

**UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD**

TOYOTA MOTOR CORPORATION,
Petitioner

v.

INFOGATION CORPORATION,
Patent Owner.

U.S. PATENT NO. 10,107,628

DECLARATION OF DR. WILLIAM R. MICHALSON

Declaration

I declare that all statements made herein on my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

By: 

William R. Michalson, Ph.D.

I, William R. Michalson, do hereby declare:

1. I am making this declaration at the request of Toyota Motor Corporation in the matter of Toyota Motor Corporation's petition for inter partes review of U.S. Patent No. 10,107,628.

2. I am being compensated for my work in this matter at my standard hourly rate of \$525 for consulting services. My compensation in no way depends on the outcome of this proceeding or the content of my testimony.

3. In preparing this Declaration, I considered the following materials:

Exhibit	Description
1001	U.S. Patent No. 10,107,628 to Pu
1002	Prosecution File History of U.S. Patent No. 10,107,628
1004	Japan Patent Application Publication No. JP2001-082973 (JP973)
1005	Certified Translation of JP973
1006	Japan Patent Application Publication No. JP2007-17351 (JP351)
1007	Certified Translation of JP351
1008	Japan Patent Application Publication No. JP2003-130680 (JP680)
1009	Certified Translation of JP680
1010	Japan Patent Application Publication No. JPH09229706A (JP706)
1011	Certified Translation of JP706
1012	U.S. Patent No. 5,459,824 to Kashiwazaki
1013	U.S. Patent No. 5,805,165 to Thorne
1014	U.S. Patent No. 6,040,824 to Maekawa
1016	R.L. French, "Automobile navigation: Where is it going?," Aerospace and Electronic Systems Magazine, pp. 6-12, May 1987 (French)

1017	D.E. Boyce, "Route Guidance Systems for Improving Urban Travel and Location Choices," Transportation Research Part A: General, Vol. 22A, No. 4, pp.275-281, Pergamon Press, 1988 (Boyce)
1018	UK Patent Application GB 2,079,453 (Wootton)
1019	Ishikawa K.; Ogawa, M.; Azuma, S.; Ito, T.; "Map navigation software of the electro-multivision of the '91 Toyoto Soarer," IEEE Vehicle Navigation and Information Systems Conference, pp. 463-473, 20-23 Oct. 1991 (Ishikawa).
1020	Saito, T.; Shima, J.; Kanemitsu, H.; Tanaka, Y.; "Automobile navigation system using beacon information," IEEE 1989 Vehicle Navigation and Information Systems Conference, pp. 139-145, Toronto, 11-13 Sep 1989 (Saito)
1021	Wootton, J.; Ness, M.; "The experience of developing and providing driver route information systems," 1989 Vehicle Navigation and Information Systems Conference, pp. 71-75, Toronto, Ont., Canada, 11-13 Sep 1989 (Wootton 1989 VNIS)
1022	Guzolek, J.; Koch, E.; "Real-time route planning in road networks," 1989 Vehicle Navigation and Information Systems Conference, pp. 165-169, Toronto, Ont., Canada, 11-13 Sep 1989 (Guzolek)
1023	B. Coppock et. al., History of GIS, Geographical Information Systems: Principles and Applications, Vol. 1, Longman Group, pp. 21-34, 1991 (Coppock)
1024	Peuquet, A Conceptual Framework And Comparison Of Spatial Data Models, Cartographica, Vol. 21, No. 4, pp. 66-113, 1984 (Peuquet).
1025	White, Car Navigation Systems, Geographical Information Systems: Principles and Applications, D.J. Maguire, et. al., eds., Vol. 2, pp. 115-125, Longman Group, 1991
1026	Rosen, D.A.; Mammano, F.J.; Favout, R.; "An electronic route-guidance system for highway vehicles," IEEE Transactions on Vehicular Technology, vol. 19, no. 1, pp. 143-152, Feb 1970 (Rosen)

I. Professional Background

4. All of my opinions stated in this Declaration are based on my own personal knowledge and professional judgment. In forming my opinions, I have relied on my knowledge and experience in designing, developing, researching, and teaching the technology referenced in this Declaration.

5. I am over 18 years of age and, if I am called upon to do so, I would be competent to testify as to the matters set forth herein. I understand that a copy of my current curriculum vitae, which details my education and professional and academic experience, is being submitted as EX1015. The following provides an overview of some of my experience that is relevant to the matters set forth in this Declaration.

6. I am currently a tenured Professor in Robotics Engineering in the Robotics Engineering Department of Worcester Polytechnic Institute (WPI). Additionally, I have appointments as a Professor of Computer Science, Electrical and Computer Engineering, and Mechanical Engineering at WPI. As part of my appointments, I perform research and teach in the areas of navigation, communications, and computer system design. I supervised the WPI Center for Advanced Integrated Radio Navigation (CAIRN), where I was developing a Public Safety Integration Center focused on the integration of communications,

navigation, and information technologies for public safety applications. Currently, I direct the Robot Communication and Navigation Laboratory where my research focuses on the development, testing, and evaluation of communication and navigation systems for both civilian and military applications with a special emphasis on techniques focused on indoor, underground, or otherwise GPS-deprived situations. My interests in communication, navigation, and computing have led me to play an active role in the development of the Robotics Program at WPI, where I teach robotics courses at the graduate and undergraduate level.

7. Prior to joining the faculty of WPI, I worked at the Raytheon Company from 1981-1991, with a leave of absence between 1985-1988 to complete my Doctoral Degree (Ph.D.) in Electrical Engineering from the Worcester Polytechnic Institute. Prior to my leave of absence, I worked as an Engineer in the Cursive Displays Department and VLSI Design Department of the Computer and Displays Laboratory within Raytheon's Equipment Division. After receiving my Ph.D., I returned to the Equipment Division of the Raytheon Company where I was promoted to the title of Engineer, Design and Development. I was subsequently selected to sit on the engineering staff of the newly formed System Engineering Department of the Division's Computer and Displays Laboratory. In this capacity, I acted primarily as a consultant to other departments

within the laboratory, and my responsibilities ranged from leading the hardware and software development of supercomputer-class computer systems to performing applied research into the exploitation of new technology.

8. I earned a B.S. from the Syracuse University in 1981, an M.S. and a Ph.D. in Electrical Engineering from WPI in 1985 and 1989, respectively.

9. I have more than 40 years of experience in the field of computer technology, specifically in the specialized field of signal and data processing. I have consulted and served, including being qualified by courts, as an expert for numerous patent cases, including in patent cases involving motion sensing, positioning, map navigation technologies, and wireless communications, a listing of which is set forth in my current curriculum vitae, which is attached as Exhibit 1015. I hold a commercial General Radio Operator's license (with Ship RADAR Endorsement), an Extra Class Amateur Radio operator's license, and have held a Commercial Radiotelegraph Operators license. I was first licensed as a Radio Amateur in 1974 and have been involved in the design, implementation, and repair of radio systems, including radio-controlled systems, since that time.

10. I have been involved with numerous projects involving remote objects which require wireless tracking, control, and telemetry. These objects include land vehicles, sea vehicles, and air vehicles. Starting with my work at the Raytheon

Company, I was involved with the tracking of aircraft in both military and civilian air traffic control systems. I have worked on the guidance and control systems for multiple missile systems as well as the guidance and tracking systems for fire control systems and on spaceborne systems for tracking ballistic missiles. In my work at WPI, I have been involved with numerous projects related to tracking land, sea, and air vehicles using the GPS and/or inertial guidance systems. Some of this work has involved the use and control of rotorcraft for applications, such as firefighting and landmine detection and destruction. All of these projects involve interacting with these systems remotely via wireless communications.

11. GPS and GPS-related technologies have dominated the bulk of my research since 1992. I have been involved in numerous academic and consulting projects involving navigation technologies and their association with geographic information system technologies. Examples of academic projects include (1) a container tracking system in 2003 which explored the application of tracking and communications technologies to track shipping containers, (2) an automotive based system in 2000 which combined GPS and map data in an automotive environment, (3) a remote hazard detection system in 1996 that combined GPS and radio communications to remotely identify hazards to the engineer operating a freight train, and (4) a differential GPS system in 1995 that combined GPS and radio

technologies to allow determining the precise path of vehicles operating off-road during forest operations. As a consultant, I have worked with the combination of GPS and radio communications in the context of space shuttle docking operations, transfer of traffic information to GPS devices in a vehicle, combinations of GPS and cellular communications for the tracking of individuals, and map-based handheld tracking devices.

12. I am a named inventor on nine patents, including patents on map navigation devices, geolocation systems, and high resolution and precision location systems. I have authored, or co-authored, over 100 journal papers and conference publications, including papers and publications regarding positioning and navigation systems and methods. I am also the co-author of a chapter entitled “An Approach for Implementing a Reconfigurable Optical Interconnection Network for Massively Parallel Computers” in Optical Interconnection – Foundations and Approaches by C. Tocci and H. J. Caulfield Eds., Artech House, 1994. I am currently under contract to write a book tentatively entitled “Radionavigation and the Global Positioning System,” which covers the physical principles upon which radionavigation system are based as well as the hardware and software required to perform navigation. At WPI, I have taught courses in Sensors, Circuits, and Systems, Digital Circuit Design, Embedded Computing, Computer Architecture,

Computer, and Navigation. In addition, I have advised projects involving computers, navigation, and communications for a large variety of applications in the air, on land, and on the sea.

13. I have received several awards and recognition for my work, including becoming an Elected Senior Member of the IEEE. In addition, I was awarded the Joseph Samuel Satin Distinguished Fellowship for the 1994-1995 academic year, and the Aldo Miccioli Fellowship from the Raytheon Company's Equipment Division. I am also a member of the Institute of Navigation, the Royal Institute of Navigation, the American Society of Engineering Educators, The Society of Automotive Engineers, the National Marine Electronics Association, and the National Academy of Inventors.

14. My curriculum vitae, attached as Exhibit EX1015, includes a list of publications on which I am a named author. It contains further details regarding my experience, education, publications, and other qualifications pertinent to an expert opinion in connection with this proceeding.

II. Background of Navigation Systems

15. At the time of the '628 Patent, the navigation space had already undergone significant development and was quite robust. As I have detailed herein, the specific modifications proposed by the inventors of the patents-in-suit

were already known before the '628 Patent. Before moving to the specific invalidity analysis, I describe some of the background technology and state of the art at the time of the '628 Patent:

i. The Global Positioning System (GPS)

16. The Global Positioning System, or GPS, is a satellite-based positioning system that was developed and deployed by the United States for use in both military and civilian applications. When the GPS satellite constellation grew to 24 satellites in December, 1993, the GPS was considered as having its initial operational capability, or IOC. Since IOC, GPS technology has become more and more widely used, and by the early 1990s was used in cars, planes, boats, handheld devices, laptop computers and many other applications. GPS receivers integrated into cars, handheld devices and other systems were able to provide users with precise time, location or could function as an aid to navigation. Although it's been 30 years since IOC, the basic structure of the GPS today remains substantially the same as it was at IOC.¹

¹ Certain changes to the GPS, such as the elimination of Selective Availability, the addition of more satellites and the addition of new signals transmitted by the GPS satellites are not relevant to the structure of the GPS constellation, or the basic operational details of the L1 C/A code receiver typically used in consumer applications as discussed herein. Relative to such a receiver, the GPS today operates substantially the same way that it did at IOC in 1993.

17. In brief, a GPS receiver could calculate its position by determining the distance between itself and four or more GPS satellites. This process was known as “trilateration.” Each GPS satellite would broadcast a signal that could be detected by a GPS receiver. Each satellite’s signal included a unique code called a Coarse / Acquisition (C/A) code, which was in a format known as a pseudo-random noise (PRN) code. The GPS receiver used this unique PRN code to identify a satellite and to measure the time delay between transmission of a GPS signal by a satellite and reception by the GPS receiver. Because the signal traveled at approximately the speed of light, this time delay provided a measure of the distance between the satellite and the GPS receiver.

18. This distance, or range, to the satellite was known as a “pseudorange” because it was derived from a rough estimate of the time delay of the PRN signal from the satellite to the GPS receiver and was corrupted by delays in the troposphere and ionosphere, as well as noise and clock error in the receiver. The signals from the GPS satellite also carried information about the satellite’s estimated orbital parameters (collectively known as “ephemeris” and “almanac” data). By using the calculated pseudoranges to four or more satellites and the estimated position of the satellites calculated from each satellite’s ephemeris or

almanac data, the GPS receiver was able to calculate its own position to within a few meters.

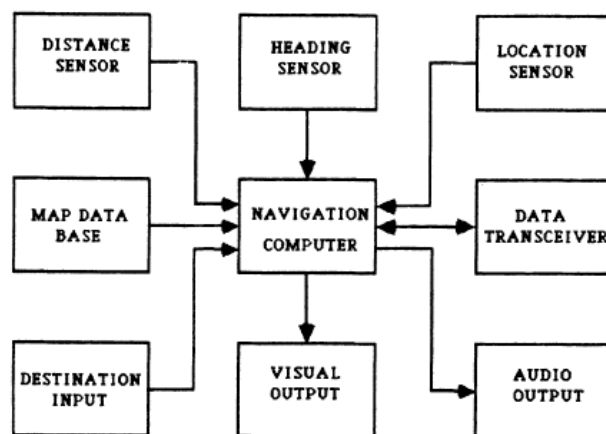
ii. Map Navigation Systems in Portable Platforms and Vehicles

19. Providing navigation systems in portable platforms and in vehicles was not a new idea by the time of the '628 Patent. Indeed, many practitioners had developed map-based navigation systems before that date. Early systems generally determined position based on inertial navigation sensors using a technique called dead-reckoning, used radio navigation sensors such as the Long-Range Navigation (LORAN) system deployed by the US Coast Guard (or radio systems like the then-new Global Positioning System, or GPS), or used some combination of these technologies. But by the mid-90s, GPS was the dominant positioning technology used in consumer navigations systems. These systems were implemented in a number of different formats including GPS-enabled laptop-based systems, portable navigation systems and in-dash vehicle systems.

20. By the late 1990s there were numerous examples of portable GPS receivers that were known in the art. At least as early as 1991 the Magellan NAV Pro 1000 was available as were numerous updates and variations on this initial offering by Magellan. The Sony Pyxis was also available at this time, and provided a small battery-powered GPS receiver. In the mid-1990s portable

receivers such as the Garmin GPS 45 added features such as a graphical display which allowed showing navigation information, satellite status and other information to the user. By the late 1990s devices like the Garmin Street Pilot added functionality such as digital maps.

21. By 1987 there was enough activity in the area of automobile navigation systems, that R. L. French wrote the seminal paper “Automobile navigation: Where is it going?” *See* R.L. French, “Automobile navigation: Where is it going?,” Aerospace and Electronic Systems Magazine, pp. 6-12, May 1987 (“French,” EX1016). He begins by stating that “Automobile navigation systems based on dead reckoning, map matching, satellite positioning and other navigation technologies are under active development.” *Id.* at 6. In this 1987 paper, French describes an architecture for such a system that remains essentially the same to this day. *Id.* at Figure 2:



22. Regarding user interface, French explains that “[m]ost systems proposed or developed to date use detailed map displays or some combination of symbolic graphics, alphanumeric messages, and audio signals.” *Id.* at 8. In early systems, the displays “projected simple combinations of arrows and words on the windshield.” *Id.* at 9. Other systems “used a plasma display panel to give route guidance in the form of shaped arrows along with street names, etc.” *Id.* at 9. By 1984, Ford, Chrysler and General Motors demonstrated systems “which displayed detailed map images.” *Id.* at 9.

23. According to Boyce, systems “for finding the required best routes by applying minimum path algorithms to network representations of the highway system” had been specified as early as 1970, meaning that this problem was known, understood and had proposed solutions by that time. *See* D.E. Boyce, “Route Guidance Systems for Improving Urban Travel and Location Choices,” *Transportation Research Part A: General*, Vol. 22A, No. 4, pp.275-281, Pergamon Press, 1988 (“Boyce,” EX1017).

iii. Provision of Electronic Maps

24. As described above, and as presented in the system examples provided below, the ability to provide electronic map information in a vehicle navigation device was well-known.

25. As early as 1980, Wootton described a system containing “a map data storage means for storing map data defining and describing the respective road sections of a road system on a predetermined map section, each such road section being a length of road lying between adjacent points at which an approaching driver has different courses of action open to him.” *See* H.J. Wootton, “Route selection and guidance apparatus and method,” UK Patent Application GB 2,079,453, filed July 1980 (“Wootton,” EX1018) at 2:20.

26. In 1991 Ishikawa described a map navigation system used in the Toyota Soarer. *See* Ishikawa K.; Ogawa, M.; Azuma, S.; Ito, T.; “Map navigation software of the electro-multivision of the ‘91 Toyoto Soarer,” IEEE Vehicle Navigation and Information Systems Conference, pp. 463-473, 20-23 Oct. 1991 (“Ishikawa,” EX1019). This paper describes “technology for displaying the calculated [position] on the map.” *Id.* at 463; *see also id.* at Figures 1 and 6.

27. This was typical of automotive navigation systems of the time. Indeed, in 1987, French remarked that “[m]ost systems proposed or developed to date use detailed map displays or some combination of symbolic graphics, alphanumeric messages, and audio signals.” *See* EX1016 at 8. Other examples cited by French include “satellite-based navigation systems demonstrated by Ford

[27], General Motors [28], and Chrysler [7], all of which displayed detailed map images.” *Id.* at 9.

28. In 1989, Saito described a system in which “location is continuously indicated on the digital road map display.” *See* Saito, T.; Shima, J.; Kanemitsu, H.; Tanaka, Y.; “Automobile navigation system using beacon information,” IEEE 1989 Vehicle Navigation and Information Systems Conference, pp. 139-145, Toronto, 11-13 Sep 1989 (“Saito,” EX1020) at 139. In this system, “[t]he shortest route between any two points can be calculated from stored data and indicated on the digital map.” *Id.* at 139. Electronic maps were displayed to the user on a CRT-based display – “The core of the man-machine interface is the display unit” – “The display changes automatically when the vehicle moves from one navigation map to another.” *Id.* at 140; *see also id.* at Figs. 3 and 4.

29. In 1989, when describing the Etak, Carin, Travel Pilot and Honda navigation systems, Wootton states that “[i]n these systems a map is displayed to the driver and the location of the vehicle on the map is shown.” *See* Wootton, J.; Ness, M.; “The experience of developing and providing driver route information systems,” 1989 Vehicle Navigation and Information Systems Conference, pp. 71-75, Toronto, Ont., Canada, 11-13 Sep 1989 (“Wootton 1989 VNIS,” EX1021) at 73-74.

iv. Display of Position On An Electronic Map

30. In addition to showing map information on an electronic map, these systems would also typically provide an “[i]ndication of the exact position of the vehicle to the driver.” EX1019 at 463; Figure 7. Using techniques such as map-matching, “the position of the vehicle is automatically corrected to the most probable and predictable on the road.” *Id.* at 468.

31. In other systems, such as the one described by Saito, “[t]he dead reckoning device calculates the present position of the vehicle from directional and distance data. The calculated position is displayed on the navigation map.” EX1020 at 139. As remains the case today for many systems, “the position of vehicle location mark on the CRT is updated every second.” *Id.* at 141.

32. The ability to display the position of a vehicle was available on commercial systems. As described by Wootton, “[t]he most elementary [sic] of the self-contained systems are those that undertake map matching. The Etak, Carin, Travel Pilot and Honda systems are typical examples. In these systems a map is displayed to the driver and the location of the vehicle on the map is shown.” EX1021 at 73.

33. Certainly by 1989 it was well-known that “[f]or in-vehicle applications, the route guidance system must also accurately track the position of

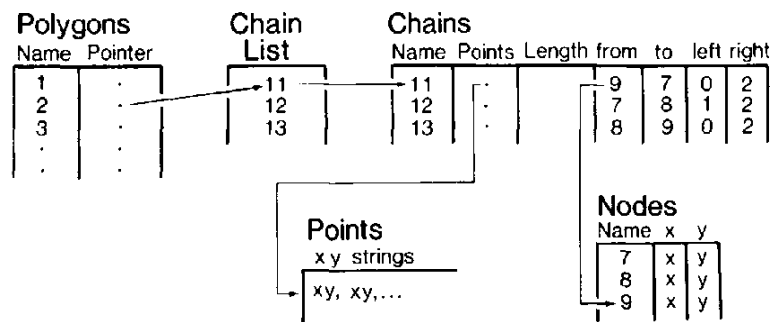
the vehicle, so it can present the next driving maneuver at the appropriate time and so it can determine whether the driver has deviated from the prescribed route, which might trigger a re-routing requirement.” *See* Guzolek, J.; Koch, E.; “Real-time route planning in road networks,” 1989 Vehicle Navigation and Information Systems Conference, pp. 165-169, Toronto, Ont., Canada, 11-13 Sep 1989 (“Guzolek,” EX1022) at 165.

v. Points of Interest (“POI”) Databases That Provide a Variety of Categories of POIs and Detailed Information About Those POIs

34. These systems generally contained a searchable database containing map and point of interest information and computer hardware and software for receiving user input, executing instructions, performing searches and computations, and displaying information on a map. These systems were also capable of receiving and displaying information relating to points of interest from an external source.

35. Systems that used databases containing map information were commonly known as Geographic Information Systems, or GIS. “Computer-based GIS have been used since at least the late 1960s.” *See*, B. Coppock *et. al.*, *History of GIS*, Geographical Information Systems: Principles and Applications, Vol. 1, Longman Group, pp. 21-34, 1991 (“Coppock,” EX1023) at p. 21.

36. By the mid-1980s, it was known that there were many ways that GIS data could be stored and that the manner in which data are stored impacts the time and computer resources required to effectively use the data. *See generally*, Peuquet, *A Conceptual Framework And Comparison Of Spatial Data Models*, Cartographica, Vol. 21, No. 4, pp. 66–113, 1984 (“Peuquet,” EX1024). For example, Figure 9b of Peuquet, reproduced below, shows that by 1984 it was known that GIS data could be stored in data structures that contain geographic information.



37. By the early 1990s, real-time information, geographic information systems and databases became key components in the transportation industry, specifically in the field of Intelligent Vehicle Highway Systems. For example, in 1991, White identified automobile navigation as “a demanding application of digital maps,” and noted that “[a] few systems are commercially available and many prototypes exist. *See White, Car Navigation Systems*, Geographical

Information Systems: Principles and Applications, D.J. Maguire, et. al., eds., Vol. 2, pp. 115-125, Longman Group, 1991.

38. White also explained that the “primary use of navigation systems is in finding the location of destinations, usually specified by street address but also by street intersection or major landmark.” *Id.* at 121. To fulfill this purpose, it was necessary to design the navigation system in such a way that it could interact with a user, receiving inputs from the user and providing guidance information to the user. “In the Bosch Travelpilot and the Etak Navigator, for example, there are 12 buttons for input and the user only needs to enter a few characters before selecting from a list of possible cities or street names.” *Id.* at 121. And the users could also find “the nearest hardware store or service station.” *Id.* White also noted the availability of radio navigation systems such as the Global Positioning System and LORAN. *Id.* at 118-119, 124.

39. The following sections describe the state of technology in some of these areas as it existed by 1991 and demonstrates that persons of ordinary skill in the art would not have considered any of these foundational technologies to be innovative. Instead, they were part of the building blocks that anyone in this space was familiar with and could build upon.

40. In sum, by the early 1990s, all of the foundational concepts and technology needed to develop location based systems that allowed users to use a graphical user interface to interactively search databases of geographical and point of interest information to retrieve point of interest information, in particular, time sensitive information (such as traffic conditions) were well known and had, in fact, been commercially implemented.

vi. Calculating an Optimum Route

41. As early as 1970 the value of computing optimal routes was known. Rosen divided the problem into two categories, “static” and “dynamic.” *See* Rosen, D.A.; Mammano, F.J.; Favout, R.; “An electronic route-guidance system for highway vehicles,” IEEE Transactions on Vehicular Technology, vol. 19, no. 1, pp. 143-152, Feb 1970 (“Rosen,” EX1026) at 144. Using this characterization, “[t]he static routing problem is exemplified by the difficulties unfamiliar drivers have while traversing the highway network over a ‘best route’ (e.g., minimum-time path) using only conventional maps and signs.” *Id.* at 144. “The dynamic routing problem is exemplified by the difficulties both familiar and unfamiliar drivers have while seeking best routes through highway networks (mainly urban) wherein traffic and other conditions are varying with time.” *Id.* at 144.

42. As discussed by Rosen, by 1970 it was known how to determine optimal routes in a network of highways. “Best route solutions can be obtained by assigning numerical values to the links of the network and exercising minimum path algorithms. Numerical values can represent minimum travel time, distance, or other link characteristics.” *Id.* at 150. “Also developed under this phase was an algorithm for the solution of best routes through a highway network. A FORTRAN IV program for the solution of best routes was written and compiled on Philco model 212 computers. The program determines the minimum path and the exit branch which connects each pair of nodes in a matrix representation of a roadway network.” *Id.* at 147.

43. In 1980, the system discussed by Wootton directly addresses determining optimal routes, “[r]oute selection and guidance apparatus for a vehicle includes a digital data processor 18 controlled by programs stored in a ROM 30 to select an optimum route between driver-selected journey starting and finishing positions, using driver-selected optimisation [sic] criteria.” EX1018 at Abstract.

44. Boyce discusses the application of communications and navigation technologies to “provide useful information to drivers concerning expected travel times, best routes , and best departure times.” EX1017 at 275. The system described by Boyce “specified software for finding the required best routes by

applying minimum path algorithms to network representations of the highway system.” *Id.* at 276. In one possible implementation “Travel times over alternative routes between hundreds of thousands of O-D pairs would be evaluated.” *Id.* at 277.

45. In his 1989 paper, Wootton provided quantitative data about how drivers select routes, noting that “drivers are influenced by information from a variety of sources in selecting the route they travel.” EX1021 at 71. According to Wootton, “The route may well be personalised so that if the customer is towing a caravan (trailer) unsuitable roads are avoided or the customer may wish to avoid tolled routes. The route provided may be the quickest or it may be the best by some other criteria.” *Id.* at 72.

46. The concept of using different selectable criteria for determining an optimal route is also discussed by Guzolek who presents a route planning system that can “[d]etermine the best routes in the road network using different optimization criteria.” EX1022 at 165. In his system, “[a] Route Planner's main responsibility is to determine an ‘optimum’ route between some origin and destination. Optimum in this sense refers to the best route as measured against some criteria.” *Id.* at 165. Some of the criteria cited by Guzolek include minimum time, minimum distance, fewest turns and avoiding/encouraging the use of

freeways. Once calculated, this optimal route “can be explicated into a set of directions that may be used for route guidance.” *Id.* at 165. In terms of computer algorithms for determining the optimal route, Guzolek teaches that “[t]he primary tool for finding the “best route” is a well-known AI graph search technique called A* which was introduced by Nilsson[1].” *Id.* at 166. “When implemented with proper heuristics, the A* algorithm has been shown to produce the optimum path while considering the fewest number of nodes in the graph.” *Id.* at 166. In addition to the original A* algorithm, Guzolek also describes refinements in which the A* algorithm “has been modified in order to optimize its performance within the physical resource limits of the host computer.” *Id.* at 167.

47. Other practitioners echo similar concepts. “The shortest route between any two given points is calculated using data regarding link length and flow direction at intersection (e.g. no right-hand turn etc.).” EX1020 at 142. “The path is determined by using the dijkstra [sic] method.” EX1019 at 465. Thus, the concepts of calculating optimal routes, the algorithms that are still used today for computing an optimal route, and the concept of allowing the user to select criteria for determining the optimal route were each well-known prior to the 1990s.

vii. Providing Route Guidance Instructions for a User

48. Fundamental to the automobile navigation systems known in the art was the ability to provide route guidance instructions to the driver of the automobile.

49. There were many systems which presented information about the multiple links of a route to a driver. For example, some systems displayed routes, or links of routes, “on the navigation maps in a flashing green color” (EX1020 at 142) in which “[t]he path was displayed by means of road markings consisting of small circles” (EX1019 at Figure 6) as well as in other ways described in the citations presented herein.

50. For example, in 1980 when describing his invention Wootton states that “[t]he selected route is stored in the storage unit 32, and serves to provide with an instruction during each route-stage, each instruction being announced to the driver.” EX1018 at Abstract. Specifically, Wootton’s system includes an “*instruction producing means* for producing in sequence from a pre-planned route individual route-stage instructions each defining an action to be taken by a driver of a vehicle at the end of an associated route-stage.” *Id.* at 1:44-46.

51. This feature is also part of the MicroPilot system described by Wootton in 1989. “Other self-contained systems, for example our own MicroPilot, have the added feature of selecting the route and presenting it to the driver as a set

of instructions.” EX1021 at 74. When discussing the Autoguide system, Wootton teaches that “[t]he driver receives messages on the turns to make, routes to follow and is guided to within 50 metres of the required destination.” *Id.* at 74.

52. Thus, the technology required to provide route guidance instructions for a user was well-known and was implemented in many systems starting at least as early as 1980.

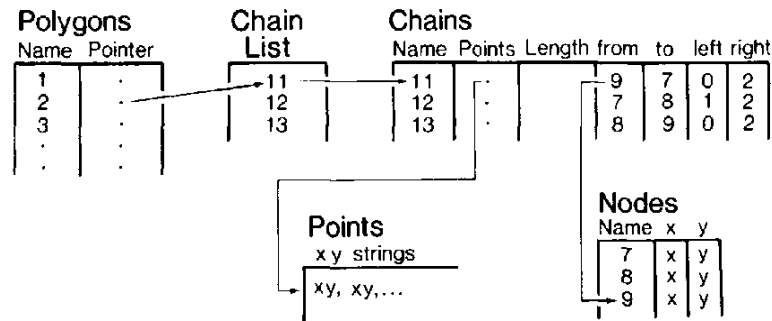
viii. Storing and Recalling Points of Interest

53. The maintenance of a database containing points of interest for storing and recalling points of interest was well-known in the art. Early navigation devices like the Trimble NavTrac were early examples of navigation devices that could store and recall waypoints and point of interest information.

54. Systems that used databases containing map information were commonly known as Geographic Information Systems, or GIS. “Computer-based GIS have been used since at least the late 1960s.” EX1023 at 21.

55. By the mid-1980s, it was known that there were many ways that GIS data could be stored and that the manner in which data are stored impacts the time and computer resources required to effectively use the data. *See generally* EX1024. For example, Figure 9b of Peuquet, reproduced below, shows that by

1984 it was known that GIS data could be stored in data structures that contain geographic information.



56. Such databases typically consisted of multiple files, each file containing database records, and fields within those records. For example, the record can be divided into fields, such as a first name, last name, street address, city, state and ZIP code. Each field, in turn, can have attributes such as its length (the number of characters) and its type (character, numeric or date).

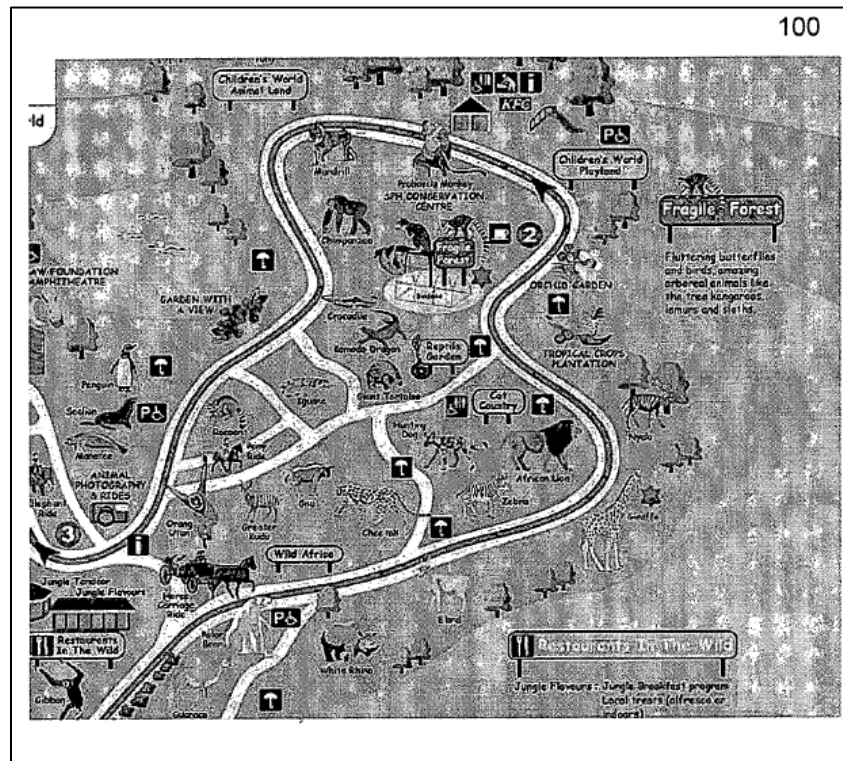
57. In his 1989 paper, Guzolek describes a system in which “[t]he database contains the road network of the area for which route planning is required,” specifically mentioning that “the database also includes,” *inter alia*, “[p]oints-of-interest and business information.” EX1022 at 166. When discussing the retrieval of information from the database, Guzolek says that “are numerous other access routines which are used to access road names and points of interest etc.” *Id.* at 168.

58. The technology required for storing and recalling points of interest was well-known and was implemented in a number of systems starting at least as early as 1984.

III. Introduction

59. The '628 Patent (EX1001) describes a method and apparatus for providing navigational directions on artistic maps. EX1001, Title, Abstract. The specification of the '628 Patent describes that points of interest (POI) are difficult to see in prior art systems that display “actual maps” for “leisure activities, such as touring a city, a park and a zoo.” EX1001, 1:46-54. “All the user sees are the roads and unrelated landmarks until the user is getting sufficiently close to the point of interest.” *Id.*, 1:52-54. The prior art systems that I reviewed show that this characterization of the state of the art is not accurate. *See, infra*, Sec. VIII.

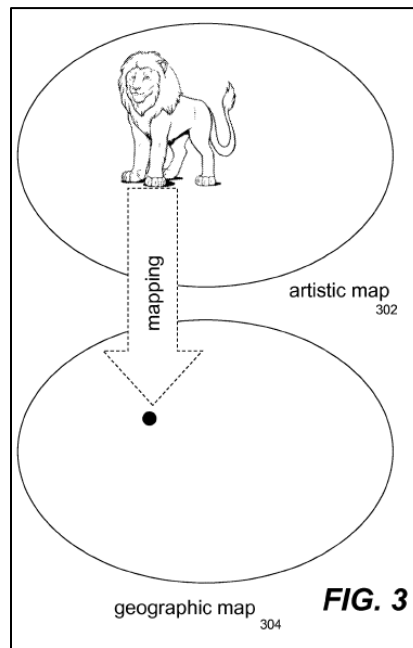
60. The '628 Patent states that it provides a solution in which “a non-linearly scaled map... [that] shows exaggeratedly points of interest... allow[s] users to navigate easily from one point to another point.” *Id.*, 1:55-60. Fig 1 of the '628 Patent below shows an example of an artistic and non-linearly scaled map:



EX1001, FIG. 1

61. A portable device with GPS capability receives the artistic map, and displays it to a user. *Id.*, 5:66-6:5. “Different from a regular map, the map is artistically represented. Objects or distances are nonlinearly scaled. In one embodiment, the objects are exaggeratedly shown to illustrate respective points of interest.” *Id.*, 6:5-9. A user can select an exaggerated object (point of interest) on the displayed artistic map as a destination for navigation. *Id.*, 6:12-14. Regardless of where on the object that the user selects, the pixel coordinates corresponding to the point of selection are transformed to a single pair of latitude and longitude (geographic) coordinates. *Id.*, 6:17-23. This transformation is illustrated in FIG. 3,

in which the points of the exaggerated object (in this case, a lion is shown) are translated to a single latitude/longitude coordinate pair on the geographic map. *Id.*, 4:33-50.



Id., FIG. 3

62. The portable device then determines navigation directions from a current location to the geographic coordinates, and maps these directions to the artistic map for presentation to the user. *Id.*, 6:23-32.

63. As detailed below for claim 1, the use of an artistic map to receive a user's selection of a destination on an exaggerated point of interest (POI) and to subsequently display the navigation route to that selected destination was well known before the '628 patent.

IV. Relevant Legal Standards

64. I have been asked to provide my opinions as to whether claims 1-20 of the '628 Patent would have been anticipated and/or obvious to a person of ordinary skill in the art ("POSITA") at the time of the filing of the '628 patent.

65. I am a professor and engineer by training and profession. The opinions I express in this declaration involve the application of my technical knowledge and experience to the evaluation of certain prior art with respect to the '628 Patent. In addition, I understand that the following legal principles apply.

66. It is my understanding that, in determining whether claims of the '628 Patent are anticipated or obvious in this proceeding, the claim terms are generally given their ordinary and customary meaning as understood by a POSITA, in view of the specification and prosecution history. That is, a POSITA would read the claim terms in the context of the entire patent specification in which they appear, as well as the prosecution history of the patent.

67. It is my understanding that a claim is anticipated under 35 U.S.C. § 102 if each and every element and limitation of the claim is found, either expressly or inherently, in a single prior art reference. I also understand that a reference must describe all claimed elements as arranged in the claim, although identical terminology need not be used in the reference and claim elements.

68. It is my understanding that a claim is unpatentable under 35 U.S.C. § 103 if the claimed subject matter as a whole would have been obvious to a POSITA in the art at the time of the alleged invention. I also understand that an obviousness analysis takes into account the scope and content of the prior art, the differences between the claimed subject matter and the prior art, and the level of ordinary skill in the art at the time of the invention.

69. In determining the scope and content of the prior art, it is my understanding that a reference is considered relevant prior art if it falls within the field of the inventor's endeavor. In addition, a reference is prior art if it is reasonably pertinent to the particular problem with which the inventor was involved. A reference is reasonably pertinent if it logically would have commended itself to an inventor's attention in considering his problem. If a reference relates to the same problem as the claimed invention, that supports use of the reference as prior art in an obviousness analysis.

70. To determine the differences between the prior art and the claimed subject matter, it is my understanding that 35 U.S.C. § 103 requires the claimed invention to be considered as a whole. This "as a whole" assessment involves showing that one of ordinary skill in the art at the time of invention, confronted by the same problems as the inventor and with no knowledge of the claimed

invention, would have selected the elements from the prior art and combined them in the claimed manner.

71. It is my further understanding that several rationales may be applied for combining references or modifying a reference to show obviousness of claimed subject matter. These rationales include: combining prior art elements according to known methods to yield predictable results; simple substitution of one known element for another to obtain predictable results; a predictable use of prior art elements according to their established functions; applying a known technique to a known device (method or product) ready for improvement to yield predictable results; choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify a prior art reference or to combine prior art teachings to arrive at the claimed invention.

V. Prosecution History

72. The '628 Patent application was filed on August 6, 2008. The Challenged Claims were allowed in August 2018 after an examination that focused on a particular prior art reference, and in my opinion that did not provide an accurate picture of the state of the art at the time of the '628 Patent.

73. In the first Non-Final Office Action issued on September 2, 2011, all of the pending claims 1-20 were rejected as being obvious, with the Examiner

citing U.S. Patent Application Publication No. 2007/0176932 to Salmre as the primary reference. EX1002, 62-72. The Office Action also rejected claims 1-10 on § 101 grounds. In response to the rejection by the Examiner, the Applicant amended independent claims 1 and 11 to specify, *inter alia*, that the claimed computing device receives a non-linearly scaled map and receives a selection of one of the objects as a destination for navigational direction as shown below:

1. (Currently amended) A method for navigating in a particular area, the method comprising:
providing-receiving in a computing device with navigation capability a map that is non-linearly scaled, the map including various objects being exaggeratedly shown on the computing device, each of the objects represented by a plurality of points;
receiving a selection on one of the objects;
capturing coordinates of one of the points on one of the objects being selected;
transforming the coordinates to a physical point represented by a pair of latitude and longitude, wherein each of the points representing the one of the objects has different coordinates, but all of the points correspond substantially to the physical point when said transforming is performed;
detecting a current location of the computing device;
determining a navigational direction from a-the current location to the one of the objects physical point when the user decides to travel to the one of the objects; and
synchronizing the navigational direction with the map being displayed.

11. (Currently amended) A portable device for navigating a designed place, the portable device comprising:
a display screen configured to display a map including various objects being exaggeratedly shown, each of the objects represented by a plurality of points;
a memory for storing code;
a processor executing the code to perform operations of:
capturing coordinates of one of the points on one of the objects being selected in the map being displayed;
receiving a selection on one of the objects;
capturing coordinates of one of the points on one of the objects being selected;
transforming the coordinates of the one of the points to a physical point represented by a pair of latitude and longitude, wherein each of the points representing one of the objects has different coordinates, but all of the points correspond substantially to the physical point when said transforming is performed;
detecting a current location of the computing device;
determining a direction from a-the current location to the physical point;
and
synchronizing the direction with the map being displayed.

EX1002, 96, 98

74. In response to the § 103 rejection, the Applicant argued that the Salmre reference does not describe the claimed feature of “wherein each of the points representing one of the objects has different coordinates, but all of the points correspond substantially to the physical point when said transforming is done.”

EX1002, 82-83. The Applicant argued that this feature in the claim is found in FIG. 3 of the application:

As shown in FIG. 3 and described in paragraphs [0030] – [0032], one embodiment of the present invention teaches a transformation of many-to-one. As clearly shown in FIG. 3, one object (i.e., the lion) is represented by many points (e.g., pixels when displayed on a screen). All of the coordinates of these points are mapped or corresponding to a single “physical” point in a real map (represented by a pair of latitude and longitude). When a user desires to travel to a location of the object (where the lion is), no matter of where (which point) the user has selected on the object, it always means the same physical point. As a result, a navigational direction can be determined from a current position to the physical point.

EX1002, 82. According to the Applicant, Salmre describes a “one-to-one transformation or conversion between two maps,” which is “mathematically and operationally different from the many-to-one transformation in the present invention as claimed.” *Id.*

75. The Examiner was apparently unconvinced, as the Examiner maintained the Salmre rejections in a Final Office Action that issued February 2, 2012. *Id.*, 102-115. The Applicant then made further amendments to the independent claim 1 (in addition to clarifying amendments to claim 11), specifying that the objects in the artistic map (“map that is non-linearly scaled”) are

exaggeratedly shown “to facilitate a user using the computing device to view and select one of the objects to navigate thereto” as shown below:

1. (Currently amended) A method for navigating in a particular area, the method comprising:

- receiving in a computing device with navigation capability a map that is non-linearly scaled, the map including various objects being exaggeratedly shown on the computing device to facilitate a user using the computing device to view and select one of the objects to navigate thereto, each of the objects represented by a plurality of points on a display of the computing device;
- receiving a selection on one of the objects from the user;
- capturing a pair of coordinates of for one of the points on one of the objects being selected;
- transforming the pair of coordinates to a physical point represented by a pair of latitude and longitude in a geographical map, wherein each of the points representing the one of the objects has having different pairs of coordinates, but all of the points corresponding substantially to the physical point when said transforming is performed;
- detecting a current location of the computing device;
- determining a navigational direction from the current location to the one of the objects being selected when the user decides to travel to the one of the objects; and
- synchronizing the navigational direction with the map being displayed.

11. (Currently amended) A portable device for navigating a designed place, the portable device comprising:

- a display screen configured to display an artistic map including various objects being exaggeratedly shown therein, each of the objects represented by a plurality of points;
- a memory for storing code;
- a processor executing the code to perform operations of:
 - capturing a pair of coordinates of one of the points representing on one of the an objects being selected in the artistic map being displayed on the display screen;
 - receiving a selection on one of the objects;
 - capturing coordinates of one of the points on one of the objects being selected;
 - transforming the pair of coordinates of the one of the points to a physical point represented by a pair of latitude and longitude, wherein each of the points representing one of the objects has different pairs of coordinates, but all of the points correspond substantially to the physical point when said transforming is performed;
 - detecting a current location of the computing device;
 - determining a direction from the current location to the physical point; and
 - synchronizing the direction with the map being displayed.

EX1002, 121, 123-124

76. The Applicant repeated for the most part the same arguments that were made in response to the previous Office Action, by again arguing that Salmre teaches a “symmetric” and “one-to-one” correspondence between its linear and non-linear maps. *Id.*, 127-128.

77. In the next Office Action, issued November 26, 2013, the Examiner rejected the claims on § 103 grounds once again, adding U.S. Patent Application Publication No. 2005/0149303 to Agrawala for teaching the disputed many-to-one transformation of the claims. *Id.*, 183-194. In response, the Applicant made various amendments to the independent claims, most notably that the geographical

map is “not being shown on the display” during the transformation of coordinates as shown below:

1. (*Currently amended*) A method for navigating in a particular area, the method comprising:

- receiving in displaying on a display of a computing device with navigation capability a map that is non-linearly scaled, the map including various objects being exaggeratedly shown on the computing device to facilitate a user using the computing device to view and select one of the objects to navigate thereto, each of the objects represented by a plurality of points on a display of the computing device;
- receiving a selection on the one of the objects from the user as a selected object;
- capturing a pair of coordinates for one of the points on the selected object ~~one of the objects being selected~~;
- transforming the pair of coordinates to a physical point represented by a pair of latitude and longitude in a geographical map not being shown on the display, ~~each of the points representing the one of the selected objects~~ having different pairs of coordinates, but all of the different pairs of coordinates for the selected object ~~all of the points~~ corresponding substantially to the physical point when said transforming is performed;
- detecting a current location of the computing device;
- determining a navigational direction from the current location to the one of the objects being selected when the user decides to travel to the one of the objects; and
- synchronizing the navigational direction with the map being displayed.

11. (*Currently amended*) A portable device for navigating a designed place, the portable device comprising:

- a display screen configured to display an artistic map including various objects being exaggeratedly shown therein, each of the objects represented by a plurality of points;
- a memory for storing code;
- a processor executing the code to perform operations of:
- capturing a pair of coordinates of one of the points representing an object being selected in the artistic map being displayed on the display screen;
- transforming the pair of coordinates of the one of the points to a physical point represented by a pair of latitude and longitude in a geographical map not being shown on the display, wherein ~~each of the points~~ representing the object ~~has have~~ different pairs of coordinates, but all of the different pairs of coordinates ~~points~~ correspond substantially to the physical point when said transforming is performed;
- detecting a current location of the computing device;
- determining a direction from the current location to the physical point; and
- synchronizing the direction with the map being displayed.

EX1002, 204, 206

78. The Applicant argued that “Agrawala explicitly states that a search algorithm is used to facilitate the scaling” to re-size a map, “which is contradictory to the [claimed transforming].” *Id.*, 213. Further, the Application argued that “Agrawala is silent about using coordinates in one map corresponding to a pair of latitude and longitude in another map.” *Id.*

79. In the next Office Action issued July 14, 2014, the Examiner maintained the rejections based on the Salmre-Agrawala combination. *Id.*, 217-228. In response, the Applicant amended the claims to specify that the artistic map is not used directly for the navigation, and that the geographical map is used to

determine the navigational direction. *Id.*, 233, 235. Based on this claim amendment, the Applicant argued that the cited references do not suggest that their non-linear maps are not used directly for navigation purposes. *Id.*, 240-244.

80. The Examiner did not accept these arguments in the Office Action issued March 26, 2015, and the rejections based on Salmre and Agrawala (as well as a § 101 “abstract idea” rejection) we again cited. *Id.*, 267-280. The Applicant then amended the claims to indicate the navigation device is directed to a “portable” computing device equipped with navigation capability. *Id.*, 286, 288. Based on this amendment, the Applicant argued that the claims are not directed to an abstract idea. *Id.*, 296. With respect to the § 103 rejection, the Applicant substantially repeated the same arguments that were made in the previous response.

81. In the next Office Action, the Examiner repeated the § 101 and § 103 rejections, refuting the Applicant’s traversal arguments. *Id.*, 309-321. The Applicant then proceeded with an appeal to the Board of Patent Appeals and Interferences. *Id.*, 330-353. The Board issued its decision on June 27, 2018, reversing the Examiner’s rejections. *Id.*, 389-401. The Board held that the Examiner’s Office Actions were deficient in that they did not provide specific citations to Salmre or to Agrawal for showing the negative limitation that the

artistic map is not used directly for navigation. *Id.*, 399. Specifically, the Board stated that “[b]ecause the Examiner has not fully developed the record to establish how Salmre (or Agrwala) teaches or suggest the disputed negative limitation, we find speculation would be required to affirm the Examiner on this record. ... Therefore, we are constrained by the record before us to find the Examiner erred in concluding the combination of Salmre and Agrwala renders obvious Applicants’ independent claim 1.” *Id.*, 400.

82. The claims were subsequently allowed in August 2018, and the ‘628 Patent issued October 23, 2018. *Id.*, 403-409, 434. The Notice of Allowance stated the reason that the claims were allowed was due to the Board’s reversal of the Examiner’s rejection. *Id.*, 408.

VI. Person of Ordinary Skill in the Art

83. It is my opinion that one of ordinary skill in the art in the field of the ‘628 Patent would have had at least a bachelor’s degree in electrical engineering, computer science, or a related discipline, and at least two years of work experience with navigation systems, or an equivalent advanced education in the field of navigation systems.

84. I base this opinion on my experience working on systems similar to that described in the '628 patent, and my experience teaching students and working with other professionals on similar systems.

85. Based on my education, training, and professional experience in the field of the claimed invention, I am familiar with the level and abilities of a person of ordinary skill in the art at the time of the '628 Patent. Additionally, I met at least these minimum qualifications to be a person having ordinary skill in the art at least as of 2007. Further, although my qualifications may exceed those of the hypothetical person having ordinary skill in the art defined above, my analysis and opinions regarding the '628 Patent have been rendered from the perspective of a person having ordinary skill in the art at the time of the '628 Patent.

VII. Claim Construction

86. As set forth in the Relevant Legal Standards section above, it is my understanding that the claim terms are generally given their ordinary and customary meaning as understood by a POSITA, in view of the specification and prosecution history. That is, a POSITA would read the claim terms in the context of the entire patent specification in which they appear, as well as the prosecution history of the patent.

87. It is my opinion that no claims require construction beyond their plain and ordinary meaning as would be understood by a POSITA.

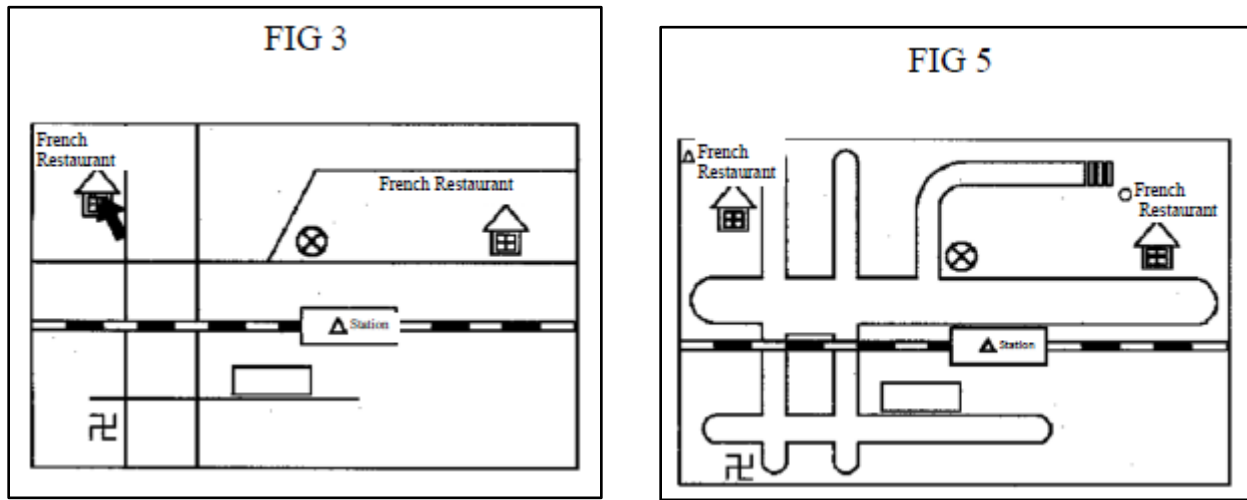
VIII. Challenging Patentability

A. GROUND 1: Claims 1, 4-8, and 11-18 are anticipated by JP973 (EX1004)

i. Overview of JP973

88. JP973 (EX1004) is entitled “Navigation Device and Destination Setting Method and Storage Medium Thereof,” and describes systems for navigating to a destination selected on a raster map. EX1005², Abstract, ¶¶ [0026], [0041]. JP973 is in the same field as the ’628 Patent, *i.e.*, navigation devices and methods. The raster map is “a deformed... illustration map or the like that is often used in travel information magazines and sightseeing maps.” *Id.*, ¶ [0033]. FIGS. 3 and 5 are examples of the non-linearly scaled raster map, and show points of interest (*e.g.*, French restaurants) in an exaggerated and non-linear manner:

² EX1005 is a certified translation of JP973.



EX1005, FIGS. 3 (L) and 5 (R)

89. Upon designation by a cursor's position of a point of interest ("facility"), the system (*e.g.*, portable device) transforms the designated position to the facility's latitude/longitude coordinates. *Id.*, ¶ [0039], [0050]. As explained in Fig. 2, there is a one-to-one relationship between the pixels of the displayed point of interest (POI) and corresponding Cartesian coordinates. *Id.* In Fig. 4 shown below, however, there is a many-to-one relationship between the pixels of the displayed POI and a single latitude/longitude coordinate pair of the POI. *Id.* According to the arrangement in Fig. 4, no matter the designated position on the selected POI, that position is transformed to a single representative coordinate pair (annotated red below) for the POI (annotated blue below):

FIG 4		
Rectangular Image Data	Facility in image	East Longitude and North Latitude Coordinates of Facility in Image
Image Data of French Restaurants Near ▲ Station	○ French Restaurant	(X _a , Y _a)
	△ French Restaurant	(X _b , Y _b)
⋮	⋮	⋮

EX1005, FIG. 4 (annotated)

90. JP973 describes that “[w]hen the destination can be set using this type of illustration map, there is an effect wherein even a person unfamiliar with the operation of the navigation device can easily set the destination.” *Id.*, ¶ [0033].

91. The raster map is “different from the digitized (vector) normal map data (vector map data) stored in the map database 71” of the portable device. EX1005, ¶ [0028]. Of course the navigation route to the destination is not determined using the raster map, since it is simply bitmap data. The navigation route is determined using conventional processes based on the vector map data stored in the database 71. *Id.*, ¶ [0026] (“The navigation device searches for a travel route to the destination based on the intersection data 72 and the road data 73,” *i.e.*, the geographical vector map data). The determined directions are then displayed on both the vector map and the raster map or, in other arrangements, on only the raster map. *Id.*, ¶¶ [0045] – [0046].

ii. Claim 1

a. 1[pre] “A method for navigating in a particular area, the method comprising:”

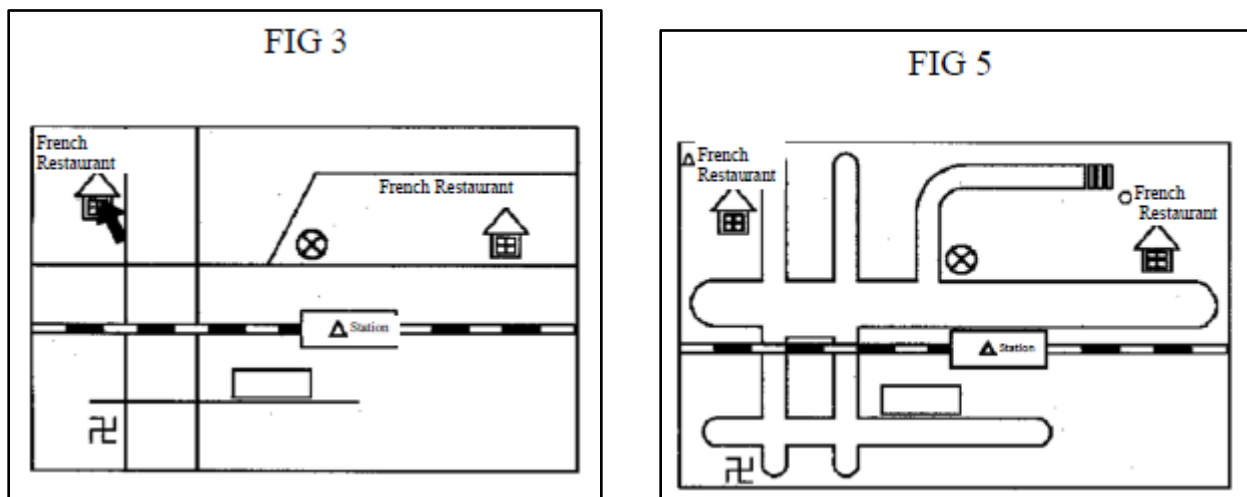
92. I understand that the beginning portion of a claim is called the “preamble.” I also understand that for purposes of this proceeding the preamble is not considered as a requirement of the claim. In my view, even if the preamble of claim 1 was considered a requirement, JP973 describes the preamble of claim 1. JP973 describes a method for navigating to a particular destination selected on a raster map. EX1005, Abstract, ¶¶ [0026], [0041].

b. 1[a1] “downloading from a network into a computing device an artistic map,”

93. JP973 describes this downloading operation. JP973 describes that its navigation device downloads raster map data (*artistic map*) from any of “various communication networks such as the Internet and personal computer communication and the like.” EX1005, ¶ [0021]; *see also id.*, ¶ [0030] (raster map data “imported from... the communication network 43”).

94. The navigation device is a “computing device” as indicated in the claim as it includes a central processing unit (CPU 11), memory units 70, 12, 13, and various other computing elements connected via a bus. EX1005, ¶¶ [0017] – [0018].

95. The downloaded raster map is a non-linearly scaled and deformed artistic map with exaggerated objects. “Furthermore, for raster map data configured as in FIG. 4, even when the image data of the map displayed on the display of the image display unit 30 is not an accurate map according to scale, because a desired facility (a French restaurant in the drawings) can be designated as the destination, the rectangular image data, for example, may be configured using a deformed raster map such as that illustrated in FIG. 5. In this manner, the deformed raster map is an illustration map or the like that is often used in travel information magazines and sightseeing maps. When the destination can be set using this type of illustration map there is an effect wherein even a person unfamiliar with the navigation device can easily set the destination.” EX1005, ¶ [0033]. FIGS. 3 and 5 show examples of the artistic raster map:



EX1005, FIGS. 3 (L) and 5 (R)

c. 1[a2] “the artistic map being non-linearly scaled and including various objects being exaggeratedly shown on the computing device to facilitate a user using the computing device to view and select one of the objects to navigate thereto in the artistic map”

96. The artistic raster map is non-linearly scaled with exaggerated objects as I previously described. EX1005, FIGS. 3 and 5, ¶ [0033] (“not... according to scale” and “deformed... illustration map”). As shown in FIG. 5, reproduced above, objects (*e.g.*, facilities or points of interest) are shown on a display screen 30 of the navigation device artistically and exaggeratedly, and also out of scale. EX1005, ¶ [0023], [0030], FIG. 5. This has “an effect wherein even a person unfamiliar with the operation of the navigation device can easily set the destination.” *Id.*, ¶ [0033]. JP973 describes the reason why the objects are exaggeratedly shown, that is, to facilitate viewing and selection thereof as a navigation destination.

d. 1[a3] “wherein the computing device is portable, equipped with navigation capability and provides a traveling guidance based on a geographical map,”

97. The navigation device described in JP973 is a “portable navigation device[.]” EX1005, ¶ [0050]. The navigation device provides traveling guidance (*i.e.*, searches and displays a driving route) using conventional vector map data stored in a memory 70 (distinct and “separate” from raster map database 80). EX1005, ¶¶ [0025] – [0027]. “The navigation device searches for a travel route to

the destination based on the intersection data 72 and the road data 73,” *i.e.*, geographical map data. EX1005, ¶ [0026].

e. 1[a4] “the artistic map is not used directly by the computing device for navigation,”

98. The raster map data (*artistic map*) described in JP973 is not used directly by the computing device for navigation, *i.e.*, to calculate a navigation route. Instead, the raster map data includes rectangular image data in the form of bitmap images. EX1005, ¶¶ [0028] (“raster data (bitmap) format... not suitable for map matching processing of the navigation device.”), [0031]. Instead of using the raster map data for calculating the navigation route, the map data stored in the memory 70 for drawing the vector map is used to calculate the navigation route. EX1005, ¶¶ [0025] – [0026].

f. 1[a5] “each of the objects is represented by a plurality of points on a display of the computing device,”

99. JP973 describes the use of facilities (“*objects*”) that are displayed on the raster map as artistic two-dimensional icons. EX1005, FIG. 3. The raster map itself is a bitmap image. EX1005, ¶ [0028]. As a result, each of the icons is constituted by several points (pixels).

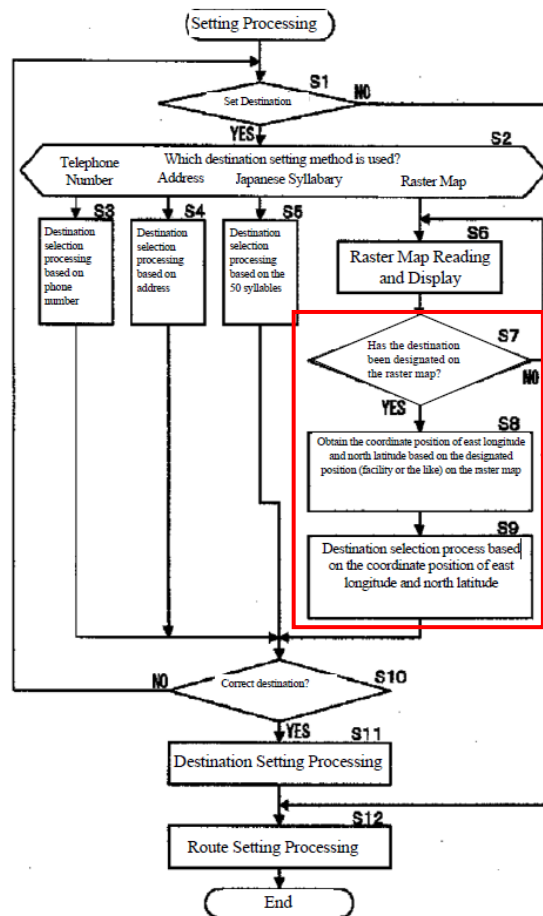
g. 1[a6] “and the geographical map is not being displayed on the display”

100. Among the various arrangements described in JP973, it is disclosed that only the raster map is displayed. The vector map, and the constituent road and intersection data used to determine the route are not displayed. EX1005, ¶ [0045] (“one map may be displayed” according to a setting by the user), ¶ [0046] (“the current position of the vehicle and the set route may be displayed only on the raster map”); *see also id.*, ¶ [0011] (“display[] a map based on the raster map data... instead of... a map based on the vector map data”), ¶ [0051] (“In the embodiment described above,... only the raster map [is] displayed when setting the destination”).

h. 1[b] “receiving in the computing device a selection on the one of the objects from the user as a selected object;”

101. JP973 describes the navigation device receiving a selection of a destination by a user selecting a displayed object on the raster map as the destination. EX1005, ¶¶ [0031], [0038]. “[A]ny location or facility in the image can be designated as a destination.” EX1005, ¶ [0033]. FIG. 6 is a flowchart of a method for setting the destination. According to this method, a raster map (artistic map) may be selected for the destination selection process, which is shown in steps S6 to S9 of the flowchart. EX1005, ¶ [0036]. The selected raster map is imported from a communication network 43, and displayed. EX1005, ¶ [0037]. A

destination is then selected on the displayed map by the user, step S7, and the coordinates of the selected object are determined, step S8. EX1005, FIG. 6, ¶¶ [0038] – [0039].



EX1005, FIG. 6 (annotated)

- i. 1[c] “determining by the computing device a pair of coordinates for one of the points on the selected object;”

102. JP973 describes this determining operation. EX1005, ¶¶ [0031] – [0033]. JP973 indicates that a particular facility is selected “based on the position designated on the raster map.” EX1005, ¶ [0039]. This plainly entails identifying

“the position designated on the raster map,” *i.e.*, the display coordinates of the selected point, in order to identify the selected facility and the single pair of geographic (lat./long.) coordinates recorded for that facility, as shown in FIG. 4 (annotated in red below).

FIG 4		
Rectangular Image Data	Facility in image	East Longitude and North Latitude Coordinates of Facility in Image
Image Data of French Restaurants Near ▲ Station	○ French Restaurant	(X _a , Y _a)
	△ French Restaurant	(X _b , Y _b)
⋮	⋮	⋮

JP1005, FIG. 4 (annotated)

- j. 1[d] “transforming in the computing device the pair of coordinates to a physical point represented by a pair of latitude and longitude in the geographical map not being shown on the display, the points representing the selected object having different pairs of coordinates, but all of the different pairs of coordinates for the selected object corresponding substantially to the physical point when said transforming is performed;”

103. In my view, the use of “substantially” in this transforming operation is unclear. A POSITA reading this claim element, the prosecution history and the

'628 patent itself would still not know what are the limitations, that is, the metes and bounds of the word “substantially.” Under any reasonable interpretation of “substantially,” JP973 describes this transforming operation since it describes a facility on the displayed map being two-dimensional (*i.e.*, constituted by a plurality of display points) yet corresponding to only a single lat./long. coordinate position, such that a specified touch selection position on any of the points constituting the facility object is transformed to the single lat./long. coordinate position of the selected facility in the process of setting a destination. EX1005, ¶¶ [0038] – [0041], FIG. 4. This process is performed while the vector map (geographical map) is “not being shown on the display.” EX1005, ¶ [0051] (“In the embodiment described above,... only the raster map [is] displayed when setting the destination”).

104. In further detail, JP973 describes that the raster map data includes a single pair (X_a , Y_a) of latitude and longitude coordinates (annotated in red below) representing a facility (annotated in blue below). EX1005, FIG. 4, ¶ [0033].

FIG 4		
Rectangular Image Data	Facility in image	East Longitude and North Latitude Coordinates of Facility in Image
Image Data of French Restaurants Near ▲ Station	○ French Restaurant	(X_a, Y_a)
	△ French Restaurant	(X_b, Y_b)
⋮	⋮	⋮

JP1005, FIG. 4 (annotated)

105. This coordinate pair is used as the destination for navigation guidance, *i.e.*, the physical point in the vector map data stored in the memory 70 (*geographical map* data) used for navigation guidance. EX1005, ¶¶ [0039] – [0041]. Since FIG. 4 shows that the facility is represented by the single physical point, this means that all of the display coordinates of points that make up the facility (*e.g.*, the points making up the building icon for the French restaurant) would correspond to that single physical point, *i.e.*, lat./long. coordinate pair.

106. JP973 also describes that a cursor can designate any position of the POI object to select the object. As described in FIG. 2, the geographical coordinates of two opposing corners of the “image data of the [POI]” are recorded and used to determine the geographical coordinates for any selected point of the

object vis-à-vis an arithmetic process “based on the east longitude and north latitude coordinates of [the] two diagonal points.” EX1005, ¶ [0031]; *see also* ¶ [0033] (“coordinate data relating to any location in the image” can be obtained by the arithmetic processing). JP973 therefore describes that the geographical coordinates of any selected display point within the object (*i.e.*, within the bounds of the two opposing corners) can be interpolated from the geographical coordinates of the two opposing corners. JP973 then describes, as an alternative to the interpolation, a single representative geographical coordinate value can be recorded and determined for the POI when selected. EX1005, ¶ [0032], FIG. 4. According to this alternative arrangement, if the “any location” designated by the cursor falls within the area of the of the two-dimensional object representing the POI (*i.e.*, selects any pixel of the object), the alternative arrangement of FIG. 4 transforms that selection to the single physical point recorded for the POI. Indeed, selecting a display (or Graphical User Interface (GUI)) object by designating any pixel point constituting that object was the conventional method by which a GUI object was selected. *See, e.g.*, EX1013, 12:19-25, 12:39-42 (conventionally, a GUI object’s boundaries define its activation/control area); EX1014, FIG. 6B, FIG. 11:S16, 6:35-43, 8:1-14, 8:43-59 (touch position coordinates of a user input at any point determined in order to identify selected landmark and set its single

corresponding pair of lat./long. coordinates). JP973 therefore describes the many-to-one conversion in which all of the display pixels of the POI correspond to a single geographical coordinate pair value. *Id.*

k. 1[e] “detecting a current location of the computing device in the geographical map;”

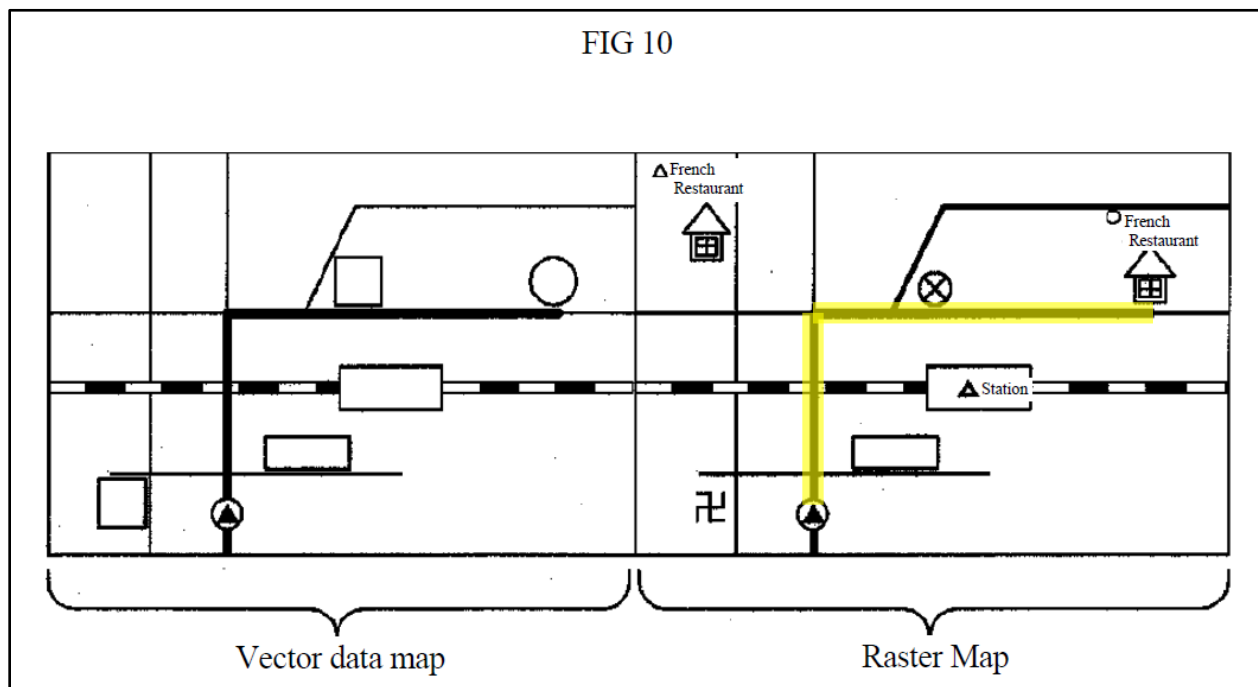
107. JP973 describes that the navigation system includes a “current position detection unit 60... for detecting the absolute position of the vehicle according to latitude and longitude.” EX1005, ¶ [0024]. The “map data... including the current position of the vehicle detected by the current position detection unit 60” is identified. EX1005, ¶ [0026].

l. 1[f] “determining according to the geographical map a navigational direction from the current location to the one of the objects being selected; and”

108. “The navigation device searches for a travel route to the destination based on the intersection data 72 and the road data 73.” EX1005, ¶ [0026]. JP973 therefore describes that the geographical map data (*i.e.*, the map data stored in memory 70 and used to draw a vector map) and its absolute coordinate system (lat./long.) are being used to determine the navigation from the current location to the selected facility by “processes that are similar to conventional processes.” EX1005, ¶ [0041].

m. 1[g] “showing the navigational direction on the artistic map being displayed.”

109. JP973 describes that the set route and an encircled triangle pointing in the direction of the route is displayed on the raster map (*artistic map*). EX1005, ¶¶ [0045] – [0046]. FIG. 10 shows this feature and is reproduced below with the displayed route annotated in yellow:



EX1005, FIG. 10 (annotated)

110. I note that FIG. 10 shows that both the vector map and the raster map are displayed, but in other arrangements, only the raster map is displayed.

EX1005, ¶ [0045] (“one map may be displayed” according to a setting by the user); *see also id.*, ¶ [0011] (“display[] a map based on the raster map data ...instead of...

a map based on the vector map data”), ¶ [0051] (“In the embodiment described above,... only the raster map [is] displayed when setting the destination”).

iii. Claim 4

- a. “The method as recited in claim 1, wherein said showing the navigational direction on the artistic map being displayed comprises transforming in the computing device the navigational direction based on the geographical map to a navigation direction based on the artistic map.”**

111. JP973 describes claim 4. JP973 describes that the navigational direction (“travel route” or “set route”) is determined using the geographical map data (vector map) but is displayed on the artistic map (raster map). EX1005, ¶¶ [0026], [0045] – [0046]. This means that JP973 transforms the set route from the coordinate system of the vector map data used to calculate the route to that of the raster map used to display the route.

112. JP973 describes that “[t]he navigation device searches for a travel route to the destination based on the intersection data 72 and the road data 73.” EX1005, ¶ [0026]. JP973 therefore describes that the geographical map data (i.e., the map data stored in memory 70 and used to draw a vector map) and its absolute coordinate system (lat./long.) are being used to determine the navigational direction from the current location to the selected facility “processes that are similar to conventional processes.” EX1005, ¶ [0041]. This navigational direction

is displayed on the “deformed” and out-of-scale raster map. EX1005, ¶¶ [0045] – [0046]. In order to do so, the navigational direction is transformed from the vector map to the raster map.

iv. Claim 5

- a. “The method as recited in claim 4, further comprising determining a set of instructions of how to move from the current location to the physical point as a destination.”**

113. JP973 describes claim 5 by determining the route guidance to a set destination. EX1005, ¶¶ [0026], [0045] – [0046]. JP973, for example, describes conventional navigation guidance in which the step-by-step directions (or instructions) are provided for moving from a current location to the set destination. EX1005, ¶ [0043].

v. Claim 6

- a. “The method as recited in claim 5, wherein said showing the navigational direction on the artistic map being displayed comprises: transforming the instructions with respect to the geographical map to the artistic map being displayed.”**

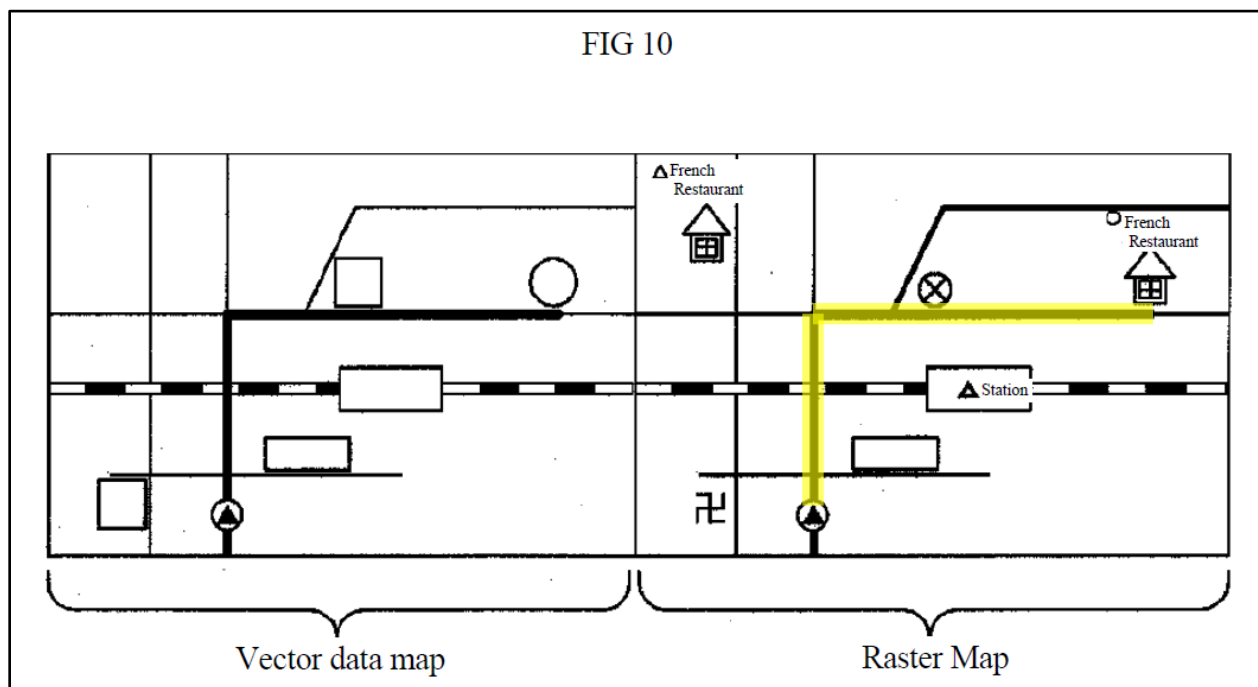
114. JP973 also describes claim 6, as I discussed above in connection with claim 4. JP973 calculates the route using the geographical map data (vector map data) but displays the calculated route on the artistic map (raster map). EX1005, ¶¶ [0026], [0041], [0045] – [0046]. A POSITA would therefore understand that this

transforms the calculated route from the geographical map data to the artistic map, which displays the route.

vi. **Claim 7**

- a. **“The method as recited in claim 6, wherein the navigational direction shows how to move from the current location to the destination among a route, points of the route belonging to a road network, so pixel coordinates of each of the points are used to transform geographic coordinates of the points to image coordinates of the points”**

115. Fig. 10 of JP973 shows the route guidance (navigational direction) on a road network:



EX1005, FIG. 10 (annotated)

116. “The navigation device searches for a travel route to the destination based on the intersection data 72 and the road data 73,” *i.e.*, a road network.

EX1005, ¶ [0026]. Further, as I discussed above for claim 4, JP973 transforms or converts the route from geographical map data to artistic map data.

vii. Claim 8

a. “The method as recited in claim 7, further comprising connecting the pixel coordinates of the points to show the route on the map.”

117. JP973 describes that the route shown by connecting pixel coordinates of points of the route. EX1005, FIG. 10.

viii. Claim 11

a. 11[pre] “A portable device for navigating a designated place, the portable device comprising:”

118. *See* Claim 1[pre] and 1[a3].

b. 11[a1] “a display screen configured to display an artistic map downloaded from a network,”

119. *See* Claim 1[a1] and 1[a2].

c. 11[a2] “the artistic map being non-linearly scaled and including various objects being exaggeratedly shown therein,”

120. *See* Claim 1[a2].

d. 11[a3] “each of the objects represented by a plurality of points,”

121. *See* Claim 1[a5].

- e. 11[a4] “wherein the portable device is equipped with navigation capability and provides a traveling guidance based on a geographical map,”**

122. *See* Claim 1[a3].

- f. 11[a5] “the artistic map is not used directly by the portable device for navigation,”**

123. *See* Claim 1[a4].

- g. 11[a6] “and wherein the geographical map is not being shown on the display screen;”**

124. *See* Claim 1[a6].

- h. 11[b] “a memory for storing code;”**

125. JP973 describes its portable device includes a memory (*e.g.*, ROM) storing programs (code). EX1005, ¶¶ [0017] – [0019].

- i. 11[c] “a processor executing the code to perform operations of:”**

126. JP973 describes a processor (arithmetic processing unit 10 including a CPU 11) that performs various navigation processes according to programs (code) stored in memory (*e.g.*, ROM). EX1005, ¶¶ [0017] – [0019].

- j. 11[d] “determining a pair of coordinates of one of the points representing an object being selected in the artistic map being displayed on the display screen;”**

127. *See* Claim 1[b] and 1[c].

- k. 11[e] “transforming the pair of coordinates of the one of the points to a physical point represented by a pair of latitude and longitude in the geographical map not being**

shown on the display, wherein the points representing the object have different pairs of coordinates, but all of the different pairs of coordinates correspond substantially to the physical point;”

128. *See* Claim 1[d].

l. 11[f] “detecting a current location of the computing device in the geographic map;”

129. *See* Claim 1[e].

m. 11[g] “determining according to the geographical map a direction from the current location to the physical point; and”

130. *See* Claim 1[f].

n. 11[h] “showing the direction in the artistic map being displayed.”

131. *See* Claim 1[g].

ix. Claim 12

a. “The portable device as recited in claim 11, wherein the selected object is represented by a plurality of pairs of coordinates, all of the pairs of coordinates are substantially transformed to the physical point represented by the latitude and longitude.”

132. *See* Claim 1[a5] and 1[d].

x. Claim 13

a. “The portable device as recited in claim 12, wherein the artistic map is non-linearly scaled, where the physical point is located in the geographical map in accordance with the latitude and longitude.”

133. *See* Claim 1[a2] and 1[d].

xi. Claim 14

- a. “The portable device as recited in claim 13, wherein the determining of the direction from the current location to the physical point is carried out by the portable device in accordance with the geographical map.”**

134. *See* Claim 1[f].

xii. Claim 15

- a. “The portable device as recited in claim 14, where the operations further comprises determining a set of instructions of how to move from the current location to the physical point as a destination.”**

135. JP973 describes claim 15. JP973 describes determining the route guidance to a set destination. EX1005, ¶¶ [0026], [0045] – [0046]. JP973 describes conventional navigation guidance in which step-by-step directions (or instructions) are provided for moving from a current location to the set destination. EX1005, ¶ [0043].

xiii. Claim 16

- a. “The portable device as recited in claim 15, wherein said showing the direction in the artistic map being displayed comprises: transforming the direction with respect to the geographical map to the artistic map being displayed; and transforming the instructions with respect to the geographical map to the artistic map being displayed.”**

136. JP973 describes claim 16 by indicating that the navigational direction and instructions (“set route” and the encircled triangle pointing north in FIG. 10) are determined using the geographical map data (vector map) but are displayed on the artistic map (raster map). EX1005, ¶¶ [0026], [0045] – [0046]. This means that JP973 transforms the set route from the coordinate system of the vector map data in which the route is calculate to that of the raster map in which the route is displayed.

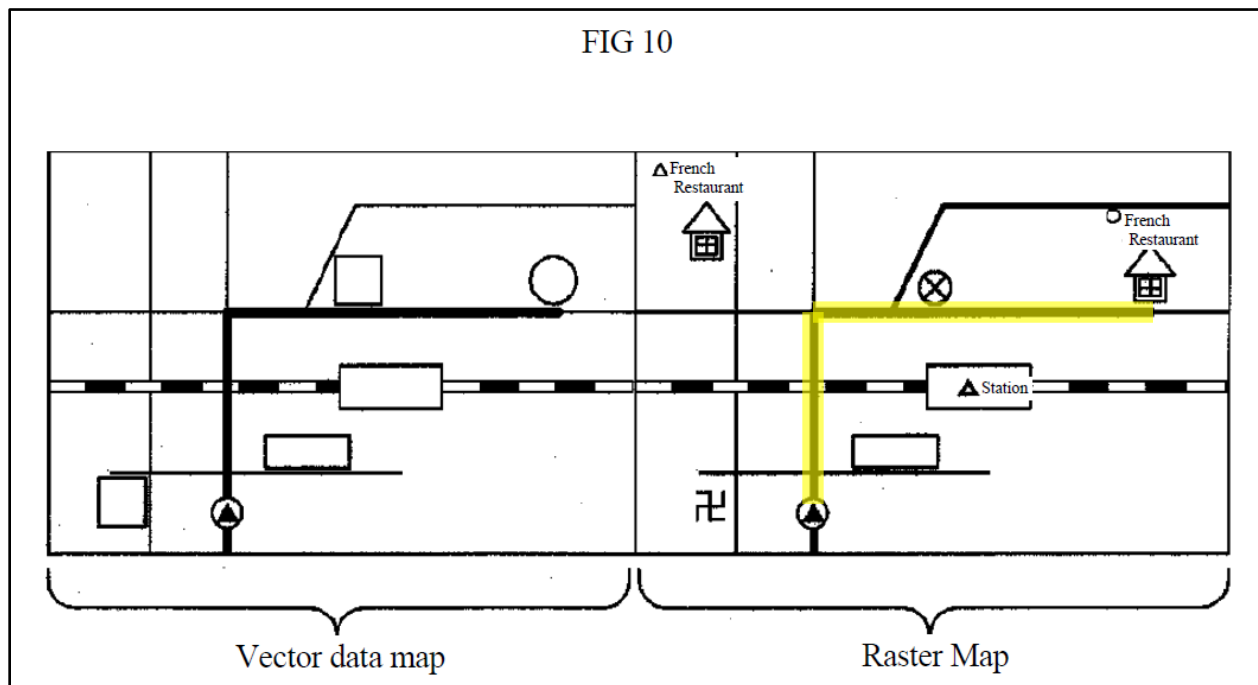
137. JP973 describes that “[t]he navigation device searches for a travel route to the destination based on the intersection data 72 and the road data 73.” EX1005, ¶ [0026]. JP973 therefore describes that the geographical map data (i.e., the map data stored in memory 70 and used to draw a vector map) and its absolute coordinate system (lat./long.) are being used to determine the navigational direction from the current location to the selected facility by “processes that are similar to conventional processes.” EX1005, ¶ [0041]. This navigational direction, in turn, is displayed on the “deformed” and out-of-scale raster map. EX1005, ¶¶ [0045] – [0046]. In order to do so, the navigational direction is transformed from the vector map to the raster map.

xiv. Claim 17

- a. “The portable device as recited in claim 16, wherein the direction shows how to move from the current location to**

the destination among a route, points of the route belong to a road network, so pixel coordinates of every of the points are used to transform geographic coordinates of the points to image coordinates of the points.”

138. JP973 shows the route guidance (navigational direction) on a road network:



EX1005, FIG. 10 (annotated)

139. “The navigation device searches for a travel route to the destination based on the intersection data 72 and the road data 73,” *i.e.*, a road network.

EX1005, ¶ [0026].

xv. Claim 18

a. “The portable device as recited in claim 17, wherein the operations further comprises connecting the pixel

coordinates of the points to show the route in the artistic map.”

140. JP973 describes the route being shown is displayed by connecting pixel coordinates of points of the route. EX1005, FIG. 10.

B. GROUND 2: Claims 1, 2, 4-9, and 11-19 are obvious over JP680 (EX1008) in view of JP973

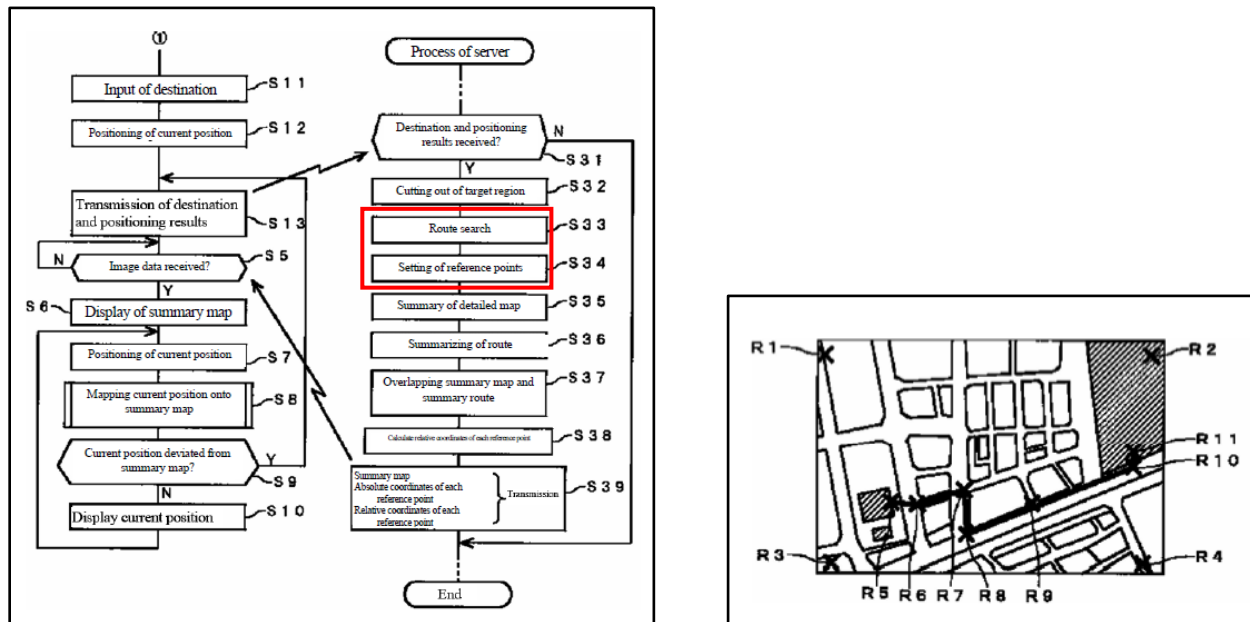
i. Overview of JP680

141. JP680 (EX1008) is entitled “Map Display Terminal, Map Display Device, and Wireless Terminal and Map Server Thereof,” and describes navigation systems “that can achieve high visibility even on a small screen of a mobile telephone or the like.” EX1009³, Abstract, ¶ [0052]. JP680 is in the same field of navigation devices and methods as the ’628 Patent.

142. JP680 describes a non-linearly scaled “summary” map in which route guidance is displayed on a portable navigation device, and a backend detailed geographical map which is not displayed and which navigation routes are calculated in the portable navigation device. EX1009, Abstract, ¶¶ [0040] – [0041], [0048] (“it is also possible to incorporate all functions into [a] wireless terminal”). An optimal route is calculated and determined by a “route search means” using the backend “detailed map” (*i.e.*, geographical map), and reference

³ EX1009 is a certified translation of JP680.

points of the route are set on this geographical map as shown in FIG. 12. EX1009, ¶ [0041].



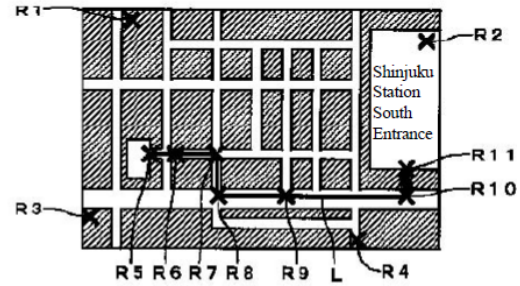
EX1009, FIG. 6 (L, annotated), FIG. 12 (R)

143. The determined route is converted to the relative coordinate system of the summary map by converting the coordinates of the reference points from the first coordinate system (“absolute coordinates”) of the geographic map (detailed map) to the second coordinate system (“relative coordinates”) of the artistic map (summary map). EX1009, ¶¶ [0043] – [0044]. “[A]s illustrated in FIG. 14, the relative coordinates of the nine reference points R1 to R11 are found by the reference point coordinate conversion means 210.” EX1009, ¶ [0044].

[FIG. 12]

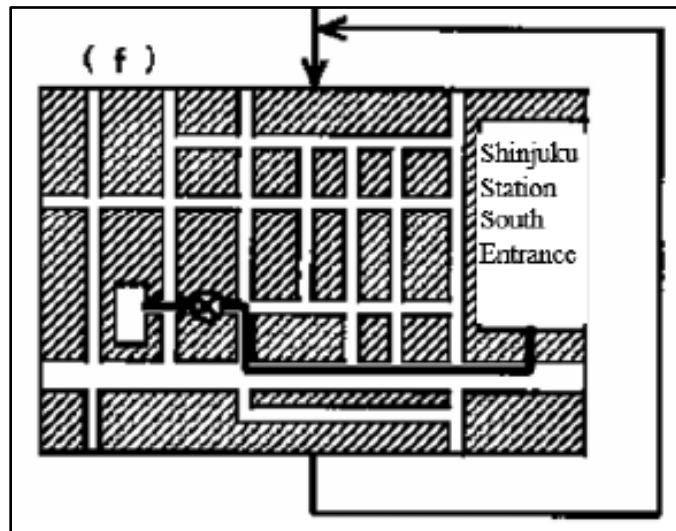


[FIG. 14]



EX1009, FIG. 12 (L), FIG. 14 (R)

144. As shown in Fig. 8(f) below, the converted route is then superimposed and displayed on the summary (artistic) map:

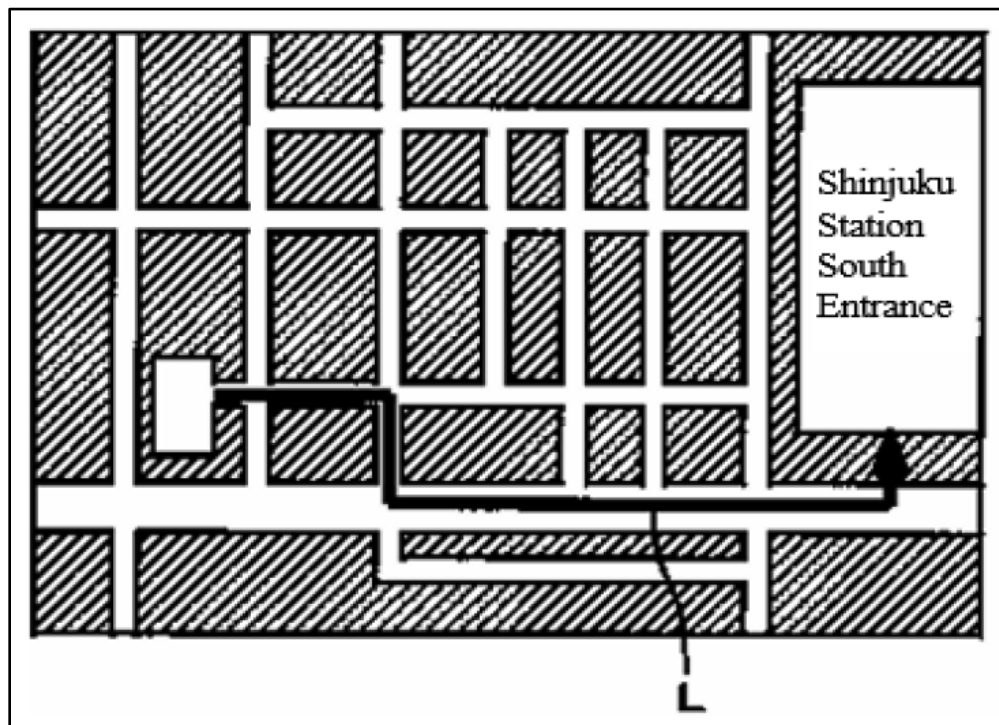


EX1009, FIG. 8(f)

ii. **Claim 1**

a. 1[pre] “A method for navigating in a particular area, the method comprising:”

145. As I mentioned above, even if the preamble of claim 1 is a requirement of the claim, JP680 describes the preamble of claim 1. JP680 also describes a navigation method as a “route search to destination” process shown in FIG. 6. EX1009, ¶ [0040]. A user can select the “route search to destination” function from the menu screen shown in FIG. 8(a), and then input a destination as shown in FIG. 8(d). A mapping server or a portable wireless terminal 1 then determines the optimal route and displays the optimal route on a summary map as shown in FIG. 13. EX1009, FIG. 6:S33, ¶¶ [0040], [0043].



EX1009, FIG. 13

146. As shown in FIG. 6, the “particular area” is Shinjuku Station South Exit, and the method navigates thereto by displaying the route and the current

position superimposed on the summary map, with the displayed current position “chang[ing] in synchronization with movement of the current position as illustrated in FIG. 8(f).” EX1009, ¶ [0046].

147. JP973 also discloses the preamble of claim 1. *See* Ground 1, Claim 1[pre].

b. 1[a1] “downloading from a network into a computing device an artistic map,”

148. JP680 describes downloading its summary map (*artistic map*) from a network (“a map server 2... via a wireless base station”). EX1009, ¶ [0014].

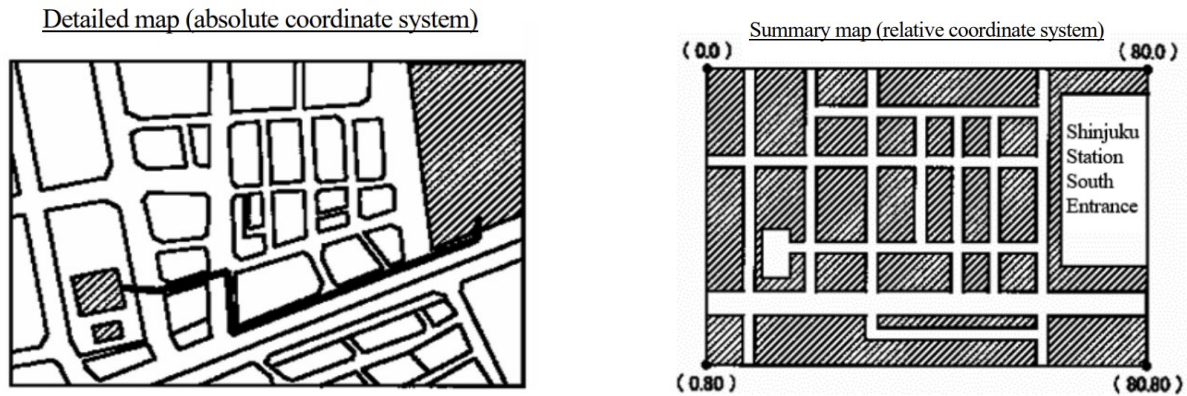
“Returning to the wireless terminal 1, summary map acquisition means 103 acquire a summary map (or a summary route map) returned from the map server 2.” *Id.*, ¶ [0024]. The “summary map” is an example of an “artistic map.”

149. As I indicated above, JP973 also describes the downloading operation of claim 1. *See* Ground 1, Claim 1[a1].

c. 1[a2] “the artistic map being non-linearly scaled and including various objects being exaggeratedly shown on the computing device to facilitate a user using the computing device to view and select one of the objects to navigate thereto in the artistic map”

150. JP680 describes this feature. The summary map (*artistic map*) in JP680 is non-linearly scaled and includes objects (landmarks) in an exaggerated

manner. The non-linear scaling can be seen in the comparison between the geographic (“detailed”) map in FIG. 3 and the summary map in FIG. 4:



EX1009, FIG. 3 (L) and FIG. 4 (R)

151. As can be seen above, the non-linear scaling is realized by the deformation and normalization of roads and objects (*e.g.*, Shinjuku Station). “FIG. 4 is a diagram illustrating one example of the summary map, and among the roads described according to the actual road width and orientation on the detailed map piece of FIG. 3, narrow roads are omitted, and all roads within a predetermined range of road widths are described having the same width. Moreover, the directions of the roads are unified in horizontal or vertical directions, and all the blocks are simplified into rectangles.” EX1009, ¶ [0020].

152. The objects in the summary map include destinations/landmarks (*e.g.*, Shinjuku Station) that are exaggerated by being “deformed and displayed emphasized and enlarged for a mobile wireless terminal.” EX1009, ¶ [0005].

153. JP680 describes that the wireless terminal 1 receives a user input of a destination: “the destination (here, Shinjuku Station) is input from the destination input means 102.” EX1009, ¶ [0040].

154. I also note that JP973 describes selecting an object on the artistic (summary) map, and also that such a method to designate a destination was well known in the art. For example, JP973 describes selecting a landmark object on a non-linearly scaled artistic map, *i.e.*, its “deformed” raster map. EX1005, FIGS. 3 and 5, ¶¶ [0033], [0020], [0030]; *see also* Ground 1, Claim 1[a2]. A POSITA would have been motivated to incorporate this selection technique into the destination input means of JP680 for the reason described in JP973: “When the destination can be set using this type of illustration map, there is an effect wherein even a person unfamiliar with the operation of the navigation device can easily set the destination.” EX1005, ¶ [0033].

155. A POSITA would have also found it obvious to incorporate JP973’s selection technique into JP680 as no more than a simple substitution of one known element for another to obtain predictable results. This feature was known in the art as described by at least JP973. EX1005, FIGS. 3 and 5, ¶¶ [0033], [0020], [0030]; *see also* Ground 1, Claim 1[a2].

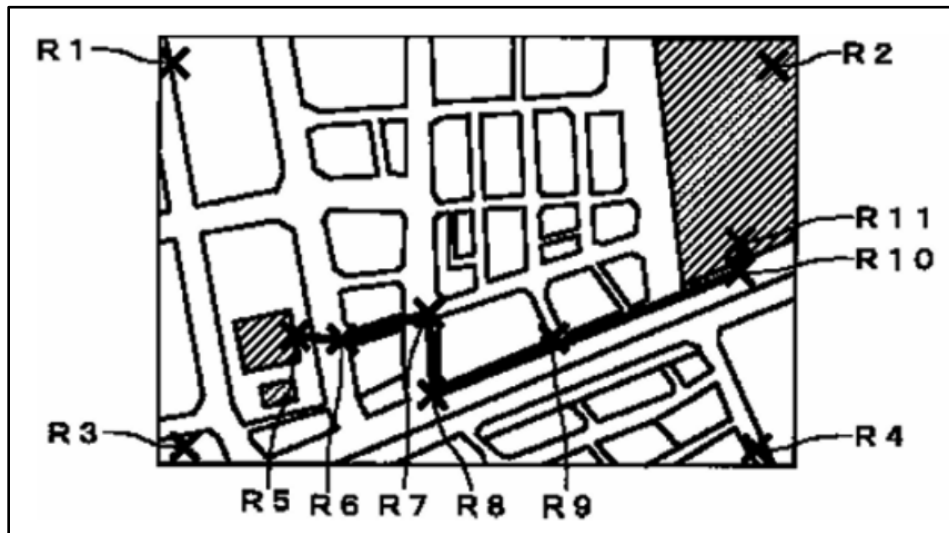
156. A POSITA could have substituted the known object selection method of JP973 for the destination selection means of JP680 with predictably successful results, namely, the selecting of a displayed object on a displayed map to designate its single recorded geographical coordinates as the destination for navigation. A POSITA would have no reason to doubt that this simple functionality as described by JP973 would be equally operable and successful in selecting JP680's POI (and its single geographical coordinate pair value) as a destination. Both JP973 and JP680 describe out-of-scale and deformed artistic maps including exaggerated objects, and both describe a single geographical coordinate pair value represented by each of the exaggerated landmark objects. EX1009, ¶¶ [0016], [0017], [0020] [0041], FIG. 4; EX1005, FIGs. 3-5, ¶¶ [0023], [0030], [0033], [0036], [0038] – [0039]. The relevant functionalities of the portable devices in both JP973 and JP680 are substantially identical: determining navigation directions using geographical map data that is not displayed (EX1005, ¶¶ [0026], [0041], [0045], [0051]; EX1009, ¶¶ [0040]-[0041], [0048]) and displaying the resulting route on a distinct artistic map (EX1005, ¶¶ [0045] – [0046]; EX1009, ¶¶ [0043] – [0044]). Integrating JP973's destination selection techniques into JP680 would therefore not alter the respective functions of either the POI selection and route calculation method of JP973 or the route calculation and display method of JP680. The results

would have been recognized as desirable, and the implementation predictable by a POSITA: enabling any user, including those “unfamiliar with the operation of the navigation device,” to “easily set the destination.” EX1005, ¶ [0033]; *see also* ¶ [0052].

**d. 1[a3] “wherein the computing device is portable,
equipped with navigation capability and provides a
traveling guidance based on a geographical map,”**

157. JP680 describes a portable wireless terminal such as a cellular phone to perform the disclosed map and route display methods. EX1009, ¶¶ [0005] – [0006].

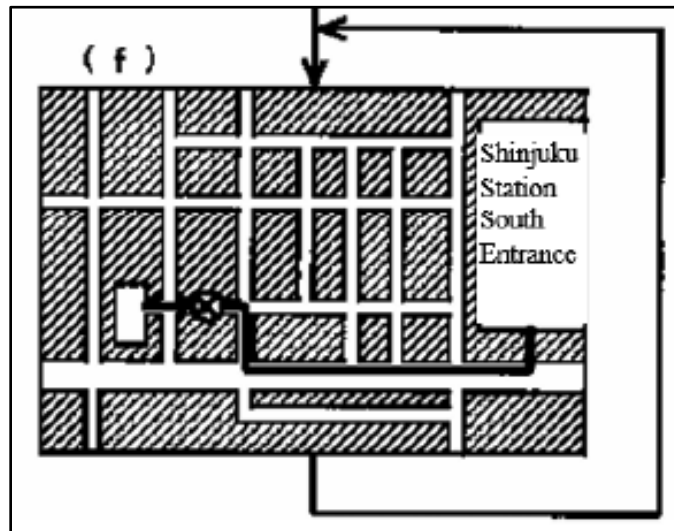
158. The traveling guidance in JP680 is shown in the flowchart of FIG. 6, in which an optimal route is calculated and determined by a “route search means” with reference to a geographic map (“detailed map”), and reference points of the route on the geographic map are set. EX1009, ¶ [0041]. This is shown in FIG. 12, in which the route is provided based on the geographical map and reference points R5-R11 are set along this route:



EX1009, FIG. 12

159. The determined route is then converted to the coordinate system of the summary map by converting the coordinates of the reference points from the first coordinate system (“absolute coordinates”) of the geographic map (detailed map) to the second coordinate system (“relative coordinates”) of the artistic map (summary map). EX1009, ¶¶ [0043] – [0044]. “[A]s illustrated in FIG. 14, the relative coordinates of the nine reference points R1 to R11 are found by the reference point coordinate conversion means 210.” EX1009, ¶ [0044].

160. As shown in FIG. 8(f), the summary map on which the route is superimposed is displayed by the wireless terminal 1.



EX1009, FIG. 8(f)

161. According to JP680, “all functions” can be incorporated into a wireless terminal. EX1009, ¶ [0048]. The entire mapping and routing processes therefore can be performed in the portable wireless terminal 1.

162. JP973 also describes this claim element. *See* Ground 1, Claim 1[a3].

e. 1[a4] “the artistic map is not used directly by the computing device for navigation,”

163. JP680 describes this feature. As I described above for Claim 1[a3], the artistic map (summary map) is not directly used for calculating the navigation route. Instead, the calculated navigation route in JP680 is based on the detailed (geographic) map and then converted for display on the summary map.

164. JP973 also describes this claim element. *See* Ground 1, Claim 1[a4].

f. 1[a5] “each of the objects is represented by a plurality of points on a display of the computing device,”

165. This feature is described by JP680. The landmarks (*e.g.*, Shinjuku station) in JP680 are each objects that are represented by several points constituting “rectangles” on the display of the portable wireless terminal. EX1009, ¶ [0020].

166. JP973 similarly describes this feature. *See* Ground 1, Claim 1[a5].

g. 1[a6] “and the geographical map is not being displayed on the display”

167. JP680 describes this feature. Only the summary map is displayed on the portable wireless terminal. The detailed map is not displayed. EX1009, ¶¶ [0005] – [0006], FIG. 8(a) – 8(f).

168. JP973 also describes this feature. *See* Ground 1, Claim 1[a6].

h. 1[b] “receiving in the computing device a selection on the one of the objects from the user as a selected object;”

169. JP680 by itself and also in view of JP973 describes this claim feature, or renders it obvious to a POSITA. *See* Claim 1[a2]; *see also* Ground 1, Claim 1[b].

i. 1[c] “determining by the computing device a pair of coordinates for one of the points on the selected object;”

181. As I discussed above, JP680 describes that the wireless terminal 1 receives a user input of a destination: “the destination (here, Shinjuku Station) is input from the destination input means 102.” EX1009, ¶ [0040]. Besides the

description found in JP680 that the destination can be input by selecting a point (or pixel) of the displayed object, such a selection was known in the art. JP973, for example, describes a selection of a displayed landmark object on a raster map, where that object is represented by several pixels. EX1005, FIGS. 3 and 5, ¶¶ [0031] - [0033], [0039]; *see also* Ground 1, Claim 1[c]. JP973 therefore determines the display coordinates, *i.e.*, “the position designated on the raster map, of the point at which the landmark object is selected. *Id.* A POSITA would have found it obvious to incorporate this destination selection technique of JP973 into JP680 for the reasons indicated above with respect to Claim 1[a2]. A POSITA would have been motivated to incorporate the destination selection teachings of JP973 to enable a user to more “easily set the destination,” particularly where an artistic map that is out of scale is used. EX1005, ¶ [0033]; *see also* ¶ [0052].

- j. 1[d] “transforming in the computing device the pair of coordinates to a physical point represented by a pair of latitude and longitude in the geographical map not being shown on the display, the points representing the selected object having different pairs of coordinates, but all of the different pairs of coordinates for the selected object corresponding substantially to the physical point when said transforming is performed;”**

170. JP680 identifies one pair (Q (x, y)) of absolute coordinates (physical point) represented by a pair of “latitude and longitude” for the selected destination. EX1009, ¶¶ [0016], [0017], [0041]. The absolute coordinates are in relation to the

geographic map. EX1009, ¶¶ [0009] (“detailed map managed in the first coordinate system,” *i.e.*, “absolute coordinate system”), [0018] (“A detailed map created on the basis of the absolute coordinate system”). The destination is visualized by a rectangle (several points/pairs of coordinates) on the summary map. *Id.*, FIG. 4. Therefore, all of the points of the landmark displayed on the summary map correspond to the same physical point of the destination.

171. Even if JP680 did not describe the operation of transforming a coordinate pair of a point (or pixel) of the displayed object selected by a user to the single pair of absolute coordinates for that object, such a transforming was known in the prior art. As I discussed above, JP973 for example describes this claim element. *See* Claim 1[d]. JP973 obtains a single lat./long. physical point of a selected facility in response to a user selecting “any location” of a two-dimensional display object representing that facility. EX1005, ¶¶ [0031] – [0033]. This means that all of the display points of the object correspond to the single physical point recorded for the facility represented by the object. EX1005, ¶¶ [0038] – [0041].

172. A POSITA would have found it obvious to incorporate this destination selection technique of JP973 into JP680 for the reasons set forth above with respect to Claim 1[a2]. Indeed, selecting a display (or Graphical User Interface (GUI)) object by designating any pixel point constituting that object was

the conventional method by which a GUI object was selected. *See, e.g.*, EX1013, 12:19-25, 12:39-42 (conventionally, a GUI object's boundaries define its activation/control area); EX1014, FIG. 6B, FIG. 11:S16, 6:35-43, 8:1-14, 8:43-59 (touch position coordinates of a user input at any point determined in order to identify selected landmark and set its single corresponding pair of lat./long. coordinates). A POSITA would have been motivated to incorporate the destination selection described in JP973 to enable a user to more "easily set the destination," particularly where an artistic map that is out of scale is used. EX1005, ¶ [0033]; *see also* ¶ [0052].

173. Further, a POSITA could have incorporated this feature into JP680 using known methods. That is, methods for transforming a selection of a two-dimensional graphical object at any point to the singular function of that object (*e.g.*, setting a single physical point as a destination, as described by JP973) were conventionally known. For example, JP351 discloses a known method of selecting a displayed object (*e.g.*, a building) at "any position" to obtain a single geographical (latitude/longitude) coordinate value for that object. EX1007, ¶ [0038]. Namely, JP351 discloses that this can be done based on a color change, *i.e.*, detecting that the selected point corresponds to a particular object based on color change in a downward direction from the selected point. EX1007, ¶ [0053].

Thorne also describes a known method for implementing JP973's landmark object selection into JP680, by using the boundaries of the graphical object to define its activation area. EX1013, 12:19-25, 12:39-42. Combining JP680 with JP973 using any of these known methods would not change the POI selection and route calculation method of JP973 or the route calculation and display method of JP680. Rather, a POSITA would have expected that the combination would have made it easier for a user to set the destination, by allowing any user, including those "unfamiliar with the operation of the navigation device," to "easily set the destination." EX1005, ¶ [0033]; see also ¶ [0052].

k. 1[e] "detecting a current location of the computing device in the geographical map;"

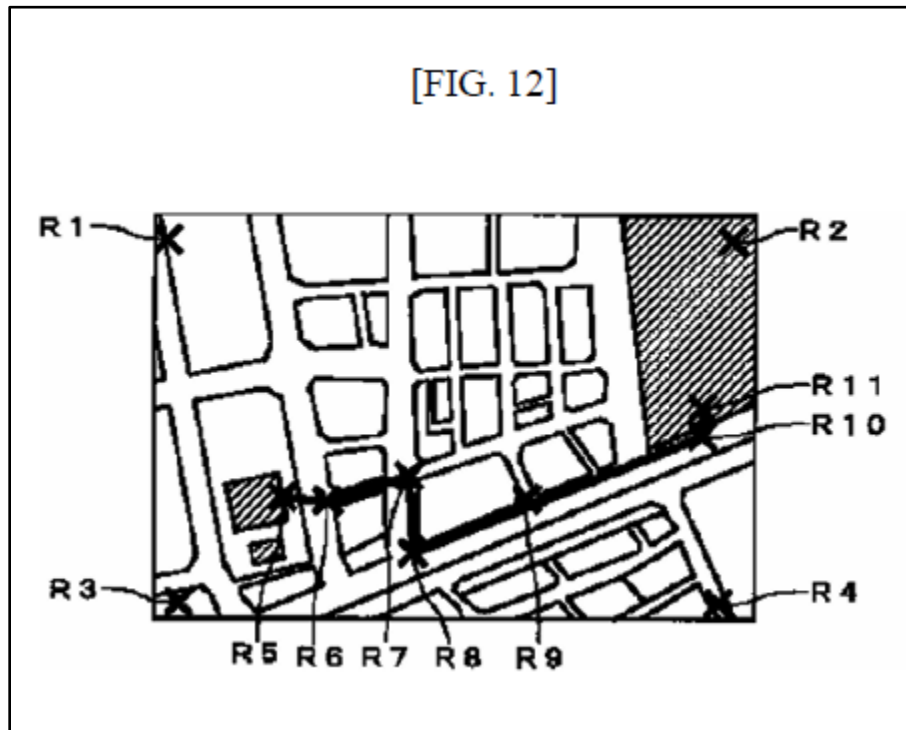
174. JP680 describes that the wireless terminal detects its current position "on a first coordinate system (hereinafter expressed as absolute coordinate system) on the basis of latitude and longitude." EX1009, ¶ [0016]. This first coordinate system, also referred to as the absolute coordinate system, is the coordinate system of the detailed map (geographic map). EX1009, ¶¶ [0009], [0018]. The absolute coordinates P (x, y) of the current position is located on the geographical map in order to determine the relevant portion ("cut-out") of the geographical map from which to generate the summary map. EX1009, ¶ [0018].

175. JP973 also describes this feature. *See* Ground 1, Claim 1[e].

l. 1[f] “determining according to the geographical map a navigational direction from the current location to the one of the objects being selected; and”

176. JP680 described this feature. As I described above, Claim 1[a3], the route guidance (navigational direction) from the current location to the selected destination is calculated using the geographic (detailed) map in JP680.

177. This is shown in the flowchart of FIG. 6, in which an optimal route is calculated and determined by a “route search means” with reference to a geographic map (“detailed map”), and reference points of the route on the geographic map are set. EX1009, ¶ [0041]. As shown in FIG. 12 below, the route is provided based on the geographical map and reference points R5-R11 are set along this route:



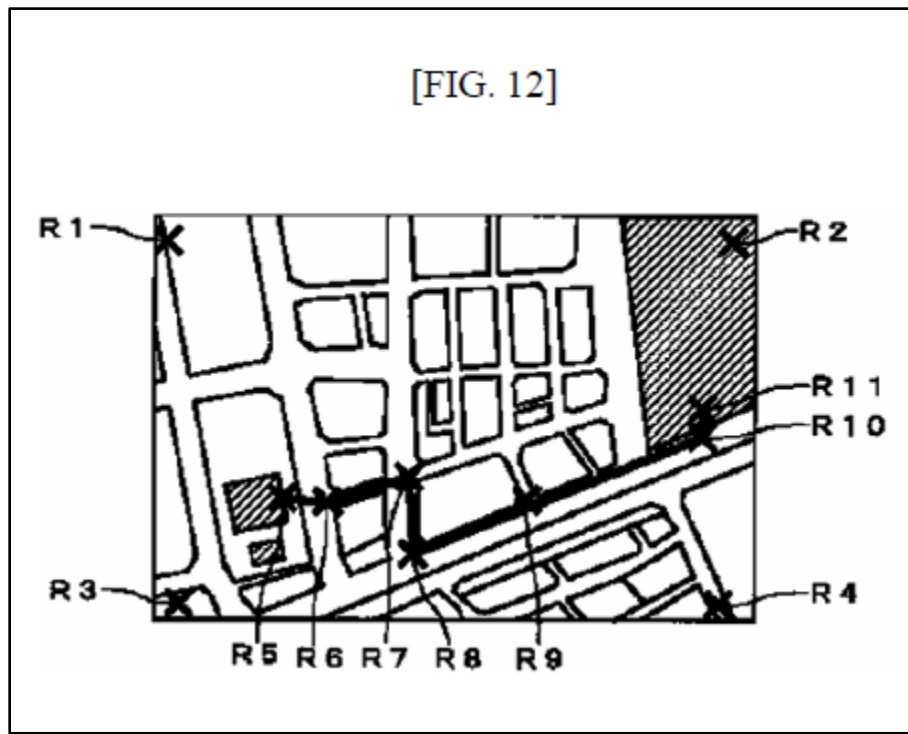
EX1009, FIG. 12

178. JP973 also describes this claim element. *See* Ground 1, Claim 1[f].

m. 1[g] “showing the navigational direction on the artistic map being displayed.”

179. JP680 describes both a “summary” map (*artistic map*) in which route guidance is displayed on a portable navigation device, and a backend detailed geographical map which is not displayed and which navigation routes are calculated in the portable navigation device. EX1009, Abstract, ¶¶ [0040] – [0041], [0048] (“all functions” can be incorporated into a wireless terminal). This is shown in the flowchart of FIG. 6, in which an optimal route is calculated and determined by a “route search means” with reference to a geographical map

(“detailed map”), and reference points of the route on the geographical map are set.
EX1009, ¶¶ [0040] – [0041]. As shown in FIG. 12 below, the route is determined
based on the geographical map and reference points R5-R11 are set along this
route:

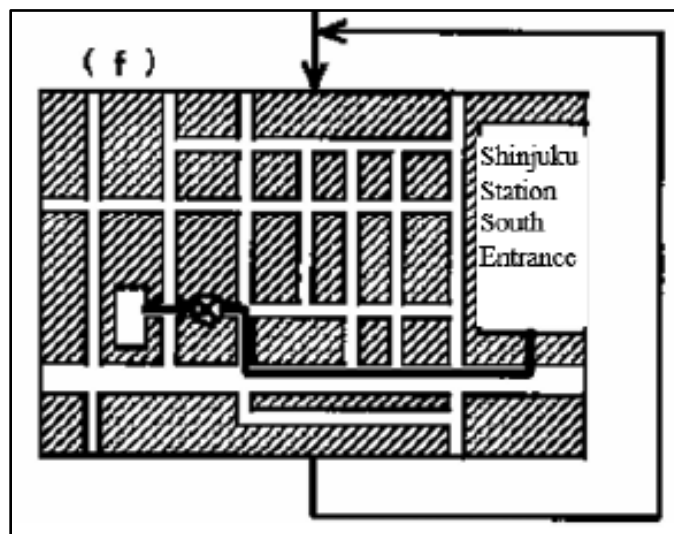


EX1009, FIG. 12

180. The determined route is then converted to the relative coordinate system of the summary map by converting the coordinates of the reference points from the first coordinate system (“absolute coordinates”) of the geographic map (detailed map) to the second coordinate system (“relative coordinates”) of the artistic map (summary map). EX1009, ¶¶ [0043] – [0044]. “[A]s illustrated in

FIG. 14, the relative coordinates of the nine reference points R1 to R11 are found by the reference point coordinate conversion means 210.” EX1009, ¶ [0044].

181. As shown in FIG. 8(f) below, the route (including a navigation directional arrow) is superimposed and shown on the summary map displayed by the wireless terminal 1.



EX1009, FIG. 8(f)

182. JP973 also describes this claim element. *See* Ground 1, Claim 1[g].

iii. Claim 2

- a. “The method as recited in claim 1, wherein the artistic map is a theme park map, each of the objects represents an attraction.”**

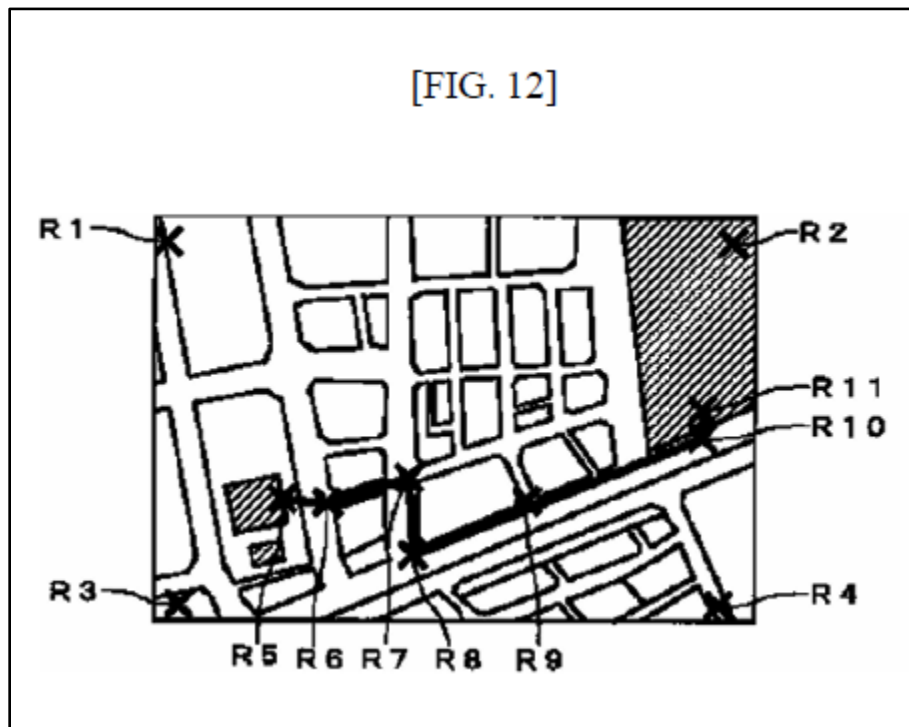
183. JP680 describes an artistic “summary map,” but does not specify that the map is a theme park map. A theme park map, however, was of course certainly known in the art at the time of the ‘628 patent. JP973 describes that its raster map

(*artistic map*) may be an illustration map such as a “sightseeing map[.]” EX1005, ¶ [0033]; *see also* ¶ [0029] (raster map data may be “in a magazine” such as a “travel information magazine[.],” including “facilities and stores”). A POSITA would have understood that a sightseeing map would include a theme park map in which the objects or points of interest are attractions. At the very least, a POSITA would have found it obvious to use a theme park map as the artistic map in either JP680 or JP973, as this would be nothing more than the simple substitution of one known element for another to obtain predictable results. First, JP680 and JP973 describe the claimed method, but do not explicitly indicate that their artistic maps are a theme park map. Second, a theme park map was known in the art. EX1001, FIG. 1, 1:46--54. Third, a POSITA could have substituted a theme park map for either reference’s artistic map, with predictable results. For example, JP973 describes that its raster map includes sightseeing maps. EX1005, ¶ [0033]. A POSITA would have understood that either of the maps in JP680 or JP973 could have been applied to a theme park.

iv. Claim 4

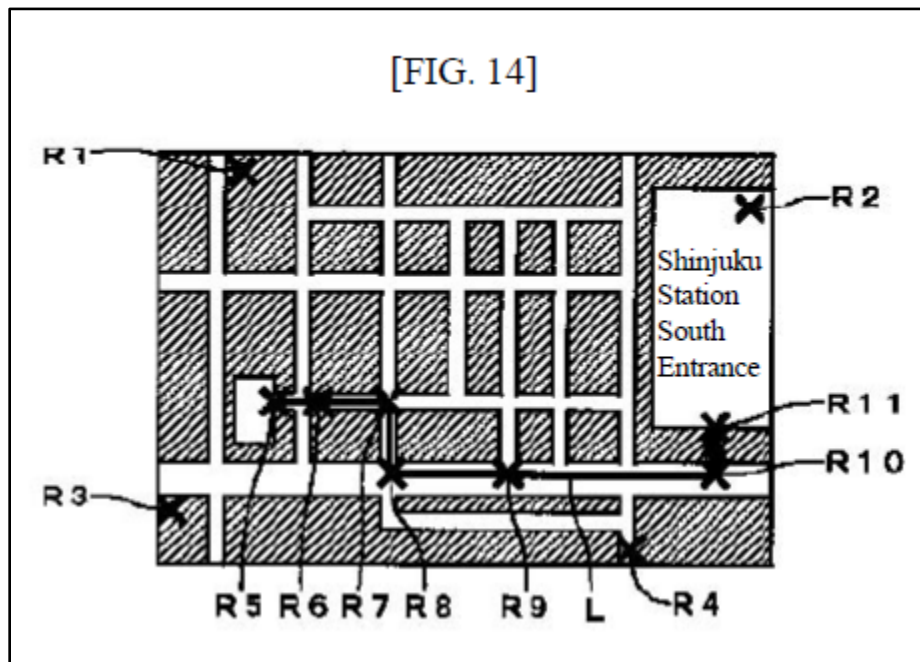
- a. “The method as recited in claim 1, wherein said showing the navigational direction on the artistic map being displayed comprises transforming in the computing device the navigational direction based on the geographical map to a navigation direction based on the artistic map.”**

184. JP680 describes a transformation of route guidance from a backend and detailed geographical map to a deformed and displayed artistic (summary) map. EX1009, Abstract, ¶¶ [0040] – [0041], [0048] (“all functions” can be incorporated into a wireless terminal.). As described in the flowchart of FIG. 6, an optimal route is calculated and determined by a “route search means” with reference to a geographical map (“detailed map”), and reference points of the route on the geographical map are set. EX1009, ¶ [0040]. As shown in FIG. 12 below, the route is determined based on the geographical map and reference points R5-R11 are set along this route:



EX1009, FIG. 12.

185. The determined route is then transformed from the absolute coordinate system of the geographical map (FIG. 12) to the relative coordinate system of the artistic map (FIG. 14, reproduced below) by converting the coordinates of the reference points from the first coordinate system (“absolute coordinates”) of the geographic map (detailed map) to the second coordinate system (“relative coordinates”) of the artistic map (summary map). EX1009, ¶¶ [0043] – [0044]. In particular, “as illustrated in FIG. 14, the relative coordinates of said the nine reference points R1 to R11 are found by the reference point coordinate conversion means.” EX1009, ¶ [0044].



EX1009, FIG. 14

186. JP973 also describes this feature. *See, supra*, Ground 1, Claim 4.

v. Claim 5

- a. “The method as recited in claim 4, further comprising determining a set of instructions of how to move from the current location to the physical point as a destination.”**

187. JP973 and JP680 both describe this feature, by determining the route guidance to a set destination. EX1005, ¶¶ [0026], [0045] – [0046]; EX1009, Abstract, ¶¶ [0040] – [0041]. JP680 determines reference points along turns, intersections, and junctions along the route. EX1009, [0042]. JP973 describes a conventional navigation guidance in which the step-by-step directions (or instructions) are provided for moving from a current location to the set destination. EX1005, ¶ [0043].

vi. Claim 6

- a. “The method as recited in claim 5, wherein said showing the navigational direction on the artistic map being displayed comprises: transforming the instructions with respect to the geographical map to the artistic map being displayed.”**

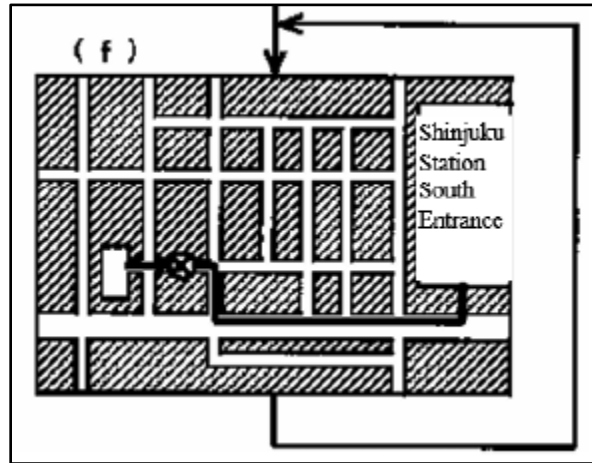
188. JP680 and JP973 both describe this feature, as I discussed above with reference to claim 4.

vii. Claim 7

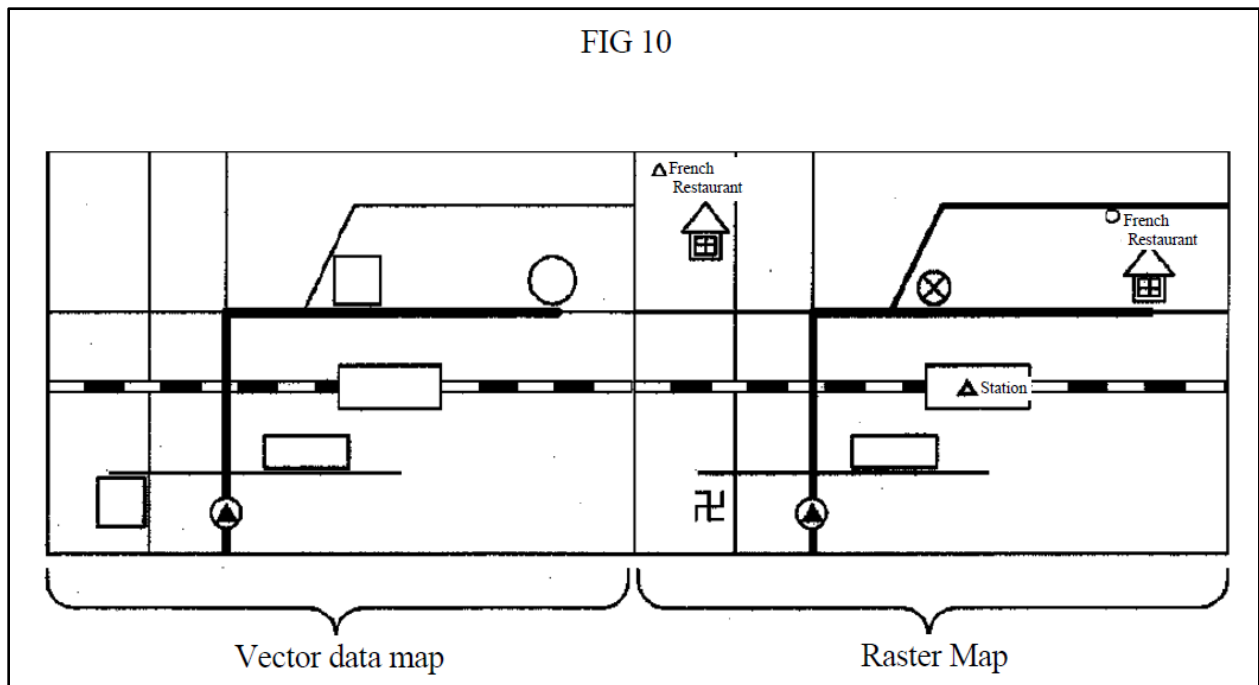
- a. “The method as recited in claim 6, wherein the navigational direction shows how to move from the**

**current location to the destination among a route, points
of the route belonging to a road network,”**

189. JP680 and JP973 both describe this feature as both show the route
guidance (navigational direction) on a road network:



EX1009, FIG. 8(f)



EX1005, FIG. 10; *see also* Ground 1, Claim 7.

b. “so pixel coordinates of each of the points are used to transform geographic coordinates of the points to image coordinates of the points.”

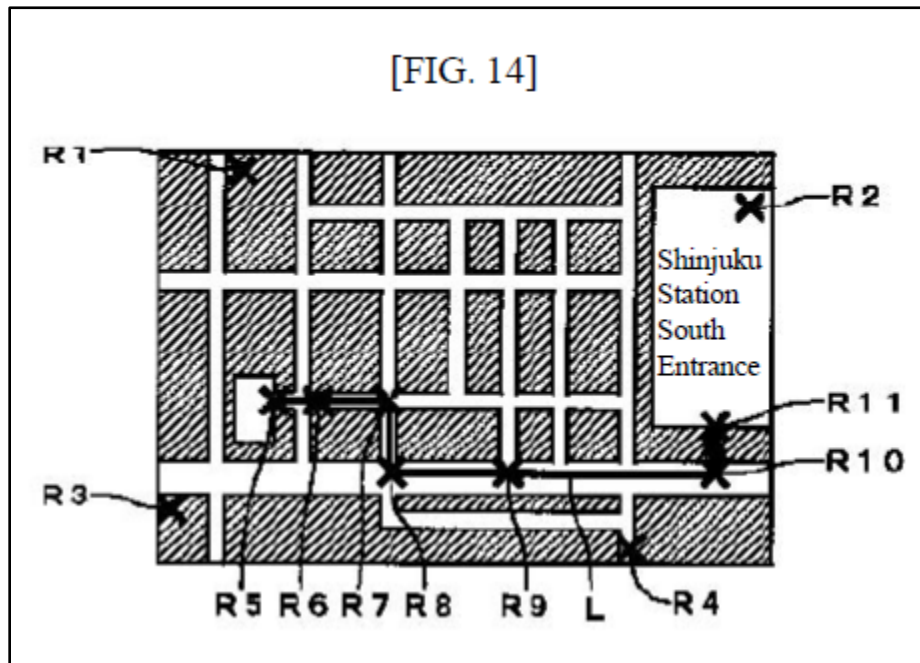
190. As I discussed above in connection with claim 4, both JP680 and JP973 transform or convert the route from geographical map data to artistic map data. JP680 describes this transformation is from the coordinates of the reference points in the first coordinate system (“absolute coordinates”) of the geographic map (detailed map) to the second coordinate system (“relative coordinates”) of the artistic map (summary map). EX1009, ¶¶ [0043] – [0044]. In particular, “as illustrated in FIG. 14, the relative coordinates of the nine reference points R1 to R11 are found by the reference point coordinate conversion means 210.” EX1009, ¶ [0044]. These relative coordinates correspond to pixel coordinates on the displayed summary image. EX1009, ¶¶ [0035] – [0037], FIG. 15. JP680 describes that the pixel coordinates of the points are being used in the transformation between coordinate systems.

viii. Claim 8

a. “The method as recited in claim 7, further comprising connecting the pixel coordinates of the points to show the route on the map.”

191. JP680 and JP973 both describe the route being shown by connecting pixel coordinates of points of the route. EX1009, FIG. 14; EX1005, FIG. 10. JP680 describes a process in which reference points converted from the absolute

coordinate system of the geographical map are determined in the relative coordinate system of the artistic map, and connected to show the route. EX1009, ¶¶ [0040] – [0045], FIG. 14.

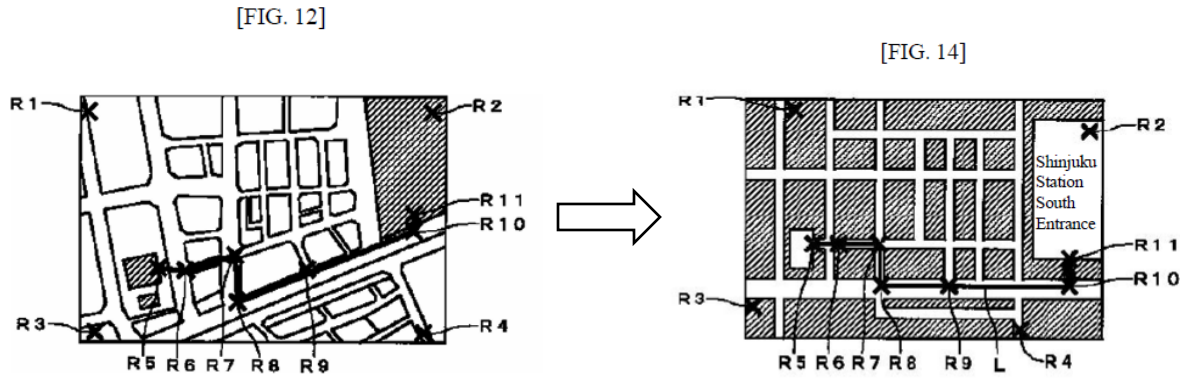


EX1009, FIG. 14.

ix. Claim 9

- a. “The method as recited in claim 5, wherein said showing the navigational direction on the artistic map being displayed is carried out according to a transformation derived from a deformation of the geographical map to the artistic map being displayed.”

192. JP680 states that its artistic map (summary map) is generated from a deformation of its geographical map (detailed map). EX1009, ¶¶ [0005], [0010], [0019] – [0024].



EX1009, FIG. 12 (L), FIG. 14 (R)

193. The coordinate conversion between the two maps is based on a correspondence of reference points between the two maps. EX1009, ¶¶ [0012] – [0013], FIG. 15.

[FIG. 15]

Reference point	Absolute coordinates	Relative coordinates
R 1	139.693, 35.690	10, 5
R 2	139.700, 35.690	78, 10
R 3	139.693, 35.688	3, 70
R 4	139.700, 35.688	80, 80
R 5	139.697, 35.689	35, 38

EX1009, FIG. 15

x. Claim 11

a. 11[pre] “A portable device for navigating a designated place, the portable device comprising:”

194. *See* Claim 1[pre] and 1[a3].

b. 11[a1] “a display screen configured to display an artistic map downloaded from a network,”

195. *See* Claim 1[a1] and 1[a2].

c. 11[a2] “the artistic map being non-linearly scaled and including various objects being exaggeratedly shown therein,”

196. *See* Claim 1[a2].

d. 11[a3] “each of the objects represented by a plurality of points,”

197. *See* Claim 1[a5].

e. 11[a4] “wherein the portable device is equipped with navigation capability and provides a traveling guidance based on a geographical map,”

198. *See* Claim 1[a3].

f. 11[a5] “the artistic map is not used directly by the portable device for navigation,”

199. *See* Claim 1[a4].

g. 11[a6] “and wherein the geographical map is not being shown on the display screen,”

200. *See* Claim 1[a6].

h. 11[b] “a memory for storing code;”

201. JP680 describes a portable device that includes a memory and that all functions are installed in the device. EX1009, ¶ [0050].

i. 11[c] “a processor executing the code to perform operations of:”

202. JP680 describes that its portable device may be a mobile telephone, a mobile PC, or a personal digital assistant (PDA). EX1009, ¶ [0050]. A POSITA would have understood that all of these computing devices implement functions by executing software code or instructions. *See, e.g.*, EX1005, ¶¶ [0017] – [0019].

203. JP973 also describes a processor (arithmetic processing unit 10 including a CPU 11) that performs the various navigation processes disclosed therein in accordance with programs (code) stored in memory (*e.g.*, ROM). EX1005, ¶¶ [0017] – [0019].

j. 11[d] “determining a pair of coordinates of one of the points representing an object being selected in the artistic map being displayed on the display screen;”

204. *See* Claim 1[b] and 1[c].

k. 11[e] “transforming the pair of coordinates of the one of the points to a physical point represented by a pair of latitude and longitude in the geographical map not being shown on the display, wherein the points representing the object have different pairs of coordinates, but all of the different pairs of coordinates correspond substantially to the physical point;”

205. *See* Claim 1[d].

l. 11[f] “detecting a current location of the computing device in the geographic map;”

206. *See* Claim 1[e].

m. 11[g] “determining according to the geographical map a direction from the current location to the physical point; and”

207. *See* Claim 1[f].

n. 11[h] “showing the direction in the artistic map being displayed.”

208. *See* Claim 1[g].

xi. Claim 12

a. “The portable device as recited in claim 11, wherein the selected object is represented by a plurality of pairs of coordinates, all of the pairs of coordinates are substantially transformed to the physical point represented by the latitude and longitude.”

209. *See* Claim 1[a5] and 1[d].

xii. Claim 13

a. “The portable device as recited in claim 12, wherein the artistic map is non-linearly scaled, where the physical point is located in the geographical map in accordance with the latitude and longitude.”

210. *See* Claim 1[a2] and 1[d].

xiii. Claim 14

a. “The portable device as recited in claim 13, wherein the determining of the direction from the current location to

the physical point is carried out by the portable device in accordance with the geographical map.”

211. *See* Claim 1[f].

xiv. Claim 15

- a. **“The portable device as recited in claim 14, where the operations further comprises determining a set of instructions of how to move from the current location to the physical point as a destination.”**

212. *See* Claim 5.

xv. Claim 16

- a. **“The portable device as recited in claim 15, wherein said showing the direction in the artistic map being displayed comprises: transforming the direction with respect to the geographical map to the artistic map being displayed; and transforming the instructions with respect to the geographical map to the artistic map being displayed.”**

213. *See* Claim 4.

xvi. Claim 17

- a. **“The portable device as recited in claim 16, wherein the direction shows how to move from the current location to the destination among a route, points of the route belong to a road network, so pixel coordinates of every of the points are used to transform geographic coordinates of the points to image coordinates of the points.”**

214. *See* Claim 7.

xvii. Claim 18

- a. **“The portable device as recited in claim 17, wherein the operations further comprises connecting the pixel coordinates of the points to show the route in the artistic map.”**

215. *See* Claim 8.

xviii. Claim 19

- a. **“The portable device as recited in claim 15, wherein the synchronizing of the direction with the artistic map being displayed is carried out according to a transformation derived from a deformation of the geographical map to the map being displayed.”**

216. *See* Claim 9.

C. GROUND 3: Claim 3 is obvious over JP680 in view of JP973 and JP706

i. Claim 3

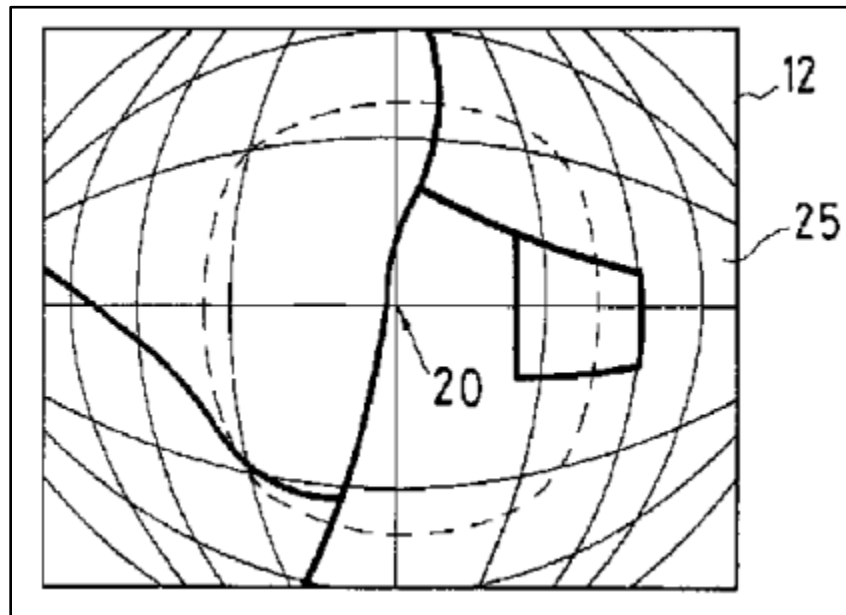
- a. **“The method as recited in claim 1, wherein the map is presented in such a way that a display resolution of the map goes lower from a center of the display to an edge of the display.”**

217. JP680 describes a summary map (*artistic map*) that is non-linearly scaled and includes objects (landmarks) in an exaggerated manner. EX1009, FIG. 4. “FIG. 4 is a diagram illustrating one example of the summary map, and among the roads described according to the actual road width and orientation on the detailed map piece of FIG. 3, narrow roads are omitted, and all roads within a

predetermined range of road widths are described having the same width. The directions of the roads are unified in horizontal or vertical directions, and all the blocks are simplified into rectangles.” EX1009, ¶ [0020]. JP973 also describes a non-linearly scaled map that is deformed and out of scale. EX1005, FIGS. 3 and 5, ¶ [0033] (“not... according to scale” and “deformed... illustration map”).

218. Neither JP680 or JP973 explicitly states that its map is displayed such that a resolution decreases from the center outward. Such a non-linear scaling of a navigation map, however, was well known at the time of the invention. For example, JP706 (EX1010) discloses a navigation system in which a resolution of a displayed map decreases, *i.e.*, a scale increases, from a center of the display outward. EX1011⁴, ¶ [0014]; FIG. 5; *see also* ¶¶ [0023], [0036]–[0037].

⁴ EX1009 is a certified translation of JP706.



EX1011, FIG. 5

219. A POSITA would have found it obvious to incorporate the non-linear scaling of JP706 into the non-linear map display of JP680 (or JP973); the prior art provides a motivation for the combination, “making the destination setting operation easy.” EX1011, ¶ [0014]; *see also* ¶¶ [0023], [0036]–[0037]. A POSITA would have reasonably expected that the modification would successfully allow a destination to be accurately set. *Id.*, ¶ [0037].

D. GROUND 4: Claims 10 and 20 are obvious over JP680 in view of JP973 and Kashiwazaki (EX1012)

i. Claim 10

- a. “The method as recited in claim 1, wherein there is a color map to define a color of each of the objects in the artistic map, and the method further comprising:**

adjusting the color for the each of objects in the artistic map, and generating a color definition map.”

220. Neither JP680 nor JP973 describe the use of a color map to define a color of each of the objects in the artistic map, or the process to adjust the color for the each of objects in the artistic map and generate a color definition map.

Nevertheless, a POSITA would have found such a modification to have been obvious in view of Kashiwazaki (EX1012). Kashiwazaki is directed to a “navigation apparatus capable of changing color scheme of a displayed picture.” EX1012, Title. Kashiwazaki is analogous art to the ’628 Patent because both are in the same field of endeavor of navigation devices and methods.

221. Kashiwazaki describes a color scheme that assigns colors and palette numbers to contents of a map, such as background, rivers, seas, green tracts, roads, and the like. EX1012, 3:18-4:4. Kashiwazaki describes “a color map to define a color of each of the objects” in the navigation map. Kashiwazaki also describes a process to choose the palette number for displaying the map (*i.e.*, adjust the specific color), and a process to adjust the color scheme when the display device being used to display the map has different characteristics from the display device used by the user to set the desired color scheme. EX1012, 5:17-28, 6:5-14.

222. I note that the claimed “generating a color definition map” is described in the ’628 Patent as a process for generating a map with adjusted color:

[T]he artificial [sic] map presents an artificial [sic] scene including all the objects ... When the artificial [sic] scene is displayed on a particular GPS receiver, the manufacturer [sic] of the GPS receiver can adjust the respective colors to suit the display screen of the GPS receiver. The revised artificial [sic] map is referred to as a color-definition map.

EX1001, 7:27-56. Kashiwazaki, therefore, describes generating a color definition map in the same way that the '628 Patent this operation.

223. A POSITA would have found it obvious to incorporate the color map and generating of a color definition map of Kashiwazaki into the map display of JP680 (or JP973); the prior art provides an explicit motivation for the combination, to “provid[e] a navigation apparatus which can adjust a color scheme to one preferred by a user, and which can easily change a scheme setting so that it becomes suitable for a display device actually used.” A POSITA would have reasonably expected that the modification would “provide[] improved legibility” of the displayed map (*e.g.*, depending on time of day/ambient light) and “support a drive effectively.” EX1012, 6:5-15; *see also* 1:9-37, 3:47-4:4.

ii. Claim 20

- a. “The portable device as recited in claim 11, wherein colors of various objects are displayed thereon in accordance with a color definition map that is generated after an adjustment of the colors originally produced according to a color map.”**

241. *See* Claim 10.