AUTOMATIC DATA SET 154A1 — ORIGINATING CIRCUIT TESTS AND ADJUSTMENTS USING 166A1 TEST SET TELEGRAPH TEST CIRCUIT

1. GENERAL

1.01 This section describes a method for testing the originating Automatic Data Set 154A1 using the 166A1 station test set SD-70908-01 when used in conjunction with the originating DATA-PHONE line circuit — SD-70914-01, at the serving test center.

1.02 Comparable tests for the originating Automatic Data Set 154A1 installed for use on customer premises are covered in Section 591-010-501.

1.03 The tests covered are:

A. V3 Amplifier Adjustment: This test checks the adjustment of the V3 amplifier gain.

B. MF Oscillator: This test checks the frequency of a high and low tone of the MF oscillator in the Data Set 154A1.

C. 43A1 Carrier Channel Terminal Line-Up: This test checks the alignment and operation of the 43A1 carrier channel terminal in the Data Set 154A1.

1.04 When testing a Data Set 154A1 arranged for carrier supervision, the associated signaling converter at the No. 5 office must be disabled.

1.05 All tests shall be made with the Data Set 154A1 terminated in the 166A1 station test set and the line terminated in the proper impedance.

1.06 *Lettered Steps:* A letter a, b, c, etc, added to a step number in Part 3 or 4 of this section, indicates an action which may or may not be required depending on local conditions. The condition under which a lettered step or a series of lettered steps should be made is given in the ACTION column, and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

2. APPARATUS

All Tests

2.01 166A1 station test set, J70141A (SD-70908-01).

2.02 Triplett 310-W volt-ohmmeter (furnished with 166A1 station test set per "Z" option).

2.03 Three patching cords, P3J cord, 6 feet long, equipped with two 241B plugs (3P14B cords).

Test C

2.04 Patching cord, P2A cord, 2 feet long, equipped with two 347A plugs (2P1B cord).

2.05 164C3 telegraph transmission measuring set, J70146A (SD-70886-01).

3. PREPARATION

STEP	ACTION	VERIFICATION
All Tests		
1	Disconnect cord normally patched to A connector of Data Set 154A1, connect to ORIGINATING CUSTOMER EQUIPMENT connector of test set.	

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STEP	ACTION	VERIFICATION
2	Patch ORIGINATING DATA-PHONE SET connector to A connector of Data Set 154A1, using P1 cord, supplied with test set.	
3	Operate TER key in originating portion of test set.	
4a	If Data Set 154A1 arranged for 2-wire operation — Terminate line by patching TER IMP 1 900 jacks to LINE 1 jacks, using 3P14B cord.	
5b	If Data Set 154A1 arranged for 4-wire operation — Terminate line by patching TER IMP 1 600 jacks to LINE 1 jacks and TER IMP 2 600 jacks to LINE 2 jacks, using 3P14B cords.	

4. METHOD

STEP	ACTION	VERIFICATION
	A. V3 Amplifier Adjustment	
Send V3 Amplifier (RX1)		
6c	If Data Set 154A1 arranged for carrier supervision — Operate CONVR switch to ORIG SET, allow 30 seconds for converter to warm up.	
7b	If Data Set 154A1 arranged for 4-wire operation — Patch EQUIP 1 jacks to EQUIP 2 jacks, using 3P14B cord.	
8	Operate DIAL MODE key.	DIAL MODE lamp lights.
9	Operate OFF HOOK key.	OFF HOOK lamp lights. *Note:* When testing Data Set 154A1 arranged for carrier supervision, the REG ASGN lamp also lights.
10d	If Data Set 154A1 arranged for dc supervision — Operate SIMLT RA key.	REG ASGN lamp lights.

STEP	ACTION	VERIFICATION
11	Operate LOOP BACK key.	This key, when operated, holds P relay in Data Set 154A1 released which allows steady MF tone to be present at output of SEND V3 amplifier.
12c	If Data Set 154A1 arranged for carrier supervision — Turn CONVR switch to OFF.	
13	Operate FREQ STD switch to 1336 MF.	
14	At Data Set 154A1 — Release P2, PA relays.	
15	Hold PA relay released.	
16	Operate P2 relay.	
17	Allow PA relay to operate. *Note:* This will ensure that any information stored in the MF tone selector circuit will have been removed, and the desired information supplied by the operation of the FREQ STD switch to 1336 MF has been properly registered.	
18	At Data Set 154A1 — Operate OSC switch of 43A1 carrier channel terminal to OFF.	
19	Set Triplett 310-W meter to 1-volt ac scale.	
20	Connect meter to BRIDGE T-R pin jacks.	
21	At Data Set 154A1 — Adjust RX1 V3 amplifier potentiometer for +1/2 db level indication of meter.	
22	Remove all patches, connections, restore all keys to normal.	All lamps extinguished.

Receive V3 Amplifier (RX2)

	Note: Steps 23 through 36 are only applicable for 2-wire operation.	
23	Patch TER IMP 2 900 jacks to EQUIP 1 jacks, using 3P14B cord.	

STEP	ACTION	VERIFICATION
24d	If Data Set 154A1 arranged for dc supervision — Operate DIAL MODE key.	DIAL MODE lamp lights.
25d	Operate OFF HOOK key.	OFF HOOK lamp lights.
26d	Operate SIMLT RA key. *Note:* This permits access to the input of the RX2 V3 amplifier via the EQUIP 1 jacks.	
27	Remove patch between TER IMP 2 900, EQUIP 1 jacks.	
28	Patch FREQ STD OUT jacks to EQUIP 1 jacks, using 3P14B cord.	
29	Set Triplett 310-W meter to 1-volt ac scale.	
30	Operate FREQ STD switch to 1990 OSC.	
31	Connect —48V pin jack of terminating portion of test set to —48V pin jack of originating portion of test set, using P9 cord, supplied with test set.	
32	Connect meter to BRIDGE T-R pin jacks, note reading.	
33	Disconnect meter from BRIDGE T-R pin jacks.	
34	Connect meter to REC LEVEL, GRD pin jacks.	
35	At Data Set 154A1 — Adjust RX2 V3 amplifier potentiometer for same reading noted in Step 32.	
36	Remove all patches, connections, restore all keys to normal.	All lamps extinguished.

B. MF Oscillator

1336 Frequency Check

6c	If Data Set 154A1 arranged for carrier supervision — Operate CONVR switch to ORIG SET, allow 30 seconds for converter to warm up.	

STEP	ACTION	VERIFICATION
7b	If Data Set 154A1 arranged for 4-wire operation — Patch EQUIP 1 jacks to EQUIP 2 jacks, using 3P14B cord.	
8	Operate DIAL MODE key.	DIAL MODE lamp lights.
9	Operate OFF HOOK key.	OFF HOOK lamp lights. *Note:* When testing Data Set 154A1 arranged for carrier supervision, the REG ASGN lamp also lights.
10b	If Data Set 154A1 arranged for 4-wire operation — Remove patch between EQUIP 1, EQUIP 2 jacks.	
11	Patch FREQ STD OUT jacks to EQUIP 1 jacks, using 3P14B cord.	
12	Operate LOOP BACK key. *Note:* This operation is necessary in order to present a steady MF tone at the output of the send V3 amplifier.	
13c	If Data Set 154A1 arranged for carrier supervision — Operate CONVR switch to OFF.	
14	Operate FREQ STD switch to 1336 MF.	
15	At Data Set 154A1 — Release P2, PA relays.	
16	Hold PA relay released.	
17	Operate P2 relay.	
18	Allow PA relay to operate. *Note:* This will ensure that any information stored in the MF tone selector circuit will have been removed, and the desired information supplied by the operation of the FREQ STD switch to 1336 MF has been properly registered.	
19	Set Triplett 310-W meter to 1-volt ac scale.	

STEP	ACTION	VERIFICATION
20	Connect meter to BRIDGE T-R pin jacks.	Meter needle swings back and forth.
21	Count number of times needle goes back and forth in 10-second interval.	Number of fluctuations should be less than 10.
22e	If requirement of Step 21 is not met — Adjust slug in B transformer of MF oscillator to give count of less than 10.	
23	Remove all patches, connections, restore all keys to normal.	All lamps extinguished.
852 Frequency Check		
24	Repeat Steps 6c to 13c, inclusive.	
25	Operate FREQ STD switch to 852 MF.	
26	Repeat Steps 15 to 20, inclusive.	
27	Count number of times needle goes back and forth in 10-second interval.	Number of fluctuations should be less than 10.
28f	If requirement of Step 27 is not met — Adjust slug in A transformer of MF oscillator to give count of less than 10.	
29	Remove all patches, connections, restore all keys to normal.	All lamps extinguished.

C. 43A1 Carrier Channel Terminal Line-Up

Initial Send Level Adjustment

6c	If Data Set 154A1 arranged for carrier supervision — Operate CONVR switch to ORIG SET, allow 30 seconds for converter to warm up. *Note:* Spacing carrier must be present on the receive channel of the 43A1 carrier channel terminal in order to allow the Data Set 154A1 to go off hook.	
7b	If Data Set 154A1 arranged for 4-wire operation — Patch EQUIP 1 jacks to EQUIP 2 jacks, using 3P14B cord.	
8	Operate DIAL MODE key.	DIAL MODE lamp lights.
9	Operate OFF HOOK key.	OFF HOOK lamp lights. *Note:* When testing Data Set 154A1 arranged for carrier supervision, the REG ASGN lamp also lights.

STEP	ACTION	VERIFICATION
10d	If Data Set 154A1 arranged for dc supervision — Operate SIMLT RA key.	REG ASGN lamp lights.
11d	Operate SIMLT ANS key.	
12	Operate CONVR switch to OFF.	
13	Set Triplett 310-W meter to 1-volt ac scale.	
14	Connect meter to BRIDGE T-R pin jacks.	
15	At Data Set 154A1 — Adjust 43A1 SEND LEV potentiometer for —8 db indication on meter.	
16	Remove all patches, connections, restore all keys to normal.	All lamps extinguished.
Send Frequency Check		
17	Patch FREQ STD OUT jacks to EQUIP 1 jacks, using 3P14B cord.	
18c	If Data Set 154A1 arranged for carrier supervision — Operate CONVR switch to ORIG SET, allow 30 seconds for converter to warm up. *Note:* Spacing carrier must be present on the receive channel of the 43A1 carrier channel terminal in order to allow Data Set 154A1 to go off hook.	
19	Operate DIAL MODE key.	DIAL MODE lamp lights.
20	Operate OFF HOOK key.	OFF HOOK lamp lights. *Note:* When testing Data Set 154A1 arranged for carrier supervision, the REG ASGN lamp also lights.
21c	If Data Set 154A1 arranged for carrier supervision — Operate CONVR switch to OFF.	
22d	If Data Set 154A1 arranged for dc supervision — Operate SIMLT RA key.	REG ASGN lamp lights.
23d	Operate SIMLT ANS key.	

STEP	ACTION	VERIFICATION
24	Operate FREQ STD switch to 2330 OSC.	
25	Set Triplett 310-W meter to 1-volt ac scale.	
26	Connect meter to BRIDGE T-R pin jacks.	Meter needle swings back and forth.
27	Count number of times needle goes back and forth in 10-second interval.	Number of fluctuations should be less than 10.
28e	If requirement of Step 27 is not met — Adjust OSC potentiometer in 43A1 carrier channel terminal to give count of less than 10.	
29	Remove all patches, connections, restore all keys to normal.	All lamps extinguished.
Receive Gain Adjustment		
30a	If Data Set 154A1 arranged for 2-wire operation — Patch FREQ STD OUT jacks to EQUIP 1 jacks, using 3P14B cord.	
31b	If Data Set 154A1 arranged for 4-wire operation — Patch FREQ STD OUT jacks to EQUIP 2 jacks, using 3P14B cord.	
32d	If Data Set 154A1 arranged for dc supervision — Operate DIAL MODE key.	DIAL MODE lamp lights.
33d	Operate OFF HOOK key.	OFF HOOK lamp lights.
34d	Operate SIMLT RA key.	REG ASGN lamp lights.
35	Set Triplett 310-W meter to 15-volt ac scale.	
36	Operate 40DB PAD key.	
37	At Data Set 154A1 — Connect meter to A2 to G pin jacks of 43A1 carrier channel terminal.	
38	Connect —48V pin jack of terminating portion of test set to —48V pin jack of originating portion of test set, using P9 cord, supplied with test set.	
39	Operate FREQ STD switch to 1990 OSC.	

STEP	ACTION	VERIFICATION
40	At Data Set 154A1 — Adjust REC GAIN potentiometer of 43A1 carrier channel terminal for 5.6-volt indication on meter.	
41	Remove all patches, connections, restore all keys to normal.	
Voltage and Current Checks		
42b	If Data Set 154A1 arranged for 4-wire operation — Patch EQUIP 1 jacks to EQUIP 2 jacks, using 3P14B cord.	
43c	If Data Set 154A1 arranged for carrier supervision — Operate CONVR switch to ORIG SET, allow 30 seconds for converter to warm up. *Note:* Spacing carrier must be present on the receive channel of the 43A1 carrier channel terminal in order to allow the Data Set 154A1 to go off hook.	
44c	Set Triplett 310-W meter to 150-volt dc scale.	
45c	Connect meter to +80 R-LP, GRD pin jacks.	
46c	At Data Set 154A1 — Adjust LP CUR potentiometer in 43A1 carrier channel terminal for +80 volt indication on meter.	
47c	Disconnect meter from +80 R-LP, GRD pin jacks.	
48c	Patch RCV LOOP jack to METER jack, using 2P1B cord.	
49c	Operate DIAL MODE key.	DIAL MODE lamp lights.
50c	Operate OFF HOOK key.	OFF HOOK lamp lights. *Note:* When testing Data Set 154A1 arranged for carrier supervision, the REG ASGN lamp also lights.
51c	Set Triplett 310-W meter to 30-ma scale.	

STEP	ACTION	VERIFICATION
52c	Connect meter to METER pin jacks.	Meter reads 18 to 22 ma.
53c	Disconnect meter from METER pin jacks.	
54c	Set Triplett 310-W meter to 150-volt dc scale.	
55c	Connect meter to +80 S-LP, GRD pin jacks.	Meter reads 79 to 81 volts.
56c	Disconnect meter from +80 S-LP, GRD pin jacks.	
57c	Remove patch from RCV LOOP jack to METER jack.	
58c	Set Triplett 310-W meter to 30-ma scale.	
59c	Patch SEND LOOP jack to METER jack, using 2P1B cord.	
60c	Connect meter to METER pin jacks.	Meter reads 18 to 22 ma.
61d	If Data Set 154A1 arranged for dc supervision — Operate CONVR switch to ORIG SET, allow 30 seconds for converter to warm up. *Note:* Spacing carrier must be present on the receive channel of the 43A1 carrier channel terminal to allow Data Set 154A1 to go off hook.	
62d	Operate DIAL MODE key.	DIAL MODE lamp lights.
63d	Operate OFF HOOK key.	OFF HOOK lamp lights.
64d	Operate SIMLT RA key.	REG ASGN lamp lights.
65d	Operate SIMLT ANS key.	
66d	Set Triplett 310-W meter to 150-volt dc scale.	
67d	Connect meter to +80V R-LP, GRD pin jacks.	
68d	Adjust LP CUR potentiometer in 43A1 carrier channel terminal for +80 volt indication on meter with SEND SPACE key operated.	

STEP	ACTION	VERIFICATION
69d	Disconnect meter from +80V R-LP, GRD pin jacks.	
70d	Patch RCV LOOP jack to METER jack, using 2P1B cord.	
71d	Set Triplett 310-W meter to 30-ma scale.	
72d	Connect meter to METER pin jacks.	Meter reads 18 to 22 ma.
73d	Disconnect meter from METER pin jacks.	
74d	Remove patch between RCV LOOP jack to METER jack.	
75d	Set Triplett 310-W meter to 150-volt dc scale.	
76d	Connect meter to +80V S-LP, GRD pin jacks.	Meter reads 79 to 81 volts.
77d	Patch SEND LOOP jack to METER jack, using 2P1B cord.	
78d	Set Triplett 310-W meter to 30-ma scale.	
79d	Connect meter to METER pin jacks.	Meter reads 18 to 22 ma.
80	Remove all patches, connections, restore all keys to normal.	All lamps extinguished.

Final Send Level Adjustment

81c	If Data Set 154A1 arranged for carrier supervision — Operate CONVR switch to ORIG SET, allow 30 seconds for converter to warm up. *Note:* Spacing carrier must be present on the receive channel of the 43A1 carrier channel terminal to allow the Data Set 154A1 to go off hook.	
82	Operate DIAL MODE key.	DIAL MODE lamp lights.
83	Operate OFF HOOK key.	OFF HOOK lamp lights.
84d	If Data Set 154A1 arranged for dc supervision — Operate SIMLT RA key.	REG ASGN lamp lights.

STEP	ACTION	VERIFICATION
85d	Operate SIMLT ANS key.	
86	Operate CONVR switch to OFF.	
87	Set Triplett 310-W meter to 1-volt ac scale.	
88	Connect meter to BRIDGE pin jacks.	
89	At Data Set 154A1 — Adjust SEND LEV potentiometer in 43A1 carrier channel terminal to level indication on meter which would produce —11 db input at line link frame of No. 5 office. ***Example:*** Assume 10 db-loop in provided for use by Data Set 154A1. Then meter should indicate —1 db level at BRIDGE T-R pin jacks of 166A1 station test set in order to produce —11 db level at No. 5 office.	
90	Remove all patches, connections, restore all keys to normal.	All lamps extinguished.
Receive Bias Adjustment		
91a	If Data Set 154A1 arranged for 2-wire operation — Remove patch between TER IMP 1 900, LINE 1 jacks.	
92b	If Data Set 154A1 arranged for 4-wire operation — Remove patches between TER IMP 1 600, LINE 1 jacks and TER IMP 2 600, LINE 2 jacks.	
93	Operate DIAL MODE key.	DIAL MODE lamp lights.
94	Operate OFF HOOK key.	OFF HOOK lamp lights. When No. 5 office attaches originating register — RA lamp lights.
95	Outpulse number of STC, using 0-9 keys in test set.	Lamp corresponding to digit key operated lights.
96	Release DIAL MODE key.	DIAL MODE lamp extinguished.
97	Connection will be established via No. 5 office to called party.	ANS lamp lights when called party has answered.

STEP	ACTION	VERIFICATION
98	Patch 164C3 telegraph transmission measuring set, which is set to read signals in 20-ma loop, into RCV LOOP jack.	
99	Contact test position of serving test center (STC), request source of signals over path just established.	
100	At Data Set 154A1 — Adjust REC BIAS potentiometer in 43A1 carrier channel terminal for least distortion of signal received.	
101	Remove all patches, connections, restore all keys to normal.	All lamps extinguished.