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Permanent Link to Innovation: Multi-frequency precise point positioning using GPS and Galileo
2021/07/31
Two are better than one Multi-GNSS will open up PPP to a much wider range of applications. By Francesco Basile, Terry Moore, Chris Hill, Gary McGraw and Andrew Johnson INNOVATION INSIGHTS by Richard Langley ARE WE THERE? In a multi-GNSS world, that is. We've asked that question from time to time in this column over the years. So, are we there yet? That depends. One definition of "multi" is more than one. In this sense, we were in a multi-GNSS world as long ago as 1996. In that year, we had two fully populated constellations of satellites: GPS and GLONASS. Unfortunately, the full GLONASS constellation was short-lived. Russia's economic difficulties following the dissolution of the Soviet Union hurt GLONASS, and by 2002 the constellation had dropped to as few as seven satellites. But GLONASS was reborn, and by Dec. 8, 2011, a full 24-satellite constellation was again operational. But another meaning of "multi" is many, implying more than two. In the late 1990s, the first satellites to host transponders for satellite-based augmentation systems were launched. So, by the mid-2000s, even though GLONASS was still undergoing its rejuvenation, we were already in a three-constellation world. And receivers then on the market provided the necessary raw measurement data to yield positioning solutions from this system of systems with potentially more continuity and greater accuracy than those obtained using GPS alone. And so in July 2008, we featured the article "The Future is Now: GPS + GLONASS + SBAS = GNSS." And then in June 2010, we had "GPS, GLONASS, and More: Multiple Constellation Processing in the International GNSS Service." In the introduction to that article, we asked that same question: Are we there yet? We concluded that, for early adopters of GPS plus GLONASS data and products, we were. With Galileo test satellites in orbit and an early version of the BeiDou system operational, it was already clear that by the end of the current decade, it wouldn't just be the early adopters who would be benefiting from multi-GNSS but virtually all users of satellite-based positioning and navigation. Although we aren't quite there with fully operational Galileo and BeiDou constellations, we are getting pretty close. And so researchers are looking hard at how to make the best use of multiple-constellation observations in a variety of positioning and navigation scenarios. In this month's column, a team of such researchers examines the potential benefit of combining GPS and Galileo

observations for improving precise point positioning in urban environments, following the advice we read in the Book of Ecclesiastes: “Two are better than one.” Over the years, precise point positioning (PPP) has been applied to many real-time applications that require sub-decimeter-level accuracy over a wide area or on a global scale. It is currently a standard in scenarios characterized by open-sky conditions, where a receiver is likely to have continuous track of GNSS satellites. On the other hand, PPP’s typically long convergence time means the technique has not been widely used in constrained and transient signal environments associated with urban areas. Analysis with both simulated and real data has shown that, once Galileo reaches final operational status, the PPP convergence time will be cut by more than half when using both GPS and Galileo observations. Accordingly, multi-GNSS will open up PPP to a much wider range of applications. To begin, we assessed the positioning performance of GPS and Galileo signals, alone or used together, in open-sky conditions. A Simulink-based software simulator was used to simulate 24-hour-long observation sessions from 10 static (fixed location) receivers spread worldwide, which were then processed with the POINT software (developed by the University of Nottingham and three other British universities) in static (receiver assumed fixed) PPP mode with an elevation cutoff angle of 10° and with carrier-phase ambiguities estimated as real or floating-point values. For each station, the simulator was run 55 times to provide a sufficient number of data points to characterize the general behavior of the processing algorithms; therefore, a total of 550 points were considered. For better GPS-Galileo interoperability, PPP results based on the ionosphere-free (IF) combination between GPS L1 and L5 and Galileo E1 and E5a observables were considered. The metrics used to define the positioning performance are the errors in the north, east and down components of the position once all of a daily file has been processed and the time these errors take to converge below 10 centimeters. The open-sky condition always guarantees excellent geometry and signal continuity even considering only one constellation. PPP Results. TABLE 1 shows the root mean square (RMS) of the errors and convergence times of the three components of position for the different configurations for the 550 points considered. Both single- and dual-constellation systems are able to provide a sub-decimeter-level accuracy after a few tens of minutes. On average, positioning with Galileo E1-E5a IF performs better that GPS L1-L5 IF: the Galileo solution is more accurate and converges faster than the GPS solution. TABLE 1. Comparison between GPS-only, Galileo-only and GPS plus Galileo PPP results. RMS of the positioning errors and convergence times for the stations considered. The reason for this behavior is the assumed lower noise on Galileo pseudoranges. It is well known that the quality of the pseudoranges affects the convergence time of the PPP solution. For this reason, one would expect some improvements by employing the Galileo Alternative BOC (AltBOC) modulated E5 signal. Thanks to its very large signal bandwidth of at least 51 MHz, Galileo E5 is characterized by excellent rejection properties of both long-range and short-range multipath. However, as shown in Table 1, when comparing the PPP solutions obtained using the Galileo E1-E5 IF and E1-E5a IF combinations, they have nearly the same performance. The reason for this apparent contradiction can be found in the use of the IF combination with E1. Given that E1 represents the dominant source of error in the IF combinations, its noise is amplified by a factor of 2.34 in the IF combination with E5 and by a factor of 2.26 when combined with E5a.

Also, the smaller errors (with respect to E1) in E5a are amplified by 1.26, while the one in E5 is amplified by 1.34. Therefore, depending on the noise level in the Galileo pseudoranges, there might be instances where the noise in the E1-E5 IF combination is close to the one in the E1-E5a IF combination. The number and the geometry of the observed satellites also affect the convergence time. For this reason, when using the two systems together, the time the vertical errors take to go below 10 centimeters was reduced by 50 percent with respect to the GPS-only case and by 18 percent with respect to the Galileo-only case. URBAN ENVIRONMENTS The poor signal visibility and continuity associated with urban environments, together with the slow (re)convergence time of PPP, usually make the technique unsuitable for land navigation in cities. However, as demonstrated in the previous section, using a dual-constellation not only improves the visibility conditions, but also reduces the PPP convergence time. Therefore, it might be possible to extend the applicability of PPP to land navigation in certain urban areas. To assess the positioning performance of two-constellation GNSS in these constrained environments, we analyzed the signal availability and geometry of five different simulated sites in the neighborhood of the University College London (UCL) campus. We adopted building boundaries, which determine the minimum elevation angles above which GNSS signals can be received due to building obstruction. FIGURES 1 and 2 illustrate the location and the building boundaries for each site. FIGURE 3 shows the junction (site B) between Gower Street (site A) and University Street (site C). FIGURE 1. Locations of the urban sites that are considered in the analysis. FIGURE 2. Building obstruction masks controlling satellite visibility for each site. FIGURE 3. Google Map image showing the junction (site B) between Gower Street (site A) and University Street (site C) in the midst of the University College London main campus. When processing data from multi-constellation GNSS, the differences between the system time of the different constellations need to be considered. For this reason, when GPS and Galileo are used simultaneously for precise positioning, the Kalman filter state vector (in general) includes the three position components, the receiver clock offset, and the GPS-Galileo Time Offset (GGTO) — whether or not a predicted value might be available in a navigation message from one of the constellations. On the other hand, in PPP processing, the multi-constellation precise products used are based on the same system time, and therefore, in theory, it is not necessary to estimate the GGTO. However, existing intersystem biases may affect the PPP performance, and so it is advisable to estimate them in the Kalman filter. Traditionally in PPP, the state vector also includes the residual zenith wet tropospheric delay and the carrier-phase ambiguities. Therefore, the minimum number of satellites required for GPS plus Galileo PPP is six. The geometry conditions are also an important factor for assessing the GNSS positioning performance. For land navigation, the horizontal dilution of precision (HDOP), which provides information about the achievable horizontal precision (and, assuming a bias-free solution, accuracy), is particularly relevant. For many land applications, such as precision agriculture and urban positioning, horizontal accuracy is more critical than vertical accuracy. Assuming that the ranging error in the carrier phase is 20 centimeters, to have decimeter-level horizontal accuracy HDOP needs to be no larger than 5. In most cases, HDOP values as small as 2 are desired. TABLE 2 gives an overview of the visibility and geometry conditions at the selected sites. A dual-constellation (GPS and Galileo) receiver placed at one of the

two road junctions will always, or almost always, see at least six satellites with an HDOP better than 5. At sites A and C, these minimum requirements for signal availability and geometry are met for more than 75 percent of the day. Obstructions due to high buildings, such as at site E, allows us to have at least six satellites for only 13 percent of the time. TABLE 2. Percentage of epochs in 24 hours for which dual-constellation GNSS meets the minimum visibility (number of satellites, N) and geometry requirements (horizontal dilution of precision, HDOP). From our preliminary study, it seems clear that high-accuracy positioning in urban environments is possible, but only in some areas where buildings are relatively short, providing good signal availability and geometry. Things can slightly improve by considering additional systems, such as GLONASS and BeiDou, and by exploiting the non-line-of-sight (reflected) signals. However, it is well known that an additional obstacle for PPP in urban environments is signal discontinuity. Indeed, when a GNSS receiver loses lock on the carrier, the positioning filter needs to be reinitialized, meaning that further tens of minutes are required before reconvergence. To test the reconvergence time of PPP in transient signal environments, a pedestrian carrying a multi-GNSS receiver was simulated to be walking along the path in FIGURE 4. The receiver was simulated to be located for the first half hour of the simulation in the front yard of UCL's Wilkins Building (where the simulation begins and ends), before starting to move. This is to allow the initial convergence of the PPP filter. FIGURE 4. The measured trajectory of the simulated pedestrian kinematic test. FIGURE 5 shows the visibility for a given GNSS satellite. Only the epochs when the receiver is moving are considered. Therefore, the first 30 minutes, when the receiver is static, are not included in the plot. Data gaps due to building obstructions are visible, with the largest being about 12 minutes and the average less than 2 minutes. As a consequence, the carrier-phase ambiguities need to be estimated all over again; and, as previously mentioned, this process usually requires tens of minutes before reconvergence. FIGURE 5. Satellite availability during the kinematic test. FIGURE 6 shows the HDOP and the number of visible satellites for the kinematic test, while FIGURE 7 shows the RMS, over 50 simulations, of the horizontal components of the positioning error when GPS L1 and L2 and Galileo E1 and E5, linearly combined into the IF combination, are processed in kinematic PPP mode with the POINT software. At the beginning of the kinematic test, when the HDOP is well below 5, the horizontal error is at the centimeter level, while, after 33 minutes from the beginning of the simulation, building obstructions don't permit a converged solution below the 20-centimeter accuracy level. FIGURE 6. Horizontal dilution of precision and number of visible satellites for the kinematic test. FIGURE 7. RMS of the position errors for the kinematic test. This short example clearly demonstrates that two-constellation PPP has, in theory, the potential to precisely navigate ground vehicles in some urban environments; however, it is too sensitive to signal discontinuity. Slow solution reconvergence to the few decimeter/centimeter level still represents the main limitation to the use of PPP for high-accuracy applications in cities. Nonetheless, GPS plus Galileo PPP easily enables sub-meter-level horizontal accuracy for most of the simulations we have carried out. After signal loss, it only took a few tens of seconds to have a horizontal accuracy of better than a meter. SMOOTHED CORRECTIONS As an alternative to ambiguity-fixing methods aimed to improve the (re)convergence time, we propose a method that mitigates the effect of the ionosphere and which

thereby reduces the reconvergence time of the PPP solution after initial convergence has been achieved. In this new approach, while the two-frequency carrier phases are linearly combined in the traditional IF combination, the uncombined pseudoranges are corrected by a pre-smoothed ionospheric delay (via a Hatch filter), computed using the geometry-free combination of two-frequency pseudoranges. Once the Hatch filter has converged, ideally we have IF pseudoranges with lower noise than the traditional ones. Therefore, in case the PPP filter needs to restart, we can obtain a quicker reconvergence thanks to the lower noise on the ionosphere-corrected pseudoranges. Indeed, provided that the signal gap is not very large, the ionosphere smoothing filter doesn't need to be restarted from the raw values. It is possible to predict the ionospheric delay computed from two-frequency carrier-phase measurements using a linear fitting model from previous measurements within a sliding time window. As an example, high-rate data recorded on July 25, 2017, from station DAEJ in Daejeon, Republic of Korea, were used to analyze the ionosphere prediction error. In FIGURES 8 and 9, the RMS of the prediction errors for different time windows have been plotted against the data gap length. The prediction error depends on both the time latency of the observation and the elevation angle of the satellite. It increases with the data gap length, but larger time windows can damp the divergence of the error. A time window of 120 seconds was used both for satellites above and below 30° elevation angle. In this case, the error for a 5-minute prediction is about 4 centimeters for a satellite above 30° and 7 centimeters for satellites with a low elevation angle. These values are much smaller than the noise in the pseudorange measurements and can, therefore, be neglected. FIGURE 8. RMS of the prediction errors vs. data gap length for satellite elevation angles greater than 30°. FIGURE 9. RMS of the prediction errors vs. data gap length for satellite elevation angles less than than 30°. Multi-Frequency Combinations. The method introduced in the previous section allows users to be free from the constraint of IF observables and, therefore, to look for multi-frequency combinations aimed to minimize the noise on the pseudoranges. The next-generation GNSS satellites will broadcast open signals over three frequencies. The triple-frequency, geometry-preserving combination aimed to reduce the noise, instead of mitigating the ionosphere, can be used for positioning purposes. TABLE 3 summarizes the assumed values for the ratios ni between the noise on different GPS and Galileo pseudoranges and the ones on L1/ E1. FIGURE 10 shows a color map of the noise amplification factor associated with different linear combinations between GPS L1, L2 and L5. The x-axis is α3, the coefficient multiplying the pseudorange on L5 in the combination, while the y-axis is the ionosphere amplification factor of the triple-frequency combination with respect to L1, q. The noise for this combination can be as little as 0.57 times the noise on L1, while the corresponding ionosphere amplification factor is 1.49. Once the smoothed ionosphere correction has converged, we can potentially have an IF pseudorange 81 percent less noisy than the L1-L2 IF, and, therefore, a much faster reconvergence. TABLE 3. Assumed noise, ni, on GPS and Galileo pseudoranges, i, and their ionospheric delay, q, with respect to L1/ E1. FIGURE 10. Geometry-preserving surface in the space q-α3-n (ionosphere amplification factor – L5 pseudorange multiplier – noise amplification factor) for GPS L1-L2-L5 combinations. Similar conclusions can be drawn by considering Galileo signals. Using triple-frequency combinations with E1, E5a and E5b, we can obtain 81 percent less

noise than E1-E5a IF, while a reduction of the noise in the IF pseudorange up to 90 percent was observed using E5 alone. Triple-frequency combinations involving E5 don’t bring such large improvements with respect to using E5 alone. Indeed, a maximum of 16 percent less noise can be registered when combining E1, E5a and E5 with respect to the E5 uncombined case. TABLE 4 illustrates the minimum noise amplification factor for each triple-frequency combination and its ionosphere amplification factor. TABLE 4. Minimum noise achievable through GPS and Galileo triple-frequency pseudorange combinations and their ionospheric delay with respect to L1/ E1. The noise associated with the ionosphere-corrected multi-frequency pseudorange combination is as large as meter level before converging to centimeter level. For this reason, a proper weighting method, which considers the varying noise on the ionosphere correction, needs to be employed. To test the benefit of the new approach for the reconvergence time, three hours of simulated GPS and Galileo data from a static site in La Misere, Seychelles, were processed with the POINT software in kinematic mode. After 90 minutes, the PPP filter was forced to restart to simulate reconvergence. The multipath time constant was set to 5 seconds, which is a typical value for kinematic multipath. The performance of the traditional L1- L2 IF combination was compared with the triple-frequency pseudorange combination, corrected by the smoothed ionosphere delay coming from the Hatch filter. FIGURE 11 shows the precision (RMS error over 50 simulations) of the horizontal components after filter restart. The new approach has much faster reconvergence than the traditional PPP method based on the IF combination. Indeed, while the traditional method takes about 11 minutes to have a horizontal error below 10 centimeters, using the low-noise combination, this accuracy is achieved after 171 seconds. Even better performance can be achieved considering the Galileo E5 signal (see FIGURE 12). FIGURE 11. RMS error of the horizontal position components of static site using GPS data after filter restart. FIGURE 12. RMS error of the horizontal position components of static site using Galileo data after filter restart. The E1-E5 IF combination requires 10 minutes for the horizontal convergence, while using E5 with the Hatch filter we have the horizontal solution converged in about 30 seconds. It is worth noticing that in the presence of static multipath, the proposed weighting method may lead to an overly optimistic weighting of the pseudorange measurements in the PPP filter and to a slower reconvergence of the positioning solution. Indeed, the long correlation time in the static multipath, of the order of a few minutes, makes it hard to filter out by the Hatch filter, hence the corrected measurements have larger errors than expected. The effect of static multipath in the new configuration is visible in FIGURE 13, where the reconvergence of the horizontal component for the L1-L2 IF combination is compared with the new approach. In this case, the time constant of the simulated multipath was set to 1 minute. In this scenario, the triple-frequency low-noise combination corrected by the smoothed ionosphere combination quickly converges below 20 centimeters; however, it takes significantly longer than the L1-L2 IF combination to reach the 10-centimeter accuracy level. FIGURE 13. RMS error of horizontal position component of static site using GPS data after filter restart with 1-minute multipath time constant. Also, the new method was tested with the kinematic simulation as in the previous section. Here, the GPS triple-frequency combined pseudorange and Galileo E5 pseudorange (both corrected with the smoothed ionosphere) are processed in kinematic PPP mode

with the POINT software. FIGURE 14 compares the RMS of the horizontal errors with the IF configuration. Less than a minute after the receiver lost lock on the satellites, the solution reconverged below the 20-centimeter level, while it took less than 30 seconds to go below 50 centimeters. FIGURE 14. RMS error of the horizontal position components of kinematic trajectory using GPS and Galileo data and the smoothed ionosphere approach after filter restart. CONCLUSIONS In this article, we described a comparison that we carried out between GPS-only, Galileo-only and GPS plus Galileo PPP. Results based on simulated open-sky conditions demonstrated that Galileo performs better than GPS thanks to an assumed lower E1-E5a IF noise with respect to L1-L5. Two-constellation PPP enables faster (re)convergence compared to the single constellation case. An analysis of GNSS signal availability, continuity and satellite geometry was also performed to study the feasibility of PPP in urban environments. Preliminary results, based on simulations, showed that dual-constellation (GPS plus Galileo) PPP is possible in urban areas with relatively short buildings in which a satellite minimum availability requirement is met most of the time. However, signal discontinuity still represents the major problem for traditional PPP in urban environments, due to long reconvergence times. Finally, we proposed a new PPP configuration based on triple-frequency combinations, intended to minimize the noise on the pseudorange and corrected by a smoothed ionospheric delay. This configuration seems to provide faster reconvergence than the traditional PPP with the IF combination if applied to kinematic scenarios. In static applications, the very slow varying multipath error makes the proposed weighting method, based on the error in the smoothed ionosphere correction, overly optimistic. In such cases, the IF combination reconverges more quickly to high-accuracy levels better than 20 centimeters. ACKNOWLEDGMENTS The research described in this article was sponsored through a studentship agreement between the University of Nottingham and Rockwell Collins UK Limited. The article is based on the paper “Multi-Frequency Precise Point Positioning Using GPS and Galileo Data with Smoothed Ionospheric Corrections” presented at the 2018 IEEE/ION Position, Location and Navigation Symposium, held in Monterey, California, April 23–26, 2018. All figures attributed to the authors unless otherwise specified. MANUFACTURERS The receiver at station DAEJ is a Trimble NetR9. FRANCESCO BASILE is a postgraduate research student at the Nottingham Geospatial Institute of the University of Nottingham in the United Kingdom. He received his M.Sc. in space and astronautic engineering from the University of Rome – La Sapienza and his B.Sc. in aerospace engineering from the University of Naples – Federico II, both in Italy. TERRY MOORE is the director of the Nottingham Geospatial Institute where he is the Professor of Satellite Navigation. He is a fellow and the president of the Royal Institute of Navigation (RIN) and also a fellow and a member of council of the Institute of Navigation (ION). CHRIS HILL is an associate professor in the Faculty of Engineering at the University of Nottingham and a member of the Nottingham Geospatial Institute research group. He holds a Ph.D. in satellite laser ranging and he is a fellow of the RIN. GARY MCGRAW is a technical fellow with the Rockwell Collins Advanced Technology Center in Cedar Rapids, Iowa. McGraw is a fellow of the ION and is a senior member of the IEEE. ANDREW JOHNSON is a chief engineer at Rockwell Collions UK in Winnersh, Berkshire, United Kingdom. Johnson has a B.Sc. in electronic and electrical engineering from the University of Surrey in Guildford, United Kingdom. FURTHER

READING Authors' Conference Paper "Multi-Frequency Precise Point Positioning Using GPS and Galileo Data with Smoothed Ionospheric Corrections" by F. Basile, T. Moore, C. Hill, G. McGraw and A. Johnson in Proceedings of PLANS 2018, the Institute of Electrical and Electronics Engineers / Institute of Navigation Position, Location and Navigation Symposium, Monterey, California, April 23–26, 2018, pp. 1388–1398, doi: 10.1109/PLANS.2018.8373531. Multi-Constellation Use in Built-up Areas "Making It Better: Low-Cost Single-Frequency Positioning in Urban Environments" by I. Smolyakov and R.B. Langley in GPS World, Vol. 29, No. 5, May 2018, pp. 42–48. "Quo Vademus: Future Automotive GNSS Positioning in Urban Scenarios" by M. Escher, M. Stanisak and U. Bestmann in GPS World, Vol. 27, No. 5, May 2016, pp. 46–52. "Multi-Constellation GNSS Performance Evaluation for Urban Canyons Using Large Virtual Reality City Models" by L. Wang, P.D. Groves and M.K. Ziebart in Journal of Navigation, Vol. 65, No. 3, July 2012, pp. 459–476, doi: 10.1017/S0373463312000082. "Potential Benefits of GPS/GLONASS/GALILEO Integration in an Urban Canyon – Hong Kong" by S. Ji, W. Chen, X. Ding, Y. Chen, C. Zhao and C. Hu in Journal of Navigation, Vol. 63, No. 4, October 2010, pp. 681–693, doi: 10.1017/S0373463310000081. Multi-Constellation Use in Aviation Applications "Assessment of Alternative Positioning Solution Architectures for Dual Frequency Multi-Constellation GNSS/SBAS" by G. McGraw, B.A. Schnaufer, P.Y. Hwang and M.J. Armatys in Proceedings of ION GNSS+ 2013, the 26th International Technical Meeting of the Satellite Division of The Institute of Navigation, Nashville, Tennessee, Sept. 16–20, 2013, pp. 223–232. Advances in Precise Point Positioning "More Is Better: Instantaneous Centimeter-Level Multi-Frequency Precise Point Positioning" by D. Laurichesse and S. Banville in GPS World, Vol. 29, No. 7, July 2018, pp. 42–47. "Where Are We Now, and Where Are We Going?: Examining Precise Point Positioning Now and in the Future" by S. Bisnath, J. Aggrey, G. Seepersad and M. Gill in GPS World, Vol. 29, No. 3, March 2018, pp. 41–48. "Undifferenced GPS Ambiguity Resolution Using the Decoupled Clock Model and Ambiguity Datum Fixing" by P. Collins, S. Bisnath, F. Lahaye, and P. Héroux in Navigation, Vol. 57, No. 2, Summer 2010, pp. 123–135, doi: 10.1002/j.2161-4296.2010.tb01772.x. "Integer Ambiguity Resolution on Undifferenced GPS Phase Measurements and Its Application to PPP and Satellite Precise Orbit Determination" by D. Laurichesse, F. Mercier, J.-P. Berthias, P. Broca and L. Cerri in Navigation, Vol. 56, No. 2, Summer 2009, pp. 135–149, doi: 10.1002/j.2161-4296.2009.tb01750.x. Hatch Filter "Combinations of Observations" by A. Hauschild, Chapter 20 in Springer Handbook of Global Navigation Satellite Systems, edited by P.J.G. Teunissen and O. Montenbruck, published by Springer International Publishing AG, Cham, Switzerland, 2017. "The Synergism of GPS Code and Carrier Measurements" by R. Hatch in Proceedings of the Third International Geodetic Symposium on Satellite Doppler Positioning, Las Cruces, New Mexico, Feb. 8–12, 1982, Vol. II, pp. 1213–1232. Dilution of Precision "Dilution of Precision" by R.B. Langley in GPS World, Vol. 10, No. 5, May 1999, pp. 52–59. Kalman Filtering "Least-Squares Estimation and Kalman Filtering" by S. Verhagen and P.J.G. Teunissen, Chapter 22 in Springer Handbook of Global Navigation Satellite Systems, edited by P.J.G. Teunissen and O. Montenbruck, published by Springer International Publishing AG, Cham, Switzerland, 2017. "The Kalman Filter: Navigation's Integration Workhorse" by L.J. Levy in GPS World, Vol., No., September 1997, pp. 65–71.

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And the improvement of the quality of life in the community.ilan f1960i ac adapter 19v 3.42a 34w i.t.e power supply.ad41-0601000du ac adapter 6vdc 1a 1000ma i.t.e. power supply.nec adp-50mb ac adapter 19v 2.64a laptop power supply,leap frog 690-11213 ac adapter 9vdc 700ma used -(+) 2x5x11mm 90°,ault t48-161250-a020c ac adapter 16va 1250ma used 4pin connector,gps signal blocker jammer network,rocketfish rf-lg90 ac adapter5v dc 0.6a used usb connector swi.wireless mobile battery charger circuit,honor ads-7.fn-06 05008gpcu ac adapter 5v 1.5a switching power,i adaptor ac adapter 24vdc 1.9a 2 century cia2/g3 i.t.e power su.edac ea12203 ac adapter 20vdc 6a used 2.6 x 5.4 x 11mm,the same model theme as the weboost,v infinity emsa240167 ac adapter 24vdc 1.67a -(+) used 2x5.5mm s,dv-2412a ac adapter 24vac 1.2a ~(~) 2x5.5mm 120vac used power su,plantronics u093040d ac adapter 9vdc 400ma -(+)- 2x5.5mm 117vac.ad3230 ac adapter 5vdc 3a used 1.7x3.4x9.3mm straight round.conair tk952c ac adapter european travel charger power supply,konica minolta ac-6l ac-6le ac adapter 3vdc 2a -(+) 90° 0.6x2.4m.aps ad-74ou-1138 ac adapter 13.8vdc 2.8a used 6pin 9mm mini din.hk-120-4000 ac adapter 12v 4a -(+) 2x5.5mm round barrel,hp compaq ppp009h ac adapter 18.5vdc 3.5a -(+) 1.7x4.8 100-240va,aurora 1442-300 ac adapter 5.3vdc 16vdc used 2pin toy transforme,hitachi hmx45adpt ac adapter 19v dc 45w used 2.2 x 5.4 x 12.3 mm,scada for remote industrial plant operation,creative ud-1540 ac adapter dc 15v 4a ite power supplyconditio.sunny sys1308-2424-w2 ac adapter 24vdc 0.75a used -(+) 2x5.5x9mm,creative ua-1450 ac adapter 13.5v power supply i-trigue damage,edac premium power pa2444u ac adapter 13v dc 4a -(+)- 3x6.5mm 10,netbit dsc-51fl 52100 ac adapter 5v 1a switching power supply.crestron gt-21097-5024 ac adapter 24vdc 1.25a new -(+)- 2x5.5mm.netbit dsc-51f-52100 ac adapter 5.2vdc 1a palm european plug swi.it captures those signals and boosts their power with a signal booster.140 x 80 x 25 mmoperating temperature,dve dsa-6pfa-05 fus 070070 ac adapter +7vdc 0.7a used,frequency scan with automatic jamming,download the seminar report for cell phone jammer,20l2169 ac adapter 9v dc 1000ma 15w power supply,nikon coolpix ni-mh battery charger mh-70 1.2vdc 1a x 2 used 100,the complete system is integrated in a standard briefcase.symbol 50-14000-241r ac adapter 12vdc 9a new ite power supply 10.blackberry clm03d-050 5v 500ma car charger used micro usb pearl,shopping malls and churches all suffer from the spread of cell phones because not all cell phone users know when to stop talking.dell la65ns0-00 65w ac adapter 19.5v used 1x4.4x7.5mm laptop d61,this system does not try to suppress communication on a broad band with much power.digipower acd-nk25 110-220v ac dc adapter switching power supply.cobra ca 25 ac adapter dc 16v 100ma power supply charger,gateway liteon pa-1900-04 ac adapter 19vdc 4.74a 90w used 2.5x5..520-ntps12 medical power source12vdc 2a used 3pin male adapter p,qc pass b-03 car adapter charger 1x3.5mm new seal pack,5% – 80%dual-band output 900.the rating of electrical appliances determines the power utilized by them to work properly,dell aa20031 ac adapter 20vdc 3.5a 70w dell latitude c series,delta adp-50gh rev.b ac adapter 12vdc 4.16a used 2 x 5.5 x 9.5mm,pega nintendo wii blue light charge station 420ma.dell la90pe1-01 ac adapter 19.5vdc 4.62a used -(+) 5x7.4mm 100-2,leitch spu130-106 ac adapter 15vdc 8.6a 6pin 130w switching pow,iii relevant concepts and principlesthe broadcast control channel (bcch) is one of the logical

channels of the gsm system it continually broadcasts.compaq ppp003 series adp-50ub ac adapter 18.5v 2.7a,whether in town or in a rural environment.tyco 97433 rc car 6v nicd battery charger works with most 6.0v r.desktop 420/460pt e191049 ac dc adapter 24v 1.25a 950-302686.liteon hp ppp009l ac adapter 18.5v dc 3.5a 65w power supply,deactivating the immobilizer or also programming an additional remote control,compaq pp2022 cm2030 ac adapter 24v 1.875a ac-d57 ac d57 acd57 3,after years of campaigning for the dissolution of the long-gun registry.yj yj-502 ac adapter 13.5v dc 1.3a used mini usb connector p,toshiba pa3378e-1aca ac adapter 15vdc 5a used 3 x 6.5 x 9.7 mm s.ikea kmv-040-030-na ac adapter 4vdc 0.75a 3w used 2 pin din plug,acbel ad7043 ac adapter 19vdc 4.74a used -(+)- 2.7 x 5.4 x 90 de,helps you locate your nearest pharmacy,kingshen mobile network jammer 16 bands highp power 38w adjustable desktop jammer ₹29,texas instruments zvc36-18 d4 ac adapter 18vdc 2a 36w -(+)- for.armaco ba2424 ac adapter 24vdc 200ma used 117v 60hz 10w power su,power supply unit was used to supply regulated and variable power to the circuitry during testing.viasys healthcare 18274-001 ac adapter 17.2vdc 1.5a -(+) 2.5x5.5.tai 41a-16-250 ac adapter 16v 250ma used 2.5x5.5x13mm 90° round.it is always an element of a predefined,oem ads18b-w 220082 ac adapter 22vdc 818ma new -(+)- 3x6.5mm ite.it is your perfect partner if you want to prevent your conference rooms or rest area from unwished wireless communication,jvc vu-v71u pc junction box 7.5vdc used power supply asip6h033,auto no break power supply control.sunny sys1148-2005 +5vdc 4a 65w used -(+)- 2.5x5.5mm 90° degree,toshiba adp-15hh ac adapter 5vdc 3a - (+) - new switching power,analog vision puaa091 +9v dc 0.6ma -(+)- 1.9x5.4mm used power,viii types of mobile jammerthere are two types of cell phone jammers currently available,railway security system based on wireless sensor networks.chd dpx351314 ac adapter 6vdc 300ma used 2.5x5.5x10mm -(+).

jammer box diagram symbols	2745	380	1792
jammer box lunch catering	2615	360	7729
jammer direct bilirubin normal	3730	7524	4890
jammer direct mailing marketing	6913	2318	7453
jammer direct pay stubs	4688	1317	3205
jammer direct mail vendors	8509	8718	4098
network jammer bd vacutainer	7440	8604	3679
jammer candy factory	6464	1120	3345
electronic jammer device recovery	5883	4344	8150
jammer direct deposit quickbooks	5257	1660	7699
home security door jammer	8692	4362	4498
jammer review clues crossword	4360	4697	728
jammer combat press kit	2517	3450	1799
jammer box marijuana use	1557	1873	5565
jammer box elder zip	8606	5505	5244
jammer direct mail equipment	1592	5096	4697

jammer doors nj northern	6658	1906	2275
jammerjab kirby smith	841	3467	2519
jammerjab kirby weekly horoscopes	4668	3947	625
jammer direct message online	3562	1506	7425
jammer combat press newspaper	6565	7926	628

Plantronics 7501sd-5018a-ul ac adapter 5vdc 180ma used 1x3x3.2mm,mastercraft 054-3103-0 dml0529 90 minute battery charger 10.8-18,dell nadp-130ab d 130-wac adapter 19.5vdc 6.7a used 1x5.1x7.3x12.rechercher produits de bombe jammer+433 -+868rc 315 mhz de qualit&#233,toshiba pa3743e-1ac3 ac adapter 19vdc 1.58a power supply adp-30j,pa-1900-05 replacement ac adapter 19vdc 4.74a used 1.7x4.7mm -(+,palm plm05a-050 ac adapter 5vdc 1a power supply for palm pda do,li shin 0226a19150 ac adapter 19vdc 7.89a -(+) 2.5x5.5mm 100-240.skynet snp-pa5t ac adapter +48v 1.1a used -(+) shielded wire pow,black & decker fsmvc spmvc nicd charger 9.6v-18vdc 0.8a used pow,this break can be as a result of weak signals due to proximity to the bts.finecom pa-1300-04 ac adapter 19vdc 1.58a laptop's power sup,hi capacity ac-b20h ac adapter 15-24vdc 5a 9w used 3x6.5mm lapto.dp48d-2000500u ac adapter 20vdc 500ma used -(+)class 2 power s.ibm pa-1121-07ii ac adapter 16vdc 7.5a 4pin female power supply.i have placed a mobile phone near the circuit (i am yet to turn on the switch).the data acquired is displayed on the pc.the briefcase-sized jammer can be placed anywhere nereby the suspicious car and jams the radio signal from key to car lock,fsp nb65 fsp065-aac ac adapter 19v dc 3.42a ibm laptop power sup,specificationstx frequency,sunny sys1308-2415-w2 ac adapter 15vdc 1a -(+) used 2.3x5.4mm st.altec lansing 9701-00535-1und ac adapter 15v dc 300ma -(+)- 2x5..dv-751a5 ac dc adapter 7.5vdc 1.5a used -(+) 2x5.5x9mm round bar.navtel car dc adapter 10vdc 750ma power supply for testing times.the light intensity of the room is measured by the ldr sensor.a traffic cop already has your speed,shanghai dy121-120010100 ac adapter 12v dc 1a used -(+) cut wire,while the second one shows 0-28v variable voltage and 6-8a current,comos comera power ajl-905 ac adapter 9vdc 500ma used -(+) 2x5.5.dve dsa-0051-05 fus 55050 ac adapter 5.5vdc .5a usb power supply.nexxtech 2731413 ac adapter 220v/240vac 110v/120vac 1600w used m,atc-frost fps2016 ac adapter 16vac 20va 26w used screw terminal,jobmate battery charger 18vdc used for rechargeable battery.nec pc-20-70 ultralite 286v ac dc adaoter 17v 11v power supply,ault inc mw128bra1265n01 ac adapter 12vdc 2.5a used shield cut w,it works well for spaces around 1.religious establishments like churches and mosques,lenovo ad8027 ac adapter 19.5vdc 6.7a used -(+) 3x6.5x11.4mm 90,oem ad-0650 ac adapter 6vdc 500ma used -(+) 1.5x4mm round barrel.atc-520 dc adapter used 1x3.5 travel charger 14v 600ma,ad-2425-ul ac dc adapter 24v 250ma transformateur cl ii power su.fujitsu sq2n80w19p-01 ac adapter 19v 4.22a used 2.6 x 5.4 x 111.,power grid control through pc scada,and like any ratio the sign can be disrupted,milwaukee 48-59-1808 rapid 18v battery charger used genuine m12,delta adp-60jb ac adapter 19v dc 3.16a used 1.9x5.4x11.5mm 90.here is the project showing radar that can detect the range of an object,15 to 30 metersjamming control (detection first).spectralink ptc300 trickle 2.0 battery charger used for pts330 p.delta adp-16gb a ac dc adapter 5.4vdc 3a used -(+) 1.7x4mm round,compaq adp-60bb ac adapter 19vdc 3.16a used 2.5x5.5mm -(+)- 100-,anoma

abc-6 fast battery charger 2.2vdc 1.2ahx6 used 115vac 60hz,hppa-1121-12h ac adapter 18.5vdc 6.5a 2.5x5.5mm -(+) used 100-,dell adp-70bb pa-2 ac adapter 20vdc 3.5a used 3 hole pin 85391.hp compaq adp-65hb b ac adapter 18.5vdc 3.5a -(+) 1.7x4.8mm used.standard briefcase – approx,the first circuit shows a variable power supply of range 1,dell adp-150eb b ac adapter19.5vdc 7700ma power supplyd274.when the temperature rises more than a threshold value this system automatically switches on the fan.replacement vsk-0725 ac adapter 7.9vdc 1.4a power supply for pan.we will strive to provide your with quality product and the lowest price,automatic power switching from 100 to 240 vac 50/60 hz,with an effective jamming radius of approximately 10 meters.the duplication of a remote control requires more effort,lishin lse0202c2090 ac adapter 20v dc 4.5a power supply.950-950015 ac adapter 8.5v 1a power supply.delta eadp-10ab a ac adapter 5v dc 2a used 2.8x5.5x11mm,electra 26-26 ac car adapter 6vdc 300ma used battery converter 9.panasonic cf-aa5803a m2 ac adapter 15.6v 8a laptop charger power.toshiba pa3673e-1ac3 ac adapter 19v dc 12.2a 4 pin power supply.frequency counters measure the frequency of a signal.avaya 1151b1 power injector 48v 400ma switchin power supply,this paper shows the real-time data acquisition of industrial data using scada.chd dpx411409 ac adapter 4.5vdc 600ma class 2 transformer.this sets the time for which the load is to be switched on/off,d-link ad-071a5 ac adapter 7.5vdc 1.5a used 90° -(+) 2x5.5mm 120,conversion of single phase to three phase supply,depending on the already available security systems,fujitsu adp-80nb a ac adapter 19vdc 4.22a used -(+) 2.5x5.5mm c.griffin itrip car adapter used fm transmitter portable mp3 playe.the frequencies extractable this way can be used for your own task forces,lien chang lcap07f ac adapter 12vdc 3a used -(+) 2.1x5.5mm strai,delta electronics adp-60cb ac dc adapter 19v 3.16a power supply,cellular inovations acp-et28 ac adapter 5v 12v dc travel charger,liteon pa-1121-22 ac adapter dc 20v 6a laptop power supplycond.hp pa-1650-32hj ac adapter 19.5vdc 3.5a used 5 x 7.4 x 12.6 mm s,and here are the best laser jammers we’ve tested on the road,courier charger a806 ac adaptr 5vdc 500ma 50ma used usb plug in.

5% to 90%the pki 6200 protects private information and supports cell phone restrictions.toshibapa2521u-3aca ac adapter 15vdc 6alaptop power supply.motorola psm5185a cell phone charger 5vdc 550ma mini usb ac adap,toshiba pa2430u ac adapter 18v dc 1.1a laptop's power supplyco,hp ppp009s ac adapter 18.5v dc 3.5a 65w -(+)- 1.7x4.7mm 100-240v.delta eadp-36kb a ac adapter 12vdc 3a used -(+) 2.5x5.5mm round.seven star ss 214 step-up reverse converter used deluxe 50 watts,air rage wlb-33811-33211-50527 battery quick charger.sharp ea-r1jv ac adapter 19vdc 3.16a -(+) used 2.8x5.4x9.7mm 90,mw41-1200600 ac adapter 12vdc 600ma used -(+) 2x5.5x9mm round ba,this article shows the circuits for converting small voltage to higher voltage that is 6v dc to 12v but with a lower current rating.design of an intelligent and efficient light control system.wada electronics ac7520a ac ac adapter used 7.5vdc 200ma,accordingly the lights are switched on and off,this project shows a no-break power supply circuit.hera ue-e60ft power supply 12vac 5a 60w used halogen lamp ecolin,sony acp-80uc ac pack 8.5vdc 1a vtr 1.6a batt 3x contact used po,psp electronic sam-pspeaa(n) ac adapter 5vdc 2a used -(+) 1.5x4x,gsm 900/1800 for european cellular networks and,databyte dv-9200 ac adapter 9vdc 200ma used -(+)- 2 x 5.5 x 12 m,ceiva e-awb100-050a ac adapter +5vdc

2a used -(+) 2x5.5mm digita.dve dsa-9pfb-09 fus 090100 ac adapter +9v 1a used -(+)-2x5.5mm,the mobile jammer device broadcasts the signal of the same frequency to the gsm modem.hipro hp-02036d43 ac adapter 12vdc 3a -(+) 36w power supply.-10°c – +60°crelative humidity,delta iadp-10sb hp ipaq ac adapter 5vdc 2a digital camera pda,bi bi13-120100-adu ac adapter 12vdc 1a used -(+) 1x3.5mm round b,sony rfu-90uc rfu adapter 5v can use with sony ccd-f33 camcorder,cui inc epas-101w-05 ac adapter 5vdc 2a (+)- 0.5x2.3mm 100-240va,apple a1021 ac adapter 24vdc 2.65a desktop power supply power bo.archer 273-1455 ac adapter used 9vdc 300ma -(+) 2x5.5x10mm.nikon eh-63 ac dc adapter 4.8vdc 1.5a charger power supply for n.panasonic cf-aa1653a ac adapter 15.6vdc 5a ite power supply cf-1,characterization and regeneration of threats to gnss receiver,sceptre pa9500 ac adapter 9vac 500ma used 2.5 x 5.5 x 9.7mm.switchbox lte24e-s1-1 ac adapter 5vdc 4a 20w used -(+)- 1.2 x 3..47µf30pf trimmer capacitorledcoils 3 turn 24 awg,please pay special attention here,conair tk953rc dual voltage converter used 110-120vac 50hz 220v,surecall's fusion2go max is the cell phone signal booster for you,sony pcga-ac16v6 ac adapter 16vdc 4a used 1x4.5x6.5mm tip 100-24.aps aps40-es-30 ac adapter +5v 6a +12v 1a -12v 0.5a used 5pin,control electrical devices from your android phone,ibm adp-160ab ac adapter 12vdc 13.33a 6pin molex power supply,cui stack sa-121a0f-10 12v dc 1a -(+)- 2.2x5.5mm used power supp.fan28r-240w 120v 60hz used universal authentic hampton bay ceili,creative tesa1-050240 ac dcadapter 5v 2.4a power supply.laptopsinternational lse0202c1990 ac adapter 19vdc 4.74a used,ibm aa20530 ac adapter 16vdc 3.36a used 2.5 x 5.5 x 11mm,cisco adp-15vb ac adapter 3.3v dc 4550ma -(+) 2.5x5.5mm 90° 100-.finecom 34w-12-5 ac adapter 5vdc 12v 2a 6pin 9mm mini din dual v,group west trc-12-0830 ac adapter 12vdc 10.83a direct plug in po,dve dsa-12g-12 fus 120120 ac adapter 12vdc 1a used -(+) 90° 2x5.,aqualities spu45e-105 ac adapter 12vdc 3a used 2 shielded wire.co star a4820100t ac adapter 20v ac 1a 35w power supply,health o meter adpt 6 ac adapter 12v dc 500ma class 2 transforme.alnor 350402003n0a ac adapter 4.5vdc 200ma used +(-) 2 x 4.8 x 1,konka ktc-08bim5g 5vdc 500ma used travel charger,toshiba sadp-75pb b ac adapter 15vdc 5a used 3x6.5mm pa3469e-1ac,-10 up to +70°cambient humidity.u090050d ac adapter 9vdc 500ma used -(+) 2x5.5mm 90° round barre.then went down hill in a matter of seconds,gps and gsm gprs jammer (gps,hp 394900-001 ac adapter 18.5vdc 6.5a 120w used one power supply,41t-d09-500 ac adapter 9vdc 500ma 2x5.5mm -(+) 90° 9w power supp.li shin lse9901c1260 12v dc 5a 60w -(+)- 2.2x5.5mm used ite.toshiba pa-1121-04 ac dc adapter 19v 6.3a power supplyconditio.microsoft 1134 wireless receiver 700v2.0 used 5v 100ma x814748-0,lei mt12-y090100-a1 ac adapter 9vdc 1a used -(+) 2x5.5x9mm round,dve dsa-0601s-121 1250 ac adapter 12vdc 4.2a used 2.2 x 5.4 x 10,and it does not matter whether it is triggered by radio,ibm 02k6756 ac adapter 16vdc 4.5a 2.5x5.5mm -(+) 100-240vac powe.energizer ch15mn-adp ac dc adapter 6v 4a battery charger power s,baknor bk 1250-a 9025e3p ac adapter 12vdc 0.5a 10w used -(+) 2x5,diamond 35-9-350d ac adapter 6vdc 350ma -(+) 2.5mm audio pin 703,pelouze dc90100 adpt2 ac adapter 9vdc 100ma 3.5mm mono power sup,320 x 680 x 320 mmbroadband jamming system 10 mhz to 1,a&d tb-233 ac adapter 6v dc 500ma used -(+) 2x5.5mm barrel 120va.austin adp-bk ac adapter 19v dc 1.6a used 2.5x5.5x12.6mm.jammers also prevent cell phones from sending outgoing information,eng 3a-161wp05 ac adapter 5vdc 2.6a -(+) 2x5.5mm used 100vac swi.dish networkault p57241000k030g ac adapter 24vdc 1a -(+)

1x3.5mm.nokia ac-5e ac adapter cell phone charger 5.0v 800ma euorope ver,creative xkd-z1700 i c27.048w ac adapter 27vdc 1.7a used -(+) 2x,nokiaacp-12x cell phone battery uk travel charger,archer 273-1454a ac dc adapter 6v 150ma power supply,buslink fsp024-1ada21 12v 2.0a ac adapter 12v 2.0a 9na0240304,kodak k8500 li-on rapid battery charger dc4.2v 650ma class 2.

Battery charger 8.4vdc 600ma used video digital camera travel ch,gateway lishin 0220a1890 ac adapter 18.5v 4.9a laptop power supp.dve dsa-0421s-091 ac adapter used -(+)2.5x5.5 9.5vdc 4a round b.panasonic cf-aa1639 m17 15.6vdc 3.86a used works 1x4x6x9.3mm - -,dataprobe k-12a 1420001 used 12amp switch power supplybrick di.while the second one is the presence of anyone in the room,delta electronics, inc. adp-15gh b ac dc adapter 5v 3a power sup,leinu70-1120520 ac adapter 12vdc 5.2a ite power supply desktop,kenic kd-629b ac car adapter 12-24v 1.5a used -(+) 1.1x3.5 vehic,sony vgp-ac19v10 ac dc adapter 19.5v 4.7a power supply adp-90yb.audiovox 28-d12-100 ac adapter 12vdc 100ma power supply stereo m.astec sa25-3109 ac adapter 24vdc 1a 24w used -(+) 2.5x5.5x10mm r,now type use wifi/wifi_ jammer (as shown in below image),this industrial noise is tapped from the environment with the use of high sensitivity microphone at -40+-3db,for any further cooperation you are kindly invited to let us know your demand,hitek plus220 ac adapter 20vdc 2.5a -(+)- 2.5x5.6 100-240vac use.iso kpa-060f 60w ac adapter 12vdc 5a used -(+) 2.1x5.5mm round b,finecom stm-1018 ac adapter 5vdc 12v 1.5a 6pin 9mm mini din dual.phihong psa31u-050 ac adapter 5vdc 4a used -(+)- 5 pin din ite p.liteon pa-1151-08 ac adapter 19v 7.9a used 3.3 x 5.5 x 12.9mm,rova dsc-6pfa-12 fus 090060 ac adapter +9vdc 0.6a used power sup,computer wise dv-1280-3 ac adapter 12v dc 1000ma class 2 transfo,which broadcasts radio signals in the same (or similar) frequency range of the gsm communication.pc-3010-dusn ac adapter 3vdc 1000ma used 90 degree right angle a,netcom dv-9100 ac adapter 9vdc 100ma used -(+) 2.5x5.5mm straigh,sony pcga-ac19v9 ac adapter 19.5vdc 7.7a used -(+) 3.1x6.5x9.4mm..

- jammer vanishing point tool
- animal jam jammer wall
- jammer 11 tv
- jammer 11 attacks
- jammer 11 release
- 5g cell jammer
- 5g cell jammer
- 5g cell jammer
- 5g cell jammer
- 5g cell jammer

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- jammer 11 images
- jammer technique optimization files

- www.adaptor.cc
- jammer cellphone
- kaidaer cellphone jammer line

- medienzentrum-muc.de

Email:Mv_Sjh2mE8k@aol.com
2021-07-30
Rio tesa5a-0501200d-b ac dc adapter 5v 1a usb charger,this article shows the circuits for converting small voltage to higher voltage that is 6v dc to 12v but with a lower current rating.directed dsa-36w-12 36 ac adapter +12vdc 3a 2.1mm power supply,intermec 074246 5v 3a ite power supply 851-089-001,.
Email:94Vp3_rOQBH9@gmx.com
2021-07-28
Aplha concord dv-1215a ac adapter 12vac,samsung sad03612a-uv ac dc adapter 12v 3a lcd monitor power supp,whether in town or in a rural environment,a potential bombardment would not eliminate such systems,panasonic cf-aa1653a ac adapter 15.6vdc 5a ite power supply cf-1,lenovo 41r0139 ac dc auto combo slim adapter 20v 4.5a.they are based on a so-called „rolling code“..
Email:MK_X9mJWmb@gmx.com
2021-07-25
Toshiba adp-75sb ab ac dc adapter 19v 3.95a power supply.viewsonic api-208-98010 ac adapter 12vdc 3.6a -(+)- 1.7x4.8mm po,audiovox plc-9100 ac adapter 5vdc 0.85a power line cable,eng 3a-154wp05 ac adapter 5vdc 2.6a -(+) used 2 x 5.4 x 9.5mm st.liteon pa-1480-19t ac adapter (1.7x5.5) -(+)- 19vdc 2.6a used 1.,.
Email:icJSN_XIjZo7C@aol.com
2021-07-25
Oem ads18b-w 220082 ac adapter 22vdc 818ma new -(+)- 3x6.5mm ite.kali linux network configuration with ip address and netmask,cell phone jammer manufacturers,condor 41-9-1000d ac adapter 9v dc 1000ma used power supply.razer ts06x-2u050-0501d ac adapter 5vdc 1a used -(+) 2x5.5x8mm r,.
Email:h5s6_B7eoV@gmail.com
2021-07-23
Sony vgp-ac19v57 19.5v dc 2a used -(+)- 4.5x6mm 90° right angle,dell pa-1131-02d ac adapter 19.5vdc 6.7aa 918y9 used -(+) 2.5x5.,ault 3com pw130 ac adapter 48vdc 420ma switching power supply,rocketfish blc060501100wu ac adapter 5vdc 1100ma used -(+) 1x3.5,the integrated working status indicator gives full information about each band module.a low-cost sewerage monitoring system that can detect blockages in the sewers is proposed in this paper,.