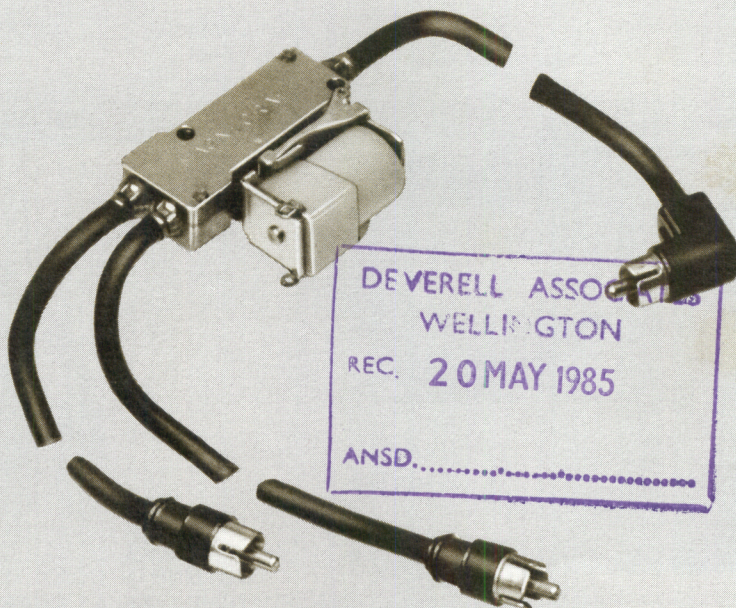
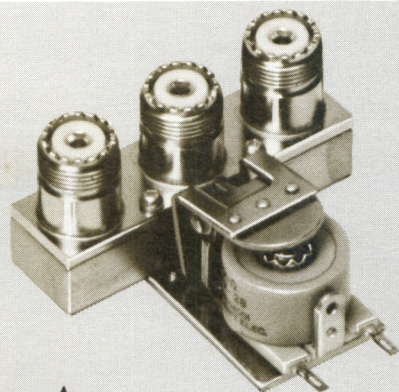


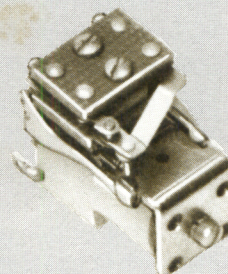
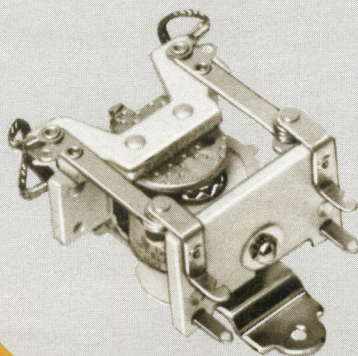
# COAXIAL & R.F. SWITCHING RELAYS



DEVERELL ASSOCIATES  
WELLINGTON  
REC. 20 MAY 1985  
ANSD.....

CATALOG  
No. 773-B

**JULY  
'83**



**Magnecraft<sup>®</sup>**  
ELECTRIC COMPANY

"W" RELAYS  
ARE STOCK ITEMS  
AND  
AVAILABLE FOR  
IMMEDIATE  
DELIVERY



In this catalog you will find various types of Coaxial Relays designed for minimum size and weight, AC or DC operation, with Time Delay and with auxiliary contacts. Unshielded RF switching relays are also included.

Magnecraft Coaxial Relays have been developed to meet today's demand for reliable radio frequency switching through coaxial cables and connectors with minimum size, at low cost. They are particularly suitable for antenna switching in two way radios, mobile, aircraft, marine, etc.

Coaxial relays feature low voltage standing wave ratio (VSWR), excellent cross-talk characteristics and a wide selection of connectors. Long life, fast operation and high reliability

are characteristic of Magnecraft Coaxial Relays.

Magnecraft builds coaxial relays in two basic styles, one with RF connectors as an integral part of the cavity (See Fig. 1) the other with shielded cables connected directly to the cavity. (See Fig. 2)

Magnecraft also offers a line of radio frequency switching devices with special contact blades to provide low capacitance between contacts and resulting low cross-talk. These non-coaxial cavity RF switching relays are generally smaller in size. Used for RF antenna transfer of high voltage switching applications, they are also suitable in applications requiring high interelectrode isolation.

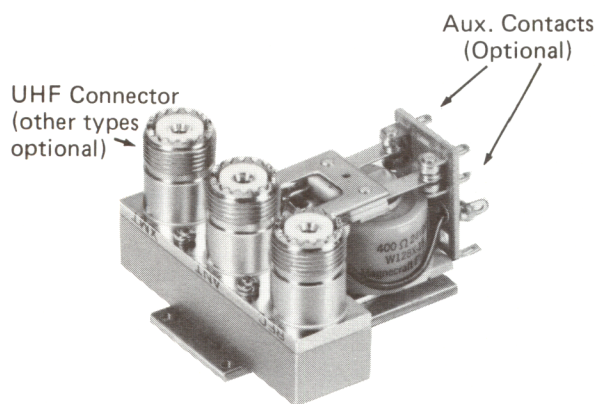


Figure 1.  
Class 128

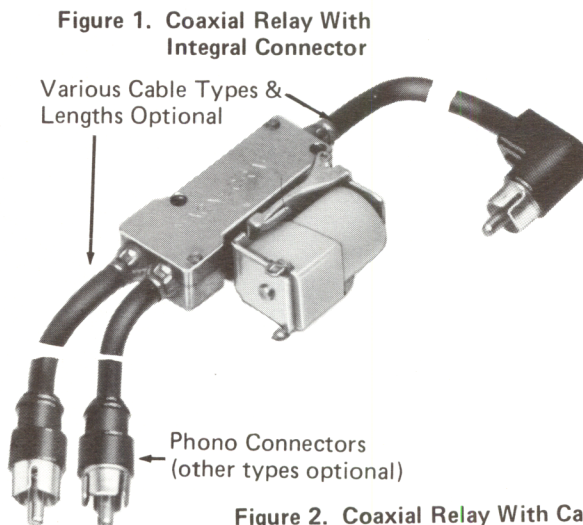


Figure 2. Coaxial Relay With Cable and  
Optional Connectors

### OUTLINE OF COAXIAL AND R.F. SWITCHING RELAY CHARACTERISTICS

- ▶ Particularity suitable for antenna switching in two way radios, e.g. mobile, aircraft, marine, etc.
- ▶ Combines the time-proven long life and reliability of the telephone relay with RF switching.
- ▶ AC-DC Coil Operation (to 240VAC or 220VDC)
- ▶ Time Delay (Class 122/126)
- ▶ Auxiliary Contacts (SPDT and DPDT to 10 Amps)
- ▶ Coaxial Switch Cavity (SPDT and DPDT)
- ▶ Unshielded Switching Types (Lower cost, Class 33F & 151)
- ▶ Wide Selection of Connectors (phono-BNC-TNC-N-C-UHF.) Matched impedances.
- ▶ Low power operate coils (1 watt, Class 126)
- ▶ Low voltage standing wave ratio, VSWR (1.25:1 from 0-470 MHZ typ.)
- ▶ Excellent cross talk characteristics (40 Db. min. from 0 to 470 MHZ typ.)
- ▶ Cavity Styles:
  - 4 different cable exits
  - Removable plate for contact inspection (all styles).
  - Panel or reverse mtd. cavities, Class 128.
- ▶ Contact supported directly on connectors for low loss at high frequencies.
- ▶ Enclosure with snap on inspection cover (Class 122/126)
- ▶ Mtg. bracket (Eliminates chassis cut-outs, Class 122 and 126)
- ▶ Cable Styles:
  - Standard coaxial cable RG58C/U 50 Ohms (12 inches long, inner and outer conductors stripped 1/4 inch)
  - Optional cables & lengths (Outer cable dia., less than .195", inner conductor less than .032")
  - Cables can be terminated with coaxial connectors.
- ▶ Hermetically sealed RF contact & encapsulated coil (Class 101RF) All relays utilize non-hygroscopic and non-corrosive materials to withstand high humidity environments.
- ▶ XMT/REC contact grounding (optional for Class 128) Recommended where optimum circuit isolation is required.
- ▶ Temperature Range: —55C to +65C (higher ratings possible)
- ▶ RF Contact Load Ratings: 75 to 1000 watts, 0 to 1000 MHZ. (See individual relays for exact range).

NOTE: All specifications in this catalog are subject to change without notice.

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CHICAGO, IL. 60630

**Magnecraft**  
ELECTRIC COMPANY



**Coaxial Relay - What Is It?** A relay with its switching members enclosed in a metal cavity that provides the desired characteristics of impedance and electrical shielding. Coaxial cables are assembled by Magnecraft directly to the cavity so that the resulting structure will switch radio frequency current with a minimum amount of signal loss.

**Voltage Standing Wave Ratio (VSWR)** - Power loss due to mismatch introduced into the line by a relay expressed as a ratio of the highest voltage to the lowest voltage, found in the RF line. See SWR below.

**Grounding Contacts** - With the coaxial relay in the de-energized position, the transmitter side is grounded. Grounding contacts reduce RF leakage to the disengaged connector and is recommended when optimum circuit isolation is required.

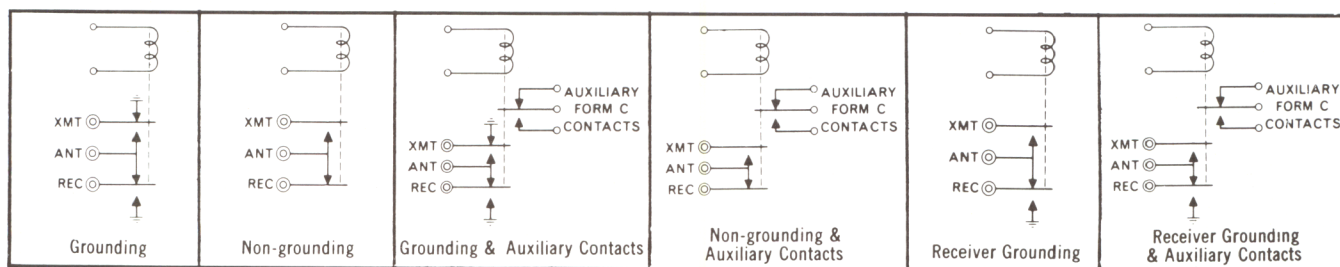
**Non-Grounding Contacts** - In non-grounding coaxial relays the disengaged contact blade does not ground against the cavity

wall. NOTE: With non-grounding coaxial relays "resistor-terminated" circuits are used to ground the disengaged connector through a resistor.

**Insertion Loss** - When a relay is inserted between a source and a load impedance, the ratio of current with and without the relay in the circuit is termed the insertion loss. This Insertion loss ratio is expressed in decibels.

**RF Contact Load Rating (Power)** - Capability to handle RF power after contacts are closed. For better contact life, the RF should be removed during the switching cycle for high contact loads.

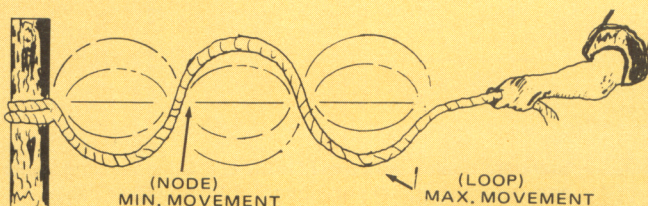
**Cross-Talk** - Cross-talk is defined as the electrical coupling between a closed contact circuit and other open or closed contacts on the same relay or switch, expressed in decibels down from the signal level. The loss is independent of operating level and can be reduced by grounding all unconnected components.



Standard Coaxial Contact Forms Available With Integral Connectors Types Classes 128, 128M, etc.

## WHAT IS SWR? (STANDING WAVE RATIO)

In RF transmission lines it is desirable to avoid, whenever possible, standing waves which create reflected power losses. These reflected losses are a result of the impedance mismatch between the transmitter output and the impedance of the combined load (transmission line, coaxial switching relay and antenna). Ideally, maximum power transfer occurs from transmitter to antenna when the source and combined load impedances are equal. Taking the ratio of the measured maximum and minimum voltages along the transmission line is then an indication of these reflection losses which can be expressed as SWR. (e.g. 1.25 to 1)



Tie a rope or string to some solid, stationary object such as a tree or post, as shown in the diagram. Grasp the free end and start waving the rope up and down. You are now generating a train of waves much in the way that a transmitter sends waves down a transmission line.

When the wave reaches the point where the rope is anchored, there is no place for it to go so it is reflected back down the length of the rope. In this way, a pattern is formed as shown, with the loops being the points of maximum movement and the nodes the points of minimum movement of the rope. The ratio of the maximum to minimum waveform amplitude along the rope (called the Standing Wave Ratio, or SWR) in this case is 1:0, or infinity. This happens because essentially no energy is being absorbed by the post and all is being reflected back to the driving source. This is analogous to the termination of a transmission line with an impedance that is different from that of the line. If the rope were not tied to the post and were free to continue to move so that the transmission of the wave could continue, there would be no wave

SWR (e.g. 1.2 to 1, etc.)	1.0	1.2	1.5	2.0	3.0	5.0
Reflection Loss (dB)	0.000	0.04	0.18	0.51	1.25	2.55
Antenna Power (watts)	4.00	3.97	3.84	3.56	3.00	2.22

reflection. Each point on the rope would then reach the same maximum amplitude and the SWR would be 1:1, or simply 1.0.

In electrical terms, SWR can be considered as the ratio between the antenna impedance and the CB transmitter output impedance, with the larger value being the dividend and the small value, the divisor. The closer the ratio is to 1:1, the more of the transmitter r-f goes to the antenna. Besides reducing the power output to the antenna, a high SWR can also damage the transmitter output stage by submitting it to major importance to select a relay with the VSWR as close to 1:1, as possible.

The table shows the relationship between SWR and the power delivered to the antenna, assuming a nominal 4-watt output from the CB transmitter.

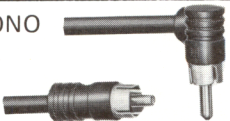
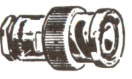

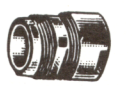

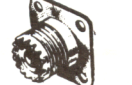


## OPTIONAL CABLE CHART

RG Number	Part Number	Inner Conductor	O.D. (In.)	Imped. Ohms	Jacket
58C/U	33-156	19 X .0071 TC	.195	50.0	Black PVC
122/U	33-172	27 X 36 TC	.160	50.0	Black or Gray PVC
141A/U	33-560	19 SCW	.195	50.0	SGL Fiberglass Braid
142B/U	33-345	19 SCW	.195	50.0	Teflon FEP
174/U	33-175	7 X .0063 CW	.100	50.0	Black PVC
178B/U	33-561	7 X .0040 SPCW	.075	50.0	Teflon FEP
179B/U	33-356	7 X .0040 SPCW	.100	75.0	Teflon FEP
187A/U	33-343	7 X .0040 SPCW	.110	75.0	WH. Teflon TFE
195A/U	33-562	7 X .0040 SPCW	.155	95.0	WH. Teflon TFE
196A/U	33-563	7 X .0040 SPCW	.080	50.0	WH. Teflon TFE
303/U	33-167	Solid SPCW	.188	50.0	Teflon FEP
316/U	33-245	7 X .0067 SPCW	.102	50.0	Teflon FEP
400/U	33-564	19 X .0077 SPC	.195	50.0	Teflon FEP
404/U	33-565	7 X .0038 SPCW	.075	50.0	Teflon FEP

TC-Tinned Copper SCW- Silvered Copperweld  
SPC Silver plated Copper SPCW- Silver plated Copper wire

## OPTIONAL CONNECTOR CHART

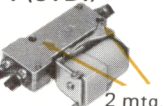
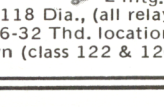
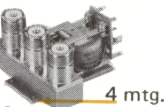

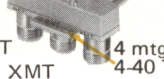
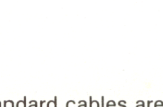
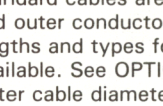
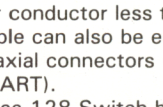
Type	Description
PHONO 	Inexpensive coupling available in straight and right angles and both male or female. Suitable for low R.F. Switching.
BNC 	Bayonet coupling coax connector in both straight and right angle for use with RG-58, 59 and other cable.
TNC 	Type TNC straight connectors are available in both male and female versions. Female only in right angle.
N 	Type N straight connectors are available in both male and female versions. Female only in right angle.
C 	Type C straight connectors are available in both male and female versions. Female only in right angle.
UHF 	UHF straight connectors are available in both male and female versions. Female only in right angle.

## SELECTION GUIDE FOR HI FREQUENCY RELAYS

Max. Watts	Frequency Range	Relay Type
75	175 MHz	33F
500	1000 MHz	128, 128M
150	470 MHz	120, 122
500	175 MHz	151
150	600 MHz	101RF

## CAVITY TYPES

(Direction of cable exits from switch housing)

RELAY CLASS NUMBER	120	122	126	128
<b>CABLE EXIT</b>				
<b>TYPE I (STD.)</b>				
XMT 	X	X(3)	X	
REC 				
<b>CONNECTOR EXITS</b>				
<b>TYPE I</b>				X
XMT 				
ANT 				
REC 				
<b>TYPE II</b>				X
REC 				
ANT 				
XMT 				

- Standard cables are type RG58C/U (12 inches long, inner and outer conductors stripped 1/4 inch.) Other cable lengths and types for proper impedance matchings are available. See OPTIONAL CABLE CHART. Outer cable diameter must be less than .195 inch and inner conductor less than .032 inch. Cable can also be equipped with a wide selection of coaxial connectors (See OPTIONAL CONNECTOR CHART).
- Class 128 Switch housings are equipped for mounting UHF, N, BNC, or TNC connectors. Contact grounding available as an option where optimum circuit isolation is required.
- Class 122 also available as a DPDT coaxial relay.
- General:  
All coaxial relays are SPDT  
Auxiliary contacts are also available with most cavity types. See individual relay.  
XMT: Transmit terminal (N.O.)  
REC: Receive terminal (N.C.)  
ANT: Antenna terminal (Common)



# RELAY SELECTION CHART

**COAXIAL/R.F.  
SWITCHING**

## APPLICATION GUIDE COAXIAL AND R.F. SWITCHING RELAYS

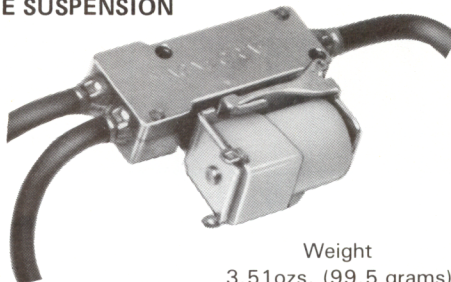
Reference	GENERAL DESCRIPTION	Coaxial (shielded)					R.F. Switching (unshielded)	
		Fast Oper. Herm. Seal	Smallest Size Cable Exit	Med. Size	Heavy Duty, Time Delay	Con. nector exit	Small Size, Low Cost	Aux. Con- tact
	Relay Class Number	101 RF	120	122	126	128	33F	151
	Page Number	14	4-5	4-7	6-9	8-13	14	15
Construction	Connector: Cable/UHF, BNC, N or TNC Conn.	UHF/ phono	Cable/ Conn.	Cable/ Conn.	Cable/ Conn.	Conn.	Solder Lug	Solder Lug
	Aux. Contacts, 120 VAC or 28 VDC resist.			SPDT 10 amp	SPDT 5 amp	DPDT 10 amp		SPDT 10 amp
	Grounding Contacts:					X		
	RF Contact Combination:	SPDT	SPDT	SPDT DPDT	SPDT	SPDT	SPDT	DPDT
RF Ratings	RF Contact Rating: Watts, Max.	150	150	150	150	500	75	500
	Freq. Range: 0 to — MHz.	600	470	470	470	1000	175	175
	Cross Talk: —DB @ 0 to—MHz.	40 600	40 470	40 470	40 470	40 470		
	VSWR, max. @ 0 to—MHz.	1.2:1 600	1.25:1 470	1.25:1 470	1.25:1 470	1.25:1 470		
	Initial Contact Resist: Milli Ohm, Max.	250	50	50	50	50		100
	Dielectric Strength: Vac across contacts RMS @ sea level	300 VDC	1000	1000	1000	1000	750	500
	Insulation Resistance: —Meg. Ohm, Min.	1000	1000	1000	1000	1000		100,000
	Operate Coil Voltage: up to VDC NOTE 3, up to VAC	12 —	48 —	48 120	48 —	48 120	140 240	220 230
Coil	Operate Time: MS max./Slow operate	2 typ.	15	15	15	20		15 typ.
	Release Time: M.S. Max./Slow release	2 typ.	7	7	7/225	20		10 typ.
	Slow Operate or Release:				X			
	Temp. Range: °C	— 55 +85	— 55 +65	— 55 +65	— 55 +65	— 55 +65	— 55 +65	— 55 +65
Shock & Vib.	Shock: 30g., 11ms	X				X		
	Vibration: 10g's @ —Hz.	0 to 500Hz				10 to 55Hz.		
General	Available from Stock (w)		X			X		X
	Weight: gms					255	45	142
	Snap on Cover or mtg. brkt.			X	X			

NOTES: (1) Relays pull in at 80% of nominal or less for DC operation and 85% or less for AC operation. Higher coil operate voltages than shown are available up to 200 VDC. Special versions available on most relays with solid state rectifiers for AC operation up to 240 VAC at frequency between 50 and 400 Hz.



### CLASS 120 - TYPE I DC OPERATION ONLY SMALLEST SIZE SPDT CONTACTS-GOLD PLATED SILVER ALLOY HINGE PIN ARMATURE SUSPENSION

The Class 120 Type I is the basic coaxial relay. It consists of the standard Type I cavity assembled to a Class 33 Actuator. The Class 120 is ideally suited for antenna switching applications where size and weight must be kept to a minimum. It is also our lowest cost coaxial relay.

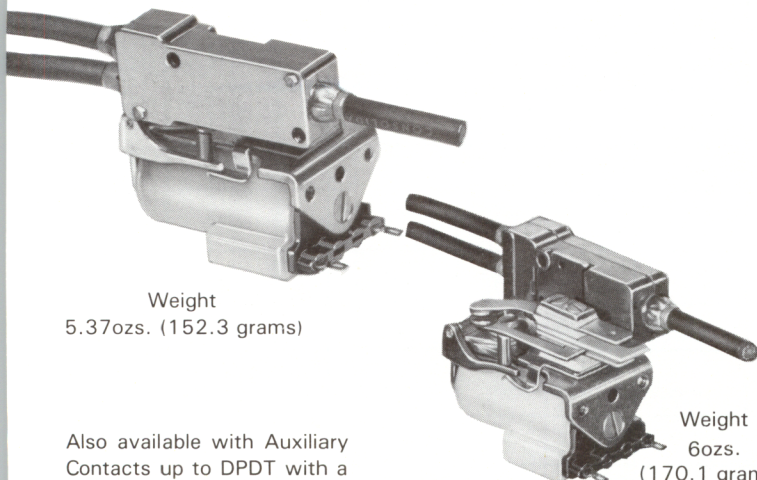


Weight  
3.51ozs. (99.5 grams)

#### SPECIFICATIONS

**R.F. Contact Load Rating:** 150 watts max., up to 470 MHz.  
**R.F. Contact Combination:** SPDT (1 form C)  
**Initial Contact Resistance:** 0.05 ohms max.  
**VSWR (Voltage Standing Wave Ratio):** 1.25 to 1 max. from 0 to 470 MHz.  
**Cross Talk:** 40 DB min. from 0 to 470 MHz.  
**Dielectric Strength:** 1000 volts RMS at sea level.  
**Insulation Resistance:** 1000 Megohms min.  
**Operate Time:** 15 milliseconds max.  
**Release Time:** 7 milliseconds max.  
**Temperature Range:** -55°C to +65°C  
**Cable:** RG58C/U, 12" long. See Optional Cable Chart for other cables available.  
**Connectors:** None. See Optional Connector Chart for connectors available.

### CLASS 122 - TYPE I INTERMEDIATE IN SIZE AND POWER CONSUMPTION



Weight  
5.37ozs. (152.3 grams)

Also available with Auxiliary Contacts up to DPDT with a 5 amp contact rating

Weight  
6ozs.  
(170.1 grams)

## SENSITIVE COAXIAL RELAYS

#### SPECIFICATIONS

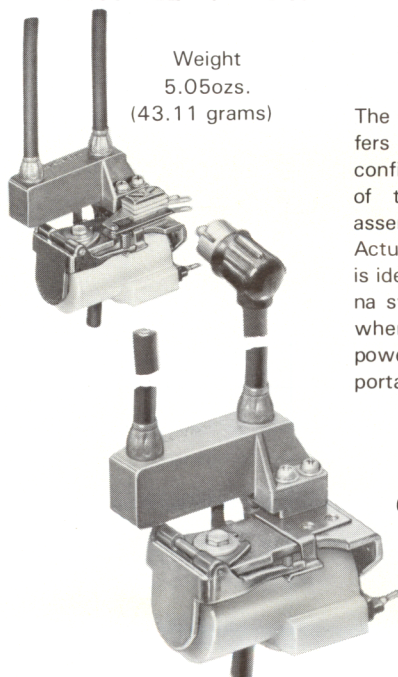
**R.F. Contact Load Rating:** 150 watts max., up to 470 MHz.  
**R.F. Contact Combination:** SPDT (1 form C)  
**Initial Contact Resistance:** 0.05 ohms max.  
**VSWR (Voltage Standing Wave Ratio):** 1.25 to 1 max. from 0 to 470 MHz.  
**Cross Talk:** 40 DB min. from 0 to 470 MHz.  
**Dielectric Strength:** 1000 volts RMS at sea level.  
**Insulation Resistance:** 1000 Megohms min.  
**Operate Time:** 15 milliseconds max.  
**Release Time:** 7 milliseconds max.  
**Temperature Range:** -55°C to +65°C  
**Cable:** RG58C/U, 12" long. See Optional Cable Chart  
**Connectors:** None. See Optional Connector Chart

#### WITH AUXILIARY CONTACTS

**Auxiliary Contact Load Rating:** 5 amps at 120VAC or 28VDC resistive.  
**Auxiliary Contact Combination:** SPDT (1 form C)  
**Auxiliary Contact Material:** Silver alloy gold flashed, .125" diameter.

## SENSITIVE COAXIAL RELAYS

### CLASS 122 - TYPE II



Weight  
5.05ozs.  
(43.11 grams)

The Class 122 Type II offers a different mounting configuration. It consists of the Type II cavity assembled to a Class 22 Actuator. The Class 122 is ideally suited for antenna switching applications where lower operating power consumption is important.

Weight  
6ozs. (170.1 grams.)

With Auxiliary Contacts up to DPDT with a 5 amp contact rating

#### SPECIFICATIONS

**R.F. Contact Load Rating:** 150 watts max., up to 470 MHz.  
**R.F. Contact Combination:** SPDT (1 form C)  
**Initial Contact Resistance:** 0.05 ohms max.  
**VSWR (Voltage Standing Wave Ratio):** 1.25 to 1 max. from 0 to 470 MHz.  
**Cross Talk:** 40 DB min. from 0 to 470 MHz.  
**Dielectric Strength:** 1000 volts RMS at sea level.  
**Insulation Resistance:** 1000 Megohms min.  
**Operate Time:** 15 milliseconds max.  
**Release Time:** 7 milliseconds max.  
**Temperature Range:** -55°C to +65°C  
**Cable:** RG58C/U, 12" long. See Optional Cable Chart for other cables available.  
**Connectors:** None. See Optional Connector Chart for connectors available.

#### WITH AUXILIARY CONTACTS

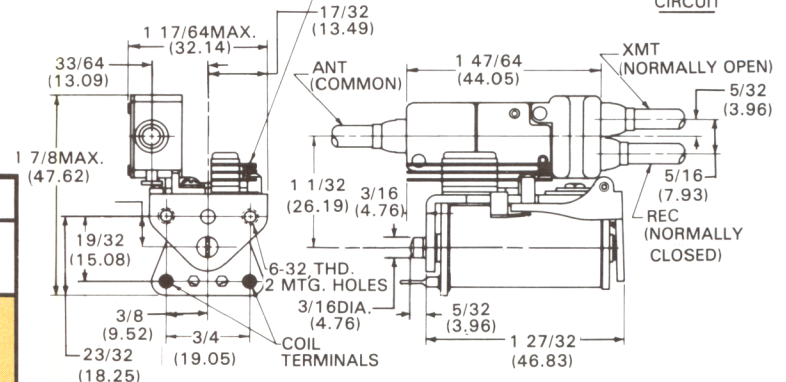
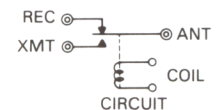
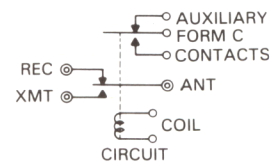
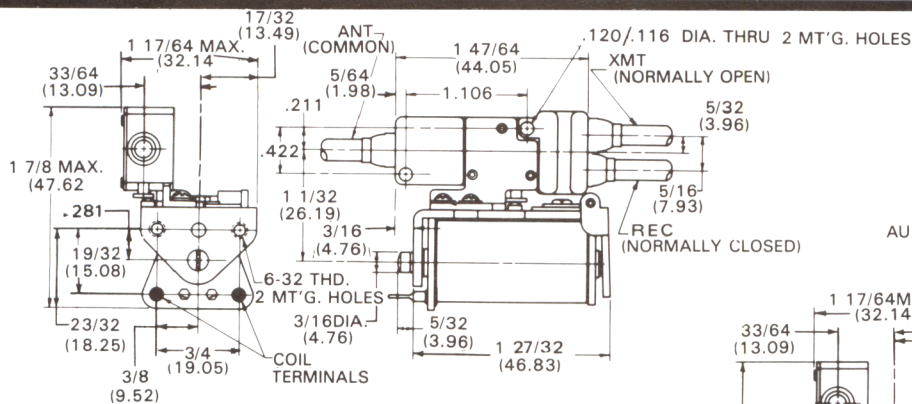
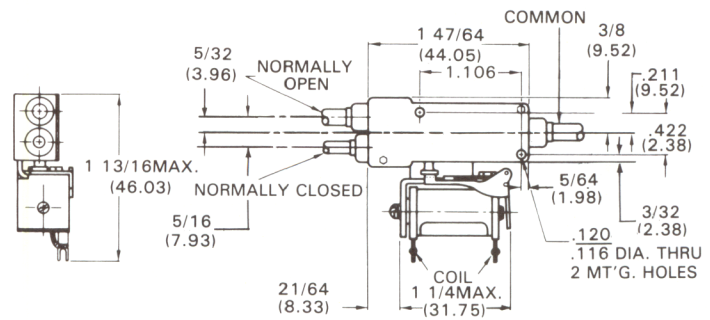
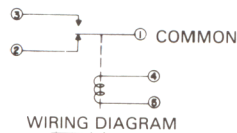
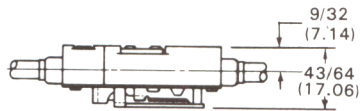
**Auxiliary Contact Load Rating:** 5 amps at 120VAC or 28VDC resistive.  
**Auxiliary Contact Combination:** SPDT (1 form C)  
**Auxiliary Contact Material:** Silver alloy gold flashed, .125" diameter.



## IN STOCK AND OTHER STANDARD RELAYS

Stock/Catalog Number	COIL		
	*Volts	†Ohms	Nom. Power
120X-13	6VDC	28	1.2W
W120X-14	12VDC	100	1.4W
120X-15	24VDC	500	1.1W
120X-16	48VDC	1800	1.2W

**“W” DENOTES STOCK RELAY**

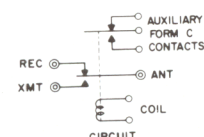
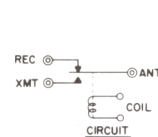
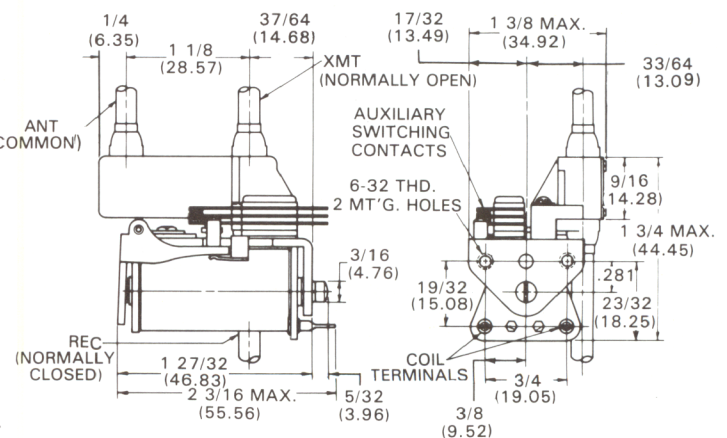
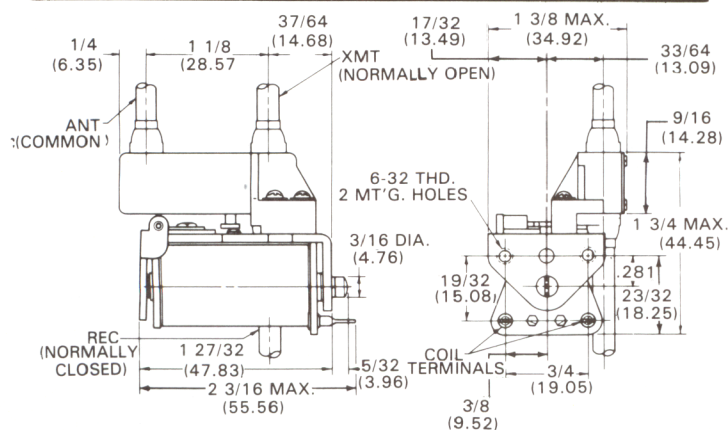


SHIPPED PROMPTLY ON SPECIAL ORDERS

Class 122 Type I Catalog Number	Class 122 Type II Catalog Number	COIL		
		† Volts	* Ohms	Nom.Power
122X-8	122X-67	6VDC	20	1.8W
122X-9	122X-68	12VDC	80	1.8W
122X-10	122X-69	24VDC	375	1.8W
122X-11	122X-70	48VDC	1300	1.8W
122AX-4	122AX-15	120VAC	—	4VA approx.

WITH AUXILIARY CONTACTS SPDT

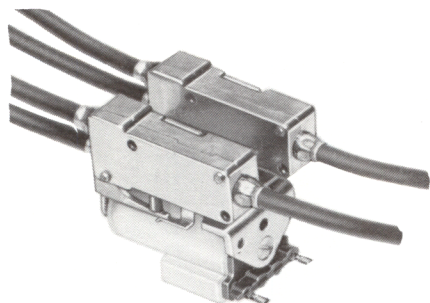
122X-63	122X-71	6VDC	20	1.8W
122X-64	122X-72	12VDC	80	1.8W
122X-65	122X-73	24VDC	375	1.8W
122X-66	122X-74	48VDC	1300	1.8W
122AX-14	122AX-16	120VAC	—	4VA approx.



\* Relays pull-in at 80% of nominal or less for DC operation and 85% or less for AC operation

† Resistance values  $\pm 10\%$  @ 25°C



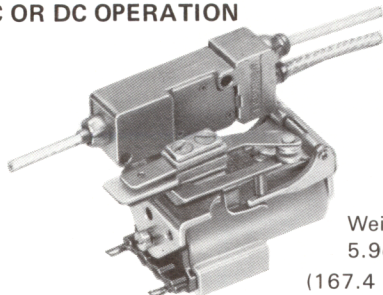
**CLASS 122 DPDT TYPE I**

Weight  
7.29ozs. (206.8 grams)

**SPECIFICATIONS**

**R.F. Contact Load Rating:** 150 watts max., up to 470 MHz.  
**R.F. Contact Combination:** DPDT (2 form C)  
**Initial Contact Resistance:** 0.05 ohms max.  
**VSWR (Voltage Standing Wave Ratio):** 1.25 to 1 max. from 0 to 470 MHz.  
**Cross Talk:** 40 DB min. from 0 to 470 MHz.  
**Dielectric Strength:** 1000 volts RMS at sea level.  
**Insulation Resistance:** 1000 Megohms min.  
**Operate Time:** 15 milliseconds max.  
**Release Time:** 7 milliseconds max.  
**Temperature Range:** -55°C to +65°C  
**Cable:** RG58C/U, 12" long. See Optional Cable Chart for other cables available.  
**Connectors:** None. See Optional Connector Chart for connectors available.

**CLASS 122R TYPE I**  
**SPST-NO**  
**WITH AUXILIARY POWER CONTACTS**  
**RATED 10 AMPS**  
**AC OR DC OPERATION**



Weight  
5.9ozs.  
(167.4 grams)

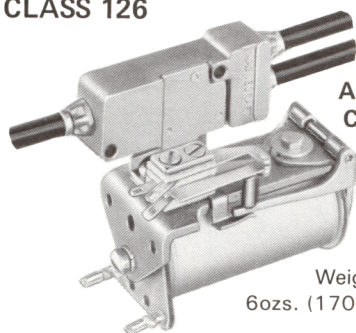
**SPECIFICATIONS**

Same as Class 122 DPDT Type I except:

**R.F. Contact Combination:** SPST-N.O. (1 form A)  
**Auxiliary Contact Load Rating:** 10 amps at 120VAC or 28VDC resistive.  
**Auxiliary Contact Combination:** SPST (1 form A)  
**Auxiliary Contact Material:** Silver alloy gold flashed, .187" diameter.  
**Cable:** RG58C/U, 12" long. See Optional Cable Chart for other cables available.  
**Connectors:** None. See Optional Connector Chart for connectors available.

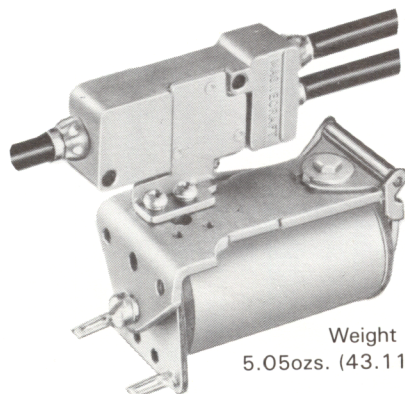
**INTERMEDIATE SIZE COAXIAL RELAYS**

**TYPE I**  
**CLASS 126**



Weight  
6ozs. (170.1 grams)

**WITH  
AUXILIARY  
CONTACTS**



Weight  
5.05ozs. (43.11 grams)

**SPECIFICATIONS**

**R.F. Contact Load Rating:** 150 watts max., up to 470 MHz.  
**R.F. Contact Combination:** SPDT (1 form C)  
**Initial Contact Resistance:** 0.05 ohms max.  
**VSWR (Voltage Standing Wave Ratio):** 1.25 to 1 max. from 0 to 470 MHz.  
**Cross Talk:** 40 DB min. from 0 to 470 MHz.  
**Dielectric Strength:** 1000 volts RMS at sea level.  
**Insulation Resistance:** 1000 Megohms min.  
**Operate Time:** 15 milliseconds max.  
**Release Time:** 7 milliseconds max.  
**Temperature Range:** -55°C to +65°C  
**Cable:** RG58C/U, 12" long. See Optional Cable Chart  
**Connectors:** None. See Optional Connector Chart

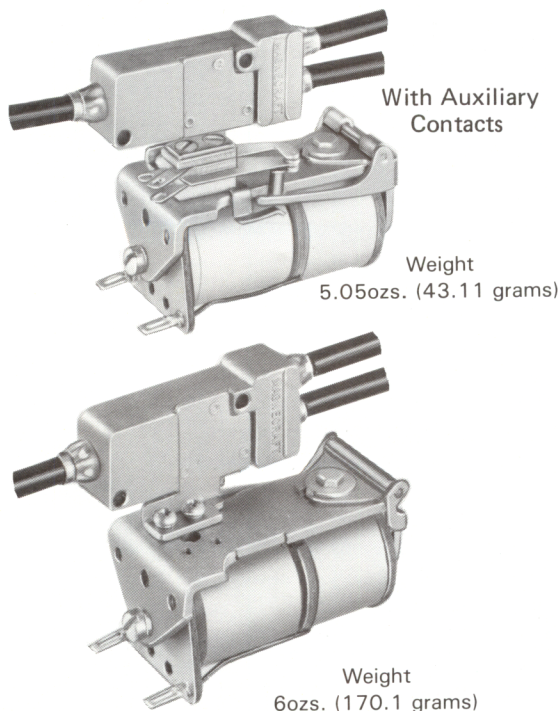
**WITH AUXILIARY CONTACTS**

**Auxiliary Contact Load Rating:** 5 amps at 120VAC or 28VDC resistive.  
**Auxiliary Contact Combination:** DPDT (2 form C)  
**Auxiliary Contact Material:** Silver alloy gold flashed, .125" diameter.







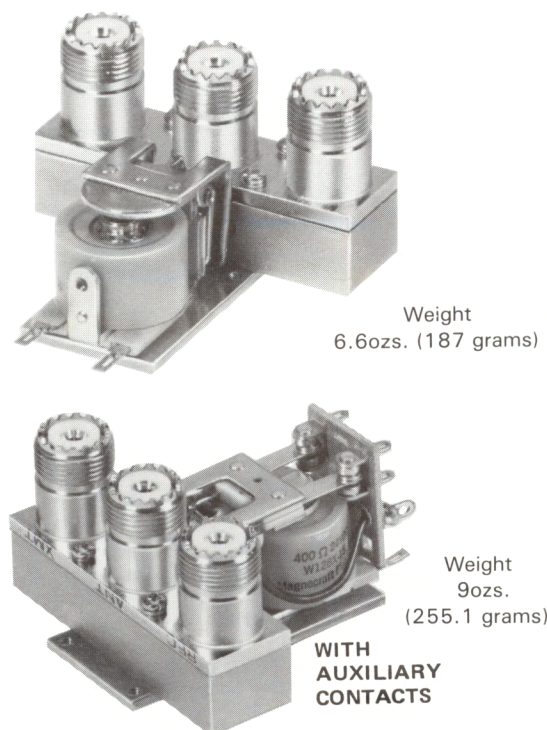
**CLASS 126SR TYPE I  
WITH SLOW RELEASE  
TIME DELAY****SPECIFICATIONS**

**R.F. Contact Load Rating:** 150 watts max., up to 470 MHz.  
**R.F. Contact Combination:** SPDT (1 form C)  
**Initial Contact Resistance:** 0.05 ohms max.  
**VSWR (Voltage Standing Wave Ratio):** 1.25 to 1 max. from 0 to 470 MHz.  
**Cross Talk:** 40 DB min. from 0 to 470 MHz.  
**Dielectric Strength:** 1000 volts RMS at sea level.  
**Insulation Resistance:** 1000 Megohms min.  
**Operate Time:** 15 milliseconds max.  
**Release Time:** 225 milliseconds max.  
**Temperature Range:** -55°C to +65°C  
**Cable:** RG58C/U, 12" long. See Optional Cable Chart  
**Connectors:** None. See Optional Connector Chart

**WITH AUXILIARY CONTACTS**

**Release Time:** 175 milliseconds min.  
**Auxiliary Contact Load Rating:** 5 amps at 120VAC or 28VDC resistive.  
**Auxiliary Contact Combination:** SPDT (1 form C)  
**Auxiliary Contact Material:** Silver alloy gold flashed, .125" diameter.

Note: For slow operate consult factory.

**INTEGRAL CONNECTOR COAXIAL RELAYS****CLASS 128 - TYPE I  
PANEL MOUNT WITH  
UHF CONNECTORS  
AC OR DC OPERATION****SPECIFICATIONS**

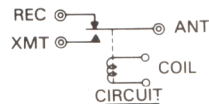
**R.F. Contact Load Rating:** 500 watts max., up to 1000 MHz.  
**R.F. Contact Combination:** SPDT (1 form C)  
**Initial Contact Resistance:** 0.05 ohms max.  
**VSWR (Voltage Standing Wave Ratio):** 1.25 to 1 max. from 0 to 470 MHz.  
**Cross Talk:** 40 DB min. from 0 to 470 MHz.  
**Dielectric Strength:** 1000 volts RMS at sea level.  
**Insulation Resistance:** 1000 Megohms min.  
**Operate Time:** 20 milliseconds max.  
**Release Time:** 20 milliseconds max.  
**Temperature Range:** -55°C to +65°C  
**Shock:** 30 G's for 11 ms  
**Vibration:** 0-55 CPS at 10 G's acceleration  
**Connectors:** UHF Standard

**WITH AUXILIARY CONTACTS**

**Auxiliary Contact Load Rating:** 10 amps at 120VAC or 28VDC resistive.  
**Auxiliary Contact Combination:** DPDT (2 form C)  
**Auxiliary Contact Material:** Silver alloy gold flashed, .187" diameter.

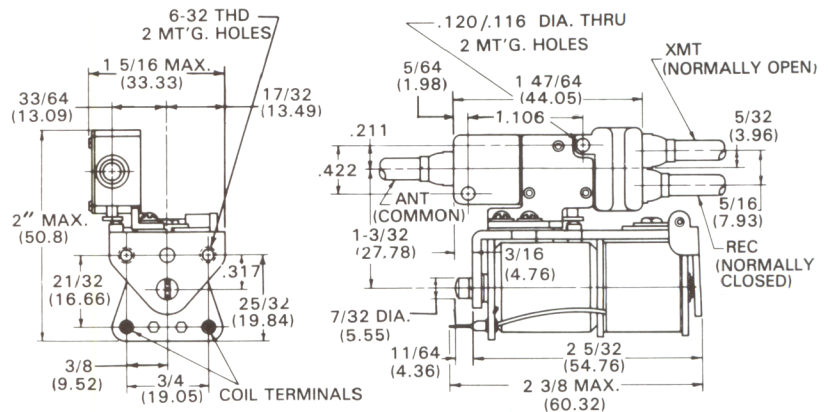
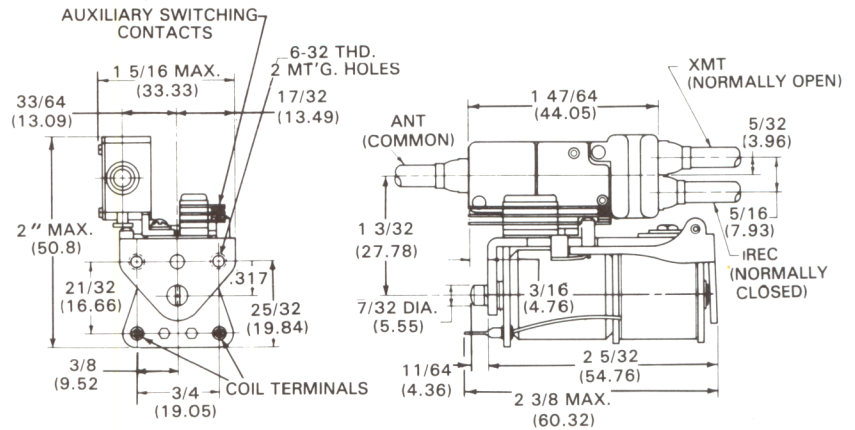
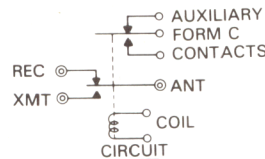
\* Relays pull-in at 80% of nominal or less for DC operation and 85% or less for AC operation  
† Resistance values  $\pm 10\%$  @ 25°C





SHIPPED PROMPTLY ON SPECIAL ORDERS

Catalog Number	COIL		
	*Volts	† Ohms	Nom. Power
126SRX-6	6VDC	—	3.5
126SRX-7	12VDC	41	3.5
126SRX-8	24VDC	135	3.5
126SRX-9	48VDC	550	3.5
WITH AUXILIARY CONTACTS (SPDT)			
126SR-10	6VDC	—	3.5
126SR-11	12VDC	41	3.5
126SR-12	24VDC	135	3.5
126SR-13	48VDC	550	3.5

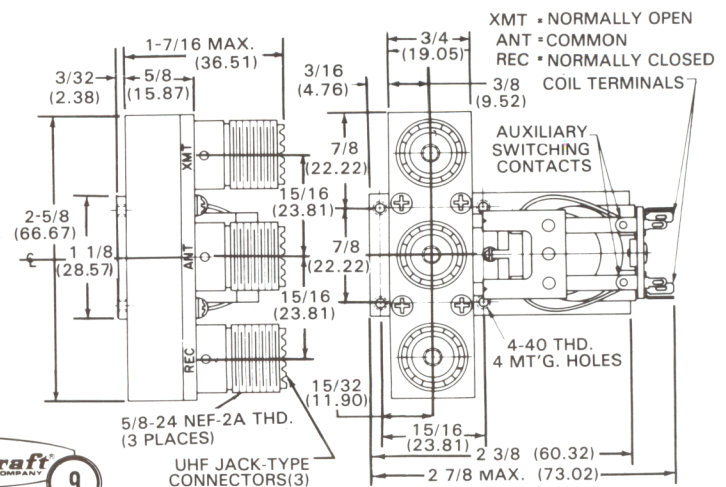
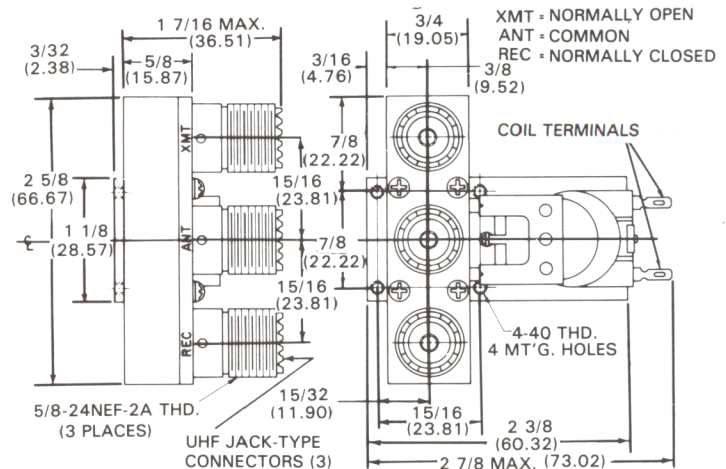
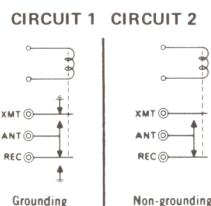


IN STOCK AND OTHER STANDARD RELAYS

Stock/Catalog Number	COIL			Circuit
	* Volts	† Ohms	Nom. Power	
128X-5	6VDC	25	1.5W	1
128X-8	6VDC	25	1.5W	2
128X-6	12VDC	100	1.5W	1
W128X-9	12VDC	100	1.5W	2
128X-7	24VDC	400	1.5W	1
128X-10	24VDC	400	1.5W	2
128X-40	48VDC	1800	1.3W	1
128X-41	48VDC	1800	1.3W	2
128AX-6	120VAC	---	3VA	1
128AX-7	120VAC	---	3VA	2
WITH AUXILIARY CONTACTS (DPDT)				
128X-48	6VDC	25	1.5W	2
W128X-14	12VDC	100	1.5W	2
W128X-15	24VDC	400	1.5W	2
128X-49	48VDC	1800	1.3W	2
W128AX-11	120VAC	---	3VA	2

"W" DENOTES STOCK RELAY

The Class 128 Type I consists of the standard UHF connector equipped cavity assembled to a Class 88 Actuator. This provides a compact size panel mount style coaxial relay with RF switching up to 500 watts max.



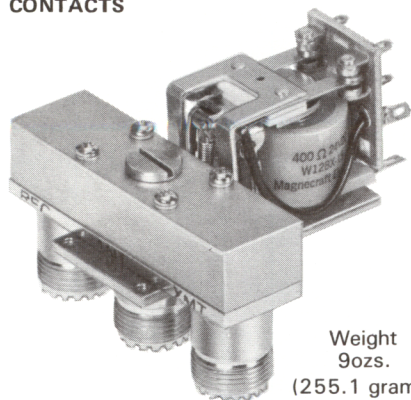
\* Relays pull-in at 80% of nominal or less for DC operation and 85% or less for AC operation  
† Resistance values  $\pm 10\%$  @ 25°C



## CLASS 128 - TYPE II REVERSE MOUNT WITH UHF CONNECTORS

Weight  
6.6ozs. (187 grams)

### WITH AUXILIARY CONTACTS

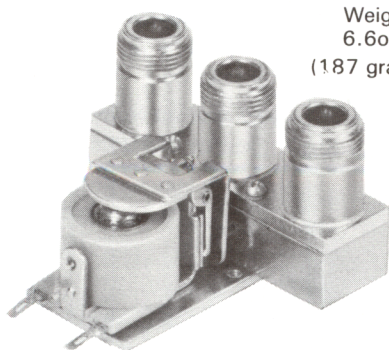


Weight  
9ozs.  
(255.1 grams)

The Class 128 Type II offers a reverse mounting configuration from the Type I. This provides a compact size panel mount style coaxial relay with RF switching up to 500 watts max.

## CLASS 128 - TYPE I PANEL MOUNT WITH TYPE N CONNECTORS

Weight  
6.6ozs.  
(187 grams)



The Class 128 Type I is equipped with three type N connectors of matched impedance.

Note: For slow operate consult factory.

### SPECIFICATIONS

**R.F. Contact Load Rating:** 500 watts max., up to 1000 MHz.  
**R.F. Contact Combination:** SPDT (1 form C)  
**Initial Contact Resistance:** 0.05 ohms max.  
**VSWR (Voltage Standing Wave Ratio):** 1.25 to 1 max. from 0 to 470 MHz.  
**Cross Talk:** 40 DB min. from 0 to 470 MHz.  
**Dielectric Strength:** 1000 volts RMS at sea level.  
**Insulation Resistance:** 1000 Megohms min.  
**Operate Time:** 20 milliseconds max.  
**Release Time:** 20 milliseconds max.  
**Temperature Range:** -55°C to +65°C  
**Shock:** 30 G's for 11 ms  
**Vibration:** 10-55 CPS at 10 G's acceleration  
**Connectors:** Type

### SPECIFICATIONS

**R.F. Contact Load Rating:** 500 watts max., up to 1000 MHz.  
**R.F. Contact Combination:** SPDT (1 form C)  
**Initial Contact Resistance:** 0.05 ohms max.  
**VSWR (Voltage Standing Wave Ratio):** 1.25 to 1 max. from 0 to 470 MHz.  
**Cross Talk:** 40 DB min. from 0 to 470 MHz.  
**Dielectric Strength:** 1000 volts RMS at sea level.  
**Insulation Resistance:** 1000 Megohms min.  
**Operate Time:** 20 milliseconds max.  
**Release Time:** 20 milliseconds max.  
**Temperature Range:** -55°C to +65°C  
**Shock:** 30 G's for 11 ms  
**Vibration:** 10-55 CPS at 10 G's acceleration  
**Connectors:** UHF Standard

### WITH AUXILIARY CONTACTS

**Auxiliary Contact Load Rating:** 10 amps at 120VAC or 28VDC resistive.  
**Auxiliary Contact Combination:** DPDT (2 form C)  
**Auxiliary Contact Material:** Silver alloy gold flashed, .187" diameter.

SHIPPED PROMPTLY  
ON SPECIAL ORDER

Class 128 Type II Catalog Number	Class 128 Type I Catalog Number	Class 128M Type I Catalog Number
128X-50	128X-44	128MX-1
128X-51	128X-45	128MX-2
128X-52	128X-46	128MX-3
128X-53	128X-47	128MX-4
128X-54	128X-12	128MX-5
128X-55	128X-13	128MX-6
128X-56	128X-42	128MX-14
128X-57	128X-43	128MX-15
128AX-20	128AX-9	128AMX-1
128AX-21	128AX-10	128AMX-2

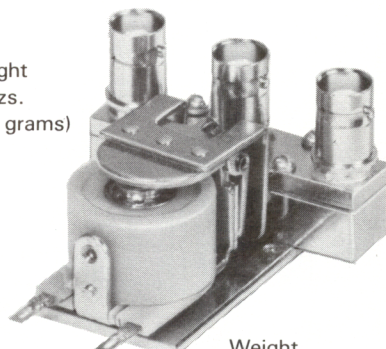
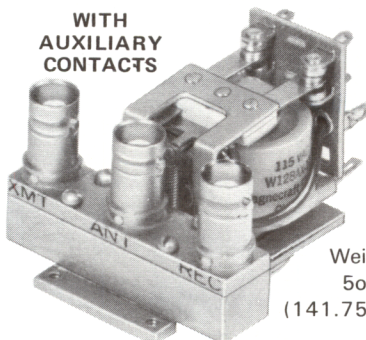
### WITH AUXILIARY CONTACTS (DPDT)

128X-58	128MX-16
128X-59	128MX-17
128X-60	128MX-18
128X-61	128MX-19
128AX-22	128AMX-6

### WITH AUXILIARY CONTACTS

## CLASS 128M - TYPE I WITH BNC CONNECTORS SPACE SAVER — SMALL SIZE

Weight  
5ozs.  
(141.75 grams)



Weight  
4 ozs. (114 grams)

The Class 128M is similar to Class 128 except the coaxial cavity is smaller and is equipped with Type BNC (bayonet) connectors.

### SPECIFICATIONS

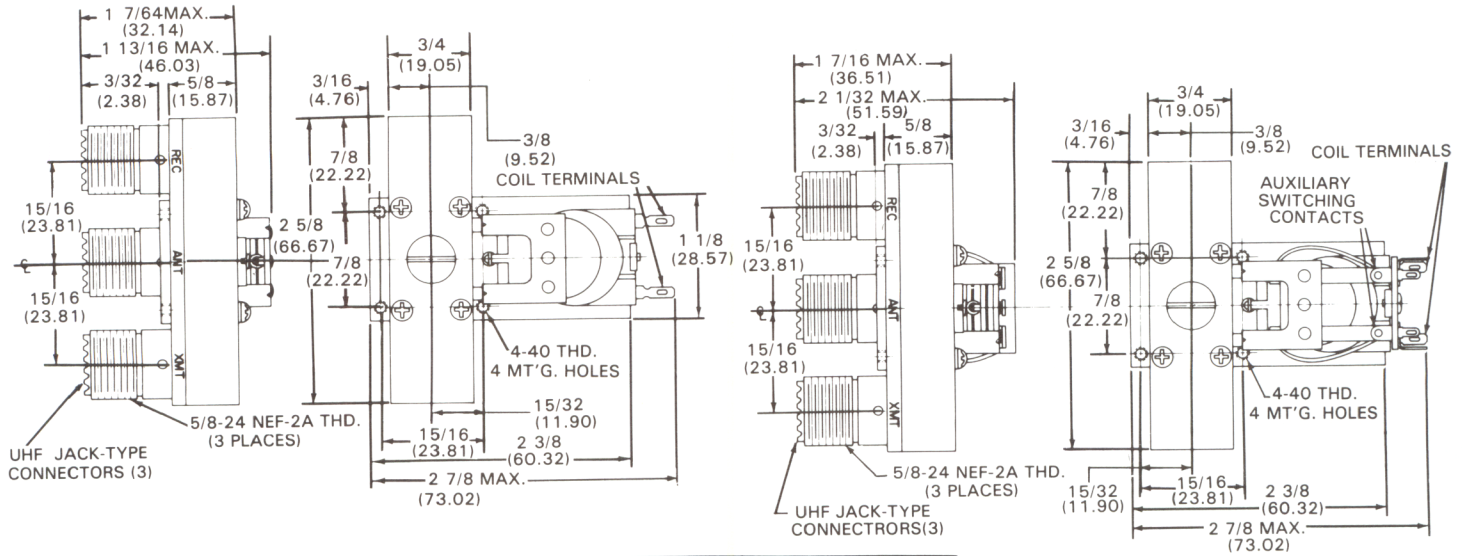
**R.F. Contact Load Rating:** 100 watts max., up to 1000 MHz.  
**R.F. Contact Combination:** SPDT (1 form C)  
**Initial Contact Resistance:** 0.05 ohms max.  
**VSWR (Voltage Standing Wave Ratio):** 1.25 to 1 max. from 0 to 470 MHz.  
**Cross Talk:** 40 DB min. from 0 to 470 MHz.  
**Dielectric Strength:** 1000 volts RMS at sea level.  
**Insulation Resistance:** 1000 Megohms min.  
**Operate Time:** 20 milliseconds max.  
**Release Time:** 20 milliseconds max.  
**Temperature Range:** -55°C to +65°C  
**Shock:** 30 G's for 11 ms  
**Vibration:** 10-55 CPS at 10 G's acceleration  
**Connectors:** Type BNC

### WITH AUXILIARY CONTACTS

**Auxiliary Contact Load Rating:** 10 amps at 120VAC or 28VDC resistive.  
**Auxiliary Contact Combination:** DPDT (2 form C)  
**Auxiliary Contact Material:** Silver alloy gold flashed, .187" diameter.



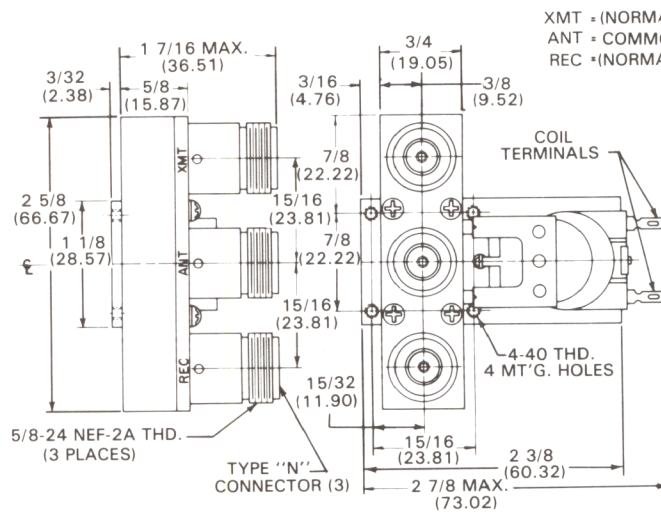
XMT = NORMALLY OPEN  
ANT = COMMON  
REC = NORMALLY CLOSED



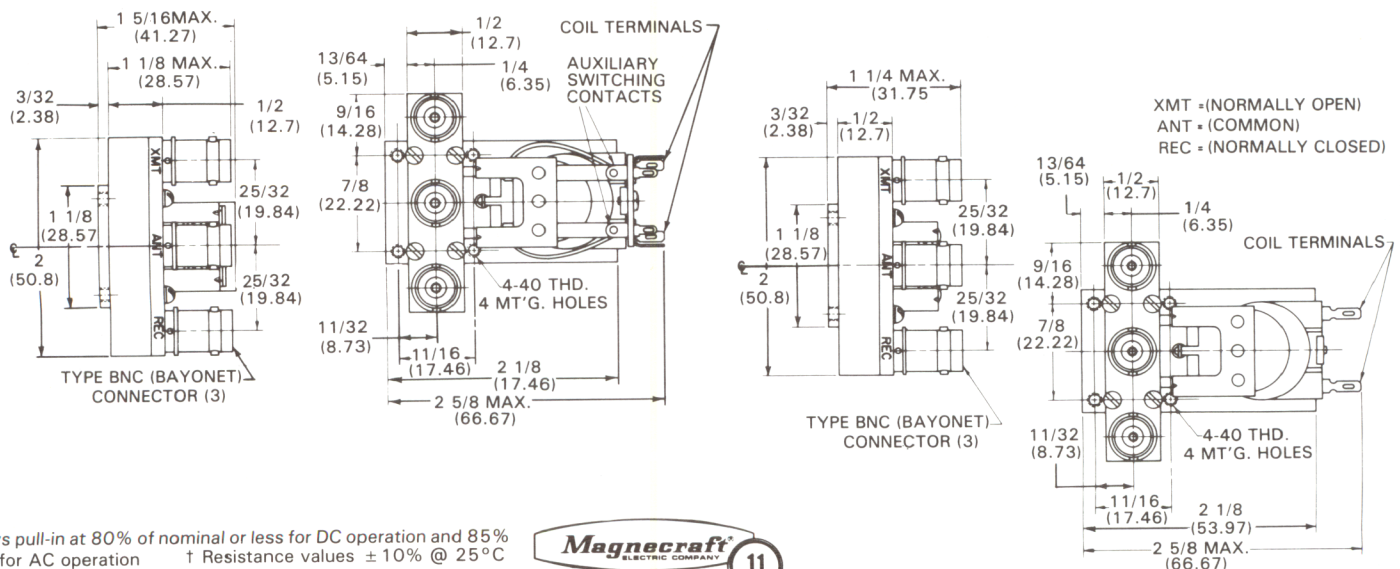
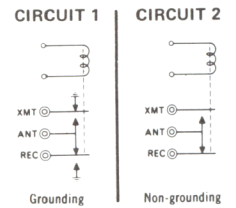
	COIL			Circuit
	† Volts	* Ohms	Nom. Power	
	6VDC	25	1.5W	1
	6VDC	25	1.5W	2
	12VDC	100	1.5W	1
	12VDC	100	1.5W	2
	24VDC	400	1.5W	1
	24VDC	400	1.5W	2
	48VDC	1800	1.3W	1
	48VDC	1800	1.3W	2
	120VAC	—	3VA	1
	120VAC	—	3VA	2

	6VDC	25	1.5W	2
	12VDC	100	1.5W	2
	24VDC	400	1.5W	2
	48VDC	1800	1.3W	2
	120VAC	—	3VA	2

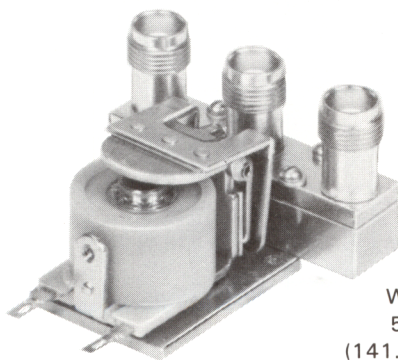


XMT = (NORMALLY OPEN)  
ANT = COMMON  
REC = (NORMALLY CLOSED)



\* Relays pull-in at 80% of nominal or less for DC operation and 85% or less for AC operation  
† Resistance values  $\pm 10\%$  @ 25°C



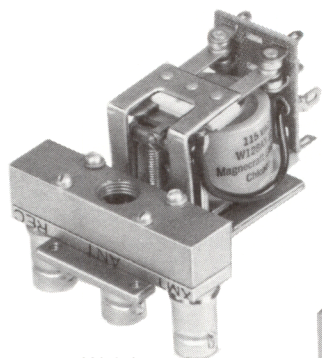
**CLASS 128M - TYPE I  
WITH TNC CONNECTORS  
SPACE SAVER—SMALL SIZE**

The Class 128M-T is similar to Class 128 except the coaxial cavity is smaller and is equipped with Type TNC (threaded) connectors.

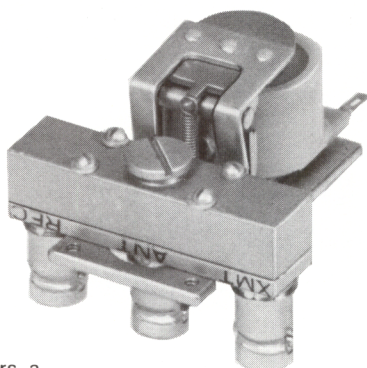
Weight  
5 ozs.  
(141.75 grams)

**SPECIFICATIONS**

**R.F. Contact Load Rating:** 100 watts max., up to 1000 MHz.  
**R.F. Contact Combination:** SPDT (1 form C)  
**Initial Contact Resistance:** 0.05 ohms max.  
**VSWR (Voltage Standing Wave Ratio):** 1.25 to 1 max. from 0 to 470 MHz.  
**Cross Talk:** 40 DB min. from 0 to 470 MHz.  
**Dielectric Strength:** 1000 volts RMS at sea level.  
**Insulation Resistance:** 1000 Megohms min.  
**Operate Time:** 20 milliseconds max.  
**Release Time:** 20 milliseconds max.  
**Temperature Range:** -55°C to +65°C  
**Shock:** 30 G's for 11 ms  
**Vibration:** 10-55 CPS at 10 G's acceleration  
**Connectors:** Type TNC

**CLASS 128M - TYPE II  
REVERSE MOUNT WITH BNC CONNECTORS**

Weight  
4ozs.(114 grams)

**WITH AUXILIARY  
CONTACTS**

Weight  
5 ozs.  
(141.75 grams)

The Class 128M Type II offers a reverse mounting configuration from the Type I. It utilizes the same small coaxial cavity and is equipped with Type BNC (bayonet) connectors. The Class 128M is ideally suited for panel mount antenna switching applications where size and weight must be kept to a minimum.

**SPECIFICATIONS**

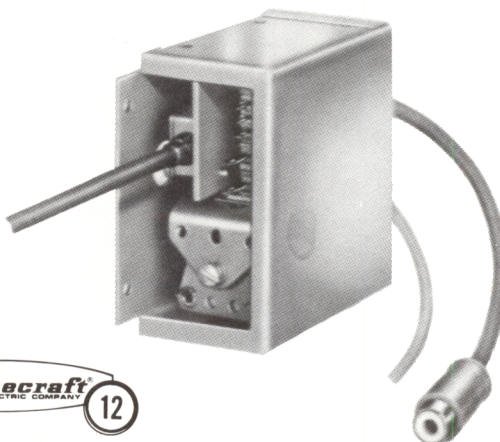
**R.F. Contact Load Rating:** 100 watts max., up to 1000 MHz.  
**R.F. Contact Combination:** SPDT (1 form C)  
**Initial Contact Resistance:** 0.05 ohms max.  
**VSWR (Voltage Standing Wave Ratio):** 1.25 to 1 max. from 0 to 470 MHz.  
**Cross Talk:** 40 DB min. from 0 to 470 MHz.  
**Dielectric Strength:** 1000 volts RMS at sea level.  
**Insulation Resistance:** 1000 Megohms min.  
**Operate Time:** 20 milliseconds max.  
**Release Time:** 20 milliseconds max.  
**Temperature Range:** -55°C to +65°C  
**Shock:** 30 G's for 11 ms.  
**Vibration:** 10-55 CPS at 10 G's acceleration  
**Connectors:** Type BNC

**WITH AUXILIARY CONTACTS**

**Auxiliary Contact Load Rating:** 10 amps at 120VAC or 28VDC resistive.  
**Auxiliary Contact Combination:** DPDT (2 form C)  
**Auxiliary Contact Material:** Silver alloy gold flashed, .187" diameter.

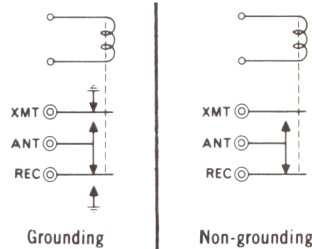
**ENCLOSURES****CLASS 122 OR CLASS 126 COAXIAL RELAY BOX  
WITH SNAP ON INSPECTION COVER**

The heavy duty steel enclosure provides low cost protection for the relay from mishandling or tampering. The panel or surface mount cover is removable for easy inspection. Other advantages of the enclosure include; RF Shield between the Coaxial Switching Cavity and Auxiliary Contacts and a wide variety of Auxiliary Contacts combinations up to 4 form C (4PDT).



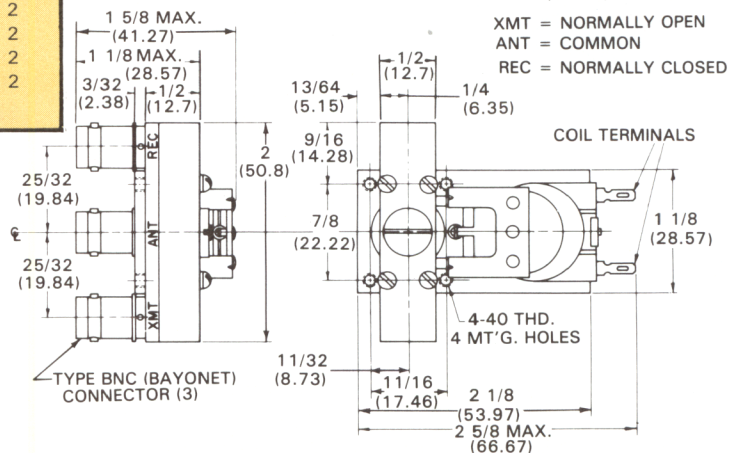
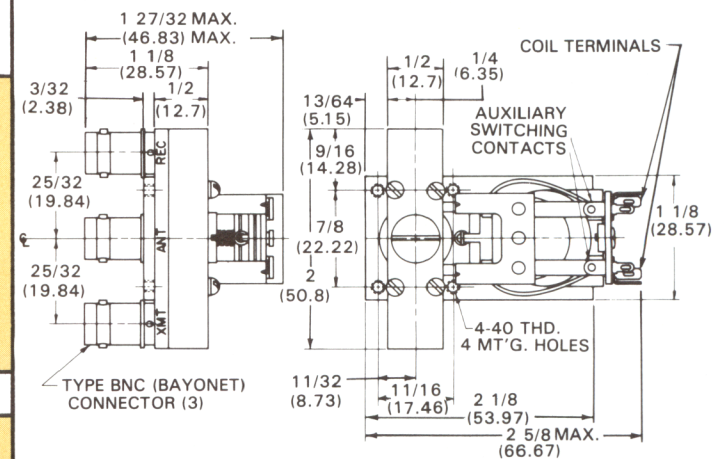
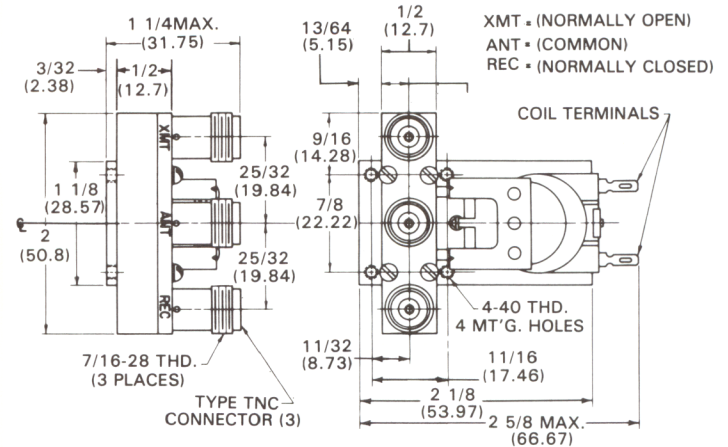


## CIRCUIT 1 CIRCUIT 2



SHIPPED PROMPTLY ON SPECIAL ORDERS

Class 128M Type I Catalog Number	Class 128M Type II Catalog Number	COIL			Circuit
		† Volts	* Ohms	Nom. Power	
128MX-32	128MX-24	6VDC	25	1.5W	1
128MX-33	128MX-20	6VDC	25	1.5W	2
128MX-34	128MX-25	12VDC	100	1.5W	1
128MX-35	128MX-21	12VDC	100	1.5W	2
128MX-36	128MX-26	24VDC	400	1.5W	1
128MX-37	128MX-22	24VDC	400	1.5W	2
128MX-38	128MX-27	48VDC	1800	1.3W	1
128MX-39	128MX-23	48VDC	1800	1.3W	2
128AMX-10	128AMX-7	120VAC	—	3VA	1
128AMX-11	128AMX-8	120VAC	—	3VA	2
WITH AUXILIARY CONTACTS (DPDT)					
	128MX-28	6VDC	25	1.5W	2
	128MX-29	12VDC	100	1.5W	2
	128MX-30	24VDC	400	1.5W	2
	128MX-31	48VDC	1800	1.3W	2
	128AMX-9	120VAC	—	3VA	2

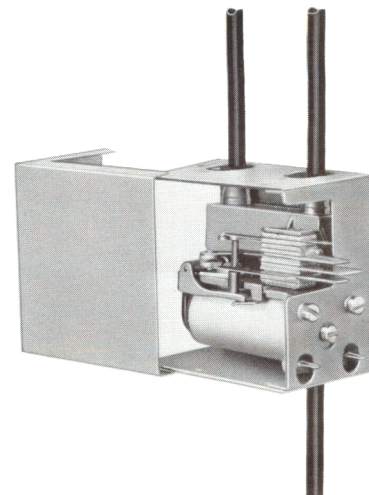


\* Relays pull-in at 80% of nominal or less for DC operation and 85% or less for AC operation

† Resistance values  $\pm 10\%$  @ 25°C

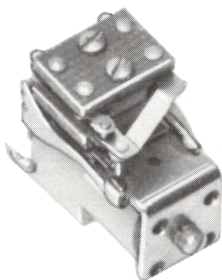
## LOW COST STEEL RELAY BOX WITH SNAP-ON INSPECTION COVER

This relay box is especially suitable for providing low cost protection for relays with critical operating requirements. Each box is designed to provide the relay it contains with protection from mechanical damage while in use and also during initial shipping and handling. Mounting requires only standard machine screws for fastening and screw clearance holes in the mounting chassis or panel. Electroplated for maximum protection against corrosion. Can also be supplied alone, without a relay. The photo shows the enclosure with a Class 122 relay.





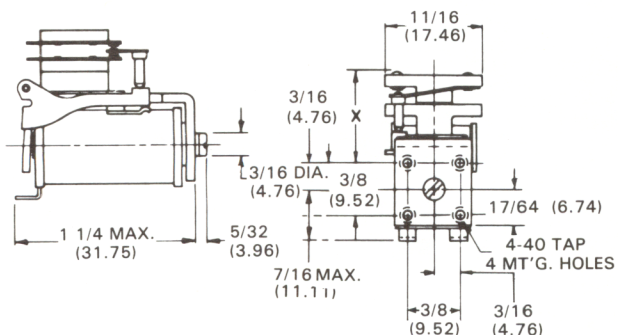
## CLASS 33F FREQUENCY RANGE UP TO 175 MHz



Weight  
1.10ozs. (30.5 grams)

The Class 33F relay has low capacitance contacts to carry radio frequency (RF) and video frequency signals with less introduction of loss or distortion. It is suitable for antenna changeover switching.

These relays are relatively low in cost, ruggedly built, reliable and constructed to the high standards of telephone type relays. This time proven construction combined with Magnecraft's outstanding hinge-pin armature pivot design, provides adjustment stability and maximum trouble free life.



## SPECIFICATIONS

**Contact Rating:** Carries up to 75 watts high frequency signal or switches 2 amps at 115VAC or 28VDC, resistive load.

**Contact Combinations:** SPDT standard, DPDT and combinations of normally open and normally closed contacts available.

**Typical Contact Capacitance:** .07 pf across contacts; .25 pf contacts to frame.

**Nominal Coil Voltage:** See table for standard voltages. Intermediate values available up to 140VDC. Special versions available with solid state rectifiers for AC operation up to 240VAC at a frequency between 50 and 400 Hz.

**Contact Material:** Palladium, .075" diameter standard.

**Contact Insulation:** Low loss melamine

**Power Dissipation Capability of DC Coils:** 3.0 watts max., continuous.

**DC Coil Resistance:** Up to 9700 ohms.

**Dielectric Withstanding Voltage:** 750VAC RMS, between mutually insulated conductive elements.

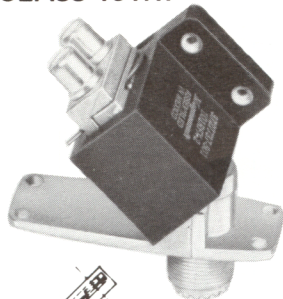
**Terminals:** Solder type standard.

## SHIPPED PROMPTLY ON SPECIAL ORDERS

Catalog Number	Contacts 2 Amps	COIL		
		*Volts	†Ohms	Nom. Power
33FX-20	SPDT	6 VDC	28	1.5 W
33FX-21	SPDT	12 VDC	100	1.5 W
33FX-22	SPDT	24 VDC	500	1.5 W
33FX-23	SPDT	110 VDC	6500	1.5 W

## CLASS 101RF

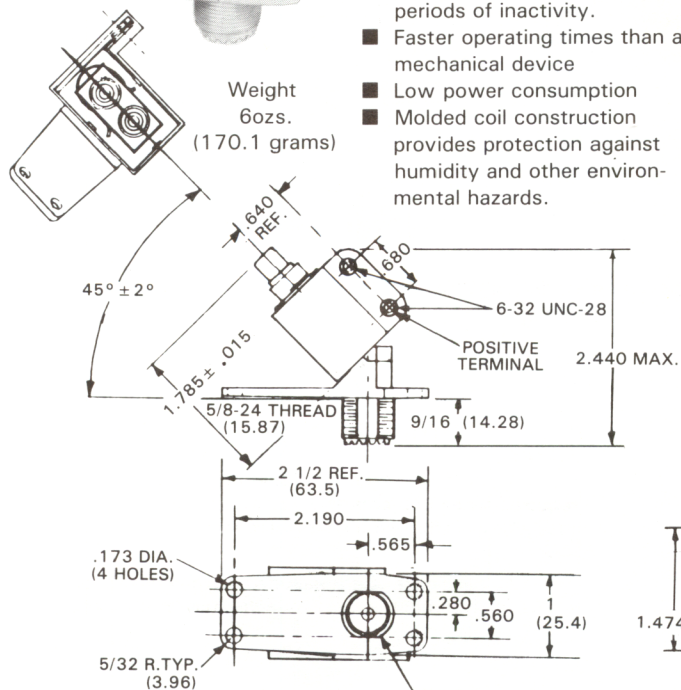
## INTEGRAL CONNECTOR COAXIAL REED



Weight  
6ozs.  
(170.1 grams)

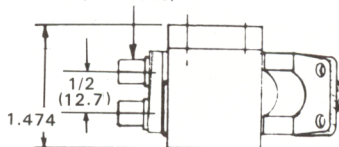
FROM MAGNECRAFT,  
REED RELAY ADVANTAGES IN A  
COAXIAL DESIGN.....

- Long life
- Hermetically sealed contacts insure contamination free-operation; even after long periods of inactivity.
- Faster operating times than any mechanical device
- Low power consumption
- Molded coil construction provides protection against humidity and other environmental hazards.



## PANEL MOUNTING

PHONO SOCKET  
(2 PLACES)



## SPECIFICATIONS

**RF Contact Load:** 150 watts max., up to 600 MHz.

**RF Contact Combination:** SPDT (Form C)

**Shock:** 30 G's, 11 ± 1 ms

**Vibration:** 0-500 Hz, 10 G's

**Connectors:** UHF for antenna phono for transmit and receive.

**Initial Contact Resistance:** 250 milliohms max.

**VSWR (Voltage Standing Wave Ratio):** 1.2:1 max. 0-600 MHz.

**Cross Talk:** 40 DB min. 0-600 MHz.

**Dielectric Strength:** 300VDC across contacts, 1000VDC between other insulated points.

**Insulation Resistance:** 1000 megohms min.

**Operate Time:** 2.0 milliseconds typ.

**Release Time:** 2.0 milliseconds typ.

**Temperature Range:** -55°C to +85°C

## SHIPPED PROMPTLY ON SPECIAL ORDERS

Catalog Number	COIL			
	Res.	Nom	Pull-In	Nom Power
101RFX-1	100	12VDC	9VDC	1.5 watts

\* Relays pull-in at 80% of nominal or less for DC operation and 85% or less for AC operation  
† Resistance values ± 10% @ 25°C



## SPECIFICATIONS

**Contact Rating:** Up to 20 milliamps at 2500VRMS resistive load or 500 watts at radio frequencies up to 175MHZ. 20 amps at 120VAC or 28VDC.

**Contact Arrangement:** 2 form C standard, 2 form C with auxiliary snap action switch available on special order.

**Contact Material:** Silver alloy, gold flashed 1/4" diameter.

**Contact Resistance:** Less than 0.100 ohms.

**Dielectric Strength:** 1000VRMS minimum coil to frame, 2500Vrms minimum across open contacts, 3000VRMS minimum contacts to frame.

**Coil Dissipation:** DC 1.5 watts, AC 3VA

**Operate Time:** 15 milliseconds typ. @ nominal voltage

**Release Time:** 10 milliseconds typ. @ nominal voltage

**Temperature Range:** -55°C to +71°C

**Terminals:** Solder lug

**Mounting:** Bracket with two 6-32 taped holes.

**Insulation Resistance @ 500VDC:** 100,000 megohms min.

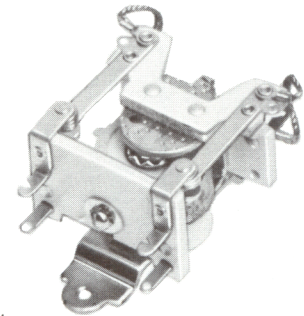
**Capacitance:** 1.7 Pf or less across open contacts

0.7 Pf or less pole to pole

1.7 Pf or less contacts to coil

35 Pf or less coil to frame

**CLASS 151**  
AC OR DC OPERATION  
CONTACTS DPDT 20 AMPS  
SOLDER TERMINALS  
HIGH DIELECTRIC STRENGTH

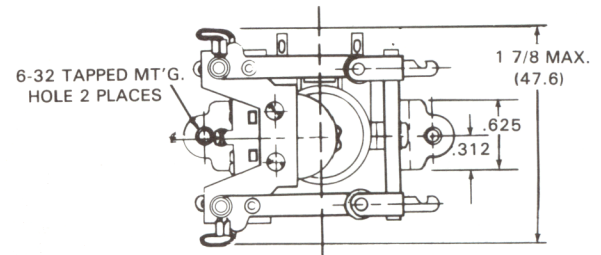
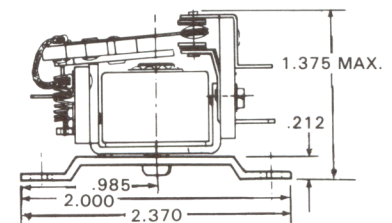


Weight  
2.5ozs. (70.7 grams)

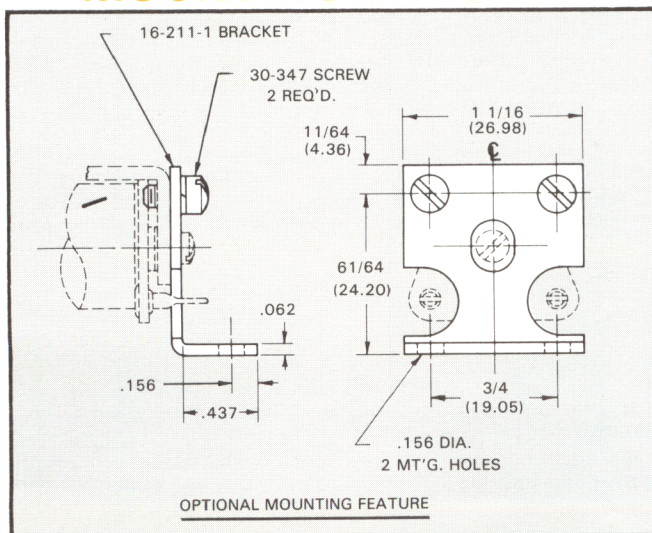
## IN STOCK AND OTHER STANDARD RELAYS

Stock Number	10 Amp Contacts	Coil		
		* Volts	† Ohms	Nom. Power
DC OPERATED				
151X-1	DPDT	6VDC	25	1.5W
W151X-2	DPDT	12VDC	100	1.5W
W151X-3	DPDT	24VDC	400	1.5W
151X-5	DPDT	48VDC	1600	1.5W
151X-6	DPDT	110VDC	8000	1.5W
151X-7	DPDT	220VDC	32000	1.5W
AC OPERATED				
151AX-3	DPDT	6VAC		3VA
151AX-4	DPDT	12VAC		3VA
151AX-5	DPDT	24VAC		3VA
151AX-6	DPDT	48VAC		3VA
W151AX-1	DPDT	115VAC		3VA
151AX-7	DPDT	230VAC		3VA

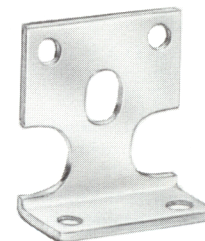
"W" DENOTES STOCK RELAY



## MOUNTING BRACKET



## MOUNTING BRACKET 16-211-1



The 16-211-1 bracket is used for mounting the Class 122 and Class 126 relays to any flat surface. Eliminates the need for panel or chassis cut-outs which are required when the conventional mounting method is used. All electrical connections are made on the relay side of the mounting panel or chassis.

Mounting hardware is not included. Two number 6-32 screws for fastening bracket to relay may be provided on special request.

\* Relays pull-in at 80% of nominal or less for DC operation and 85% or less for AC operation  
† Resistance values  $\pm 10\%$  @ 25°C



# Magnecraft® RELAY DEFINITIONS

The following definitions, except those preceded by an asterisk (\*) are reproduced from the American Standard Definitions and Terminology for Relays, C83.16-1959, Copyright 1959 by A.S.A.; copies of which may be purchased from the American Standards Association at 10 East 40th Street, New York, N.Y.

**Armature:** The moving magnetic member of an electromagnetic structure.

**Armature Overtravel:** That portion of the available armature stroke occurring after the contacts have touched.

**Back Contacts:** Sometimes used for Contacts, Normally Closed.

**Backstop:** That part of the relay which limits the movement of the armature away from the pole face or core. In some relays a normally closed contact may serve as backstop.

**\*Bi-Stable Contact:** The armature contact remains in its last operated position until the magnetic polarity of the coil is reversed.

**Blades:** Sometimes used for Springs, Contact.

**Bobbin:** Same as Spool.

**Bounce, Contact:** Intermittent closure of open contacts or opening of closed contacts; **Bounce** implies the motion resulting from contact impact. Cf. Chatter, contact.

**\*Buffer, Armature:** An insulating part which transmits the movement of the armature to an adjacent contact spring.

**\*Buffer, Spring:** An insulating part which transmits the movement of the armature from one movable contact spring to another in the same pileup.

**Chatter, Contact:** The undesired intermittent closure of open contacts or closed contacts. It may occur either when the relay is operated or released or when the relay is subjected to external shock or vibration.

**Coaxial Relay:** A type of relay designed to switch high frequency circuits.

**Coil:** One or more windings on a common form.

**Coil Terminal:** A device, such as a solder lug, binding post, or similar fitting, to which the coil power supply is connected.

**Contact, Armature:** (1) A contact mounted directly on the armature. (2) Sometimes used for Contact, Movable.

**Contact Arrangement:** The combination of contact forms that make up the entire relay switching structure.

**Contact Gap:** The distance between mating contacts with the contacts open.

**Contact, Movable:** The member of a contact pair that is moved directly by the actuating system.

**Contact, Stationary:** The member of a contact pair that is not moved directly by the actuating system.

**Contacts:** The current-carrying parts of a relay that engage or disengage to open or close electrical circuits.

**Contacts, Break:** Same as Contacts, Normally Closed.

**Contacts, Bridging:** A contact form in which the moving contact touches two stationary contacts simultaneously during transfer.

**Contacts, Low Capacitance:** A type of contact construction proving low inter-contact capacitance.

**Contacts, Low-Level:** Contacts which control only the flow of relatively small currents in relatively low-voltage circuits; e.g., alternating currents and voltages encountered in voice or tone circuits, direct currents, and voltages of the order of microamperes and microvolts, etc.

**Contacts, Make:** Same as Contacts, Normally Open.

**Contacts, Non-Bridging:** A contact arrangement in which the opening contact opens before the closing contact closes.

**Contacts, Normally Closed:** A contact pair which is closed when the coil is not energized.

**Contacts, Normally Open:** A contact pair which is open when the coil is not energized.

**Contacts, Preliminary:** Contacts which open or close in advance of other contacts when the relay is operating.

**\*Core:** Sometimes used for polepiece.

**\*De-Energize:** To disconnect the relay coil from its power source.

**Delay Relay:** A relay having an assured time interval between energization and operation or between de-energization and release.

**Drop-Out:** Same as Release.

**Duty Cycle:** A statement of energized and de-energized time in repetitious operation, as: 2 seconds on, 6 seconds off.

**\*Energize:** To connect a relay coil to its power source.

**Follow, Contact:** The displacement of a stated point on the contact actuating member following initial closure of a contact.

**\*Frame:** The main supporting part of a relay which may be part of the magnetic circuit. Sometimes used for heelpiece.

**Functioning Time:** The time between energization and operation or between de-energization and release.

**Heel Piece:** The portion of a magnetic circuit of a relay that is attached to the end of the core remote from the armature.

**Hermetically Sealed Relay:** A relay in a gas-tight enclosure which has been completely sealed by fusion or other comparable means to insure a low rate of gas leakage over a long period of time.

**Hold:** A specified functioning value at which no relay meeting the specification may release.

**Hum:** The sound emitted by relays when their coils are energized by alternating current or in some cases by unfiltered rectified current.

**Latching Relay:** A relay having contacts that lock in either the energized and de-energized positions, or both, until reset either manually or electrically.

**Non-Operate Value:** A specified functioning value at which no relay meeting the specifications may operate.

**Normal Condition:** The de-energized condition of the relay.

**Operate:** The condition attained by a relay when all contacts have functioned. See also Time, Actuation, Contact.

**Operate Time:** See Time, Operate.

**Operate Value, Must:** A specified functioning value at which all relays meeting the specification must operate.

**Pickup Value:** Sometimes used for Operate Value, Must.

**Pileup:** A set of contact arms, assemblies, or springs, fastened one on top of the other with insulation between them.

**Polarized Relay:** A relay whose operation is dependent upon the polarity of the energizing current.

**\*Polepiece:** The magnetic part about which the coil is wound.

**Pull-In Value:** Sometimes used for Operate Value, Must.

**Rating, Contact:** A statement of the conditions under which a contact will perform satisfactorily.

**Relay:** An electrically controlled device that opens and closes electrical contacts to effect the operation of other devices in the same or another electrical circuit.

**Release:** The condition attained by a relay when all contacts have functioned and the armature (where applicable) has reached a fully opened position.

**Release Value, Must:** A specified functioning value, at which all relays meeting the specification must release.

**\*Single-Side-Stable Contact:** The armature contact releases from the operated position when the coil current falls below the drop-out value.

**Spool:** A flanged form upon which a coil is wound.

**Spring, Contact:** (1) A current-carrying spring to which the contacts are fastened. (2) A non-current-carrying spring that positions and tensions a contact-carrying member.

**Stack:** Sometimes used for Pileup.

**Time Delay Relay:** Same as Delay Relay.

**Time, Operate:** The time interval from coil energization to the functioning time of the last contact to function. Where not otherwise stated the functioning time of the contact in question is taken as its initial functioning time.

**Time, Release:** The time interval from coil de-energization to the functioning time of the last contact to function. Where not otherwise stated the functioning time of the contact in question is taken as its initial functioning time.

**Time, Transfer:** The time interval between opening the closed contact and closing the open contact of a break-make contact form.

**Travel, Armature:** The distance traveled during operation by a specified point on the armature.

**Wipe, Contact:** The sliding or tangential motion between two contact surfaces when they are touching.