Title: ON-BOARD MESSAGE REPEATER FOR RAILROAD TRAIN COMMUNICATIONS SYSTEM

Abstract: A distributed power train (10) communications system for sending and receiving signals between a lead locomotive (14) and remote locomotives (12A/12B/12C) in the train (10). A lead (14) initiated message is received by at least the remote locomotive (12A/12B) nearest to the lead unit (14). The receiving remote unit (12A/12B) retransmits the message for receiving by the next remote unit (12C) in the train. Thus the message leapfrogs down the train from the lead unit (14) to the remote units (12A/12B/12C). When the last remote unit (the nth remote unit) (12C) receives the message, the last remote (12C) transmits a status or other response message to the lead unit's message. The status message is received at the (n-1)th remote unit (12A/12B), which appends its status message and transmits the combined status messages toward the lead unit (14). Each successive remote unit receives the status messages of the other remote units and appends its status message, until the concatenated status message reaches the lead unit (14).
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
B61L15/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B61L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
</table>
| A        | US 5 681 015 A (KULL ET AL)  
28 October 1997 (1997-10-28)  
column 1, line 54 - column 10, line 54;  
figures 2,4 | 1-7 |
| A        | HOERL F ET AL: "MEHRFACHFUNKFERnstEUERUNG  
VON LOKOMOTIVEN IM ZUGVERBAND MULTIPLE  
RADIO REMOTE CONTROL OF LOCOMOTIVES IN  
COUPLED TRAINS TELECOMMANDE MULTIPLE PAR  
RADIO D'ENGINS DANS LE TRAIN"  
ELEKTRISCHE BAHNEN, OLDENBOURG  
INDUSTRIEVERLAG, MUNCHEN, DE.  
vol. 100, no. 3, March 2002 (2002-03),  
pages 105-109, XP001101506  
ISSN: 0013-5437 | 1-7 |

Date of the actual completion of the international search
13 December 2005

Date of mailing of the international search report
07. 03. 2006

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NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax (+31-70) 340-3616

Authorized officer
Janhson, A
<table>
<thead>
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<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tr>
<td>A</td>
<td>US 2002/107616 A1 (DELAURELLE DALE) 8 August 2002 (2002-08-08) paragraph '0016' - paragraph '0025'; figure 1</td>
<td>1-7</td>
</tr>
</tbody>
</table>
INTERNATIONAL SEARCH REPORT

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.: because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☑ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

see annex

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (2)) (January 2004)
This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-7

Train communication with repeater function between lead and remote units wherein the remote units answer back to the lead unit by each adding status information to the message of 1st remote unit.

2. claim: 8

Selection of radio channels for train transmissions by measurements of the signal quality.

3. claims: 9,10

Determination of receiving radio devices for train transmissions
<table>
<thead>
<tr>
<th>Patent document cited in search report</th>
<th>Publication date</th>
<th>Patent family member(s)</th>
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<tbody>
<tr>
<td>US 2002107616</td>
<td>08-08-2002</td>
<td>NONE</td>
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