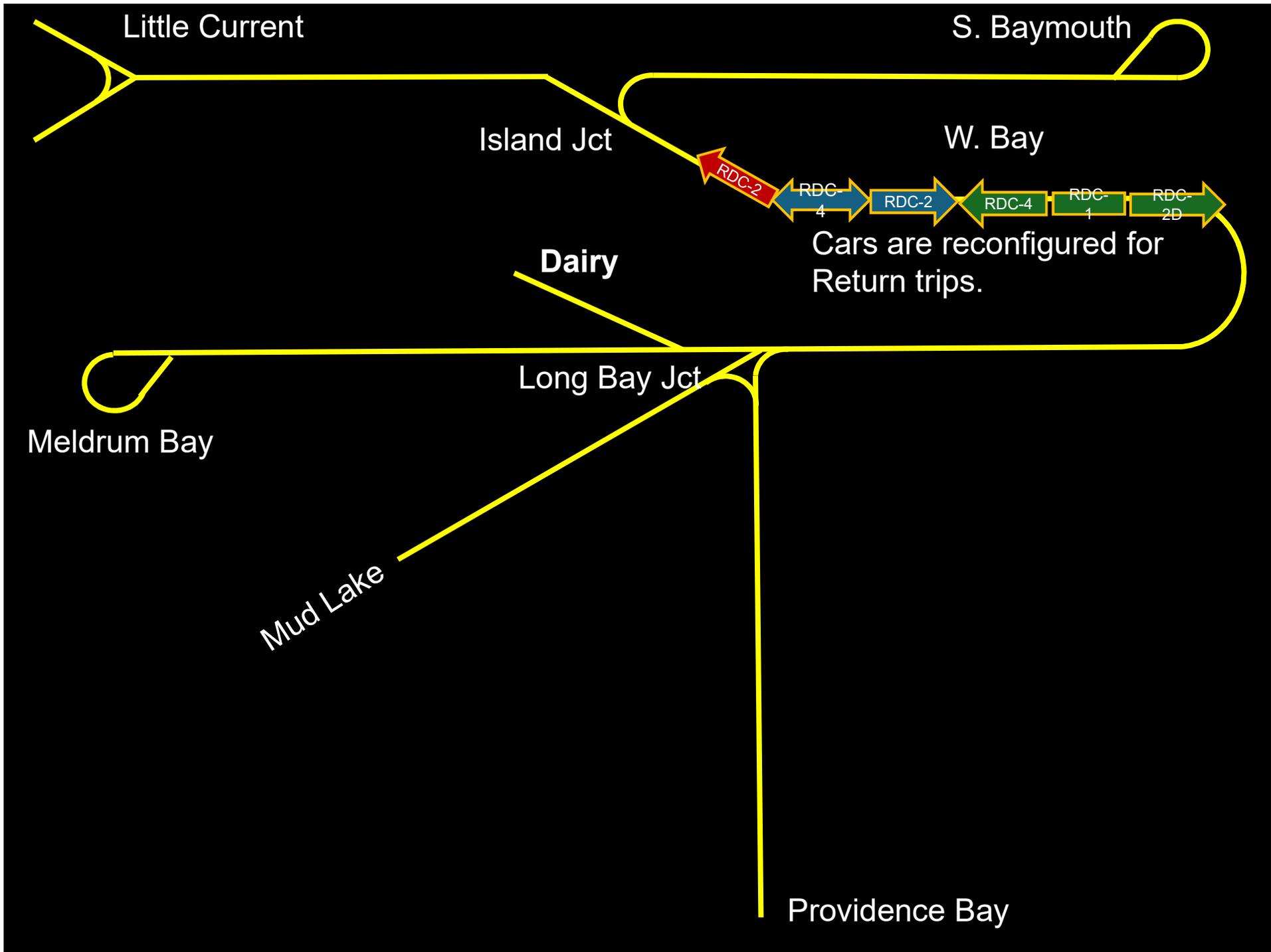


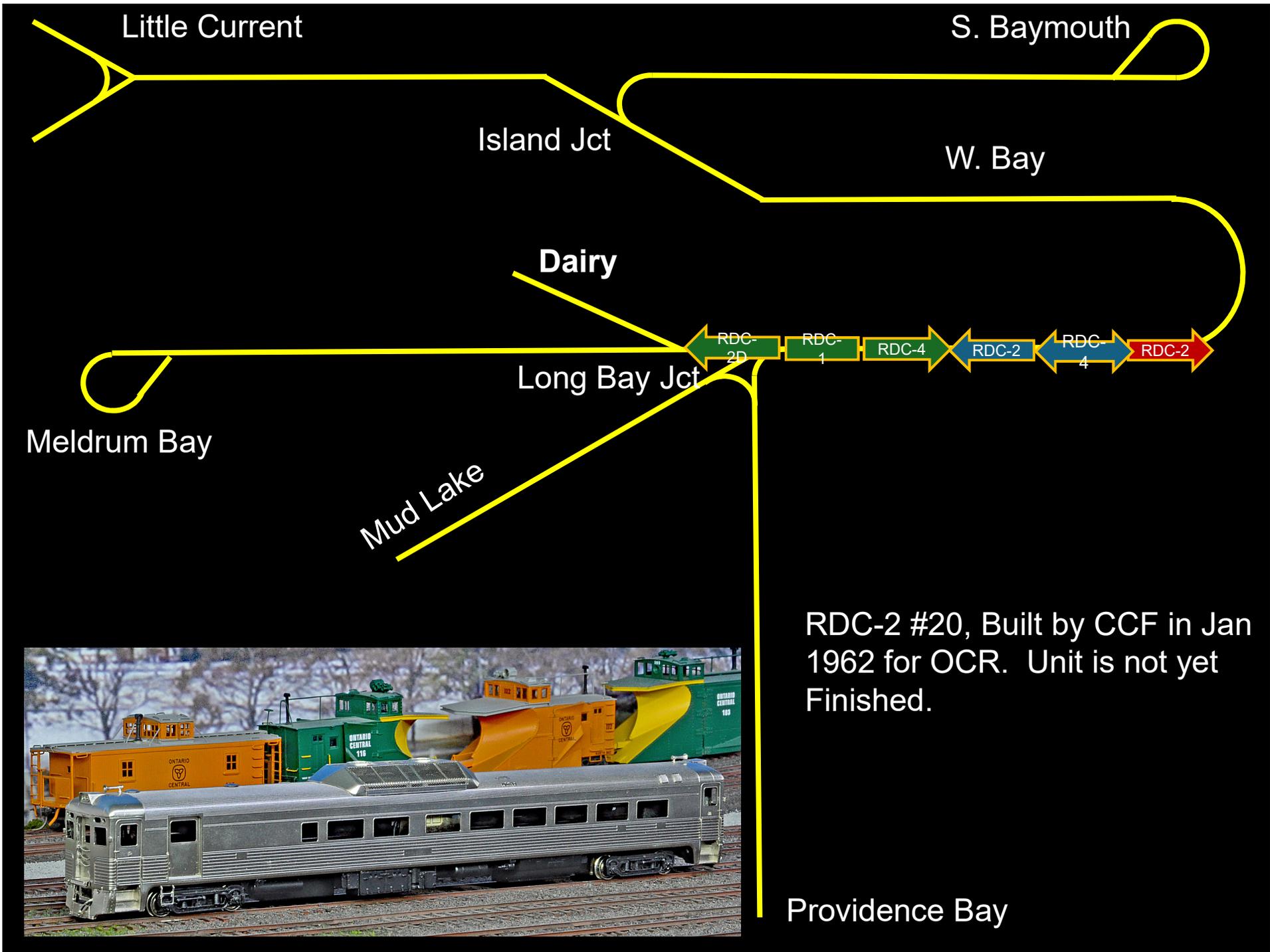






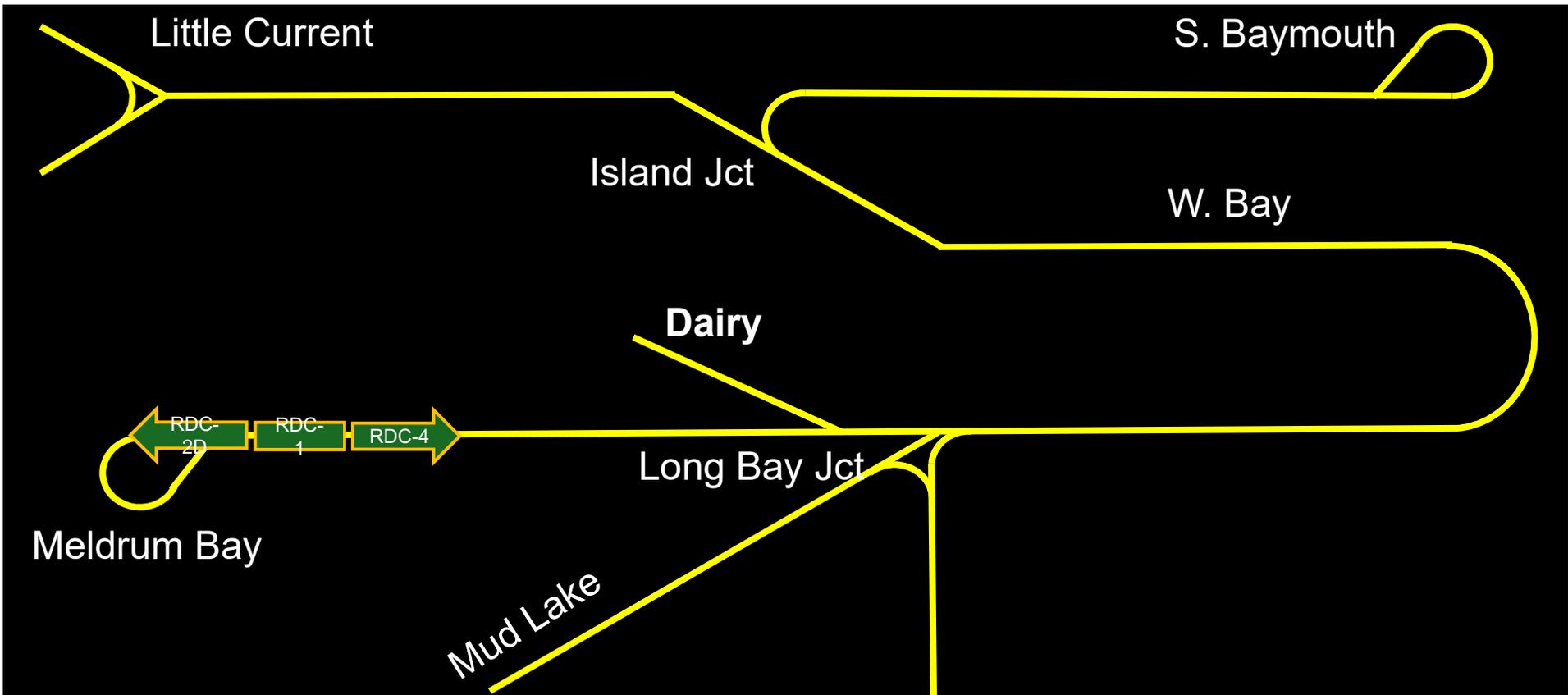






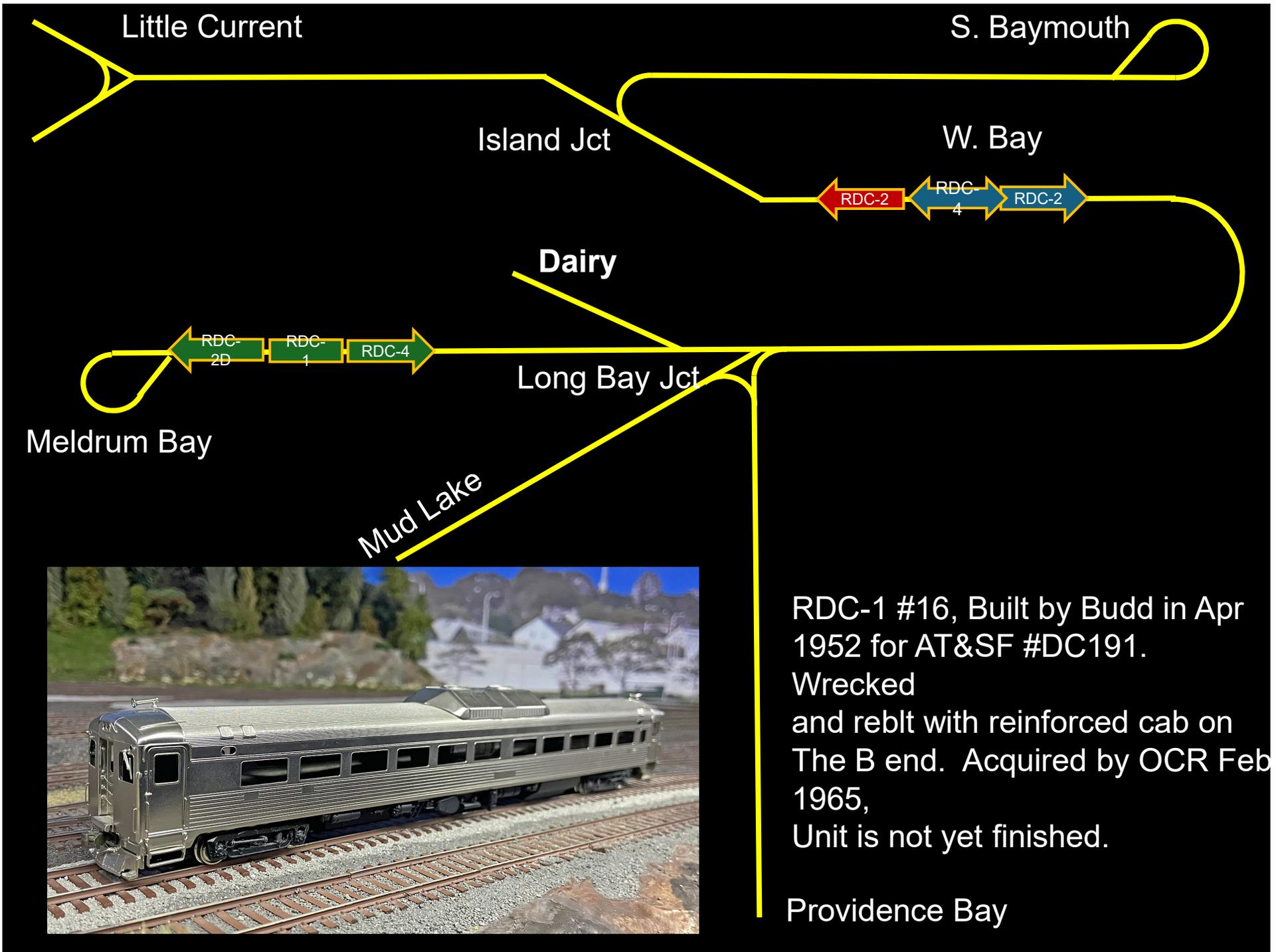
RDC-2 #20, Built by CCF in Jan 1962 for OCR. Unit is not yet Finished.

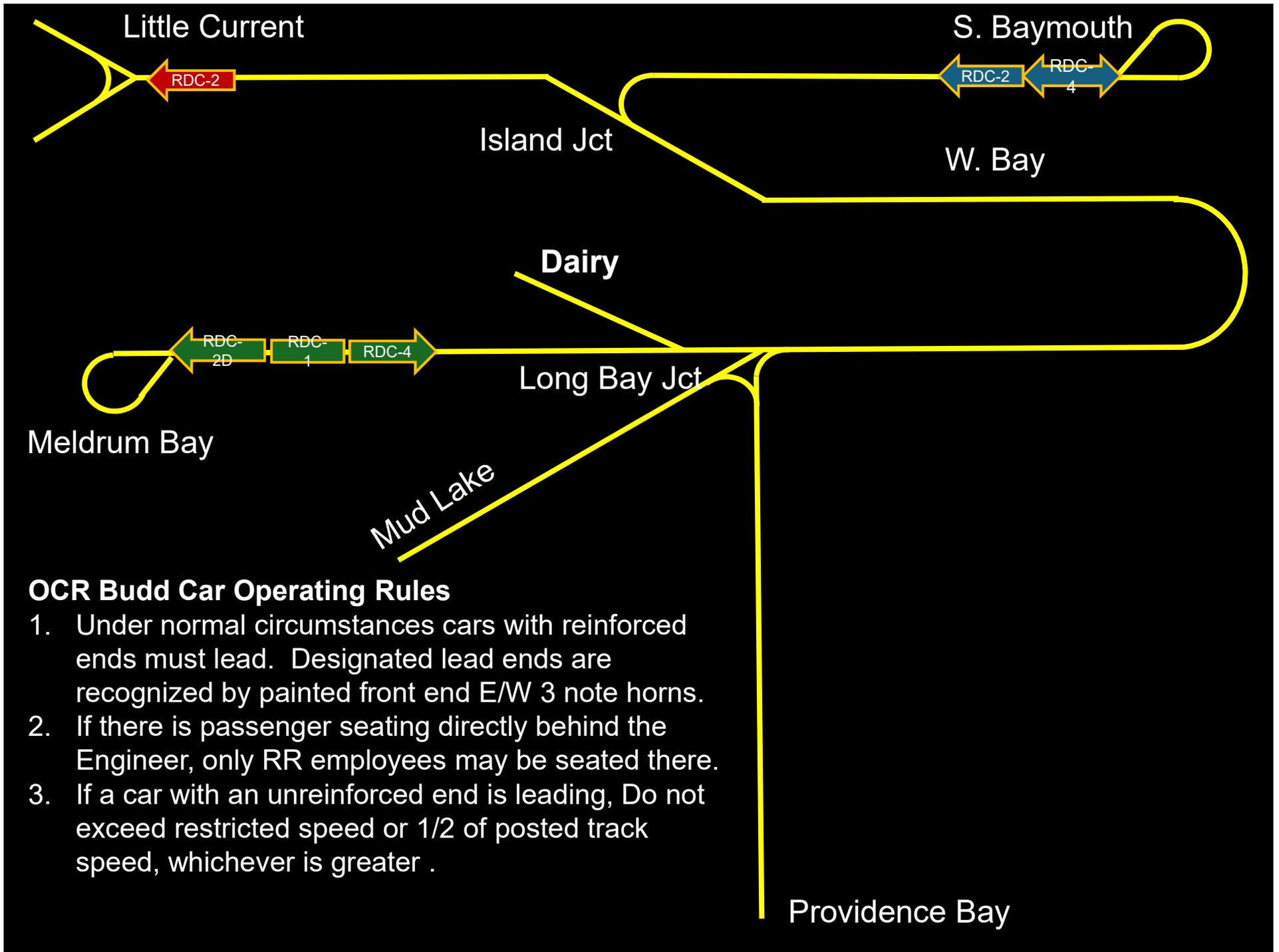




RDC-2 #60, Built by Budd in Apr 1952 as RDC-1 for AT&SF #DC192.
 Wrecked and rebuilt as an RDC-2.
 Acquired by OCR Feb 1965, part of
 of
 Baggage room rebuilt as Café.
 Unit is not yet finished.
 Providence Bay







OCR Budd Car Operating Rules

1. Under normal circumstances cars with reinforced ends must lead. Designated lead ends are recognized by painted front end E/W 3 note horns.
2. If there is passenger seating directly behind the Engineer, only RR employees may be seated there.
3. If a car with an unreinforced end is leading, Do not exceed restricted speed or 1/2 of posted track speed, whichever is greater .

HO Scale RDC Models

- Athearn Metal Kits
- Athearn Plastic RTR
- ATT, Tri-ang
- NJ Custom
- Hallmark
- Proto 1000 (Walthers)
- Rapido



Athearn

Modernized RDC-1 & RDC-3



- Plastic.
- One window short.
- Dome Centered.
- Rubber band drive.



ATT Tri-ang

Modernized RDC-1 & RDC-2

- Plastic.
- Not proportioned correctly.
- Pilot rotates with truck.
- Incorrect Trucks.
- Detail is coarse.



NJ Custom

Original RDC-1, RDC-2 & RDC-3



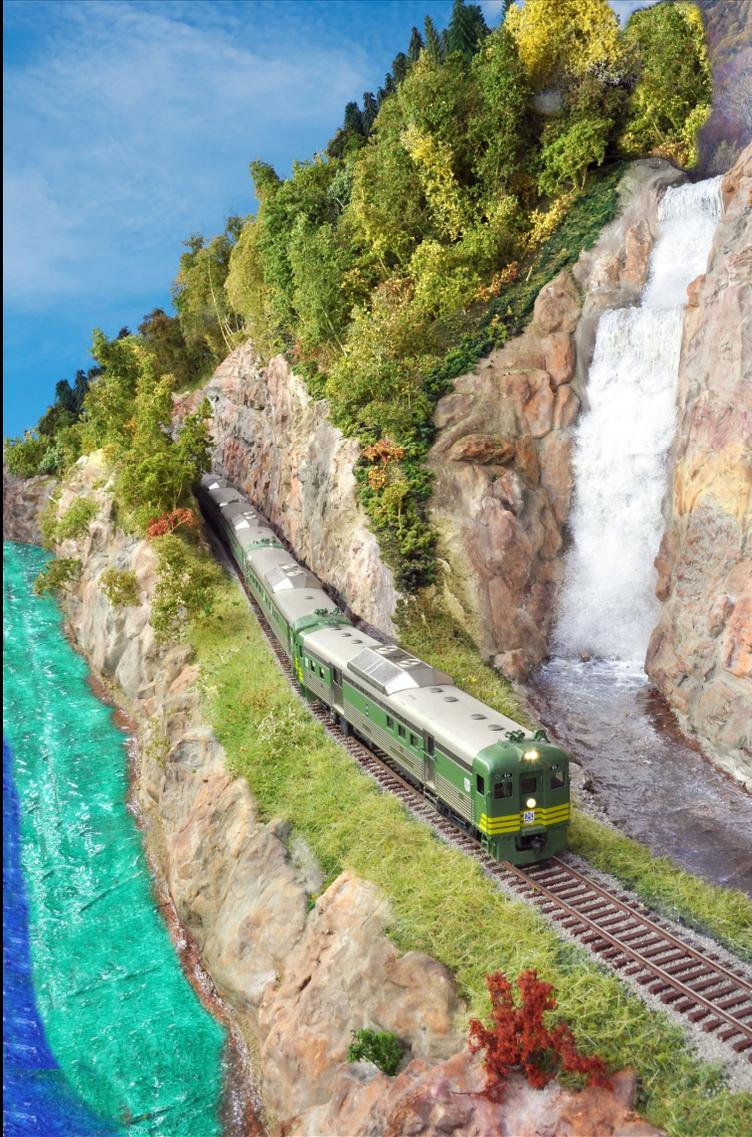
- Brass.
- Built by Kumata.
- Pilots are wrong.
- Mechanism rough.



Hallmark

Original RDC-1, 2, 3 & 4, Mod RDC-1, 2, 3, 4 & 9

- Brass.
- Built by Samhongsu.
- Great Mechanism.
- Several custom



Proto 1000 (Walthers)



Original RDC-1, RDC-2 & RDC-3

- Plastic.
- Correct proportions.
- Good Mechanism.
- Easy DCC conversion.

It's not a locomotive!!!!



Rapido

Original & Modern RDC-1, RDC-2 & RDC-3



- Plastic.
- Correct proportions.
- Under Powered
- Great detail.
- Detail customized per prototype.
- Several special cars offered.
- DCC Sound from Factory.

Photos Courtesy of
Rapido Trains



RDC Trivia...Answers

- How many brake shoes does an RDC have?
- How many traction motors does an RDC have?
- Where are the dynamic brake grids located on an RDC?
- How many lightweight coaches can an RDC haul?
- Do RDC cars use steam for heating?
- None...RDC cars have disc brakes and use 16 pads instead of conventional shoes.
- Trick Question...Yes & No.
RDC-1-9 = 0, RDC-A-B = 1
- Since there are no traction motors D/B is impossible.
- None...Using an RDC as a locomotive voids the warranty.
- Yes and No. Steam heating is used in the coach yard, but in operation heating is supplied by the engine coolant water.

The End

