

ENGINEER-IN-CHIEF'S OFFICE,
SWITCHING SYSTEMS SECTION,
POST OFFICE HEADQUARTERS,
WELLINGTON 1.

SPECIFICATION NO. I.S. 1256
DATE: 5 December 1983
ISSUE: 2

TITLE: DTMF CONVERSION OF N.Z. TELEPHONE EXCHANGES.

SCOPE: This Specification details the work involved to install DTMF-to-DP converters in New Zealand Step Exchanges and is sectionalised as follows:

SECTION A

1. GENERAL
2. PRELIMINARY WORK
3. DETAILS OF MOUNTING
4. WIRING
5. TESTING COMMENTS

SECTION B

6. MATERIAL
7. DRAWINGS

SECTION C

APPENDIX A - E.I. LINES Tools & Mech Aids J 4000 (copy attached).

REFERENCES: EIC 389/25
E.I. LINES Cable Jointing E 3104, E 3144
E.I. TELES Gen Z 0500
ER/SS 1752, Issue 1

PREPARED:



MATERIAL:



APPROVED:



SECTION A

1. GENERAL

1.1 The DTMF to DP converters are to be installed in SXS Exchanges (excluding UAXs and RAXs) which are not being replaced within 5 years.

1.2 The DTMF converters are housed in a 5-card bin which comes complete with cable form attached.

1.3 The DTMF converters are to be connected between the sub uniselector outlet and the first stage of switching, in series with the existing wiring.

1.4 Each converter is fused and powered from its associated selector, but de-fusing of selectors is not necessary during wiring of the converters.

1.5 For technical details of the DTMF-to-DP converters, refer to ER/SS 1752.

1.6 Installation personnel should acquaint themselves with E.I. TELES Gen Z 0500.

1.7 A suitable MF push-button phone should be acquired for testing purposes.

1.8 Each DTMF converter card has a test access point fitted to enable installation testing to be done from the cards.

1.9 Faulty cards should not be tampered with, but sent to TEAC for repair.

2. PRELIMINARY WORK

2.1 Dial Tone Filters

2.1.1 In EIC 397/45/21 dated 1.10.81 and EIC 389/3/16 dated 4.11.81, it was requested that all SXS Exchanges have the DIAL TONE checked for level of the fundamental and the 3rd harmonic (1200 Hz). Results of these tests should be known in each District.

2.1.2 Subsequently, dial tone filters (S.L. No. IH 75) are required to be inserted in all SXS exchanges converted to DTMF working, to eliminate the 3rd harmonic (1200 Hz) from the dial tone feed to the DTMF converters.

2.1.3 The filters are installed one per ringing machine, wired in series between the dial tone output of the generator, and the howler filter (capacitor bank).

2.1.4 Failure to do so will result in faulty operation of the DTMF converter, as some digits may not be accepted.

2.1.5 Dial tone filter installation documentation has already been distributed to Districts. The resultant dial tone level (as measured at the MDF) should be nominally -15 dbm, +or-1 db.

2.2 1st Selector Modifications

2.2.1 DSR Exchanges: A modification is necessary to the dial tone earth lead of each DSR, details of which will be issued separately.

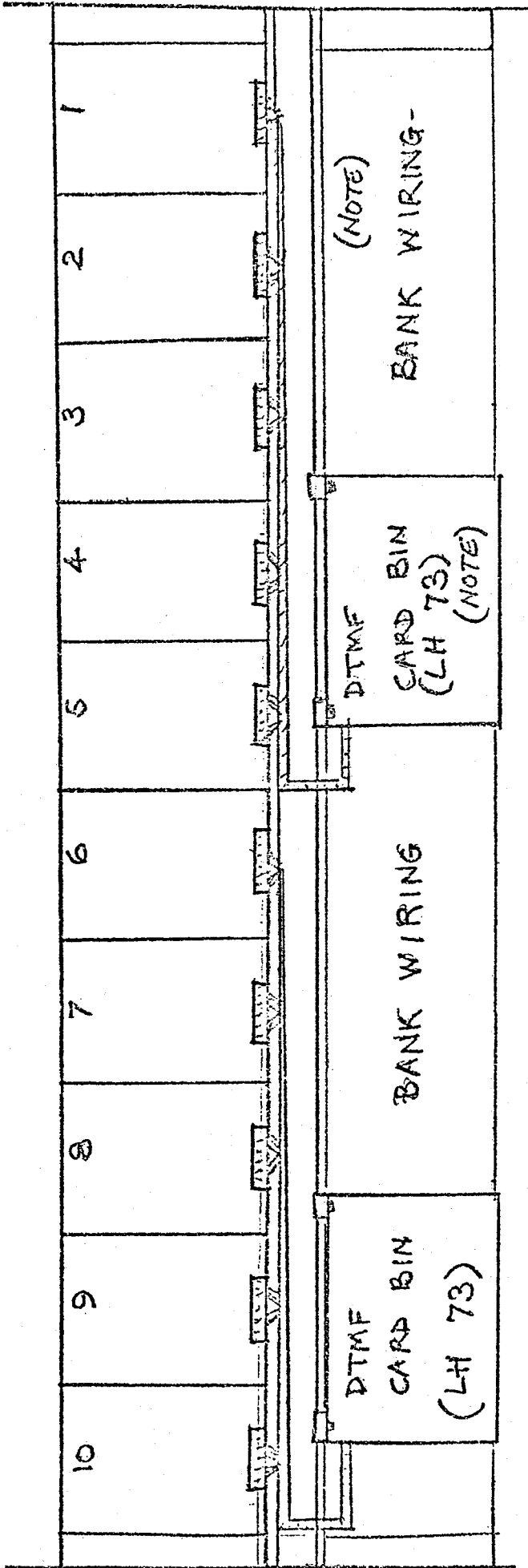
2.2.2 Group Selector Exchanges:

- (1) A modification is necessary to overcome some operational problems with the DTMF circuits.
- (2) Modification documentation to overcome these problems will be issued separately.
- (3) The remainder of the installation work, however, should still proceed. DTMF converter pins "9 - 13" and "12 - 14" should each be strapped temporarily and the cards removed, until the DTMF circuits are cleared for commissioning.

3. DETAILS OF MOUNTING

3.1 The card bins are to be mounted at the back of selector shelves where required, hanging from the "U" channel which supports the selector cradles and bank wiring.

3.2 Where a shelf is equipped with more than 5 selectors, two card bins need to be fitted; see Fig. 1.



REAR VIEW

NOTE: Some later type SXS equipment has a RTN-Access uniselector mounted behind selectors 1 and 2.

In that case, shift the DTMF card bin over to allow removal of the cards.

FIG. 1

3.3 On some DSR racks the wiring to the Junction Hunter U/S may have to be shifted down to enable the card bin to be fitted; on others there is a metal strip holding the U/S spark quench's which may have to be loosened before the card bin will fit. In all cases local arrangements will have to be made to ensure that the card bin is fitted in such a way that the cards can be withdrawn or inserted with adequate clearance.

3.4 Once the best position for fitting the bins has been determined, fasten the bin in place with the studs supplied using a suitable nut driver.

The converter bin mounting bracket studs should not be over-tightened, as this will result in an ineffective clamping on the shelf channel.

3.5 A supplementary method of mounting is a "mounting bar" that accommodates both DTMF bins of the same shelf, and is available through the Hamilton Workshops. (Order on Engr. 54).

The bar is secured to the shelf channel using existing shelf hardware, with the DTMF bins in turn being clamped to this bar.

NOTE: All drilling should be done away from the switchroom.

3.6 It is suggested that the DTMF converters be secured and wired on the lowest shelf of a selector rack before proceeding to the immediate shelf above, to allow access to u-points for terminating.

3.7 Place the cable form in position and tie it in with the other wiring forms, leaving the 120 mm tails at the centre of the appropriate U point bracket.

4. WIRING

4.1 Jointing of wires is necessary in the installation of DTMF to DP converters. The preferred method of jointing is described in E.I. LINES Tools & Mechanical Aids J 4000. See Appendix A.

4.2 Other jointing methods are described in E.I. LINES Cable Jointing E 3104 and 3144.

4.3 Arrangements should be made with the local C & M branch to borrow an "A-MP model MR 1, MINI," cable jointing hand tool. Green connectors S.L. No. P73 should be used.

4.4 Wiring is NOT to be done with the DTMF converter cards inserted in the bin.

4.5 Busy the appropriate selector(s) before wiring.

4.6 Wiring of the cable form should be as follows on each selector:

4.6.1 Lift off both wires on U point 1 (TDF and RTN Acc). Connect these wires to R (in) wire (yellow-green of the cable form) using the jointing tool. (See Table 1).

4.6.2 Lift off both wires on U point 2 and connect these wires to T (in) wire (yellow-black of the cable form).

TABLE 1

DTMF CARD PIN	FUNCTION	CABLE FORM COLOUR	
14	T (out)	yellow - white yellow - brown	} Twisted pair
9	R (out)		
12	T (in)	yellow - black yellow - green	} Twisted pair
13	R (in)		
15	GND +50V	red	
17	BATT -50V	black	

4.7 The other wires coming from the cable form are to be connected as follows:

T (out) wire (yellow - white) to U point 2
 R (out) wire (yellow - brown) to U point 1
 Black wire to U point 12
 Red wire to U point 11

4.8 When terminating has been completed on a shelf, the wiring should be checked before DTMF converter cards are inserted.

4.9 As card extractors may be supplied separately, ensure that an extractor is fitted before each card is inserted. The cards should be inserted with the components facing, LEDs at front. Hold the edges of the card between fingers and thumb to insert the card between the appropriate card guides and push the card in fully, making sure that the pin connections are properly home in the connector.

4.10 With the selector(s) still busied, no LEDs should light up permanently.

5. TESTING COMMENTS

5.1 To test for continuity of the wire joints, an MF push button phone should be connected to either TDF or to subs uniselector. Listen for dial tone. Key in a test number and test for speech upon answering.

5.2 The second test is done with the Routiner set up for a normal test. Check that the DTMF converter is "Transparent" to DP pulses.

5.3 It should be noted when looking at the converter card that:

- (1) L2 lights up when the selector is siezed;
- (2) L3 lights up every time a digit is received;
- (3) L1 lights up to indicate that outstepping is taking place (In case of "push button" working only).

5.4 The "Off Hook" LED (L2) CANNOT be relied upon to indicate selector/converter is busy on a call, as under certain conditions the LED will be extinguished by the reversal put on the line by the answering final selector.

SECTION B

6. MATERIAL

6.1 Material including wire connectors and Dial Tone filters should be obtained from NZPO stock.

6.2 Items required are as follows:

LH 71 DTMF/DP converter PAMCO P7700 (one per selector).

LH 73 SXS Mounting Bin (5 card).

LH 75 Dial Tone filter (2 required).

P 73 Mini connectors, green (.4 - .63mm).

6.3 EIC approval is required for all items except P 73.

7. DRAWINGS

7.1 Circuit diagrams associated with this project are:

NZPC 43335 Dial tone filter

PE 7000-1 Schematic for DTMF to DP converter

PE 7000-4 Component layout for converter.

END

N.Z. POST OFFICE
 Engineering Instructions
 Distribution: E L

Copy for File No.	Tools & Mechanical Aids
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LINES
 J 4000

**JOINTING MACHINES, A-MP MODEL MR-1:
 OPERATING INSTRUCTIONS**

1. CANCELLATIONS. Nil.
2. GENERAL.
 - 2.1 This Instruction describes the A-MP model MR1 Cable Jointing Hand Tool. There are Mini and Standard sized tools.
3. DESCRIPTION.
 - 3.1 The Mini and Standard are hand crimping tools. They are similar in appearance. The Mini tool is shown in Fig. 1. Later purchases of the Standard tool have a modified upper handle arrangement. There are two upper moveable handles, one to cut the wires and the second to crimp the connector. All tools are suitable for use in confined areas or where the size of the joint does not warrant the setting up of the larger MA-6B or MA-10 machine.

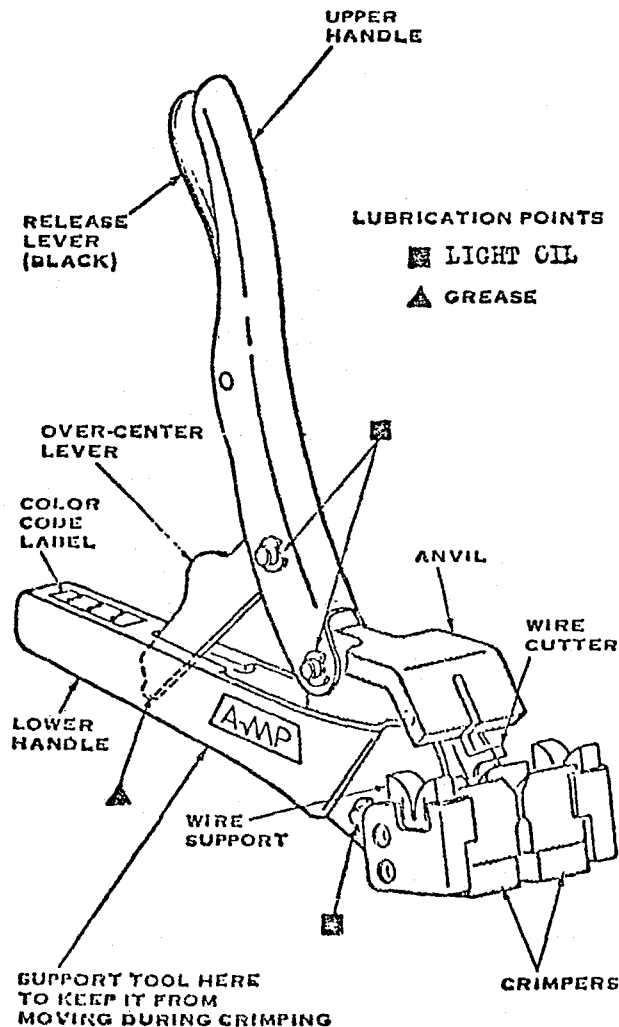


Figure 1.

3.2 The MR-1 Mini hand tool uses mini Picabond connectors for jointing two wires. The MR-1 Standard uses standard Picabond connectors and may be used for three wire jointing.

3.3 A tool holder is available to support the tool and leave both hands free for jointing. See Figure 2. The screw clamp allows fixing to any convenient support.

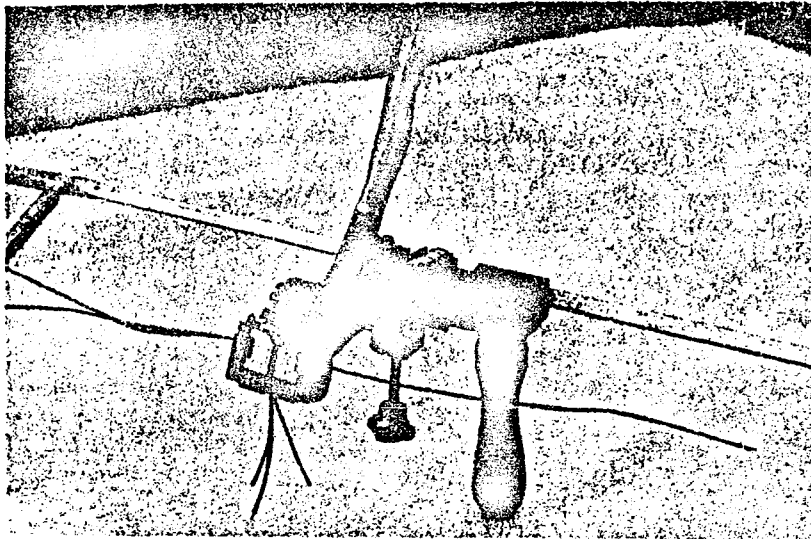


Figure 2

4. CONNECTORS.

4.1 The insulation on the connectors is colour coded so that the right size of connector is used for the cable sizes being jointed. The connectors are supplied loose in a box of 1000.

4.2 The mini connectors used with the MR-1 Mini tool are detailed in Table 1. These are for straight-through jointing only.

S.L. No.	Connector Colour	Conductor Size (mm)
P37	Pink	.32 - .5
P20	Blue	.4 - .63
P36	Brown	.5 - .9

Table 1 Relationship between connector colour and conductor size for MR1 Mini Hand Tool.

5. MR-1 MINI CRIMPING TOOL.

5.1 The wires to be jointed are loaded into the wire supports on each side of the tool and drawn down the slot between the two crimpers. See Figure 3. The insulation is not removed. After positioning a connector between the anvil and the wire cutter, the handles are squeezed together until they snap over centre and lock. The excess wire is cut away during this operation.

5.2 The lock is released by applying upward pressure to the release lever.

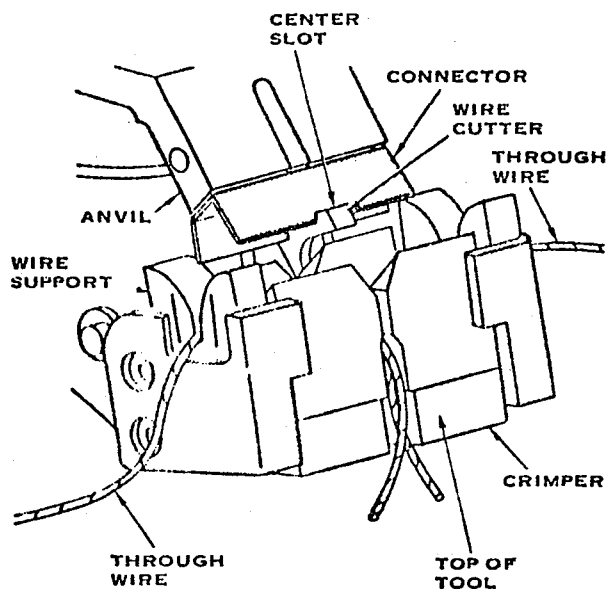


Figure 3

6.2 For 3 wire multiple jointing, wires from each side of the joint are loaded into the wire supports and under the pins. The third wire is placed over the pin on the appropriate side of the tool. See Figure 4. The handles are then squeezed together until they snap over centre.

6.3 Teeing In. Two methods are available for connecting a tee wire into an existing through wire.

NOTE: In both methods slack wire must be available in the through conductor.

6.3.1 Method 1 involving a momentary break in the through circuit.

- (a) Place the through wire into the wire supports on both sides of tool under the pins.
- (b) Place the tee wire into the support over the pin on the appropriate side and feed it out through the slot between the crimpers. See Figure 4.
- (c) Crimp in the normal manner.

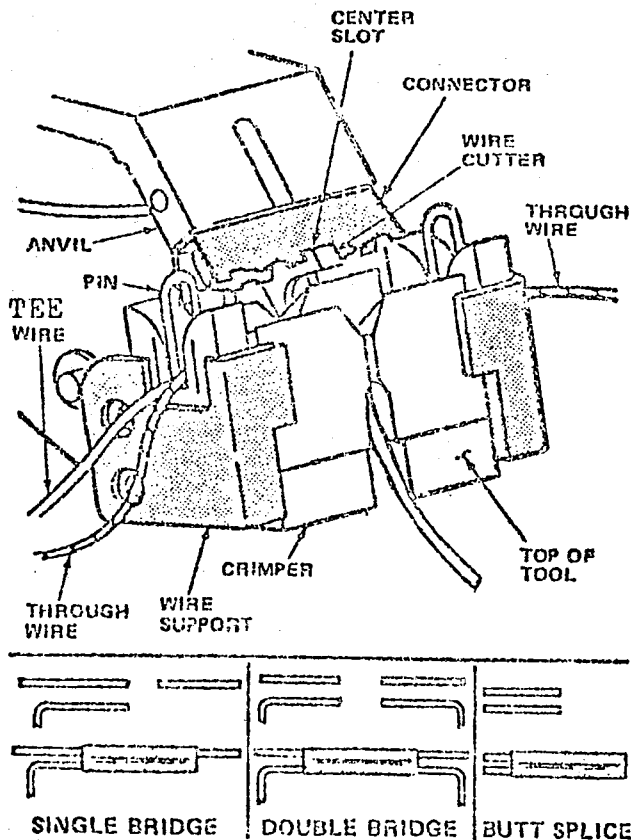


Figure 4

6.3.2 Method 2 involving no break in the through circuit.

- (a) Place a connector around the through wire and insert the connector and wire into the tool above the wire cutter.
- (b) Draw the through wire under the wire support pins on each side of the tool.
- (c) Feed the tee wire above the pin on the appropriate side and down between the crimpers. See Figure 5.
- (d) Crimp in the normal manner.

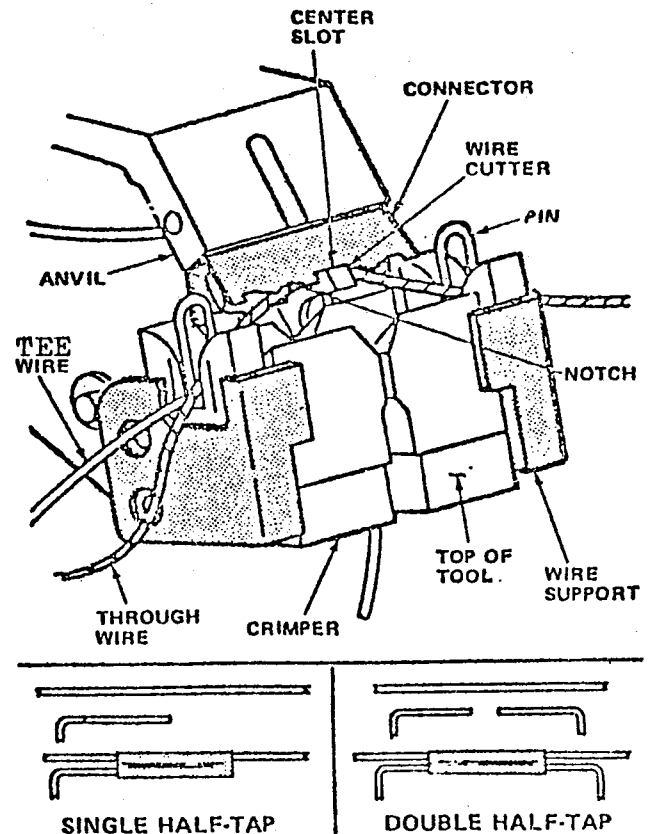


Figure 5

7. CONNECTOR INSPECTION AND TEST.

7.1 After crimping, the connector should be visually checked for protruding wires and damaged insulation. Faulty joints or connectors should be replaced.

7.2 A crimp test should be made to verify that the connectors are crimped satisfactorily. The test should be carried out before jointing starts, and should be repeated after every 100 pairs.

7.2.1 For the MR-1 Mini tool, select the proper gauge end by matching the dot colour with the connector colour. Insert the connector into the gauge, making sure that both ends are flush with the gauge. See Figure 6. Hold the wire and slide the gauge along the connector - little or no drag should be felt. If the connector sticks, make two sample crimps with scrap wire and test them. If they also stick the tool should be returned to the Workshops for adjustment.

Engineer-in-Chief's Office
Post Office Headquarters
WELLINGTON

Telephone 749 754 CRF:JH
Telex NZ3949

EIC 389/25

2 November 1983

Regional Engineers,
District Engineers.

DUAL TONE MULTI-FREQUENCY (DTMF) CONVERSION: CROSSBAR AND
STEP EXCHANGES

The installation of DTMF equipment in crossbar exchanges and step exchanges is now underway in the New Zealand telephone network.

The following points are considered relevant to the installation of the DTMF equipment in the districts:

1. Crossbar Exchanges: IS 1254 and IS 1257
 - (1) Installation of DTMF equipment in NC 100, 230, 400 and 460 type exchanges is now almost completed.
 - (2) A modification to the DPOR circuits in all crossbar types (released August 1983) improves response characteristics of the DTMF converters.
 - (3) This modification should also result in a measured dial tone level of nominally -15 dBm + or - 1 dB.
 - (4) Failing this, a dial tone filter (S.L. No. LK 495) may be required to achieve this level.
2. Step Exchanges: IS 1256
 - (1) Dial tone filters (S.L. No. LH 75) are required to be inserted in all ringing machine capacitor-networks, to eliminate the third harmonic (1200 Hz) from the dial tone feed to the DTMF converters.

The resultant dial tone level as measured at the MDF should be nominally -15 dBm + or - 1 dB.

Documentation is currently being finalised for this modification, and should be available during November 1983.

EIC 389/25, 2.11.83

- (2) DTMF converter bins (S.L. No. LH 73) and converter cards (S.L. No. LH 71) are now available from stock.
- (3) The converter bin mounting bracket studs should not be overtightened, as this will result in an ineffective clamping on the shelf channel.
- (4) A supplementary method of mounting is a "mounting bar" that accommodates both DTMF bins of the same shelf, and is available through the Hamilton Workshops.

The bar is secured to the shelf channel using existing shelf hardware, with the DTMF bins in turn being clamped to this bar.

If necessary, self-tapping screws through locally pre-drilled holes in the mounting brackets and bar will firmly secure the bins to the bar.

NOTE: All drilling should be done away from the switchroom.

- (5) It is suggested that the DTMF converters be secured and wired on the lowest shelf of a selector rack before proceeding to the immediate shelf above, to allow access to u-points for terminating.
- (6) DSR Exchanges: A modification is necessary to the dial-tone earth lead of each DSR, documentation of which is currently being finalised for releasal during November 1983.
- (7) 1st Group Selector Exchanges: Some operational difficulties are being experienced with DTMF circuits in 1st Group selectors.

These problems are currently being investigated by Circuit Design section, and Districts will be advised accordingly.

- (8) With reference to the above modifications and difficulties at DSR and Group selector exchanges respectively, the remainder of the installation work should still proceed.

DTMF converter pins "9 - 13" and "12 - 14" should be strapped temporarily and the cards removed, until the DTMF circuits are cleared for commissioning.

- (9) All difficulties encountered during installation and testing should be reported to Mr C. Fell, telephone (04) 749 754, Switching Systems (Works).

3. DTMF Installing Specifications: IS 1254, 1256 and 1257

- (1) Amendments to the respective DTMF installing specifications have so far been covered by telex.

However, it is desirable to now incorporate these amendments in new issues of these specifications.

- (2) IS 1254 (NC 400/460) and IS 1257 (NC 100/230) will be re-issued with individual pages that incorporate all amendments to date.
- (3) IS 1256 (Step) will be completely re-issued to incorporate its amendments.
- (4) These up-dated issues will be distributed during November 1983.

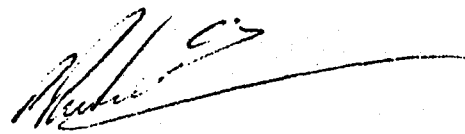
4. Step Exchange DTMF Installation Progress Reports

- (1) The monthly DTMF equipment Installation Progress Report will still be required for step exchanges under your control.
- (2) The details should be supplied formatted under the following headings: Exchange, Type, Lines to be converted, work started, programmed completion date, and actual completion date.

Where necessary, additional information should be provided where installation work is affected by (e.g.) DSR modifications, 1st Group Selector DTMF problems etc.

- (3) The completion date should be based on an average installation time of 2 manhours per DTMF unit, including any modifications to DSR's or associated step equipment.

It is recommended that this publication be circulated to all staff involved with DTMF installations.



for Superintending Engineer
(Switching Systems).

ENGINEER IN CHIEF'S OFFICE
SWITCHING SYSTEMS SECTION
POST OFFICE HEADQUARTERS
WELLINGTON 1

SPECIFICATION NO. I.S. 906/c
ADDENDUM NO. 989
DATE: 19 JUL 1985

REFERENCE: N2M XU

Engineer in Chief's File: EIC 389/25

TITLE: MODIFICATION TO ENGINEERING DISTRICT STEP EXCHANGE
EQUIPMENT

SCOPE: This Addendum details the Action Required to correct
the Failure of Time Out on DTMF (Step) cards. EC 45195

SECTION A

1. GENERAL

1.1 A report has been received from Auckland indicating that in a large number of DTMF cards, the 20 second time-out feature, following the last DTMF signal, is not functioning. This is resulting in misoperation of end-to-end signalling following the establishment of the call.

1.2 It has been found that the cause of the problem is that the pulse produced by the disable latch trigger U7 is too short to operate U11, and consequently disable the key board encoder U3 and the pulse dialler U4. This short pulse produced by U7 is the result of the removal of capacitor C21, which was done on the instructions of "PAMCO" as a means of overcoming the 4 second unguarded - interval fault which resulted in being unable to break dial tone.

1.3 Tests have now shown that the complete removal of capacitor C21 is not satisfactory, but replacing it with a 22 nf capacitor overcomes the time-out problem without incurring the previous fault. The original capacity of C21 was 47 uf, and this produced the 4 second unguarded - interval, but reducing it to 22 nf produces a 1.5 millise card pulse which provides a reliable operate pulse for the disabling circuit without giving rise to the previous fault.

1.4 To this end, STC are supplying us with the 22 nf capacitors to enable us to modify all the step cards received to date.

PREPARED:

A. J. Lyndon

MATERIAL:

R. Herbert

APPROVED:

[Signature]

1.5 While this modification is in progress, it would be prudent to clear up another minor point. At the end of last year, STC indicated that there was a possibility of a "glitch" on the power supply of Issue 10 cards, and they changed the value of C9 from 820 pf to 22 nf. They suggested we leave the present C9 in situ, and connect the replacement 22 nf across it.

1.6 Only the first 2500 Issue 10 cards received require modification, and STC have already supplied us with the necessary capacitors.

1.7 It would therefore seem that now would be a good time to do those boards that require it.

SECTION B

Details of Work

- (1) All Issues of cards EC 45195

Using a Wellar 25 watt temperature controlled iron, remove existing C21 (47 uf) and replace with 22 nf.

- (2) Issue 10 cards received to date from STC (where necessary)

Using a Wellar 25 watt temperature controlled iron, connect new 22 nf capacitor in parallel with existing C9 (820 pf).

SECTION C

Material

Capacitor (2232 T 44) 22 nf - 50V working - Stock List Number
EF 426.