NAA15

Ground Distance Auxiliaries

DESCRIPTION

The NAA relay is the general designation of a large family of special purpose auxiliary relays. Most NAA relays have two or more telephone type auxiliaries mounted in the regular draw out case. In some specific types an overcurrent function may also be included.

APPLICATION

Ground Distance Relay Auxiliaries

NAA15E — For Ground Step Distance scheme with GCXG51 and GCXG53 phase packaged relays. In this application the three auxiliary units and plunger type overcurrent unit are interlocked with the mho units of the GCXG relays to permit 1st and 2nd zone tripping for single-phase-to-ground faults only.

NAA15H — For use with Ground Distance scheme with CEYG51 and 53 and torque controlled overcurrent relays such as the IAC80 and CFC17A.

BURDENS — Typical for NAA15E

The AC burden of the instantaneous unit is shown in Table 1 for the available current ranges. The values in Table 1 are with the armature set for minimum pickup and in the dropped-out position.

Table 1

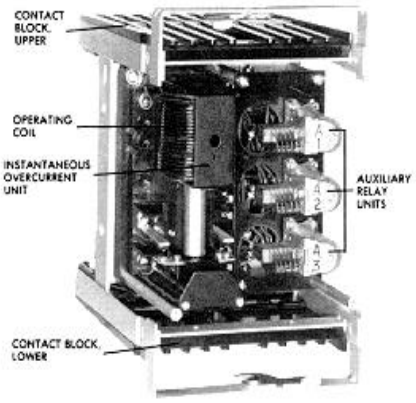
Burden Data at 60 Hz Instantaneous OC Unit

Rated	Cal	At 5 Amp		At Min PU	
Amps	Range	Watts	VA	Watts	VA
6	2-8	3.6	11.5	0.6	1.7
3	1-4	12.7	41	0.6	1.7
15	0.5-2	55	165	0.6	1.7

RATINGS

The relays can be furnished with instantaneous overcurrent units having ac ratings and calibration ranges as shown in Selection Guide. The overcurrent units are suitable for operation on either 50 or 60 hertz, but are ***not*** rated for ***continuous*** operation in the ***picked-up position.***

The contacts of the auxiliary A units and the instantaneous overcurrent unit will make and carry momentarily 30 amperes dc at control voltages of 250 volts or less. These contacts will carry 3 amperes continuously and have an interrupting rating as shown in Table 2.



(Photo 8035575)

Fig. 1. Typical Type NAA15E ground distance auxiliary

Table 2

Interrupting Ratings A Unit Contacts

	Current Amps	
Volts Dc	Inductive①	Non-Inductive
48	1.0	3.0
125	0.5	1.5
250	0.25	0.75
Volts Ac		
115	0.75	2.0
230	0.5	1.0

① Average trip coil.

SELECTION GUIDE

NAA15 – Ground Distance Auxiliaries – 50/60 Hertz

Volts DC	Inst OC Amp Range	Rated Amps	Mechanical Target	OC Unit ② Contacts	Model Number	Case Size	Approx Wt Lb (Kg) Net	Ship
NAA15E—For Use With Phase Packaging Type GCXG								
48/125/250	2-8	6	None	2 NO	NAA15E5A	S2	14(6.4)	18(8.2)
48/125/250	1.4	3	None	2 NO	NAA15E6A			
48/125/250	0.5-2	1.5	None	2 NO	NAA15E7A			
24/48/125	1-4	3	None	2 NO	NAA15E8A			
48/110/220	0.5-2	1.5	None	2 NO	NAA15E9A			
NAA15H—For Use With CEYG51-53 and IAC80 With CFC17A								
48	2-8	6	None	1 NO	NAA15H2A	S2	14(6.4)	18(8.2)
125	2-8	6	None	1 NO	NAA15H1A			

② Auxiliary unit contacts are wired to relay studs as required.

NAA19

Out-of-Step Auxiliaries

GE Protective Relays

DESCRIPTION

The NAA19B is an auxiliary relay for use with an angle impedance relay such as CEX57E for tripping on system out-of-step conditions. This relay contains a number of telephone type auxiliary units plus a PJC instantaneous overcurrent unit and one target seal-in unit all mounted in an M1 case.

APPLICATION-Section B

In general the NAA19B is applied in conjunction with the CEX57E to detect system out of step conditions and to initiate tripping of the proper local and/or remote breakers in order to separate the system. It is important to note that these relays should be applied at those locations where system studies indicate that an out of step condition can be detected. However, the breaker(s) that should be tripped, to properly separate the system, with generation balancing load, may be remotely located. If this is the case some sort of transferred or remote tripping scheme will be required in addition to the CEX57E and NAA19B relays.

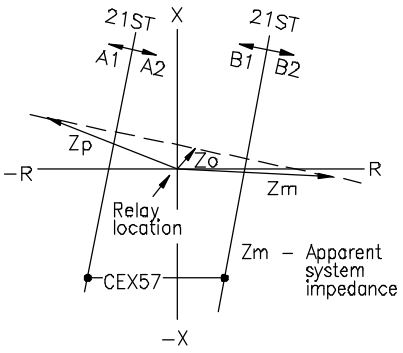
In this scheme, the relays detect the out of step condition by the sequential operation of the angle impedance units in the CEX57E relay as the apparent impedance sweeps across the R-X diagram in the manner outlined in Fig. 1. From Fig. 1 it is apparent that the angle impedance characteristics extend, almost without practical limit, in both the "forward" and "reverse" directions.

During light load conditions on the system, it is possible, due to reactive power transfer, that the apparent (load) impedance as seen by the CEX relay will plot in the vicinity of the CEX characteristics rather than near the R axis as in the case of appreciable real power flow. With slight variations in this load it is possible for the apparent impedance to vary in such a manner as to wander across the angle impedance characteristics at a point quite remote from the origin in the R-X diagram. This would appear as an out of step condition to the CEX-NAA combination except for the instantaneous overcurrent unit which supervises the scheme.

The overcurrent unit in the NAA19B relay is a plunger PJC and is not intended for operation in the continuously 'picked up position. Thus, the overcurrent unit should be set for a pick-up of at least 15 percent above the maximum full load current. This will automatically prevent any false operation during light load conditions.

RATINGS

The NAA19B relays covered by this section are available with dc control voltages as indicated in the Selection Guide. The telephone type relay contacts will make and carry 30 amperes momentarily at 250 volts dc or less and have interrupting ratings as indicated in Table A.



(Dwg. 6556547)

Fig. 1. Typical Characteristic CEX75 with NAA19B for Out-of-Step Tripping

TABLE A

Interrupting ratings X units contacts

Volts	Interrupt Amps	
	Inductive①	Non-Inductive
125-DC	0.5	1.5
250-DC	0.25	0.75
115-60 Hz	0.75	2.0
230-60 Hz	0.5	1.0

①Inductance of Average Trip Coil.

SELECTION GUIDE

NAA 19B – Out-of-step Auxiliaries – 50/60 Hertz

Volts Dc	Instantaneous Overcurrent② Amp Range	Rated Amps	Target Seal-In Amps	X1,X2,X4,X5 Time DO Milliseconds	Model Number	Case Size	Approx Wt. Lb (Kg) Net	Ship
48 125 250	2-8	6	0.2/2	200	NAA19 B 8 A NAA19 B 5 A NAA19 B10A	M1	21(9.6)	26(11.8)
125 250	4-16	12			NAA19 B 2 A NAA19 B 4 A			
110 220	2-8	6			NAA19 B 7A NAA19 B 9A			
110 220	4-16	12			NAA19 B 3A NAA19 B 6A			

② The PJC inst. overcurrent unit is not designed to be operated continuously in the picked up position.

NOTE—For Information on the CEX57 Relay, see Section 10.

APPLICATION

Transferred Tripping Auxiliaries

NAA27AA — For dual channel transformer differential equipment transferred tripping with audio tones of frequency shift carrier, with automatic throw-over to single channel. The relay includes three telephone type units for the functions of X1, X2 and TX and a target/seal-in unit.

NAA27AC—For use in permissive overreaching line protection schemes with single channel audio tone equipment or frequency shift carrier. Included in the relay are three telephone type units for the functions of BX, RI and TTZ and a target. TTZ pick-up time must be specified.

NAA27AD—Intended for use in permissive underreaching line protection schemes with single channel audio tone equipment or frequency shift carrier. Included in the relay are two telephone type units for the functions of BX and RI and a target.

NAA27H — For use in direct and permissive transmission line underreaching schemes with Type 51 channel. This auxiliary includes three telephone type relay units for the functions of GX, TX, and RI and a target/seal-in unit.

NAA27K — Intended for use in direct and permissive transmission line scheme when multi-terminal lines are involved. This relay is required in addition to the other necessary transferred trip auxiliaries and includes two telephone type units for the functions of GX and TX.

GENERAL AND ORDERING

For permissive overreaching schemes the TTZ unit is connected in series with the trip contact (T) of the receiver and introduces a slight coordinating delay into the scheme. This TTZ unit is picked up by the local overreaching phase or ground relays which key the local transmitter. The time delay pickup setting of TTZ should be set for approximately 3-4 milliseconds longer than the release time of the channel being used.

This setting may be specified on the requisition and will be set in final test at the factory.

NAA27L—Intended for use in direct and permissive schemes where Type 51 frequency shift carrier is used as the channel. This relay includes four telephone type units for the functions of GX, TX, RI and TTY, and a target/seal-in unit. The GX, TX and RI units are identical to the corresponding units in the NAA27H relay. TTY is a high speed keying relay for the type 51 carrier channel.

NAA27M — A special purpose auxiliary relay for use at the receiving end terminal in transformer differential transferred tripping schemes with a Type 51 carrier or an audio tone channel. This relay includes two telephone type units for the functions of GX and TX and a target/seal-in unit.

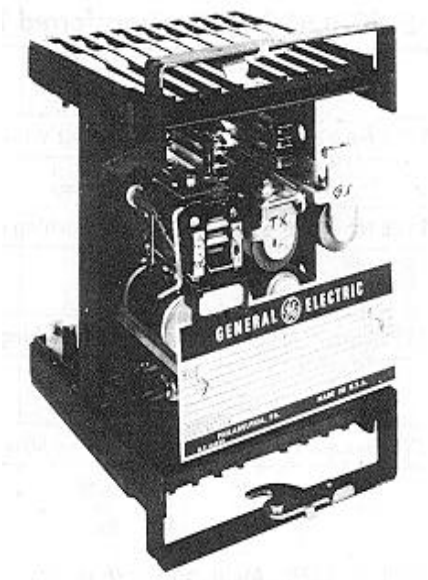
NAA27N — For use in permissive overreaching schemes in conjunction with line relays and other auxiliary devices. Use with Type 51 carrier or audio tone channel. The NAA27N includes the functions of BX, TTY and TTZ. If the circuit to be protected cannot have a power reversal on clearing an external fault, the TTZ function is not needed and studs 1 and 2 should be jumpered together. TTZ pickup time must be specified.

NAA27S — For use in permissive overreaching line schemes where single channel tone equipment with receiver logic module is used. This relay includes three telephone type auxiliary units for the functions of BX, RI and TTZ. Otherwise, similar to the NAA27N. TTZ pick-up time must be specified.

NAA27Y — For use with tone equipment that includes the receiver logic module. The functions included are CX1, CX2 and TX and a target/seal-in unit. One NAA27Y relay is required at each terminal in the scheme.

RATINGS

The telephone relay contacts will make and carry 3 amp continuously or 30 amp dc for tripping duty at control voltages of 250V dc or less. Some of the Type NAA27 relays such as NAA27AA, NAA27AC and NAA27AD have tripping diodes. For such applications these diodes will carry 10 amp continuously or 30 amp for tripping duty and will withstand a maximum of 600V in the reverse direction. The blocking diodes generally have a rating of 600V in the reverse direction and will carry 1 amp in the forward direction.



(Photo 8043136)
Fig. 1. NAA27M auxiliary relay

The interrupting rating of the telephone relay contacts such as "RI" and "BX" are listed in Table 1, below.

Table 1
NAA27 Interrupting Ratings

AC Volts	Amperes	
	Inductive①	Non-Inductive
115	0.75	2.0
230	0.5	1.5
DC Volts		
48	1.0	3.0
125	0.5	1.5
250	0.25	1.0

① Average trip coil.

SELECTION GUIDE- Transferred Tripping Auxiliaries

Device No.	Control Volts DC	Functions Included	Target Seal-in Amp	TTZ TD Pickup Milliseconds	Model Number	Case Size	Approx Wt (Kg) Net	Approx Wt (Kg) Ship
NAA27AA – Dual Channel Direct With Audio Tones or Frequency Shift Carrier								
	48	X1,X2,TX,TSI		—	NAA27AA2A			
94	125	X1,X2,TX,TSI	0.6/2.0		NAA27AA1A	S2	14(6.4)	18(8.2)
NAA27AC – Permissive Overreaching and Single Channel Audio Tones or Frequency Shift Carrier								
	48		(Target	11-21	NAA27AC3A			
94	125	BX,RI	only)	11-21	NAA27AC1A	M2	21(9.6)	27(12.2)
	250	TTZ	0.6/2.0	11-21	NAA27AC2A			
NAA27AD – Permissive Underreaching and Single Channel Audio Tones or Frequency Shift Carrier								
	48		(Target		NAA27AD2A			
94	125	BX,RI	only)	---	NAA27AD1A	M2	20(9.1)	26(11.8)
	250		0.6/2.0		NAA27AD3A			
NAA27H – Direct and Permissive Schemes With Type 51								
	48		0.6/2.0	---	NAA27H17A			
	125	GX,TX	0.6/2.0	---	NAA27H16A			
94	250	RI	0.6/2.0	---	NAA27H15A	S2	13(5.9)	17(7.7)
	125	TSI	0.2/2.0	---	NAA27H19A			
NAA27K – Multi Terminal Auxiliary								
	48		---	---	NAA27K17A			
94	125	GX,TX	---	---	NAA27K16A	S1	12(5.4)	16(7.3)
	250		---	---	NAA27K15A			
NAA27L – Direct Underreaching Auxiliary With Type 51 Channel								
	48	GX,TX		---	NAA27L30A			
94	125	RI,TTY	0.6/2.0	---	NAA27L29A	S2	14(6.4)	18(8.2)
	250	TSI		---	NAA27L28A			
NAA27M – Transformer Differential Auxiliary With Type 51 Channel								
	48		0.6/2.0	---	NAA27M17A			
	125	GX,TX	0.6/2.0	---	NAA27M16A			
94	250	TSI	0.6/2.0	---	NAA27M15A	S2	13(5.9)	17(7.7)
	125		0.2/2.0	---	NAA27M18A			
NAA27N – Permissive Overreaching With Type 51 or Audio Tones								
	48		---	12-25	NAA27N33A			
	125		---	12-25	NAA27N32A			
	250	BX	---	12-25	NAA27N31A			
94	48	TTY	---	20-40 ①	NAA27N36A	S2	13(5.9)	17(7.7)
	125	TTZ	---	20-40	NAA27N35A			
	250		---	20-40	NAA27N34A			
NAA27S – Permissive Overreaching With Audio Tones – When Receiver Logic Module Is Used								
94	125	BX,RI	(Target	11-21	NAA27S1A	S2	13(5.9)	17(7.7)
		TTZ	only) 0.6/2.0					
NAA27Y – Dual Channel Direct With Audio Tones – When Receiver Logic Module Is Used								
		CX1,CX2						
94	125	TX,TSI	0.6/2.0	---	NAA27Y1A	S2	14(6.4)	18(8.2)

① For Type 51 carrier channel.

NAA30A Auxiliary

For Relay Supervision of Manual Synchronising

GE Protective Relays

APPLICATION

Auxiliary For Relay Supervision of Manual Synchronising

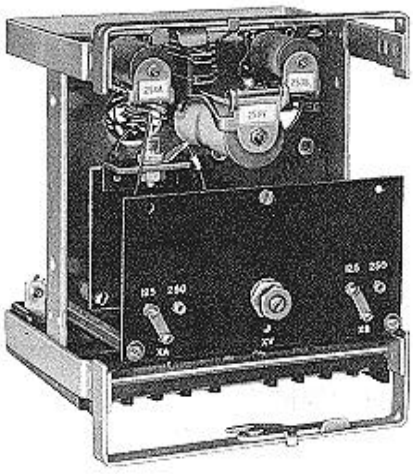
NAA30A—Intended for use with GXS11B synchronising relay to provide supervision of manual synchronising. Included in the NAA30A are three telephone type auxiliary units. This combination will allow the operator to synchronise only if permission is received from the GXS11B indicating the bus and machine voltage have not passed the in-phase condition and the machine is running faster (slower by re-connection) than the system. The three auxiliaries included in the NAA30A are— 25XA, 25XB and 25XV. Figure 2 illustrates the typical external ac connections for the scheme.

RATINGS

The two auxiliary circuits, 25XA and 25XB, are continuously rated at 125 or 250 volts dc. The voltage selection is made with two links (one per unit) located and clearly identified on the front of the relay. The voltage auxiliary, 25XV, is energised from an input transformer (T1) designed to carry 240 volts continuously. Transformer (T1) is connected in the machine and bus PT circuits, each of which are rated 120V. However, since it is the vector difference of these voltages that is applied to (T1), the transformer must be rated for 240V which occurs when the two voltages are 180 degrees apart.

The 25XV input transformer T1, primary winding has a tap which can be connected for a phase to neutral potential transformer connection by reversing the leads on studs 5 and 5A.

The telephone relay contacts will make and carry 30 amperes momentarily and can carry 3 amperes continuously. The interrupting capabilities for each contact is listed in Table 1.



(Photo No. 8041547)
Fig. 1. Type NAA30A Auxiliary Relay

INTERRUPTING RATINGS

Table 1

Volts DC	Interrupt Amps	
	Inductive①	Non-Inductive
125	0.5	1.5
250	0.25	0.75

① Average trip coil.

SELECTION GUIDE

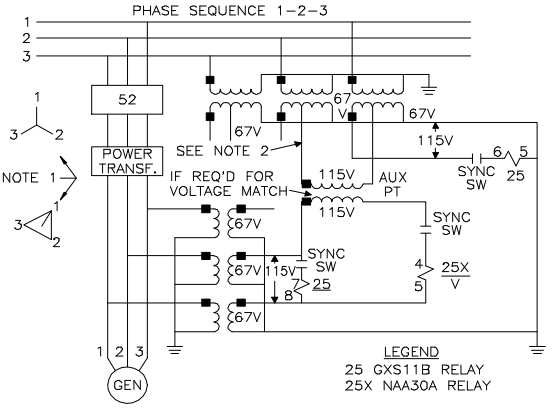
NAA30—120 V AC Auxiliary For GXS11B Manual Synchronising

Frequency HZ	Control Volts DC	Functions Included	② Dropout Range-25XV Volts	Model Number	Case Size	Approx Wt lb/(Kg) Net	Approx Wt lb/(Kg) Ship
60	125/250	25X,	30-70	NAA30A1A	S1	14(6.4)	18(8.2)
50	110/220	25XB,		NAA30A3A			
50	125/250	25XV		NAA30A2A			

②Unless specified otherwise factory setting is 62 volts.

NOTE:

See Section 9 for GXS relays.



NOTE 1 – HIGH SIDE ASSUMED TO LEAD LOW SIDE BY 30° UNDER NORMAL SYNCHRONIZING CONDITIONS THE VOLTAGES SUPPLIED TO THE RELAYS FROM THE BUS & MACHINE PT'S. SHOULD BE NEAR EQUAL.

NOTE 2 – SCHEME AS SHOWN IS FOR CLOSING ON FAST SCOPE FOR CLOSING ON SLOW SCOPE, CONNECT THIS LEAD TO PHASE 3.

(0246A3380 SH. 1–0)

Fig. 2. Typical External Ac Connections for NAA30A and GXS11B to Supervise the Operator When Synchronizing a Generator onto a System, Zero Degree Cut–off.