



Elaborarea dispozitivului de intrare al masuratorului de distanță la stația de urmarire la sol

Pa3pa60TKa BXOAH Opo ycT.pOMCTBa M3MepMTenJI
A3nbHOCTM AIIJI H339MHOM CTaHL\MM cne>KeHMst

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„_____” _____ 2017

Elaborarea dispozitivului de intrare al masuratorului de distanta la statiei de urmarire la sol

Pa3pa60TKa BXOAHOro ycTpOMCTBa M3MepMTenS1
AanbHOCTM AnS1 Ha3eMHOM CTaHMM cne>KeHMS1

Proiect de licenta

.1=!

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Chișinău 2018

ADNOTARE

in nota explicativa a proiectului de diploma se efectueaza analiza analogilor i a prototipurilor dispozitivului in curs de dezvoltare. Analiza metodelor de masurare a intervalului la tinta.

Scopul i sarcinile au fost determinate pcntru dezvoltarca dispozitivului de intrarc al contorului de distanta a statiei de urmarire a solului. Acesta este conceput pentru a determina coordonatele tinte i viteza de micare.

Al doilea capitol al tezei este o schema bloc a statiei de receptie parte, selectati baza elementului dorit, oscilatorul local calculat, un amplificator cu o caracteristica amplitudine logaritmica a unui detector i statia de urmarire fiabilitate portiune de primire. Se elaboreaza setul necesar de documentatie de proiectare.

ANNOTATION

In the explanatory note of the diploma project the analysis of analogs and prototypes of the device being developed is performed. The analysis of methods for measuring the range to the target.

The goal and tasks were determined for the development of the input device of the range meter of the ground tracking station. It is designed to determine the coordinates of the target and the speed of its movement.

In the second chapter of the thesis the structural diagram of the receiving part of the station is presented, the necessary element base is chosen. The local oscillator, the amplifier with a logarithmic amplitude characteristic, the detector and the reliability of the receiving part of the tracking station are calculated. The necessary set of design documentation is developed.

AHHOTAIDI

B noxcHHTeJibHOH 3anHcKe AHUJOMHoro npoeKTa BbmOJIHeH aHaJIH3 aHanopoe H npoTOTHoa p83pa6aTbBaeMoro ycTPOHCTBa, MeTO.IJ;OB H3MepeHHR .IJ;aJibHOCTH AO u;enH H onpe.IJ;eJieHJI u;eJib H 3a.IJ;aqH npH p83pa6oTKe BXO.IJ;Horo YCTPOHCTBa H3MepHTem1 .IJ;aJI>HOCTH H83eMHOH CTaHI.I;HH CJie)KCHHR. OHa npeAHaTafeHa AM onpeAeJICHHR KOOp.IJ;HHaT u;eJIH H CKOpOCTH ee nepeMeiu;eHHR.

Bo BTopoil rnae .IJ;HUJOMHo:H pa6oTJI npeACTaBJieHa CTPYKTYPHM cxeMa npHeMHOH qacTH CTaHI.I;HH, BJI6paHa Heo6XO,IJ;HMM '.J)JICMCHTHM 683a, pacqHTaHd reTepO.IJ;HH, ycrHHTeJib c JioraHkI>MHqecKOH aMJIHTYAHOH xapaKTePHCTHKOH, ACTeKTop H HMC)KHOCTb npHeMHOH qacTH CTaHI.I;HH CJIC)KeHHR, a TaK)Ke p83pa6oTah Heo6XO,IJ;HMbIH KOMIJICKT KOHCTPYKTOPCKOH AOK)'MCHTau;1n.

B HacTo.smee epeM.si: OtfеHb 6ypHo paJeusaeTc.si: aeuauuoHHOe coo6meHue. Eonbmoe KOJIHfeCTBO B03,llymHb X cy.noe (CaMOJieTOB, BePTOJieTOB H T.n.) cocne.noTOtfеHHbX 8 OTHOCHTeJibHO MaJIOM npOCTpaHCTBe Tpe6yeT onne.neneHHbX Mep.llJI.sl IOBblleHHsl 6e3ollaCHOCTH noneTOB. 3Tu Mepbl HeB03MO>KHbl 6e3 pa.3pa60TKH COOTBeTCTBYIOI{HX pa.nuoTeXHHfeCKHX cne.ncTB, KOTOpl>1e onne.neJ.slOT KOOp,IlHHaTbB03,llyllHbX cy.noe, CKOпOCTH HX nepeMeIl{eHH.sl B 3a.naHHOM nanpaeJieHHH, TO eCTb 6e3 pa.3pa6oTKH COOTBeTCTBYIOI{HX pa,IlHOJIOKaUHOHHbX ycTpoi:crn.

Pa.nuoJIOKaJ.J,HR - 0611aCTb HayKH H TeXHHKH, npe,wdeT KOTOpoi - Ha6110.neHHe pa.JIH'iHbIX o6oeKTOB (yeneii) pa,IlHOTeXHHqeCKHM MeTO,llaMH: HX o6Hapy>KeHHe, pacn03HaBaHHe, onne.neneHHe HX KOOp,IlHHaTb CKOпOCTH H .rp.

Pa.JIHIfalOT aKTHBHBJO H naccHBHBJO pa.nHonoKauHH,пH aKTHBHOBH pa.nHonoKauHH o6oeKT o6nyqaeTCR pa,IlHOBOJIIHaMH, nocblJaeMblMH pa,IlHOJIOKaUHOHHOii: CTaHyHeit (PJIC), B pe3yl11>TaTe qepo B03HHKaJOT CHpHaJibl OT o6oeKTa.AKTHBHBJI pa,IlHOJIOKaUHR, B CBOIO oqene.n1>, no.npaJ.neJIRETCR Ha pa.nHOJIOK8UHIO crraCCHBHbIM H aKTHBHbIM OTBeTамH.

пH pa,IlHOJIOK8UHH c naccHBHb M OTBeTOM o6Hapy>KeHHe npOH3BO,IlRT no CHpHaJiy, oTpa>KeHHOMY OT o6oeKTa nocne o6nyqeh.sl: ero 3JieKTJ>OMarHHThblMHBOJIIHaMH. B noM cnpiae CHpHaJI, H3JiyqaeMb H PJIC, HaJdbalOT 3OH,IlHpYJOI{HM, a CHpHaJI, npHXO)ljlIl{Hli OT yeh, - OTpa>KeHHblM HJH 3XO-CHpHaJIOM. 3HatfeHHe OTJ>a>KeHHOpo CHpHaJia 3BHCHT OT OTpa>K810I{HX CBOHCTB06'LeKTa.

пH pa,IlHOJIOK3I.J,HH c aKTHBHbIM OTBeTOM o6Hapy>Kenue npOH3BO,IlRT no CHpHany, peTJ>aHCJIHpoeaHHOMY o6oeKTOM. flPH 3TOM npRMOH CHpHaJI HaJdbalOT JapnoCHb M, a CHpHaJI, npHXO. IlRll{HH OT yeh,- orneTHLIM. PeTpaHCJIRUHOHHYJO annapary, HaxO, IlRll{YJOCR Ha o6oeKTe, HMеHYJOT OTBeT'iHKOM);.l MHTeHCHBOCTb OTBeTHOpo CHpHana JaBHCHT OT MOU{HOCTH ycTaHOBJieHHoro Ha o6oeKTe peTJ>aHCJIRUHOHHo po nepe.naT'iHKa. J];anBOCTb .neifcTBHR 3THX PJIC HamHoro 60111>llle .nanDHOCTH .neicTBHR PJIC c naccHBHbIM OTBeTOM. O.nHaKo TakHe PJIC Mory pa6oTatb TOJbKO co «CBOHMH» o6oeKTамH. Mx 8 OCHOBHOM HCil01b3YJOT .llJI.sl conpOBO)l{,IlleHHR paKeT H .rp.rHX o6oeKTOB, o6Jia)laloI{HX c11a61>MH OTpa>KaOIl{HM CBOHCTBaMH, a Tak>Ke .llJI.sl Oil03HaBaHH.sl «CBOHX» o6oeKTOB.

лcCHBHBJI pa.nuoJioKauHR OCHOBaHa Ha rrpHeMe co6cTBeHHOpo pa.nHOH3JiyqeHH.sl o6oeKTOB. пJIC c rraccHBHOBH pa.nHOJIOKauHeH He HMeeT rpe.naT'iHKa. OHa HMeeT JIHllb nanpasnenHYJO rrpHeMHYIO aHTeHHY, ynaBJIHBalOIlzyIO HJiy'ieHHR o6oeKTa, rrpueMHHK, yчJIIHBalOIl{Hii: npHRTb e pa,IlHOCHpHaJib , H YCTJ>OHCCTBa, c IDMOIl{blO KOTOpb X rrpOHCXOMT perycTpaH.sl: H aHaJIH3 3THX CHpHaJIOB. TakHe пJIC HCilOJlb3YJOT .llJI.sl HCCJie,IOB3HHR RBJieHHH,

npOHCXO,ZVIUHX B KOCMH1eCKOM npOCTJ>aHCTBe (pa,nHOTenecKOnb), a TaK)(e .nm1 onpe.neneHIJ MeCTOnOJIO)(eHHH KOpa6neH: H CaMOJieTOB no pa,nHOMrulKaM (pa,nHoneneHnU_\Hjf).

0CHOBOHOH HBJIHeTCJI aKTHBHrul pa,nHOJIOKauin, KOTOprul B .ZJ.aJibHe hneM HMeHyeTCJI nrocTO pa,nHonoKauaeH:. B pa,nHonoKauHH npHMeHmoT Pnc c HerpephIBHblM H HMnynLCHM H3JIY1:1eHHeM JHeprHH.

Eme A.C. ITonoB 3aMeTHJI, 'ITO pa,nHoBOJIHhHMeIoT cno6o6HocTb OTpa)(aTbC.sl. Ha JTOH H OCHOBOfill npHHUHn .neH:CTBHJI pa,nHOJIOK8UHOHHOH CT8HUHH. MOIUbblt nyq pa,nHOJIOKauHOHHOro nepe.naT'HKaM cpOKYCHpyeTC.sl 60JibWOit 8HTeHHOit B HanpaBJieHHH HCCne.nyeMoro o6'beKTa, cpHKCHpyeTC.sl HH3yqaeTCJI OTpa)(eHHblB pa,nHOCHpHaJI, Ha OCHOBe qepo .neJialOTCJI BhBO.ZJ.blOTex HJIH HHblX xapaKTePHCTHKax o6'beKTa.

Onpe.neneHHe Koop.ZJ.HHaT yenH pa,napom rpoH3BO.ZJ.HTC.R c yqeToM c1>6paHHoi CHCTeMhl KOOp.ZJ.HHaT. B1>6op TOA HJIH HHOH CHCTeMbl KOOp.ZJ.HHaT CB.R38H co cpepot npHMeHeHH.R pa,nHOJIOKaUHOHHOH YCT8HOBKH. H8npHMep, Ha3eMHrul pa,nHOJIOKauHOHHrul CT8HUHJI (PnC) Ha6JIIO.ZJ.eHH.R 38 B03JTYWHOH o6CT8HOBKOH H3Mep.ReT TPH KOOp.ZJ.HHaTyeJIH: a3HMYT, yron Mecw HH8KJIOHHYIO .ZJ.aJibHOCTL (noJIJ1pHru1cHCTeMa Koop.ZJ.HH8T).

Pa3JIH'laIOT .ZJ.88 OCHOBHblX pe)(HM8 pa6OTbl PJIC: pe)(HM o63opa (CKaHnpOBfillHH) nrocTpuillCTBa H pe)(HM cJie)(eHH.R 38 uepp1>10. B pe)(HMe o63opa nyq PJIC no CTporo onpe.neneHHOH CHCTeMe nrocMaTpuHBaeT ece nrocTpaCTBO HJIH 3a,II8HHbH ceKTop. AHTeHa, HanpHMep, MO)(eT Me.D.JICHHO nosopa'HBaTLCJI no a3HMYTY HBTO)Ke epeM.R 6@cTpo HaKJIOHHTbCH eepx H BHH3, CK8HHpyg no ypny MecTa. Bpe)(HMe cne)(eHH\$1 fillTeHHa ece BpeM.sl HanpaeneHa Ha Bb 6p8HHYIO yenb, H cneuHaJibhle CJie,ZVIUHe CHCTeMhoeopa'HBaIOT ee ecre.n 38 .ZJ.BHIUeHCH yenLIO.

y.narreHHOCTb Toro HJIH HHOro o6'beKTa onpe.nelljeTCji no 3ana3.ZJ.b B8HHIO OTpa)(eHHOro CHpHaJia OTHOCTeJibHO H3nyqaeMoro. 38na3.ZJ.b B8HHe CHpHarra oqeHb Marro, IIOCKOJibKY pa,nHOBOJIHbl pacnrocTpaH.RIOTC.R co CKOrocTbio, 60KOH K CKOPOCTH CBeTa (300 000 KM/c). ,ZJ;eH:CTBHTeJibHO, .ZJ.JIJI CaMOJieTa, Haxo.zvimerOCJI Ha paCCTO.RHHH 3 KM OT PJIC, 3ana3.ZJ.blBaJIHe CHpHaJia COCTaBHT ecepo 20 MKC. TaKOH pe3yJibTaT, nonyqaeTC.R, H3-3a Toro, 'ITO pa,nHOBOJIHa npOXO.ZJ.HT IlyTb B o60HX HanpaeneHHIX, K yelIH H o6paTHO, TaK 'ITO o6mee paCCTO\$1HHe,' npott.neHHoe BOJIHOIi,COCT8BHT 6 KM. 0.ZJ.HaKO npHpa,nHOJIOK8UHH Mapca,ycnemHO npoe.neHHOH B Haqarre 60-x p.no, 3a,nep)(Ka CHpHana COCTaBHJia OKOJIO 11 MHH,a JTO epeM.9: MajihIM HaJBaTb HeJib3\$1. CoepeMeHHM BJI{HCJIHTeJibHM TeXHHKa cno6o6Ha O6pa6aT1>maTb CHpHaJiblc Bb COKOH TO'HOCTbio H HH'ITO)(HbM epeMeHeM 3aila3.ZJ.blBaHH.9:, noJTOHY c noMOIUbIO pa,napoe MO)(ff0 perCTpuOB8Tb o6'beKtbl, pacnoJIO)(eHHble KaK Ha 6oJibWHX, TaK H Ha MajihIX paCCTO.JIHH.JIX OT Ha6n10.naTeJIJ1. CymecTByeT e.ZJ.HHCTBeHHoe cymecTBeHHoe opaHH'leHHe npHMeHeHHR pa,napoe e ue.rutx CBepx.nan1>HHX Ha6JIIO.ZJ.eHHli- JTO ocna6neHHe CHpHarra. EcnH CHpHaJI npOXO.ZJ.HT 60JibWOe

pacCTOJIHHe, TO OH qaCTHIJHO pacceHBaeTCJI, HCKa>KaeTCJI H ocna6esaeT H Bbl,AeJIHTb ero B npHeMHHKe H3 co6CTBeHHblX III'MOB npHeMHHKa H III'MOB HHOpo npOHCXO>K,HeHHJI 3aqacTyro KpaHHe 3apy.D.HHTeJibHO. Ocna6eHHe cHrnana npH pa.nHonoKauHH anonHe no.z.r.:r.aeTCH pacteTY, KOTOpbtt OCHOBaH Ha npOCTbX <|>H3HTieCKHX coo6pa>KeHHJIX. EcnHB KaKOH - TOTOT(Ke H3JI)"laeTCJI MOI.UHOCTb p.TO nOTOK MOI.UHOCTH qepe3 e.D.HHHTmyro nom;a,nKy. Haxo.z.r.:gm;yrocq Ha pacCTOJIHHH R , 6y.z.r.eT npononyHoHaneH $P/4 \cdot \frac{2}{1tR}$ B 3HaMeHaTene CTOHT mom;a,nb c<Pepblpa,nHycoM R, OKpy)(aOI.UeA HCTOIHMK. TaKHM o6pa3OM, npH o6bTIHOH pa,nHOCTBJ13H MOI.UHOCTb, npHHITaH aHTeHHOIl,o6paTHO nponopUHOHaJbHa KBa,npary paCTOJIHHJI. 3TOT 3aKOH - 38KOH c<PepHTieCKOIl paCXO.D.HMOCTH nyqKameprHH - BblIJHHeTCJI acer.z.r.a npH pacnpOCTpaHeHHH BOJIH B CB06o,rHOM npocpaCTBe.)a>Ke ecJIH CKOHueHpbHoBaTb H3JiyqaeMyro MOIJJHOCTb B yKHH nyq H nOTOK 3HeprHH B03paCTeT B HeCKOJbKO pa3, (3TOT K03<|><|>HHeHT Ha3blBaeTCJI K03<|><|>HHeHTOM HanpaeneHHoro .z.r.eilcTBHH aHTeHHH , KH)) , KBa,npaTHIHaH JaBHCHMOCTb OT pacCTOJIHHH coxpaHTCJI. Ho a pa,nHonoCauHH pa,nHOCTpHan nepo.nonesaeT .z.r.:soii:Hb e pacCTOJIHHH, a caMa o6nyqaeMaH uehnpacceHBaeT 3Hepm10 no aceM HanpaBJieHffjIM,H ecnH o6nyqaromHH uehb noTOK 3HepmH ocna6esaeT o6paTHO nponopuyoHanbHO $\frac{2}{R}$ TO npHXO.D.HI.UHH K npHeMHHKY pacceHHblI IOCTOK eme ocna6JJJeTCJI BO CTOJbKO)(e pa3 HOKa3blBaeTCJI o6paTHO nponopUHOHaJbHb M $\frac{4}{R}$. 3TO 03HatiaeT, TITO .z.r.:ns noBb UieHHR .D.aJlbHOCTH .neilcTBHH PJIC B .z.r.:sa pa3a npH npoTlHX paaHhX ycnoaHRx MOI.UHOCTH ee nepe.z.r.:aTtJHKa Ha,no noBb CHTb a 16 pa3. CTonb Bb COKoA ueHoH .IJ.OCTHralOTCJI Bb COKHe xapaKTePHCTHKH COBpeMeHHblX PJIC.

B PJIC c <|>aJOBHIM MeTO.D.OM H3MepeHH.si: .ranbHOCTH, xapaKTePHO HerpepbBHoe JoH.nHyroiee HJHTieHHe. B 3TOM cnyqae o pacCTOJIHHH .no o6neKTa cy);JIT no H3MeHeHHIO <|>aJH CHrnana reHepaTopa M8CUIa6HOH qacTOTbl (fMq) 33 BpeMH pacnpocpaHeHHR 3JielCTpOMaHTHbIX BOJH .no o6neKTa H o6paTHo. B <|>aJoMerpe cpaBHHBalOTCR .nee BOJIHbl: np.si:MaH,nocrynalOI.UaH Henoce.ztCTBeHHO OT fMq, H Orpa>KeHHaH, IOCTYflalOI.UaH CBblXO.D.a npHeMHHKa nocne orpak<eHHJI OT o6'LeKTa. 3TH pa,nHOBOJHblHMeOT pa3JIHTiHb e <|>aJb .

C.D.BHR<|>aJ Me>K,Ily npRMBMHopa>KeHHblMCHpHaJlaMH 3aBHCHTOT .ZlaJlbHOCTH.no o6'LeKTa H tiaCTOTbl KOJJe6aHHH, reHepHyemblX fMq. TIOCKOJbKY 'IBCTOTa KOJJe6aHHit IOCTO.JIHHa, no c.nshry <|>aJ MO)(HO orpe.neJIHTb .ZlaJlbHOCTb .no o6'LeKTa.

Hau6onLUiee pacnpocTpaHeHHe nonyqun HMnynLCHhllcnoco6 orpe.reneHHJI .ranbHOCTH_ Pa6oTOii HMilYJbCHOro JIOKaTopaynpaBJJfeT reHepaTopHMilYJbCOB, cne.nyIO.UHX c OTHOCTeJbHO HeBbCOKOit:qaCTOTOH nOBTOpenH.JI-np.si:.z.r.:Ka COTeH HMilYJbCOB B ceKyH.ny. MomHbe HMilYJbCbI no.nalOTC.JI Ha reHepaTop Bb COKOit: qacTOTbl, Bb pa6aTblBalOI.UHil OtieHb MOI.UHbe KOpOTKHe HMnyJbCbI Bb COKOllaCTOTHblX KOJJe6aHHf. qepe3 aHTeHHbH nepeKJI10llaTeJb Bq HMilYJbC nocrynaeT B aHTeHHY H H3JiyqaeTC.JI. TioeH H3JiyqehHJI HMnynLca aHTeHHa no.rKJIIOtaeTCJI K BXO.IJ.Y npHeMHHKa.

0.UHOBpeMeHHO c H3nytJeHHeM HMiiYJibCa 3anycKaeTCR reHepaTop pa3BepTKH, Bb pa6aTbIBaIOI.UHA JIHHeHHO HapaCTaIOI.Qee IHJI006pa3HOe HanpR)f(eHHe. OHO IOCTYIIaeT Ha rrrnacTHHbl ropH30HTaJibHoro OTKJIOHeHHR meKpOHHO-nyqeBoli TPY6KH, 3KpaH KOTopoi H RBJUeTCR 3KpaHOM pJIC.

yCHJieHHbIH H Ilo.IeTelCTHpOBaHHLit CHrHaJI c BbXO,lla npHeMHHKa 10.uaeTCR Ha nnaCTHHbIBepTHKaJibHOro OTKJIOHeHIDI.t(To)Ke MO)f(HO Ha6JIO,llaTb Ha 3Kpatte? Tipe)f(,Ile Bcero, B CaMOM Ha'laJie JIHHHH pa3BepTKH IOpBHTCR MOI.QHblfHMrryJibC CHrHaJia SqreHepaTopa, KOTOpbH cny>KHT Ha'laJIOM wKani.1.nani.HOCTH. CnyCTR HeKoTopoe BpeMR, HY)f(HOe .IIIIil pacncocTPatteHIDI BOJIH, npH.IlyT CHrHaJibl OT y:enIt. Jlyq K 3TOMY BpeMeHH nepeMeCTHTCR rrpasee. qeM ,llaJibWe u;eJib, TeM ,llaJibille OT HaJiaJia pa3BepTKH OKTCR OTpR)f(eHHble HMIIYJibCb . A HX aMIJHTY.Ila 6y.neT COOTBeTCTBOBRTb HHTeHCHBOCTHOTPR)f(eHHOro CHrHaJia.TioHeit BKRKOH - TO Mepe MO>KHO cy.nHTbo BeJIH'IHHe u:enH. Orne.n:eJIRtb .nan1>HOCTb Ha 3KpatteHMrryni.cHoronoKaTopa.n:ocTaTO'IHO npocro: no.n: JIHHeH pa3BepTKH MO)f(HO pacnono>KHTb mKany. Hb, nocKOJI&Ky TaKOH crroco6 y>K OIJeHb Hecebbe3eH, B cxeMy JIOKaTopa BBeJIH MaCMTa6Hb e reHepaTOpblMeTOK. IIKany ,llaJibHOCTH CTaJI pHCOBaTb 3JieKpOHb liNYq napanneJILHO co CBOHM OCHOBHbM Ha3HaJeHHeM - HH,IHKau;HeH u:eneA. f eHepaTop pa3BepTKH COBepmeHCTBOBaJIC.i, HanpHMep, .IOCTHrHyTa B03M0)f(HOCTb «paCTPHyTb» no ropH30HTaJIH JII06oe MecTO JIHHHH pa3BepTKH, IT06bl no.npo6Hee paCCMOTPeTb OTPR)f(eHHb e CHrHaJibl B 3a.IlaHHOM HHTepBane ,llaJibHOCTeli. y OilHCaHHOfo HH,IHKaTopa (OH IOJYIYI(HJI Ha3BaHHe «HH,IHKRTOp THa «A») eCTb cymecTBeHHJA He,IOCTaTOK: OH .n:aeT TOJILKO .llaJILHOCTb, a HallpaBJieHHe Ha u:eru. HMO onne.n:UITb no IIKaJiaM noaopoTHOfo YCTPOHCTBa aHTeHHb . Tio3TOMY oqeHL cKopo 6JJI pa3pa6oTaH .n:pyoA HH,IHKaTop (THn B), Hcnon:3yeMi.11t B pJIC KpyroBoro o63opa. AHTeHHA 3TOA CTaHU:HH BpamaeTCR BOKpy BepTHKaJILHOA OCH, «npocMaTPHBar» Bee a3HMyTaJILHble HanpaBJieHHR OT 0 .no 360 rpa.nycob. CTPYKTYPHaR cxeMa PJIC H nopR,IOK pa6OTbl OCTaOTCR npe)f(HMH, HO HH,IHKaTop KpyroBoro o63opa (Ili<O) BbIIIOJIIHeH COBceM no:..,tipyroMy. TIHJI006pa3HOe HanpR)f(eHHe pa3BepTKH no.uaeTCR Ha cneu;HaJibHb:di KOJILU:eBOii OTKJIOHRIOI.UHii 3JieICTpO.n:,H JIHHR pa3BepTKH IloXO,IHT no.n:n:Hcy - OT u:eH1'pa K KpaIO 3KpaHa.0Ha nosopatIBaeTCR CHHXpOHHO c aHTeHHOH. ,(mI noBopOTa JIHHHH pa3BepTKH Ha 061NHb e OTKJIOHRIOI.UHe nnaCTHHbX H y no,llaIOT CHHYCOH,llaJibHble nepeMeHHL e HallpR)f(eHIDI B KBa.n:paTYe, T.e. Ha 0.IIHY napy nnaCTHH - KOCHHYCOH.IlaJILHOe Hanpg)f(eHHe, a Ha .npyyro CHHYCOH,llaJibHOe. qaCTOTbl3THX HallpR)f(eHHH paBHbl tiaCTOTe BpameHHR aHTeHHbl H COCTaBJUIOT ,IIJIH repy:a. Jlyq npH 3TOM onHChBaJI 6i.1KpyH Ha 3Kpatte, HO, nocKOJILKY HMeeTCR eme HanpR)f(eHHe pa:i:HaJibHOH pa3BepTKH Ha KOJibU:eBOM meKpO.n:,e, H3MeUIIOmeecg 3HatHTeH:Ho 6i:Tpee c qacToToA noBTopeHHR HJiyqaeMbX HMIIJILCOB, nyq qepTHT JIHHHO pa3BepTKH, Bp8I.Ual01.QYIOCI BMeCTe c BpaI.QeHHeMaHTeHHbl.

CHrHaJI c Bb xo.na npHeMHKa no.naeTcI Ha ynpaBJISII OIUHii JJJeKTpo.n (ceTKY) 3JIT H JacTaBJISleT nyq yeeJH'IHBArb SlpKOCTb npH HaJIH'IHH OTPa>KeHHbIX HMnynhoe. TakHM o6paJoM, Ha 3KpaHe 11KO nyq «pHCYeT» pa.n.HoJJOKaIIHOHHyIO KapTy MeCTHOCTH. MecTo pacnono>KeHHSI caMoi PJC cooTBeTCTBYeT ueHTpY 3KpaHa.JloKaTop Kpyeopo o63opa xopowo no.nxo.n;HT JJ;Jjl MopeKOH HaBHf8UHH, JJ;8JlbHero o6Hapy>KeHHSI 803.D; ywHbIX yeneii, JJ;HCileT'IeK Kopo KOHTPOJISI B aJponoTax. Tenepb see qame nepexoJJ; (T K ceKTopHoMy o63opy, npH KoTopoM aHTeHHa «OeMaTpbAeT» He Beeb ropH3OHT, a TOJJbKO ffY>KHYIO ero qacTb. Eo6WHe HaJeMHb e PJC CHa6>KaIoT HH.n;HKaTopaMH HeeKOJibKHX THOB: Kpyosopo o63opa JJ;M o6Hapy>KeHHR yeneii H KOHTpOM o6CTaHOBKH, THa A JJ;Jjl TO'IHoro onne.neneHHSI .D; aJibHOCTH HT*.n;. EcnH, HanpHMep, .n; HarpaM Ma HanpaBJIeHHOCTH aHTeHHbMO>KeT «KaTa6eSI» eme H no ypny MeCTa (JJ;Jjl 3TOFO o6bNHO He HaKJIOHSIoT BCIO aHTeHHy, .{OCTaTO'IHO «Ka'laTb») ee o6nyqaTeJib), TO npHMeHRJOT B .nononHeHHe K 11KO HH.n;HKaTop «JJ; aJibHOCTb - BbICOTa». B HeM nyq pa3BepTb BaeTcI no pa.n.Hycy H «Ka'laeTCSI» B HeKOTopOM ceKTOpe CHHXpOHHO c aHTeHHOH, a KOOp.D; H HaTb Bb 6paHb npRMoypJlbHMH. TaKoi HH.n;HKaTop yarJJR.n;HO noKa>KeT He1>T0Ty uenH.

HoebTe Tpe60BaHHSI, npe.n; bSIBJIjeMble K PJC, npHeBJJK pa3pa6oTKe cosepweHHO HOBOii TexHHKH, HOBBIX npHHUHos pa.n.HoHoKarrH. B aeToS1mee BpeMR Ha coseMeHHbIX PJC HMnyJbC, DCblJJaeMbH CTaHyHeH, npe.n;CTaBMeT co6oi CHRH8JI, 38KO.D; HpoBaHHbB no BeCbMa cno>KHOMY anpHTMY (HaH6onee pacnoCTpaHeH Ko.n BapKepa), noJBOJlJ(JOii{Hii nonyqaTb JJ; aHHb e DBnleHOii TO'IHOCTH H pSI.n. nonoJHHTeJibHbX cee.neHHJf 0 Ha6JIO.n; aeMOJf ueJIH. C IOHBJieHeM TP83HCTOpoB H Bb'IHCJIHTeJibHOH TexHHKH MOIYHb e MerasaTTHb e nepenaT'IHKH YWJIH B npoWJioe. Ha HX CMeHy npHWJIH CJIO>KHble CHCTeMb PJC cpe.n; Hei MOIYHOCTH, o6'be.n; HHeHHbJe nocpe.n;TBOM 3BM. B1aro.napS1 BHe.n; peHHJO HH>opMaIIHOHHbX TexHononii cTaJia BOJMO>KHa CHHXpOHHaSI asToMaT'H'ecKaSI pa6oTa HeCKOJbKHX PJC. Pa.n; Ho10KaUHOHHbTe KOMnJieKCbI IOCTOSIHO coeepweCTByIoTCSI, HaxOJJ; fi HOBB e ccl>epbl npHMeHeHHSI: B HCCJie.D; O BaHHKOCMoca, JI HaBHf8UHH 803.D; ywHbIX HMOpcKHX cy.noB, BBOeHHOHTeXHKe (JJ;Jjl o6Hapy>KeHHSI uenH H uase.nenM paKeT ua uenb), B reocl>HJKe H reopacl>HH, B m.ponopH, B OKeaHopacl>HH H T.n.

Mod	Coala	Nr. document	Semnat	Data

