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STATE OF NEW YORK  
OFFICE OF THE STATE COMPTROLLER

July 18, 2019

Mr. Patrick J. Foye  
Chairman  
Metropolitan Transportation Authority  
2 Broadway  
New York, NY 10004

Re: Maintenance and Inspection of  
Event Recorder Units  
Report 2018-S-19

Dear Mr. Foye:

Pursuant to the State Comptroller's authority as set forth in Article X, Section 5 of the State Constitution and Section 2803 of the Public Authorities Law, we audited Metropolitan Transportation Authority – New York City Transit's (Transit) operating units to determine whether they complied with maintenance and inspection requirements pertaining to Event Recorder Units (ERUs) and whether Transit has a corrective action plan (Plan) to fix ERU deficiencies that are identified. The audit covered the period from January 1, 2014 through to February 7, 2018.

**Background**

Transit is the largest public transportation agency in North America and one of the largest in the world, with 472 subway stations spread across four of the five boroughs of New York City. As of February 3, 2018, Transit had 6,435 subway cars and, on an average weekday, carried about 7.7 million passengers. In 2000, Transit began to deploy its New Technology Trains (NTTs; i.e., Models R142, R142A, R143, R160, R188) and train locomotives (Model R156), which included ERUs, or "black boxes." ERUs are a valuable safety feature that allow for the monitoring of train equipment and technical analysis of incidents/accidents based on data they record, such as train speed, brake pipe pressure, and train direction. Only the cars with cabs used by train operators and conductors are equipped with ERUs (see Table 1).

**Table 1 – Cars With ERUs Installed**

<b>Car Class</b>	<b>Manufacturer</b>	<b>Fleet Size</b>	<b>Number of ERUs</b>
R142	Bombardier	1,030	412
R142A	Kawasaki	220	88
R143	Kawasaki	212	82
R160	Kawasaki	1,662	665
R188	Kawasaki	506	202
R156	Motive Power Inc.	28	28

\*Approximately 40 percent of the fleet for each car class has ERUs, with the exception of R156s. The R156s are locomotives, and there is one ERU in each locomotive.

**Results of Audit**

We determined Transit was not in compliance with its ERU maintenance and inspection policy, as detailed below:

- Train car inspections were not always done timely. We determined that, of the 822 timed inspections during our scope period, 70 were late, exceeding the permitted time and/or mileage interval.
- For 129 inspections, maintenance personnel did not provide evidence that they downloaded information from ERUs to ensure that they were functioning correctly, as required by Transit’s work manuals.
- In 1998, the U.S. Department of Transportation released a memo about ERU requirements, based on federal regulation, which stated the industry standard for memory capacities for ERUs is 48 hours. Model R142 cars, which comprise a significant portion of Transit’s fleet, were brought into revenue service in 2000 after the federal guidance was issued. However, for this car class, the ERU’s memory capacity is not up to industry standards. This makes it challenging for Transit to retrieve a download when it is requested for a non-emergency incident/accident because the ERUs have only a 12-hour memory before their data is overwritten. Transit has been unable to fulfill some download requests as a result of this limited time frame.
- There are discrepancies between the Rolling Stock Management Information System (RSMIS) and source documents due to staff not complying with Transit guidelines regarding documentation of work. This has resulted in Transit not being able to effectively track the maintenance and inspection of the ERUs or work orders through its system.
- Transit did not have a Plan to fix deficiencies identified during the maintenance and inspection of ERUs. Instead, Transit officials stated they have processes to ensure they have a sufficient supply of working ERUs to be used as replacements as needed.

## ***Maintenance and Inspection***

Transit officials stated that their policies and procedures for the maintenance and inspection of ERUs are incorporated within the work manuals for each car class, with the exception of the R156 locomotive, whose manual does not include a required ERU inspection. For the R156 locomotives, Transit inspects the ERUs when it inspects the car.

Cars are inspected based on the number of miles in service since last inspection or the number of days since the last service. NTTs are to be inspected every 10,000-12,000 miles or 68-78 days, whichever comes first; R156s locomotives are inspected every 92 days.

There are four scheduled maintenance cycles for each car class. Each car class has a “Regular” and “Heavy” inspection for different components. For the majority of trains, the Regular and Heavy inspections are the same for ERUs. During these inspections, the following must be done: the compartment the ERU is in must be opened and checked for any loose cables and wires; the Train Operator Display must be checked to ensure the ERU is online and communicating with the train; and the Monitoring and Diagnostics System (MDS) log must be checked to see if any ERU-related faults are logged. The car inspector also performs a visual inspection by checking the LED fault light. If it is illuminated steadily, the ERU is in a fault state and the condition must be reported to the supervisor. For three car classes, the car inspectors are required to perform a download verification by attaching a common Portable Test Equipment (PTE) laptop connector to the ERU, taking a download of the data, and saving the file to PTE. If the ERU fails to connect or does not transfer the data, it is reported to the supervisor.

### ***Periodic Inspections***

Supervisors/managers use “Days Since Last Inspection” and “Mileage Since Last Inspection” to determine what cars to bring in for inspections. The employee who selects the car for inspection tells the yardmaster, who then determines when to take the cars out of service. According to maintenance officials at the Coney Island shop, the yardmaster takes into account rush hour traffic and will pull the train out of service when ridership has decreased.

We selected a random sample of 45 train cars with ERUs to verify that the units were inspected. Between January 1, 2014 and August 23, 2017, these 45 cars had a total of 867 inspections. The first inspection date of the scope period for each car is not counted in the early/late/on-time calculation because it is used as the base date for subsequent calculations. We reviewed the timeliness of the remaining 822 inspections. Scheduled inspections and their dates were verified by the “History of Car” report for each car. Transit does not use paper records and keeps track of inspections through RSMIS.

Of the 822 inspections, 83 were early, 669 were on time, and 70 were late. The East New York maintenance shop had 23 late inspections, which was the most out of all the shops, accounting for 33 percent of the late inspections. The range of mileage for a required inspection was 454 miles under to 2,932 miles over the required interval; for days, the range was 1 day under to 124 days over the recommended interval.

### *Inspection Downloads*

Transit did not provide documentation that car inspectors took an ERU download for 129 inspections for three car classes (R142, R142A, and R143), as required. They did, however, download ERU data for the R156, even though it was not required. The Pelham Diesel Shop started collecting this information in mid-2016 due to a prior ERU malfunction.

Maintenance officials at the Coney Island, Jamaica, Corona, and East New York shops advised they only do downloads when there is a report of Train Trouble or when it is requested by Car Accidents and Investigations. These officials explained they do not take downloads during periodic inspections; rather, they take an MDS download. According to Transit officials, the MDS logs any faults in the train cars, including the ERU. However, it will not tell if the ERU is properly recording, only if it is not working. Although Transit officials indicated that the MDS download is used instead of an ERU download, we found that for 8 of the 45 cars for which information about the MDS download was available, just 45 of 113 inspections had an MDS download.

During initial visits to the E180th Street and 239th Street facilities, similar to the other maintenance shops, Transit officials stated downloads are only taken when there is Train Trouble. However, on a subsequent visit, Transit officials stated that, while downloads are taken during Heavy inspections for the R142s, they are not saved because they occupy too much space on the PTE. The instructions for a Heavy inspection of the ERU on the R142 do not explicitly say whether saving the download is required. In response to the preliminary findings, Transit agreed to update the written requirements pertaining to ERUs in the manuals to ensure clarification and consistency of procedures for all car classes and inspection types.

In performing the test of whether an ERU's light is on, Transit officials' primary concern is whether a full download can be taken (not whether it can be read or the data is properly recorded). Moreover, training for analyzing downloads is not mandatory, but optional. Responding to the preliminary, Transit management stated that, in March 2018, it contacted the manufacturer for the R142/R142A ERU and requested a quote to upgrade its memory capacity. If it is feasible, Transit will incorporate this memory increase on these ERUs as part of its 2020 overhaul plan. During January and February 2018, at five of the eight shops we visited, just 73 of 500 car inspectors and maintenance supervisors attended training courses that teach how to read and analyze ERU downloads. The maintenance shops' managers stated that some car inspectors and supervisors assigned to their shops learn how to take and interpret ERU downloads on the job, and some are former employees of the train car manufacturers with prior knowledge on ERU downloads. Nonetheless, by making these classes optional, some staff might not be trained to determine if the equipment is functioning as intended.

### *ERU Download Requests*

Auditors obtained the history of ERU download requests from January 1, 2014 to December 31, 2017 and tracked the number of download requests that were not fulfilled (see Table 2), as well as how long it took Transit's Operations and System Safety and the shop to address these download requests. There were four occasions where the download could not be retrieved because the data was corrupted.

**Table 2 – History of ERU Download Requests, January 1, 2014–December 31, 2017**

<b>Year</b>	<b>Number of Requests</b>	<b>Unfulfilled Requests</b>
2014	241	33
2015	379	41
2016	358	40
2017	362	39
<b>Totals</b>	<b>1,340</b>	<b>153</b>

Download requests were unfulfilled because Operations and System Safety would sometimes make the request after the memory capacities of downloads were exceeded and, therefore, the download was overwritten. In addition, the memory capacity for R142 and R142A ERUs is only 12 hours, after which it begins to overwrite itself, giving Transit a small window to retrieve downloads. In 1998, the U.S. Department of Transportation released a memo about ERU requirements, based on federal regulation, which stated the industry standard for memory capacities for ERUs is 48 hours. The R142/R142A were brought into revenue service in 2000 after the guidance was issued. Taking this into consideration, the R142/R142A ERU memory capacity is not up to industry standards. The memory capacity for R160s is 48 hours and, thus, within industry standards.

The lack of memory within an R142 ERU makes it challenging for Transit to retrieve a download when it is requested for a non-emergency incident/accident, as Transit has a limited window to retrieve the information before it is overwritten. (For emergency response, a download is required immediately, and the train is immediately brought out of service.) In response to our preliminary findings, Transit advised it requested a quote from the manufacturer of the R142/R142A to upgrade the memory capacity.

#### ***Corrective Action Plan***

Transit officials advised us they do not have a formal Plan for ERUs because ERUs have a low failure rate. The Central Electronics Shop (CES) repairs ERUs on an as-needed basis. In addition, Transit has specific steps it takes to ensure shops have what they need in regard to the ERU and adequate spares within the inventory system.

### *ERU Listing and Stock Levels*

Transit officials explained that during maintenance of the ERUs, if an ERU is removed, the maintenance shop must perform a component movement plan. The movement plan requires that, whenever an ERU is removed or installed on a train, the serial number is noted and inputted into RSMIS. Transit officials provided an inventory listing of all ERUs and their serial numbers. The listing had a total of 1,527 ERUs (located both on and off trains). Of the 1,527 listed ERUs, 729 did not have a serial number listed. Officials explained that employees replacing and installing ERUs did not correctly perform the component movement plan within RSMIS, which led to the missing serial numbers. The absence of a complete listing of ERUs does not allow Transit to effectively track the maintenance and inspection of the ERUs.

In response to the preliminary findings, Transit stated it issued a bulletin instructing maintenance personnel to capture and record serial numbers of the entire population of ERUs during the next regularly scheduled inspection so that all information will be recorded by year-end 2018.

We also examined stock levels. Transit officials stated that the standard number of spares for each component ordered is 7.5 percent. Depending on the failure rate of the component, this percentage might be lowered or raised. Based on Transit's data, we calculated the number of spare ERUs that should have been ordered, whether the standard percentage was used, and the relevant stock levels in the storerooms (see Table 3). We also calculated the failure rate for ERUs each month from January 1, 2014 to September 30, 2017, and found the per-month failure rate was below 2 percent.

**Table 3 – ERU Stock Inventory Levels**

<b>Car Class</b>	<b>Number of ERUs in Fleet</b>	<b>Number Based on 7.5 Percent Standard</b>	<b>Actual Number of ERUs in Stock</b>	<b>Difference Over/(Under)</b>
R142	412	31	26	(5)
R142A	88	7	96*	89
R143	82	6	8	2
R160	665	50	80	30
R188	202	15	2	(13)

\*84 in salvage storeroom.

Based on the stock inventory levels, Transit ordered more than the base 7.5 percent of spares for R142As, R143s, and R160s, even though the failure rate for ERUs was very low. Transit explained that the large number of ERUs for the R142A was due to the conversion of R188 trains from R142As on the No. 7 line, and stated it is “pursuing the purchase of additional R188 ERUs and are reviewing the existing stock of R142A ERUs to determine their compatibility with other car classes. In the event the existing stock levels of R142A ERUs cannot be upgraded, overall spare quantities will be reduced to meet the operating needs of [Transit].” If Transit consistently recorded information regarding the status of ERUs in its system of record, it could likely improve inventory management.

## *ERU Work Orders*

CES officials explained that they are solely responsible for what comes in and goes out of their shop doors. CES repairs items based on priority; if there isn't an immediate need for an ERU in the fleet, then CES will repair another electronic component with a higher priority. CES officials do not have any written criteria on the repair time for the ERUs.

From January 1, 2014 to October 11, 2017, 386 work orders for ERUs went to CES. We selected a random sample of 30 work orders to determine how long it took to close each one. We found that, on average, it took 20 days to close a work order, ranging from 2 to 77 days, even though the actual time spent on repairing the ERU may be a few hours.

Additionally, Transit's system does not track all work orders performed. We compared the ERUs in the CES work orders with the Information Technology (IT) list of 260 ERUs that were replaced in the shops from January 1, 2014 to October 18, 2017. Only 15 of the sample of 30 CES work orders were included on the IT list. Transit attributed the problem to maintenance personnel within the shop who did not complete the component movement plan, which leads to deficiencies within RSMIS.

While ERUs have a low failure rate, a Plan would provide more assurance that inventory control is properly managed. This would ensure not only that ERUs are always working and available when needed, but that excess inventory is not kept. Such a Plan should include accounting for work orders issued for the repair of ERUs and standards for new or less experienced employees responsible for the ERUs to follow to ensure appropriate inventory of ERUs.

### **Recommendations**

1. Ensure ERUs are inspected in accordance with Transit's maintenance and inspection policy and procedures.
2. Expand ERU testing to include analyzing downloads.
3. Increase the hard memory module capacity for R142s and R142As to be in compliance with the industry standard.
4. Ensure Operations and System Safety is cognizant of the maximum time frame for requesting ERU downloads to be retrieved.
5. Designate personnel within each maintenance shop to perform data entry so the RSMIS for the maintenance department is comprehensive.
6. Develop a more detailed work manual to include specific steps pertaining to ERUs and ensure consistency in testing across ERU models.
7. Develop a Plan with steps that, at a minimum, address identifying an ERU malfunction, removing and replacing an ERU, and sending and repairing the ERU at the CES.

## **Audit Scope, Objectives, and Methodology**

The objectives of our audit were to determine whether Transit's operating units complied with maintenance and inspection requirements pertaining to ERUs and whether Transit has a Plan to fix deficiencies identified in its maintenance and inspection system for ERUs. The scope of the audit is from January 1, 2014 to February 7, 2018.

We selected a random sample of 45 NTT cars and 5 R156s from a population of 1,555 (1,527 train cars plus 28 locomotives) equipped with ERUs. In addition, we selected a random sample of 30 ERU work orders from a population of 386 CES-generated ERU work orders. The samples were not intended to be projected to the population.

We met with officials from the maintenance shop for the NTTs and with Pelham Diesel Shop officials for the R156. We visited 8 of the 24 maintenance shops. We participated in walkthrough inspections at the Coney Island, East New York, and Jerome shops and observed maintenance personnel from these shops downloading ERUs. We also met with officials from Engineering, Car Accident Investigation, IT, Production and Planning, and CES.

## **Statutory Requirements**

### ***Authority***

This audit was performed pursuant to the State Comptroller's authority as set forth in Article X, Section 5 of the State Constitution and Section 2803 of the Public Authorities Law.

We conducted our performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

In addition to being the State Auditor, the Comptroller performs certain other constitutionally and statutorily mandated duties as the chief fiscal officer of New York State. These include operating the State's accounting system; preparing the State's financial statements; and approving State contracts, refunds, and other payments. In addition, the Comptroller appoints members to certain boards, commissions, and public authorities, some of whom have minority voting rights. These duties may be considered management functions for purposes of evaluating organizational independence under generally accepted government auditing standards. In our opinion, these functions do not affect our ability to conduct independent audits of program performance.

### ***Reporting Requirements***

We provided a draft copy of this report to MTA officials for their review and formal comment. Their comments were considered in preparing this final report and are included in their entirety at the end of the report.

In their response, MTA-Transit officials agreed with several of our findings and recommendations and indicated they have taken or plan to take corrective action. They did not agree with our finding that periodic inspections were not done timely because their performance met their internal goal of 80 percent of inspections to be performed within the required intervals. However, an 80 percent goal allows for 1 out of every 5 trains they operate to be inspected outside of the required interval. Transit officials also claim they have processes for ensuring there are a sufficient number of ERUs to be used as replacements; however, when examined, the ERU stock level for two car classes was below Transit's requirements. Nonetheless, we are encouraged by the Chairman's comment that he will be working with staff to ensure management is following up and enforcing the audit's recommendations, where appropriate, and requesting reports to that effect. Our response to certain comments is included in the report's State Comptroller's Comments.

Within 90 days after the final release of this report, as required by Section 170 of the Executive Law, the Chairman of the Metropolitan Transportation Authority shall report to the Governor, the State Comptroller, and the leaders of the Legislature and fiscal committees advising what steps were taken to implement the recommendations contained herein, and where the recommendations were not implemented, the reasons why.

Contributors to this report were Robert C. Mehrhoff, Joseph F. Smith, Aurora Caamano, Paisley Fisher, and Menard Petit-Phar.

We wish to thank the management and staff of the Metropolitan Transportation Authority–New York City Transit for the courtesies and cooperation extended to our auditors during this audit.

Very truly yours,

Carmen Maldonado  
Audit Director

cc: M. Fucilli, MTA Auditor General  
D. Jurgens, MTA, Audit Director  
NYS Division of the Budget

# Agency Comments

2 Broadway  
New York, NY 10004  
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**Patrick J. Foye**  
Chairman and Chief Executive Officer



**Metropolitan Transportation Authority**

State of New York

May 31, 2019

Ms. Carmen Maldonado  
Audit Director  
The Office of the State Comptroller  
Division of State Government Accountability  
59 Maiden Lane, 21<sup>st</sup> Floor  
New York, NY 10038

**Re: Draft Report #2018-S-19 (Maintenance and Inspection of Event Recorder Units)**

Dear Ms. Maldonado:

This is in reply to your letter requesting a response to the above-referenced draft report.

I have attached for your information the comments of Andy Byford, President, MTA NYC Transit, which address this report.

Additionally, I will be working with staff to ensure that management is following up on and enforcing the audit's recommendations, where appropriate, and requesting regular, interim reports to that effect.

Sincerely,

  
Patrick J. Foye  
Chairman and Chief Executive Officer

cc: Veronique Hakim, MTA Managing Director  
Michael J. Fucilli, Auditor General, MTA Audit Services

*The agencies of the MTA*

MTA New York City Transit  
MTA Long Island Rail Road

MTA Metro-North Railroad  
MTA Bridges and Tunnels

MTA Capital Construction  
MTA Bus Company

# Memorandum



**New York City Transit**

**Date** May 23, 2019

**To** Patrick Foye, Chairman, MTA

**From** Andy Byford, President, New York City Transit

**Re** **New York State Comptroller Report #2018-S-19 – Event Recorder Units: 30 Day Response**

This information is being provided in response to the State Comptroller's draft audit report on the Maintenance and Inspection of Event Recorder Units (2018-S-19), which covers the period from January 1, 2014 through February 7, 2018. The stated purpose of the audit was to determine whether New York City Transit (NYCT) complied with maintenance and inspection requirements pertaining to Event Recorder Units (ERUs) and whether NYCT has a corrective action plan to fix ERU deficiencies that are identified.

## Response to "Results of Audit"

1. *Train car inspections were not always done timely. We determined that, of the 822 timed inspections during our scope period, 70 were late, exceeding the permitted time and/or mileage interval.*

NYCT Response: NYCT disagrees with this finding. NYCT is in compliance with the U.S. Department of Transportation's MAP-21 legislation, under which the Federal Transit Agency requires all transit agencies to adopt performance-based asset planning and produce a long-term Transit Asset Management Plan (TAMP) to ensure their assets are in a State of Good Repair. The TAMP includes a goal of 80 percent of inspections to be performed within the required intervals, in recognition that inspection windows are impacted by several factors, such as service requirements and General Orders affecting the operating line. The auditors' sample shows that NYCT exceeded this goal.

[\\*Comment 1](#)

2. *For 129 inspections, maintenance personnel did not provide evidence that they downloaded information from ERUs to ensure that they were functioning correctly, as required by Transit's work manuals.*

NYCT Response: NYCT only partially agrees with this finding. As explained to the auditors, the ERU download is not intended to be used as a maintenance and diagnostic

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tool during inspections, though the audit implies that such is the case, as this function resides within the Monitoring and Diagnostics System (MDS), which is designed to identify and report a faulty ERU via the Train Operator's Display. (MDS downloads will be taken when additional information is needed regarding an indicated fault). In addition, the ERU has a health status LED that must be visually verified as operating at every scheduled regular inspection. However, as an added assurance that ERUs are functioning properly, ERU downloads should be taken and analyzed during heavy inspections. Regardless of the aforementioned, NYCT has reviewed and standardized the manual requirements regarding ERUs to further ensure that downloads are taken and analyzed during all heavy inspections.

[\\*Comment 2](#)

- 3. In 1998, the U.S. Department of Transportation released a memo about ERU requirements, based on federal regulation, which stated the industry standard for memory capacities for ERUs is 48 hours. Model R142 cars, which comprise a significant portion of Transit's fleet, were brought into revenue service in 2000 after the federal guidance was issued. However, for this car class, the ERU's memory capacity is not up to industry standards. This makes it challenging for Transit to retrieve a download when it is requested for a non-emergency incident/accident because the ERUs have only a 12-hour memory before their data is overwritten. Transit has been unable to fulfill some download requests as a result of this limited time frame.*

NYCT Response: NYCT agrees with this finding. In March 2018, NYCT contacted the manufacturer of the R142/142A ERU to determine the feasibility of upgrading its memory capacity. The manufacturer has since responded that the memory upgrade is feasible, and NYCT will incorporate this upgrade into the next scheduled maintenance system (SMS) program estimated to begin in 2021.

- 4. There are discrepancies between the Rolling Stock Management Information System (RSMIS) and source documents due to staff not complying with Transit guidelines regarding documentation of work. This has resulted in Transit not being able to effectively track the maintenance and inspection of the ERUs or work orders through its system.*

NYCT Response: NYCT only partially agrees with this finding. It should be noted that all the source documents showed that all inspections had been performed, however, a small number of these inspections were not properly entered into the database. All personnel have since been re-instructed reminding them of proper data entry requirements

[\\*Comment 3](#)

- 5. Transit did not have a Plan to fix deficiencies identified during the maintenance and inspection of ERUs. Instead, Transit officials stated that they have processes to ensure they have a sufficient supply of working ERUs to be used as replacements as needed.*

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NYCT Response: NYCT disagrees with this finding. ERUs are repaired similar to other electronic components. A specific ERU plan is not necessary especially given the fact that, as the report correctly notes, the failure rate of ERUs is below 2 percent and that NYCT maintains an adequate supply of spares in the event a replacement is required. As with the maintenance of all electronic components, if a defect is found, the unit is sent to the Central Electronics Shop (CES) for repair. CES then generates a work order for the defective unit which is tracked in CES' work management system. NYCT generally follows the industry standard benchmark of a 5 percent failure rate before requiring the vendor to provide a formal plan to remedy the defects.

[\\*Comment 4](#)

**Response to "Recommendations"**

*Comptroller Recommendation #1: Ensure ERUs are inspected in accordance with Transit's maintenance and inspection policy and procedures.*

NYCT Response: NYCT already complies with this recommendation. ERUs are inspected during routine car inspections. As noted in the response to Finding #1, NYCT continues to exceed the inspection goal of 80 percent within the required interval.

*Comptroller Recommendation #2: Expand ERU testing to include analyzing downloads.*

NYCT Response: NYCT partially agrees with this recommendation. As noted in the response to Finding #2, NYCT has reviewed and standardized its written procedures within each car class manual to require that ERU downloads be taken and analyzed during all heavy inspections. Regular inspections will not require downloads.

[\\*Comment 2](#)

*Comptroller Recommendation #3: Increase the hard memory module capacity for R142s and R142As to be in compliance with the industry standard.*

NYCT Response: NYCT agrees with this recommendation. As noted in the response to Finding #3, the memory upgrades will be incorporated into the SMS program for these cars beginning in 2021.

*Comptroller Recommendation #4: Ensure Operations and System Safety is cognizant of the maximum time frame for requesting ERU downloads to be retrieved.*

NYCT Response: NYCT already complies with this recommendation. The Division of Car Equipment has issued a written reminder to the Divisions of Service Delivery and System Safety regarding the maximum timeframes to request an ERU download.

[\\*Comment 5](#)

*Comptroller Recommendation #5: Designate personnel within each maintenance shop to perform data entry so the RSMIS for the Maintenance department is comprehensive.*

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NYCT Response: NYCT already complies with this recommendation. As noted in the response to Finding #4, all personnel have since been reinstructed reminding them of proper data entry requirements.

[\\*Comment 6](#)

*Comptroller Recommendation #6: Develop a more detailed work manual to include specific steps pertaining to ERUs and insure consistency in testing across ERU models.*

NYCT Response: NYCT agrees with this recommendation. The revised manuals noted in the response to Recommendation #2 ensure consistency in testing.

*Comptroller Recommendation #7: Develop a Plan with steps that, at a minimum, address identifying an ERU malfunction, removing and replacing an ERU, and sending and repairing the ERU at the CES.*

NYCT Response: NYCT disagrees with this recommendation as there is already an established process regarding ERUs. During every car inspection (both regular and heavy), both the indicator LED and the Train Operator Display is checked for proper ERU operation. During heavy inspections, an ERU download is taken as well to check the data transfer functionality. The removal and replacement of defective ERUs are outlined in the overhaul process manuals. As with any electronic component, if a defect is identified, it is sent to NYCT's Central Electronics Shop, a work order is generated in the maintenance management system, and the unit is assigned to a maintainer for testing and repair. There are detailed work procedures which list the step by step processes for ERU repair by car class.

[\\*Comment 7](#)

## State Comptroller's Comments

1. Transit officials replied that their goal is to have 80 percent of required inspections completed within the required interval. This allows 1 out of every 5 trains they operate to not be inspected in accordance with their official policy of 68 to 78 days or 10,000 to 12,000 miles, whichever comes first.
2. As stated in the audit, Transit's work manuals require ERU downloads. However, ERU downloads were not always done as required. Instead, in some, but not all cases, MDS downloads were performed. If Transit wishes to change its requirements from ERU to MDS downloads, it should amend its procedures. However, it should ensure that whatever procedures are in place are followed, which is currently not occurring.
3. The information not in RSMIS is more than just a small number of inspections. The work orders were not tracked and the serial numbers were not included for 729 of 1,527 ERUs. The absence of the data makes it difficult for Transit to track the location of the ERUs at any given time. According to Transit officials responsible for tracking equipment, it is important that RSMIS accurately and completely list the components of the train car because it enables users of the system to view all of the items in the car.
4. Transit officials claim they have processes for ensuring there are a sufficient number of ERUs to be used as replacements. However, when we examined if the stock level was adequate, we found that the ERU stock level for two car classes was below Transit's requirements.
5. Transit officials claim they are in compliance with the recommendation because a written reminder was sent to the Divisions of Service Delivery and System Safety. However, officials never provided this information to the auditors.
6. Transit officials replied they are in compliance with the recommendation because all personnel were "reinstucted reminding them of proper data entry requirements." However, no documents were provided to the auditors. In addition, a general reminder does not address the recommendation, which called for assigning the responsibility to designated staff in the maintenance department to ensure accountability.
7. Transit officials replied they do not need a plan because they have processes in place that address when a defect is identified in any electronic component. However, we found that for a sample of 30 malfunctioning ERU work orders, the CES did not have a record for half, did not have a complete inventory, and did not have the required number of spares for two car classes based on Transit's own standard. We therefore urge Transit management to revisit the "processes" that it believes are in place to ensure that they are working.