



Our Reference 4/26-61  
Your Reference

Subject PORTLAND - CAPE BRIDGEWATER PCM HBER

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To

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TRANSMISSION MEASUREMENTS TEST REPORT  
Summary of Test No: 91/679  
Date of Test: July, 1991

Transmission Measurements was requested by local installation staff to assist in the elimination of high bit error rates occurring in the transmission of 2Mbit digital data streams on the second PCM system in the Portland - Cape Bridgewater PCM route.

When the 'A' direction of system 2 was initially tested, approximately 11000 errors per hour were measured. In the 'B' direction, approximately 216 errors per hour were measured, 72 errors per hour is the specified number allowable. It was found that when the third PCM system was turned off, zero errors occurred in the 'A' direction of the second system, but errors still occurred at the same rate in the 'B' direction.

The initial design of the PCM regenerator housing layout was done with the intentions that only 2 PCM systems to Cape Bridgewater would be used and with the stipulation that all regenerator housing must be located at existing load coil locations. To fall within this criteria, PCM design standards had to be relaxed, with pairs selection carried out using the Barrage Tester.

TPH 0511 Transmission Design of 2/Mbit Line Systems in Junction Networks states that for a 20 pair cable no more than 2 PCM line systems are allowable, and that section length between regenerator housings be no more than 1500m long. In the Cape Bridgewater PCM routes most sections are well in excess of 1500m.

To overcome the above mentioned problems and to enable a third system to operate, the following steps were taken:-

In regenerator section 6 - 7 a new 'A' direction pair for system 2 was selected, being changed from pair 10 to 7.

In regenerator 7 - 8, two new pairs were selected for system 2, being changed from 10 and 18 to 7 and 15.

The regenerator section length between reg 8 and 9 was 2125m and a new regenerator housing (Reg 8A), had to be located at a joint 1419m from Reg 8. Please note that regenerator housing 8A has had no interrogation filters placed in it as none were available at the time of the cutover. A regenerator was replaced in position 2 to Reg 7 as it went faulty during testing.

Final Bit Error Rate testing carried out over 20 hours on system 2 showed in the 'A' direction zero errors in all but 3 hours, in which 4 errors each occurred. In the 'B' direction zero errors occurred. These results indicate that three PCM systems will operate between Portland and Cape Bridgewater within specifications.

CABLE DETAILS

DESIGNATION : G PORD VCP2 01, G GBWR VCP2 01  
SIZE AND GAUGE : VARIOUS 0.90 & 0.64 (SEE CABLE PLANS)  
REGENERATOR POSITIONS : 1, 2, 3  
PCM GO PAIRS MAIN : 309, 310, 308  
'B' : 9, 10, 8  
PCM RETURN PAIRS MAIN : 317, 318, 316  
'B' : 17, 18, 16

NOTE: For pair changes within regenerator sections, see report above.

SUPERVISORY PAIRS MAIN : 311, 312  
'B' : 11, 12  
ORDERWIRE PAIRS MAIN : 304  
'B' : 4



for SUPERVISING ENGINEER - N.E.P.D. - TRANSMISSION MEASUREMENTS

5/8/91.

91/679.rpt

Ref New 000024



To Manager  
Warrnambool COG  
[Redacted]

From [Redacted]  
Pair Gains Support

Subject Portland to Cape  
Bridgewater RCM System.

File XS13/2.

Date 12th July 1993.

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**PORTLAND - CAPE BRIDGEWATER  
RCM SYSTEM.**

At the request of [Redacted], Manager, Warrnambool COG. (CPE), NSS-Melbourne, Pair Gain Support Section, visited Portland exchange on 2nd March '93, to investigate problems reported on the Portland - Cape Bridgewater RCM system.

Initial reports where of a vocal customer at Cape Bridgewater complaining of VF cut-offs in one direction. The customer had been transferred off system 1, onto systems 2 and 3 on the 24th February '93, and had experienced no further problems. Investigations revealed that system 1 was running a large number of degraded minutes (DM) and errored seconds (ES) in the Portland to Cape Bridgewater direction, these errors could have caused the VF cut-off problem.

**Initial error counter readings:-**

Portland to Cape Bridgewater direction:-

	System 1	System 2	System 3
SES	0	0	0
DM	45993	3342	2
ES	65535	65535	87

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Cape Bridgewater to Portland direction:-

	System 1	System 2	System 3
SES	0	0	0
DM	1	1	0
ES	246	751	23

At this stage we had no idea over what period of time these errors had accumulated.

Attempts to test the inground repeaters using the "trios" system where unsuccessful as the strapping records could not be located.

Other faults identified with the Cape Bridgewater installation where:-  
-the presence of 500Hz. noise on all customer lines at -58 dBm causing minor noise problems.

- cable ducts into both the cross connect cabinet and the concrete hut were sealed allowing the ingress of moisture, which could affect the error counters detailed above.
- the alarm system on all three RCM systems had not been programmed. This would have prevented any local alarms being extended back to Portland.

The bearer performance was monitored overnight and revealed that system 1, in the Portland to Cape Bridgewater direction, accumulated approximately 450 DM's and 43500ES's while systems 2 and 3 recorded no errors in either direction.

A problem with the installation of the enhanced lightning protection modules in the IDS block at Cape Bridgewater was discovered. After this problem was rectified and the bearer monitored overnight, no DM's or ES's were recorded.

All the SE boards used in the Portland - Cape Bridgewater RCM system have now been modified to eliminate the 500Hz. noise problem. SE boards installed in the Portland - Alcoa RCM system were also modified to eliminate a 500Hz. noise problem on cut over.

The problem of sealing the cable ducts has since been rectified by the local lines staff.

NSS-Melbourne has continued to monitor the Portland - Cape Bridgewater bearers since the 3rd March '93. In the period from the 3rd March '93, to the 17th March '93, the errors on all three bearers have been minimal.

ie:- Portland to Cape Bridgewater direction:- system 1, 4 ES  
- system 2, 3 ES  
- system 3, 0 ES

Cape Bridgewater to Portland direction:- system 1, 1 ES  
- system 2, 1 ES  
- system 3, 3 ES

[REDACTED]  
[REDACTED]  
for Supervising Engineer, National Switching Support - Melbourne.