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- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
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- Published:**
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  - before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))
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14 January 2010

(54) **Title:** REMOTE DETECTION AND MEASUREMENT OF OBJECTS

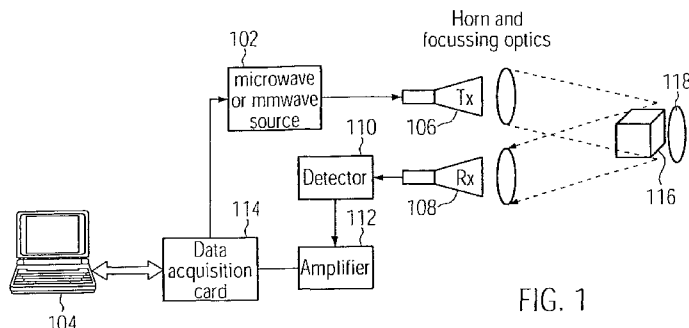


FIG. 1

(57) **Abstract:** Provided are methods of using electromagnetic waves for detecting metal and/or dielectric objects. Methods include directing microwave and/or mm wave radiation in a predetermined direction using a transmission apparatus, including a transmission element; receiving radiation from an entity resulting from the transmitted radiation using a detection apparatus; and generating one or more detection signals in the frequency domain using the detection apparatus. Methods may include operating a controller, wherein operating the controller includes causing the transmitted radiation to be swept over a predetermined range of frequencies, performing a transform operation on the detection signal(s) to generate one or more transformed signals in the time domain, and determining, from one or more features of the transformed signal, one or more dimensions of a metallic or dielectric object upon which the transmitted radiation is incident. A system and method for remote detection and/or identification of a metallic threat object using late time response (LTR) signals is also disclosed.

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## INTERNATIONAL SEARCH REPORT

International application No

PCT/GB2009/000752

A. CLASSIFICATION OF SUBJECT MATTER  
 INV. G01S13/88 G01S13/04 G01S7/41

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)  
 G01S

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, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2006/001821 A (TEMS THE MACALEESE COMPANIES I [US]; HAUSNER JERRY [US]; WEST JONATHAN) 5 January 2006 (2006-01-05)	1-3, 14-16, 93
Y	page 1, line 18 - line 21; claims 16,17;	8, 28, 38, 66
A	page 14 - page 17	4-7, 17-20, 27
A	US 2005/230604 A1 (ROWE RICHARD L [US] ET AL) 20 October 2005 (2005-10-20) paragraphs [0025] - [0030], [0079] - [0084]; figures	1-7, 14-20, 27
Y	US 2006/066469 A1 (FOOTE HARLAN P [US] ET AL) 30 March 2006 (2006-03-30) paragraph [0059] - paragraph [0080]; figures 8-18	8
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Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents :

\*A\* document defining the general state of the art which is not considered to be of particular relevance

\*E\* earlier document but published on or after the international filing date

\*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

\*O\* document referring to an oral disclosure, use, exhibition or other means

\*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\* & \* document member of the same patent family

Date of the actual completion of the international search

9 November 2009

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24/11/2009

Name and mailing address of the ISA/

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## INTERNATIONAL SEARCH REPORT

International application No  
PCT/GB2009/000752

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2006/021799 A1 (TERAVIEW LTD [GB]; TADAY PHILIP FRANCIS [GB]; SHEN YAO-CHUN [GB]) 2 March 2006 (2006-03-02) paragraph [0029] - paragraph [0035] paragraph [0102] - paragraph [0105]; figures	28, 38, 66
A	US 7 246 522 B1 (DIAZ AARON A [US] ET AL) 24 July 2007 (2007-07-24) abstract; figures	1, 8-13, 21-54
A	US 5 486 833 A (BARRETT TERENCE W [US]) 23 January 1996 (1996-01-23) column 21 - column 22	28-53, 55-92
A	GB 2 435 509 A (TERAVIEW LTD [GB]) 29 August 2007 (2007-08-29) page 6 - page 7	28-53, 55-92
A	US 2007/052576 A1 (HAUSNER JERRY [US] ET AL) 8 March 2007 (2007-03-08) abstract; claims; figures	1, 28

INTERNATIONAL SEARCH REPORT

International application No.  
PCT/GB2009/000752

**Box No. 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 No. 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 fees, this Authority did not invite payment of additional fees.
  
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.:

**Remark on Protest**

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-7, 14-20, 27

stepwise sweeping and storing time domain or optical depth domain in respective sweep channel  
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2. claims: 8-13, 21-26, 54, 93

producing 1st and 2nd outputs, the 1st comprising the sum of all vectors in a first array, the 2nd being the sum of integrated signals above a threshold.  
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3. claims: 28-53, 55-92

extracting from one or more features of the transformed signal, the late time response (LTR) signal  
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## INTERNATIONAL SEARCH REPORT

information on patent family members

International application No

PCT/GB2009/000752

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 2006001821	A	05-01-2006	AU 2004321106	A1 05-01-2006
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