

ORDER

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WESTERN-PACIFIC REGION

WP-6540.2

7/9/87

MAINTENANCE OF THE GRANGER RADIO (MODEL 6018) AND DTL MULTIPLEX MODEL
(MODEL 7300) AND RITRONS TELENEXUS RADIO COMMUNICATION LINK (RCL) SYSTEMS
SUBJ:

1. PURPOSE. This order establishes division guidelines for the administration of maintenance activities involving the Granger and the Ritron TELENEXUS (RCL) systems.
2. DISTRIBUTION. This order is distributed to Branch level and above in the Airway Facilities and Air Traffic Divisions, with standard distribution to all Airway Facilities Sectors and their subordinate field elements.
3. BACKGROUND. As part of the network integration plan, the Western Pacific Region has installed RCL local area networks in the San Francisco and Los Angeles areas using Granger equipment. Ritron TELENEXUS systems have been installed at the Hector and Daggett VORTAC'S. Installation of Granger and Ritron RCL systems have been justified by reductions in lease lines as well as higher reliability. Current maintenance orders do not cover the Granger and Ritron systems.
4. CERTIFICATION. Granger and Ritron TELENEXUS RCL systems shall require service certification only. Certification parameters, intervals and log entries are summarized in Appendix 1 of this order. The service certification for RCL local area networks shall be the responsibility of the control terminal (associated ARTCC). Service certification will encompass all facilities connected to the loop networks. The service certification for point-to-point circuits will be done at the FAA RCL facility closest to the control facility.
5. LOGS. Each terminal and repeater station shall maintain a FAA Form 6030-1 (or FAA Form 6030-2) log. This log shall be maintained per Order 6000.15A, General Maintenance Handbook for Airway Facilities. Site visits, periodic maintenance, modifications, etc. shall be documented.
 - a. Shared Master Log. There is no requirement for a separate RCL log. RCL entries may be made in an existing facility master log. The RCL log may be the master if there are no other co-located facilities.

b. Interruptions. All interruptions of the RCL shall be entered in the control terminal log. When an interruption requires restoring the RCL to service, the RCLR technician shall transmit the pertinent outage information to the control terminal facility.

c. Certification. All service certifications of the RCL shall be entered in the control terminal log.

6. MAINTENANCE. The Granger and the Ritron TELENEXUS systems shall be maintained with the MAINTENANCE OF THE 80's Philosophy in mind. These systems are designed and packaged to facilitate easy equipment maintenance.

a. Maintenance of the Granger system is divided into three categories: first, second and third levels. Reference the appropriate Granger instruction books.

(1) First level maintenance (no loss of link service) consists of operational checks that can be accomplished using only the integral equipment meters and indicators. These results shall be recorded on FAA Form 6000-8 Technical Performance Record. (Refer to Appendix 2 for a typical Technical Performance Record). Typical first level maintenance checks (from the Model 6015 A/E protected terminal instruction book) are shown in Appendix 3. First level maintenance shall be performed semi-annually as a minimum. (If the technician is visiting the site for other reasons, more frequent first level maintenance is a recommended option).

(2) Second level maintenance (minimal loss of link service) consists of checks and adjustments necessary to insure the terminal is operating properly. These results shall also be recorded on FAA Form 6000-8 Technical Performance Record. Second level maintenance procedures appear in the Granger terminal instruction book. Specialized test equipment for second level checks may be obtained from sector, loan stock or rental inventory. (Contact Regional Test Equipment Coordinator, AWP-463.2, FTS 984-1097 for loan stock and rental information). As part of second level maintenance, it is also recommended to:

(a) Operate the system on standby batteries (to exercise the batteries).

(b) Measure the channel frequency response (at 300, 1000 and 3000 Hz) from end terminal to end terminal. Three channels should be tested (to evaluate the MUX and RCL end to end performance).

(c) Measure the unweighted baseband signal-to-noise ratio in both directions (to evaluate the RCL). Connect a 75 Ohm dummy load to the baseband input at one end and measure the noise at the output of the other end. The noise ratio will be reference to a normal -15dBm (0dBm0). Second level maintenance shall be performed annually as a minimum.

(3) Third level maintenance (major loss of link service) consists of procedures necessary to restore both terminals of each radio link to optimum performance following replacement of major sub-assembly or rechannelization of the terminal. For these maintenance procedures, refer to the Granger terminal instruction book. Specialized test equipment should be obtained as described in the previous paragraph on second level maintenance. In general the sectors are responsible for third level maintenance. However, the Maintenance Operations Branch, AWP-460 may recommend contracting of the third level maintenance if an individual problem appears beyond the resources of the sector. Third level maintenance shall be performed only as required.

b. Maintenance of the Ritron TELENEXUS system shall be on an as fail basis.

7. MODIFICATIONS. Many of the Granger Engineering Change Orders (ECO) only change the packaging of the components. Granger has agreed to notify AWP-460 of only those future modifications that change the system's performance. AWP-460 will evaluate these ECO'S and make a recommendation whether to purchase the ECO retrofit kits. Proposed field modifications should be submitted to AWP-460. Refer to Order 6000.15A para 88 for guidance on FAA modification policy.

8. TECHNICAL ASSISTANCE. Granger and Ritron's Customer Service Departments are available for technical assistance.

Granger: (408) 982-1481
Ritron: (317) 846-1201

9. SUPPLY SUPPORT. The Depot does not provide supply support for the Granger or Ritron systems. Spare replacement parts can be procured directly from the Granger or Ritron manufacturers. Defective circuit boards shall be sent directly to the manufacturers for repair or replacement.

Granger: (408) 982-1387
Ritron: (317) 846-1201

a. A Purchase Order can be used to obtain needed repair work and parts.

b. All parts and repair work may be unconditionally guaranteed for a period of 90 days.

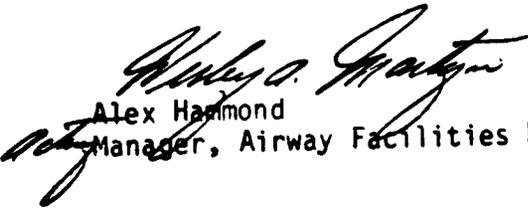
10. MANUALS. One set of manuals are included with each equipment order. Additionally manuals are available on an open market basis.

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11. FACILITY RESTORATION. The Granger and Ritron systems shall normally be level A2. Both the San Francisco and Los Angeles area RCL networks are hot standby systems that also have automatic switching to alternate paths. Air-ground channels using the RCL may also have BUEC back-ups via telco lines. A different restoration classification may be justified if there are no alternative paths for critical air traffic data. Reference Order 6030.31D, Restoration of Operational Facilities, Sup 4, Appendix 1.

12. TRAINING. Training will be accomplished by factory and locally developed courses. Western-Pacific course #95256, Granger RCL, has been held in both the San Francisco and Los Angeles areas. Contact Regional Training Coordinator, AWP-462.3, FTS 984-1120 with your training requirements.

13. JOINT ACCEPTANCE INSPECTION (JAI). Each sector shall participate in the JAI of a new RCL installation. It is the responsibility of the sector to identify tangible exceptions.



Alex Hammond

Manager, Airway Facilities Division

APPENDIX 1. CERTIFICATION REQUIREMENTS

TABLE 1. RCL SERVICE

Service	Certification Parameter	Reference Paragraph STDS and TOL/Limits
Communication	Overall Certification is based on the knowledge that an acceptable level of communication service is being provided. There are no overall service certification parameters.	
<p>NORMAL CERTIFICATION INTERVAL.....12 months</p> <p>MAXIMUM CERTIFICATION INTERVAL.....15 MONTHS</p> <p>PERSON RESPONSIBLE FOR CERTIFICATION.....RCL technician and area control center technician, jointly.</p> <p>CERTIFICATION ENTRY IN FACILITY MAINTENANCE LOG....RCL Service Certified (i.e., as a communication service.)</p>		

APPENDIX 2. TYPICAL FAA FORM 6000-8 TECHNICAL PERFORMANCE RECORDS

CONTINUATION OR TEMPORARY RECORD/REPORT FORM

TECHNICAL PERFORMANCE RECORD PAGE 1 OF 5

ACTIVITY BAY TRACON (CHUCK CAGE BAY TRACON RECOMMEND EA 6 MO.)

LOCATION OAKLAND, CA (CITY, STATE, AIRPORT, CTR)

EQUIPMENT G/A CMLT TX "A & B" (A/C, D/C, COMPONENTS, ETC.)

INITIALIZATION DATA 7-10-84

FREQ. 1740 MHz

REMARKS 6015 A/E NST FRONT PANEL METER & RF BODY INDICATORS.

INITIALS

DATE	TIME	TX "A"		TX "B"		TX FREQ. MHz	TX MON. FREQ. MHz	TX APC FREQ. MHz	PR. OUT (WATTS)	VOLT. (VDC)	VSWR	REMARKS	INITIALS
		PR. OUT (WATTS)	VOLT. (VDC)	PR. OUT (WATTS)	VOLT. (VDC)								
7-19-84	1740	1.89	1.66	1.17	1.60	1740	10.25	51	1.65	1.65	1.16	RESET - 21VDC. WAS @ 20.5VDC	A
7-19-84	1740	1.89	1.66	1.17	1.60	1740	10.25	51	1.65	1.65	1.16	WATTS PR. OF ELEMENT OK. CAPS OK.	A
7-19-84	1740	1.89	1.66	1.17	1.60	1740	10.25	51	1.65	1.65	1.16	RF DATA READINGS	A

21VDC
-14.2
-14.2
-14.2

24VDC
-14.2
-14.2
-14.2

3 2 ← First Level Maintenance Step #

4 5

1740 MHz

APPENDIX 3. TYPICAL FIRST LEVEL MAINTENANCE CHECKS

5. MAINTENANCE

5.01 This section describes the maintenance procedures for the Model 6015A/E Protected Terminal. Maintenance is divided into three categories, dependent upon the complexity of the procedure, terminal disassembly, and the test equipment. First Level Maintenance is limited to those procedures which can be accomplished without disassembly, using the built-in terminal meters and indicators to obtain test data. Second Level Maintenance requires the use of test equipment, but does not require disassembly. Additional test equipment and disassembly of the terminal is required for Third Level Maintenance.

5.02 Effective maintenance can best be accomplished when the contents of this manual are fully understood. Therefore, the principles of operation and other technical information on the terminal should be thoroughly read before attempting any corrective action.

RECOMMENDED TEST EQUIPMENT

5.03 Test equipment for First Level Maintenance is limited to the panel meter built into the power supply. Table 5-1 lists the general types of test equipment required for both Second and Third Level Maintenance, together with some specific examples of each general type.

5.04 Other instruments having the same capabilities will serve equally as well as those specified in either section. Items having G/A part numbers are available directly from Granger Associates. See Series 6000 Service Manual for ordering information.

FIRST LEVEL MAINTENANCE

5.05 First Level Maintenance consists of operational checks that can be accomplished without disassembly of the equipment, using only the integral equipment meters and indicators. These operational checks should be performed on a regularly scheduled periodic basis and compared to the ETR to determine any terminal deterioration. The results should be recorded in a performance log.

5.06 First Level Maintenance of the terminal is limited to checking performance levels, using the panel meter built into each power supply and the baseband combiner indicating lamps, as detailed in the following procedures.

NOTE

For the purpose of checking performance levels, it is assumed that the terminal has been in operation, and that the frequency determining circuits have stabilized.

FIRST LEVEL MAINTENANCE CHECKS

STEP	PROCEDURE	REMARKS
1	Check terminal performance by observing the power supply meter indication with the switch S1 set to the positions listed in steps 2 through 8.	Check "A" Power Supply and then repeat steps 2 through 8 with the "B" Power Supply switch S1.

APPENDIX 3. TYPICAL FIRST LEVEL MAINTENANCE CHECKS

STEP	PROCEDURE	REMARKS
	<p>NOTE</p> <p>Refer to following sections of this manual and to the appropriate instruction manual, to correct any observed abnormal indications.</p>	<p>NOTE</p> <p>Listed meter indication limits are typical only. Refer to the Terminal ETR for acceptable limits.</p>
2	Set power supply switch S1 to 15V position and verify that the meter indicates between 0.6 and 0.7.	Indicates presence of -15 Vdc.
3	Set the power supply switch S1 to 21V position and verify that the meter indicates between 0.9 and 1.0.	Indicates presence of -21 Vdc.
4	Set power supply switch S1 to TX-AFC and verify that the meter indicates between 0.45 and 0.55.	Indicates AFC/VCO in phase-lock condition.
5	Set power supply switch S1 to TX-PR OUT and verify that the meter indicates between 0.9 and 1.0.	Indicates operation of transmitter rf power amplifier circuits and rf power output.
6	Set power supply switch S1 to RX-1 MXR and verify that the meter indicates between .35 and .75.	Indicates receiver mixer current.
7	Set power supply switch S1 to RX-RF SG and verify that the meter indicates between 0.0 and 1.0.	Indication of incoming rf signal strength (to receiver).
8	Set power supply switch S1 to RX-AFC and verify that the meter indicates between 0.45 and 0.55.	Indicates AFC/VCO LO in phase-lock condition.
9	Ensure that all Baseband Combiner manual select switches are set to AUTO position.	
10	Observe XMT A and XMT B LED's on the Baseband Combiner.	One green LED should be ON and the other should be OFF for HST, and WST. Both LED's should be ON for FDT.
11	Observe REC A and REC B LED's on the Baseband Combiner.	Both green LED's should be ON.
12	Observe the fault (red) LED's on the Baseband Combiner.	All red LED's should be OFF.
13	Observe the FUSE ALARM indicator on the Baseband Combiner.	The indicator should be OFF.