

STANDARD DRAWING

IF IT IS FOUND DESIRABLE TO CHANGE ANY TOLERANCE OR OTHER DETAIL SPECIFIED ON THIS DRAWING NOTIFY THE PURCHASER PROMPTLY.

MAXIMUM ALLOWABLE TOLERANCES HAVE BEEN DETERMINED AND DEVIATIONS WILL BE CAUSE FOR REJECTION. REMOVE ALL BURRS AND SHARP EDGES

CRYSTAL UNIT QUARTZ (TYPE)	HOLDER TYPE	FREQUENCY RANGE NOMINAL (KC. SEC)	FREQ. TOL. %	OPERABLE TEMP. RANGE #	OPERATING TEMP. RANGE	XTAL UNIT MAX. CAP. (µµF)	RESONANCE	LOAD CAP. (µµF)
CR-18A/U	HC-6/U	800-20,000	±0.005	-	-55° to +90°	7.0	PARALLEL	32.0 ± 0.5
CR-19A/U	"	800-20,000	±0.005	-	-55° to +90°	7.0	SERIES	-
CR-23/U	"	10,000-75,000	±0.005	-	-55° to +90°	7.0	"	-
CR-25A/U	"	200-500	±0.010	-	-40° to +70°	-	"	-
CR-26A/U	"	200-500	±0.002	-40° to +80°	75° ± 5°	-	"	-
CR-27A/U	"	800-20,000	±0.002	-55° to +90°	75° ± 5°	7.0	PARALLEL	32.0 ± 0.5
CR-28A/U	"	800-20,000	±0.002	-55° to +90°	75° ± 5°	7.0	SERIES	-
CR-32A/U	"	10,000-75,000	±0.002	-55° to +90°	75° ± 5°	7.0	"	-
CR-33A/U*	"	10,000-75,000	±0.005	-	-55° to +90°	12.0	PARALLEL	32.0 ± 0.5
CR-35A/U	"	800-20,000	±0.002	-55° to +90°	85° ± 5°	7.0	SERIES	-
CR-36A/U	"	800-20,000	±0.002	-55° to +90°	85° ± 5°	7.0	PARALLEL	32.0 ± 0.5
CR-44/U*	"	15,000-20,000	±0.002	-55° to +90°	85° ± 5°	7.0	"	32 ± 0.5
CR-45/U*	"	455	±0.02	-	-40° to +70°	7.5	SERIES	-
CR-46A/U*	"	200-500	±0.01	-	-40° to +70°	-	PARALLEL	20 ± 0.5
CR-47A/U*	"	200-500	±0.002	-40° to +80°	75° ± 5°	-	"	20 ± 0.5
CR-48/U*	"	800-3,000	±0.015	-	-55° to +90°	7.0	"	32.0 ± 0.5

* SPECIAL APPLICATION TYPE

TEMPERATURE CONTROL XTAL UNITS HAVE A FREQ. TOL. OF ±0.002% AT 75° OR 85° C., WHICHEVER IS APPLICABLE. IN ADDITION, THESE UNITS, WHEN MEASURED OVER THE OPERATING TEMP. RANGE, SHALL NOT DEVIATE MORE THAN ±0.0005% FROM THE FREQ. VALUE MEASURED AT THE MID POINT OF THE OPERATING TEMP. RANGE.

THE OPERABLE TEMP. RANGE IS DEFINED AS THE TEMP. RANGE OVER WHICH THE XTAL WILL OSCILLATE BUT NOT NECESSARILY WITHIN THE FREQ. TOL.

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Property of:
THE TECHNICAL MATERIEL CORPORATION
MAMARONECK, NEW YORK

ISSUE	ITEM	CHANGED FROM	DATE	CN. NO.	DRAFTS	CHECKER	ENG. APP.
D	1	NOTE 182 REV. 3 ADDED	10/26/53	5324	K.V.	JCB	J
C	1	SEE EMN #10855	8/18/64	10855	A.M.	J.R.	J
B	1	RE-DRAWN COMPLETE REVISION	4/1/65	2	W.D.	JCB	J

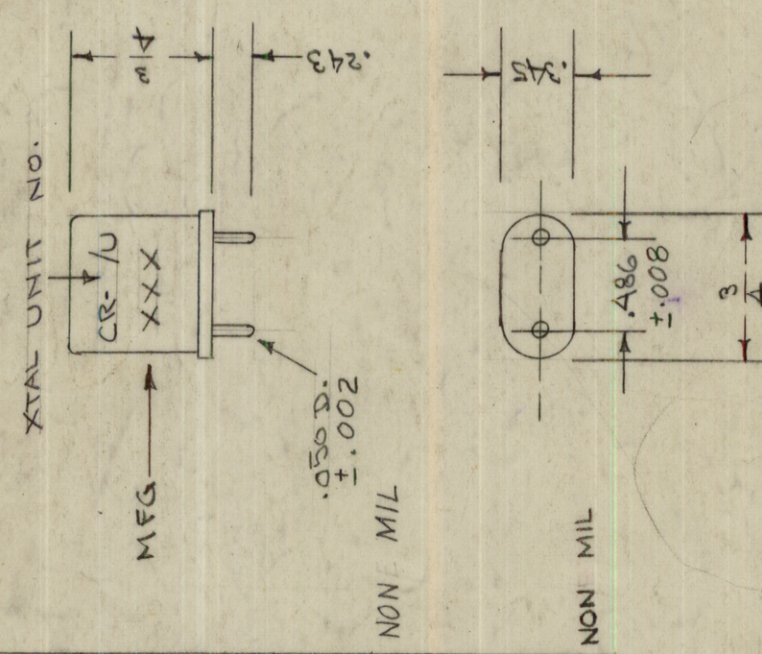
ALL OTHERS	TOLERANCES		SCALE:
	DEC. DIM. ±	FRAC. DIM. ±	
	DRILL, PUNCH, COMMERCIAL STOCK SIZES AND MANUFACTURERS TOLERANCES ARE NOT INCLUDED.		

REQ. UNIT	MODEL	PROJECT NO.	ASSY. NO.	DATE
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TYPE DESIGNATION TO BE IN FOLLOWING FORM.

CR-18A/U - 1.500000 MC
 COMPONENT XTAL UNIT TYPE
 SEE NOTE 2

NOTE:
 1. CRYSTAL OPERATING FREQ. TO BE STAMPED ON TOP OF UNIT
 2. FREQ. BELOW 1 MC EXPRESS IN KC.
 FREQ. 1 MC AND ABOVE EXPRESSED IN MC.
 IF FREQ. IS LESS THAN 10 MC, FREQ. MARK SHALL CONSIST OF ALL DIGITS THROUGH CYCLES PER SECOND. IF FREQ IS 10 MC OR ABOVE, FREQ. MARK SHALL CONSIST OF THE FIRST SEVEN DIGITS
EXAMPLES:
 CR-XX/U-12.00000 MC
 CR-XX/U-8.000000 MC
 CR-XX/U-455.000 KC
 3. ANY OTHER FREQUENCY SUCH AS EQUIPMENT OPERATING FREQUENCY, WILL BE MARKED ON THE SIDE OF THE HOLDER.

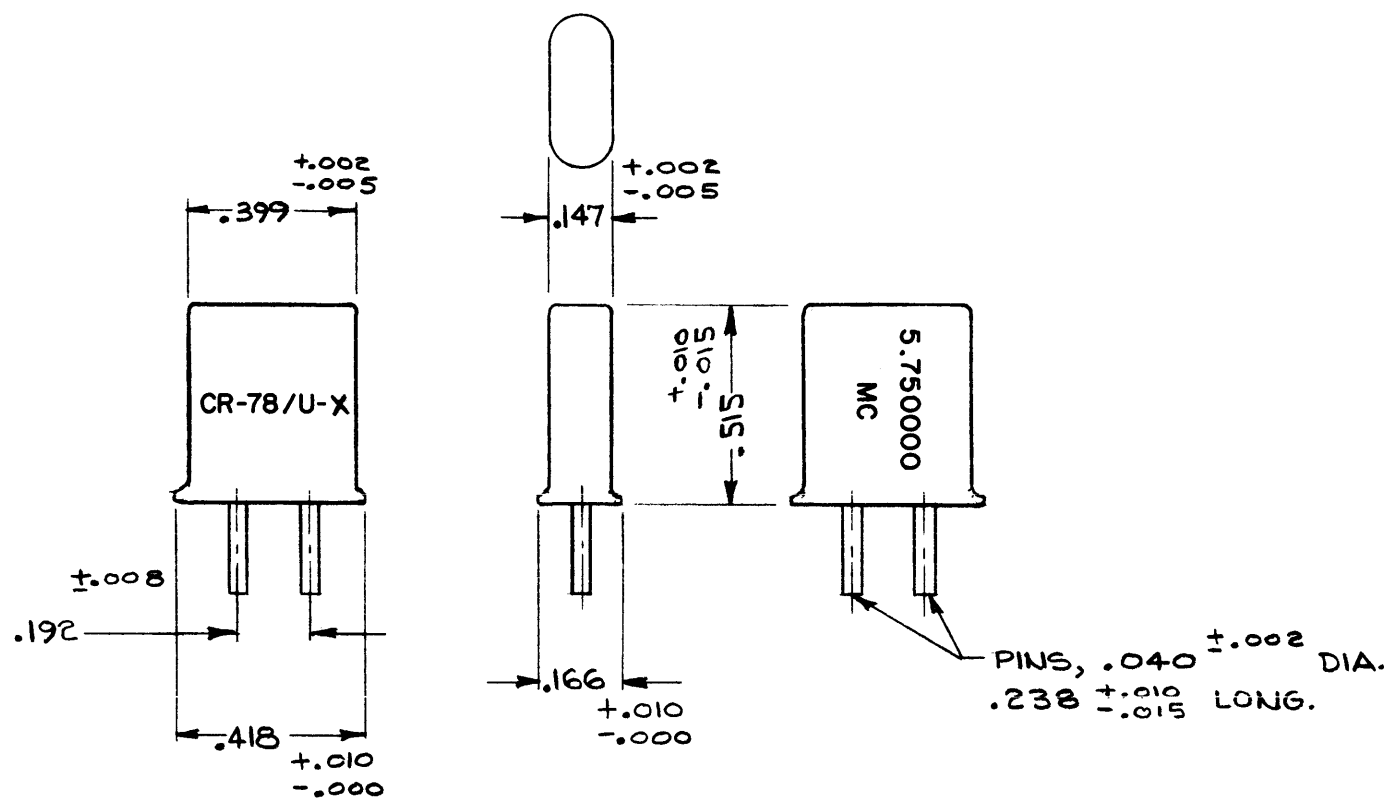


REF: MIL-C-3098 SUP. 1

REQ. ITEM	PART NO.	DESCRIPTION	SYMBOL
		THE TECHNICAL MATERIEL CORP.	
		MAMARONECK, NEW YORK	
		CRYSTAL UNITS, QUARTZ (IN HC-G/U HOLDERS)	
		CDD.A.25-55	
		DRAWN	ELEC. DES. APP. MECH. DES. APP.
		Checked	FINAL APPROVAL
		CR-18, 19, 23, 25, 26, 27, 28, 32, 33, 35, 36, 44, 45, 46, 47, 48	

CR-78/U 0

REVISIONS					
SYM	DESCRIPTION	DATE	E.M.N. NO.	DRAFT	CHKD
X	EXPER. RELEASE	3-24-64	1		
0	ORIGINAL RELEASE FOR PRODUCTION	4.2.64			



NOTES

- 1- UNITS SHALL BE MANUFACTURED IN ACCORDANCE WITH AND SHALL MEET THE REQUIREMENTS OF MIL-C-3098* AND AMENDMENTS.
- 2- HOLDERS SHALL CONFORM (CONSTRUCTION, FINISHES, ETC.) TO MIL-H-10056
- 3- MARKING INFORMATION:
ALL MARKING SHALL BE IN ACCORDANCE WITH MIL-C-3098*

* LATEST REVISION TO BE USED.

TMC PART NUMBER SHALL BE IN THE FOLLOWING FORM;

CR-78/U-5.750000 MC

BASIC MIL PART NUMBER

FREQUENCY DESIRED IN MEGACYCLES (MC) EXAMPLES (RESTRICT TO SEVEN DIGITS)	
9.000000	= 9 MC
10.00000	=10 MC
33.75000	=33.75 MC

SPECIFICATIONS

FREQUENCY RANGE: 3 TO 20 MC INCL
 OVERALL FREQUENCY TOLERANCE: $\pm 0.005\%$
 RESONANCE: PARALLEL
 MODE OF OSCILLATOR: FUNDAMENTAL
 OPERATING TEMPERATURE RANGE: $-55^{\circ} -3^{\circ}$ TO $+105^{\circ} -0^{\circ}$
 DRIVE LEVEL: 5.0 ± 0.1 MW
 MAXIMUM SHUNT CAPACITANCE: 7 μ f
 EFFECT RESONANCE RESISTANCE (EQUIVALENT RESISTANCE):

MC/SEC.	OHMS
3.0 TO 3.75	175
3.75 TO 4.75	120
4.75 TO 6.0	75
6.0 TO 7.5	50
7.5 TO 10.0	35
10.0 TO 20.0	25

HOLDER TYPE: HC-25/U

REQ'D.	ITEM	PART NUMBER	DESCRIPTION	SYMBOL
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LIST OF MATERIAL

MATERIAL	THE TECHNICAL MATERIEL CORP. MAMARONECK, NEW YORK			
FINISH	TITLE CRYSTAL UNIT, QUARTZ			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES	DRAWN	DATE	FINAL APPROVAL	DATE
	CHECKED	DATE		
DECIMALS .X \pm .05 .XX \pm .01 .XXX \pm .005	ELECT. DES.	DATE	CR-78/U	REV. LTR.
	MECH. DES.	DATE		
TOLERANCES	FRACTIONS $\pm 1/64$ ANGLES $\pm 0^{\circ} 30'$		SHEET	

NOTES

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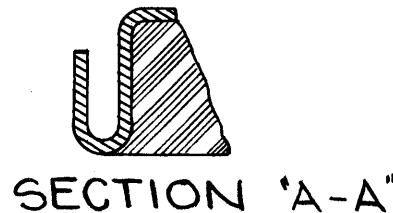
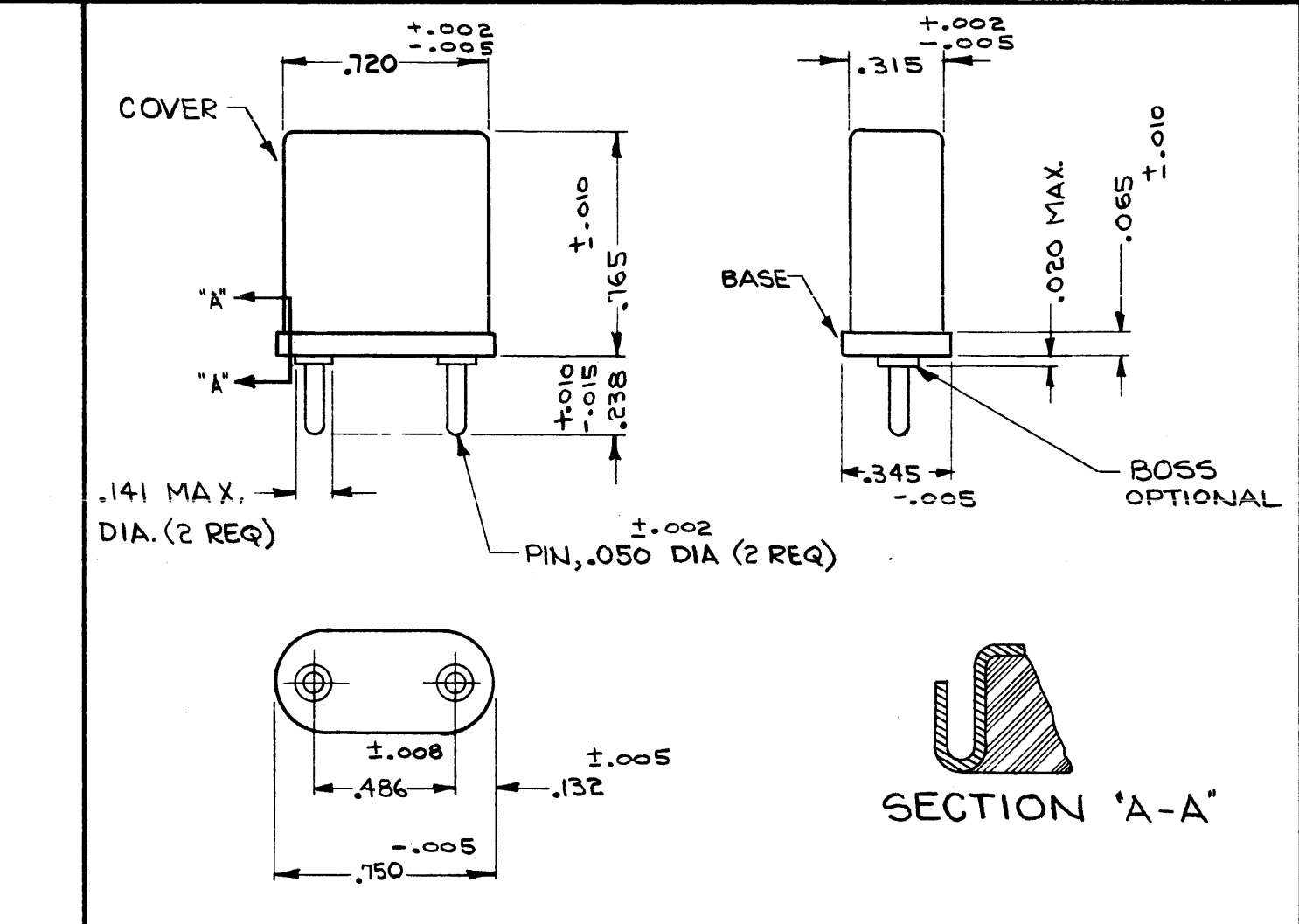
TMC PART NUMBER	OPERATING FREQ. (MC)	SPURIOUS SUPPRESSION BANDWIDTH	FREQUENCY ABSOLUTE
CR 113-1	1.000000	\pm 100 KC	.05% LOW OR OR 5 PARTS IN 10^4
CR 113-2	1.010000	\pm 100 KC	
CR 113-3	1.020000	\pm 100 KC	
CR 113-4	1.030000	\pm 100 KC	
CR 113-5	1.040000	\pm 100 KC	
CR 113-6	1.050000	\pm 100 KC	
CR 113-7	1.060000	\pm 100 KC	
CR 113-8	1.070000	\pm 100 KC	
CR 113-9	1.080000	\pm 100 KC	
CR 113-10	1.090000	\pm 100 KC	
CR 113-11	1.100000	\pm 100 KC	.01% LOW OR 1 PART IN 10^4
CR 113-12	1.110000	\pm 100 KC	
CR 113-13	1.120000	\pm 100 KC	.02% LOW OR 2 PARTS IN 10^4
CR 113-14	8.000000	\pm 400 KC	
CR 113-15	10.000000	\pm 400 KC	
CR 113-16	1.000000	\pm 100KC	
CR 113-17	1.100000	\pm 100KC	

SPECIFICATIONS

"Q" - > 60,000
 Rs - 400 OHMS OR LESS
 OPERATING TEMPERATURE RANGE- 0° TO 55°C.
 C1- .0075 TO .0080 pf
 Co- \approx 5 pf

SPURIOUS SUPPRESSION- 40 db DOWN
 DRIVE LEVEL- .25 MW
 HOLDER- HC-6/U

REVISIONS						
SYM	DESCRIPTION	DATE	E.M.N. NO.	DRAFT	CHKD	APFD
X	EXPER. RELEASE	3-25-64	1			
Ø	ORIGINAL RELEASE FOR PRODUCTION	7-10-64				
A	ON SPECS. C1 WAS .0077 TO .0078	8-26-64	12229			
B	ON SPECS. "FREQ. ABS..." TRANSFERED TO CHART. CR113-16,-17 ADD.	10-30-64	12823			
C	ALL X'S DELE. ON SPECS, * NOTE RELOC. TO CR113-14&15 FREQ COL.	11-13-64	12906			



REQ'D.	ITEM	PART NUMBER	DESCRIPTION	SYMBOL
M. GELLMAN LIST OF MATERIAL				
MATERIAL			THE TECHNICAL MATERIEL CORP. MAMARONECK, NEW YORK	
FINISH			TITLE CRYSTAL - SPECTRUM FILTER	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES			DRAWN G. Sencer 3/25/64 DATE 7-9-64 DATE 7-9-64 DATE	
DECIMALS .X ± .05 .XX ± .01 .XXX ± .005			TOLERANCES ± 1/64 ANGLES ± 0° 30'	
THE CONTENTS OF THIS DRAWING ARE THE EXCLUSIVE PROPERTY OF THE TECHNICAL MATERIEL CORP. ITS UNAUTHORIZED USE OR REPRODUCTION IN WHOLE OR IN PART IS STRICTLY FORBIDDEN.			ELECTRICAL MECH. DES. FINAL APPROVAL CR 113 SHEET REV. LTR. C	

Q'TY./UNIT	MODEL USED ON	ASS'Y. NO.
50	LFSAI	
SCALE	CODE	
$\frac{1}{1}$	C	S401-129

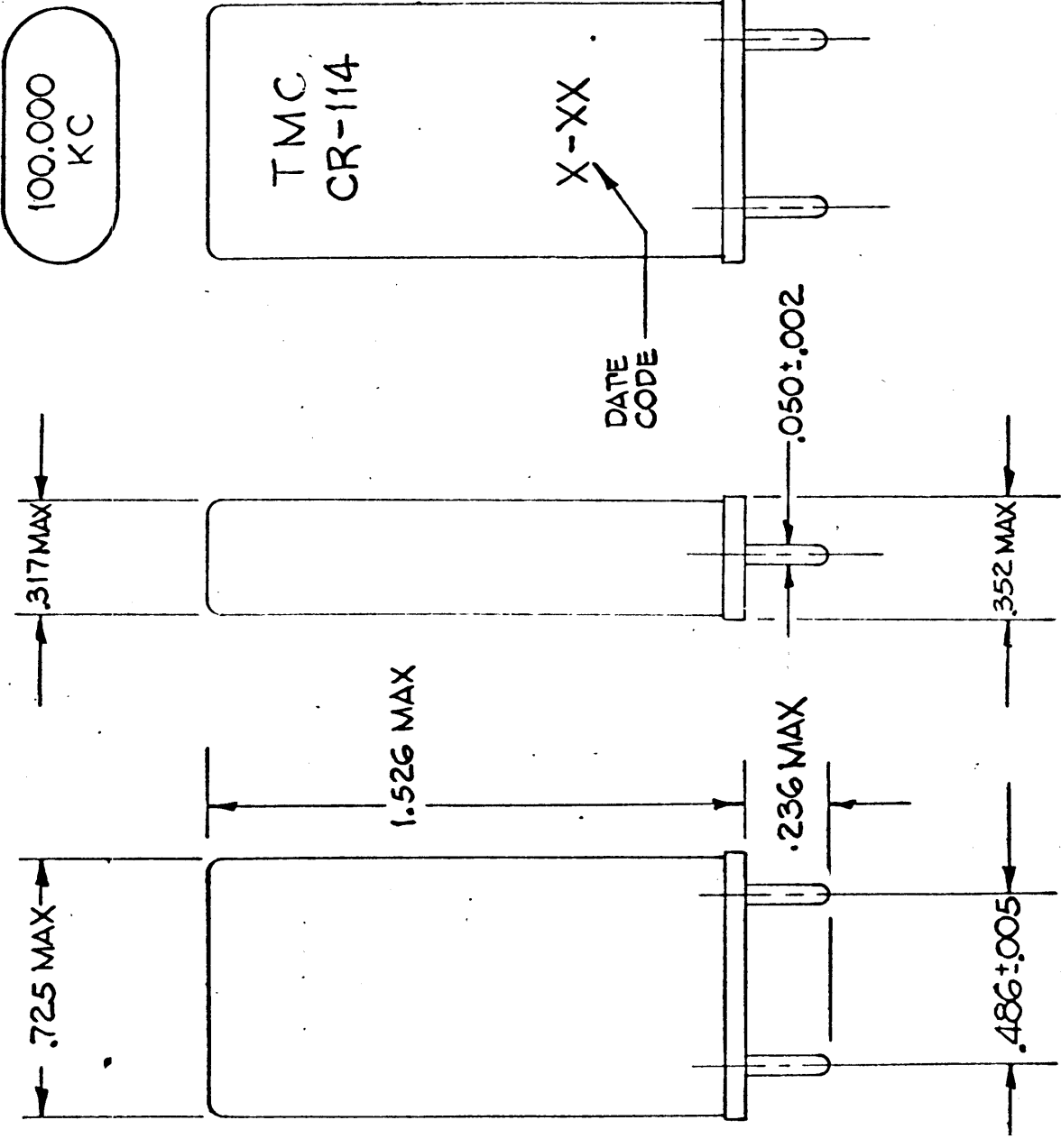
STANDARD DRAWING

NOTES

REVISIONS		DATE	E.M.N. NO.	DRAFT	CHKD	APPD
Ø	ORIGINAL RELEASE FOR PRODUCTION	7-22-65	Ø	Ø		

CR114

1. OPERATING CHARACTERISTICS:
 - 1.1 Operating temperature range: 0° to + 50 C
 - 1.2 Nominal frequency: 100.000 KC ± 0.01% At 25°C
 - 1.3 Frequency deviation from nominal over operating temperature range: Shall not exceed eight cycles.
 - 1.4 Operating condition: Resonance with series load capacitance of 20 ± 0.5 PF
 - 1.5 Deleted
 - 1.6 Pin - to - pin capacity: 13.7 ± .5 pf Pin - to pin capacity shall not vary more than 5% from unit to unit.
 - 1.7 Motional inductance: Delta frequency (F20 pf minus F series) shall be 152 cps ± 5%.
 - 1.8 Maximum effective resistance: 2000 Ω @ series resonance over operating temperature range.
 - 1.9 Drive level: 0.4 mw max.
 - 1.9.1 Method of test: ungrounded
2. PERFORMANCE CHARACTERISTICS:
 - 2.1 The following tests shall be conducted in accordance with the latest version of MIL-C-3098.
 - 2.1.1 Immersion
 - 2.1.2 Insulation resistance.
 - 2.1.3 Leakage
 - 2.1.4 Moisture resistance
3. MECHANICAL REQUIREMENTS:
 - 3.1 Holder: HC-13/U
 - 3.2 Markings: Per MIL-C-3098



REQ'D.	ITEM	PART NUMBER	DESCRIPTION	SYMBOL
	POSE		LIST OF MATERIAL	
MATERIAL				
FINISH				
TITLE				
THE TECHNICAL MATERIEL CORP. MAMARONECK, NEW YORK				
CRYSTAL UNIT, QUARTZ 100 KC				
DRAWN	DATE	FINAL APPROVAL	DATE	
H. AMSTON	3-17-65			
CHECKED	DATE			
	3-17-65			
ELECT. DES.	DATE			
MECH. DES.	DATE			
SHEET				REV. LTR.
				Ø

QTY./UNIT	MODEL USED ON	ASBY. NO.
SCALE	CODE	S401-308
	C	
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NOTES

FREQ IN MHZ	MAX EFFECTIVE RESISTANCE	FREQ IN MHZ	MAX EFFECTIVE RESISTANCE
10.0	40 Ω	7.0	91 Ω
11.0	30	8.0	68
12.0	30	9.0	51
14.0	22	13.0	22
16.0	22	15.0	22
16.1	22	19.0	10
16.2	22	14.545	22
16.3	22	53.5	
16.4	22		
16.5	22		
16.6	22		
16.7	22		
16.8	22		
16.9	22		
17.0	22		

CASE TYPE: HC 16/U
 OPERATING RANGE: 0 TO 60 C
 XTAL Q: TO BE GREATER THAN 50,000
 XTAL SPOT DIAMETER: 0.125 INCHES
 SERIES RESONANT FREQ: ALL CRYSTALS ARE TO HAVE A SERIES RESONANT FREQUENCY 500 HERTZ LOWER THAN THE DESIGNATED FREQUENCY, FD FOR EXAMPLE; A XTAL DESIGNATED AS A 10 MHZ XTAL WOULD BE SERIES RESONANT AT 9.999500 MHZ

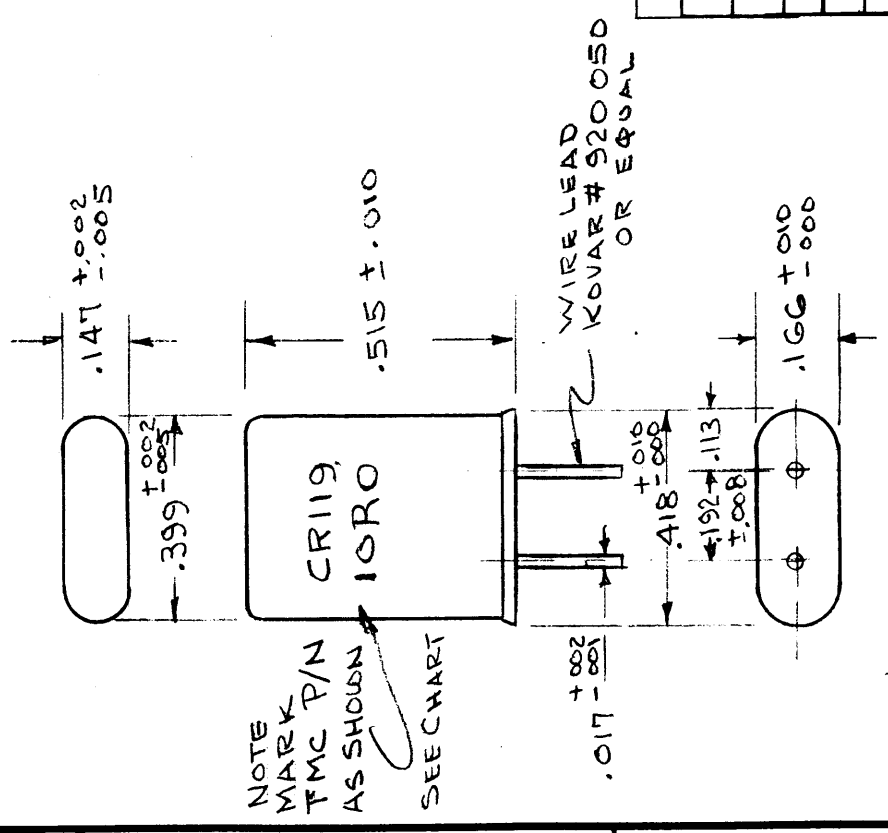
SERIES RESONANT FREQ, TOLERANCE: ±100 HERTZ
 SERIES RESONANT FREQ. VARIATION: ± 300 HERTZ FROM 0 TO 60°C
 DRIVE LEVEL: 2.5 MILLIWATTS

ZONE	LTR	DESCRIPTION	DATE	E.M.N.NO	DRAFT	CHKD	APPD
	X	EXPERIMENTAL RELEASE	3/18/68		C.V.		
	Ø	ORIG. RELEASE FOR PROD	10-22-68		R.G.		
	A	CASE TYPE & MATERIAL REV.	11/22/68	19104	L.H.		91012
	B	CHART REVISED, SPEC ADDED	1/10/69	19342	CW		11119
	C	CHART UPDATED		20500	CV		
	D	ADD TO CHART FREQ IN MHZ 130.150	6/28/72	20767	GE		
	E	190-MAX EFF RES 22.22.10	10-6-72	20912	GE		
	F	ADD TO CHART 14.545MHZ 22.1	5-26-76	21385	GDL		
		ADD TO CHART 53.5 MHZ					

TMC PART NUMBER SHALL BE IN THE FOLLOWING FORM:

CR 119 - 10R0

DESIGNATED FREQ IN MHZ
 "R" DENOTES DECIMAL POINT (SEE CHART)



NOTE
 DIMENSIONS FOR REF ONLY

REQ'D ITEM	PART NUMBER	DESCRIPTION	SYM.
HOGAN		LIST OF MATERIAL	
FINAL APPROVAL		DATE	
MECH. DES.		DATE	
ELECT. DES.		DATE	
CHECKED		DATE	
DRAWN		DATE	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES		FRACTIONS 1/64	
.X ± .05 TOLS.		ANGLES 0°-30'	
.XX ± .01			
.XXX ± .005			
MATERIAL		FINISH	
RSU-1			
GPR-110			
HFSR-4			
MODEL USED ON		ASSY NO.	
APPLICATION		S401-466	
CODE C			
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SIZE	CODE IDENT. NO.	DWG NO.	ISSUE
B	82679	CR 119	F
SCALE		SHEET	OF
		1	1