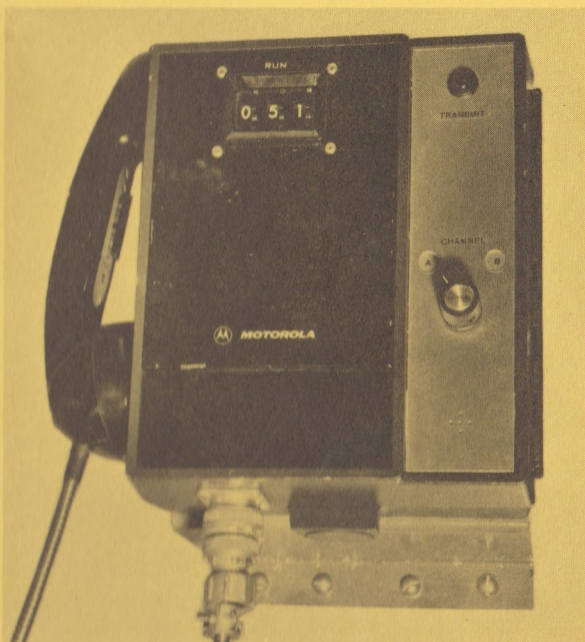


# **BUS REPAIRER'S PROCEDURES**

## **FOR SERVICING BUS RADIOS**



## BUS REPAIRER'S PROCEDURE FOR SERVICING BUS RADIOS

When a Bus Repairer is assigned a radio to work on, he will be given a form CTA 4980. This form will indicate the defect(s) that have been reported. The Repairer is responsible for performing all the tests necessary, as outlined in this booklet, and for following the appropriate procedures to correct any defects that he finds. He may also be assigned work with a form CCS 100 which indicates a specific task which has been requested. The Repairer is responsible for performing this work.

The Repairer will first enter the serial number of the radio on form CTA 4980. Next, he will perform the appropriate tests, enter the results on the form, and sign the form. Then he will take the appropriate corrective action, repair the radio, request a technician or remove the radio, sign the form, and return it to the foreman. Radios which are removed must be tagged and placed in the radio cabinet. If the defect(s) indicated on form CTA 4980 are wrong or the defect has been more accurately determined, this information should be added to both copies of form CTA 4980. Forms for radios requiring a technician should be marked accordingly. Radios which are repaired should have the "trouble found" clearly indicated (replaced 5 amp fuse, replaced roof antenna, etc.).

When a radio is reinstalled, the Repairer must retest the radio. The tests related to the listed defect(s) are sufficient. Form CTA 4980 is signed, dated, the appropriate box is marked "OK" or "NOT OK," and the form is returned to the foreman. Do not remove the radio if the same defect exists. A technician will now be called to repair the unit.

When work is assigned with CCS Form 100, the Repairer will perform the requested action, initial form CCS 100 in the upper right corner, perform any tests necessary to verify that the listed defect has been corrected, and return the forms to the foreman.



DEFECT	DESCRIPTION OF DEFECTS/ PROBABLE CAUSES	ACTION TO BE TAKEN (Unless Otherwise Specified)	TESTS TO BE PERFORMED - ACTION TO BE TAKEN (See Following Section For Details of Tests)
Not replying (A run number specified on Form 4980)	Radio does not respond to data interrogations from the com- puter. No response to Program 30-Zero reply rate.	Test Radio	<p>If radio completely dead, proceed as outlined under "Dead Radio," otherwise try I.D. test on the run number listed in the defect. If it fails to I.D. on this number, proceed as outlined under "Incorrect Voice I.D." If I.D.'s properly, call Dispatcher for a "Program 30" test.</p> <ul style="list-style-type: none"> <li>a. If reply rate zero, remove radio for "not replying."</li> <li>b. If reply rate below 75%, call technician for "low reply rate."</li> <li>c. If reply rate above 75%, radio O.K.</li> </ul>
Low reply rate	Radio responds poorly to data interrogations from the com- puter.	Test Radio	<p>Call Dispatcher for a Program 30 test.</p> <ul style="list-style-type: none"> <li>a. If reply rate is zero, remove radio for "not replying."</li> <li>b. If reply rate is below 75%, call technician because of "low reply rate."</li> <li>c. If reply rate is above 75%, radio is O.K.</li> </ul>



DEFECT	DESCRIPTION OF DEFECTS/ PROBABLE CAUSES	ACTION TO BE TAKEN (Unless Otherwise Specified)	TESTS TO BE PERFORMED - ACTION TO BE TAKEN (See Following Section For Details of Tests)
High invalids or low valid rate	Radio responds to data inter- rogations from the computer with false signpost numbers.	Test Radio	Drive bus past a signpost location and then call Dispatcher for a Program 30 test. a. If the location number is incorrect, remove radio for "high invalids." b. If the location number is correct, the radio is O.K.
E.T./No Location	Radio responds to data inter- rogations from the computer by giving an elapsed time number without a signpost number. (Electronic timer in radio is defective.)	Remove Radio	
No Elapsed Time	Radio responds to data inter- rogations from the computer by giving a signpost number but never an elapsed time number. (Electronic timer in radio is defective.)	Remove Radio	

DEFECT	DESCRIPTION OF DEFECTS/ PROBABLE CAUSES	ACTION TO BE TAKEN (Unless Otherwise Specified)	TESTS TO BE PERFORMED - ACTION TO BE TAKEN (See Following Section For Details of Tests)
No Location	Radio responds to data inter-rogations from the computer without ever giving a signpost number. (Signpost Receiver in the Control Head is probably defective.)	Call for a Technician	
Erratic Timer	Electronic timer in radio does not run at the correct rate. (Electronic timer in radio is defective.)	Remove Radio	
Channel Searches	Radio is continuously transmitting noise and causing interference at the Control Center. (Loud tone in handset, transmit light may or may not stay on continuously.)	Remove Radio	

DEFECT	DESCRIPTION OF DEFECTS/ PROBABLE CAUSES	ACTION TO BE TAKEN (Unless Otherwise Specified)	TESTS TO BE PERFORMED - ACTION TO BE TAKEN (See Following Section For Details of Tests)
No Voice Receive	Radio does not receive voice transmissions from the Dispatcher.	Test Radio	<p>Call Dispatcher for a voice test.</p> <ol style="list-style-type: none"> <li>If you can hear him acknowledge the voice test, the radio is O.K.</li> <li>If the Dispatcher does not acknowledge the call after several tries, attempt to contact him by telephone to determine if he responded to your calls. If he did, and you did not hear him, remove the radio for "No Voice Receive."</li> </ol>
Noisy Voice Receive	Radio does receive voice transmissions from the Dispatcher, but with an excessive amount of background noise.	Test Radio	<p>Call Dispatcher for a voice test.</p> <ol style="list-style-type: none"> <li>If his acknowledgment comes in clearly, without excessive background noise, radio is O.K.</li> <li>If his acknowledgment cannot be clearly heard over the background noise, call for a technician because of "Noisy Voice Receive."</li> </ol>



DEFECT	DESCRIPTION OF DEFECTS/ PROBABLE CAUSES	ACTION TO BE TAKEN (Unless Otherwise Specified)	TESTS TO BE PERFORMED - ACTION TO BE TAKEN (See Following Section For Details of Tests)
No Voice Transmit	Dispatcher does not receive calls from radio.	Test Radio	Call Dispatcher for a voice test. a. If he acknowledges the call with "loud and clear" or 10-4, the radio is O.K. b. If he fails to acknowledge after several tries, check fuses. Attempt to contact him by telephone to determine if he received your calls. If he did not receive the calls, and the fuses are O.K., remove the radio.
Noisy Voice Transmit	Dispatcher does receive calls from radio, but has difficulty understanding the message because of background noise.	Test Radio	Call Dispatcher for a voice test. a. If he acknowledges the call with "loud and clear" or 10-4, the radio is O.K. b. If he indicates that your transmission was very noisy or poor, call for a technician because of "Noisy Voice Receive."
No Voice I.D.'s	When the push-to-talk button on the handset is depressed, the garage and run number is not received at the Control Center.	Test Radio	Call Dispatcher for an I.D. test. a. If Dispatcher correctly receives a set of random run numbers, the radio is O.K. b. If radio fails to I.D. at all, remove radio for "No Voice I.D.'s."



DEFECT	DESCRIPTION OF DEFECTS/ PROBABLE CAUSES	ACTION TO BE TAKEN (Unless Otherwise Specified)	TESTS TO BE PERFORMED - ACTION TO BE TAKEN (See Following Section For Details of Tests)
Incorrect Voice I.D.	Dispatcher receives a wrong garage number or a wrong run number when the push-to-talk button on handset is depressed.	Test Radio	Call Dispatcher for an I.D. test a. If radio continuously transmits the wrong garage number, remove the radio for "wrong garage number." (For 1000 Series Buses, call for a technician.) b. If radio repeatedly transmits incorrect run numbers, call for a technician because of "incorrect voice I.D.'s."
No Select Call	Tone signal in control head does not sound when the Dis- patcher tries calling.	Test Radio	Call Dispatcher for a return call test. a. If no calls (tone signals) are received, remove the radio for "no select call." b. If a return call is received, the radio is O.K.
Receives False Tone Signals	Tone signals in control sounds, but was not actuated by the Dispatcher.	Test Radio	Drive bus around for about 15-20 minutes, periodically using all the accessories (doors, horn, lights, emergency brake, etc.). Try to determine which accessory might be triggering the call signal. a. If determined, call for a tech. b. If not determined, but falsing continues, remove radio.
E.T. at Signpost	Electronic timer in radio does not rest to zero while at a signpost location.	Remove Radio	
No Alarm	No alarm signal is received at the Control Center when the alarm button is depressed.	Test	Call Dispatcher for an alarm test. a. If he receives the alarm, with the correct information, the radio is O.K. b. If he fails to receive the alarm, check the alarm switch. If this does not correct the problem, call for a technician.
Alarm Does Not Decode	An audible alarm signal is received at the Control Center, but the run, bus, garage, loca- tion, and elapsed time cannot be determined.	Test	Call Dispatcher for an alarm test. a. If all information is received currently at Control Center, the radio is O.K. b. If the Dispatcher replies with alarm does not decode, remove the radio.
Wrong Run Number on Alarm	Alarm signal is received at the Control Center, but not with the run number set up on the thumbwheel switches.	Test	Call Dispatcher for an I.D. test. a. If radio repeatedly transmits incorrect run numbers, call for technician because of "incorrect voice I.D.'s." b. If radio I.D.'s correctly, radio is O.K.



DEFECT	DESCRIPTION OF DEFECTS/ PROBABLE CAUSES	ACTION TO BE TAKEN (Unless Otherwise Specified)	TESTS TO BE PERFORMED - ACTION TO BE TAKEN (See Following Section For Details of Tests)
Wrong Garage Number on Alarm	Alarm signal is received at Control Center, but with an incorrect garage number.	Test	Call Dispatcher for an alarm test. a. If Dispatcher receives correct garage number, radio is O.K. b. If Dispatcher receives incorrect garage number, remove radio for "wrong garage number." (For 1000 Series Buses, call for technician.)
Wrong Bus Number on Alarm	Alarm signal is received at the Control Center, but with an incorrect bus number.	Test	Call Dispatcher for an alarm test. a. If Dispatcher receives correct bus number, radio is O.K. b. If Dispatcher receives incorrect bus number, remove radio for "wrong bus number."



DEFECT	DESCRIPTION OF DEFECTS/ PROBABLE CAUSES	ACTION TO BE TAKEN (Unless Otherwise Specified)	TESTS TO BE PERFORMED - ACTION TO BE TAKEN (See Following Section For Details of Tests)
False Alarms	Radio repeatedly transmits alarm signals to the Control Center without depressing the alarm foot-switch.	Test	<p>Drive bus around for about 15 to 20 minutes, periodically using all the accessories (doors, horn, lights, emergency brake, etc.). Then call Dispatcher to see if an alarm was received from that bus. If so, check if alarm switch stuck in depressed position or try to determine which accessory might have triggered the alarm.</p> <p>a. If alarms continue, remove both fuses and call for technician because of "false alarms."</p> <p>b. If problem clears, radio is O.K.</p>
Bad Order Handset	Earpiece or mouthpiece elements missing, defective push-to-talk button, short in handset cable - cable heats up/blows 5 amp fuse, etc.	Test	Replace handset. Return defective handset to shop.

DEFECT	DESCRIPTION OF DEFECTS/ PROBABLE CAUSES	ACTION TO BE TAKEN (Unless Otherwise Specified)	TESTS TO BE PERFORMED - ACTION TO BE TAKEN (See Following Section For Details of Tests)
No Transmit Light	Radio does transmit to Dis- patcher but blue transmit light does not come on when push- to-talk button depressed.	Test	Call Dispatcher for a voice test. a. If blue light does come on, radio is O.K. b. If blue light does not come on, open control head and replace bulb - if blue light still does not come on, remove radio for "no transmit light."
No Channel Light(s)	Radio is operational, but one or both channel lights out.	Test	Replace defective bulb(s). If channel lights still out, call for technician to check control head wiring because of "no channel light(s)."
Bad Order Hang-up Switch	Plunger of Hang-up Switch sticks in down position (unable to transmit or receive). Broken plunger (zero reply rate and no return call).	Test	Operate plunger manually (depress and release with finger) to see if it is broken or stuck. If defective, replace hang-up switch.

DEFECT	DESCRIPTION OF DEFECTS/ PROBABLE CAUSES	ACTION TO BE TAKEN (Unless Otherwise Specified)	TESTS TO BE PERFORMED - ACTION TO BE TAKEN (See Following Section For Details of Tests)
Blown Fuse	Unable to transmit or receive, no power to control head (no channel lights or any sound in handset).	Test	<p>Check both fuses and replace if necessary.</p> <p>Green wire - 5 amp (Control Head Power)</p> <p>Red wire - 15 amp (Transmitter Power)</p> <p>NOTE: Series 1000 Buses are equipped with a 25 amp fuse.</p> <p>After replacing fuse(s), check entire radio installation to make sure nothing is smoking or overheating (handset, handset cord, control head, radio, etc.). If so, remove fuse(s) and call for technician to test bus (specify problem).</p>
Damaged 450 Antenna	Bent or broken roof antenna results in zero or low reply rates and also reduces ability to communicate with the Dispatcher.	Test	Make visual check of antenna. Replace all defective antennas.



DEFECT	DESCRIPTION OF DEFECTS/ PROBABLE CAUSES	ACTION TO BE TAKEN (Unless Otherwise Specified)	TESTS TO BE PERFORMED - ACTION TO BE TAKEN (See Following Section For Details of Tests)
Damaged 150 Antenna.	Bent, broken, or stretched signpost antenna (on bottom of control head).	Test	Make visual check of antenna. Replace all defective antennas.
B.O. Radio or Dead Radio	Radio is reported as being defective but the exact problem has not been specified.	Test	Perform all radio tests and take whatever action is appropriate for any defects found. (Check fuses first.)

PROCEDURES FOR CONDUCTING  
TESTS REQUIRING COMMUNICATIONS WITH THE DISPATCHER  
(THESE TESTS MUST BE PERFORMED OUTSIDE THE GARAGE)

Before performing any of these tests, the repairer must set in an appropriate run number on the thumbwheel switches. Any number from 990 to 998 may be used. (Remember to reset the switches to 000 when testing is completed.)

Prior to making any calls to the Dispatcher, listen for approximately 20 seconds to make sure he is not talking to anyone else. (You can hear only the Dispatcher side of the conversation.) If all is clear, "key" the radio by depressing the push-to-talk button on the handset (pausing one second) and giving your run number, then release the button. Now wait for him to acknowledge your call. When the Dispatcher acknowledges the call, request the desired test.

A. Program 30

When the Dispatcher acknowledges the Program 30 request, hang up the handset securely. He will call you back in 2 to 3 minutes and give you the results of the Program 30. These results consist of a location number, an elapsed time number, and a reply rate. (If the reply rate is zero, no location or elapsed time numbers will be given.) If you do not get the return call within 3 minutes, call him back for the results.

B. Return Call

When the Dispatcher acknowledges the return call request, hang up the handset securely. If you do not get a return call - (tone from the control head) within a minute, call him back and request another return call. If you still do not receive the call, the radio is defective.

### C. Alarm Test

When the Dispatcher grants permission for the alarm test, depress the alarm foot-switch and listen for his reply. (Do not hang up.) If the alarm decodes, he will give you the information he received at the Control Center. This information will consist of the garage number, the run number, the bus number, a location number, and an elapsed time number. (Currently, the 1000 Series Buses will give zero location and elapsed time numbers on all alarms.) After you receive this information, acknowledge by saying 10-4, turn the bus off, and wait at least 3 minutes before restarting the bus, otherwise the alarm will continue to sound at the Control Center for the next 2 minutes.

### D. I.D. Test (Identification Test)

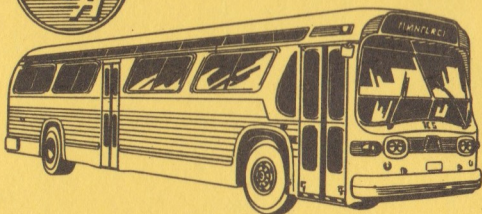
When the Dispatcher acknowledges the I.D. request, insert the number 111 on the thumbwheel switches, "key" the radio by momentarily depressing the push-to-talk button on the handset, and wait for the Dispatcher to reply with the run number he received at the Control Center. If he replies with the correct number, go to the next number. If not, "key" the radio several more times using the same number. If he still fails to receive the number or receives an incorrect number, go to the next number and proceed as already described. The following run numbers must all be tested - 111, 222, 333, 444, 555, 666, 777, 888, 999, 000.

### E. Voice Test

When the Dispatcher acknowledges the call for a voice test, he will reply with either "loud and clear" or tell you that your voice transmission is not being received clearly.

When all required tests have been performed, the repairer must inform the Dispatcher that testing has been concluded by stating, "This concludes the test on Bus - - - - ."





CHICAGO TRANSIT AUTHORITY  
TRAINING AND PUBLIC SAFETY DEPARTMENT  
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