

DIAGRAM NOTES (ISSUE 1)

concerning

DIAGRAM G.B.W. 14000

titled

MAINTENANCE TESTER FOR U.A.X. NZ13.

1. GENERAL.

1.1 The above diagram shows the circuit of a maintenance tester for a U.A.X. NZ13.

1.2 The tester has been designed to test the following ccts:-

GBW.13890	Group Selector.
GBW.13900	Final Selector.
GBW.13910	(Subs) Line Finder and control set.
GBW.13950	O/G to dep. U.A.X. (terminal traffic).
GBW.13960	" " " " (non-terminal traffic).
GBW.13990	I/C from dep. U.A.X.
GBW.13780	I/C from attached R unit.
GBW.13930	O/G parent and non-parent.
GBW.13980	I/C from parent or Non-dependent.
GBW.13970	O/G to Non-dependent.
GBW.14450)	Bothway to parent (limited facility).
GBW.14451)	
GBW.13920	Route Disc. and timing R/S.
GBW.14010	" " R/S (common).
GBW.13940	Route restriction.

1.3 Abbreviations.

Neg	-	Minus or negative pole of battery (batt)
Pos	-	Plus or positive pole of battery (eth)
Number before a letter		indicates coil resistance.
Number after a letter		indicates a contact unit number
O/G	-	Outgoing
I/C	-	Incoming
Cct	-	Circuit
Oper	-	Operated
TJ	-	Test Jacks.

2. FACILITIES.

Provision is made for the following tests:-

2.1 Busy Test.

2.2 The operation of the equipment on a regular call, the manual hold facility, and the absence of metering on calls to the manual board.

2.3 The operation of the junction equipment at the U.A.X. and the parent exchange, in the case of a call from a coin collecting box (CCB) subscriber.

2.4 The operation of the junction equipment at the U.A.X. and the parent or intermediate exchange on an answered call, and also on a call to an engaged subscriber.

2. FACILITIES (CONT'D)

- 2.5 The operation of the junction equipment at the U.A.X. and the manual exchange including the manual hold facility.
- 2.6 The trunk offering facility of the junction equipment at the U.A.X. and dependent exchange.
- 2.7 The operation of the equipment at the U.A.X. on incoming calls from parent and manual exchanges.
- 2.8 The operation of the equipment at the U.A.X. on calls incoming from automatic exchanges except dependent U.A.X.s.
- 2.9 The operation of the junction equipment at the U.A.X. brought into use on a call from dependent to the local U.A.X.
- 2.10 The operation of the junction equipment at the U.A.X. brought into use on a call originated by a regular subscriber on dependent U.A.X. to the parent exchange manual board, including the manual hold facility.
- 2.11 The operation of the equipment on a CCB call from dependent U.A.X. to the parent exchange manual board.
- 2.12 That the CCB discriminating signal is correctly given by each linefinder.
- 2.13 The operation of the Group Selector when a spare level is dialled.
- 2.14 The operation of the Group Selector on a local call.
- 2.15 That the group selector applies the correct discriminating signal in the case of an "0" level call originated by an ordinary subscriber.
- 2.16 That the CCB subscriber does not obtain access to barred levels of the group selector.
- 2.17 That the group selector connects the appropriate CCB discriminating signal to the junction equipment when used on a CCB call.
- 2.18 That the correct conditions are returned from the group selector and that the overflow meter operates when all outlets on the level are engaged.
- 2.19 The ringing and metering functions of the final selector, impulsing under simulated long and short line conditions and that the selector will seize an intermediate line of a private branch (PBX) group when required for night service.
- 2.20 The P.B.X. hunting facility of the final selector and the return of busy conditions when all lines in a P.B.X. group are engaged.
- 2.21 The trunk offering facility of the final selector.
- 2.22 The associated route discriminating or route restricting equipment.
- 2.23 Testing for busy tone on a group selector.

3. PRELIMINARY INSTRUCTIONS.

- 3.1 Insert the plug of a handset into TJ 3 and 4. By this means it may be observed if a busy selector is in use by a subscriber and tones etc. may be received.
- 3.2 Volume of tone received should be consistent on all switches.
- 3.3 Ringing should be allowed to proceed to test for premature ring trip.

4. CIRCUIT DESCRIPTION.

Outline.

The plugs of the tester are connected to the unit under test and the general function of the tester is shown under the detailed circuit description.

Detail.

4.1 Busy Tests.

- (a) The cct under test is engaged if the busy lamp glows when all keys are normal, earth being returned over the P wire to light the busy lamp via pos. on P wire, KP2 normal, busy lamp to neg. This test is applied when testing group and final selectors, outgoing, incoming and bothway junctions.
- (b) The cct. is engaged if the P lamp does not glow when key KP is operated. Lamp lights via pos, PT1 cper, KP1 oper, P lamp to neg. This test is applied when testing outgoing, incoming and bothway junctions.

Private key operated.

KP1 prepares cct for P lamp.
 KP2 extends P wire to the PT relay.

If the junction is busy, earth is returned on the P wire and PT relay remains normal. P lamp does not glow.

If the junction is free, battery is returned on the P wire and PT relay operates.

PT operated.

PT1 completes cct. for P lamp.
 PT2)
 PT3) ineffective.
 PT4)

- (c) If a battery test lamp lights when applied to test jack No. 2 the cct. is busy. This test is applied when testing incoming junctions from dependent U.A.X.s (GBW.13990) to determine if the corresponding outgoing junction (GBW.13950, or GBW.13960) is busy.

4.1 (cont'd)

Busy key operated.

KB1 applies earth (via FT4 oper.) to TJ1 in the group selector to release CC relay (operating on spare levels). This forces the group selector to step to the 11th step and busy conditions are returned.

KB2 Short circuits 90OR13 to enable trunk offering to be tested, and to allow satisfactory impulsing over junctions.

Operate Manual Board Key.

KMB1 applies an earth on the neg. lead (via pos, KMB1 oper, KL1 normal, 80OR5, KCB2 oper, KL4 normal, relay D KCB3 oper, KMH1 normal to neg. lead) when key KCB is operated to:-

- (1) Operate relay A in the outgoing junction relay set (GBW.13930) when testing a CCB call to a parent manual board.
- (2) Operate relay LB in the incoming junction relay set (GBW.13990) when testing an incoming CCB "O" level call on junctions from a dependent U.A.X.

KMB2 applies battery to the pos. lead (via neg. KMB2 oper, KL2 normal, 80OR7, KCB2 normal, KCB4 normal, KMH2 normal to pos. lead):-

- (1) Operate relay A in the junction relay set (GBW.13930) on an ordinary call to the parent manual board.
- (2) Operate relay LA in the incoming junction relay set (GBW.13990) when testing an incoming ordinary "O" level call on junctions from a dependent U.A.X.

KMB3 prepares a path for the operation of relay PT (when relay D operates) when testing incoming "O" level calls from dependent exchanges.

KMB4 applies a discriminating signal, 2000 or 350 ohm battery, controlled by KCB6, to the M lead to operate relay WS in the junction relay set (GBW.13930, 14450, 14451) to simulate an ordinary subscriber calling the parent manual board or relays WS and CB to simulate a CCB subscriber calling the parent manual board.

Operator Call key operated.

KOC1 applies an earth to the neg and pos lines to unbalance and operate relay OC in the junction relay sets and final selectors when the trunk offering facility is being tested.

KOC2 spare.

Manual Hold Key operated.

KMH1) disconnect battery, earth, or loop conditions from
 KMH2) the neg. and pos. lines thus simulating subscribers clearing conditions when testing the manual hold facility.

4.1 (cont'd)

KMH3 disconnects the loop of the test telephone from the neg. and pos. lines to simulate subscribers clearing conditions when testing the manual hold facility. A .02mF condenser is connected in series with the test telephone to allow listening to be effected under these conditions.

KMH4 spare.

Trip and Busy key operated.

KTB1 presents a 4200 ohm loop to the neg and pos. lines of the "10" test line to trip the ringing from the final selector.

KTB2 disconnects a 1500 ohm battery from the "10" test line P1 lead to engage this line.

Meter key operated.

KM1 connects the meter in the routine tester to the "D" lead to test the receipt or non-receipt of metering conditions when the meter cct of the equipment under test is connected to the "D" lead of its associated test jack.

KM2 connects the meter in the routine tester to the "M" lead to test the receipt or non-receipt of metering conditions when the metering circuit of the equipment under test is connected to the "M" lead of its associated test jack.

Private key operated.

KP1 prepares the cct for lighting the P lamp when relay PT operates.

KP2 extends relay PT to the P lead; PT operates if line is free. PT1 lights P lamp.

Trunk Offering key operated.

KTO1 extends a 350 ohm pos battery to the "D" lead:-

- (1) on final selectors to operate relay TO to allow the trunk offering facility to be tested.
- (2) on relay sets outgoing to dependent exchanges - to operate relay DS in the associated route discriminating or route restricting equipment which in turn operates relay TO in the junction relay set to allow the trunk offering facility to be tested.

KTO2 spare.

Loop key operated.

KL1) connect the 10 I.P.S. dial across the neg. and pos.
 KL2) lines to allow dialling.
 KL3)

KL3 normal is required when testing incoming "0" level calls from a dependent U.A.X.:-

- (1) for a CCB call - to interrupt the positive lead to prevent the operation of relay LA in the junction relay set (see also KMB1 (2)).
- (2) for an ordinary call - to interrupt the negative lead to prevent the operation of LB in the junction relay set (see also KMB2(2)).

4.1 (cont'd)

KL4 connects rectifier MR1 across relay D and removes short-circuit from rectifier MR3 in the positive lead to render that relay sensitive to reversals of line current for supervisory purposes.

Coin collecting Box key operated.

- KCB1 } cause a reversal of the neg. and pos. lines between
 KCB2 } KCB1 and KCB2, KCB3 and KCB4, thus extending earth on
 KCB3 } the neg. lead from KMB1 to operate relay LB in the
 KCB4 } junction relay set when testing an incoming CCB "0"
 level call from a dependent U.A.X. and transferring
 relay D to the neg. lead for subsequent supervision on
 the same class of call.
- KCB5 } (with KMB key normal) extends a 350 ohm battery on the
 KCB6 } "D" lead to give CCB discriminating conditions to:-
- (1) group selectors when testing the CCB barred level and barred code facility.
 - (2) junction relay sets when testing a CCB "1" level call.
 - (3) junction relay sets when testing route discriminating or route restricting equipment.
- KCB6 (normal) with KMB key operated, extends a 2000 ohm battery to the "M" lead to operate relay WS in the junction relay set. (GBW. 13930, 14450, 14451)
- KCB6 (operated) with KMB key operated, extends a 350 ohm battery to the "M" lead to operate relays WS and CB in the junction relay set.

Short Line key operated.

- KSL1 connects a 14,000 ohm resistor across the neg. and pos. lines to simulate leaky line conditions.
- KSL2 spare.

Discriminating Signal Key operated.

- KDS1 extends a 2000 ohm pos. battery over the "D" lead to operate relay DS in the multi metering relay set (via the associated junction relay set), when testing the route discriminating equipment.
- KDS2 spare.

Relay D.

With key KL operated this relay is shunted by a rectifier and responds to reversals of current.

- D1 (with KMB key operated) operates relay PT.
 D2 controls the supervisory signal.

Relay TD.

responds to ringing current sent out over the "10" neg. and pos. leads, to give an audible signal on the receipt of ringing. TD1 is spare.

Relay PT (see also Busy Tests)

This relay also operates when testing incoming "0" level calls from the dependent U.A.X.

A. GENERAL.

Seizing and marking tests on linefinders are made using the test jacks and level test keys which are mounted on the A units.

Tests for C.C.B. discrimination are made using the same jacks and keys, in conjunction with the Tester GBW. 14000.

Testing Operations	Result if Circuit is in Order	Object of Test
<u>SEIZING TESTS</u>		
1. Insert plug of handtest telephone (Buttinski) into the level 1/11 test jack of the line-finder group to be tested.		
2. Operate button of handtest telephone: operate level-1 test key.	One line finder is seized, steps to level 1, and hunt for the marked contact.	To check that line finder will hunt for, and seize a calling line; that it will connect the line to a group selector; and that metering connection via the line finder is in order.
3. Restore level-1 test key immediately line finder commences rotary stepping. (If restoration of the key is delayed, a second line finder will be seized and will commence to step). Listen on handtest telephone.	Line finder switches to contact 11; dial tone is heard and LF test lamp glows.	
4. Release button of handtest telephone.	Line finder restores to normal.	Clear down for next test.
5. Repeat tests 2 to 4 on remaining line finders in the unit.		
6. Shift handtest telephone to level 1/11 test jack of each A unit in turn, and repeat tests 2 to 5 on line finders contained in each unit.		
<u>MARKING TESTS</u>		
7. Operate level-9 test key of the A unit to be tested.	Each line finder in the unit is seized in turn, hunts on level-9, switches momentarily to 11th contact, and is released.	To check that all line finders in the unit will hunt on level-9.
8. Repeat test 7 using level-test keys No. 8 to No. 0 in turn.	As for test 7, except that each line finder hunts to level corresponding to to operating level-test key.	As for test 7 except that marking conditions are checked on level corresponding to the level-test key operated.
9. Repeat tests 7 and 8 on the remaining A units.		
<u>C.C.B. DISCRIMINATION</u>		
10. Insert the 6 point plug of the test set into the level 1/11 test jack of the A unit to be tested and insert plug of handset into jack springs 3 and 4 of test set.		

4.1 (cont'd)

PT2 provides a holding path for relay PT when relay D releases.
 PT3 prepares a cct. for relay J.

Relay J. operates on release of relay D.

- J1 extends earth on the neg. lead (or battery on the pos. lead if KCB key is operated) to complete the necessary circuit operations of the unit under test.
- J2 provides a holding path for relay J when relay D next re-operates.

5. DESIGN DETAIL.

The rectifier MR1 connected across relay D and MR3 in series with D when key KL is operated, ensures that the relay responds to reversals of current. The rectifier MR2 connected to KM2 ensures that when testing a "1" level call, where an answered condition is encountered (Keys KM and KL oper) the negative battery meter pulses received over the "D" lead will satisfactorily operate the meter in the tester. The rectifier also prevents these pulses from leaking back via the "M" lead and operating relay WS in the parent exchange relay set, which would disconnect the call.

The ringing cct. connected to the "10" neg. and pos. final selector test line leads, is designed to simulate the most onerous condition met with in practice.

The "11" test line P2 lead is connected to 250 ohm battery to assimilate the first line of a P.B.X. group. Thus if "11" is dialled, an engaged condition is met due to "11" P1 cct. being disconnected by the insertion of the plug into the interception jack and automatic hunting commences due to the battery applied to the P2 wiper.

The "12" P2 lead is connected to earth to ensure that should "11" or "10" be the last line of a P.B.X. group, the "final line" condition (earth on P2) is applied to the line "12" to prevent calls to the P.B.X. group interfering with routine testing.

Impulsing.

Dial ADA provides impulses at 10 I.P.S. with a break of 66% and a make of 34%.

NOTE: When connecting the 24 point plug of the test set to the routine test jack on an A unit, unit A1 or A2 should be used if possible. If the length of cord does not permit this and connection is made to a unit in which the "10" and "11" lines are working lines, then before connection is made, it should be ascertained that these lines are free, by testing the P wires of these circuits with a test lamp.

Testing Operations	Result if Circuit is in Order	Object of Test
11. Operate LOOP, SHORT LINE and BUSY keys. Operate level-1 test key and restore it immediately seized line finder cuts into level 1; listen on handtest telephone.	Dial tone heard. SUPY lamp glows. LF test lamp glows.	Preparation for next test.
12. Dial 0 on tester dial; listen on handtest telephone.	Ringing tone heard.	To prove correct oper- ation of level-1 normal post springs, and that battery passed forward to operate CB relay in junction relay-set.
13. When operator answers operate button of hand- test telephone and con- firm that CCB discrim- ination is made.	Ringing tone ceases. SUPY lamp darkens if call is via GBW.13930 (but not GBW.14450).	Completion of test.
14. Ask the operator to clear connection; rest- ore SHORT-LINE key and button of handtest telephone.		
15. Repeat tests 11 to 14 on each line finder in the A unit.		
16. Shift plug of tester to level-1/11 test jack of each A unit in turn, and repeat tests 11 to 15 on each line finder con- tained in each unit.		

TEST OF GROUP SELECTORS GBW. 13890

Connect the 24 point plug of test set into a convenient routine test jack on an A unit and connect handset to jacks 3 and 4 of test set.

Insert the 6 point plug into test jack of selector to be tested. If the Busy Lamp glows the selector is busy and testing cannot proceed. If the Busy lamp does not glow, busy the associated line-finder by transferring the test link from test jacks 13 and 14 of line-finder, to test jacks 1 and 2.

Testing Operations	Result if Circuit is in order	Object of Test
1. Operate PRIVATE key.	PRIVATE lamp glows.	Check of private battery.
2. Restore PRIVATE key. Operate LOOP key.	PRIVATE LAMP DARKENS. BUSY & SUPY lamps glow. Dial Tone heard.	Seizure of selector & check of earth on private.
3. Dial a spare level.	Selector steps but does not cut in. NU tone heard.	Check of spare level.
4. Restore LOOP key.	Selector restores BUSY & SUPY lamps darken.	Check of release.
5. Repeat tests 2 to 4 on remaining spare levels.		
6. Operate SHORT LINE, LOOP and METER keys. Dial level of final selector in unit to which 24 point plug is connected.	Selector steps to level dialled & cuts in. BUSY & SUPY lamps glow.	To prove selection of a free outlet.
7. Dial "10".	Final steps to "10". Ringing tone heard. Ringing to test set.	
8. Operate TRIP & BUSY key.	Ringing ceases. SUPY lamp darkens. The test set meter operates once.	Check of M wire.
9. Restore all keys.	Selector restores BUSY lamp darkens.	
10. Operate LOOP key. Dial another local level.	Selector steps to level dialled & seizes a final. BUSY & SUPY lamps glow.	Check of V.M.B.
11. Restore LOOP key.	Selector restores. BUSY & SUPY lamps darken.	
12. Repeat tests 10 & 11 on any remaining local levels.		Check of V.M.B.
13. Operate LOOP and BUSY keys.	BUSY and SUPY lamps glow.	
14. Dial "0".	The selector steps to level "0" and cuts in. Ringing tone heard. When the operator answers ringing tone ceases. SUPY lamp darkens.	Check of "0" level discriminating battery.
15. Operate button of handset	Confirms that call appeared as an "ordinary" call.	
16. Release button of handset. Restore LOOP and BUSY keys.	Selector restores. SUPY lamp darkens.	

Testing Operations	Result if Circuit is in order	Result of Test
17. Operate COIN BOX, LOOP and BUSY keys. Dial level barred to coin box subscribers.	Selector steps to level dialled but does not cut in. NU tone heard. BUSY lamp glows.	Check of CCB barring facility.
18. Restore all keys.	Selector releases. BUSY lamp darkens.	
19. Repeat tests 17 and 18 on any remaining barred CCB levels.		
20. Operate COIN BOX, SHORT LINE, LOOP and BUSY keys.	BUSY lamp glows.	
21. Dial an exchange code barred to CCB calls trunked from a group selector level which is not barred to CCB calls.	Selector steps to level dialled & cuts in. NU tone heard.	Check of CCB discriminating signal to junction circuit.
22. Restore all keys.	Selector releases. BUSY lamp darkens.	
23. Operate LOOP and MANUAL BOARD keys.	BUSY and SUPY lamps glow. Dial tone heard.	Preparation for next test.
24. Dial a spare level.	Selector steps but does not cut in. NU tone heard.	
25. Operate BUSY key.	Selector cuts in & steps to 11th step. NU tone ceases. O/F busy tone heard.	Check of hunting to 11th step & operation of 'S' springs. Check of O/F meter operating cct.
26. Restore all keys.	Selector restores. O/F - operates. BUSY and SUPY lamps darken.	
27. Repeat tests 1 to 26 on each group selector.		
<u>TIME PULSE RELEASE TEST</u>		
28. Insert a U-link into test jacks 3 and 4 of a line-finder level 1/11 test jack. Operate level 1 key momentarily.	The line-finder steps vertically to level 1 and rotary to the 11th step. The line-finder releases after 1-4 minutes.	Check of forced release condition.

Repeat this test on the remaining line-finders. For these tests, one line-finder may be seized in each A unit and the release may be speeded up by hand stepping the TP uniselector in the tone and time pulse relay set.

TEST OF FINAL SELECTORS GBW. 13900

The operator at the parent exchange should be advised before testing is commenced.

Connect the 24 point plug of test set into a convenient routine test jack on an A unit and connect handset to jacks 3 and 4 of test set.

Insert the 6 point plug into the test jack of the selector to be tested.

If the BUSY lamp glows the selector is busy and testing cannot proceed.

Testing Operations	Result if Circuit is in order	Object of Test
--------------------	-------------------------------	----------------

RINGING AND METERING TEST

- | | | |
|-------------------------------------------------|------------------------------------------------------------------------------------------|---------------------------------------------------|
| 1. Operate the PRIVATE key. | PRIVATE lamp glows. | Check of private battery. |
| 2. Restore the PRIVATE key. | PRIVATE lamp darkens. | |
| 3. Operate the SHORT LINE, LOOP and METER keys. | BUSY and SUPY lamps glow. | Check of seizure of selector and earth on P wire. |
| 4. Dial "10" on test set. | Final selector steps to 10. Test set responds to ringing. Ringing tone heard in handset. | Check of stepping and ringing conditions. |
| 5. Operate the TRIP & BUSY key. | Ringing and ringing tone cease. Test set meter operates once. SUPY lamp darkens. | Check of ring trip and metering (if required). |
| 6. Restore LOOP key. | Selector restores. BUSY lamp darkens. | Check for release of selector. |
| 7. Restore TRIP & BUSY, and METER keys. | | |

P.B.X. HUNTING TEST

- | | | |
|---------------------------------------|-------------------------------------------------------------------------|------------------------------------|
| 8. Operate LOOP key. | BUSY and SUPY lamps glow. | |
| 9. Dial "11" on test set. | Selector steps to 10. Ringing tone heard. Test set responds to ringing. | Check for P.B.X. hunting facility. |
| 10. Restore LOOP and SHORT LINE keys. | Selector restores. BUSY and SUPY lamps darken. | Check for release of selector. |

P.B.X. GROUP BUSY TEST

- | | | |
|--------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|
| 11. Operate the LOOP, SHORT LINE and TRIP & BUSY keys. | The BUSY and SUPY lamps glow. | |
| 12. Dial "11" on test set. | Selector steps to contacts 1/11. Busy tone is heard. | Check for busy conditions when all P.B.X. lines engaged. |
| 13. Restore LOOP key. | SUPY lamp darkens. Selector restores. BUSY lamp darkens. | Check for release of selector. |
| 14. Restore TRIP & BUSY key. | | |

Testing Operations	Result if Circuit is in order	Object of Test
<u>TRUNK OFFERING TEST</u>		
15. Operate TRIP & BUSY and LOOP keys.	The BUSY & SUPY lamps glow.	
16. Operate TRUNK OFFER key momentarily and dial "10" on test set.	Selector steps to contact "10". BUSY tone heard.	
17. Operate BUSY key.		
18. Operate OPERATOR CALL key momentarily.	Busy tone ceases. SUPY lamp darkens.	Check for offering of call when called line is busy.
19. Restore TRIP & BUSY key.	SUPY lamp glows.	Check that called line seized when free, and operator signalled.
20. Operate OPERATOR CALL key momentarily. Then operate METER key.	Test set responds to ringing.	Check of ringing to called line after trunk offering.
21. Operate TRIP & BUSY key.	Ringing ceases. SUPY lamp darkens. Meter does <u>not</u> operate.	Check of talking condition.
22. Restore all keys.	Selector restores BUSY lamp darkens.	Check of release of selector.
23. Repeat tests 1-22 on each final selector.		

TEST OF JUNCTION RELAY-SETS OUTGOING TO DEPENDENT U. A. X. GBW. 13950
(term. traffic) GBW. 13960 (non-term. traffic)

Insert the 24 point plug into a convenient routine test jack and connect handset to jacks 3 and 4 of test set.

Insert the 6 point plug into the test jack of the relay-set to be tested.

BUSY TEST

1. If used on a bothway junction, (i.e., associated with incoming junction relay-set GBW.13990) the circuit is busy if the BUSY lamp glows, or if the PRIVATE lamp does not glow when the PRIVATE key is operated.
2. If used on a unidirectional junction the circuit is busy if the BUSY lamp glows.

Testing Operations	Result if Circuit is in order	Object of Test
1. For junctions over which subscriber dialling is permitted, operate the LOOP, METER and BUSY keys.	BUSY and SUPY lamps glow.	
2. Dial the test number (811) of the dependent U.A.X.	SUPY lamp darkens. Test number tone heard & meter in test set operates according to fee of the route.	To check establishment of call, and correct metering.
3. Restore all keys.	BUSY lamp darkens.	Check of release.

TRUNK OFFERING TEST

4. Operate the LOOP and BUSY keys.	BUSY and SUPY lamps glow.	
5. Dial the code of the dependent U.A.X. followed by the test number (811) on the service telephone.	Test number tone heard - or busy tone if the test number is engaged.	
6. Operate and release the TRUNK OFFER key.		
7. Operate the METER key and dial the test number (811) on the test set.	Busy tone is heard. SUPY lamp flashes a minimum of 3 times. Meter of test set does not operate.	Check for busy tone and no meter registrations.
8. Operate and release the OPERATOR CALL key.	Test number tone heard. SUPY lamp darkens.	Check of trunk offering.
9. Restore all keys and replace service telephone.	BUSY lamp darkens	Check of release

TIME PULSE RELEASE TEST

- | | | |
|-------------------------------------|----------------------------------------------------------------------------|--------------------------|
| 10. Operate the LOOP and BUSY keys. | BUSY and SUPY lamps glow. After 3-6 minutes BUSY lamp darkens momentarily. | Check of forced release. |
| 11. Restore all keys. | BUSY and SUPY lamps darken. | |

Repeat tests 1 - 11, (4 - 11 for junctions barred to subscribers) on remaining junctions.

FORCED RELEASE - FAULTY JUNCTION.

Sheet 15 of 27 sheets

Testing Operations	Result if Circuit is in Order	Object of Test
1. Operate BUSY and LOOP keys	BUSY and SUPY lamps glow	
2. Operate TRUNK OFFERING key momentarily.		
3. Operate OPERATOR CALL key momentarily.	BUSY and SUPY lamps darken.	To release junction for faulty application of trunk-offering signal.

TEST OF JUNCTION RELAY-SETS INCOMING FROM DEPENDENT U.A.X.

GBW. 13990

Insert the 24 point plug into a convenient routine test jack on an A unit and connect handset to jacks 3 and 4 of test set.

Insert the 6 point plug into the test jack of the relay-set to be tested.

BUSY TEST.

1. If used on a bothway junction, (i.e., associated with outgoing junction relay-set GBW.13950 or GBW.13960) the circuit is busy if the BUSY lamp glows or if earth is found to be connected to test jack spring 2 of the associated outgoing junction relay-set (GBW.13950 or GBW.13960).
2. If used on a unidirectional junction the circuit is busy if the BUSY lamp glows.

BUSYING THE CIRCUIT DURING TESTING

1. Bothway junctions. Busy the circuit by transferring the test link on the associated outgoing junction relay-set (GBW.13950 or GBW.13960) from 7 and 8 to 3 and 4.
2. Unidirectional junctions. Arrange for the junction to be busied at the outgoing end and disconnect it at the local M.D.F.

TESTING PROCEDURE

Busy the line-finder control relay-set No. 1 in the unit with which the junction is associated by hand operating relay TB in the control relay-set. The SUPY lamp in the control relay-set glows.

<u>Testing Operations</u>	<u>Result if Circuit is in Order</u>	<u>Object of Test</u>
<u>TEST OF CALL FROM DEP. U.A.X. TO LOCAL U.A.X.</u>		
1. Operate LOOP and BUSY keys.	Dial tone heard BUSY and SUPY lamps	To check that "loop" condition is sent forward to group selector.
2. Dial 810 on test set.	Ringing tone heard.	Check of calling conditions.
3. Restore all keys.	Ringing tone ceases BUSY and SUPY lamps darken.	Check of release.

TEST OF ORDINARY CALL FROM DEP. U.A.X. TO PARENT.

4. Operate the MANUAL BOARD key	BUSY and SUPY lamps glow. Junction hunter seizes junction to parent. Ringling tone heard.	
5. When operator answers confirm that call appeared as a regular calling signal. Check transmission and ask operator to hold the connection.	Ringling tone ceases	Check of calling conditions
6. Operate MANUAL HOLD key.	SUPY lamp darkens.	
7. Restore MANUAL HOLD key and confirm with the operator that a ring off signal was received.	SUPY lamp glows.	Check of ring-off signal.
8. Ask operator to clear and restore MANUAL BOARD key and button of handset.	Junction hunter homes. BUSY and SUPY lamps darken.	Check of release.

TEST OF C.C.B. CALL FROM DEP. U.A.X. TO PARENT.

- | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|------------------------------|
| 9. Operate the COIN BOX and BUSY keys and then the MANUAL BOARD key. | BUSY and SUPY lamps glow. Junction hunter seizes junction to parent. Ringing tone heard. | |
| 10. When the operator answers confirm that the call appeared as C.C.B. calling signal. | Ringing tone ceases. | Check of calling conditions. |
| 11. Ask operator to clear the connection. Restore the MANUAL BOARD and then COIN BOX keys. | BUSY and SUPY lamps darken. Junction hunter homes. | Check of release. |
| 12. Release line-finder control relay-set No. 1 by momentarily withdrawing the test link from springs 5 and 6 of the control relay-set, and busy control relay-set No. 2 as above. | | |
| 13. Repeat tests 1 - 3, and release control relay-set No. 2.
Restore the junction to normal. | | |

TEST OF JUNCTION RELAY-SETS INCOMING FROM LOCALUNIT U.A.X. N.Z. 13R GEW. 15780

Insert the 24 point plug into a convenient routine test jack on unit and connect handset to jacks 3 and 4 of test set.

Insert the 6 point plug into the test jack of the relay-set to be tested.

BUSY TEST.

The circuit is busy if the BUSY lamp glows.

TESTING PROCEDURE.

Busy the line-finder control relay-set No. 1 in the unit with which the junction is associated by hand operating relay TB in the C.R.S. - The BUSY lamp in the C.R.S. glows.

<u>Testing Operations</u>	<u>Result if Circuit is in Order</u>	<u>Object of Test</u>
1. Operate the LOOP and BUSY keys.	BUSY and SURV lamps glow. Dial tone is heard.	To check that "loop" condition is sent forward to group selector.
2. Dial 810 on test set.	Ringing tone heard in handset.	Check of calling conditions.
3. Restore LOOP and BUSY keys.	Ringing tone ceases.	Check of release.
4. Release line-finder control relay-set No. 1 by momentarily withdrawing the test link from springs 5 and 6 of the control relay-set, and busy control relay-set No. 2 as above.		
5. Repeat tests 1 - 3; and release control relay-set No. 2.		

TEST OF JUNCTION RELAY-SETS OUTGOING TO PARENT GBW. 13930

Insert the 24 point plug into a convenient routine test jack on an A unit and connect the handset to jacks 3 and 4 of the test set.

Insert the 6 point plug into the test jack TJA of the relay-set to be tested.

BUSY TEST.

1. If used on a bothway junction (i.e., associated with incoming junction relay-set GBW. 13980) the circuit is busy if the BUSY lamp glows, or if the PRIVATE lamp does not glow when the PRIVATE key is operated.
2. If used on a unidirectional junction, the circuit is busy if the BUSY lamp glows.

<u>Testing Operations</u>	<u>Result if Circuit is in Order</u>	<u>Object of Test.</u>
1. Operate the BUSY and MANUAL BOARD keys and the button on the handset. Restore the MANUAL BOARD key and operate the METER key.	BUSY and SUPY lamps glow. Ringing tone heard. SUPY lamp darkens.	Check of seizure of junction for call from ordinary sub. to parent
2. When the operator answers confirm that the call appeared as a regular calling signal.	Ringing tone ceases. Meter on test set does not operate.	Check of talking conditions.
3. Ask the operator to hold the connection. Operate the MANUAL HOLD key momentarily and confirm that the operator received a ring-off signal.		Check of ring-off and manual hold.
4. Ask the operator to clear. Restore all keys and button of handset.	BUSY lamp darkens	Check of release.
5. Operate the BUSY, COIN BOX, MANUAL BOARD and LOOP keys, in that order. Restore the COIN BOX key.	BUSY and SUPY lamps glow. Ringing tone heard.	Check of seizure of junction and discrim. signal for C.C.B. call to parent.
6. When the operator answers confirm that the call appeared as a C.C.B. calling signal.	SUPY lamp darkens.	
7. Ask the operator to clear and restore all keys.	BUSY lamp darkens.	Check of release.

The following testing operations 8 - 14 are required only for testing calls to parent auto exchanges, or for metered calls routed via a tandem exchange.

8. Operate the BUSY LOOP and METER keys	BUSY and SUPY lamps glow.	Check of correct polarity of + and - wires.
9. Dial a test number that returns a permanent loop condition - or a service number of the auto parent.	Test number tone heard - or call answered if to parent auto. SUPY lamp darkens. Meter operates according to fee of route.	Check for auto junction call; and correct metering
10. Restore all keys.	BUSY lamp darkens.	
11. Operate LOOP and BUSY keys.	BUSY and SUPY lamps glow.	

- | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------------------|
| 12. From the service telephone dial the test number of the parent (or tandem) exchange. (If the distant exchange test numbers are arranged as a P.B.X. group, the second in the group should be dialled). | Test number tone is heard in service telephone. Dial tone in handset. | |
| 13. Operate the METER key and dial the same number on the test set. | Busy tone is heard. Meter does not operate. | Check receipt of busy tone and non-metering for a busy line. |
| 14. Restore all keys and replace service phone. | BUSY and SUPY lamps darken. | |

TIME PULSE-RELEASE.

- | | |
|----------------------|---------------------------------------------------------------------------|
| 1. Operate LOOP key. | BUSY and SUPY lamps darken. After 3-6 mins BUSY lamp darkens momentarily. |
|----------------------|---------------------------------------------------------------------------|

TEST OF JUNCTION RELAY-SETS INCOMING FROM PARENT ORNON-DEPENDENT EXCHANGE GBW. 13980

Insert the 24 point plug into a convenient routine test jack on an A unit and connect the handset to jacks 3 and 4 of the test set.

Insert the 6 point plug into the test jack of the relay-set to be tested.

BUSY TEST.

1. If used on parent junctions (either associated with outgoing junction relay-set GBW.13930 as bothway, or as unidirectional) the circuit is busy if the BUSY lamp glows.
2. If used on a bothway junction to a non-dependent auto exchange (i.e., in association with outgoing junction relay-set GBW.13970) the circuit is busy if the BUSY lamp glows, or if earth is found to be connected to test jack spring 2 of the outgoing junction relay-set.
3. If used on a unidirectional junction to a non-dependent auto exchange the circuit is busy if the BUSY lamp glows.

BUSYING THE CIRCUIT DURING TESTING.A. U..X.'s directly connected to parent.

1. Bothway junctions. Busy the circuit in an outgoing direction, by transferring the test link on the outgoing test jack from 7 and 8 to 1 and 2. Request the distant exchange operator to insert a plug in the outgoing junction multiple to busy the circuit. Disconnect the junction at the M.D.F.
2. Unidirectional junctions. Request the distant exchange operator to insert a plug in the outgoing junction multiple to busy the circuit. Disconnect the junction at the M.D.F.

B. U..X.'s connected via tandem to parent.

1. Bothway junctions. Busy the circuit in an outgoing direction by transferring the test link on the outgoing test jack from 7 and 8 to 1 and 2. Busy the junction in an incoming direction by applying a loop to the junction and disconnecting it at the M.D.F.
2. Unidirectional junctions. The test on these circuits should be made at a time when co-operation can be given to busy the junctions at the outgoing end. When busied, disconnect the junction at the M.D.F.

TESTING PROCEDURE.

Busy the linefinder control relay-set No. 1 in the unit with which the junction is associated by hand operating relay TB in the C.R.S. - The SUPY lamp in the C.R.S. glows.

<u>Testing Operations.</u>	<u>Result if Circuit is in Order</u>	<u>Object of Test</u>
A. <u>Junctions Incoming From Parent Exchange.</u>		
1. Operate LOOP and BUSY keys.	BUSY and SUPY lamps glow. Dial tone heard.	To check that "loop" condition is sent forward to group selector.
2. Remove the receiver of the service telephone. Operate TRIP & BUSY key and dial 810 on test set.	Busy tone heard.	To verify busy condition before applying trunk offering.
3. Operate OPERATOR CALL key momentarily.	Busy tone ceases SUPY lamp darkens momentarily	Check of trunk offering facility.
4. Restore all keys and replace service telephone. (CRV 11,000)	USY and SUPY lamps darken.	

B. Junctions Incoming From Non-Dep. Auto Exchanges.

- | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-------------------------------------------------------------------|
| 1. Operate LOOP and BUSY keys. | BUSY and SUPY lamps glow. | To check that "loop" condition is sent forward to group selector. |
| 2. Dial 810 on test set | Ringing tone is heard. | Check of calling conditions. |
| 3. Restore LOOP and BUSY keys. | BUSY and SUPY lamps darken. | Check of release. |
| 4. Release line-finder control relay-set No. 1 by momentarily withdrawing the test link from springs 5 and 6 of the control relay-set, and busy control relay-set No. 2 as above. | | |

Repeat tests A 1 - 4 or B 1 - 3 and restore junction to normal.

TEST OF JUNCTION RELAY-SETS OUTGOING TO NON-DEPENDENTAUTO EXCHANGES GBW. 13970

Insert the 24 point plug into a convenient routine test jack on an A unit and connect handset to jacks 3 and 4 of test set.

Insert the 6 point plug into the test jack of the relay-set to be tested.

BUSY TEST.

1. If used on a bothway junction (i.e., associated with incoming junction relay-set GBW.13980) the circuit is busy if the BUSY lamp glows or if the PRIVATE lamp does not glow when the PRIVATE key is operated.
2. If used on a unidirectional junction-the circuit is busy if the BUSY lamp glows.

<u>Testing Operations</u>	<u>Result if Circuit is in Order</u>	<u>Object of Test</u>
1. Operate the LOOP and METER keys.	BUSY and SURV lamps glow.	Check of correct polarity of + and - wires.
2. Operate the BUSY key and dial the service number of the auto exchange.	Ringing tone heard. SURV lamp darkens when call answered. Correct meter registrations.	Check of correct circuit operation and metering.
3. Restore all keys.	BUSY lamp darkens.	Check of release.
4. Operate LOOP and BUSY keys.	BUSY and SURV lamps glow.	
5. From the service telephone dial the code of auto exchange followed by service number. Leave call connected.		
6. Operate the METER key and dial service number of auto exchange.	Busy tone heard. Meter does not operate.	Check of busy conditions
7. Restore all keys and replace service telephone.	BUSY and SURV lamps darken.	Check of release.

TEST OF BOTHWAY JUNCTIONS TO AIRPORT EXCHANGE

LIMITED FACILITY TYPE. GBV. 14450 OR GB. 14451

Insert the 24 point plug into a convenient routine test jack on an A unit and connect handset to jacks 3 and 4 of test set.

Insert the 6 point plug into the test jack TJA of the relay-set to be tested.

BUSY TEST.

If the BUSY lamp glows the circuit is busy.

<u>Testing Operations</u>	<u>Result if Circuit is in Order</u>	<u>Object of Test</u>
1. Operate the LOOP and BUSY keys and operate the MANUAL BOARD key momentarily.	BUSY and SUPY lamps glow. Ringing tone heard.	Check of ordinary call to parent.
2. When the operator answers confirm that the call appeared as a regular calling signal, and that transmission is satisfactory.	SUPY lamp darkens. Ringing tone ceases.	Check of talking conditions.
3. Ask operator to hold the connection. Operate the MANUAL HOLD key momentarily and confirm that the ring off signal was sent.		Check of manual hold, ring-off, and recall facilities.
4. Ask operator to clear and release button of handset.	SUPY lamp glows.	
5. Restore all keys.	BUSY and SUPY lamps darken.	Check of release.
6. Operate the BUSY, LOOP and COIN BOX keys.		
7. Operate the MANUAL BOARD key momentarily.	BUSY lamp glows. Ringing tone heard.	Check of C.C.B. call to parent.
8. When the operator answers confirm that the call appeared as a C.C.B. discriminating signal.		
9. Ask the operator to clear and restore all keys and button of handset.	BUSY and SUPY lamps darken	Check of release.

TEST OF ROUTE DISCRIMINATING & TIMING CIRCUIT GBW.13920

Insert the 24 point plug into a convenient routine test jack on an A unit and connect handset to jacks 3 and 4 of tester.

Insert the 6 point plug into the outgoing test jack of the associated outgoing junction relay-set.

Insert the 2 point plug into test jack springs 3 and 4 of the route discriminating relay-set.

BUSY TEST

The circuit is busy if the BUSY lamp glows, or if the PRIVATE lamp does not glow when the PRIVATE key is operated.

NOTE: Only those codes which apply locally should be tested.

<u>Testing Operations</u>	<u>Result if Cct is in Order</u>
1. Operate the LOOP and BUSY keys and dial an SP code.	BUSY and SUPY lamps glow. NU tone heard, and the meter on the test set operates (twice).
2. Restore LOOP key.	BUSY and SUPY lamps darken.
3. Repeat 1 and 2 dialling a spare code on each arc in turn if possible.	
4. Repeat 1 and 2 for all BA and BM codes.	
5. Operate the LOOP key and dial a 1F call. (If call is to a manual exchange wait for the operator to answer to avoid false calls.)	BUSY and SUPY lamps glow. Meter on test set operates once.
6. Restore LOOP key.	BUSY and SUPY lamps darken.
7. Repeat tests 5 and 6 on remaining 1F, 1B, 2F, 3F, 4F, 5F and 6F codes.	Meter on test set operates according to fee, once only.
8. Repeat tests 5 and 6 on all 1RP, 2RP, 3RP, 4RP, 5RP and 6RP codes.	Meter on test set operates according to fee, once for each complete metering cycle. MM switch should be stepped manually to hasten these operations.
9. Operate the COIN BOX and LOOP keys, in that order. Dial a 2F code.	BUSY lamp glows. NU tone heard. Meter on test set operates. (2 pulses)
10. Restore LOOP key.	BUSY lamp darkens.
11. Repeat tests 9 and 10 for all 1B and MB codes.	As for test 9 but meter does not operate on MB code.
12. Restore COIN BOX key.	
13. Operate LOOP key. Operate and restore the DISC. SIGNAL key. Dial a BA code followed by test number of barred exchange.	BUSY and SUPY lamps glow. Test number tone heard. Meter on test set does not operate.

Testing OperationsResult if Cct is in Order

- | | |
|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 14. Restore LOOP key. | BUSY and SUPY lamps darken. |
| 15. Repeat tests 13 and 14 on remaining BA codes. | |
| 16. Operate LOOP key. Operate and restore DISC. SIGNAL key and dial a BM code. | BUSY and SUPY lamps glow. Ringing tone heard. |
| 17. Ask operator to hold the connection and operate the MANUAL HOLD key. (After a delay of a few seconds). | SUPY lamp darkens when operator answers, and ringing tone ceases. |
| 18. Restore MANUAL HOLD key and ask operator to clear. | |
| 19. Restore LOOP key. | BUSY lamp darkens. |
| 20. Repeat tests 16-19 for remaining BM codes. | |
| 21. Repeat tests 16-19 for all M and MB codes, omitting operation of DISC. SIGNAL key. | |

COMMON EQUIPMENT GBW.14010

The tests detailed above should be completely performed from one junction relay-set, for codes which use the common route discriminating equipment. From other junction relay-sets it is not necessary to test all codes, but as far as possible each code should be tested once and one test should be made on each arc.

TEST OF ROUTE RESTRICTING EQUIPMENT GBW. 13940

Insert the 24-point plug into a convenient routine test jack on an A unit and connect handset to jacks 3 and 4 of test set.

Insert the 6-point plug into the outgoing test jack of the associated junction relay-set.

BUSY TEST

The circuit is busy if the BUSY lamp glows, or, if the PRIVATE lamp does not glow when the PRIVATE key is operated.

<u>Testing Operations</u>	<u>Result if Cct is in Order</u>
1. Operate the LOOP and BUSY keys. Dial a barred code.	BUSY and SUPY lamps glow. NU tone is heard.
2. Restore the LOOP key.	BUSY and SUPY lamps darken. NU tone ceases.
3. Repeat tests 1 and 2 on remaining barred codes	
4. Operate the LOOP key. Dial a test number on the distant exchange.	BUSY and SUPY lamps glow. Uniselector MM steps. Test number tone heard.
5. Restore LOOP key.	Tone ceases. BUSY and SUPY lamps darken.
6. Repeat tests 4 and 5 on any other test numbers commencing with different digits.	
7. Operate the LOOP key. Dial any other unbarred digit.	BUSY and SUPY lamps glow. Uniselector MM steps. NU tone <u>not</u> heard.
8. Dial a further digit.	Uniselector MM does not step.
9. Restore LOOP and BUSY keys.	Uniselector homes. BUSY and SUPY lamps darken.
10. Repeat tests 7-9 for any other unbarred digits.	

END.