$\Sigma$ (1915) 5/2 $^{+}$ 

 $I(J^P) = 1(\frac{5}{2}^+)$  Status: \*\*\*

Discovered by COOL 66. For results published before 1974 (they are now obsolete), see our 1982 edition Physics Letters **111B** 1 (1982).

This entry only includes results from partial-wave analyses. Parameters of peaks seen in cross sections and invariant-mass distributions in this region used to be listed in in a separate entry immediately following. They may be found in our 1986 edition Physics Letters **170B** 1 (1986).

	<b>Σ</b> (1915) POLE P	OSITI	ON	
REAL PART VALUE (MeV)	DOCUMENT ID	)	TECN	COMMENT
$1890^{+3}_{-2}$	<sup>1</sup> KAMANO	15	DPWA	Multichannel
• • • We do not use the following	owing data for averag	es, fits,	limits, e	tc. • • •
1897	ZHANG	ZHANG 13A		Multichannel
<sup>1</sup> From the preferred solution	on A in KAMANO 15			
-2×IMAGINARY PART				
VALUE (MeV)	DOCUMENT ID		<u>TECN</u>	COMMENT
97 <sup>+4</sup> <sub>-6</sub>	$^{ m 1}$ KAMANO	15	DPWA	Multichannel
• • • We do not use the following	owing data for averag	es, fits,	limits, e	tc. • • •
133	ZHANG	13A	DPWA	Multichannel
$^{ m 1}$ From the preferred solution	on A in KAMANO 15			
	Σ(1915) POLE R	ESIDU	JES	
	-			
The normalized resid	due is the residue divid	ded by	$\Gamma_{pole}/2$ .	
The normalized residue in N			$\Gamma_{pole}/2$ .	
Normalized residue in Na	$\overline{K} \rightarrow \Sigma(1915) \rightarrow DOCUMENT I$	N <b>K</b>	TECN	COMMENT
Normalized residue in Normalized residue in Normalized PHASE (°)  • • • We do not use the following the following properties of the proper	$\overline{K} \rightarrow \Sigma(1915) \rightarrow \underline{DOCUMENT}$ owing data for averag	NK ID es, fits,	TECN	
Normalized residue in Normalized PHASE (°)  • • • We do not use the followate the foll	$ \overline{K} \rightarrow \Sigma(1915) \rightarrow \underline{DOCUMENT} $ owing data for averag $1 \text{ KAMANO}$	NK ID es, fits,	TECN	COMMENT
Normalized residue in Normalized PHASE (°)  • • • We do not use the following the following properties of the properties	$ \overline{K} \rightarrow \Sigma(1915) \rightarrow \underline{DOCUMENT} $ owing data for averag $1 \text{ KAMANO}$	NK ID es, fits,	TECN	
Normalized residue in Normalized PHASE (°)  • • • We do not use the followate of the preferred solution in Normalized PHASE (°)  1 From the preferred solution in Normalized PHASE (°)  2 PHASE (°)  3 PHASE (°)  4 PHASE (°)  5 PHASE (°)  6 PHASE (°)  7 PHASE (°)	$\overline{K} \rightarrow \Sigma(1915) \rightarrow DOCUMENT N$ owing data for averag  1 KAMANO on A in KAMANO 15	NK  IID  res, fits,  15	TECN	
Normalized residue in	$\overline{K} \rightarrow \Sigma(1915) \rightarrow DOCUMENT N$ owing data for averag  1 KAMANO on A in KAMANO 15	<b>Ν</b> <del>K</del> les, fits,  15  Σπ	TECN	tc. • • •  Multichannel
Normalized residue in	$\overline{K}  ightarrow \Sigma(1915)  ightarrow DOCUMENT No. 1000 MeV No. 1000 Me$	NK  ID  res, fits,  15  . Σπ	TECN limits, e DPWA	COMMENT  tc. • • •  Multichannel  COMMENT
Normalized residue in Normalized residue in Normalized PHASE (°)  • • • We do not use the followater of the preferred solution of the preferred solution of the preferred in Normalized residue in Normalized PHASE (°)	$\overline{K}  ightarrow \Sigma(1915)  ightarrow DOCUMENT No. 1000 MeV No. 1000 Me$	NK  ID  res, fits,  15  . Σπ	TECN limits, e DPWA	COMMENT  tc. • • •  Multichannel  COMMENT

Created: 5/30/2017 17:20

Normalized	residue in $N\overline{K} \rightarrow$	$\Sigma(1915) \rightarrow \Lambda\pi$	
MODULUS	PHASE (°)	DOCUMENT ID	TECN COMMENT
• • • We do	$not\ use\ the\ following$	data for averages, fits,	limits, etc. • • •
0.0757	166	<sup>1</sup> KAMANO 15	DPWA Multichannel
$^{ m 1}$ From the	preferred solution A in	n KAMANO 15.	
		$\Sigma$ (1915) $\rightarrow \Xi K$	
		DOCUMENT ID	
		data for averages, fits,	
0.002			DPWA Multichannel
<sup>1</sup> From the	preferred solution A in	n KAMANO 15.	
		$\Lambda(1915) \rightarrow \Sigma(136)$	-
		DOCUMENT ID	
		data for averages, fits,	
0.0724			DPWA Multichannel
<sup>1</sup> From the	preferred solution A in	ı KAMANO 15.	
Normalized	residue in $N\overline{K} \rightarrow$	$\Lambda(1915) \rightarrow \Sigma(135)$	85)π, <i>F</i> -wave
MODULUS	PHASE (°)	DOCUMENT ID	TECN COMMENT
		data for averages, fits,	
	-163		DPWA Multichannel
$^{ m 1}$ From the	preferred solution A in	n KAMANO 15.	
			(892), <i>S</i> =1/2 , <i>F</i> -wave
			TECN COMMENT
	not use the following	data for averages, fits,	
0.00476			
	4		DPWA Multichannel
	4 preferred solution A in		DPWA Multichannel
$^{ m 1}$ From the	preferred solution A in	n KAMANO 15.	
<sup>1</sup> From the <b>Normalized</b>	preferred solution A in residue in $N\overline{K} \rightarrow$	n KAMANO 15. $\Sigma(1915)  o N\overline{K}^*$	(892), <i>S</i> =3/2 , <i>P</i> -wave
<sup>1</sup> From the <b>Normalized</b>	preferred solution A in residue in $N\overline{K} \rightarrow PHASE (^{\circ})$	n KAMANO 15. $\Sigma(1915) \rightarrow N\overline{K}^*$ DOCUMENT ID	(892), <i>S</i> =3/2 , <i>P</i> -wave
1 From the  Normalized  MODULUS  • • • We do	preferred solution A in residue in $N\overline{K} \rightarrow PHASE$ (°) not use the following	$\Sigma$ (1915) $\rightarrow N\overline{K}^*$ $DOCUMENT ID$ data for averages, fits,	(892), <i>S</i> =3/2 , <i>P</i> -wave  TECN COMMENT  limits, etc. • • •
1 From the  Normalized  MODULUS  • • • We do  0.0494	preferred solution A in residue in $N\overline{K} \rightarrow PHASE (^{\circ})$	n KAMANO 15. $\Sigma(1915) \rightarrow N\overline{K}^*$ $\underline{DOCUMENT\ ID}$ data for averages, fits, $1 \text{ KAMANO} \qquad 15$	(892), <i>S</i> =3/2 , <i>P</i> -wave
1 From the  Normalized  MODULUS  • • • We do  0.0494  ¹ From the	preferred solution A in residue in $N\overline{K} \rightarrow PHASE$ (°) not use the following 51 preferred solution A in	The KAMANO 15. $\Sigma(1915) \rightarrow N\overline{K}^*$ $DOCUMENT ID$ $DOCUME$	TECN COMMENT  limits, etc. • • •  DPWA Multichannel
1 From the  Normalized  MODULUS  • • • We do  0.0494  ¹ From the	preferred solution A in residue in $N\overline{K} \rightarrow PHASE$ (°) not use the following 51 preferred solution A in	to KAMANO 15. $\Sigma(1915) \rightarrow N\overline{K}^*$ $DOCUMENT ID$ data for averages, fits, 1 KAMANO 15. $LAMANO = LAMANO = LAMAN$	(892), <i>S</i> =3/2 , <i>P</i> -wave  TECN COMMENT  limits, etc. • • •
1 From the  Normalized  MODULUS  • • • We do  0.0494  1 From the  Normalized  MODULUS	preferred solution A in  residue in NK →  PHASE (°)  not use the following  51  preferred solution A in  residue in NK →  PHASE (°)	to KAMANO 15. $\Sigma(1915) \rightarrow N\overline{K}^*$ $DOCUMENT ID$ data for averages, fits, 1 KAMANO 15. $LAMANO = LAMANO = LAMAN$	#(892), <i>S</i> =3/2 , <i>P</i> -wave  ###
1 From the  Normalized  MODULUS  • • • We do  0.0494  1 From the  Normalized  MODULUS	preferred solution A in  residue in NK →  PHASE (°)  not use the following  51  preferred solution A in  residue in NK →  PHASE (°)	to KAMANO 15. $\Sigma(1915) \rightarrow N\overline{K}^*$ $DOCUMENT ID$ data for averages, fits, $^{1} \text{KAMANO} \qquad 15$ in KAMANO 15. $\Sigma(1915) \rightarrow N\overline{K}^*$ $DOCUMENT ID$	I(892), S=3/2, P-wave  TECN COMMENT  Ilimits, etc. • • •  DPWA Multichannel  F(892), S=3/2, F-wave  TECN COMMENT  Ilimits, etc. • • •

Created: 5/30/2017 17:20

### **Σ(1915) MASS**

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1900 to 1935 (≈ 1915) OUR EST	IMATE			
1920± 7	ZHANG	13A	DPWA	Multichannel
$1937 \pm 20$	ALSTON	78	DPWA	$\overline{K}N \rightarrow \overline{K}N$
$1894\pm 5$	$^{ m 1}$ CORDEN	77C		$K^- n \rightarrow \Sigma \pi$
$1909\pm 5$	$^{ m 1}$ CORDEN	<b>77</b> C		$K^- n \rightarrow \Sigma \pi$
$1920 \pm 10$	GOPAL	77	DPWA	$\overline{K}N$ multichannel
$1900 \pm 4$	<sup>2</sup> CORDEN	76	DPWA	$K^- n \rightarrow \Lambda \pi^-$
$1920 \pm 30$	BAILLON	75	IPWA	$\overline{K}N \rightarrow \Lambda\pi$
$1914 \pm 10$	HEMINGWAY	75	DPWA	$K^- p \rightarrow \overline{K} N$
$1920^{+15}_{-20}$	VANHORN	75	DPWA	$K^- p \rightarrow \Lambda \pi^0$
1920± 5	KANE	74	DPWA	$K^-p \rightarrow \Sigma \pi$
• • • We do not use the following	data for averages	, fits,	limits, e	tc. • • •
not seen 1925 or 1933 1915			DPWA	$\begin{array}{ll} \overline{K}N \to & \overline{K}N \\ \overline{K}N \text{ multichannel} \\ K^-p \to & \Lambda\pi^0 \end{array}$

## **Σ(1915) WIDTH**

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
80 to 160 (≈ 120) OUR ESTIMA	TE			
$149 \pm 17$	ZHANG	13A	DPWA	Multichannel
$161 \pm 20$	ALSTON	78	DPWA	$\overline{K} N \rightarrow \overline{K} N$
$107\!\pm\!14$	<sup>1</sup> CORDEN	77C		$K^- n \rightarrow \Sigma \pi$
$85 \pm 13$	<sup>1</sup> CORDEN	<b>77</b> C		$K^- n \rightarrow \Sigma \pi$
$130 \pm 10$	GOPAL	77	DPWA	$\overline{K}N$ multichannel
$75\pm14$	<sup>2</sup> CORDEN	76	DPWA	$K^- n \rightarrow \Lambda \pi^-$
$70\pm20$	BAILLON	75	IPWA	$\overline{K}N \rightarrow \Lambda\pi$
$85\pm15$	HEMINGWAY			$K^- p \rightarrow \overline{K} N$
$102 \pm 18$	VANHORN	75	DPWA	$K^- p \rightarrow \Lambda \pi^0$
$162\!\pm\!25$	KANE	74	DPWA	$K^- p \rightarrow \Sigma \pi$
ullet $ullet$ We do not use the following	data for averages	, fits,	limits, e	etc. • • •
171 or 173	<sup>3</sup> MARTIN	77	DPWA	$\overline{K}N$ multichannel
60	DEBELLEFON	76	<b>IPWA</b>	$K^- p \rightarrow \Lambda \pi^0$
4				

<sup>&</sup>lt;sup>1</sup> The two entries for CORDEN 77C are from two different acceptable solutions.

<sup>2</sup> Preferred solution 3; see CORDEN 76 for other possibilities.

<sup>3</sup> The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.

 $<sup>^1\,\</sup>text{The}$  two entries for CORDEN 77C are from two different acceptable solutions.  $^2\,\text{Preferred}$  solution 3; see CORDEN 76 for other possibilities.  $^3\,\text{The}$  two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.

# $\Sigma$ (1915) DECAY MODES

	Mode	Fraction $(\Gamma_i/\Gamma)$
$\overline{\Gamma_1}$	NK	5–15 %
$\Gamma_2$	$\Lambda\pi$	seen
$\Gamma_3$	$\Sigma \pi$	seen
$\Gamma_4$	ΞK	
$\Gamma_5$	$\Sigma(1385)\pi$ , <i>P</i> -wave	
$\Gamma_6$	$\Sigma(1385)\pi$ , <i>F</i> -wave	
Γ <sub>7</sub>	$\Sigma(1385)\pi$	<5 <b>%</b>
Γ <sub>8</sub>	$\Sigma(1385)\pi$ , <i>P</i> -wave	
Γ <sub>9</sub>	$\Sigma(1385)\pi$ , $\emph{F}$ -wave	
$\Gamma_{10}$	$N\overline{K}^*(892)$ , $S=1/2$ , $F$ -wave	
Γ <sub>11</sub>	$N\overline{K}^*(892)$ , $S=3/2$ , <i>P</i> -wave	
Γ <sub>12</sub>	$N\overline{K}^*(892)$ , $S=3/2$ , $F$ -wave	

# $\Sigma$ (1915) BRANCHING RATIOS

See "Sign conventions for resonance couplings" in the Note on  $\varLambda$  and  $\varSigma$  Resonances.

$\Gamma(N\overline{K})/\Gamma_{total}$					$\Gamma_1/\Gamma$
VALUE	DOCUMENT ID		TECN	COMMENT	
0.05 to 0.15 OUR ESTIMATE					
$0.026 \pm 0.004$	ZHANG	_		<u>M</u> ultichannel	
		80		$\overline{K}N \rightarrow \overline{K}N$	
$0.14 \pm 0.05$	ALSTON			$\overline{K}N \rightarrow \overline{K}N$	
$0.11 \pm 0.04$				$K^- p \rightarrow \overline{K} N$	
• • • We do not use the following	-	s, fits,	limits, e	etc. • • •	
0.036	<sup>2</sup> KAMANO	15	DPWA	Multichannel	
$0.05 \pm 0.03$	GOPAL	77	DPWA	See GOPAL 80 $\overline{K}N$ multichanne	
0.08 or 0.08	<sup>3</sup> MARTIN	77	DPWA	$\overline{K}N$ multichanne	el
<sup>2</sup> From the preferred solution A in <sup>3</sup> The two MARTIN 77 values are		k pole	and from	m a Breit-Wigner	
$\Gamma(\Lambda\pi)/\Gamma_{ m total}$					$\Gamma_2/\Gamma$
VALUE	DOCUMENT ID			COMMENT	
• • • We do not use the following	data for averages	s, fits,	limits, e	etc. • • •	
0.127	<sup>1</sup> KAMANO	15	DPWA	Multichannel	
$^{\mathrm{1}}$ From the preferred solution A in	n KAMANO 15.				
$\Gamma(\Sigma\pi)/\Gamma_{total}$					$\Gamma_3/\Gamma$
VALUE	DOCUMENT ID			COMMENT	
• • • We do not use the following	_	s, fits,	limits, e	etc. • • •	
0.678	<sup>1</sup> KAMANO	15	DPWA	Multichannel	
$^{ m 1}$ From the preferred solution A in	n KAMANO 15.				
HTTP://PDG.LBL.GOV	Page 4		Creat	ed: 5/30/2017	17:20

$\Gamma(\Xi K)/\Gamma_{\text{total}}$					$\Gamma_4/\Gamma$
VALUE	DOCUMENT ID		TECN	COMMENT	
$\bullet$ $\bullet$ We do not use the following		s, fits,	limits, e	etc. • • •	
not seen	<sup>1</sup> KAMANO	15	DPWA	Multichannel	
$^{ m 1}$ From the preferred solution A in	n KAMANO 15.				
$\Gamma(\Sigma(1385)\pi, P$ -wave $)/\Gamma_{total}$					$\Gamma_5/\Gamma$
VALUE	DOCUMENT ID		TECN	COMMENT	
$\bullet$ $\bullet$ We do not use the following		s, fits,	limits, e	etc. • • •	
0.112	<sup>1</sup> KAMANO	15	DPWA	Multichannel	
$^{ m 1}$ From the preferred solution A in	n KAMANO 15.				
$\Gamma(\Sigma(1385)\pi$ , <i>F</i> -wave $)/\Gamma_{total}$					$\Gamma_6/\Gamma$
VALUE	DOCUMENT ID		TECN	COMMENT	
$\bullet$ $\bullet$ We do not use the following	_	s, fits,	limits, e	etc. • • •	
0.004	<sup>1</sup> KAMANO	15	DPWA	Multichannel	
$^{ m 1}$ From the preferred solution A in	n KAMANO 15.				
$\Gamma(N\overline{K}^*(892), S=1/2, F-wave)$	$/\Gamma_{\text{total}}$				Γ <sub>10</sub> /Γ
VALUE	DOCUMENT ID		TECN	COMMENT	
ullet $ullet$ We do not use the following	_				
0.001	<sup>1</sup> KAMANO	15	DPWA	Multichannel	
$^{\mathrm{1}}$ From the preferred solution A in	n KAMANO 15.				
$\Gamma(N\overline{K}^*(892), S=3/2, P-wave)$	/F <sub>total</sub>				Γ <sub>11</sub> /Γ
VALUE	DOCUMENT ID		TECN	COMMENT	
• • • We do not use the following			limits, e	etc. • • •	
0.042	<sup>1</sup> KAMANO	15	DPWA	Multichannel	
$^{ m 1}$ From the preferred solution A in	n KAMANO 15.				
$\Gamma(N\overline{K}^*(892), S=3/2, F-wave)$	/Casal				$\Gamma_{12}/\Gamma$
VALUE	DOCUMENT ID		TECN	COMMENT	. 12/ -
• • • We do not use the following					
not seen	<sup>1</sup> KAMANO	15	DPWA	Multichannel	
$^{ m 1}$ From the preferred solution A in	n KAMANO 15.				
$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}} \text{ in } N\overline{K} \to \Sigma (19)$	01E) . A-			<b>/</b> F	Γ <sub>2</sub> ) <sup>1/2</sup> /Γ
$\frac{( j f)^{r}}{VALUE}$	DOCUMENT ID		TECN	COMMENT	2) / 1
$-0.09 \pm 0.03$	GOPAL			$\overline{K}N$ multichann	nel
$-0.10~\pm 0.01$	<sup>1</sup> CORDEN	76	DPWA	$K^- n \rightarrow \Lambda \pi^-$	
$-0.06 \pm 0.02$	BAILLON	75		$\overline{K}N \rightarrow \Lambda\pi$	
$-0.09 \pm 0.02$	VANHORN	75	DPWA	$K^- p \rightarrow \Lambda \pi^0$	
$-0.087\pm0.056$	DEVENISH	74B	Paris a	Fixed-t dispersi	on rel.
• • • We do not use the following					
-0.09 or $-0.09$ $-0.10$	<sup>2</sup> MARTIN DEBELLEFON	77 76		$\overline{K}N$ multichann $K^-p \rightarrow \Lambda \pi^0$	nei
				$\Lambda  \rho \rightarrow \Lambda \pi^{\bullet}$	
$^{1}$ Preferred solution 3; see CORD $^{2}$ The two MARTIN 77 values are	EIN 70 for other per from a T-matrix	possib k pole	onities. and froi	m a Breit-Wigne	r fit.
HTTP://PDG.LBL.GOV	Page 5		Creat	ed: 5/30/201	7 17:20

 $(\Gamma_i \Gamma_f)^{\frac{1}{2}} / \Gamma_{\text{total}} \text{ in } N\overline{K} \to \Sigma (1915) \to \Sigma \pi$ ZHANG  $-0.14 \pm 0.01$ 13A DPWA Multichannel <sup>1</sup> CORDEN 77C  $K^- n \rightarrow \Sigma \pi$  $-0.17 \pm 0.01$ <sup>1</sup> CORDEN  $K^- n \rightarrow \Sigma \pi$ 77C  $-0.15 \!\pm\! 0.02$  $-0.19 \pm 0.03$ **GOPAL** 77 DPWA  $\overline{K}N$  multichannel **KANE** 74 DPWA  $K^-p \rightarrow \Sigma \pi$  $-0.16 \pm 0.03$ • • • We do not use the following data for averages, fits, limits, etc. • • <sup>2</sup> MARTIN -0.05 or -0.05DPWA  $\overline{K}N$  multichannel

<sup>&</sup>lt;sup>2</sup> The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.

$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}} \text{ in } N\overline{K} \to 1$	$(\Gamma_1\Gamma_8)^{\frac{1}{2}}/\Gamma$		
<u>VALUE</u>	DOCUMENT ID	TECN	COMMENT
< 0.01	CAMERON	78 DPWA	$K^- p \rightarrow \Sigma(1385) \pi$

$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}} \text{ in } N \overline{K} \to 1$	$\Sigma(1915) \rightarrow \Sigma(138)$	<b>5)π</b> ,	F-wave	$(\Gamma_1\Gamma_9)^{\frac{1}{2}}/\Gamma$
VALUE	DOCUMENT ID		TECN	COMMENT
$+0.06 \pm 0.02$	ZHANG	-		Multichannel
$+0.039\pm0.009$	$^{ m 1}$ CAMERON	78	DPWA	$K^- p \rightarrow \Sigma(1385) \pi$

<sup>&</sup>lt;sup>1</sup> The published sign has been changed to be in accord with the baryon-first convention.

### $\Sigma$ (1915) REFERENCES

KAMANO ZHANG PDG PDG GOPAL ALSTON Also CAMERON CORDEN DECLAIS GOPAL MARTIN Also Also CORDEN DEBELLEFON BAILLON HEMINGWAY VANHORN Also DEVENISH	15 13A 86 82 80 78 77 77 77 77 77 77 77 77 77 77 77	PR C92 025205 PR C88 035205 PL 170B 1 PL 111B 1 Toronto Conf. 159 PR D18 182 PRL 38 1007 NP B143 189 NP B125 61 CERN 77-16 NP B119 362 NP B127 349 NP B126 266 NP B126 285 NP B104 382 NP B109 129 NP B94 39 NP B94 39 NP B91 12 NP B87 145 NP B87 157 NP B81 330	H. Kamano et al. H. Zhang et al. M. Aguilar-Benitez et al. M. Roos et al. G.P. Gopal M. Alston-Garnjost et al. M. Alston-Garnjost et al. W. Cameron et al. M.J. Corden et al. Y. Declais et al. G.P. Gopal et al. B.R. Martin, M.K. Pidcock, R. B.R. Martin, M.K. Pidcock B.R. Martin, M.K. Pidcock M.J. Corden et al. A. de Bellefon, A. Berthon P.H. Baillon, P.J. Litchfield R.J. Hemingway et al. A.J. van Horn A.J. van Horn R.C.E. Devenish, C.D. Froggat	(LOUC) (LOUC) IJP (BIRM) IJP (CDEF) IJP (CERN, RHEL) IJP (CERN, HEIDH, MPIM) IJP (LBL) IJP (LBL) IJP
KANE	74	LBL-2452	D.F. Kane	` (LBL)́ IJP
COOL	66	PRL 16 1228	R.L. Cool et al.	(BNL)

Created: 5/30/2017 17:20

 $<sup>^{</sup>m 1}$  The two entries for CORDEN 77C are from two different acceptable solutions.