

1418 Dupas Street • Gretna, LA 70053 • Ph: (504) 394-8106

ULTRASONIC INSTRUMENT CALIBRATION CERTIFICATE 16:64 PHASED ARRAY INSTRUMENT

CUSTOMER:	MER: Peak NDT		RER: Olympus
MODEL:	Omniscan X ₃	SERIAL #:	QC-0086806
SOFTWARE VER	SION: MXU 5.18.		

CALIBRATION EQUIPMENT, TRANSDUCERS AND STANDARDS

MFR:	Olympus		TYPE:	5L64		SIZE:	38.4x	10	SERIAL #:	N4032
MFR:	Olympus	;	TYPE:	5L64		SIZE:	38.4×	(10	SERIAL#:	N3965
MFR:	Olympus	;	FREQ:	2.25 N	ИHz	SIZE:	1/2"		SERIAL #:	551838
MFR:	Olympus		FREQ:	2.25 N	ИHz	SIZE:	1/2"		SERIAL#:	1293138
MFR:	Olympus	,	PULSER E	OX:		E32P1-:	23UT-E	Z	SERIAL #:	1095424-01
MFR:	Olympus	,	SPLITTER	SPLITTER ADAPTER		OMNI-A-ADPo5		05	SERIAL#:	890289-03
MFR:	Rohde&S	Schwarz	OSCILLIS	COPE:	-	RTB2004		SERIAL#:	108339	
MFR:	Extech		TEMP. & H	HUMID	ΤY	RH520a			SERIAL#:	CH45269
IIW:	23-1257				AST	M E2491 PA:				58975
NAVSHIP:	23-1537		ASTI	STM E-127 #5-0025:			91-5842			
COUPLANT	COUPLANT: Oil									
TEMPERAT	URE:	74.7°F				HUMIDT	Y:	38%		

CALIBRATED TO: Q. A. PROCEDURE UEQ-011P AND UEQ-010 WITH STANDARDS TRACABLE TO N.I.S.T. CERTIFICATE NUMBERS 66857-A & 69069-A. Q.A. PROCEDURE UEQ-010 APPLICABLE DOCUMENTS ARE ASME SECTION V, ABS REQUIREMENTS FOR ULTRASONIC INSPECTION OF HULL WELDS, ASTM E317, AND MANUFACTURER'S SPECIFICATIONS. Q.A. PROCEDURE UEQ-011P APPLICABLE DOCUMENTS INCLUDE ASME SECTION V AND MANUFACTURE'S SPECIFICATIONS.

CALIBRATION DATE:	03-17-25	CALIBRATION PERFORMED BY:
CALIBRATION DUE:	03-17-26	Nichts Chit

APPROVED

By Kayla Myers at 8:42 am, Apr 11, 2025



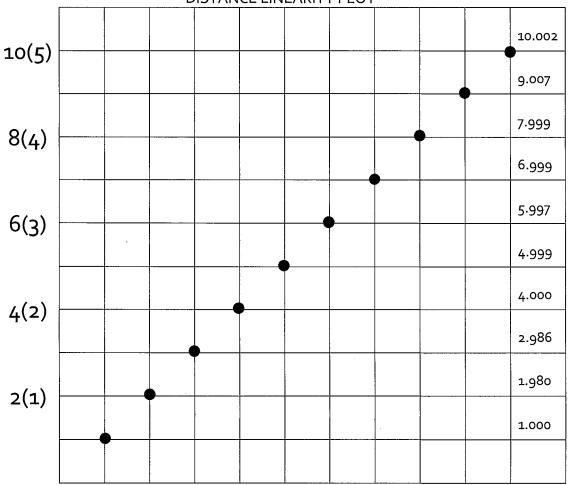
1418 Dupas Street • Gretna, LA 70053 • Ph: (504) 394-8106

CONVENTIONAL SINGLE ELEMENT PULSER CALIBRATION (P1/R1)

LINEARITY TEST INSTRUMENT SETTINGS

PULSE PO	WER:	95V	REJECT:		0%	FINE GAIN:		o.o dB
RANGE:	5" 0.23:	21/10" 0.2321	FILTER:	BP	2.25 MHz	DELAY:	1.0	02 / 1.02
DISTANCE LINEARITY GAIN: 12.5 dl			12.5 dB	AMPL	ITUDE LINEA	RITY GAIN:	23	.6 dB



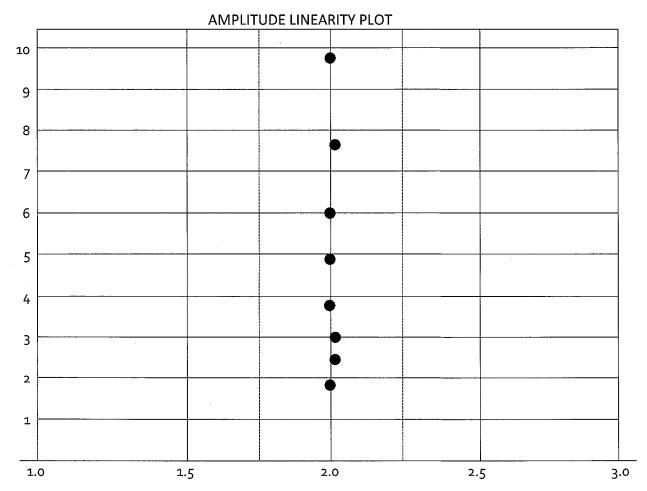


2(1) 4(2) 6(3) 8(4) 10(5)

PERCENT FULL SCREEN	dB CHANGE	ACTUAL	LIMIT % FULL SCREEN
79.8%	-6 dB	39.9	32% to 48%
79.8%	-12 dB	20.0	16% to 24%
39.9%	+6 dB	80.2	64% to 96%
20%	+12 dB	80.2	64% to 96%



1418 Dupas Street • Gretna, LA 70053 • Ph: (504) 394-8106



BACK ECHO	NOTCH ECHO	RATIO
95.1	47.5	2.00:1
75.6	37.7	2.01 : 1
60.0	30.0	2.00:1
47.7	23.8	2.00:1
37.8	18.9	2.00:1
30.1	15.0	2.01 : 1
23.9	11.9	2.01:1
19.0	9.5	2.00:1

CALIBRATION RESULTS

NEAR SURFACE RESOLUTION DEPTH RESOLUTION SHEAR WAVE RESOLUTION

ACCEPT	Yes	REJECT	
ACCEPT	Yes	REJECT	
ACCEPT	Yes	REJECT	

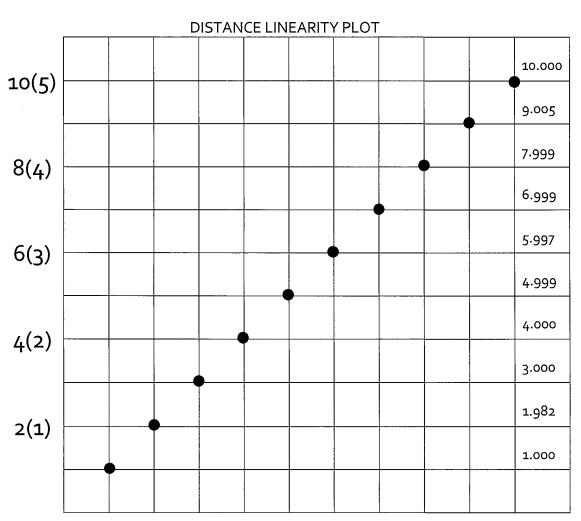


1418 Dupas Street • Gretna, LA 70053 • Ph: (504) 394-8106

CONVENTIONAL SINGLE ELEMENT PULSER CALIBRATION (P2/R2)

LINEARITY TEST INSTRUMENT SETTINGS

PULSE PO	WER:	95V	REJECT:		0%	FINE GAIN:	o.o dB
RANGE:	5" 0.23	21/10" 0.2321	FILTER:	BP	2.25 MHz	DELAY:	1.00/1.00
DISTANCE LINEARITY GAIN:			10.1 dB	AMPI	ITUDE LINEA	RITY GAIN:	23.6 dB

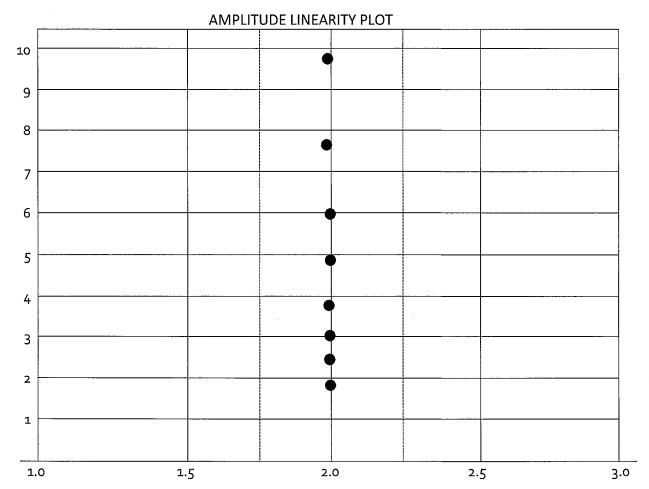


2(1)	4(2)	6(3)	8(4)	10(5)
2(1)	4(Z)	りいくり	О(Д)	10(5)

PERCENT FULL SCREEN	dB CHANGE	ACTUAL	LIMIT % FULL SCREEN
79.8%	-6 dB	39.9	32% to 48%
79.8%	-12 dB	20.0	16% to 24%
39.9%	+6 dB	79.8	64% to 96%
20%	+12 dB	79.8	64% to 96%



1418 Dupas Street • Gretna, LA 70053 • Ph: (504) 394-8106



BACK ECHO	NOTCH ECHO	RATIO
95.6	47.8	2.00 : 1
75.9	37.9	2.00:1
60.3	30.1	2.00:1
47.9	23.9	2.00:1
38.0	19.0	2.00:1
30.2	15.1	2.00:1
24.0	12.0	2.00:1
19.1	9.5	2.00:1

CALIBRATION RESULTS

NEAR SURFACE RESOLUTION DEPTH RESOLUTION HEAR WAVE RESOLUTION ACCEPT Yes REJECT
ACCEPT Yes REJECT
ACCEPT Yes REJECT

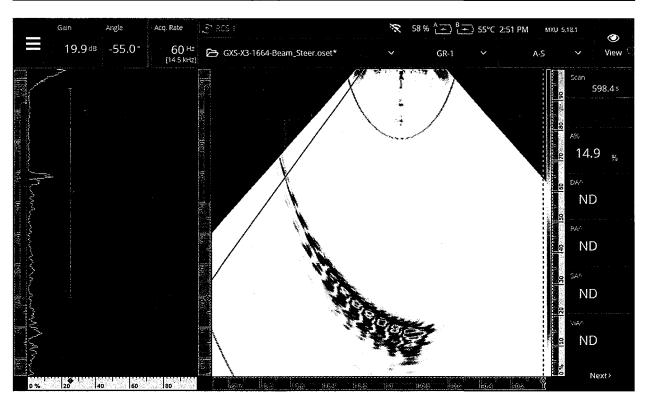


1418 Dupas Street • Gretna, LA 70053 • Ph: (504) 394-8106

16:64 PHASED ARRAY CALIBRATION PHASED ARRAY BEAM STEERING

The ultrasonic phased array beam steering capabilities of the unit are tested by the method described in ASME Section V, Article 23. The tested unit was capable of steering the ultrasonic phased array beam above 35° in both the positive and negative direction using the method described in QEU-011P.

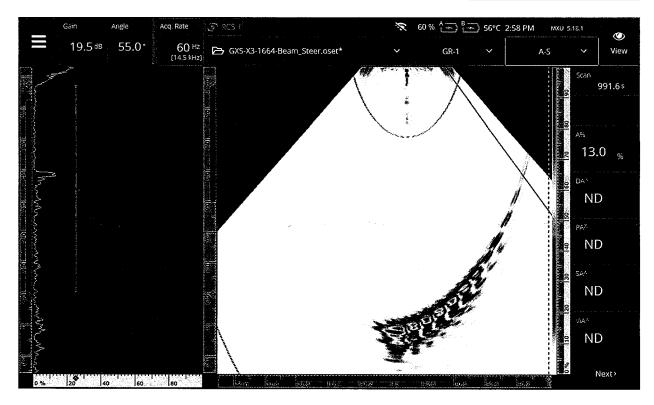
REFERENCE SDH ANGLE:	-10	AMPLITUDE:	80.3%	REFERENCE dB:	19.9dB
MAXIMUM STEERING ANGLE 1:	-55°	AMPLITUDE:	Р		
MAXIMUM STEERING ANGLE 2:	-60°	AMPLITUDE:	Р		





1418 Dupas Street • Gretna, LA 70053 • Ph: (504) 394-8106

REFERENCE SDH ANGLE:	+10	AMPLITUDE:	80.4%	REFERENCE dB:	19.5dB
MAXIMUM STEERING ANGLE 1:	+55°	AMPLITUDE:	Р		
MAXIMUM STEERING ANGLE 2:	+60°	AMPLITUDE:	Р		





1418 Dupas Street • Gretna, LA 70053 • Ph: (504) 394-8106

PHASED ARRAY VERTICAL LINEARITY

VPA:	1 Element		REFERENCE dB:	18.9 dB	
TEST:	20% Full Screen Height				
PERFOR	RMANCE CRITERIA:	+12 dB, Scre	en Height Between 65	% To 95%	

Each VPA is tested at the above reference gain to ensure that each element is within 2% screen height of the required 20% Full Screen Height prior to changing the gain by +12 dB. When the gain is increased by 12 dB, each element is then checked to ensure that each signal is between the stated performance criteria listed above. The results of this test are indicated below.

VPA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
< 2% Dev.	Р	Р	Р	P	Р	Р	Р	Р	Р	Р	Р	Р	P	Р	Р	.P
+12 dB Acc.	P	Р	Р	Р	P	Р	Р	Р	Р	Р	Р	Р	P	P	P	P
VPA	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
< 2% Dev.	Р	P	Р	Р	P	P	Р	Р	P	Р	P	P	P	P	Р	Р
+12 dB Acc.	Р	Р	Р	Р	P	P	Р	Р	P	Р	P	P	Р	P	Р	Р
VPA	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
< 2% Dev.	Р	Р	Р	P	Р	Р	Р	P	Р	Р	P	Р	P ·	P	Р	Р
+12 dB Acc.	P	Р	Р	Р	Р	Р	Р	Р	Р	Р	P	P	Р	Р	P	Р
VPA	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
< 2% Dev.	P	Р	Р	Р	Р	Р	P	Р	Р	Р	P	Р	Р	P	Р	. Р
+12 dB Acc.	P	Р	Р	Р	Р	Р	Р	Р	Р	Р	Р	Р	Р	P	Р	Р



1418 Dupas Street • Gretna, LA 70053 • Ph: (504) 394-8106

VPA:	1 Element		REFERENCE dB:	24.9 dB
TEST:	40% Full Screen Height			
PERFOR	RMANCE CRITERIA:	+6 dB, Scree	n Height Between 65%	To 95%

Each VPA is tested at the above reference gain to ensure that each element is within 2% screen height of the required 40% Full Screen Height prior to changing the gain by +6 dB. When the gain is increased by 6 dB, each element is then checked to ensure that each signal is between the stated performance criteria listed above. The results of this test are indicated below.

. VPA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
< 2% Dev.	Р	Р	Р	Р	Р	Р	Р	Р	P	Р	Р	Р	Р	Р	Р	Р
+6 dB Acc.	P	Р	P	Р	Р	Р	Р	Р	Р	Р	Р	P	Р	Р	Р	Р
									ļ							
VPA	17	18	19	20	21	22	23	24	`25	26	27	28	29	30	31	32
< 2% Dev.	P	P	P	Р	P	P	Р	Р	P	P	P	P	P	Р	P	P
+6 dB Acc.	P	Р	Р	Р	P	Р	Р	Р	P	Р	P	P	P	Р	Р	Р
VPA	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
< 2% Dev.	Р	Р	Р	Р	P.	Р	Р	Р	P	Р	. P	Р	Р	Р	Ρ.	Р
+6 dB Acc.	Р	Р	Р	Р	Р	Р	Р	P	: P	Р	P	Р	Р.	Р	P	P
VPA	49	50	51	52	53	54	55	56	. 57	58	59	60	61	62	63	64
< 2% Dev.	Р	Р	Р	· P	Р	P	P	Р	Р	Р	P	Р	P	P.	P	Р
+6 dB Acc.	Р	Р	Р	Р	Р	Р	Р	Р	Р	Р	Р	P	Р	P	Р	Р



1418 Dupas Street • Gretna, LA 70053 • Ph: (504) 394-8106

VPA:	1 Element		REFERENCE dB:	30.8 dB
TEST:	80% Full Screen Height			
PERFOR	RMANCE CRITERIA:	-6 dB, Screer	n Height Between 35%	To 45%

Each VPA is tested at the above reference gain to ensure that each element is within 2% screen height of the required 80% Full Screen Height prior to changing the gain by -6 dB. When the gain is decreased by 6 dB, each element is then checked to ensure that each signal is between the stated performance criteria listed above. The results of this test are indicated below.

VPA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
< 2% Dev.	P.	P	Р	Р	Р	Р	Р	Р	Р	Р	Р	P	Р	Р	P	Р
-6 dB Acc.	P	Р	Р	Р	Р	Р	P	Р	P	Р	P	Р	Р	Р	Р	Р
VPA	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
< 2% Dev.	P	Р	P	P	Р	Р	Р	P	P	Р	P	Р	P	P	P	P
-6 dB Acc.	Р	. p.	Р	Р	Р	Р	Р	Р	Р	Р	Р	Р	P	Р	Р	Р
VPA	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
< 2% Dev.	Ω	Р	Р	Р	Р	Р	Р	Р	P	Р	Р	P	Р	Р	Р	Р
-6 dB Acc.	Ρ	Р	Р	Р	Р	Р	Р	Р	Р	P	Р	Р	Р	Р	Р	· P
VPA	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
< 2% Dev.	Р	- P	Р	Р	Р	P	Р	P	Р	P	Р	Р	P	Р	Р	Р
-6 dB Acc.	Р	Р	Р	Р	Р	Ρ.	Р	Р	Р	Р	Р	Р	Р	Р	Р	Р



1418 Dupas Street • Gretna, LA 70053 • Ph: (504) 394-8106

VPA:	1 Element		REFERENCE dB:	30.8 dB
TEST:	80% Full Screen Height			
PERFOR	RMANCE CRITERIA:	-12 dB, Scree	n Height Between 15%	6 To 25%

Each VPA is tested at the above reference gain to ensure that each element is within 2% screen height of the required 80% Full Screen Height prior to changing the gain by -12 dB. When the gain is decreased by 12 dB, each element is then checked to ensure that each signal is between the stated performance criteria listed above. The results of this test are indicated below.

VPA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
< 2% Dev.	Р	P	Р	Р	P.	Р	Р	Р	Р	Р	Р	Р	P	Р	Р	Р
-12 dB Acc.	Р	. Р	Р	Р	Р	. Р	Р	P	Р	Р	Р	Р	. Р	P	Р	Р
VPA	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
< 2% Dev.	P	Р	Р	Р	P	Р	P	Р	Р	Р	Р	Р	Р	· P	Р	Р
-12 dB Acc.	Р	P	Р	Р	Р	Р	.P	Р	Р	Р	Р	Р	P	P	Р	Р
VPA	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
< 2% Dev.	Р	Р	Р	Р	P	P	Р	P	Р	Р	Р	Р	.P	P - P	Р	Р
-12 dB Acc.	Р	Р	Р	Р	Р	Р	Р	Р	Р	Р	Р	Р	Р	Р	Р	Р
VPA	49	50	51	52	53	54	55	56	. 57	58	59	60	61	62	63	64
< 2% Dev.	P	P	Р	Р	P	Р	P	Р	Р	Р	Р	Р	P	Р	Р	Р
-12 dB Acc.	Р	Р	P	Р	Р	Р	Р	P	Р	Р	Р	Р	Р	Р	Р	Р



1418 Dupas Street • Gretna, LA 70053 • Ph: (504) 394-8106

PHASED ARRAY HORIZONTAL LINEARITY

VPA:	1 Element	REFERENCE dB:	24.3 dB
TEST:	1st BWR @ 8o% Full Screen Height	VELOCITY:	o.2323 in/us
		WEDGE DELAY:	0.39 us

Each VPA is tested using the method contained in QEU-o11P. Each echo must peak at the block thickness and each subsequent multiple for a minimum of 4 multiples for each VPA within \pm 3 timing units. The results of this test are indicated below.

								,							,	
VPA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1st BWR	Р	Р	Р	Р	Р	Р	Р	Р	Р	P	P	P	P	Р	Р	P
2 nd BWR	P	Р	P	P	Р	Р	P	Р	Р	P	Р	Р	P	P	Р	.P
3 rd BWR	P	Р	P	Р	Р	P	Р	Р	и Р	Р	Р	Р	p ·	Р	P	P
4 th BWR	P	Р	Р	Р	Р	Р	Р	Р	P	P	. Р	Р	Р	P	P	P
VPA	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1st BWR	Р	Р	P	Р	Р	P	Р	Ρ.	. Р	. Р	Р	P	P	Р	Р	P
2 nd BWR	P:	Р	Р	Р	Ρ.	Р	Р	. Р	P	P	P	P	P	Р	Р	P
3 rd BWR	Р	P	Р	P	Р	P	Р	Р	P	. P.	Р	P	P	Р	P	Р
4 th BWR	P	Р	Р	ïр	P	Р	P	Р	P	Р	P	Р	P	Р	Р	P
VPA	33	34	35	36	37	38	- 39	40	41	742	43	44	45	46	47	48
1 st BWR	Р	P	P	P	P	P	Р	Р	P	P	P	P	р	Р	Р	Р
2 nd BWR	Р	. P	P	P	P	. P	Р	- P	Р	P	Р	P	P	P	Р	P
3 rd BWR	P	Р	P	. P	• . Р	Р	, P	Р	P	Р	Р	Р	Р	P	P	Р
4 th BWR	P	P.	P	P	P	Р	P	P	Р	P	Р	Р	P	Р	Р	Р
VPA	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
1st BWR	P.	P	P	P	P	P	P	Р	Р	Р	Р	Ρ	Р	P	P	Р
2 nd BWR	P	P	, . P	Р	Р	Р	Р	Р	Р	P	Р.	P	P	P	ър	P
3 rd BWR	Р	Р	Р	р	Р	P	P	Р	P	P	P	P	P	Р	P	Р
4 th BWR	P	Р	Р	P	P	P.	P	Р	Р	Р	Р	P	P	Р	Р	Р



1418 Dupas Street • Gretna, LA 70053 • Ph: (504) 394-8106

PULSER OUTPUT RESPONSE

PULSER SETTING:	8o V	PULSER WIDTH:	250 ns
PULSER RISE TIME:	Fixed	PULSER FALL TIME:	Fixed
PULSE REPETITION RATE:	20 Hz	LOAD:	50 Ohm
PERFORMANCE CRITERIA:	Pulser Voltage:45V-	55V, Pulser Width+/-25n	s, Pulser Rise: 2ns-10ns

Each pulser is checked for response using a single element transducer and an isolator/splitter allowing the testing of the Pulse Width, Voltage, and Rise Time on the Oscilloscope. The results are compared to the criteria shown in QEU-011P and are shown below.

Pulser	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Width(ns)	Ρ.	P	Р	P.	P	Р :	Р	Р	Р	Р	. P	Р	Р	Р	Р	Р
Voltage(V)	Р	Р	Р	P	Р	P	Р	Ρ.	P	P	Р	Р	P	Р	Р	Р
Rise Time(ns)	Р	Р	Р	* . P .	P	P	Ρ	Р	P	Р	Р	P	Р	Р	Р	Р